Volume II

Appendices B through L

to

PROGRAM ENVIRONMENTAL IMPACT REPORT
For the *Plan Santa Barbara* General Plan Update

SCH # 2009011031

City of Santa Barbara
Community Development Department
630 Garden Street
Santa Barbara, California 93101

Prepared by:
AMEC Earth & Environmental, Inc.
Santa Barbara, California 93101

September 2010

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September 2010

APPENDIX B

NOTICE OF PREPARATION AND SCOPING (NOP/NOS)

COMMENTS ON NOP

INDEX TO NOP COMMENTS

Appendix B includes a copy of the Notice of Preparation (NOP) for the *Plan Santa Barbara* EIR, transcripts from the Public Scoping Hearings conducted on the NOP, copies of all comment letters received on the NOP during the public comment period, and an indication (Section or sub-Section) where each individual comment is addressed in the Draft EIR. **Table B-1** lists all comments and shows the comment set identification number for each letter or commenter. **Table B-2** responds to the comments by identifying the location where each individual comment is addressed in the Draft EIR. Comment letters are presented chronologically followed by the transcripts from the Public Hearing.

Table B-1. NOP Commenters and Comment Set Numbers

Agency /Affiliation	Name of Commenter	Date of Comment	NOP Comment Set
Department of Transportation	Chris Shaeffer	12/11/08	1
Governor's Office of Planning & Research	Scott Morgan	1/14/08	2
None	Bruce Burnworth	1/15/09	3
None	Russell Ruiz	1/15/09	4
Hidden Valley Residence Association	Judy Orias	1/16/09	5
Santa Barbara County Local Agency Formation Commission	Bob Braitman	1/16/09	6
County Agricultural Commissioner's Office	William D. Gillette	1/23/09	7
None	June Jones	1/23/09	8
Citizen's Planning Association of Santa Barbara County, Inc.	General Plan Update Committee	1/25/09	9
None	Paula Westbury	1/25/09	10
Native American Heritage Commission	Katy Sanchez	1/26/09	11
None	Jean Holmes	1/27/09	12
None	Brian Fahnestock	1/28/09	13
League of Women Voters of Santa Barbara, Inc.	Cathie McCammon	1/28/09	14
None	Joe Rution	1/29/09	15
Coalition for Community Wellness	Christy Schuerch	1/29/09	16
None	Russell Ruiz	1/29/09	16
None	Dianne Channing	1/29/09	16
None	Mickey Flacks	1/29/09	16
General Plan Update Committee	Naomi Kovaks	1/29/09	16
Comprehensive Planning Committee	Paul Hernadi	1/29/09	16
General Plan Update Committee	Mary Louise Days	1/29/09	16
League of Women Voters of Santa Barbara, Inc.	Connie Hannah	1/29/09	16
Coastal Housing Coalition	Debbie Cox Bulton	1/29/09	16
Allied Homeowners Association	Cathie McCammon	1/29/09	16
Planning Commission	Chair Larson and Commissioners Jostes, Thompson, White, Lodge, Jacobs, Bartlett	1/29/09	16
None	Bruce Burnworth	2/1/09	17
None	Bruce Burnworth	2/2/09	18
None	Edward McGowan	2/3/09	19
None	Tony and Caroline Vassallo	2/5/09	20

Table B-1. NOP Commenters and Comment Set Numbers

Agency /Affiliation	Name of Commenter	Date of Comment	NOP Comment Set
None	Sheila Lodge	2/5/09	21
Citizen's Planning Association of Santa Barbara County, Inc.	Paul Hernadi	2/6/09	22
Bungalow Haven Neighborhood Association	Joe Rution	2/8/09	23
Water Commission	Not signed	2/9/09	24
None	Judy Orias	2/10/09	25
Plan Santa Barbara Outreach Committee	Joe Rution	2/10/09	26
None	Russell Ruiz	2/12/09	27
California Department of Fish & Game	Edmund J. Pert by Helen R. Bern	2/11/09	28
Santa Barbara County Air Pollution Control District (APCD)	Molly Pearson	2/11/09	29
League of Women Voters of Santa Barbara, Inc.	Connie Hannah	2/12/09	30
Allied Neighborhoods Association	Judy Orias	2/12/09	31
Santa Barbara County Association of Governments	Andrew Orfila	2/12/09	32
Santa Barbara Downtown Organization	Government Relations Committee	2/12/09	33
Community Environmental Council	Dave Davis and Megan Birney	2/12/09	34
County of Santa Barbara	John Baker	2/12/09	35
Citizen's Planning Association of Santa Barbara County, Inc.	Naomi Kovaks	2/12/09	36
None	Dall & Associates representing Thomas Felkey	2/12/09	37
City of Santa Barbara Public Works Department	Rebecca Bjork	2/12/09	38
Santa Barbara Trust for Historic Preservation	Craig Makela and Jarrell Jackman	2/12/09	39

Table B-2. EIR Sections Addressing NOP Comments

Comment #	EIR Sections
Comments from Department of Transportation	
1-1	A description of potential impacts on service levels and capacity degradation of SR 154 and SR 192 is presented in Section 16.4 *Transportation.*
1-2	In addition to the *Plan Santa Barbara* policies which would reduce potential transportation impacts, a wide range of mitigation measures is presented in Section 16.8 *Transportation.*
1-3	Potential cumulative transportation impacts of *Plan Santa Barbara* development and UCSB's long-range development are discussed in Section 16.5 Transportation.
1-4	In addition to many proposed policies and programs in *Plan Santa Barbara* which would reduce City-generated traffic on U.S. Hwy 101, additional mitigation measures in Section 16.8 *Transportation* would allow the City to assist in a regionally coordinated effort to manage congestion on U.S. Hwy 101.
1-5	Hydraulic and drainage facilities that pass under U.S. Hwy 101 are considered in the analysis in Section 11.0 *Hydrology and Water Quality*.
1-6	Use of U.S. Hwy 101 for internal City trips is analyzed in the *Plan Santa Barbara* traffic model and is described in Section 16.0 *Transportation*.
1-7	The movement of freight under *Plan Santa Barbara* policies is discussed in Section 16.4 *Transportation.*
Comments from Governor's Office of Planning & Research	
2	*No comments, circulated NOP to State agencies*
Bruce Burnworth	
3-1	The rationale behind the development of the MODA is described in Section 3.3 *Proposed Plan Santa Barbara Project Components*.

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
3-2	Figures showing potential locations of future development provide a representative citywide distribution of growth for purposes of overall impact analysis, and do not represent actual future locations of growth.
3-3	Adoption of a policy designating what development should be allowed within a certain distance of U.S. Hwy 101 is included as a mitigation measure in Section 6.8 *Air Quality*.
Russell Ruiz	
4-1	Comment noted.
4-2	The error has been corrected in subsequent documents.
Hidden Valley Residence Association	
5-1	Potential traffic impacts from development of second units, including potential for the Hidden Valley area, are addressed in Section 16.4 *Transportation.*
Santa Barbara County Local Agency Formation Commission	
6-1	Comment noted.
County Agricultural Commissioner's Office	
7-1	Potential restrictions on ordinance provisions are noted.
June Jones	
8-1	A smoking ban is not being considered as part of the *Plan Santa Barbara* general plan update process.
Citizen's Planning Association of Santa Barbara County, Inc.	
9-1	The daily influx of nonresidents into the City is addressed throughout the EIR as appropriate.
9-2	Monitoring of housing affordability is included in the proposed Adaptive Management Plan, as described in Appendix D.
9-3	The potential impacts of demolition associated with redevelopment of existing structures are addressed throughout the EIR as appropriate.
9-4	Potential impacts of proposed Policy H14 are discussed in Section 8 *Energy* and Section 19 *Population and Jobs-Housing Balance.*
9-5	Potential impacts of increased residential density within the MODA on exposure to degraded air quality are considered in Section 6 *Air Quality*.
9-6	A discussion of archaeological and historical resources within the City and potential impacts of *Plan Santa Barbara* development is presented in Section 10 *Heritage Resources.*
Paula Westbury	
10-1	Comment noted.
Native American Heritage Commission	
11-1	Comment noted; however, because the EIR is analyzing a program rather than a project, the project-specific guidance provided does not apply. Records of existing Native American sites are described in Section 11 *Heritage Resources.*
Jean Holmes	
12-1	Cumulative impacts of *Plan Santa Barbara* are considered throughout the document, and opportunities for regional coordination are highlighted in the resource-specific mitigation measures.
Brian Fahnestock	
13-1	The General Plan addresses future land use issues, and the EIR looks at physical environmental changes, not socioeconomic issues. However, proposed affordable housing policies, and EIR Sections 14 *Public Services*, and Section 20 *Socioeconomic Issues* pertain in part to homeless issues.
13-2	Law enforcement impacts are discussed in Section 14 *Public Services*.
13-3	Existing pedestrian conditions and potential impacts of *Plan Santa Barbara* on pedestrian conditions are described in Section 16 *Transportation*.
13-4	Existing traffic conditions and potential impacts of *Plan Santa Barbara* on traffic conditions are described in Section 16 *Transportation*. In addition, *Plan Santa Barbara* contains several policies aimed at traffic calming and attainment of safe traffic flow to encourage multimodal transportation.
13-5	Existing traffic conditions and potential impacts of *Plan Santa Barbara* on bicycle safety conditions are described in Section 16 *Transportation*. In addition, *Plan Santa Barbara* contains several policies aimed at traffic calming and attainment of safe traffic flow to encourage multimodal transportation.
13-6	The existing noise environment in the Downtown area and potential impacts of *Plan Santa Barbara* policies are discussed in Section 12 *Noise*.

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
13-7	Encouragement of and participation in car sharing programs is included in proposed *Plan Santa Barbara* policies, and further included in mitigation in Section 16.8 *Transportation*.
13-8	The EIR is not required to address socioeconomic issues. However, some analysis was included in Section 20 *Socioeconomic Issues*.
13-9	Flooding and hydrology are discussed in the EIR in Section 11 *Hydrology and Water Quality*. Impacts to flooding from climate change are further discussed in Section 18 *Global Climate Change*.
League of Women Voters of Santa Barbara, Inc. (Cathie McCammon)	
14-1	The baseline conditions for public utilities and energy consumption in the EIR include all usage within the City and do not separate consumption by "transient" visitors from full-time City residents.
14-2	Baseline supplies of resources are described in Section 15 *Public Utilities* and Section 14 *Public Services*, and account for reasonably foreseeable changes to supply.
14-3	Potential technologies for expanding availability of resources, including desalination, are discussed in Section 15 *Public Utilities*. The energy cost of utilizing the desalination facility is estimated in Section 17 *Energy*.
14-4	Information regarding the Adaptive Management Program is included in Section 3.3.2 and in Appendix D.
14-5	Analysis of the expected effects of *Plan Santa Barbara* policies encouraging development along transit corridors and expansion of multimodal transportation is included in Section 16 *Transportation*. While it is difficult to fully predict consumer behavior, it is expected that only a small percentage of trips retail businesses would be redirected outside the City as a result of these policies.
14-6	Multimodal transportation options outside of buses, including vanpools, car sharing services, etc. are included in the analysis of transportation in Section 16 *Transportation*.
14-7	Potential changes in parking requirements are discussed in Section 16 *Transportation*. Infrastructure and incentives for electric cars are discussed in Section 6 *Air Quality*.
14-8	Affordable housing and the jobs-housing balance are discussed in Section 19 *Population and Jobs-Housing Balance.*
14-9	Second units and the potential impacts of encouraging their development are discussed throughout the EIR in the various resource area sections, as appropriate.
14-10	Second units and the potential impacts of encouraging their development are discussed throughout the EIR in the various resource area sections, as appropriate.
Joe Rution	
15-1	The EIR analyzes a conservative estimate of the potential development allowed under *Plan Santa Barbara*, and notes where proposed policies would potentially reduce impact resulting from that development.
Coalition for Community Wellness	
16-1	Such issues are considered in the discussion of development setbacks from U.S. Hwy 101 and other policies and mitigations throughout the document.
Russell Ruiz	
16-2	The EIR does not include water from the desalination facility in the baseline supply. Constraints on water supply from the State Water Project and Gibraltar Reservoir are discussed in Section 15 *Public Utilities*.
Dianne Channing	
16-3	Details regarding the Adaptive Management Program are provided in Appendix D.
Mickey Flacks	
16-4	The analysis of extended range is at a much more qualitative level than the analysis within the *Plan Santa Barbara* planning horizon. Where potential impacts are especially unclear, they are noted in the text.
16-5	The environmentally superior alternative is described in Section 22.2 *Environmentally Superior Alternative*. Some policies from Alternative 2 are also carried over as mitigation measures for *Plan Santa Barbara*, especially in Section 16 *Transportation*.
General Plan Update Committee (Naomi Kovaks)	
16-6	The daytime population of the City is taken into account throughout the document, where applicable.
16-7	The development of benchmarks for the Adaptive Management Program are described in Appendix D, and would include the existing affordable housing supply and jobs-housing balance.
Comprehensive Planning Committee (Paul Hernadi)	
16-8	Potential impacts of increased residential density within the MODA on exposure to degraded air quality are

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
	considered in Section 6 *Air Quality*. Traffic impacts and mitigation measures are discussed in Section 16 *Transportation*.
16-9	Cumulative impacts, including those regarding regional traffic and transit, ocean vessel emissions, etc., are considered throughout the document where appropriate.
General Plan Update Committee (Mary Louise Days)	
16-10	The potential impacts of demolition associated with redevelopment of existing structures is addressed throughout the EIR as appropriate.
16-11	Second units and the potential impacts of encouraging their development are discussed throughout the EIR in the various resource area sections, as appropriate.
League of Women Voters of Santa Barbara, Inc. (Connie Hannah)	
16-12	All of the issues raised are analyzed within the EIR, as appropriate, in the various resource areas.
16-13	Comment noted. Draft Adaptive Management Program is part of the project description analyzed in EIR. See Section 23 *Mitigation Monitoring and Reporting*
Coastal Housing Coalition	
16-14	The Additional Housing Alternative is analyzed in the document in order to identify the impacts from expanding the housing supply. Although the total number of units in *Plan Santa Barbara* is the same as the No Project Alternative, the composition of those units is substantially different, with more multi-family and potentially affordable units under *Plan Santa Barbara*.
16-15	Comment noted.
Allied Homeowners Association	
16-16	The transient "daytime" population of the City is considered in analysis throughout the document, as appropriate. Data regarding usage of public service and utilities includes all usage within the City, thus capturing this population.
16-17	Details regarding the Adaptive Management Program are provided in Appendix D.
16-18	An economic analysis of *Plan Santa Barbara*, most notably the required densities and prices of potential units, was conducted separately from this EIR.
Planning Commission	
16-19	The EIR contains detailed analysis of water, wastewater and solid waste in Section 15 *Public Utilities*, and transportation in Section 16 *Transportation*.
16-20	The desalination plant is not included in the baseline water supply.
16-21	Comment noted. Draft Adaptive Management Program is part of the project description analyzed in EIR. See Section 23 *Mitigation Monitoring and Reporting*
16-22	Comment noted. Draft Adaptive Management Program is part of the project description analyzed in EIR. See Section 23 *Mitigation Monitoring and Reporting*
16-23	Details regarding the Adaptive Management Program are provided in Appendix D. Where possible, the ways in which proposed mitigation measures would interact with the Adaptive Management Program have been specified throughout the document.
16-24	The analysis of extended range is at a much more qualitative level than the analysis within the *Plan Santa Barbara* planning horizon. Where potential impacts are especially unclear, they are noted in the text.
16-25	The EIR scope has been limited to the resource areas of most concern to regulators and the general public. Proposed policies from alternatives, most notably the Additional Housing Alternative, have been applied as mitigation to the Proposed Project.
16-26	Where possible, proposed elements of alternatives have been introduced as mitigation measures for *Plan Santa Barbara.*
16-27	Full build out under each Alternative is the condition which is analyzed throughout the EIR.
16-28	Impacts on demand for public services such as police services are addressed in Section 14 *Public Services*.
16-29	The transient "daytime" population of the City is considered in analysis throughout the document, as appropriate.
16-30	The renting population is considered and impacts addressed in Section 19 *Population and Jobs-Housing Balance.*
16-31	Impacts of *Plan Santa Barbara* on commuting and potential mitigation is included in Section 16 *Transportation.*

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
16-32	The EIR identifies an assumed amount of growth within the sphere which is consistent for all the alternatives.
16-33	The size and shape of the MODA was refined during the preparation of the *Plan Santa Barbara* project description. It was intended to represent that area with the best combination of pedestrian friendliness and accessible transit.
16-34	The extended range element has been retained as it is useful for certain resource areas (e.g., climate change); however, analysis is kept at a relatively qualitative level.
16-35	For the purposes of generating a conservative estimate, per unit resource use of future construction is assumed to be the same as existing, with separate consumption rates for single-family and multi-family dwellings. Trip generation is addressed in Section 16 *Transportation*.
16-36	Community educational facilities are included in Section 14 *Public Services*.
16-37	Increased density allowances are included in the proposed policies under *Plan Santa Barbara* and alternatives.
16-38	Comment noted.
16-39	Comment noted.
Bruce Burnworth	
17-1	The EIR scope did not include measurement of air quality; analysis regarding U.S. Hwy 101 setback is based on other measurements taken, modeling of local conditions, and State guidance. Refer to Section 6.0 *Air Quality* and Appendix D.
17-2	The air quality analysis focuses on all criteria pollutants regulated by the SCAQMD, including particulate matter.
17-3	Exposure to air pollution is analyzed in Section 6 *Air Quality.*
17-4	Mitigation measures to reduce exposure to degraded air quality are described in Section 6.8 *Air Quality*.
Bruce Burnworth	
18-1	Comment noted.
18-2	Comment noted.
Edward McGowan	
19-1	The potential for dispersion of infectious agents through aerosol drift is discussed in Section 11.0 *Hydrology and Water Quality*.
19-2	Section 11.0 *Hydrology and Water Quality* includes a discussion of how polluted runoff can affect fish development.
19-3	Sea water intrusion is addressed in Section 11 *Hydrology and Water Quality*, and water supply is addressed in Section 15 *Public Utilities*.
19-4	The potential for health impacts from expansion of the recycled water program in the City are discussed in Section 11 *Hydrology and Water Quality.*
19-5	The potential use of new technology to increase the quality and quantity of output from El Estero is not considered as a part of *Plan Santa Barbara.*
19-6	Sea water intrusion is addressed in Section 11 *Hydrology and Water Quality*, and water supply is addressed in Section 15 *Public Utilities*.
19-7	Contamination of restroom surfaces through aerosol dispersion following toilet flushing is not considered by the City to be an issue; however, the potential for health impacts resulting from general aerosol drift of irrigation systems is discussed in Section 11.0 *Hydrology and Water Quality*.
19-8	The EIR discusses the possibility of pre-digestion use of sewage solids as mitigation in Section 17.0, *Energy*.
19-9	The EIR discusses the possibility of pre-digestion use of sewage solids as mitigation in Section 17.0, *Energy*.
19-10	The potential growth inducing impacts of expanding the recycled water program are discussed in Section 21, *Population and Jobs-Housing Balance*.
19-11	The potential for dispersion of infectious agents through recycled water is discussed in Section 11.0 Hydrology and Water Quality.
19-12	The potential for increases in drug-resistant pathogens in the water treatment input and effluent is discussed in Section 12.0 Hydrology and Water Quality.
Tony and Caroline Vassallo	
20-1	The development of Specific Neighborhood Plans is a key component of *Plan Santa Barbara*, which

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
	includes "Sustainable Neighborhood Plans".
20-2	Development at specific sites within the City would be reviewed on a case-by-case basis and are not analyzed in this document.
20-3	Police services are analyzed in this document in Section 14.0, *Public Services*.
20-4	Comment noted; such a plan could be included in a Sustainable Neighborhood Plan.
20-5	The location of cannabis dispensaries is not an issue analyzed in this document.
20-6	Encouragement of private and public gardening and development of more farmer's markets are components of *Plan Santa Barbara (Policies LG10, LG15, LG18, etc.)*.
20-7	Significant architectural and historic resources in the City are analyzed in Section 10.0 *Heritage Resources*.
20-8	Traffic flow and traffic calming are potential components of an SNP.
Sheila Lodge	
21-1	The urban forest is included in discussion of aesthetics (Section 13 *Open Space and Visual Resources*) and climate change (Section 18 *Global Climate Change*). It is also addressed Section 7 *Biological Resources*, and by proposed policies.
Citizen's Planning Association of Santa Barbara County, Inc.	
22-1	No quantitative data exist for mid-block congestion in the City, and it is not a phenomenon for which an established measurement protocol exists. Therefore, discussion of mid-block congestion in Section 16.0, *Transportation* and the Transportation Appendix includes only qualitative information.
22-2	The methodology for ADT and LOS are described in the Transportation Appendix.
22-3	The EIR includes discussion of potential health impacts from locating development in dense areas in Section 6.0 *Air Quality*.
22-4	No quantitative data exist for mid-block congestion in the City, and it is not a phenomenon for which an established measurement protocol exists. Therefore, discussion of mid-block congestion in Section 16.0, *Transportation* includes only qualitative information.
22-5	Section 16.0 *Transportation* includes a discussion of the Upper State Street Study and its conclusions and includes the traffic count for Upper State Street west of Las Positas that was included in that Study.
Bungalow Haven Neighborhood Association (Joe Rution)	
23-1	Section 3 *Project Description* identifies proposed rezonings.
Water Commission	
24-1	Comment noted.
24-2	Near- and long-term water supplies are considered in Section 15.0, *Public Utilities*.
24-3	The potential future supplies from the State Water Project are considered in Section 15.0, *Public Utilities*.
24-4	Potable water production from the Desalination Facility is not included in the baseline for water supply.
Judy Orias	
25-1	The EIR evaluated Plan Santa Barbara policies for second units, and alternative policies in the Lower Growth and Additional Housing alternatives.
25-2	The areas designated as being potentially suitable for 2nd units have been revised.
25-3	Comment noted; the lack of services in the Hidden Valley area would result in greater trip generation should development occur there. This is noted in Section 16.0 *Transportation*.
25-4	The potential for increased commuting as a result of fewer single-family houses being constructed is discussed in Section 16.0 *Transportation*.
Plan Santa Barbara Outreach Committee (Joe Rution)	
26-1	The "workforce-generating" effect of new housing is addressed in Section 19 *Population and Jobs-Housing Balance*.
Russell Ruiz	
27-1	Potable water production from the Desalination Facility is not included in the baseline for water supply.
27-2	The potable water used in recycled water production is discussed in Section 15 *Public Utilities*.
27-3	Where applicable, extension of water service is discussed in Section 15 *Public Utilities*.
California Department of Fish & Game	
28-1	An assessment of flora and fauna in the City is included in Section 7.0 *Biological Resources*.
28-2	Cumulative impacts to biological resources are discussed in Section 7.5 *Biological Resources*.

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
28-3	Mitigation measures for potential impacts to biological resources are discussed in Section 7.8 *Biological Resources.*
28-4	Alternatives are analyzed for their impacts to biological resources in Section 7.6 *Biological Resources.*
28-5	The proposed project is not a specific development project but rather an update to the City's General Plan; therefore, no CESA permit is required.
28-6	Potential impacts to wetlands are discussed in Section 7.0 *Biological Resources.*
Santa Barbara County Air Pollution Control District (APCD)	
29-1	Comment noted.
29-2	Section 6.0 *Air Quality* compares the proposed project to the 2007 CAP to identify conflicts.
29-3	Section 6.0 *Air Quality* identifies potential conflicts between areas of higher emissions and sensitive receptors.
29-4	Section 6.0 *Air Quality* quantifies emissions associated with the proposed project and compares them to APCD thresholds.
29-5	The air quality analysis is based on a project-specific traffic analysis.
29-6	Section 6.0 *Air Quality* includes quantification of emissions from construction vehicles and fugitive dust.
29-7	Potential impacts related to asbestos are discussed in Section 9.0 *Hazards*.
29-8	Global climate change and GHG emissions are addressed in Section 18.0 *Global Climate Change*.
29-9	*Plan Santa Barbara* includes a robust suite of measures to increase access to and use of alternative transportation, and the EIR includes several alternatives and mitigation measures that further address this issue.
League of Women Voters of Santa Barbara, Inc. (Connie Hannah)	
30-1	Comment noted. The document uses the most recent figures available to construct an accurate baseline.
30-2	The EIR does not include potential supplies from the desalination facility in the potable water supply baseline.
30-3	The expansion of the recycled water system is analyzed in Section 15.0 *Public Utilities*.
30-4	The capacity of the existing solid waste facility at Tajiguas is discussed in Section 15.0 *Public Utilities*.
30-5	Recreational opportunities in the City and potential need for new recreational facilities are discussed in Section 14.0 *Public Services.*
30-6	Provision of more public parks (especially small "pocket parks") and open space areas in the Downtown area is proposed as mitigation in Section 14.9, *Public Services*.
30-7	Funding for alternative transportation is discussed as part of Plan Santa Barbara and as mitigation in Section 16.0 *Transportation*. Creating parking maxima for downtown developments are also discussed in Section 16.0 *Transportation.*
30-8	The potential health impacts of locating additional development Downtown is addressed in Section 6.0 *Air Quality.*
30-9	Growth inducement and "living within our resources" are addressed throughout the document, as appropriate, and in Section19 *Population and Jobs/Housing Balance*.
30-10	Comment noted.
30-11	Comment noted.
30-12	Policy consistency is addressed throughout the document, as appropriate.
Allied Neighborhoods Association	
31-1	The unique characteristics that affect planning in the City are described throughout the EIR as appropriate.
31-2	Changes to policies and existing policies that would remain under *Plan Santa Barbara* are described throughout the EIR as appropriate.
31-3	Potential impacts to heritage resources, aesthetics, and community character are assessed in Sections 10 *Heritage Resources* and 13 *Open Space and Visual Resources.*
31-4	Consistency with the City's goals for sustainability and "living within our resources" is addressed throughout the EIR.
31-5	Policy consistency is addressed throughout the document as appropriate.
31-6	Annexation is not proposed as part of *Plan Santa Barbara* but is considered in the cumulative analysis throughout the document.

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
31-7	Housing supply and affordability is considered in Section 19 *Population and Jobs/Housing Balance.*
31-8	Where increased public transit is proposed as part of *Plan Santa Barbara* or mitigation measures, existing and potential future funding sources are identified.
31-9	Potential funding sources for each proposed Mitigation Measure are identified in Section 23 *Mitigation Monitoring and Reporting*.
31-10	Ways in which the Adaptive Management Program would interact with Plan Santa Barbara policies and proposed Mitigation Measures are described throughout the EIR.
31-11	Potential issues associated with mixed-use development are described throughout the EIR as appropriate.
31-12	Regional planning needs are identified and addressed throughout the EIR.
31-13	Desalination is not included as part of the water supply in the EIR, and the drought buffer is discussed in Section 15 *Public Utilities*.
31-14	Potential for growth inducement is discussed in Section 19 *Population and Jobs/Housing Balance.*
31-15	Potential needs for recreation facilities are described in Section 14 *Public Services.*
31-16	The additional development in the MODA allowed by TDR has been accounted for in the development assumptions and is analyzed throughout the EIR as appropriate.
Santa Barbara County Association of Governments	
32-1	The City LOS and regional CMP thresholds are discussed in Section 16.0 *Transportation.*
32-2	Comment noted.
32-3	Comment noted; Airport policies and regulations are discussed in Section 9 *Hazards*.
32-4	Comment noted; the document discusses potential conflicts between the airport and the City of Goleta in Section 9 *Hazards.*
32-5	The most recent airport noise contours have been included in Section 12.0 *Noise*.
Santa Barbara Downtown Organization	
33-1	Comment noted.
33-2	Comment noted.
33-3	Potential funding sources for affordable housing and alternative transportation are discussed in Sections 19.0 *Population and Jobs-Housing Balance* and 16.0 *Transportation*, respectively.
33-4	Potential aesthetic impacts are analyzed in Section 13.0 *Open Space and Visual Resources*, and water supply constraints are discussed in Section 15.0 *Public Utilities*.
33-5	Comment noted; however, the scope for *Plan Santa Barbara* does not include a census of Downtown employees. Specific locations for workforce housing would be decided on a case-by-case basis.
Community Environmental Council	
34-1	Existing and potential future energy consumption is discussed in detail in Section 17.0 *Energy*.
34-2	Global climate change and the City's existing and potential future GHG emissions are analyzed in Section 18.0 *Global Climate Change*.
34-3	Transportation and its connection to the jobs-housing balance are addressed in Sections 16.0 *Transportation* and 19.0 *Population and Jobs-Housing Balance.*
34-4	Comment noted.
34-5	Comment noted. Potential impacts related to climate change are discussed throughout the document, as appropriate, and are summarized in Section 18.0 *Global Climate Change.*
County of Santa Barbara	
35-1	Comment noted. Population, employment and housing are examined in detail in 19.0 *Population and Jobs-Housing Balance.*
Citizen's Planning Association of Santa Barbara County, Inc.	
36-1	The daytime population of the City is taken into account throughout the document, where applicable.
36-2	Monitoring of housing affordability is included in the proposed Adaptive Management Plan.
36-3	The EIR does not include water from the desalination facility in the baseline supply.
36-4	The potential impacts of demolition are addressed throughout the EIR as appropriate.
36-5	Second units and the potential impacts of encouraging their development are discussed throughout the EIR in the various resource area sections, as appropriate.
36-6	Potential impacts of increased residential density within the MODA on exposure to degraded air quality are

Table B-2. EIR Sections Addressing NOP Comments	
Comment #	**EIR Sections**
	considered in Section 6 *Air Quality*.
36-7	Cumulative impacts to transportation within the City are addressed in Section 16.0 *Transportation* and include the results of a project-specific traffic study.
36-8	Cumulative impacts to transportation within the City are addressed in Section 16.0 *Transportation* and include the results of a project-specific traffic study.
36-9	Comment noted.
36-10	Potential impacts to archaeological and historic resources are analyzed in Section 10.0 *Heritage Resources.*
Dall & Associates representing Thomas Felkey	
37-1	Existing and potential future effects of stormwater discharge on coastal water quality are addressed in Section 11.0 *Hydrology and Water Quality.*
37-2	Geological constraints are discussed in Section 8.0 *Geological Conditions.*
37-3	Viewsheds are described and analyzed in Section 13.0 *Open Space and Visual Resources.*
37-4	Comment noted; however, the General Plan does not include this level of detail.
37-5	Geology is discussed in Section 8.0 *Geological Conditions.*
37-6	Comment noted; however, detailed elevations are not relevant to the figures included in this document.
37-7	The EIR evaluates *Plan Santa Barbara* policies.
37-8	See Section 3 *Project Description.*
37-9	Consistency with the LCP is addressed throughout the document, as appropriate.
37-10	Comment noted.
City of Santa Barbara Public Works Department	
38-1	Comment noted; however, water from the desalination facility is not included as part of the baseline water supply in this EIR.
38-2	Section 15.0 *Public Utilities* includes a thorough discussion of the City's water supply, including potential supplies from the desalination facility.
Santa Barbara Trust for Historic Preservation	
39-1	Comment noted, the term "heritage resources" has been chosen to reflect all historic, archaeological, and paleontological resources.
39-2	Comment noted; however, specific project objectives are not included in the table of contents.
39-3	Potential impacts on archaeological and historic resources are discussed in Section 10.0 *Heritage Resources*, and to a limited extent in other resource area sections.
39-4	Comment noted; the analysis of archaeological resources in Section 10.0 *Heritage Resources* in inclusive of all such resources in the City and vicinity.

APPENDIX C

PLAN SANTA BARBARA POLICY PREFERENCES REPORT, JANUARY 2009

Plan Santa Barbara
LIVING WITHIN OUR RESOURCES

General Plan Update:
Draft Policy Preferences

Plan Santa Barbara

"In our way of life, in our government, with every decision we make, we always keep in mind the Seventh Generation to come. It's our job to see that the people coming ahead, the generations still unborn, have a world no worse than ours – and hopefully better. When we walk upon Mother Earth we always plant our feet carefully because we know the faces of our future generations are looking up at us from beneath the ground. We never forget them."

– OREN LYONS (Onondaga), 1990

City Council Direction
JANUARY, 2009

Plan Santa Barbara

GENERAL PLAN UPDATE:
DRAFT POLICY PREFERENCES
CITY COUNCIL DIRECTION

JANUARY, 2009

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Many thanks to the individuals and community groups who participated in the workshops and grassroots meetings, and who submitted thoughtful comments.

table of contents

FORWARD **1**

INTRODUCTION **7**

PLAN SANTA BARBARA PURPOSE AND NEED 7

HISTORY, TRENDS AND POLICY DRIVERS **9**

HISTORY OF THE GENERAL PLAN SINCE 1964 9

CONDITIONS, TRENDS AND ISSUES 11

POLICY DRIVERS 12

SUSTAINABILITY FRAMEWORK **17**

SANTA BARBARA AS A SUSTAINABLE COMMUNITY 17

A VISION OF A SUSTAINABLE SANTA BARBARA 18

SUSTAINABILITY PRINCIPLES 19

SUSTAINABILTIY AND RESOURCE CAPACITY 20

SUSTAINABILITY FRAMEWORK 21

ADAPTIVE MANAGEMENT PROGRAM 25

LAND USE AND GROWTH MANAGEMENT **27**

GROWTH MANAGEMENT 28

LAND USE 29

NEIGHBORHOODS 32

PARKS, RECREATION, TRAILS AND OPEN SPACE 33

SCENIC HIGHWAYS 33

ECONOMY AND FISCAL HEALTH **35**

LOCAL ECONOMY 36

REGIONAL ECONOMY 38

…table of contents cont'd.

ENVIRONMENTAL RESOURCES **39**
CLIMATE CHANGE 40
ENERGY CONSERVATION 41
AIR QUALITY 43
BIOLOGICAL RESOURCES 44
HYDROLOGY, WATER QUALITY AND FLOODING 45
FOOD AND AGRICULTURE 46
NOISE 47
AESTHETICS AND VISUAL RESOURCES 48
HISTORIC RESOURCES AND COMMUNITY DESIGN **49**
HISTORIC AND CULTURAL RESOURCES 50
COMMUNITY DESIGN 51
HOUSING **53**
CIRCULATION **57**
CIRCULATION 58
PARKING 59
DEVELOPMENT 60
PUBLIC SERVICES AND SAFETY **61**
WATER AND SEWER 62
WASTE MANAGEMENT, RECYCLING AND DISPOSAL 63
EMERGENCY PREPAREDNESS 63

Forward

The purpose of this document is to set forth the sustainability framework and policy direction for updating the General Plan. Sustainability is defined in the Introduction and integrated with each element through the Sustainability Principles. The proposed new or amended goals and policies contained in this document are intended to further Santa Barbara as a more sustainable community.

During this Phase II, the *Plan Santa Barbara* process will have established an overarching sustainability framework, draft goals, policies and objectives, and a draft land use map. Following Council direction, all of these components will then be subject to environmental review, which will include an assessment of existing growth policies. (*See Figure 1, Plan SB Process Phase II 2008.*)

During the upcoming Phase III, the Land Use Element and associated Land Use map, as well as the Housing Element, will be prepared, reviewed, and adopted; the EIR will be prepared, reviewed, and certified, and an Adaptive Management program will be developed. The new or amended *Plan Santa Barbara* goals and policies that will eventually reside in other General Plan elements will also be adopted. (*See Figure 2, Plan SB Process Phase III 2009/2010.*)

The existing goals and policies that are not superseded by *Plan Santa Barbara* will remain valid until they are reviewed for consistency with the Sustainability Principles, updated, and formally adopted by the City Council as part of future element updates.

This document begins to address the eventual reorganization of the General Plan elements to better fit the *Plan Santa Barbara* sustainability framework. California planning law allows for the reorganization of the required seven elements (land use, housing, circulation, conservation, open space, noise and safety) and the ability to add optional elements. For example, the current General Plan contains an optional Parks and Recreational Element (that resides within the Land Use element).

The proposed *Plan Santa Barbara* framework would both combine required elements (i.e., Conservation and Open Space) and add new optional elements (i.e., Economic & Fiscal Health and Historic Resources & Community Design). As staff continues to work with our consultants and the Planning Commission to further review how best to integrate the existing goals and policies with the *Plan Santa Barbara* sustainability framework, the organization and consolidation of the elements into one document will likely entail further adjustments.

Finally, a word on the role of the objectives. On the recommendation of the Planning Commission, staff has included dual purpose objectives for each of the elements. The first purpose is to help define the end state for achieving the goals, and the second is to set a tangible benchmark that can be measured using community indicators. An Adaptive Management program will require careful consideration in the selection of indicators to measure policy effectiveness.

Similarly, the objectives will need to be carefully considered and closely linked to the indicators. Thus, the objectives set forth in this document are a starting point that will certainly be adjusted as the community indicators are identified and the Adaptive Management program is developed.

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Figure 1

Plan SB Process Phase II 2008

Sustainability Framework

Existing General Plan Goals & Policies

- Land Use
- Open Space
- Parks & Recreation
- Scenic Highways
- Conservation
- Housing
- Circulation
- Noise
- Seismic Safety & Safety

PlanSB Draft Goals & Policies

- Land Use & Growth Management
- Economy & Fiscal Health
- Environmental Resources
- Historic Resources & Community Design
- Housing
- Circulation
- Public Services & Safety

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Figure 2

Plan SB Process Phase III 2009/2010

Sustainability Framework

Land Use & Growth Management Element

Economic & Fiscal Health Element

Environmental Resources Element

Historic Resources & Community Design Element

Housing Element

Circulation Element

Public Services & Safety Element

Adaptive Management Program

Final Envirnomental Impact Report (EIR)

LEGEND

Completed Elements

Phase IV

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Introduction

PLAN SANTA BARBARA PURPOSE AND NEED

From adoption of "Living within Our Resources" as a central mission statement, the people of Santa Barbara have affirmed the importance of sustainability for the City's continued sense of place and quality of life. While we have succeeded in creating a high quality built environment with great public spaces, marketplace forces continue to outprice many Santa Barbaran's ability to live and work in town. Few affordable housing options exist for the socio-economic needs of our diverse community, risking the very character we strive to retain.

High energy prices and global unrest are adding a new dimension of economic complexity and uncertainty to people's life choices about where to live and work. Affordable transportation is now a major issue. Much of Santa Barbara's workforce, economically displaced to live in outlying communities, now faces high commute costs, threatening business and service industries that keep our community running.

Climate change issues could forever alter our pattern of living, how we do business, and how we view local resources. These challenges are influencing how we get our energy, food and water. We will no longer be able to rely solely on fossil fuels for travel and household needs. Increasing food distribution costs urges us to retain and expand local food sources. Global weather and temperature changes could impact our region's water supply, compelling us to pursue new conservation and supply options.

The City's infrastructure is maintained by a fragile network of funding mechanisms. The current funding structure covers only the minimum in maintenance and limits our ability to fund solutions to existing and future challenges. Moving forward with a vision of sustainability will require creative financing and unwavering political will.

In order for us to successfully address the issues that challenge our ways of life and those of future generations, Santa Barbara will need to become a more sustainable community. The purpose of this updated General Plan Framework is to adjust our current course to become more holistically sustainable, at a local, regional and global level. For Santa Barbara, sustainability is to blend and balance protecting and enhancing our natural and built environments, social equity, and economic vitality, which together form the character of our community.

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History, Trends and Policy Drivers

HISTORY OF THE GENERAL PLAN SINCE 1964

The City's first General Plan was adopted on July 28, 1964. The General Plan reflected the build-out potential under the existing zoning: in excess of 100 million square feet of nonresidential development and a potential residential population of between 140,000 and 170,000.

Following adoption of the General Plan, community concern began to grow regarding the effects that amount of build-out could have on the community and the ability of the City to provide resources to support that amount of development. This concern for the quality of life in Santa Barbara and its relation to resource limits resulted in the 1974 Impacts of Growth Study. The study called for residential and commercial down-zoning and aggressive affordable housing programs.

In response to the study, the City adopted amendments to both the General Plan and Zoning Ordinance which resulted in the 1975 residential down-zoning which reduced densities in residential areas and also identified a population goal of 85,000. However, no commercial down-zoning occurred. The 1975 down-zoning was the initial step towards a concept which has come to be knows as "living within resources." The concept of "living within resources" calls for a population build out level consistent with the City's water supply, traffic and parking capacity, sewage treatment capacity, air quality, etc., which maintains the high "quality of life" that Santa Barbara presently enjoys.

In 1977, due to concerns with increasing population, a two part advisory measure was put on the ballot to give Council the opinion of the voters regarding the down-zoning. The ballot asked the community if they supported efforts to limit population to 85,000 and if voter approval should be required for changes that would increase the population. The community voted affirmative to both, and the Council upheld the 1975 down-zoning.

In 1982 the City Council established a Charter Committee to incorporate the 85,000 population goal into the City Charter. It was determined that a population goal was too specific and legally could not be incorporated into the Charter. The result of the Charter Committee's discussions was a ballot measure, Measure K, which proposed a Charter Amendment mandating that "land development shall not exceed its public services and physical and natural resources…All land use policies shall provide for a level and balance of residential and commercial development which will effectively utilize, but will not exhaust, the City's resources in the foreseeable future..." Measure K was approved by 60% of the votes and incorporated into the City Charter as Section 1507.

In 1982, technical studies for the General Plan Update (GPU) were initiated. The GPU Public Participation Process began in 1988.

In 1989, the City Council placed the non-residential growth limitation amendment before the voters as ballot Measure E, which was approved by 55% of the voters. Measure E was incorporated into the City Charter as Section 1508, limiting non-residential growth to three million square feet until 2010.

In 1990, the Council adopted amendment to the General Plan and Zoning Ordinance which:

- Reduced commercial development potential;
- Recognized residential needs as the highest priority;
- Limited residential development based on the 1985 Master Water Plan which assumed 40,005 dwelling units;
- Established mixed-use development as a high priority implementation strategy to provide additional dwelling units;
- Determined that the transitional areas must be studied and plans prepared to preserve existing dwelling units; and
- Established high-density residential in the downtown area as a high priority implementation strategy to provide additional dwelling units.

In 1995, the Housing Element was amended with a special emphasis on multi-family housing in and around the downtown employment center and incentives for mixed use development. The Housing Element goals were supported and substantiated with the 1998 update of the City's Circulation Element. The emphasis of the Circulation Element Update was on alternative modes of transportation.

Concurrent with the adoption of the 1995 Housing Element, the City Council also amended the Land Use Element to incorporate the discussion regarding the theoretical maximum residential build-out of 40,000 residential units.

In 2005, the City Council initiated the *Plan Santa Barbara* process with an affirmation and update of the 1988 General Plan Update Goals.

While there have been significant amendments, the city's General Plan has never been comprehensively updated since 1964.

This history section to be supplemented/expanded in the updated General Plan document.

CONDITIONS, TRENDS AND ISSUES

In September 2005, the *Conditions, Trends and Issues* (CTI) report was produced as the first document for the *Plan Santa Barbara* process and was designed to: 1) describe City resources, public services and facilities (14 reports in total); 2) highlight trends, policy conflicts or constraints; and 3) identify questions for discussion during the public participation phase.

The CTI document achieved these objectives as the process moved from initial public participation in Phase I into policy development in Phase II, and will continue to prove valuable into Phase III. On a technical level, the CTI will be used in the "background and setting" section of the Environmental Impact Report, and as a starting point to develop community indicators as part of the Adaptive Management Program.

In regards to policy development, the key land uses issues posited in the CTI Executive Summary have endured through this process and, to a large degree, have evolved into the core "policy drivers" that have shaped the policy preferences in this document. The issues, taken directly from the CTI, are as follows:

- How to reconcile the need for housing as articulated by the 2004 Housing Element with the constraints of our street and circulation system without degrading neighborhoods and quality of life.
- How to locate development and encourage redevelopment in a manner that takes advantage of transit and other transportation alternatives.
- What are appropriate development standards for residential development in commercial zones given that the majority of *new housing* is being built Downtown and along commercial corridors.
- How to provide additional parks, open space and public service needs in those areas of the city most likely to accommodate future residential development.

Further, as one looks at the themes and inter-relationships also identified in the CTI Executive Summary, one has a fairly comprehensive understanding of the issues or "policy drivers" that have evolved through this process to date. These themes and inter-relationships include:

- The need to review the Charter Section 1507 growth management assumptions;
- The socio-economic impact of the types of housing that are being built today;
- Environmental stewardship and sustainable development; and
- The need to adequately fund capital and service needs.

Considering the CTI issues, themes, and inter-relationships within the context of the last 18 years is helpful to anticipate the implications for the next 20 years. As *Plan Santa Barbara* has progressed since 2005, these implications have only been sharpened as a result of public input and the recent turn of events related to fossil fuel consumption, climate change, and the recent global economic upheaval. The following discussion is essentially a reflection of how the CTI report issues identified early on in the process have evolved into the broader, inter-related themes identified here as "Policy Drivers."

POLICY DRIVERS

In considering the recent trends and challenges facing Santa Barbara, the *Plan Santa Barbara* process has focused on several key issues that have gained importance as the planning process has evolved. These issues and implications also reflect comments and concerns about growth expressed by residents and community interest groups that participated in the 2007 *Plan Santa Barbara* outreach and workshop process. They are issues that have continued to inform the community dialogue about reassessing existing City land use and growth management policies, with the objective of determining which policies should be reaffirmed, which policies amended, and what new policies are required. Balancing among competing policy objectives is a key challenge in this effort.

These issues are referred to in this document as "policy drivers" because they often underlie a number of key policy questions demanding an integrated response. The following discussion also identifies some of the possible implications of future growth and development if the City made no changes to its current growth management policies, and the development trends since 1990 continued to the year 2030. Equally important, these policy drivers and implications are addressed thematically in the proposed Sustainability Principles, as well as through specific yet correlative goals and policies found throughout the several General Plan Elements. The five key policy drivers that have been identified in the *Plan Santa Barbara* process are as follows:

- Growth Management
- Energy & Climate Change
- Economic & Fiscal Health
- Historic & Community Character
- Public Health

Growth Management (Charter Section 1508 sunsets in 2010)

Current policies were developed to control growth, particularly non-residential development, in part due to concerns over resource limitations, and in part to try to correct an imbalance between jobs and affordable housing available in the City. City Charter Section 1508 ("Measure E") has been effective in limiting net new non-residential growth, as well as encouraging infill development and the redevelopment of existing structures.

Non-residential development will continue to be limited and, for the next increment of non-residential growth, expected to be between 2.0 to 2.2 million square feet, the key questions are: what types of non-residential land uses should be encouraged, particularly Community Benefit uses, and where should these land uses be encouraged to locate?

On the other side of the equation, the City affordable housing programs and policies have successfully produced a significant amount of affordable housing in an area with very high land values. From 1990 to 2007, 698 units of affordable housing have been built or are under construction, with additional units approved or with applications pending (includes both City and private projects). Approximately 12% of the City's housing stock is permanently affordable.

However, continuing increases in land values and the cost of housing have resulted in most new market-rate housing being unaffordable to the work force. Further, one of the unforeseen consequences of limiting non-residential projects under Section 1508 and encouraging mixed-use development has been the proliferation of large condominiums. Some potential implications of continuing current housing trends include:

- Continued development of large condominiums and loss of sense of community due to more absentee property owners.
- Additional residents and workers relocating out of town due to escalating housing costs, particularly critical workers such as fire, police, health and education.
- Decreased socio-economic diversity.
- Worsening jobs/housing imbalance due to continuing job growth without sufficient affordable housing.
- Displacement and loss of existing affordable and rental housing.
- Increasing incidence of overcrowding and illegal dwellings.

Energy & Climate Change

Like the nation, state and region, Santa Barbara has developed an increased dependence on fossil fuels for a multitude of necessities and pleasures. As fossil fuels become scarce, the consequences will touch many aspects of our lives including: mobility restrictions, economic development, food production and climate changes (fires, flooding, sea level rise), some of which could be potentially severe. Shifting Santa Barbara's economy to one less dependant on fossil fuels and inclusive of more "green businesses" will require conscientious planning and political will. Beyond how Santa Barbara chooses to address these issues as a community, state law now requires specific planning responses as outlined in recent legislation.[1]

[1] E.g., AB32, The California Global Warming Solutions Act of 2006; and SB375, a legislative act of 2008 regarding: transportation planning, travel demand models, sustainable communities, and environmental review.

Single occupant, fossil fuel dependant transportation is the main determinant influencing fossil fuel consumption, regional and local land use development patterns, economic development, air quality, and global climate impacts. Failure to address the role of the automobile over the next 20 years will extend well beyond increasing congestion levels at local freeway interchanges. Transportation implications of future growth may include the following:

- The City's continuing position as a regional employment, commercial, educational, institutional, cultural, and recreational center could attract added regional trips contributing to congestion at freeway interchanges and City streets serving them.
- Additional job creation in the City without sufficient affordable housing would result in more commuters, freeway and freeway interchange congestion, as well as potential traffic effects in the jurisdictions housing workers.
- The construction process for planned highway improvements south of Santa Barbara, including freeway widening, could result in increased highway congestion over the next one to two decades.
- Over time, more work-force housing along transit corridors could lessen potential traffic increases at freeway interchanges.
- External factors affect increased traffic congestion even more than land development, including population, per capita vehicle ownership, Highway 101 congestion levels, land economics, location choices for jobs and homes, and availability of commute alternatives.
- Implementation of further commuter rail improvements, regional bus service and Transportation Demand Management measures could reduce Highway 101 congestion.

Historic and Community Character

Numerous General Plan policies and design guidelines for site and architectural design, circulation, landscaping, historic preservation, and neighborhood preservation have been adopted and implemented by the City over the past 18 years. Development over this period has resulted in many benefits to the downtown commercial/mixed use core, including rehabilitation/revitalization of buildings, landscape improvements, paseos, and other improvements that foster accessibility, visual character and aesthetics, and a sense of community.

The city of Santa Barbara is largely built out, and development predominately involves demolition and redevelopment of already built sites, and development of in-fill sites. The City's extensive development policies and design guidelines provide for substantial flexibility to allow for appropriate application to specific site circumstances. Therefore, substantial discretion on the part of decision-makers is also provided with respect to project sizes and compatibility issues.

The current growth pattern of redevelopment is for larger and taller mixed-use structures and sizable condominiums within commercially zoned areas, and larger additions and home replacements in residential neighborhoods. The recently updated Neighborhood Preservation Ordinance addresses the latter issue. Continuing this trend of additional larger redevelopment and in-fill development into the future has the following potential implications to community character and design:

- Further revitalization of aging buildings within commercial areas.
- Larger and taller mixed-use structures and sizeable condominiums within commercially zoned areas.
- Improvements over time to the public streetscapes, including landscaping and pedestrian and vehicle circulation.
- Additional pedestrian activity in the downtown and other commercial districts.
- Changes in visual and historic character of the urban downtown.
- Cumulative and localized reduction in openness, light and scenic views.

Economic & Fiscal Health

Recent economic events such as the stock market crash and international credit crisis are sobering reminders of the cyclic nature of economies. From time to time Santa Barbara must expect and be prepared for such reversals. The abiding trends of loss of affordable housing, loss of our socio-economic diversity, and loss of local businesses have not changed. Nor has the government sectors' struggle with funding for public services and for maintaining and expanding necessary infrastructure.

The lack of affordable housing will continue to have an effect on the "jobs/housing" imbalance, long distance commuting, overcrowding and illegal dwellings, and worker recruitment and retention. One significant fiscal concern related to housing is the expiration of the Redevelopment Agency Project Plan in 2015 which has funded a sizable percentage of the City's permanently affordable housing stock.

Though more transitory in nature, but significant nevertheless, the state of the economy could prolong deferred maintenance of City infrastructure. Continuing to defer maintenance or upgrades to infrastructure will likely increase the overall cost when it is eventually undertaken, and could possibly in the meantime delay desired development for lack of capacity.

Numerous City programs are in place to provide for water service, wastewater collection and treatment, storm drains, waste management and recycling, fire and police protection, schools, parks and recreation, disaster preparation, and other public facilities and services. There are also extensive regulations and development review criteria in place for considering the infrastructure and services issues of new development. The continuing challenge is to ensure adequate public facilities and services commensurate with future growth. Some potential implications of future development on infrastructure and services:

- Difficulties in continuing to provide adequate funding, as public facilities and service costs increase over time; funding availability for any expansion of services needed to support upgraded service levels or new development.
- Increase in long-term water demand exceeding the level presently planned for, along with potential reduction in Cachuma and Gibraltar surface water supplies due to environmental water releases and sedimentation.
- Potential increased facility and service needs for wastewater, solid waste management, police and fire protection and disaster planning, parks and recreation, schools and other child care and youth services, health care facilities, and County services.
- Cumulative loss of open space.

Public Health

A clear causal relationship has been established between the built environment and public health issues, especially in relation to epidemics such as obesity, respiratory disease and diabetes. Health professionals maintain that where we locate our housing, how we get from Point A to Point B, and what kind of access is available to open space and healthy food are key determinates of such epidemics. Planning decisions need to acknowledge the link between the physical environment and public health, and include consideration of public health in preparing plans and project review.

Potential implications of not designing the built environment with public health issues in the fore include:

- Epidemics such as obesity, respiratory disease, and diabetes will continue to affect an increasing proportion of the population.
- Less opportunity will be provided for people to change their lifestyles in a healthier manner.
- The community overall will suffer in decreases in productivity and quality of life.
- The cost of healthcare will continue to climb.

Sustainability Framework

This section defines sustainability for Santa Barbara, establishes a set of sustainability principles, outlines the sustainability framework for the General Plan, and provides a systematic process to assess the progress toward goals set forth in this framework. To achieve a flexible and resilient community, the goals and policies that guide decisions need to be expanded beyond living within our resources in which we simply consider existing resource capacities to manage growth and preserve the City's heritage and lifestyle. We need to look at our ecological footprint and determine how we are using those resources and, equally important, to what end. Being a sustainable community means making decisions based on the connections between the environment, the economy, and the people of our community, for the benefit of all and to preserve and enhance our community character.

Santa Barbara is an ecosystem where individual, organizational, and governmental decisions affect the sustenance of all. These decisions can enhance or hurt the natural and physical environment, the valued qualities of our city, diversity, and health, safety and welfare of all residents and visitors. Therefore, a new policy framework is needed to inform and support individual, organizational, and governmental decisions to move in a direction that brings about a more sustainable Santa Barbara.

Santa Barbara as a Sustainable Community

A comprehensive definition of sustainability takes into account a number of factors, including:

1) A long-term, global perspective;

2) Concern for the welfare of the entire population, both current and future generations;

3) Acknowledgment of human dependence on Earth's finite natural resources; and

4) A recognition of the relationship between humans and their environment that attempts to achieve a steady state balance over time.

Santa Barbara as a sustainable community can be defined as follows:

"Santa Barbara is a diverse community that strives to live within its resource capacities and integrate all aspects of its ecosystem, while protecting and improving the natural and built environment for the social and economic benefit of present and future generations."

A Vision of a Sustainable Santa Barbara

By 2020, the remaining increment of growth and redevelopment will have provided social, physical and spatial connections that result in a City where walk-ability and livability are the intrinsic characteristics of urban life. Land uses will have been oriented in such a manner that all local services are accessible without the need for the automobile. Land uses within the commercial areas of the city will have transitioned such that local businesses thrive and are complimented by residential uses that serve local needs for shelter. Euclidean land use patterns have given way to functioning mixed use neighborhoods that contribute vitality to the City as a whole. The parcel-by-parcel pattern of development will have transitioned to historical and contemporary design districts that facilitate social and cultural interaction. Public spaces, particularly open space, are flexible, inviting, accessible and safe. Neighborhoods will evidence individual identities grounded in the past and focused on the future that contrast and complement each other. The City has a distinctive rhythm and balance that is uniquely and sustainably "Santa Barbara."

By 2030, the City has effectively anticipated and responded to many of the challenges of global climate change and post peak oil resource shortages. Nanotechnology development and green businesses have matured and are now integral parts of the local economic base. The City serves as a regional transportation hub with attractive, timely and functional linkages that preclude the need for the traditional automobile. Four and six-lane streets and highways have evolved into connectivity corridors that share space for all modes of travel with urban gardens and open space. The majority of parking lots have been replaced by car share facilities. Open space corridors with generous setbacks serve important ecological function and connect the community to its neighbors, the national forest and coastal resources. Santa Barbara has forged strategic alliances with Ventura, Lompoc and Santa Maria to address and plan for mobility needs, local agricultural production and interregional resource management.

Sustainability Principles

The following set of principles explains the components of sustainability: Equity, Environment, and Economy. Maintaining Santa Barbara's historic resources and community character are integral to all three components.

Equity

- Socio-economic diversity is essential for maintaining a healthy culture and stable economy, and should be supported through: housing affordable to all income levels; affordable mobility options; economic policy to encourage livable wages and good jobs; and opportunities for all to participate in education, cultural events and arts.
- A healthy community requires investment in public infrastructure, facilities and services that provide equal access to open space and recreation, clean air, healthy food, and affordable housing close to jobs. While the plan for the entire community should provide for the full "arc of life", the design of the built environment needs to be particularly responsive to the needs of youth, seniors and people with disabilities.
- All members of the community should be provided with the information and strongly encouraged to participate in community decisions that affect them.
- "Living within Our Resources" includes supporting, maintaining and enhancing our human resource, such as our workforce, in particular workers needed to keep the city functioning for normal day to day living, or in the event of disaster.

Environment

- "Living within Our Resources" means effectively managing growth and in-fill development to conserve the community's natural, physical and historic resources for present and future generations. Challenges between future development and resource use must be met with creative solutions that meet the multiple objectives of preserving historic resources and community character, retaining a diverse population and culture, and allowing sufficient growth to propel a steady economy.
- Efficiently and effectively managing our natural and physical resources entails practicing innovative strategies that achieve protection, conservation, enhancement, reduced consumption, reuse, recycling, self-sufficiency, and adaptation to changing climate conditions.
- Historic resources and the small town character of Santa Barbara need to be protected both downtown and in the neighborhoods by preserving, maintaining and reusing historic structures, and by preserving and enhancing: the human scale of architecture; public open space; landscaping; neighborhood-serving commercial uses; and public views.
- Circulation within, to and from Santa Barbara should fully utilize all available modes of transportation. As fossil fuels become increasingly scarce and prices continue to rise, the City will need to dramatically accelerate efforts to plan, improve, build, and encourage viable alternatives such as transit, rail, shared vehicles, bicycles, and pedestrian/wheel chair access ways.

Economy

- The vitality and long-term health of the Santa Barbara economy relies on maintaining the City as a center for commerce, tourism, education, employment, institutions, medicine, culture and recreation for the South Coast region, as well as encouraging economic retooling that improves the natural environment, while achieving social equity.
- A fiscally sound municipal government is essential to actively support the types of public services, infrastructure, and facilities that will be required to transition the community towards a more sustainable future that is capable of adapting to the impacts of climate change.

Sustainability and Resource Capacity

Resource capacity has been an important part of "living within our resources", and it is an important aspect of sustainability as well. However, as explained above, sustainability is a broader, more challenging concept in which resource capacity is but one of several factors to consider in making decisions for the whole of the community. For most resources, their capacity to support a population is not a fixed amount in absolute terms, though may be at any moment in time. Resource capacities can be increased or decreased depending on life-style preferences, conservation strategies, technological advances, availability of alternative resources or substitutes, and changes in relative resource costs. Santa Barbara can grow and evolve and also retain a high quality of life and an amenable environment, with foresight in the management of its resources.

Sustainability Framework

Proposed Sustainability Framework diagram (*see Figure 3, Plan SB Sustainability Framework*) helps to better understand how the key issues that have driven the *Plan Santa Barbara* process are integrated with the proposed General Plan elements, implementation actions and feedback mechanisms.

Sustainability Principles: These overarching principles are the bridge between the definition of a sustainable Santa Barbara and the goals and policies of each respective General Plan element. The principles also directly address the key policy issues (or "drivers") the community faces today and into the future.

Policy Drivers: These are the issue areas with local, regional and global significance that affect both the guiding principles and the goals and policies. The policy drivers – growth management, energy and climate change, community character, economy and fiscal health, and public health – were discussed in the previous section.

General Plan Elements: The proposed General Plan Framework is organized by the proposed elements that will comprise the updated General Plan document. The re-organization of these elements is not yet final, as staff will need to work further to ensure that the sustainability framework is consistent with State land use and planning law, and in particular, recent legislation regarding the reduction of green house gases. As noted later under the Climate Change policies in this report, a comprehensive program to address climate change will affect all of the elements of the General Plan.

The proposed General Plan Elements include:

- Land Use and Growth Management
- Economy and Fiscal Health
- Environmental Resources
- Historic Resources and Community Design
- Housing
- Circulation
- Public Services and Safety

The proposed draft goals and policies contained in the general plan elements provide the specific direction to make the City General Plan more sustainability-focused. These policies do not represent all policies that will be included in the final updated plan. The policies included here are only newly proposed policies or revised existing policies that contribute to sustainability. Many existing policies, standards and implementation actions are expected to remain unchanged. Others will be evaluated and possibly amended as a result of the Housing Element and Land Use Element updates, the environmental review process and the continuing *Plan Santa Barbara* public participation and decision processes.

Implementation Actions: These actions, consisting of regulations, programs and project findings, will be scrutinized for alignment with the Sustainability Principles for our community. Additionally, adaptive management strategies will be used to monitor the course and direction of policy implementation and progress toward achieving objectives.

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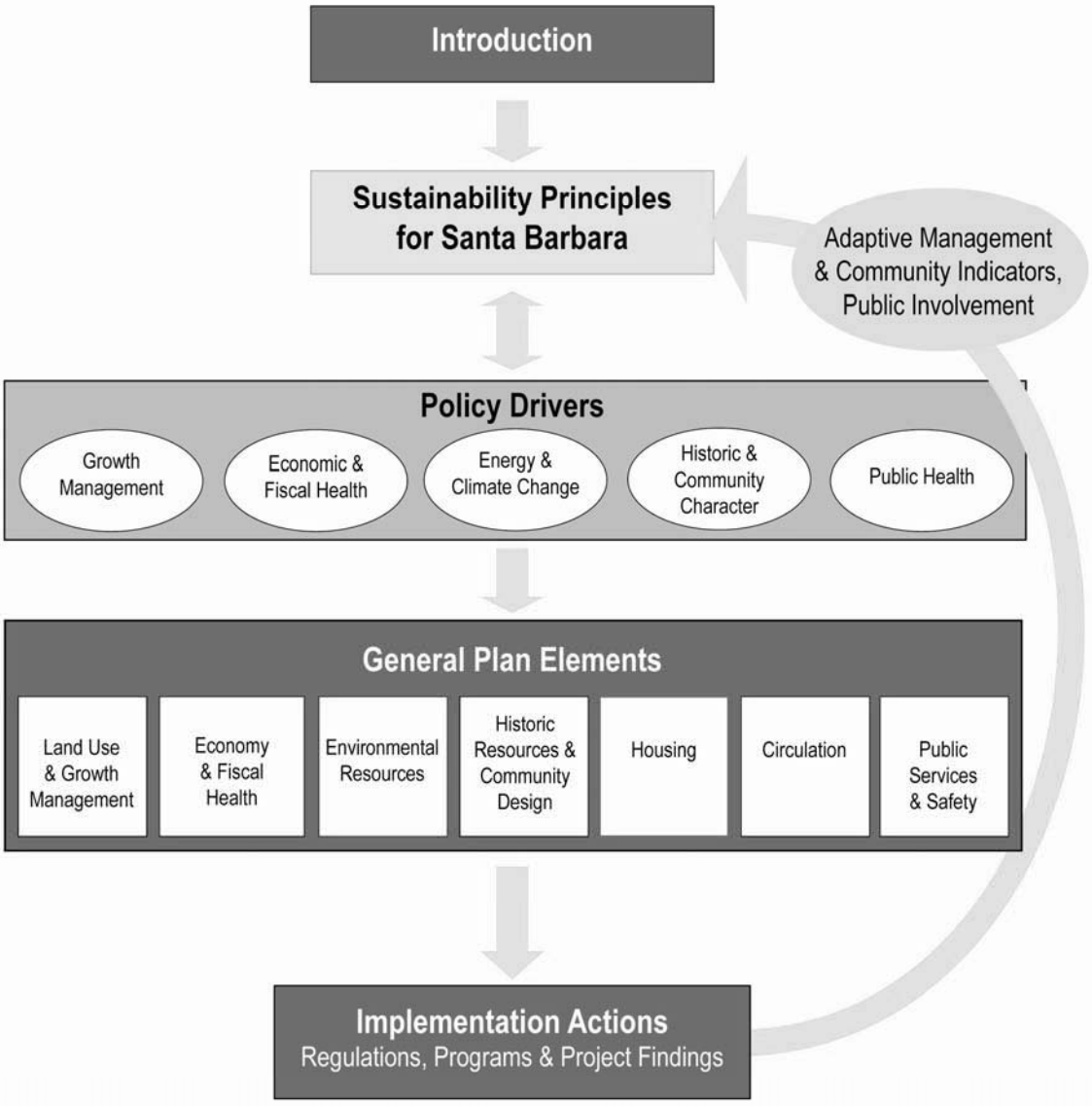
Figure 3

Plan SB Sustainability Framework



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Adaptive Management Program

An Adaptive Management Program (AMP) contains the evaluation, feedback, and adaptation components of the General Plan to track progress toward achieving the plan's goals, objectives and desired outcomes. Adaptive management enables revision of policies and implementation measures throughout the 20-year planning period to effect course corrections in response to external trends or to avert future unintended consequences. Incorporating an adaptive management approach supports sustainability by allowing the General Plan to be a living document, maintaining its relevancy through timely adjustments, and reducing the need for major updates that are often after-the-fact and reactive.

In order to measure progress toward General Plan goals, the Sustainability Framework sets out objectives for each of the elements. The objectives provide the link between the General Plan and the AMP by interpreting the aspirations of the goals into more explicit statements. Objectives can express either a desired end-state or a benchmark toward a desired end-state. While goals generally remain constant, the objectives may change throughout the course of the General Plan either as they are achieved and new objectives are desired, or more relevant measures are developed. Some policies include a monitoring requirement as well.

The components of the AMP include baseline information, community indicators, monitoring procedures and timeframes, and reports. The environmental impact report for the General Plan Update will provide much of the baseline data along with other studies.

The community indicators are the applied measures (often referred to as "metrics") which can be methodically observed, enumerated, calculated, or gauged. Indicators will be developed through review of the baseline data, the objectives, and community and Planning Commission input. Monitoring procedures will employ a variety of methods that may involve statistical evaluation, technical measurement or the use of surveys.

The AMP will set out a schedule for regular reports. Reports will provide the results of monitoring, explain the process and techniques used, and make recommendations for revisions to the General Plan.

The City's commitment to an adaptive management approach to General Plan maintenance is distilled in the following policies.

Policies

AM1. **Monitor.** Identify appropriate, measurable community indicators and develop a program for regular monitoring.

AM2: **Assess.** Perform assessments of community indicators on a regular basis, such as annually and with overall assessments every four to eight years.

AM3: **Adapt.** Where warranted by monitoring and assessment, evaluate options and adjust policies and implementation measures in a timely fashion to better achieve goals.

AM4. **Inform.** Provide public information, education, and training to support understanding and compliance with City General Plan policies. Enable staff to stay current with science and state-of-the-art technology relating to sustainability, and other topics relevant to the General Plan.

The Adaptive Management Program will be prepared during Phase III of *Plan Santa Barbara*.

Land Use and Growth Management

Goals: Achieve a balance in the amount, location and type of growth (through in-fill development and re-development) that will function within the context of available resources including water, energy, food, housing, and transportation. Neighborhoods will exhibit a sense of place with a focal community center, and improved connectivity whereby access is provided to daily necessities, including limited commercial activity, transit, community services, and open spaces for gathering and recreation.

OBJECTIVES

LG Objective 1: A sufficient or surplus resource and infrastructure supply relative to demand.

LG Objective 2: Improvement in the supply of affordable and attainable housing relative to jobs.

LG Objective 3: A majority of neighborhoods have Sustainable Neighborhood Plans.

LG Objective 4: Increase in use of alternative transportation modes relative to single occupancy vehicle use.

POLICIES

The framework policies of this element address management of future residential and non-residential growth both in amount and geographic distribution. New key policies will promote sustainable development patterns for the major commercial areas of the city, and for neighborhood centers. The Mobility-Oriented Development Area is a central concept to Santa Barbara becoming a more sustainable community. Another key new policy calls for the preparation of sustainable neighborhood plans (SNPs) that could be prepared for each neighborhood. The SNPs would be addressed through a neighborhood outreach process with the goal of increasing sustainable land use while maintaining the unique character of each neighborhood.

Growth Management Policies

LG1. **Resource Allocation Priority.** Prioritize the use of available resources capacities for additional affordable housing for very low, low, moderate and middle income households over all other new development.

LG2. **Limit Non-Residential Growth.** Extend the remaining non-residential square-foot increment in the current Land Use Element (Policy 1.1) through the year 2030, and assess the need for increases in non-residential square footage based on availability of resources, and on economic and community need.

a. Net new non-residential growth shall be limited to 1.5 million square feet, and shall be demonstrated to be supported by available resources capacities (i.e., water, sewer, affordable housing, and roads);

b. Monitor resource capacities and assess jobs/housing imbalance and transportation modal shifts at meaningful time intervals, including a review in the year 2020; and

c. Employ adaptive management to review and revise policies, consistent with resource capacities.

Non-residential development associated with:

- Minor additions,
- Demolition and replacement of existing square-footage on-site, and
- Sphere area annexations

are considered separately and in addition to the basic 1.5 million square-foot limit of net new non-residential development established above. Once annexed, all development or developable parcels are subject to the limitations of this policy.

LG3. **Future Residential Growth.** Encourage future residential growth that balances the need to live within our resources with the Housing Element goals and requirements, by:

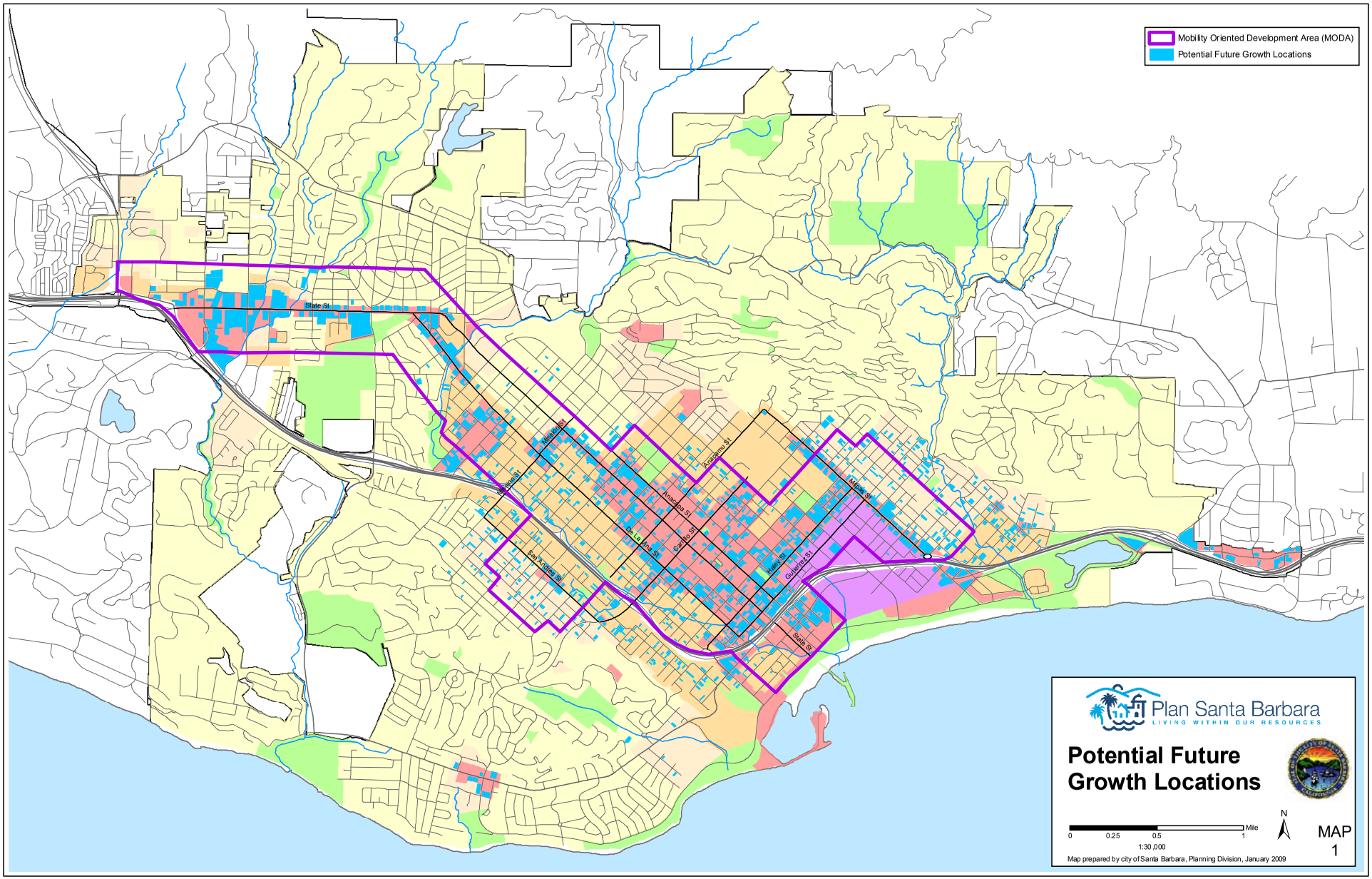
a. Strongly encouraging affordable housing units subject to available resources, such as water and sewer capacities;

b. Monitor resource capacities and policy effectiveness at intervals commensurate with Housing Element planning periods; and

c. Under the adaptive management program, review and if supportable by available resource capacities, adjust specific housing policies to further achieve the City's Housing Element goals and requirements.

LG4. **Location of Residential Growth.** Encourage new residential units be located in the MODA (Mobility Oriented Development Area). **(***See Map 1, Potential Growth Locations, and policies LG9 and LG15.***)**

LG5. **Limit New Residential Development in High Fire Areas.** Offer incentives and/or an option for property owners to transfer development rights from residential parcels in the High Fire Area to locations within the MODA. (See policies LG9 and LG15.)


Mobility Oriented Development Area (MODA)
Potential Future Growth Locations
State St
Las Positas Rd
Modoc Rd
Arrellaga St
Anacapa St
De La Vina St
Garden St
Milpas St
Gutierrez St
Haley St
Sola St
Sea Ridge Rd
Plan Santa Barbara
LIVING WITHIN OUR RESOURCES
Potential Future Growth Locations
N
Mile
0
0.25
0.5
1
1:30,000
MAP 1
Map prepared by city of Santa Barbara, Planning Division, January 2009

LG6. **Regional Transfer of Development Rights.** With local and regional cooperation, develop programs for transfer of development from rural lands and important urban open spaces to urban in-fill sites in order to provide housing in appropriate locations, reduce commutes, and preserve open space. Develop criteria for receiver sites and identify potential sites within the MODA (see Policy LG9).

LG7. **Disposition of Existing Non-Residential Square Footage if not Rebuilt.** Study the Transfer of Existing Development Rights (TEDR) ordinance to better understand its role in past non-residential development and its potential for the future.

LG8. **Annexations Involving New Development.** In addition to all other findings, annexation of land to the City for new development shall only be allowed if it is demonstrated that resource capacities exist to serve the additional area and population, that the use of resource capacities will not jeopardize priority development such as affordable housing, and that the annexation will at a minimum be cost neutral.

Land Use Policies

LG9. **Mobility Oriented Development Area (MODA).** The Mobility Oriented Development Area is an area within the City that contains a variety of compact commercial and residential land uses, is highly connected by transit, and is conducive to walking and bicycling (*see Map 2, Mobility Oriented Development Area*).

Within the MODA, the City will:

a. Focus growth, including
   - Locating most new and redeveloped commercial square footage in and around a quarter mile radius of transit nodes;
   - Providing work force and affordable living opportunities; and
   - Relocating remaining TEDR square footage.

b. Provide a mix of land uses that
   - Establish strong retail and workplace centers;
   - Re-establish residential living in commercial centers that includes access to healthy food and recreation;
   - Promote connectivity and civic engagement; and
   - Reprioritize public space for pedestrians.

c. Provide mobility and connectivity options that
   - Link mixed-use development nodes with main transit lines;
   - Allow for compact, vibrant, walkable places;
   - Reduce the need for parking; and
   - Promote active living

The MODA will be implemented through policies in this framework document and the Land Use & Growth Management, Historic Resources & Community Design, Housing, Circulation, and Public Services & Safety elements, as well as through implementation measures such as design guidelines and standards. In combination, these policies and measures will:

- Encourage a transit-oriented development pattern,
- Encourage additional residential land uses, require smaller unit sizes, and increase residential density,
- Apply appropriate zone changes to enable neighborhood-serving commercial uses,
- Change the zoning requirements to a parking demand standard (i.e., vehicular parking provided to meet but not exceed demand),
- Focus City capital improvement program expenditures on new mobility options (e.g., quality transit facilities, bicycle infrastructure and secure parking, enhanced pedestrian facilities, and car and bike-share programs) that facilitate intermodal connections (i.e., ease of movement from one form of travel to another),
- Increase public space and open space, and
- Encourage more active and healthy lifestyles

within the MODA.

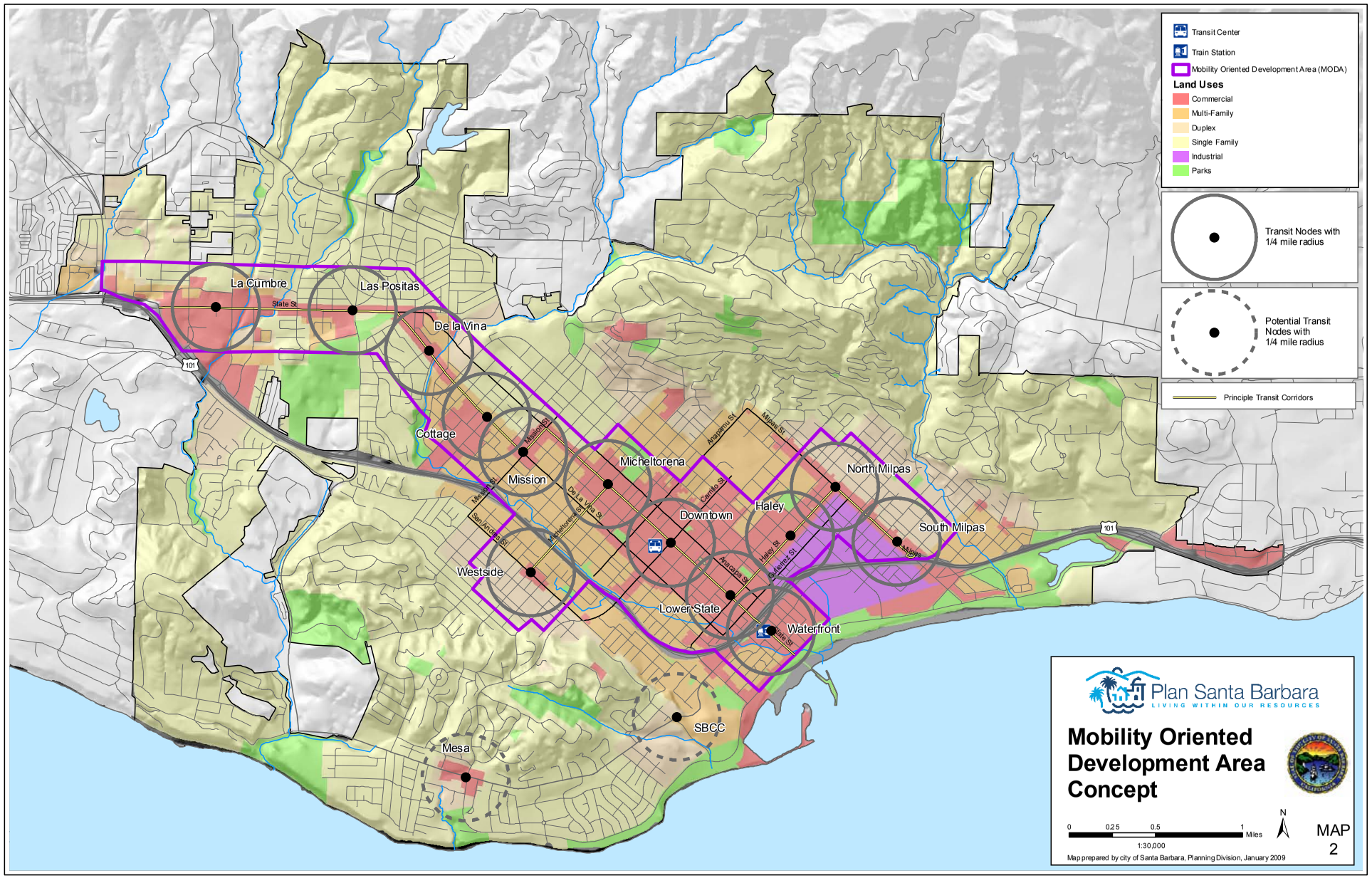
LG10. **Community Benefit Non-Residential Land Uses.** Net new non-residential square footage allocated under LG1 shall be of a secondary priority to affordable housing, and shall include one or more of the following Community Benefit Land Uses:

a. Community Priority Development. This type of project addresses a present or projected need directly related to public health, safety or general welfare including but not limited to:

   - Parks and recreation facilities;
   - Community centers;
   - Educational institutions and uses including schools;
   - Public cultural or arts facilities;
   - Youth development programs and childcare facilities; and
   - Community gardens and urban farming; or

b. Economic Development. This type of project enhances the standard of living for City and South Coast residents and/or strengthens the local and regional economy by expanding economic diversity, such as providing a new or under-represented service or commodity; or

c. "Green" Economic Development. Business that provides "green" products or "green-collar" jobs (e.g., sustainable water, energy and waste management facilities, or green building products, or climate change research, but not solely a green building or structure); or


Transit Center
Train Station
Mobility Oriented Development Area (MODA)
Land Uses
Commercial
Multi-Family
Duplex
Single Family
Industrial
Parks
Transit Nodes with 1/4 mile radius
Potential Transit Nodes with 1/4 mile radius
Principle Transit Corridors
La Cumbre
Las Positas
De la Vina
Cottage
Mission
Micheltorena
Downtown
Haley
North Milpas
South Milpas
Westside
Lower State
Waterfront
SBCC
Mesa
State St
101
Plan Santa Barbara
LIVING WITHIN OUR RESOURCES
Mobility Oriented Development Area Concept
0 0.25 0.5 1 Miles
1:30,000
N
MAP 2
Map prepared by city of Santa Barbara, Planning Division, January 2009

d. Small and local business. A Small and/or local business in the community that is started, maintained, relocated, redeveloped or expanded; or

e. Development for people with disabilities. Projects that meet the present or projected needs of people with disabilities, the workforce that provides them direct support, and the agencies or organizations providing programs and services to them.

LG11. **Community Benefit Residential Land Uses.** While acknowledging the need to balance provision of affordable housing with market-rate housing, new residential development in multi-family and commercial zones, including housing that is part of mixed-use development, shall include residential and open space community benefit land uses.

a. Affordable housing, by providing one or more of the following:

- Housing affordable to low, moderate, or middle income households;
- Housing dedicated for critical work force employees;
- Affordable housing for local workers;
- Rental housing (see also Policy H12);
- Transitional housing, single residential occupancy, and other housing for special needs populations including seniors, physically or mentally disabled, homeless;

and

b. Open space, through:

- Access to adequate public open space within a ½-mile radius; and/or
- Dedication of sufficient useable open space on-site; and/or
- A contribution made toward future parks through in-lieu fees. (See also Policy H2 and LG17.)

LG12. **Manufacturing Uses.** Preserve and encourage the long-term integrity of light manufacturing uses by amending the permitted uses in the M-1 and C-M zones to narrow the range of uses, but not preclude very limited and well defined residential uses in the C-M Zone.

LG13. **Live-Work Land Use Category.** Provide viable live-work opportunities throughout the City by, among other options, the creation of a live-work land use category.

LG14. **Regional Land Use Blueprint.** Work cooperatively with the County and other local jurisdictions to prepare a regional blueprint plan to address regional land use issues, especially provision for affordable housing.

Neighborhood Policy

LG15. **Sustainable Neighborhood Plans (SNP).** To improve sense of place, opportunities for healthy living and accessibility, while reducing the carbon footprint, develop comprehensive Sustainable Neighborhood Plans throughout the City (where desired by residents). (*See Map 3, Potential Neighborhood Districts.*) A SNP may incorporate goals, objectives, policies and implementation actions for the following components, as applicable:

a. A variety of housing types and affordability ranges;

b. Neighborhood-serving commercial uses, especially retail food establishments such as small markets, green groceries, coffee shops;

c. Parks, recreational facilities, trails;

d. Community gardens;

e. Street tree planting program;

f. Watershed protection, creeks restoration, public access to creeks;

g. Pedestrian/wheelchair connectivity;

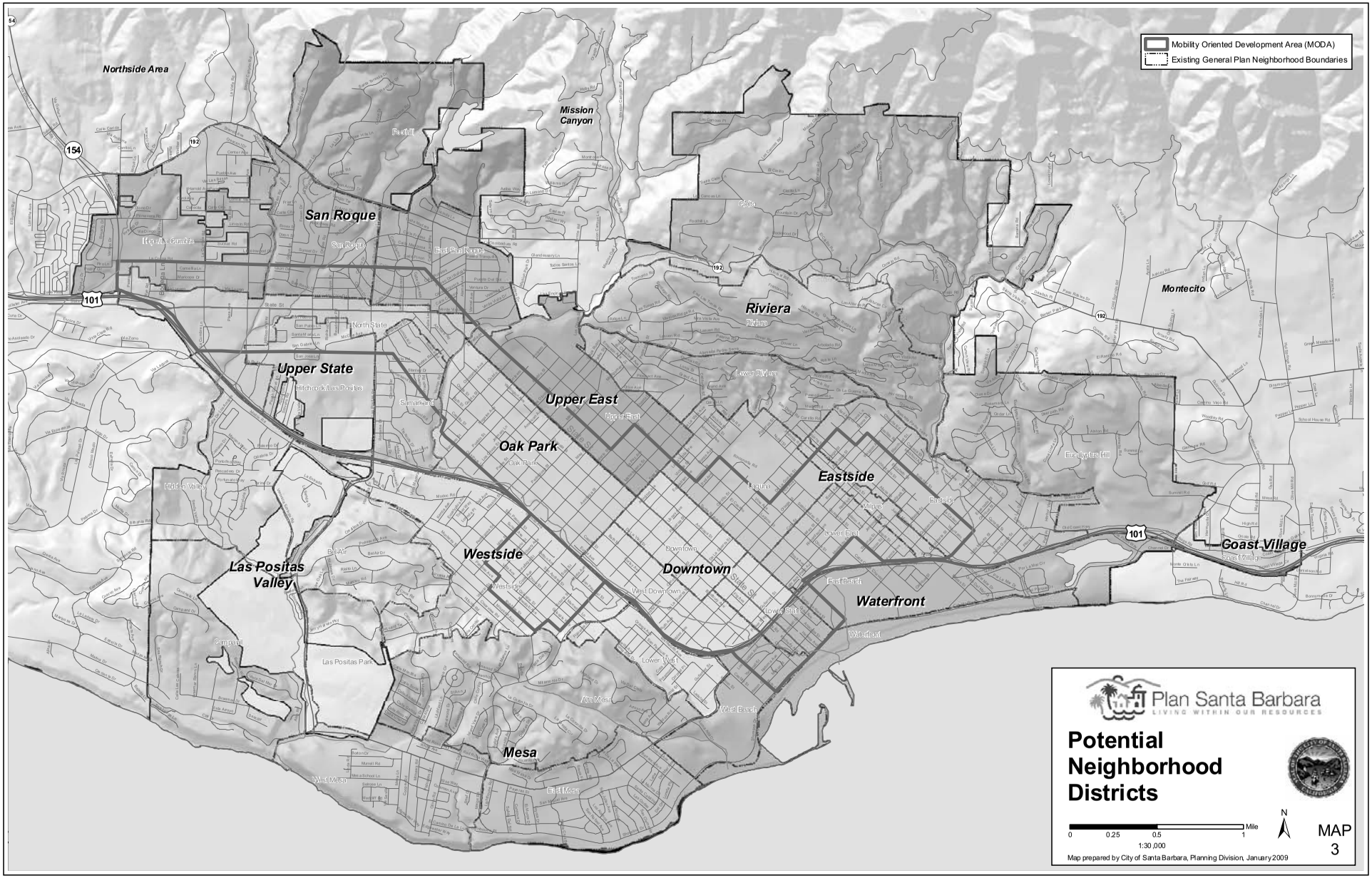
h. Transit, bicycle (including new Class 1 bike paths) and vehicle connectivity;

i. Walkable streets with an appealing and comfortable pedestrian street environment that promote physical activity and can be used safely by people of all ages or abilities;

j. Traffic calming along walkable routes to school;

k. A reduced impervious area footprint (such as street and parking areas);

l. Community services (i.e., schools, branch library, community center, clinics, etc.)


Mobility Oriented Development Area (MODA)
Existing General Plan Neighborhood Boundaries
Northside Area
Mission Canyon
San Roque
Riviera
Montecito
Upper State
Upper East
Oak Park
Eastside
Westside
Las Positas Valley
Downtown
Waterfront
Goast Village
Mesa
Plan Santa Barbara
LIVING WITHIN OUR RESOURCES
Potential Neighborhood Districts
0 0.25 0.5 1 Mile
1:30,000
N
MAP 3
Map prepared by City of Santa Barbara, Planning Division, January 2009

Parks, Recreation, Trails and Open Space Policies

LG16. **Park and Open Space Standards and Planning.** Establish or update standards for:

- The number of acres of parks/recreation/open space per increment of population (e.g., 5,000 residents) appropriate for Santa Barbara,
- Optimal walking distances to parks, including pocket parks and small play areas, and
- Types of parks or recreational facilities to satisfy different needs, or appropriate in different locations (e.g., multi-purpose pocket park for infill vs. tot lot in single family residential neighborhood) suitable for the demographics of each neighborhood.

Coordinate the studies with Sustainable Neighborhood Planning process. Using these service ratio standards, develop accessibility goals, identify facility deficiencies, establish priorities, and determine options for addressing needs, such as through joint use (and funding) of school districts' recreational facilities.

LG17. **Park, Recreation and Open Space Acquisition and Maintenance Funding.** Develop mechanisms (e.g., Quimby Act fees, conservation easements, assessment districts) for funding and maintaining public parks, recreational facilities and/or usable open space in the urban core as more residential and mixed-use projects develop. Require a contribution by all larger projects, towards public parks, recreational facilities, and/or other usable open space on site, off site, or through in lieu fees, to offset the impact of increased density/intensity of use.

LG18. **Community Gardens on Vacant Land.** Establish a program for use of vacant properties for community gardens throughout the City, to enable residents who do not have access to land to grow food, orchards or other crops. (See also Policy ER34.)

Scenic Highway Policy

LG19. **Scenic Highways.** Within the city of Santa Barbara, routes currently designated as potential State Scenic Highways include Cabrillo Blvd. and Sycamore Canyon Road. Pursue State scenic highway designations for both eligible routes, and establish associated design guidelines.

Economy and Fiscal Health

Goals: Ensure a strong economy with a diversity of business sizes and types that provide a stable long-term revenue base necessary to support essential services and community enhancements, as well as diverse job opportunities. Enhance educational opportunities for local residents to meet local employment needs. Encourage more "green" businesses. Recognize that commerce is intertwined with transportation, natural resources and housing, and together are key elements of a healthy economy that is regional in scope.

OBJECTIVES

Objective EF1: The City's economic sector diversity (e.g., tourism, retail, health, education, "green" businesses) is stable or expanded, and City revenues from commercial sources are stable or have increased.

Objective EF2: A greater proportion of local jobs are filled by local residents.

Objective EF3: Regional cooperation has increased and progress is being made on a regional blueprint for land use, housing and transportation, and on a regional economic strategy that addresses the jobs/housing balance.

POLICIES

The proposed Economy and Fiscal Health Element covers both local and regional economic considerations, and offers framework policies promoting economic resiliency and equity, and supporting green businesses, local small businesses, and employment for local residents. For complementation, a number of these policies will require a more proactive role on the part of the City through a variety of promotion, recruitment and retention efforts.

Local Economic Policies

EF1. **Integral Parts of Economic Development.** Promote energy efficiency, innovation, public health, and arts and culture as integral parts of economic development.

EF2. **Environmental Effects of Commercial Growth.** Manage commercial growth to protect the City's environment and unique qualities.

EF3. **Economic Development Plan and Special Studies.** Prepare and implement an economic development plan to focus economic development activities in desired areas to further implement economic policies. Initiate special area studies, zoning policies, or specific plans for small businesses, start-up businesses and green/sustainable businesses in the MODA and commercial areas identified in SNPs. (See also Policy LG10.)

EF4. **Jobs/Housing Balance.** Recognize the need for affordable housing to support a diverse and healthy local economy. Develop an economic development strategy that sets a regional jobs/housing balance as a goal. (See also Policy EF18.)

EF5. **Existing Businesses.** Give priority to retaining existing enterprises as the best source of business expansion and local job growth, and encourage government, businesses and residents to patronize local businesses and contractors, by working with local businesses to initiate a "Buy Local" program, with the City setting the example.

EF6. **Green/Sustainable Businesses.** Provide a green promotional and economic development program, to support businesses that:

- Develop or provide "green/sustainable" products, such as recycled building materials, alternative transportation vehicles, alternate energy sources, organic agriculture, etc.; and/or
- Enhance the natural environment, conserve energy, water or materials, prevent pollution, reduce waste; and/or
- Provide green education to the community.

Continue to support the *Green Business Program Santa Barbara County* by publicly recognizing businesses that promote environmental responsibility and community concern.

EF7. **Minority Businesses.** Support minority-owned/operated businesses to assist in preserving cultural diversity through focused promotional programs and/or operating cost-reduction measures such as start-up license fee rebates.

EF8. **Eco-Tourism.** Promote eco-tourism, such as bicycle tours, that takes advantage of existing hotels and resources such as the beach, ocean, foothill trails, etc.

EF9. **Livable Wages.** Recruit or retain businesses which provide livable wage employment as defined by the City, and provide support through promotional programs, and/or operating cost-reduction measures such as start-up license fee rebates.

EF10. **Infrastructure Improvements.** Identify, evaluate and prioritize capital improvements that would assist in business retention or expansion, such as increased public transit, a rail/transit transfer center, city-wide wi-fi, sidewalk improvements, or consolidated customer parking facilities.

EF11. **Technology.** Encourage the use of and invest in technology that supports local enterprises and attracts new businesses to the City. (See also Policy EF10.)

EF12. **Re-Use of Commercial Space.** Provide incentives for adaptive re-use of vacant commercial buildings.

EF13. **Partnerships.** Encourage public/private joint venture partnerships as an economic development tool.

EF14. **Local Needs.** Encourage enterprises that serve the needs of local residents, workers, and businesses.

EF15. **Protect Industrial Zoned Areas.** Preserve the industrial zones as a resource for the service trades, product development companies and green/sustainable industrial businesses. (See also Policy LG12.)

EF16. **Target Education for Local Needs.** "Grow our Own" local employee base, especially in the green/sustainable industries, through targeted education and training in cooperation with local businesses and educational institutions.

EF17. **Connect College Students and Employers.** Advocate for and support a program to link UCSB and Santa Barbara City College graduating students with local employers.

EF18. **Arts and Culture.** Recognize the contribution to the City's economy played by the arts and cultural events, and continue to support and promote these endeavors.

EF19. **Coordinate with SBCC.** Encourage closer ties with SBCC, recognizing its role in providing a skilled and knowledgeable labor pool and contemporary concepts or ideas for business and government.

EF20. **Child Care for Working Families.** Recognize and promote the provision of child care as a necessary compliment of employment.

Regional Economic Policies

EF21. **Regional Economic Strategy.** In cooperation with other area governments, prepare an economic strategy to define regional economic needs, and a practical and realistic regional goal for a jobs/housing balance. Identify actions that can be taken:

- By each jurisdiction toward achieving the job/housing goal;
- By each jurisdiction toward addressing other regional economic needs; and
- By the several jurisdictions together.

EF22. **Coordinate with UCSB.** Encourage closer ties with UCSB, recognizing its role as an employment base and source of start-up businesses.

EF23. **Jobs within the Region for Local Residents.** Recruit and retain businesses in the City that employ local residents, and encourage South Coast Region employers to recruit local residents to reduce commuting and increase local purchasing power.

EF24. **Connect Vocational Students and Employers.** Assist with a program to link graduating students from South Coast vocational schools with local employers. Encourage programs that also link undergraduates and high school students with employers for internships.

Environmental Resources

Goals: Protect and wisely use natural resources to sustain their quantity and quality, minimize hazards to people and property, and meet present and future service, health and environmental needs. As stewards of the environment, reduce greenhouse gas contributions to climate change, and to air pollution and related health risks, by reducing dependence on energy from fossil fuels through increased efficiency, conservation and conversion to renewable energy resources, particularly by utilizing local renewable energy resources.

OBJECTIVES

Objective ER1: A City-wide 50% reduction in fossil fuel use in buildings by the year 2020, and carbon neutrality by the year 2030.

Objective ER2: Natural areas along creeks and elsewhere within the City have been retained or expanded in area, and their quality preserved or enhanced.

Objective ER3: Opportunities for residents and students to get fresh locally-grown produce have increased.

Objective ER4: In response to AB32 and SB375, a reduction of green house gas emissions from light vehicles and trucks to 1990 levels by the year 2020.

POLICIES

Key policies of the Environmental Resources Element address air quality, noise, and protection of creeks and the urban forest, among others. Policies for the new topics of climate change, energy conservation, and food and agricultural resources are also included under environmental resources. Climate change policies and, in particular, those aimed at the reduction of green house gases, are not limited to this section. Other policies under land use, community design, circulation, public services, and other sections of environmental resources are critical components of a comprehensive program to address climate change.

Climate Change Policies
(Local and Regional)

ER1. **Climate Change.** Development and public facilities and services shall incorporate measures to minimize contributions to climate change and to adapt to climate changes anticipated within the life of the project.

ER2. **Emergency Response Strategies and Climate Change.** Incorporate into response strategies for emergency preparations, the potential effects of climate change, including from extreme weather, sea level rise, or other changes, on the following:

a. Humans,

b. The built and

c. Natural environments.

ER3. **Comprehensive Climate Change Action Plan.** Prepare a comprehensive climate action plan as specified in AB32 to address climate change concerns including reducing green-house gas emissions, green-house gas absorption, and adaptation to climate change. The climate action plan would include evaluation of community energy use (i.e, energy used by buildings and infrastructure); waste and recycling; water and wastewater systems; transportation; and community design.

All elements of the General Plan will identify which specific policies contribute towards the reduction of green house gases. (Green house gases include carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons, among many others.)

ER4. **Urban Heat Island Effect.** Reduce urban heat island effect by:

a. Amending the Zoning Ordinance to establish standards that minimize impermeable surfaces and building areas;

b. Increasing vegetation, especially suitable tree species, as appropriate (e.g., does not increase fire hazards);

c. Providing incentives such as expedited permitting for building projects that incorporate green roofs; and

d. Explore possibilities for reducing standards for impermeable surfacing required by the Transportation Division and Fire Department.

Energy Conservation Policies
(Local and Regional)

ER5. **Energy Efficient Buildings.** Require all new construction to be designed and built consistent with City green programs, policies, and the goal of achieving "carbon neutrality" by 2030 in all buildings.

Further reduce energy consumption over time to "carbon neutrality" by 2030 in new building and through retrofits. Establish a program and time line for increasing the energy efficiency and carbon neutrality of new buildings or additions, and of existing building stock. Provide:

a. Information on current energy use and conservation options;

b. Incentives for voluntary upgrades;

c. Requirements for incremental upgrades at time of sale, and/or other methods for greening the existing building stock; and

d. Tools for self-assessment financing for energy efficiency upgrades and on-site solar and wind power generation through property taxes (in conjunction with AB 811).

ER6. **Local Renewable Energy Resources.** Work with County and other local jurisdictions or parties to preserve and promote opportunities for local renewable energy resources development, such as solar, wind, geothermal, wave, hydro, methane and waste conversion. Conduct a feasibility study for a Community Choice Aggregation arrangement as either a bulk purchaser or producer of energy from alternative resources. Change codes to support and promote examining the feasibility of Community Choice Aggregation. Support and implement the California Energy Commission and State Air Resource Board goal for alternative/advanced fuels set forth in AB1007 for non-petroleum fuel use of 20% by 2020 and 30% by 2030.

ER7. **Obstacles for Small Wind Generators.** Identify and study regulatory obstacles to installing small individual or community wind generators, and prepare standards for siting, design, maintenance and operation to ensure compatibility with adjoining land uses and protect environmental resources.

ER8. **Facilitate Renewable Energy Technologies.** Promote flexible design review standards and facilitate use of renewable energy technologies through streamlined planning and development rules, codes, processing, and other incentives.

ER9. **Solar Energy.** Encourage the use of solar photo-voltaic arrays on new construction and significant remodel projects, as appropriate, taking into consideration building size, orientation, roof type, and current energy use.

Create incentives and a grant program to assist landowners to incorporate photo-voltaics into existing homes.

Where use of photo-voltaics would be inappropriate, provide information to encourage use of other forms of alternative energy, energy conservation, purchase of "green energy" offsets or investment in solar farms.

ER10. **Incentives for Alternative/Advanced Fuel Infrastructure.** Give priority through expedited processing to projects providing infrastructure for alternative/advanced fuels.

ER11. **Locally-Harvested Renewable Materials.** Establish additional green building incentives for the use of locally harvested, renewable building or manufacturing materials.

Air Quality Policies

ER12. **Highway 101 Set-Back.** Evaluate the potential health benefits of avoiding locating additional residential and other sensitive land uses (schools, day care centers, playgrounds, and medical facilities) within 500 feet of Highway 101[1], and the potential for mitigating health hazards. Establish:

a. A 500-foot set-back as an interim screening guideline (for up to 5 years) while tracking the State phased regulatory program to reduce truck and diesel particulate emissions;

b. Funding and a program to monitor emission levels and identify a more refined set-back line; and

c. Project review criteria.

ER13. **Interior Air Quality.** Establish additional green building incentives and requirements for construction with nontoxic materials.

ER14. **Low-Emission Vehicles and Equipment.** Expand infrastructure and establish incentives for use of lower emission vehicles and equipment (e.g., parking priority, electric vehicle plug-ins). Support the amendment of speed limit restrictions to permit the wider use of electric vehicles.

ER15. **Marine Shipping Emissions.** Support regional and State efforts to reduce marine shipping emissions.

ER16. **Development Mitigation.** Establish ordinance requirements to apply standard air-quality mitigation measures for new development and construction projects. These include measures to minimize construction dust and vehicle emissions; provide landscaping; conserve energy and reduce vehicle trips.

[1] California Air Resources Board land-use guideline for transportation facilities with 100,000 or more vehicles/day. Currently, approximately 140,000 vehicles/day have been recorded at the Las Positas/Hwy 101 interchange by CalTrans.

Biological Resources Policies

ER17. **Native and Other Trees and Landscaping.** Establish updated ordinance provisions to protect native oaks and other native or exotic trees, and require the use of native or Mediterranean drought-tolerant species in landscaping.

ER18. **Urban Tree Protection and Enhancement.** Prepare a City-wide program to protect, enhance, and maintain our urban trees and landscaped spaces to save energy and water, incorporate habitat, and provide shade to foster a healthy, vibrant and livable community. Create a mechanism for enforcement and mitigation when protected trees (street trees, trees in front yards, and historic or otherwise designated trees) are removed from a site.

ER19. **Protection of Wildlife and Native Vegetation.** Update policies directing the protection of wildlife and native vegetative species and their habitats, including ocean, wetland, coastal, creek, foothill, and urban-adapted habitats. Develop more detailed design guidelines to accompany the policies.

ER20. **Integrated Pest Management Program.** Establish ordinance provisions to apply integrated pest management requirements to development permits.

ER21. **Multi-Use Plan for Coast.** Develop updated multi-use plans and monitoring guidelines for beaches and other coastal areas to provide for both recreational uses and protection of coastal habitats and wildlife/plant species.

ER22. **Native Species Habitat Planning.** Develop land use/design guidelines to protect and restore habitat areas for native flora and fauna, and wildlife corridors within the City, including for chaparral, oak woodland, and riparian areas. In particular, require buildings and other elements of the built environment, and landscaping to be designed to enhance the wildlife corridor network as habitat.

ER23. **Trail Management.** Existing and future trails along creeks or in other natural settings shall be managed for both passive recreational use and as native species habitat and corridors.

Hydrology, Water Quality and Flooding Policies

ER24. **Creek Resources and Water Quality.** Continue, update and expand the City's policies and programs that support watershed planning, creeks restoration, water quality protection, storm water management, and public outreach programs.

ER25. **Storm Water Management Guidelines.** Incorporate the City's Storm Water Management Program's policies and guidelines for low impact development into the General Plan Environmental Resources Element to reduce storm water run-off and water pollutants.

The City's Storm Water Management Guidelines provide information on implementation measures such as ground water recharge, pervious surfacing, bioswales, detention basins, and green roofs. Update measures for street sweeping, storm-drain stenciling, and public outreach for inclusion in conditions of approval or as mitigation measures. Encourage the conversion of excess street paving between sidewalks and streets to bioswales.

ER26. **Creek Setbacks and Restoration.** Establish updated creek setback and restoration standards[2] for new development and redevelopment along all creeks, and guidelines for restoration, increase of pervious surfaces and appropriate land uses within creekside buffers.

ER27. **Creekside Development Guidelines.** Establish design guidelines for development and redevelopment near creeks, such as measures to orient development toward creeks, and better incorporate creeks as part of landscape and open space design. Encourage public creekside pedestrian paths where appropriate to increase connectivity and provide pocket parks and signage to improve public awareness and enjoyment of the City's creeks.

ER28. **Master Drainage Plan.** In coordination with watershed planning, develop a comprehensive drainage plan that identifies the existing system, policies and development standards to better address drainage and water quality issues, areas appropriate for drainage retention/detention, future capital improvements, and funding plan to finance the projects.

ER29. **Wash-Down Policies.** Strengthen policies to limit the practice of hosing down driveways, to conserve water and reduce pollutants carried through urban run-off and conserve water per State Water Resources Control Board regulatory guidelines for storm water management.

ER30. **Floodplain Mapping Update.** Update the Flood Insurance Rate Maps (FIRM) floodplain boundaries for the Special Flood Hazard Areas such as the Mission and Sycamore creek drainages, Arroyo Burro Creek and Area A near the Estero.

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[2] The zoning code currently provides for a minimum 25-foot setback in most instances from Mission Creek, and City practice is to apply 25 feet or more to most discretionary development along all creeks, based on project-specific studies, general creek protection policies, and environmental review.

Food and Agriculture Policies

ER31. **Farmers Markets.** Continue to support local farmers markets, and expand locations to include neighborhood locations consistent with Sustainable Neighborhood Plans, expand infrastructure to support them, and expand hours of operations.

ER32. **Gardener Education.** Continue to support the City/County/SBCC Green Gardener training program, and expand community and school educational programs for producing gardens year-round using sustainable gardening practices. Encourage the use of fruit trees in landscaping where appropriate.

ER33. **Food Scrap Recovery and Composting Program.** Continue and expand the City program for diversion of food scraps from landfill disposal, to be composted for use as soil amendments.

ER34. **Public and Private Food Gardens.** Provide for infrastructure to support local community gardens. With neighborhood support, develop publicly-available edible landscaping in existing and new parks. Reserve space for public gardening within the urban core area to be maintained by the community. Design for green roofs and urban rooftop gardens in residential development Downtown.

ER35. **Food Gardens for Schools.** Work with the Santa Barbara School Districts to develop organic gardens at schools and a waste-free lunch program:

- to educate students about where food comes from, and the nutrient and energy cycles from garden to table and back again,
- to encourage the development of healthy eating habits, and
- to provide healthy local food.

ER36. **Regional Agriculture.** Support regional coordination toward expanding local sustainable food sources. Support incentives for maintaining and establishing additional agricultural farms and farm stands within the City, the South Coast, and tri-county areas. Support directing local food to our schools, cafeterias, groceries, convenience stores, and restaurants. Support local health advocacy groups and programs with tools such as administrative support.

Noise Policies

ER37. **New Noise Guidelines for Non-Residential Zones.** Update the General Plan Noise Element Land Use Compatibility Guidelines including establishing 65 dB(A) CNEL as the appropriate maximum outdoor noise level for residential land uses.[3] This ambient noise guideline would allows for building construction to assure indoor noise levels meet building code requirements of 45 dB(A) level.

ER38. **Construction Noise.** Establish different construction noise standards for mixed-use urban and suburban residential areas, including standards for days, hours, and types of construction.

[3] Current City guideline is 60 dB(A). Surround jurisdictions' guidelines and most cities and counties in California use 65 dB(A).

Aesthetics and Visual Resources Policies

ER39. **Public Views.** Conduct a study to identify and document important public views of the ocean, the mountains or other highly-valued views, establish a list of important public view points, and provide a photo record. Prepare related development standards to protect the views seen from the public view points.

ER40. **Scenic View Protection.** Further protect public scenic views of the coast, hillsides, open spaces, and historic resources by incorporating more specific policies and guidelines within the General Plan Community Design, Environmental Resources, and Coastal Plan Elements, and as part of form-based codes, project design guidelines, and environmental review guidelines.

ER41. **Visual Resources Protection.** Update existing General Plan visual resources policies to require maintenance and enhancement of creekside environments, prevention of scarring or excessive modification of hillside areas, planting or removal of significant trees, and protection of significant open space areas from inappropriate development.

For evaluation of public scenic views and development impacts at a particular location, considers:

a. The importance of the existing view (i.e., whether a view contains one or more important visual resources, has scenic qualities such as abundance, intactness, and distinctiveness, and is experienced from a heavily used public viewpoint, such as public gathering area, major public transportation corridor or area of intensive pedestrian and bicycle use);

b. Whether a proposed change in the existing view would be individually or cumulatively significant (i.e., substantially degrade or obstruct existing important public scenic views, or impair the visual context of the Waterfront area or designated historic resource);

c. Whether changes in the proposed action could be avoided or adequately reduced through project design changes (such as site lay-out, building design, and landscape design).

Historic Resources and Community Design

Goal: Protect and enhance the community's historic and cultural structures and sites, visual character, and opportunities for social connection, through the protection, preservation, and enhancement of historic and architectural resources; appropriately sized and scaled buildings; a walkable town; useable and well-located open space; and abundant, sustainable landscaping. Increase public awareness and appreciation of Santa Barbara's history and historic sites.

OBJECTIVES

Objective CH1: The distinctive character of the City's districts and neighborhoods has been retained and their public places (including streets and paseos) have been enhanced.

Objective CH2: Designations of historic resources identified by the City have increased.

Objective CH3: Public health has improved through Community Design.

POLICIES

The framework policies for the Historic Resources and Community Design Element primarily address the visual character of the City and in particular address stewardship of its historic resources. The framework policies under Historic and Cultural Resources augment the design policies focusing on the setting of historic structures, facilitating their maintenance and promoting greater appreciation of the City's historic legacy. Under Community Design, the policies primarily address commercial and mixed-use buildings, and in some cases, multi-family residential buildings. The intent of this set of policies is to improve the private property/public space interface of development projects to maintain a high standard of design consistent with small-town character, create an amenable and safe public environment for pedestrians, and reduce the ecological footprint of buildings, while allowing for flexibility in design and use.

Historic and Cultural Resource Policies

CH1. **Adaptive Reuse.** Provide incentives for adaptive reuse of historic buildings when change of use occurs.

CH2. **Increase Historical Resource Appreciation.** Continue, promote, and expand programs that educate and recognize the importance of preserving archaeological, prehistoric, historical, and cultural resources.

CH3. **Loan Program.** Create a restoration and rehabilitation loan program specific to designated and potential historic structures.

CH4. **Development Review Adjoining Designated Historic Structures.** Review proposed buildings or additions to existing buildings on parcels adjoining designated historic structures as to how they may affect views of and from the historic structure.(See also Policy CH10.)

CH5. **Maintenance of Designated Historic Structures.** Prepare guidelines and standards for maintaining designated historic sites and structures including advice to property owners.

CH6. **Chumash Culture and Archeological Resources.** Promote awareness, appreciation and understanding of the first inhabitants of Santa Barbara by:

a. Supporting public displays or exhibits of Chumash arts, culture and history,

b. Encouraging the incorporation of elements from Chumash art and culture into public and private development,

c. Supporting the creation of a permanent Chumash archaeological "open-air museum" or interpretive center, preferably in-situ, should an appropriate site be discovered or identified.

(*This policy has been added in response to direction received at the City Council hearing on December 16, 2009 and will be reviewed and evaluated during Phase III.*)

Community Design Policies

CH7. **Healthy Urban Environment.** Create appropriate development guidelines to promote a healthy urban environment in which public health is considered in all land use and circulation decisions (e.g., similar to those developed by the Sustainable Sites Initiative in their work with the USGBC and LEED site standards).

CH8. **Commercial and Mixed-Use Development Standards and Guidelines.** In order to promote more affordable housing, maintain and enhance the community character, and further community sustainability principles, develop new mixed-use standards or guidelines to address:

a. Smaller unit sizes;

b. Building size, bulk and scale (See Policy CH9 below);

c. Variable setbacks;

d. Common usable open space, and flexibility on how and where it is provided;

e. Neighborhood compatibility, especially if located next to or near residential neighborhoods;

f. Parking location, layout, and number of spaces;

g. Minimum and maximum density standards;

h. Opportunities for pedestrian and bicycle connectivity, and

i. Encourage adaptive reuse of historic structures.

CH9. **Commercial and Mixed-Use Building Size, Bulk and Scale Requirements.** Strengthen and expand building size, bulk and scale requirements and findings for non-residential and mixed-use projects to:

a. Ensure proposed buildings are compatible in scale with the existing neighborhood and with any adjacent residential areas.

b. Provide for a successful pedestrian environment including the promotion of canopy trees to be integrated into projects and along the public streets.

CH10. **Building Height Limits in Downtown, Downtown Residential Buffer Areas and Next to Historic Structures.**

a. Implement a lower height limit to increase stepping back buildings adjacent to residential zones in the Downtown urban core; and

b. Implement lower height limits in conjunction with historic preservation form-based codes where adjacent to historic structures. (See also Policy CH5.)

CH11. **Multi-Family Residential Design Guidelines and Standards.** Develop multi-family residential design guidelines and standards to address unit sizes, setbacks, open space, landscaping, building size, bulk and scale, and site planning (e.g., pedestrian-friendly design, front porches facing the street or courtyard, and parking located out of sight).

CH12. **Set-Back Guidelines in Commercial Zones.** To make the streetscape more interesting in commercial zones, prepare guidelines that allow for variation in building setback along the street facades.

CH13. **Set-Back Landscaping in Downtown Commercial Zones.** Prepare guidelines and, as necessary, adopt provisions in the Zoning Ordinance for the use, design, and landscaping of the street frontage for commercial buildings in Downtown, consistent with the Pedestrian Master Plan. Where suitable, the building set-back should be able to accommodate planting significant trees, consistent with fire safety and protection of public views. (See also Policy CH15.)

CH14. **Commercial Neighborhood Compatibility.** Where redevelopment (demolition and replacement) of buildings of 10,000 square feet or more in the Downtown commercial zones will significantly increase height or scale, ensure compatibility with existing development through development plans, form-based codes, compatibility findings or other implementation measures.

CH15. **Form-Based Codes** The relationship between the form, height and mass of buildings in relationship to one another, and the relationship of building facades to the adjoining street or public open spaces are important parts of Santa Barbara's identity and appeal, and shall be considered in project review. To maintain and enhance the streetscape in non-residential zoned areas of the City, and in particular to protect the setting of the City's historic resources, develop form-based codes for historic districts, specific commercial areas, districts or even streets or blocks, in which standards could reflect the unique qualities of each location (e.g., El Pueblo Viejo, Downtown, Upper State Street, or Haley/Milpas). The new codes could work in conjunction with the general zoning regulations through an overlay.

Housing

Goals: Provide a wide range of housing options for a socially and economically diverse population, using creative and innovative approaches in order to retain the local workforce and the City's cultural and ethnic diversity. New housing will be strategically placed within the Mobility Oriented Development Area or a neighborhood center for ease of access.

OBJECTIVES

Objective H1: Increased housing availability for different levels of affordability (very low, low, moderate, middle-income), for the local workforce, and for special needs populations.

Objective H2: An expanded range of housing types (e.g., Single Family Residential, clustered, zero lot line, townhouse, mixed-use) is available to accommodate different types of households, different lifestyles or life stages.

Objective H3: Increases in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes.

POLICIES

The framework policies included here primarily address ways to increase the provision of affordable housing, retain or increase rental housing while also maintaining the amenity and small-town character of Santa Barbara and its residential neighborhoods. A range of housing types for a range of incomes, lifestyles and life stages are needed throughout the City to support the diverse population. Additionally, policies are proposed to support and encourage provision of non-subsidized affordable housing.

Housing Policies

H1. **In-Fill and Opportunity Sites.** Assist, coordinate or partner with builders for the development of affordable housing projects by identifying in-fill and opportunity sites in the commercial zones, on public lands and under-developed R-2, R-3 and R-4 sites. Opportunity sites are vacant or underdeveloped sites, or small parcels that could be merged.

H2. **Market Rate Residential.** A market-level housing project in the R-2, multi-family or commercial zones (including mixed-use) shall:

a. Provide unit sizes calculated using maximums set out under the City's redefined variable density provisions; and

b. Have access to adequate public open space within a ½-mile radius, a dedication of sufficient useable open space on-site, a contribution is made toward future parks through in-lieu fees, or a combination of any of these.

H3. **Average Multi-Family Residential Unit Size.** Establish standards for average unit sizes. Average unit sizes may use the LEED for homes average home size adjustment for multifamily buildings or be based on standards set by the City under revisions to the City's variable density provisions.

H4. **Unit Size and Density.** Establish base residential density standards for multi-family and commercial zones, and create a two tier maximum unit size system so if larger size units are built the density is lower than for building smaller units. (See also policy H5 and H6.)

H5. **Incentives for Affordable-By-Design Units.** Prepare design standards and codify incentives for market rate developers to build smaller, "affordable-by-design" residential units that better meet the needs of our community. Incentives could include higher allowable densities, less required parking, etc.

H6. **Promote Affordable and Workforce Housing Production.** Explore options to promote affordable and workforce housing, such as:

a. Revise variable density ordinance provisions to increase affordable housing (e.g., limit unit sizes, require a term of affordability, reduce parking standards with tenant restrictions);

b. Increase the allowed density in the R-2, R-3 and R-4 zones for rental housing developments.

H7. **Regional Employee Housing.** Provide incentives for employers throughout the South Coast to provide employee housing on-site or close-by off-site and establish or expand programs for encouraging employers to provide other housing benefits or financial assistance programs, such as down payments, closing costs and rental move-in fees for employees.

H8. **Educational Institutions.** Encourage UCSB and Santa Barbara City College to address affordable student, faculty and staff housing on campus and at close-by off-site opportunity sites.

H9. **Inclusionary Affordable Housing Amendments.** Explore requiring a percentage higher than 15% (consider 25%) for the provision of inclusionary affordable housing in new residential ownership developments. Consider low/moderate and middle income requirements for affordable housing to accommodate low/moderate and workforce (middle) income earners, and people with disabilities. Consider in-lieu fee structure based on market sales price.

H10. **Density Incentive for Sustainable Resource Use.** Establish criteria and standards for resource use in relation to density in the project review process, to encourage reduced resource footprint projects. Residential projects that exhibit a significantly lower resource per capita footprint would be allowed bonus density providing the building remains smaller than allowed by zoning.

H11. **Mixed-Use Housing at Shopping Centers.** Promote and encourage the development of mixed-use housing with an emphasis on affordability at shopping centers such as the La Cumbre Plaza shopping center, by coordinating and/or partnering with property owners and housing developers.

H12. **Rental Incentives.** Develop programs such as a rental overlay to allow for greater density for rental units and encourage the production of rental housing projects by providing incentives such as reduced parking requirements, preferential processing, fee waivers, or deferrals.

H13. **Residential Density Standards.** Develop density standards that permit greater densities for projects that provide a greater percentage of price-restricted ownership units than required by the inclusionary housing ordinance. Programs to increase density can be combined with programs to reduce density such as changes to the variable density ordinance provisions or rezoning historic districts or special design districts.

H14**.** **Second Unit Incentives.** Second units in single family neighborhoods shall be:

- Encouraged where located within the MODA;
- Allowed where located outside of the MODA;
- Restricted in the High Fire Zone.

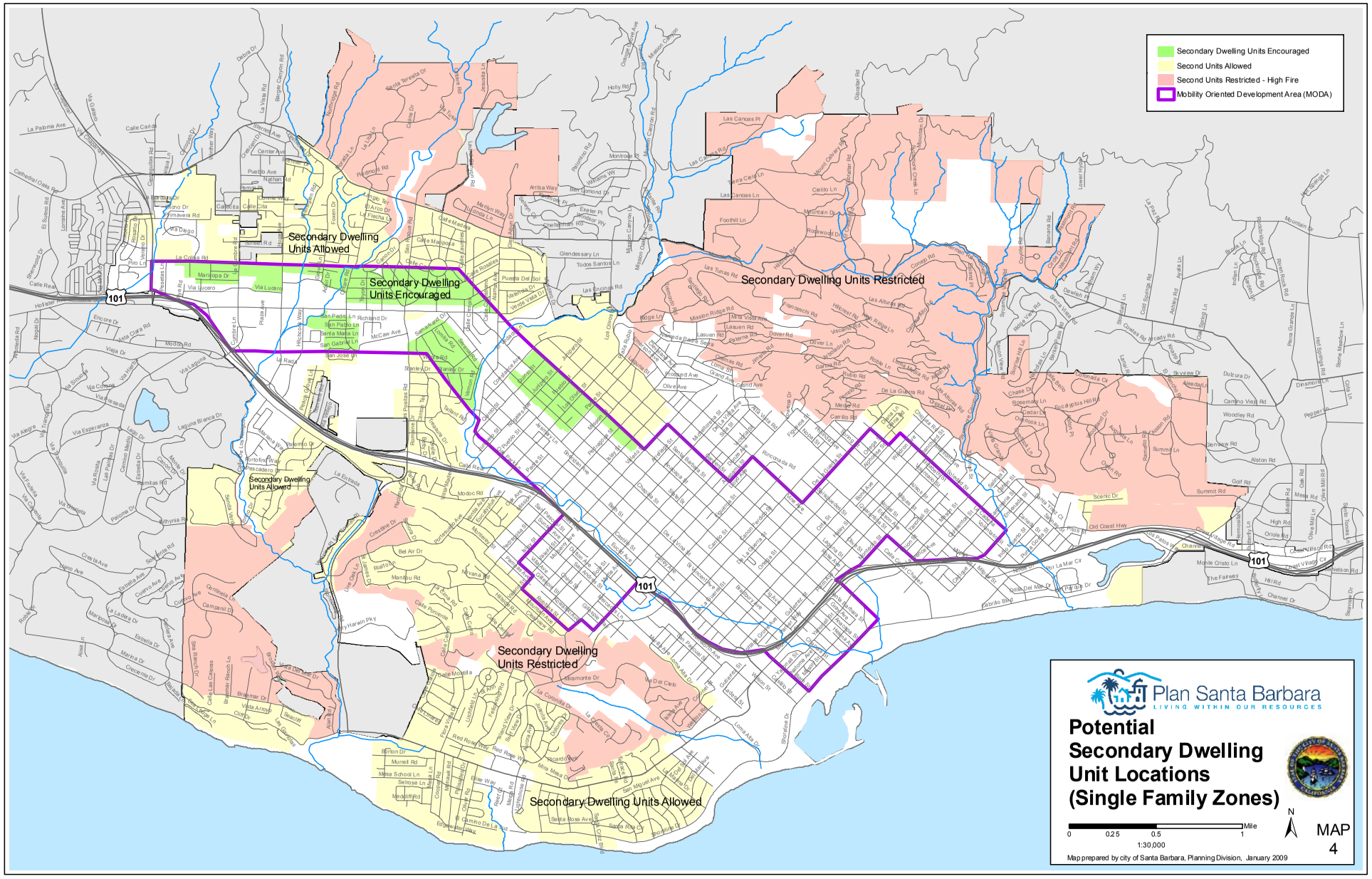
Second units (granny units) that are within 10-minutes walking distance from a main transit corridor and bus stop will be encouraged by providing incentives, such as revise development standards for second units. (e.g., eliminating the parking requirements for second units, eliminating the attached unit requirement, reducing development costs by allowing one water, gas and electric meter and a single sewer line for the main residence and the second unit, developing an amnesty program for illegal second units located within the MODA.) **(***See Map 4, Potential Secondary Dwelling Unit Locations.***)**

H15. **Preserve Existing Affordable Housing.** Preserve non-subsidized affordable rental housing. Explore ways to avoid condominium conversions, or alternatively, the possibility of cooperative tenant ownership of previous rentals, such as the use of public funding to provide mortgage or down-payment loans. Such funds could also fund new affordable rental development.

H16. **Property Transfer Tax. I**ncrease property transfer tax to provide funding for price-restricted affordable and workforce housing, in order to broaden the funding base.

H17. **Redevelopment Funding for Affordable Housing.** Continue to explore and pursue potential legislative amendments or other opportunities for extension or replacement of the Redevelopment Project Area and its funding mechanism for affordable housing and other community benefit projects.[1]

[1] The Central City Redevelopment Project (CCRP), established in 1972 and activated in 1977, will expire in 2015, at which time the Redevelopment Agency will lose its authority to take actions other than to complete existing projects and collect tax increments in the amount needed to service existing debt. Tax increment collection in the Project Plan is projected to reach the total tax increment cap of $431 million in 2018 or 2019. Changes in State law have redefined conditions constituting "blight" that provide the basis for Redevelopment powers, such that no areas of the City would be in such a decaying state as to qualify under the current State definition. Therefore, no opportunities to further extend or expand the existing Redevelopment Project are currently foreseen.


Secondary Dwelling Units Encouraged
Second Units Allowed
Second Units Restricted - High Fire
Mobility Oriented Development Area (MODA)
Secondary Dwelling Units Allowed
Secondary Dwelling Units Encouraged
Secondary Dwelling Units Restricted
Secondary Dwelling Units Allowed
Secondary Dwelling Units Restricted
Secondary Dwelling Units Allowed
Plan Santa Barbara
LIVING WITHIN OUR RESOURCES
Potential Secondary Dwelling Unit Locations (Single Family Zones)
N
MAP 4
0 0.25 0.5 1 Mile
1:30,000
Map prepared by city of Santa Barbara, Planning Division, January 2009

Circulation

Goals: Create a more multi-modal integrated transportation system that connects people, places, goods, and services by providing a choice of transportation modes that promote economic vitality, social equity, and healthy community, and decreases vehicle traffic congestion. Provide a comprehensive, integrated, and connected street network that serves all transportation modes equally.

OBJECTIVES

Objective C1: Public transit service and facilities, and miles of sidewalks, trails, bicycle paths and lanes have increased and/or been upgraded, and convenient links between the various modes are available.

Objective C2: A 50/50 mode share between the single occupant automobile and all other modes of travel within the City is achieved by the year 2020.

Objective C3: Traffic congestion has not increased or is less than the 2008 baseline study.

POLICIES

The draft framework policies for the Circulation Element mainly comprise minor revisions to existing policies. The proposed revisions are intended to further integration of circulation policies with the sustainability focus of new or revised framework policies in other elements, by giving greater emphasis to alternative modes of transportation and reassessing parking requirements to complement a people-oriented community.

Circulation Policies

C1. **Reduce Transportation Energy Use and Increase Alternative Transportation Infrastructure and Facilities.** Build high quality public right-of-way infrastructure and facilities that reduce Santa Barbara's dependence on petroleum for mobility by accommodating a diverse range of transportation options, including pedestrian enhancements, bicycle facilities, rapid transit, carshare, bikeshare, as well as improved intermodal connectivity.

C2. **Pedestrian Crossings.** Provide high quality pedestrian crossings as described in the Pedestrian Master Plan that result in a high rate of vehicle yielding at uncontrolled intersections.

C3. **Bike Lanes.** Give bike lanes designated in the Bicycle Master Plan a priority over curbside residential parking. Create more Downtown bike lane connections by regulating curbside parking during peak travel periods. Consider increased funding for bike-lane maintenance to encourage their use and maximize safety.

C4. **Personal Transportation.** Promote and provide incentives including the provision of funding, for shared-cost personal transportation options such as car-sharing and bike-sharing to increase personal mobility, reduce air pollution and green house gas emissions, reduce parking demand, and decrease cost of transportation to individuals in partnership with private interests.

C5. **Optimize Capacity.** Utilize Intelligent Transportation System (ITS) strategies (such as signal timing) to optimize capacity and improve safety for motor vehicles, bicycles, transit, and pedestrians.

C6. **Regional Commuter Transit.** Coordinate regionally with agencies and the private sector to establish viable rail, bus and carpooling options for commuters.

C7. **Intermodal Connections.** Provide intermodal connectivity at transit accessible centers, including the train depot, to support sustainable commute options such as feeder shuttles, bicycle storage facilities, bike-sharing, and car-sharing.

C8. **Excess Motor Vehicle Capacity.** Utilize excess motor vehicle travel and storage capacity, as well as right-of-way, for bicycle, transit, and pedestrian improvements.

C9. **Car-Free Zones.** Look for areas within the MODA that can be intermittently or permanently converted to car-free zones, and support utilizing public right of way for community events such as farmers markets.

C10. **Vehicle Speeds.** Advocate for new state legislation that promotes vehicle speeds that are designated and enforced with consideration of street design, adjacent land use, and mix of transportation mode usage.

C11. **Bus Pull-Out Right-of-Way.** To facilitate buses in turn-out pockets merging back into traffic, pursue changes in State regulations to require motorists to yield to a merging bus.

C12. **Transit Funding.** To provide the level of transit service needed, funding mechanisms will be studied.

Parking Policies

C13. **Appropriate Parking.** Establish requirements for on- and off-street parking in the Central Business District (CBD) appropriate to the parking users as follow:

a. Maximize availability of customer parking in the CBD;

b. Limit/discourage employee use of public parking in the CBD , and maximize employee commuting options to the CBD;

c. Manage and price public parking in the CBD so as not to put businesses in the CBD at a competitive disadvantage with other south coast shopping options; and

d. Change residential parking requirements and permitting programs in the CBD to maintain and/or increase the availability of on- and off-street customer parking.

C14. **Downtown Parking Requirements.** Update the boundary of the delineated area of the Central Business District to include more of the commercial area.

C15. **Parking Districts.** Assess existing and future parking districts to accommodate parking supply in districts such as Upper State Street, and Funk Zone.

C16. **Parking Maximums.** Create motor vehicle parking requirement maximums for new development within the MODA.

C17. **Residential Parking Program.** Revise the Residential Parking Program to exclude residential on-street parking in the commercial zones. The program currently offers parking permits for on-street parking to residents in selected residential neighborhoods adjacent to commercial zones but permits residents to park on streets all day in commercial zones within the program area.

C18. **Residential Parking Requirements within the MODA.** Reduce parking requirements and implement "unbundled" parking (i.e., selling residential units separate from parking stalls).

C19. **Residential Off-site Parking.** Amend the Zoning Ordinance to allow residential required parking off-site in commercial zones.

C20. **Bicycle, Parking and Other Needs.** Require all multi-family and commercial projects to be designed to meet the needs of bicyclists (i.e., secure parking, storage, lockers, showers, etc.).

Development Policies

C21. **Accessibility.** Make universal accessibility in the construction of all new development a priority for persons with disabilities, seniors, and other special needs populations in both public and private projects.

C22. **Trip Generation Rates.** Include all mobility options for surrounding land uses when developing site-specific trip generation rates and distribution characteristics of proposed land development.

Public Services and Safety

Goal: Ensure that public infrastructure and services are planned, sited, upgraded and maintained to meet present and future service needs efficiently, economically and in a manner consistent with a sustainable community, and emphasize safety and emergency preparedness as an integral part of land use planning.

OBJECTIVES

Objective PS1: Long range plans for essential infrastructure, services and emergency preparedness are up to date, consistent with the General Plan and one another, and are incorporated in the City's capital improvement programs.

Objective PS2: City infrastructure, facilities and services have capacity to meet existing and foreseeable demand.

Objective PS3: Conservation and management practices are maintained and/or improved.

POLICIES

Many of the framework policies included here for both public services/facilities and safety refer to existing programs, providing supporting policies, and linking them more effectively to land use planning.

Water and Sewer Policies

PS1. **Long-Range Water Supply Plan.** The City shall update and maintain the currency of the City Long-Range Water Supply Plan to accommodate needs for the next 20-year period, including measures addressing:

- Water supply changes from State Water Project, local surface and groundwater sources, recycled water use, the desalinization plant and water conservation,
- Water demand changes for both current and future development, population, and annexations, and
- Possible effects of climate change.

PS2. **Water Conservation Program.** Conservation of the City's water resources is the first priority in their management. To that end, the use of water conservation practices shall be encouraged for all development projects. In conjunction with this, continue and expand the City programs to encourage or require water conservation measures, such as services to water customers (e.g., free water check-ups, smart irrigation controller program, rain sensor rebate), public information and education measures to water customers, web site, elementary students, and Green Gardener training, and public brochures, videos, and advertising; water-conserving landscape design standards, City building conservation standards, and inverted block rate billing to promote conservation.

PS3. **Recycled Water.** Expand existing programs for use of recycled water for irrigation at parks, schools, golf courses and new development proximate to supplies. Evaluate methods to optimize the feasible use of recycled water in place of potable water, including potential system extensions, and additional uses such as toilet flushing in major commercial and recreational facilities.

PS4. **Groundwater Banking.** Investigate agreements with other water purveyors that have available groundwater storage capacity to store surplus water for later use during drought.

PS5. **On-Site Storage and Reuse.** Identify more detailed guidelines for use of cisterns and grey water in new development and retrofitting existing development.

PS6 **Agricultural Water Marketing Agreements.** Pursue with the County and other jurisdictions a regional approach to agreements with the agricultural industry to purchase water in times of drought for use by urban communities.

PS7 **Gibraltar and Cachuma Reservoirs.** Work with the County and other jurisdictions to prepare watershed management plans with the purpose of protecting and extending the useful life of the Gibraltar and Cachuma reservoirs.

Waste Management, Recycling and Disposal Policies

PS8. **Solid Waste Management Programs.** Continue and expand City recycling programs for resource reduction, reuse, and recycling of solid waste, such as City programs for construction and demolition waste; commercial, school, residential and City facilities and public spaces; foodscrap recovery and composting; waste conversion technology; and public outreach and education.

PS9. **Construction/Demolition Materials Reuse and Recycling.** Upgrade standard development requirements for recycling of construction/demolition debris or architectural salvage and incentives for use of renewable, or reused or recycled materials.

PS10. **Local Recycled Materials.** Promote the use of recycled carpeting, furnishings, wall coverings, and architectural salvage or other building materials – per LEED or comparable standards – in new construction and major renovations. Promote and/or support establishment of a local store for reusable and recycled building materials.

PS11. **Design and Space Requirements for Waste Management for Private Development.** Provide more detailed guidance on space needs and designs for recycling in both new development and to retrofit existing development.

Emergency Preparedness Policies

PS12. **Emergency Workforce.** Work cooperatively with other jurisdictions in the South Coast Region to ensure in the event of a disaster, essential workers are available and resourced to be able to respond adequately and with timeliness.

PS13. **Consideration of Disabilities in Emergency Planning.** Update evacuation plans and other emergency or contingency plans with provisions addressing the special needs and measures required to ensure the safety of people with disabilities.

APPENDIX D

REPRESENTATIVE DISTRIBUTION ASSUMPTIONS FOR FUTURE GROWTH

LEGEND

- Sphere of Influence
- City Limits
- Potential Future Growth Location
- Mobility Oriented Development Area (MODA)
- Public Facilities

LAND USE

- Commercial
- Multi-Family
- Duplex
- Single Family
- Industrial
- Park

Note: Please refer to Figures E.2, E.3, and E.4 for more details on potential development areas within the Downtown, the Upper State Street Corridor, and the Eastside Corridor.

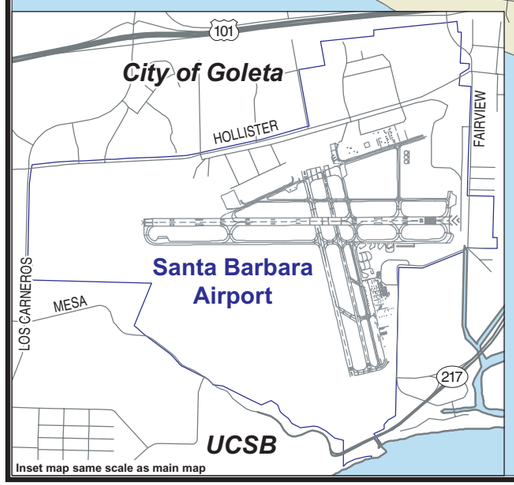
Source: City of Santa Barbara data 2008.

Annexations – *Annexations in areas such as Upper State Street, the Northside/upper La Cumbre Road and the Las Positas Valley may result in development of up to 403 units by 2030.*

Mobility Oriented Development Area (MODA) – *The 2,325 acre MODA would include the most developed ares of the City; areas linked by transit and conducive to walking/biking. The majority of future growth through 2030 is projected to occur within the MODA; 80% (358 acres) of the undervalued sites identified as Potential Future Growth Locations are within the MODA.*

Location of Future Growth – *New development would be focused toward commercial and multi-family zones, with approximately 459 acres of undervalued property identified as Potential Future Growth Locations; often sites with older single-story buildings and/or larger surface parking lots.*

Santa Ynez Foothills
GIBRALTAR
SAN ANTONIO CREEK ROAD
Tucker's Grove
CATHEDRAL OAKS
154
NORTHSIDE
192
Berger Canyon Creek
Cieneguitas Creek
LA CUMBRE
HOPE
SAN ROQUE
FOOTHILL
ONTARE
San Roque Creek
Lauro Reservoir
MISSION CANYON
Botanic Garden
Skofield Park
MOUNTAIN
Sycamore Creek
Parma Park
Westmont College
COLD SPRINGS
MONTECITO
HOT SPRINGS
SYCAMORE CANYON
EAST GOLETA VALLEY
101
TURNPIKE
San Marcos High School
HOLLISTER
La Cumbre Plaza
Municipal Golf Course
STATE
ALAMAR
MISSION CANYON
Mission Creek
RIVIERA
ALAMEDA PADRE SERRA
ANACAPA
CHAPALA
PUEBLO
SANTA BARBARA
GARDEN
MICHELTORENA
OLIVE
ANAPAMU
S.B. County Bowl
MILPAS
EASTSIDE
HALEY
SALINAS
ALSTON
S.B. High School
Atascadero Creek
Arroyo Burro Creek
MODOC
Earl Warren Showgrounds
Oak Park
HOPE RANCH
LAS PALMAS
More Mesa
LAS POSITAS
225
PORTESUELLO
WESTSIDE
MISSION
SAN ANDRES
BATH
CASTILLO
QUARANTINA
OLD COAST HIGHWAY
HOTSPRINGS
COAST VILLAGE
Andree Clark Bird Refuge
WATERFRONT
CABRILLO
Chase Palm Park
West Beach
East Beach
Stearn's Wharf
Harbor
LAS POSITAS VALLEY
CARRILLO
Arroyo Honda
S.B. City College
Elings Park
FLORA VISTA
Douglas Family Preserve
Arroyo Burro Beach
MESA
CLIFF
SHORELINE
Shoreline Park
Leadbetter Beach
Pacific Ocean
Pacific Ocean



Inset map same scale as main map

Figure E.1 Land Use, Potential Growth, and Mobility Oriented Development Area Overview

Plan Santa Barbara Draft Environmental Impact Report

City of Santa Barbara and Its Sphere of influence

Basemap prepared by amec

SCALE

0 750 1,500 3,000 Feet

0 0.25 0.5 1 Mile

1:36,000

1 inch equals 3,000 feet

NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

APPENDIX E: AIR QUALITY

Sources of Air Pollutants

On Shore Mobile Sources

Transit Corridors

A comparison of the 1990 and 2002 Census shows a 20% increase in the number of Santa Barbara County residents commuting 30 or more minutes to work. However, the 2007 Commuter Profile Survey conducted by the Santa Barbara County Association of Governments (SBCAG) Traffic Solutions, a Countywide rideshare organization, shows carpooling has increased in the last five years and people are driving to work alone less than the national average (SBCAG 2007a). The survey also shows that 71% of the County's residents drive alone to work and the remaining 29% use alternative transportation for commuting. According to the recent American Community Survey conducted by the U.S. Census Bureau, the national average rate for driving alone is 77% (U.S. Census Bureau 2006). The average commute for County residents is 14 miles, one-way, similar to what it was in 2002.

Commuters are also increasingly participating in alternative work schedules, as the number of people working a compressed work week (9-80 or 4-10 work schedules) or some alternative schedule has tripled over the last five years. The number of employees that telecommute as their primary commute mode has also doubled over the last five years. This survey was given in English and Spanish, and Spanish speaking respondents commute alone considerably less than English speakers, 43% vs. 78% respectively, and therefore Spanish speakers help to bring down the average rate at which the County commutes alone. This contributes to the County being below the nationwide average for alone commuting.

Recent studies show that children living near busy roads in Southern California can have substantial deficits in lung function and lung development, when compared to children living a mile away from busy roadways. Negative health effects also include an exacerbation of existing asthma conditions, increased absences at school, and potentially lung disease (Oosterlee et al. 1996, Brunekreef et al 1997, Gauderman et al. 2004). Although the exact cause of these health impacts is not known, links have been made between high levels of ozone and absentee rates at schools. In addition, diesel particulate matter, which is emitted from diesel-powered vehicles and equipment (e.g., trains, tractor-trailers), has been determined to be carcinogenic and toxic. Since diesel particulate matter is considered a "heavier" particulate, it typically is not transported as great a distance as smaller particulates, thus making people in closer proximity to these emissions more susceptible exposure (CARB 2008b).

Elevated air pollutant levels can persist near busy roadways, despite the presence and direction of wind (Baldauf et al. 2008). However, sound barriers or road-side structures, which are typically erected between a busy freeway and adjacent residences, can significantly decrease pollutant concentrations immediately behind the barrier (Baldauf et al. 2008).

In response to recent studies on children and air quality along busy transit corridors, in 2005 CARB released the Air Quality and Land Use Handbook: A Community Health Perspective, which strongly suggests siting new sensitive land uses (e.g., residences) greater than 500 feet from: freeways, urban roads (>100,000 vehicles per day), or rural roads (>50,000 vehicles per day).

Existing Ambient Air Quality

There are seven NAAQS, including carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), $PM_{2.5}$, and sulfur dioxide (SO_2). The CAAQS include these pollutants as well as sulfates, hydrogen sulfide, vinyl chloride (chloroethene), and visibility reducing particles. Although many of air toxic containments exist in the ambient air, these are the only pollutants that have standards in place.

Ozone. The majority of ground-level (or terrestrial) ozone is formed as a result of complex photochemical reactions in the atmosphere involving volatile organic compounds (VOCs), nitrogen oxides (NO_x), and oxygen. Ozone formulation is enhanced by warm temperatures and sunlight. Ozone is a highly reactive gas that damages lung tissue, reduces lung function, and sensitizes the lung to other irritants. Although stratospheric O_3 shields the earth from damaging ultraviolet radiation, terrestrial O_3 is a highly damaging air pollutant and is the primary source of smog.

Carbon Monoxide. CO is a colorless, odorless, poisonous gas produced by incomplete burning of carbon in fuel. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina and peripheral vascular disease. Other probable risk groups include fetuses, young infants, and pregnant women.

Nitrogen Dioxide. NO_2 is a brownish, highly reactive gas that can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Continued and repeated exposure to high concentrations of NO_2 may cause acute respiratory disease in children. NO_2 is an important precursor in the formation of O_3 or smog; therefore, control of NO_2 emissions is an important component of overall pollution reduction strategies. NO_2 is also a precursor in the formation of nitric acid and other aerosols which may affect aquatic and terrestrial ecosystems. The two primary sources of NO_2 in the U.S. are fuel combustion and transportation.

Sulfur Dioxide. SO_2 is emitted primarily from stationary-source coal and oil combustion, steel mills, refineries, pulp and paper mills, and from non-ferrous smelters. High concentrations of SO_2 may aggravate existing respiratory and cardiovascular disease; asthmatics and those with emphysema or bronchitis are the most sensitive to SO_2 exposure. SO_2 also contributes to acid rain, which can lead to the acidification of lakes and streams and damage trees.

Particulate Matter. PM_{10} is composed of dust, ash, soot, smoke, or liquid droplets emitted into the air by industrial sources, fires, construction activities, use of unpaved roads, and by natural sources like volcanic eruptions and wind-blown dust. Small-size particulates are most likely to cause adverse health effects because they can be inhaled into the thoracic or lower regions of the respiratory tract where they can cause aggravation of existing respiratory disease and decline in lung function.

Airborne Lead. Pb can be inhaled directly or ingested indirectly by consuming lead-contaminated food, water, or non-food materials such as dust or soil; fetuses, infants, and children are most sensitive to Pb exposure. Pb has been identified as a factor in high blood pressure and heart disease. Exposure to Pb has declined dramatically in the last 10 years as a result of the reduction in Pb in gasoline, paint, and the elimination of Pb from soldered cans.

Odors. Strong, unpleasant smelling odors are not considered unhealthful, or criteria pollutants, however they can generate public complaint. Some facilities known to cause odors include chemical manufacturing,

wastewater treatment plants, coffee roasting operations, painting operations, feed lots/dairies, composting facilities, landfills, and transfer stations. Although no regulations in federal or state air quality require odor control, any actions taken to reduce odors would derive from citizen complaints to local governments.

Toxic Air Contaminants. Toxic Air Contaminants (TACs) are also not criteria pollutants, in that federal and state ambient air quality standards have not been established. However, CARB and the USEPA regulate TACs and Hazardous Air Pollutants (HAPs), respectively, through the use of best (CARB) or maximum (USEPA) available control to limit HAP/TAC emissions. Federally, USEPA has established National Emission Standards for HAPs (NESHAPs), as required under the federal CAA Amendments. NESHAPs have resulted in federal Title V permitting, which are based on stationary source, technology specific regulations that limit allowable emissions of HAPs.

The California Air Resources Board (CARB) has the authority to regulate TACs from motor vehicles, fuels, and consumer products. TACs are primarily regulated under the Tanner Air Toxic Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), within California. The Tanner Act allows CARB to identify TACs through the use of public participation, scientific peer review, and research.

SBCAPCD works on a local level to regulate stationary source TACs, but evaluating TACs from all projects that require air quality permits. SBCAPCD assesses a TAC emitter's proximity to sensitive receptors (hospitals, schools, etc) and requires a health risk assessment for facilities that are in the "significant-risk" category, per AB 2588.

Existing sources of TACs in Santa Barbara County are primarily from off-shore oil drilling rigs and electric generating services, however the City of Santa Barbara itself does not contain any air toxic "hot spots".

Hot spots are typically industrial facilities, operating under an air quality permit through the SBCAPCD, and are required to perform health risk assessment (HRA) and report the findings to the nearby affected residents if the risk is above a certain threshold. The La Goleta facility, 0.7 miles east of the Santa Barbara Airport (SBA), at 1171 More Rd, is an industrial electrical facility which releases TACS, however HRA shows risks below SBCAPCD's notification thresholds. Approximately 2.3 miles west of SBA is the Ellwood generating station, another air toxics hot spot. Platform Holly, an off-shore oil rig, is approximately 1.5 miles southwest of the City of Goleta coastline, and its HRA also shows risks below notification thresholds (CHAPIS 2004).

Diesel-Exhaust Particulate Matter. Diesel-exhaust particulate matter (DPM) was recently added to the CARB list of TACs. DPM is the primary TAC of concern for mobile sources. Of all controlled TACs, emissions of DPM are estimated to be responsible for about 70 percent of the total ambient TAC risk. The CARB has made the reduction of the public's exposure to DPM one of its highest priorities, with an aggressive plan to require cleaner diesel fuel and cleaner diesel engines and vehicles (CARB 2008).

Ambient Air Quality

In 2005 there were 17 monitoring stations operating in Santa Barbara County, eight of which were operated by the SBCAPCD, the remaining stations were operated by CARB and the private sector.

City of Santa Barbara

The City has one ambient air quality monitoring station, which measures ozone, NO, NOx, NO2, CO, PM2.5, wind speed and direction and ambient temperature in the downtown area. Table 4.1-2 shows values for various air pollutant measured at that stations, any criteria pollutants not mentioned are not currently measured at that station (SBCAPCD 2005). There were no exceedances above standards for ozone in 2005, even though every year since 1988, the standards have been exceeded. No other criteria pollutant standards were exceeded at the Santa Barbara monitoring station in 2005. However, the City did have the highest concentrations of NO2 out of all monitoring stations in Santa Barbara County.

Clean Air Plan

The USEPA and CARB monitor the attainment classification of Santa Barbara County through the 17 air quality monitoring stations in the county. The attainment classification drives the clean air planning process, identifying which pollutants must be reduced in order to meet state and federal standards and determining deadlines for attainment.

The federal Clean Air Act Amendments of 1990 and the California Clean Air Act of 1988 mandate the preparation of Clean Air Plans (CAP) that provide an overview of air quality and sources of air pollution, and identifies pollution-control measures needed to meet federal and state air quality standards. The CAP also includes public comments, emissions forecasts, emissions inventories and an overview of planning efforts. The CAP affects the development of the SBCAPCD's rules and regulations and other programs. The Plan also influences transportation planning, allocation of funds designated for air quality projects, etc.

Since the County is classified as "moderate" nonattainment for the state 1-hour ozone standard, it must track and meet the following transportation performance standard: a substantial reduction in the rate increase of passenger vehicle trips and VMT. CARB has defined substantial reduction as holding growth in VMT and trips to the same growth rate as the population.

In August 2007 the APCD Board adopted the 2007 Clean Air Plan, an update to the 2004 CAP. The Plan was prepared to address California Clean Air Act mandates under Health and Safety Code sections 40924 and 40925 that require that every three years areas update their clean air plans to attain the state 1-hour ozone standard. The CAP also serves to help the County maintain attainment of the federal 8-hour ozone standard.

The 2007 Clean Air Plan has been adopted by the SBCAPCD and is currently under review by CARB and the USEPA. Previous plans developed to comply with the state ozone standard include the 1991 Air Quality Attainment Plan, the 1994 Clean Air Plan, and the 1998 Clean Air Plan. This 2007 Plan represents a partnership among the APCD, the SBCAG, CARB, the USEPA, local businesses, and the community to reduce pollution from all sources. The rules that are proposed in the 2007 Plan are directly included into the rulemaking priorities of the APCD. The measures that the 2007 Plan proposes on a near-, mid-, or long-term basis will be adopted by the APCD according to that schedule. The formal adoption of this 2007 Plan by the APCD Board of Directors establishes the commitments to adopt all proposed rules according to the schedule identified in the plan.

Transportation Control Measures

TCM's are listed in Table E-1 and measures proposed for adoption and further study can be found in the SBCAPCD's 2007 CAP. TCMs proposed for further study or adoption in the City include an ordinance against extended vehicle idling, residential parking programs, as well as incentives for van and carpooling, a high occupancy vehicle (HOV) lane on Highway 101, traffic flow improvements, and an extension of some existing TCMs.

Land Use

Stressing traditional neighborhood development with walkable access to public transport and a pedestrian oriented environment will help reduce single occupant vehicle trips. Obstacles to implementing Smart Growth principles include slow moving bureaucracies, lack of accountability, financial barriers, State fiscal policies with local governments, and various social obstacles. SBCAPCD suggests the reduction of VMTs, vehicle trips and peak hour travel will increase the quality of the County's air. Implementation of mixed-use development, encouraging infill and densification and increasing density near transit corridors will all help achieve these goals.

Specific land use strategies recommended for adoption by County and City planning agencies, outlined in the 2001 CAP include the following polices:

- *Cities and unincorporated communities should incorporate appropriately located compact development at densities that reduce trips and travel distances and encourage the use of alternative forms of transportation*
- *Urban growth should occur within the urban boundary lines of cities and unincorporated communities. Rural areas of the county should be maintained as open space, agricultural lands and very low-density residential development (20 acre or larger parcel size).*
- *Local planning agencies should encourage walking and transit use by planning neighborhoods and commercial centers at densities to allow for convenient access to, and use of, local and regional transit systems.*

Implementation of these policies would involve:

- *Local jurisdictions should adopt programs and standards that foster the development of vacant or underdeveloped land within existing community boundaries (infill property).*

- *Local jurisdictions should amend their land use regulations to allow higher density residential and commercial development when:*
  1. Urban services are capable of supporting higher densities.
  2. The development of higher densities is acceptable to the community and will not damage the character of historic areas in the community.
  3. The development has convenient access (within a 10 minute walk) to alternative means of transportation such as transit.

- *Local jurisdictions should strive to achieve higher densities in urban core areas in support of the regional transit system by:*
  1. Facilitating the Transfers of Development Rights to urbanized areas. Jurisdictions should use the Transfer of development Rights program to allow rural landowners to sell the development rights of their properties to land owners within community urban reserve lines or city limits.
  2. Increasing the use of incentives for projects with a residential component located in urban core areas.

- *Reducing or waiving processing fees and/or providing priority processing for urban core projects which satisfy established density criteria.*
- *Planning development and road systems to accommodate public transit.*
- *Allowing residential clustering along transit routes.*
- *In medium to higher density residential areas, jurisdictions should adjust existing standards to:*

(a) Encourage the development of apartments and condominiums within 500 feet of bus stops and transit stations.
(b) Encourage affordable housing and senior housing within 500 feet of bus stops and transit facilities.
(c) Discourage buildings less than two stories high in medium to high-density zones.
(d) Limit subdivisions of land into lots for single-household developments.
(e) Discourage projects of less than 20 housing units per gross acre within 500 feet of bus stops and transit facilities.
(f) Prepare design plans which provide for medium to high density while still maintaining a compatible, "livable" neighborhood.

- *In commercial neighborhoods, jurisdictions should adjust existing standards to:*

(a) Discourage buildings less than two stories high.
(b) Encourage developments with a floor/area ratio of 1.0 or higher.
(c) Encourage developments with 50 or more employees per gross acre.
(d) Discourage developments with less than 50 employees per gross acre within 500 feet of a transit stop.
(e) Discourage residential or mixed-use development of less than 15 housing units per gross acre within 500 feet of a bus stop or transit facility.
(f) Limit subdivisions of land into lots for single-household developments.
(g) Encourage development of residential units above ground floor commercial in the downtown core and other commercial neighborhoods.

- *Jurisdictions should adopt programs and standards that strictly limit the subdivision of land outside of community urban reserve lines.*

In previously subdivided areas beyond urban reserve lines, jurisdictions should establish Transfer of Development Rights programs to direct development to appropriate urban areas as well as programs that foster the development of clustered housing in situations where the Transfer of Development Rights is not possible.

Circulation Element

As previously discussed, air quality is linked to automobile use. The comprehensive goal and vision statement of the City's Circulation Element:

"While sustaining or increasing economic vitality and quality of life, Santa Barbara should be a city in which alternative forms of transportation and mobility are so available and so attractive that use of an automobile is a choice, not a necessity. To meet this challenge, the City is rethinking its transportation goals and land use policies, and focusing its resources on developing balanced mobility solutions. The language presented here, when taken together, will move the City in the direction of achieving the Vision."

Realization of the comprehensive goal and vision statement is furthered by the General Plan's policies and implementation strategies that seek to increase equality of convenience and choice among all modes of transportation, increase availability and use of transit, increase bicycling, and increase walking and other paths of travels. In order to assure that the community is moving towards the comprehensive goal and vision statement, every two years a monitoring report is prepared that evaluates, among other topics, "the

attainment of regional air quality standards." Finally, relative to environmental quality, the Circulation Element contains the following policy and implementation strategy:

Environmental Quality
Policy
2.3 The development and maintenance of mobility and utility systems should include consideration of the impacts and enhancements to Santa Barbara's environmental quality.
Implementation Strategy
2.3.2 Continue to review proposed mobility and utility projects for compliance with the Santa Barbara County Clean Air Plan and Air Quality Plan.

Table E-1: Existing TCM Commitments in Santa Barbara County, Which Have the Potential to Impact the City's Air Quality

TCM	Designation	CAP Year	Project Sponsor	Project/Program Description	Implementation Status
1-4	Travel Demand Management	1994/1998 /2004	Traffic Solutions	City-County TDM Program	Program On-Going
	Areawide Ridesharing		Traffic Solutions	County Rideshare Program	Program On-Going
	Work Schedule Changes		Traffic Solutions/Private Sector	Flexible Work Hours	Program On-Going
5	Public Transportation	1994	SBMTD SBMTD SBCAPCD City of Santa Maria City of Lompoc City of Solvang AMTRAK	Isla Vista-SBCC Express Service Downtown Waterfront Shuttle Clean Air Express Expansion SMAT Expansion – 1 30' Bus COLT Expansion SYVT Expansion Service Expansion	Service On-Going
		1998	County of Santa Barbara County of Santa Barbara	Goleta rail platform Surf rail platform	Service On-Going
7	Traffic Flow Improvements	1994	Caltrans County/Caltrans SBCAG/Caltrans SBCAG/Caltrans SBCAG/Caltrans County/Caltrans County of Santa Barbara City of Santa Barbara County of Santa Barbara	Crosstown Freeway Project Rte. 101/Patterson Ave. Rte. 101/La Cumbre Rte. 101/Storke Rte. 101/Betteravia interchange Rte. 101/Fairview Hollister/Fairview intersection Castillo/Montecito St interchange Signal Synchronization - Hollister	Completed
8	Parking Management	1994/1998/ 2004	City of Santa Barbara	Residential Parking Program	On-going
9	Park-n-Ride Lots	1998 50 μg/m3	County of Santa Barbara	Lompoc Park-n-Ride Lot Santa Maria Park-n-Ride Lot	Completed
10	Bicycle/Pedestrian 24-hr	1994	City of Santa Barbara City of Santa Barbara City of Santa Barbara	SBCC-East campus project Crosstown east-west bike lane Shoreline/Cabrillo bikeway	Completed
13	Old Car Buyback Program	1994/1998/ 2004	SBCAPCD	Vehicle Buyback Program (1996-1999, >2004)	Program On-Going
18	Alternative Fuel Program	1994	SBCAPCD	Innovative Technologies Group Program Clean Air Express Expansion	On-Going
19	Public Education	1994/1998/ 2004	SBCAPCD	Overall Work Program	On-going
		1998	SB Bike Coalition County of Santa Barbara	Bicycle Video Local Regulations for Electric Vehicles	On-Going

Source: SBCAPCD 2007a

Methodology and Assumptions for Air Quality Calculations

Construction Emissions

Air quality modeling of emissions growth from construction activities was performed using URBEMIS2007 (version 9.2.4) based on commercial and industrial square footage growth and the increase in single and multi-family residential units. URBEMIS defaults were used for the type and number of construction equipment and construction activity was divided into three Phases (paving, building construction, and architectural coating), and each Phase was assumed to occur over an entire year (2010) as a worst case scenario. Construction-related emissions were modeled based on the entire activity of *Plan Santa Barbara* occurring over a single year (2010) and then these total emissions were scaled over the 20 year life of the *Plan*, assuming construction would be spaced equally over the 20 year period. This represents a worst case scenario, as the construction equipment fleet mix (i.e., model year and efficiency of equipment) for the year 2010 is likely less efficient, and therefore generates pollutant emissions at a higher rate, than a fleet mix from future years. Standard URBEMIS dust mitigation was included in the model run, as the required County of Santa Barbara Dust Control Ordinance would serve to mitigate dust emissions. This mitigation reduces the amount of particulate matter (mainly PM_{10}) generated.

Vehicle (mobile source) Emissions

Air quality modeling of emissions growth from vehicles was performed using the EMFAC2007 ver. 2.3 burden scenario for summer 2010 in the South Central Coast Air Basin. The modeling was based on the projected increase in vehicle miles traveled (VMT). Projected increases in VMT was based on the traffic modeling developed for *Plan Santa Barbara* and its alternatives (provided in the *Plan Santa Barbara* traffic study, version received by AMEC on 13 Nov 09). Baseline emissions were calculated using existing VMT provided in the traffic study. Due to expectations for future technological advances and market conditions, some variation exists within projections of future emissions from vehicle sources. PM_{10} emissions for mobile sources include exhaust, brake wear, and tire wear, but do not include emissions from entrained road dust from travel on paved roads. The $PM_{2.5}$ fraction of PM_{10} is assumed to be 0.998 per the California Emission Inventory Development and Reporting System (CEIDARS) for internal combustion.

Area Source Emissions

Air quality modeling of area source emissions was performed using URBEMIS2007 (version 9.2.4) based on projections of commercial and industrial square footage growth and the increase in single and multi-family residential units. URBEMIS defaults were changed to assume no wood stoves would be included in new residential development and that 90 percent of residences would have natural gas fireplaces. Baseline area source emissions were calculated using commercial and industrial square footage and residential units obtained from the Development Trends Report provided by the City. Emissions estimates do not include stationary source emissions from potential future industrial development, as the nature of these industrial operations is currently not known.

Electrical Use (indirect) Emissions

Indirect emissions from electricity usage were calculated from energy usage data obtained from Southern California Edison (SCE) and Southern California Gas (refer to Section 7.0 *Energy*) and emissions factors from the USEPA publication: AP-42, 5th Edition. The percentage of coal and natural gas usage for electricity generation reflects data for Santa Barbara County as a whole, not specifically for the City. PG&E provides power to northern Santa Barbara County and SCE provides power to the southern part of the County. Therefore the percent of coal and natural-gas generated energy used in the calculations is the combination

of SCE and PG&E's energy portfolio. Emission factors for natural gas combustion are from AP-42 5th Ed. 1998, Table 1.4-1 and 1.4-2. Emission factors for coal combustion are from AP-42 5th Ed. 1996, Section 1.2. The $PM_{2.5}$ emission factor was assumed to be the same as the PM_{10} emission factor.

Greenhouse Gases and Commuting Table

Sources: Wong, W. and Agrawal A. 2004. Proposed Methodology to Model Carbon Dioxide Emissions and Estimate Fuel Economy - model year 2009, composite emission factor. Source for Average Commute Distance in the City of Santa Barbara: "Average Distance to Work for Workers that Work in the City of SB" Santa Barbara Traffic Solutions, Santa Barbara County Association of Governments (SBCAG) (excludes trips by bicycle). Average Commute Trip Distance for Workers in the Tri-Counties from SBCAG 2007 December – Travel Trends Report. *Notes:* Yearly emissions are based on 5 (days/week) x 52 (weeks/year) = 260 trips/year, with the average model year fleet mix for 2009, Emission Factor (gm/mile) x Mileage x 0.0022 (lb/gm) = Actual Emissions (lb/yr)/2000= Actual Emissions (tons/year).

APPENDIX F: HYDROLOGY AND WATER QUALITY

Individual Watershed Descriptions

Arroyo Burro Creek Watershed

Arroyo Burro Creek begins in the Santa Ynez Mountains and flows south until it empties into Arroyo Burro Beach (a.k.a Hendry's Beach). The watershed encompasses approximately 6,217 acres. It extends about seven miles from the ocean to the ridge of the Santa Ynez Mountains. Major tributaries to Arroyo Burro Creek include Las Positas Creek, Barger Canyon, and San Roque Creek. There are also two minor tributaries on each side of Northridge Road that empty into Arroyo Burro Creek through storm drains. A small tidal lagoon is present at the end of the creek at Arroyo Burro Beach. The upper portions of the creek traverse rural estates and orchards, while the middle portions of the creek cross dense residential and commercial development between Foothill Road and U.S. Hwy 101. Downstream of U.S. Hwy 101, the creek traverses a mixture of residential areas and open space (City of Santa Barbara 2005a). Arroyo Burro Creek has perennial flow in the upper San Roque tributary, along portions of the creek north of Highway 101, and in the Las Positas Valley.

Laguna Channel Watershed

The Laguna Creek Watershed is comprised of approximately 2,020 acres of almost entirely urban land on the southeast side of Santa Barbara. The watershed is bounded on the north by the foothills, on the east by Quarantina Street, on the west by State Street, and on the south by the Santa Barbara Channel. Near the foothills is a small upland area with oak woodland and chaparral vegetation; most of the remaining portion of the watershed is residential, with the area nearest Laguna Creek and just above and below Highway 101, commercial. Flooding is a major concern in this watershed, in part from flood flows that break out of lower Mission Creek. Laguna Creek is a remnant of a large estuarine area that was originally located on the east side of downtown. The channel contains both earthen and fully lined concrete reaches. There is a tide gate at the mouth of the channel to prevent tidal influx. The creek empties at the beach across from Chase Palm Park. Most of the runoff from the highly developed east side of the City is conveyed to Laguna Creek through underground storm drains. The channel has a very low gradient and the upstream areas are prone to flooding. The area upstream of the park, behind El Estero Wastewater Treatment Plant, is mixed-use commercial and industrial. The remainder of the creek upstream of this area (within the central portion of the City) is culverted or underground, limiting restoration values; only the lower 3,100 feet of the Laguna Creek remains open, although this channel has been substantially altered and straightened. There are also several secondary tributary channels south of Alameda Padre Serra that feed into the Laguna drainage system (City of Santa Barbara 2005b).

Mission Creek Watershed

The Mission Creek Watershed extends approximately 7.5 miles from the Santa Ynez Mountains to the ocean and covers approximately 7,400 acres. The Los Padres National Forest encompasses 47 percent of the overall watershed. Out of the forest, Mission Creek winds its way through highly urbanized areas until it reaches the ocean east of Stearns Wharf. The two main tributaries of Mission Creek are Las Canoas Creek and Rattlesnake Creek, which converge near Foothill Road. Other tributaries include West Mountain Drive

drainage in the upper watershed, Foothill Tributary, located east of middle Mission Creek, and Old Mission Creek tributary, west of U.S. Hwy 101 (City of Santa Barbara 2005b).

Sycamore Creek Watershed

The Sycamore Creek Watershed is relatively short compared to the other watersheds in the City. Originating in the chaparral of Los Padres National Forest, it contains five major tributaries in the foothills: the main stem, beginning near Sheffield Reservoir, Parma Park tributaries, Coyote Creek, Westmont Creek, and Chelham Creek, a tributary east of Westmont Drive. These tributaries all converge near the intersection of Sycamore Canyon Road and Stanwood Drive in a deep canyon with landslide-prone hills. The creek follows a narrow canyon to Alameda Padre Serra, where the grade decreases and traverses a medium-density residential and commercial area. This middle and lower reach floodplain area is approximately 90 percent developed, with areas of significant flooding problems. The creek empties into the ocean at East Beach, where a sandbar forms a small lagoon. Sycamore Creek has year-round water in the foothills and in a few locations along the lower creek reaches.

Table 3-1. Land Jurisdiction

Watershed		Jurisdiction			
		County Unincorporated	City of Santa Barbara	Los Padres National Forest	Total
Arroyo Burro	*% of Watershed*	*10*	*45*	*45*	-
	Acreage	574	2,537	2,522	5,633
Mission Creek	*% of Watershed*	*15*	*41*	*44*	-
	Acreage	1,141	3,021	3,256	7,418
Sycamore Creek	*% of Watershed*	*21*	*55*	*24*	-
	Acreage	550	1,427	613	2,590
Laguna Creek	*% of Watershed*	*2*	*98*	*0*	-
	Acreage	39	1,983	0	2,022
TOTAL ACREAGE BY JURISDICTION		2,303	8,968	6,392	17,663
TOTAL PERCENTAGE BY JURISDICTION		*13%*	*51%*	*36%*	

(Creeks Existing Conditions Study)

Additional Creeks

In addition to those described above, three other major creeks are located within Santa Barbara. These creeks include Arroyo Honda, Lighthouse Creek, and Cieneguitas Creek. Arroyo Honda is a short creek beginning at Leadbetter Beach and draining the Honda Valley to its headwaters at Carrillo Street. Lighthouse Creek is also a short creek which begins at Lighthouse Beach and extends to Cliff Drive. Laguna

Channel is a created channel that extends from the Stearns Wharf area to U.S. Hwy 101. The former intermittent creeks above the new channel are now contained in an underground storm drainage system. Cieneguitas Creek crosses U.S. Hwy 101 south of the City Limits, and drains into Atascadero Creek (and eventually, Goleta Slough), through the Hope Ranch Annex area. This creek includes portions from Foothill Road downstream through La Colina Junior High School, and La Barbara Drive east of San Marcos Pass Road, southwest to lands owned by Saint Vincent's School. Santa Barbara's creeks also include portions of Lower and Upper Tecolotito Creeks, Carneros Creek, Lower and Upper San Pedro Creeks, and Las Vegas Creek ("Airport creeks"), all part of the Goleta Slough watershed that traverse Santa Barbara Municipal Airport lands.

Creek Surface Water Quality

Lower Mission Creek has the poorest water quality of all the creeks. Bacteria are present throughout the year and there are ongoing problems with other pollutants, trash, and homeless encampments. The lack of natural stream bottom, wetlands, and riparian buffers, reduces the potential for natural filtration of pollutants.

During the rainy season as well as in the dry season, Arroyo Burro Beach is often posted with water quality warnings about bacterial pollution. Sediment, landscape debris, trash, pet waste and household products (cleaners, pesticides and fertilizers) also pollute the creek. Pollutants enter the creeks at many of 119 storm drain outlets. Water quality in Sycamore Creek is better than the other creeks, although during storms there are high levels of sediment and bacteria. Littering and illegal dumping occur in the lower watershed on a year-round basis.

Laguna Channel carries ground water, urban runoff and storm water to the ocean at East Beach. Water quality concerns include bacteria and other urban pollutants such as sediment, hydrocarbons, and pesticides (City of Santa Barbara 2007).

The following discussion provides information on the City's storm-event sampling, followed by background information and summary results for each constituent group. The information presented is not numeric, but the narrative represents information that has been collected in order to get a sense of the pollutants that the City should be most concerned about, and therefore focus its BMPs to reduce pollutants to the maximum extent practicable.

Nutrients. Nitrogen has not been found to be a consistent problem at any of the monitoring sites. Ammonia levels were lower than those known to cause toxicity. Nitrite was not detected in any samples. Nitrate levels were above EPA benchmark levels in several samples but were not high enough to cause eutrophication. Orthophosphate was below detection limits in nearly all samples. However, total phosphorus was above National Water-Quality Assessment eutrophication benchmarks in all cases.

Bacteria. Indicator bacteria have exceeded recreational contact standards in nearly all stormwater samples, often by orders of magnitude. However, current indicator-based standards are based on health studies where people were exposed to human fecal wastes. The relevance of these indicator standards where human fecal wastes have not contaminated storm water is questionable.

Metals. With the City's storm water monitoring efforts to date, several metals have never been detected, including lead, copper, arsenic, cadmium, mercury, nickel, and silver. Chromium and copper have been

detected infrequently and at levels below EPA benchmarks. Magnesium, iron, potassium and zinc have been detected in most cases but levels are not thought to be of concern.

Hydrocarbons. Although oil and grease was present in some samples, levels were well below the EPA benchmark. Similar results were found for Total Petroleum Hydrocarbons.

Pesticides. To date the City has tested for pesticides (Glysophate, Diazinon and Malthion) during one storm event. Of eleven sites, only malthion was detected, and only at a single site.

Total Suspended Solids (TSS). Sediment loads were low during the first two water years and extremely high during 2004/2005 due to large rain events.

Total Dissolved Solids (TDS). Results for TDS have been sporadic, with a few samples returning values above drinking water standards.

Individual Groundwater Basin Descriptions

Foothill Groundwater Basin. This 3,000-acre (4.5-square-mile) groundwater basin is bounded on the south by faults (Modoc, Mesa and Mission Ridge Faults) and on the north by the exposed bedrock of the Santa Ynez Mountains. The basin is situated within the northern part of the City of Santa Barbara and in the northeastern part of the Goleta area. The Santa Barbara Formation, which is the primary aquifer of the basin and estimated to be 400-feet thick, is comprised of unconsolidated marine sand, silt, and clay. Residential development dominates the groundwater basin, with some orchards present along the northern edge of the basin. The City of Santa Barbara, the La Cumbre Mutual Water Company, and private landowners are the three main users of this groundwater basin (City of Santa Barbara 2005b). Available storage of the Foothill Basin is estimated to be 5,000 AFY with a safe yield estimated to be 953 AFY (County of Santa Barbara 2005).

Santa Barbara Groundwater Basin. This 4,500-acre (7-square-mile) groundwater basin underlies nearly the entire city south of the Mission Ridge fault. The basin is bounded on the north and west by faults, and by the ocean on the south. The boundary to the east is an arbitrary line separating the Santa Barbara Groundwater Basin from the Montecito Groundwater Basin that does not reflect any known hydrologic or geologic barrier. The Santa Barbara Formation, comprised mainly of marine sands, silts and clays, is the primary aquifer for this basin. Dominant land uses include urban residential, industrial, and commercial uses. Groundwater from the basin also supplies a few private businesses and homeowners (City of Santa Barbara 2005b). According to the 2005 Santa Barbara County Groundwater Report, available storage supply within the Basin is estimated to be roughly 10,000 AFY, with a safe yield of 847 AFY (County of Santa Barbara 2005).

Montecito Groundwater Basin. This 4,300-acre (6.7 square mile) groundwater basin, comprised of unconsolidated non-marine deposits, is located along a narrow strip between the Santa Ynez Mountains and the Pacific Ocean. A small part of the Sycamore Creek Watershed is located in this basin and the Casitas formation is the primary aquifer for the basin. The Arroyo Parida and Montecito Faults separate the groundwater basin into three storage units, with the thickest sections of water-bearing sediments located north of the Arroyo Parida Fault and south of the Montecito Fault. Parcels in this area are one acre or more, with agriculture limited to scattered orchards (City of Santa Barbara 2005b). Available storage supply within the Basin is estimated to be roughly 14,400 AFY with a safe yield of 1,350 AFY (County of Santa Barbara 2005).

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APPENDIX G: NOISE

Introduction

DEFINITIONS OF COMMON NOISE TERMS

Decibel, dB: A unit of measurement describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

A-Weighted Level: The sound level in decibels as measured on a sound level meter using the A-weighting filter network.

L10: The A-weighted sound level that is exceeded ten percent of the measurement period. Similarly, L50, L90, etc.

L_{eq}: Equivalent energy level. The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given measurement period. L_{eq} is typically computed over 1-, 8-, and 24-hour sample periods.

CNEL: Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night from 10 p.m. to 7 a.m.

L_{dn}: Day-Night Average Level (Also abbreviated as DNL). The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of 10 decibels to sound levels in the night after 10 p.m. and before 7 a.m. (Note: CNEL and L_{dn} represent daily levels of noise exposure averaged on an annual or daily basis, while L_{eq} represents the equivalent energy noise exposure for a shorter time period, typically one hour.)

Noise Contours: Lines drawn about a noise source indicating equal levels of noise exposure.

Ambient Noise: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Intrusive Noise: That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence, and tonal or informational content as well as the prevailing noise level.

Noise is defined as unwanted or objectionable sound. The important physical characteristics of environmental noise include frequency (pitch), amplitude (loudness) and duration. The effects of noise on people can be grouped in three general categories: 1) subjective effects, such as annoyance and nuisance; 2) interference with activities, such as speech and sleep; and 3) physiological effects, such as startleand hearing loss. According to the Environmental Protection Agency, damage to the human ear can occur from exposure to noise levels averaging above 70 dBA for extended periods. Permanent hearing damage can occur at 80-85 dBA, if sustained over 8 hours over the course of a worker's career.

The standard unit of sound measurement, which includes both loudness and frequency, is the decibel, abbreviated "dB". Filters are used with sound level measuring equipment to emphasize various frequency or pitch ranges. The "A" filter is most commonly used since it comes closest to matching the frequency response of the human ear, and decibels are then abbreviated as "dBA".

Sound pressure levels measured in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a tenfold increase in sound pressure or acoustic energy, an increase of 20 dBA represents a hundredfold increase, and a 30 dBA increase represents a thousandfold increase. Zero dBA is the faintest sound a good human ear can hear. The upper limit is approximately 140-160 dBA. The ear begins to feel pain at about 120 dBA. The average range of sounds that we are commonly exposed to generally falls in the 30 to 100 dBA range. However, not all sound waves affect us equally. The human ear is more sensitive to high pitch sounds, such as a whistle, than it is to low pitch sounds, such as a drumbeat.

People generally have the ability to distinguish one sound from a background of sounds, such as a telephone ringing over music. However, certain noise levels can render a sound inaudible, for example, when heavy trucks interfere with a conversation. Face-to-face conversation usually can proceed where the noise level is up to 66 dBA, group conversations up to 60 dBA, and public meetings up to 55 dBA, without interruption.

Sleep interference is more difficult to quantify, although studies have shown that progressively deeper levels of sleep require louder noise levels to cause a disturbance. The California Building Code establishes 45 Ldn as the maximum interior sound level (attributable to exterior sources) in any habitable room for new hotels, motels, and residential structures. Interior noise standards of 45 Ldn should protect against sleep interference in most typical urban noise environments.

It is difficult to specify noise levels which are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. In general, a one dB change in noise level is imperceptible, a three dB change is just barely noticeable, a six dB change is clearly noticeable, and a 10 dB change is about twice (or half) as loud. Sound diminishes at the rate of 6 dB for each doubling of distance from a point source. Sound diminishes at a rate of 3 dB for each doubling of distance from a line (e. g., highway) (City of Santa Barbara 2005).

Noise Element

The following key Policies and Implementation Strategies are included in the Noise Element of the General Plan:

- Existing and potential incompatible noise levels in problem areas should be reduced through land use planning, building and subdivision code enforcement, and other administrative means.
    - Locate proposed developments in the City on the Noise Contour Map to determine if there is a potential impact on the development or, conversely, if the development will increase noise levels in a relatively quiet area. The development review and environmental review process should include a further analysis in areas of potential impact.
    - Discourage development of noise sensitive uses in incompatible noise-impacted areas, particularly adjacent to Highway 101, the Municipal Airport, and the Southern Pacific Railroad.
    - In existing or future development in noise-impacted areas, especially surrounding the Municipal Airport, encourage or require through ordinance that proper site planning and insulation measures be taken to reduce noise to established levels.
    - Require public housing constructed in noise conflict areas to incorporate noise attenuation measure in site design and construction techniques and materials such that HUD guidelines are met.
- Existing and potential incompatible noise levels in problem areas should be reduced through operational or source controls where the City has responsibility for such controls.
    - Establish routes for use by heavy trucks away from noise sensitive land uses.
- Noise control activities should be coordinated with those of other responsible jurisdictions.
    - Encourage the State Department of Transportation (CALTRANS) and the County Engineer to incorporate noise reduction methods, such as barrier walls, in new road construction and improvements to existing roadways.

Projected Noise Calculations

Projected noise level increases over baseline conditions along major transportation corridors for all scenarios were calculated based on the projected increase in average daily traffic (ADT) volumes using the following formula: dBA=10Log10(Projected ADT/2008 ADT).

The horizontal expansion of existing noise contours along selected roadway segments in the City were estimated using the following formula: L2=L1+10Log(d1/d2); where L1 is the projected noise level at the outward extent of the existing contour, L2 is the projected noise level at the outward extent of the new expanded contour, d1 is the distance from the roadway to the outward extent of the existing contour, and d2 is the distance from the roadway to the outward extent of the new expanded contour.

These calculations relied on existing noise levels and exposure as described in the City of Santa Barbara Master Environmental Assessment, Geospatial Data Update, Noise Report (2008). Existing and projected ADT volumes were taken from Fehr & Peers' technical memorandums for future traffic condition models (Fehr & Peers 2009a; 2009b).

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APPENDIX H

PUBLIC UTILITIES

WATER DEMAND FACTOR UPDATE REPORT

Prepared by Water Resources Division, City of Santa Barbara,
in conjunction with the Planning Division, City of Santa Barbara

October 2009

Background

In 1989, the City of Santa Barbara contracted with Interface Planning and Counseling Corporation to prepare the "Water Demand Factor and Conservation Study." Demand factors for various land use categories were developed for use in estimating water use of proposed development as a part of the environmental review process. In support of the ongoing *Plan Santa Barbara* process, staff of the Water Resources Division, in conjunction with the City's Planning Division, have prepared this update of the factors that are of particular interest as a part of *Plan Santa Barbara*.

Water consumption for various land use categories has been analyzed for calendar years 2006 and 2007. These years represent two different weather patterns that influence water use. Precipitation during the calendar year 2006 can be considered average, while 2007 was one of the driest years on record. The data have been reported as overall averages to provide an indication of how different weather patterns contribute to typical long term average water usage. Water use is measured in "Hundred Cubic Feet" (HCF), equal to 748 gallons, "Acre-Feet" (AF) equal to 325,850 gallons, and "Acre-Feet per Year" (AFY).

Methodology

The general methodology for calculating the demand factors involved joining land use data, generated by the Community Development Department, with consumption data from the City's Utility Billing System. The link between the two databases is the Assessor Parcel Number (APN). The land use database contains square footage (for commercial properties) and lot size values used in calculations. Water use through dedicated irrigation meters has been included to the extent the correct APN was identified. Therefore, all demand factors include both indoor and outdoor water use.

Data Sources

- A report from the City of Santa Barbara CIS Utility Billing System titled "Parcel Consumption Data" provided consumption data. The report was written to export account number, customer number, APN, consumption, and read date for 1/1/06 through 12/31/07.
- Land use data came from the Land Use Database established by the Community Development Department. This is a geodatabase that assigns a specific land use category to each parcel within the City limits (e.g., single family or multiple-family residential, service commercial, retail, office, institutional, etc.). This database was developed on a parcel-by-parcel basis and verified by field observation.

Data Analysis

- Specific lists of parcel numbers for a given land use category or lot size for a single family residence were determined using the GIS tool "Select by Attributes". The specific land uses and/or lot areas were selected and only the parcel numbers with those attributes were included in the output. A new layer was created from the output and the table exported to an Access database.
- To link the land use data with water use, the lists of parcel numbers generated in GIS were joined with the "Parcel Consumption Data" report containing water usage data from January 2006 through December 2007. The join was designed to find matching parcel numbers from both lists and exclude parcel numbers that were not common to both lists. Therefore, APN's missing from either the billing system or land use database were excluded from these analyses in order to focus on parcels known to fit the desired category.
- For non-residential uses, building square footage data was included in the water use analysis. Therefore, the joined list of water use and parcels within a certain land use category was merged with the area data from the original land use database. The parcel list was evaluated to ensure that the square footage data did not include parcels that were not joined to water use data.
- Multi-family accounts were analyzed on a bill code basis, as the use of APN can be problematic with this customer class. For example, each condominium is assigned a separate APN, so there is not a consistent one-to-one relationship between the APN for an irrigation account and the corresponding domestic accounts it serves.
- Irrigation accounts for multi-family properties were reviewed based upon service address to ensure the corresponding domestic accounts were also included in the database.

Data Quality Considerations

- Data extremes, likely representing extraordinary water use due to leaks, fire, or water wasting, have not been identified or removed. It is appropriate to include this type of usage, as it contributes to overall demand.
- There are times when meter reading is delayed and one month's reading actually reflects usage values over two months or more. However, this occurrence is not very frequent and does not affect overall annual averages.
- With regard to the land use database, if the land use had changed or the size increased or reduced since the last update, it could also introduce minor inaccuracies.

Presentation of Water Demand Factors

The demand factors presented in Table 1 are intended as indicators of typical water use by various land use categories. A breakout of values for 2006 and 2007 is included in Appendix A. Non-residential water use categories are Retail, Office, Hotel, Institutional, Service Commercial, and Industrial. Residential water use is generally divided between single family and multi-family residential users, with additional analysis of subsets as discussed below.

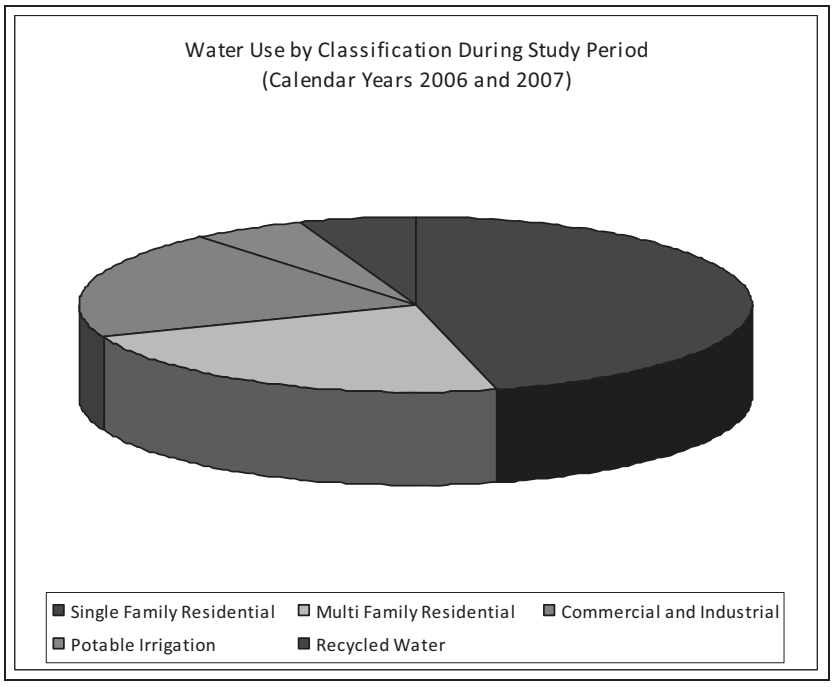

Figure 1. Water Use By Class

The non-residential user groups can be considered general headings for more specific land uses. The Service Commercial category encompasses restaurants, bars, auto service stations, banks, theatres, and

health services. The Institutional category includes educational services, hospitals, government buildings and agencies, public safety, and religious institutions. While schools are considered an Institutional use, water use from schools is not included because the data is based on the number of students and therefore not appropriate to include with data calculated on a square footage basis. Laundromats, shopping malls, grocery stores, and consumer goods fall under the Retail category. The Office category contains general office space. Hotels include hotels, motels and bed & breakfast inns. Manufacturing, warehousing, and construction related business are classified as Industrial land uses. A listing of the specific categories is included in Appendix B.

Table 1. Water Demand Factors 1989 and 2009

(All values include indoor and outdoor usage)

Land Use Category (2009 Study)	1989 Study Values	2009 Study Values	Monthly Units	1989 Study Values	2009 Study Values	Annual Units
Single Family Residential (Aggregate)	18.00	14.40	HCF/month/ dwelling unit	0.50	0.40	AFY/ year/ dwelling unit
Single Family - Small Lot size < 7000 ft^2	11.43	9.49	HCF/month/ dwelling unit	0.32	0.26	AFY/ year/ dwelling unit
Single Family - Medium Lot size 7000 ft^2 to 1 acre	18.24 – 30.42	15.09	HCF/month/ dwelling unit	0.51 – 0.85	0.42	AFY/ year/ dwelling unit
Single Family - Large Lot size > 1 acre	51.57	34.45	HCF/month/ dwelling unit	1.44	0.95	AFY/ year/ dwelling unit
Multi-Family Residential (Aggregate)	7.33	5.72	HCF/month/ dwelling unit	0.20	0.16	AFY/ year/ dwelling unit
Service Commercial	N/A	6.18	HCF/month/ 1000 ft^2	N/A	0.17	AFY/ year/1000 ft^2
Retail Large: > 20,000 ft^2 Small: < 20,000 ft^2	 2.43 3.93	(Retain 1989 values)	 HCF/month/ 1000 ft^2	 0.068 0.11	(Retain 1989 values)	 AFY/ year/1000 ft^2
Office	3.57	2.06	HCF/month/ 1000 ft^2	0.10	0.06	AFY/ year/1000 ft^2
Industrial	2.49 – 5.37	2.84	HCF/month/ 1000 ft^2	0.07 – 0.15	0.08	AFY/ year/1000 ft^2
Institutional	N/A	6.11	HCF/month/ 1000 ft^2	N/A	0.17	AFY/ year/1000 ft^2
Hotel/Motel	4.65	4.81	HCF/month/ room	0.13	0.13	AFY/ year/room
Hotel/Motel with Restaurant	5.37	7.17	HCF/month/ room	0.15	0.20	AFY/ year/room

All values in Table 1 include both indoor and outdoor water usage. Dedicated irrigation meter usage was included to the extent the data were able to be matched to the appropriate domestic service account. Lot size definitions for single family residences were slightly different for the 1989 study. Refer to Appendix B for the specific designations.

Because no aggregate single family residential value was represented in the 1989 study, the 1989 aggregate value is based on metered usage and estimated irrigation usage for calendar year 1989. The same is true for the aggregate multi-family residential value, as there were several sub-categories of multi-family use specified in both the 1989 and 2009 studies, as noted in Appendix A.

1989 values are noted as N/A (Not Applicable) for the Service Commercial and Institutional land uses, as the user group definitions and units of measuring water use were not consistent between the 1989 study and the current update. For example, Restaurant data was previously based on number of seats, Hospital data on number of beds, and School data on number of students. 2009 data for non-residential groups was consistently based on square footage, and therefore not comparable. The exception was hotel data, which was based on number of rooms, as were the 1989 values.

A value of 5.37 HCF/month/1,000 ft^2 was calculated for the 2009 Retail category as defined in the Planning Division Land Use Database. However, because this land use category now includes high usage categories such as Grocery Stores and Laundromats, use of this value is not recommended and the 1989 values of 2.43 for Large Retail (>20,000 ft2) and 3.93 for Small Retail (<20,000 ft2)are included in Table 1.

The 2009 value for Hotels/Motels with restaurants (7.17 HCF/month/room) is one of the few that is greater than the 1989 value. Investigation revealed that the highest data point in the new analysis was well above the highest value in the old database, suggesting that perhaps the old sample was not inclusive of such higher use. With the highest data point excluded, the value calculates at 5.65 HCF/month/room, which is similar to 1989 data; however the 7.17 value is considered valid and is retained.

Subset Analysis of Multi-Family Residential Water Demand

Further analysis was completed on subsets of multi-family residential water use to examine usage by neighborhood, by different types of multi-family land uses, and by age of buildings

For neighborhood analysis, the multi-family database was broken into five neighborhoods based on meter reading route books: Riviera, Downtown East, Downtown West, Mesa, and Upper State, as shown in Figure 2.

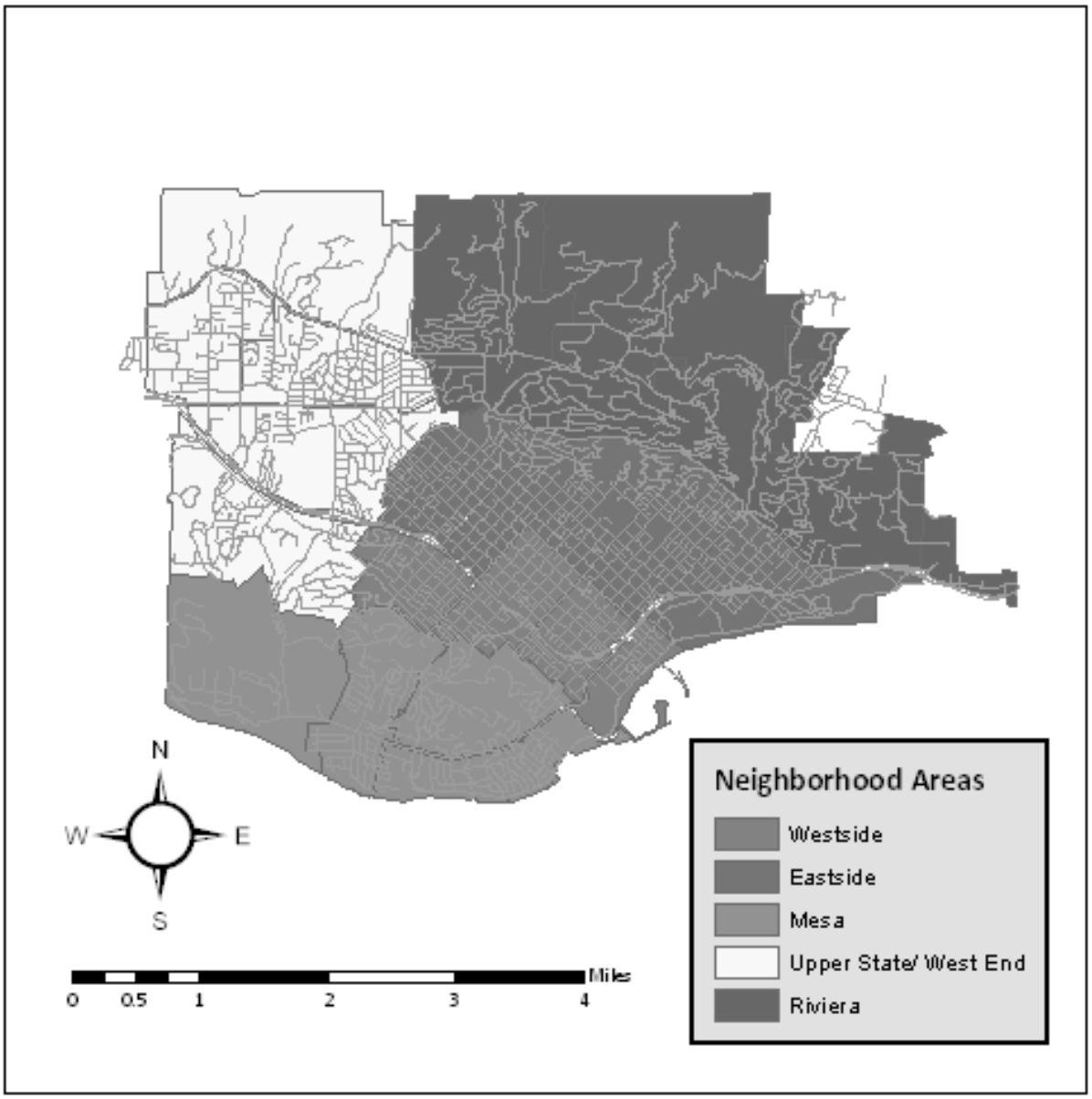

Figure 2. Neighborhood Areas

Results are summarized in Figure 3. While the overall water use patterns are similar among the groups, the Riviera neighborhood showed the greatest use compared to the other neighborhoods. All four of the other neighborhoods exhibit roughly the same range of use, varying from approximately 5 HCF per

month to 7 HCF per month throughout the year. Greater usage in the Riviera neighborhood supports the notion that there are larger lot sizes, and therefore more water used for irrigation, in this area.

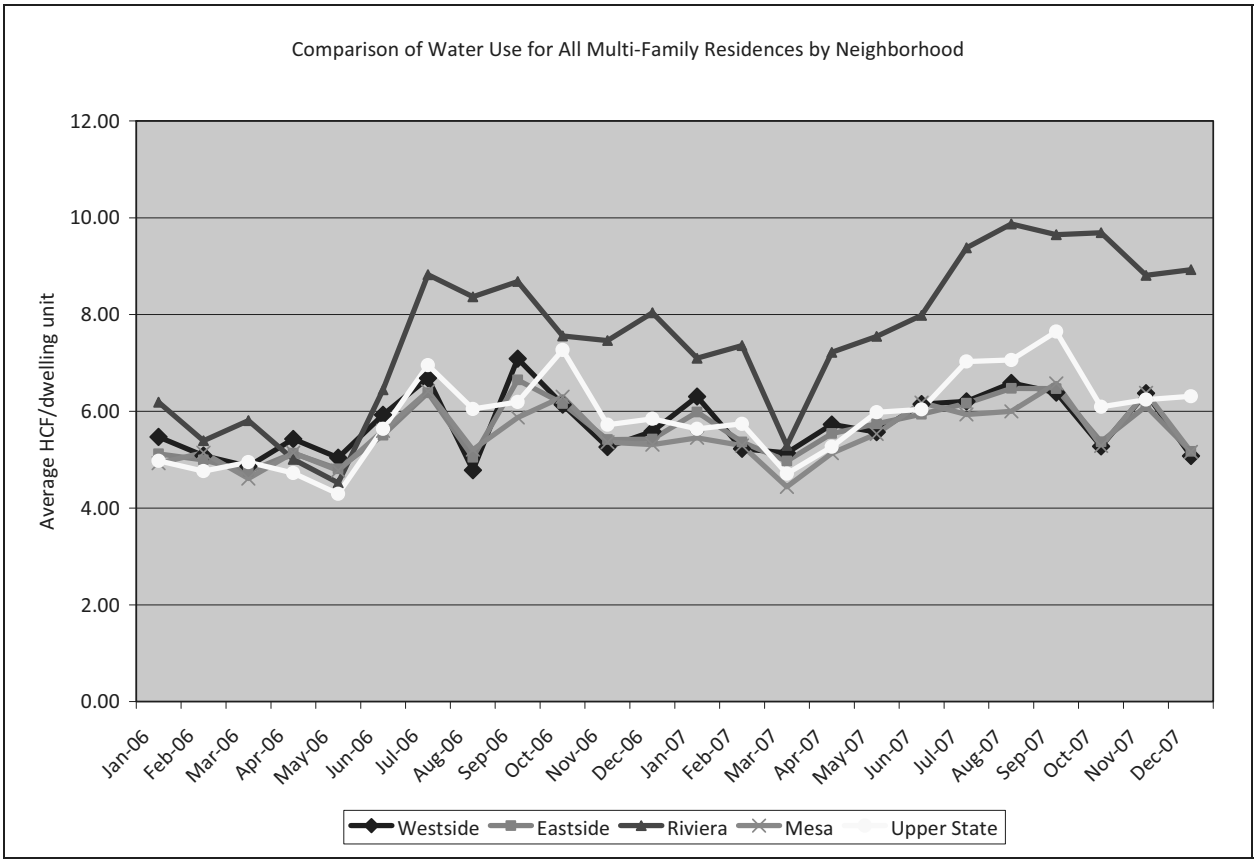

Figure 3. Multi-Family Water Use by Neighborhood

For evaluation of different types of multi-family land uses, the water use database was matched with the County of Santa Barbara Assessor land use database, which designates three different kinds of multi-family use: apartment buildings of 5 or more units, condominiums, and residential income of 2 to 4 units (more commonly referred to as duplexes, tri-plexes, and four-plexes). The County database was matched with the water use data via APN. The data are illustrated in Figure 4.

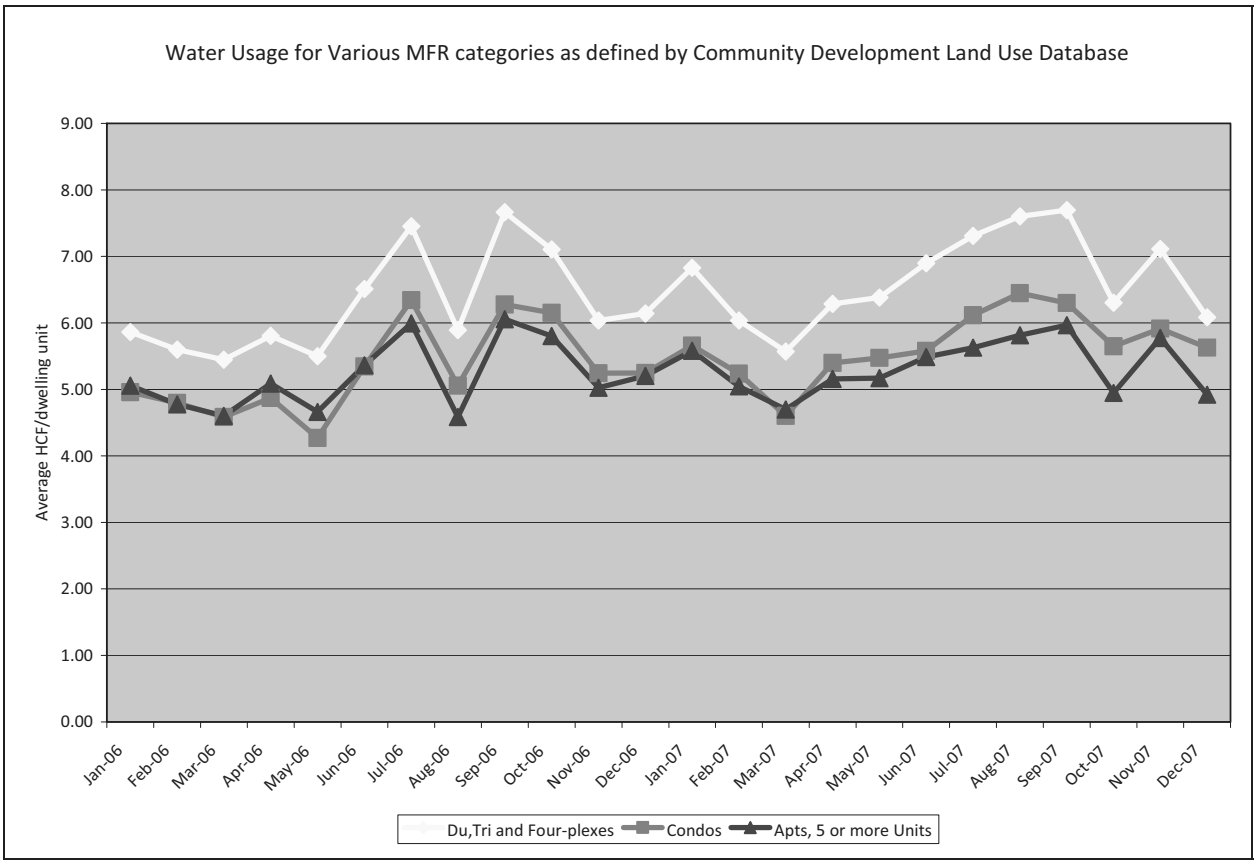

Figure 4. Water Usage by Various Multi-Family Categories

While general patterns of use are similar among the groups, use in the duplex, triplex and fourplex category data reflects consistently higher use than for condos or apartment buildings. This is consistent with the idea that lower density multi-family units have larger lot sizes with more landscaping and irrigation.

Analysis by age of structure was of interest because technology has advanced, water conservation messages have improved, block rate billing has been implemented, and stricter water use standards have been adopted. Because account numbers in the water billing system have been assigned sequentially, it was possible to designate cut-off points to distinguish between buildings built and occupied before and after 1990, the approximate effective date of current water efficiency standards. Comparing pre-1990 data to newer buildings reflects less water use overall for newer buildings, as shown in Figure 5, supporting the notion that water conservation actions have been working to reduce water use. Because the water use data analyzed was from 2006 through 2007, more recently built structures were not available for examination.

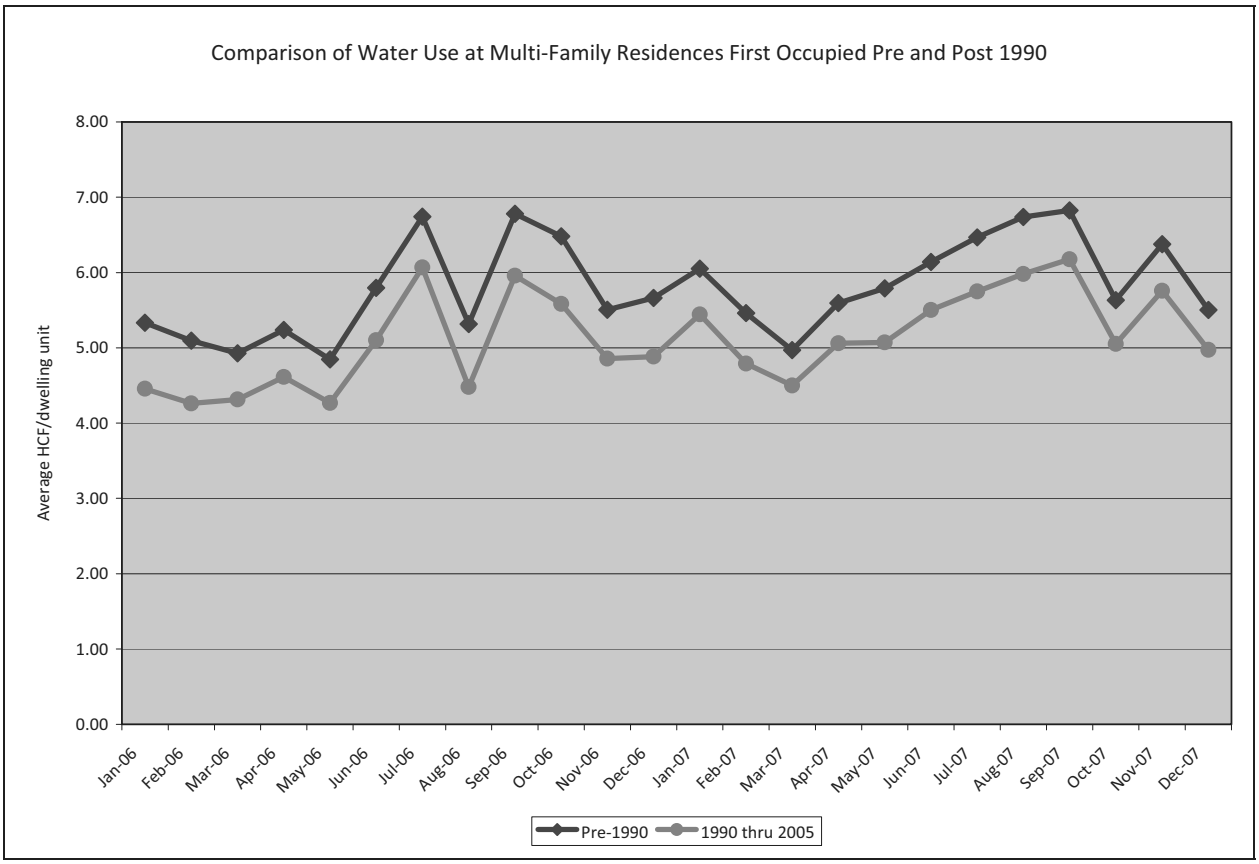

Figure 5. Multi-Family Water Usage Pre and Post 1990

Results of the subset analysis of multi-family usage as described above are summarized in Table 2.

Table 2. Subset Analysis of Multi-Family Water Usage

(All values include indoor and outdoor usage)

Multi-Family Analysis	2006 Values	2007 Values	Average	2006 Values	2007 Values	Average
	Monthly Usage (HCF/dwelling unit/month)			Annual Water Usage (AFY/dwelling unit)		
Multi-Family Residential (Aggregate)	5.56	5.88	5.72	0.15	0.16	0.16
Multi-Family – Neighborhoods (Aggregate)	5.58	5.93	5.76	0.15	0.16	0.16
Multi-Family – West Side Neighborhood	5.61	5.83	5.72	0.15	0.16	0.16
Multi-Family – East Side Neighborhood	5.45	5.77	5.61	0.15	0.16	0.15
Multi-Family – Mesa Neighborhood	5.39	5.61	5.50	0.15	0.15	0.15
Multi-Family – Upper State/West End Neighborhood	5.61	6.15	5.88	0.15	0.17	0.16
Multi-Family – Riviera Neighborhood	6.86	8.23	7.55	0.19	0.23	0.21
Multi-Family – Land use Categories (Aggregate)	5.51	5.79	5.65	0.15	0.16	0.16
Multi-Family – Du, Tri & Four-plex Category	6.25	6.68	6.46	0.17	0.18	0.18
Multi-Family – Condo Category	5.26	5.67	5.46	0.14	0.16	0.15
Multi-Family – 5+ Apt Building Category	5.18	5.35	5.27	0.14	0.15	0.15
Multi-Family – Age of Building (Aggregate)	5.59	5.92	5.75	0.15	0.16	0.16
Multi-Family – Occupied Pre-1990	5.64	5.96	5.80	0.16	0.16	0.16
Multi-Family – Occupied Between 1990 – 2005	4.90	5.34	5.12	0.13	0.15	0.14

Summary

The current water demand factor study reflects decreased water use as a whole from 1989 to the present. Figure 6 presents a summary of historical usage by customer classification. The majority of the water usage is for residential purposes, which is expected considering residential users comprise roughly 85% of the customer base. Usage rates tend to increase as the property size increases, accounting for increased landscaping area and irrigation.

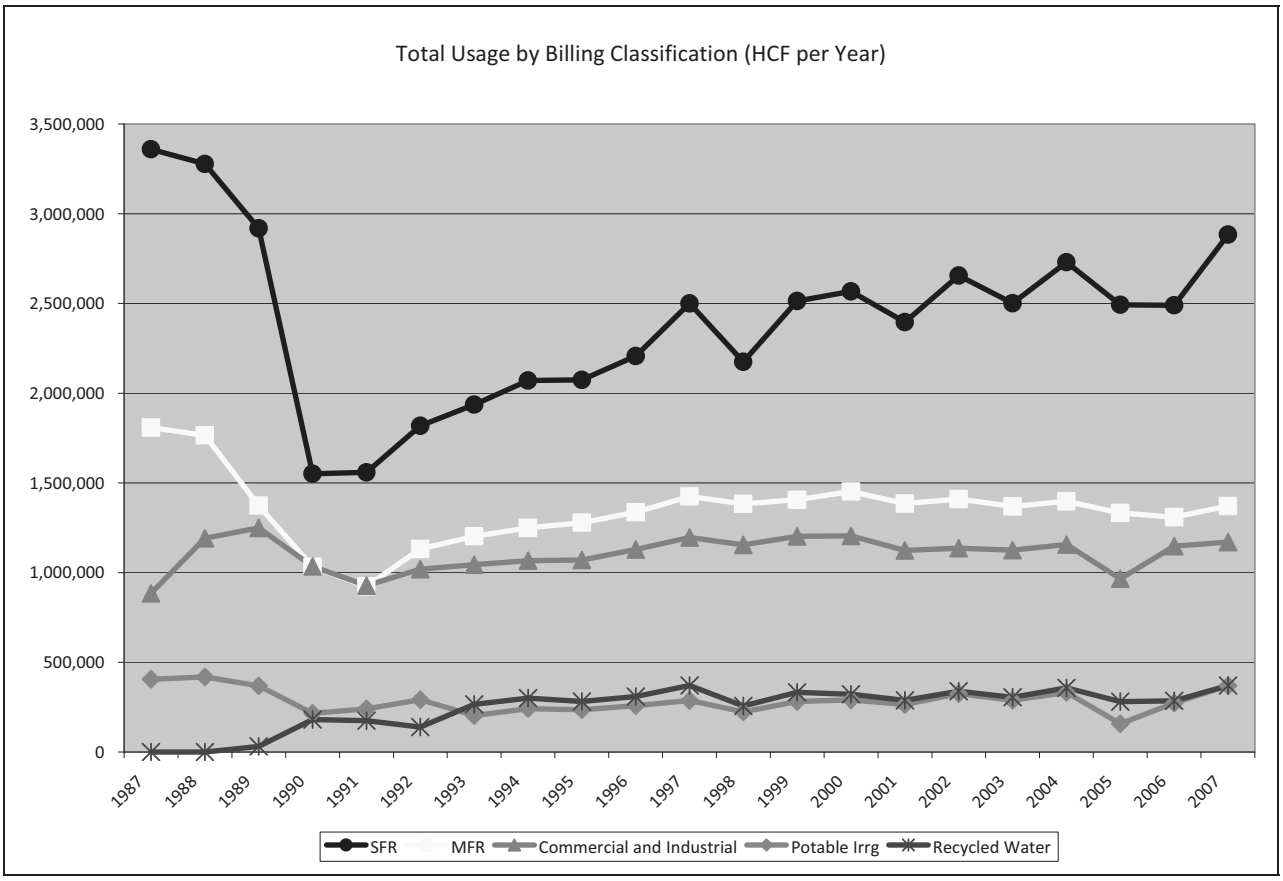

Figure 6. Historical Water Usage By Class

As a check on the updated non-residential demand factors, and as an indicator of overall water use in the non-residential sector, a comparison was made between the parcel specific data described above and aggregate water use for all non-residential accounts in the water billing system. Average 2006 & 2007 non-residential usage for all Commercial, Industrial, and non-residential Irrigation accounts was 2,752 AF. When divided by the 21.3 million square feet of currently existing non-residential floor area identified by the *Plan Santa Barbara* process, the result is .13 AFY per 1,000 sq. ft. For comparison, this same value is achieved by calculating a weighted average value (by floor area) for the data sample used in developing the demand factors in the various non-residential categories. Various analyses among multi-family users also yielded similar results on an aggregate basis, as shown in Table 2.

APPENDIX A – Factor Values: 2006, 2007, and Averages

Land Use Category (2009 Study)	2006 Values	2007 Values	Average	Monthly Units	2006 Values	2007 Values	Average	Annual Units
Single Family Residential (Aggregate)	13.43	15.37	14.40	HCF/month/ dwelling unit	0.37	0.42	0.40	AFY/ year
Single Family - Small Lot size < 7000 ft^2	9.20	9.79	9.49	HCF/month/ dwelling unit	0.25	0.27	0.26	AFY/ year
Single Family - Medium Lot size 7000 ft^2 to 1 acre	14.03	16.15	15.09	HCF/month/ dwelling unit	0.39	0.44	0.42	AFY/ year
Single Family - Large Lot size > 1 acre	33.73	38.17	34.45	HCF/month/ dwelling unit	0.93	1.05	0.95	AFY/ year
Multi-Family Residential (Aggregate)	5.56	5.88	5.72	HCF/month/ dwelling unit	0.15	0.16	0.16	AFY/ year
Multi-Family - 1-4 dwelling units	5.83	6.26	6.05	HCF/month/ dwelling unit	0.16	0.17	0.17	AFY/ year
Multi-Family - 5+ dwelling units	4.80	4.94	4.87	HCF/month/ dwelling unit	0.13	0.14	0.13	AFY/ year
Service Commercial	5.93	6.30	6.11	HCF/month/ 1000 ft^2	0.16	0.17	0.17	AFY/ year
Retail	5.35	5.38	5.37	HCF/month/ 1000 ft^2	0.15	0.15	0.15	AFY/ year
Office	1.98	2.14	2.06	HCF/month/ 1000 ft^2	0.05	0.06	0.06	AFY/ year
Industrial	2.79	2.89	2.84	HCF/month/ 1000 ft^2	0.08	0.08	0.08	AFY/ year
Institutional	5.85	6.37	6.11	HCF/month/ 1000 ft^2	0.16	0.18	0.17	AFY/ year
Hotel/Motel	4.81	4.82	4.81	HCF/month/ room	0.13	0.13	0.13	AFY/ year
Hotel/Motel with Restaurant	7.17	7.16	7.17	HCF/month/ room	0.20	0.20	0.20	AFY/ year

NOTES:

1. The 1989 Study Values are from Table 1, Water Demand Factors of the "Water Demand Factor and Conservation Study," Interface, August 1989.
2. 2009 Study values reflect the averages of usages for Calendar Years 2006 (average rainfall) and 2007 (extremely low rainfall, 43% of average), based on analysis of City Water Billing data and Planning Division Land Use Database.
3. All values represent estimated usage by category including indoor usage and outdoor usage.
4. Total SFR accounts for 2009 analysis (including 144 separately metered irrigation accounts, assumed split evenly between "medium" and "large".)
   SFR small = 5,198
   SFR medium = 9,176
   SFR large = 995
5. Number of hotels included in 2009 analysis:
   With restaurants attached = 7 hotels (20 accounts)
   Without restaurants attached = 28 hotels (36 accounts)

APPENDIX B - Land Use Category Details

2009 study categories	1989 study categories
Service Commercial	
'C - Bank, Credit Union'	Auto repair and auto body shop
'C - Bar or Drinking Place'	Bank
'C - Car Dealer'	Gas station
'C - Car Service & Repair'	Gas station/mini market
'C - Car Wash'	Health club
'C - Clubs (including gyms, health & fitness clubs, and private clubs)'	Restaurant, 24 hr
'C - Fast-Food Restaurant'	Restaurant, fast food
'C - Fast-Food Restaurant with Drive-Thru'	Restaurant, sit down
'C - Food sales (not grocery/supermarket)'	Theater
'C - Full Service Restaurant'	
'C - Gasoline Service'	
'C - Medical Related Uses'	
'C - Theater (Live or Movie)'	
'C & I - Communication & Information (TV, Newspaper, Radio, Etc.)'	
'C - Veterinary Services'	
Industrial	
'M - Manufacturing and Wholesale Trade'	Industrial assembly and manufacturing
'M - Other Industrial or Manufacturing'	Industrial R&D
'M - Warehousing and Storage'	Warehouse/industrial storage
'M - Construction Related Businesses'	
Retail	
'C - Grocery Store, Supermarket'	Grocery store
'C - Retail - Consumer Goods & Services'	Retail large
‘C - Shopping Center'	Retail small
Hotel	
'C - Lodging'	Hotel/motel
	Hotel/motel with restaurant
Institutional	
'I - Educational Services (day cares/schools)'	Church
'I - Hospital'	Church w/ school
'I - Memorial Services (funeral homes, cemeteries)'	Medical office
'I - Nursing Home/ Convalescent Hospital/ Rest Home'	Mixed medical/dental
'I - Other Government (Military, DMV, Post Office)'	School - elementary
'I - Other Institutional'	School - junior high
'I - Public Administration'	
'I - Public Safety (Police and Fire Stations)'	
'I - Religious Institutions (Churches, etc.)'	
'I - Special Purpose Institutions (Museum, Zoo, Library)'	
Office	
'C - Office (non-Institutional) - Business, Professional, Research'	General office
Multi-family	
‘R - Condo'	Condominium
'R - Mobile Home'	Multi-family apt
'R - Nursing Home/ Convalescent Hospital/ Rest Home'	Senior apt
'R - Multi-Family Residence'	
Single-family	
'R - Single Family Residence'	Single family, Small (up to 9999 sq ft lot)
	Single family, Medium (10000-22000 sq ft lot)
	Single family, Large (22001 sq ft - 1 acre lot)
	Single family, (over 1 acre lot)

Preliminary Water Demand Factor Update
City of Santa Barbara - Water Resources Division
October 2009

Land Use Category (2009 Study)	1989 Study Values	2009 Study Values	Units	Notes
Single Family Residential (Aggregate)	18.00	14.40	HCF/month/ dwelling unit	Values include SFR account usage & Irrigation usage at SFR properties; 1989 values based on average SFR accounts plus estimated Irrigation account usage by SFR's (because no aggregate SFR value was represented in 1989 study)
Single Family - Small Lot size < 7000 ft^2	11.43	9.49	HCF/month/ dwelling unit	Lot size definition was <10,000 ft^2 for 1989
Single Family - Medium Lot size 7000 ft^2 to 1 acre	18.24 – 30.42	15.09	HCF/month/ dwelling unit	18.24 – lot size 10,000 to 22,000 ft^2 for 1989 30.42 – lot size 22,000 ft^2 to 1 acre for 1989
Single Family - Large Lot size > 1 acre	51.57	34.45	HCF/month/ dwelling unit	
Multi-Family Residential (Aggregate)	7.33	5.72	HCF/month/ dwelling unit	1989 value is average MFR bill code usage plus estimated Irrigation account usage by MFR accounts. Subcategories for 1989: 4.29 – Senior Apartments 8.58 – Multi-family apartments 10.02 – Condominiums For 2009: Includes apartments, condos, & other attached dwelling units per Water Billing rate classification.
Service Commercial	N/A	6.18	HCF/month/ 1000 ft^2	Only some of the 2009 Service Commercial land use categories were represented in 1989 study. Additionally, Restaurant data was based on "seats" rather than square footage. Therefore, there is no valid 1989 value.
Retail	2.43 – 3.93	6.18	HCF/month/ 1000 ft^2	Land use categories from 1989 and 2009 are not comparable. 2009 value reflects "Retail" as defined in Planning Division Land Use Database, which includes high usage categories of Grocery Stores and Laundromats and is therefore not recommended for use in impact analysis. It is suggested that Retail be represented by 1989 values of 2.43 for Large Retail (>20,000 ft^2) and 3.93 for Small Retail (<20,000 ft^2).
Office	3.57	2.06	HCF/month/ 1000 ft^2	
Industrial	2.49 – 5.37	2.84	HCF/month/ 1000 ft^2	For 1989: 2.49 – Warehouse/ Indus. Storage, 3.03 – Indus. Assembly & Manufacturing, 5.37 – Indus. R&D
Institutional	N/A	6.11	HCF/month/ 1000 ft^2	Land use categories for 1989 and 2009 are not comparable. For example, a number of the Institutional sub-categories are not represented in the 1989 study and data for Hospitals and Schools are not based on 1000 ft^2 as for other categories.
Hotel/Motel	4.65	4.81	HCF/month/ room	
Hotel/Motel with Restaurant	5.37	7.17	HCF/month/ room	2009 value calculates at 5.65 with omission of highest data point, which is well above highest data point in 1989 study.

(See table notes on following page.)

Table Notes:

1. The 1989 Study Values are from Table 1, Water Demand Factors of the "Water Demand Factor and Conservation Study," Interface, August 1989.
2. 2009 Study values reflect the averages of usages for Calendar Years 2006 (average rainfall) and 2007 (extremely low rainfall, 43% of average), based on analysis of City Water Billing data and Planning Division Land Use Database.
3. All values represent estimated usage by category including indoor usage and potable irrigation.
4. Total SFR accounts for 2009 analysis (including 144 separately metered irrigation accounts, assumed split evenly between "medium" and "large".)
   SFR small = 5,198
   SFR medium = 9,176
   SFR large = 995
5. Number of hotels included in 2009 analysis:
   With restaurants attached = 7 hotels (20 accounts)
   Without restaurants attached = 28 hotels (36 accounts)
6. Identical 2009 values for Service Commercial and Retail have been checked to confirm that they are equal by coincidence.

APPENDIX I

TRANSPORTATION

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: August 31, 2010

To: Dan Gira, AMEC

From: Brian Welch & Reid Keller

Subject: Hot Springs Road/Coast Village Road Roundabout Future Analysis Errata

LA08-2253

The future year analysis of the Hot Springs Road/Coast Village Road roundabout contained an error that caused the delay at that intersection to be overstated for future year analysis. Due to this error the analysis originally showed a predicted level of service (LOS) of F for that location during the a.m. and p.m. peak hours, and which resulted in a significant impact. Upon correction of this error we predict LOS C during both peak hours and no significant impact. The remainder of the memorandum describes how this error occurred, and why it is limited to this location.

POST-PROCESSING MODEL DATA

Model data used to predict future traffic conditions is typically derived from three data sources:

1. Field Collected Counts
2. Base year model volumes at the same location
3. Future year model volumes at the same location.

The change in traffic found from the difference between the future year model volumes and the base year model volumes is applied to the counts to generate the future year traffic predications.[1] The Hot Springs Road/Coast Village Road roundabout had one movement (northbound through) where the base year model volume was entered incorrectly and greatly understated. The future year model volume was entered correctly. This caused the change between the base and future year to be overstated, which when applied to the counts caused the prediction of that movement to be far greater than it should have been. Correcting this issue lead to a more accurate future prediction of traffic at this location.

ISOLATED OCCURANCE

This location required specialized post–processing because of the roundabout. All other intersections, except the Milpas roundabout, use automated post-processing. The Milpas roundabout has been checked and this error was not present at the Milpas roundabout.

[1] Post-processing of model volumes is described in greater detail on pages 6-7 of the *Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario Revised Final Technical Memorandum*, (Fehr & Peers, 2010) found in the technical appendices of the EIR.

APPENDIX I-1

TRANSPORTATION EXISTING CONDITIONS REPORT

CITY OF SANTA BARBARA

Plan Santa Barbara:

Transportation Existing Conditions Report

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August 2008

Table of Contents

1.0 Introduction 1
- 1.1 What is *Plan Santa Barbara*? 1
- 1.2 What is this Transportation Existing Conditions Report About? 1
- 1.3 What's Next? 1

2 Transportation & Demographic Profile 2
- 2.1 Overview 2
- 2.2 General Demographics 2
- 2.3 Transportation Modes 2
- 2.4 Vehicle Ownership 3
- 2.5 Household Income 5
- 2.6 Key Issues and Opportunities 5

3 Automobiles 6
- 3.1 Vehicular Circulation in the Santa Barbara Area 6
  - 3.1.1 Downtown 6
  - 3.1.2 Upper State Street 11
  - 3.1.3 Eastside 11
  - 3.1.4 Other Areas 12
- 3.2 Existing Policy Framework 12
  - 3.2.1 City Circulation Element 12
  - 3.2.2 City Thresholds of Significance 13
    - 3.2.2.1 Circulation Element 13
    - 3.2.2.2 Adopted City Traffic Impact Assessment Criteria 13
  - 3.2.3 Congestion Management Plan 14
- 3.3 Existing Traffic Conditions 14
  - 3.3.1 LOS Analysis in the City of Santa Barbara 15
  - 3.3.2 Plan Santa Barbara Study Intersections 15
  - 3.3.3 Nearby Intersections 21
  - 3.3.4 Airport Area Intersections 22
- 3.4 Existing Roadway Segment Traffic Volumes 22
  - 3.4.1 Surface Streets 22
  - 3.4.2 Freeways and State Highways 22
- 3.5 Currently Programmed Roadway Improvements 24
- 3.6 Key Issues and Opportunities 24
  - 3.6.1 Regional Automobile Travel 24
  - 3.6.2 Local Automobile Travel 25
  - 3.6.3 Development Review 25
    - 3.6.3.1 Opportunities 25

4 Public Transit 26
- 4.1 Overview 26
- 4.2 Fixed-Route Transit Service 26
  - 4.2.1 MTD 26
  - 4.2.2 Regional/Commuter Transit Service 39
    - 4.2.2.1 Clean Air Express 40
    - 4.2.2.2 Coastal Express 40
    - 4.2.2.3 City of Lompoc COLT Reservation-Only Service 40
    - 4.2.2.4 Bill's Bus 40
    - 4.2.2.5 Other Regional Transit 40
- 4.3 Demand Responsive Service 41
  - 4.3.1 Easy Lift Paratransit 41
  - 4.3.2 Community Transportation Services 41
  - 4.3.3 Taxi Services 41
- 4.4 MTD Policies 42
  - 4.4.1 MTD Goals 42
  - 4.4.2 MTD Performance Standards 42
- 4.5 Key Issues and Opportunities 42

5 Bicycling Conditions 44
- 5.1 Overview 44
- 5.2 Facilities 44
  - 5.2.1 Bicycle Network 44
    - 5.2.1.1 Bicycle Routes 44
    - 5.2.1.2 Bicycle Signage 47
  - 5.2.2 Bicycle-Transit Accessibility 47
    - 5.2.2.1 Local and Regional MTD Buses 47
    - 5.2.2.2 Regional Buses 47
    - 5.2.2.3 Regional Rail 47
  - 5.2.3 Bicycle Parking 48
    - 5.2.3.1 On-Street (Sidewalk) Parking 48
    - 5.2.3.2 Off-street parking 48
  - 5.2.4 Other Bicycle-Supportive Facilities and Programs 49
- 5.3 Policies 49
- 5.4 Volumes 49
- 5.5 Safety Issues 50
- 5.6 Key Issues and Opportunities 50

6 Pedestrian Conditions 51
- 6.1 Overview 51
- 6.2 Facilities 51
- 6.3 Policies 52
- 6.4 Volumes 52
- 6.5 Safety Issues 57
- 6.6 Key Issues and Opportunities 57

7 Automobile Parking 57
- 7.1 Overview 57
- 7.2 Facilities 58

7.2.1 Downtown Parking 58
7.2.1.1 Off-Street Parking 58
7.2.1.2 On-Street Parking 58
7.2.2 Residential Parking Permit Program 60
7.2.3 Waterfront Parking 60
7.3 Policies 60
7.3.1 Minimum Parking Requirements for New Development 60
7.3.2 Parking Benefit and Improvement Assessment District 61
7.4 Key Issues and Opportunities 61

8 Transportation Demand Management 62

8.1 Overview 62
8.2 Citywide TDM Programs 63
8.3 Downtown Specific TDM Programs 65
8.3.1 Downtown Bus Pass Program 65
8.3.2 Downtown Parking Program 65
8.4 Santa Barbara County Employee Programs 65
8.5 SBCAG Traffic Solutions TDM Programs 65
8.6 Private-Sector TDM Programs 66
8.7 Other TDM Programs 66
8.7.1 UCSB TDM Programs 66
8.7.2 City College TDM Programs 67
8.7.3 APCD's "Santa Barbara Car-Free" Program 67
8.8 Policies 67
8.9 Key Issues and Opportunities 67

9 Performance Measures and Street Classification System 69

9.1 Existing Transportation Performance Measures 69
9.1.1 Existing City Transportation Performance Measures 69
9.1.2 Limitations of Existing City Performance Measures 69
9.1.3 Existing County Performance Measures 69
9.1.4 Existing Congestion Management Plan Performance Measures 70
9.2 Existing City Street Classification System 70
9.3 Key Issues and Opportunities 70

10 Pending and Planned Improvements 71

10.1 Measure D Funded Projects 71
10.2 Proposed Measure A Funding Program 71
10.3 Other Planned Improvements 73
10.3.1 Transit Improvements 73
10.3.1.1 MTD Fixed-Route Service 73
10.3.1.2 Regional Rail 73
10.3.2 Bicycle Facilities Improvements 73
10.3.3 Pedestrian Facilities Improvements 73

11 Transportation Funding Sources 74

Appendices

Appendix A: Policy Framework

List of Figures

Figure 1-1: Traffic Reduction Strategies Based on Trip Types: Within, To, From and Through Santa Barbara 2
Figure 2-1: Means of Transportation to Work for City of Santa Barbara Residents Whose Income is 150% or below of the Federal Poverty Level* 3
Figure 2-2: Median Earnings Compared to Means of Transportation to Work for City of Santa Barbara Residents 3
Figure 2-3: Transportation Mode Summary - Commuting to Work 3
Figure 2-4: Regional Commute Patterns 4
Figure 2-5: Renter Household Vehicle Ownership 5
Figure 2-6: Owner Household Vehicle Ownership 5
Figure 2-7: Average Household Vehicle Ownership 5
Figure 2-8: Santa Barbara Household Vehicle Ownership by Household Income 5
Figure 2-9: Plan Santa Barbara - Households without Vehicles (by Census Block Group) 7
Figure 2-10: Plan Santa Barbara - Households Living in Poverty (by Census Block Group) 9
Figure 3-1: CMP Designated Highways and Arterials; City of Santa Barbara 14
Figure 3-2: Level of Service Definitions for Signalized Intersections 15
Figure 3-3: Level of Service Definitions for Unsignalized Intersections (2000 Highway Capacity Manual Unsignalized Method) 15
Figure 3-4: Year 2008 Weekday Existing Conditions, Plan Santa Barbara Study Intersection Levels of Service 16
Figure 3-5. Level of Service and Average Daily Traffic Volumes 17
Figure 3-6. Intersections by Control Type 19
Figure 3-7: Plan Santa Barbara Study Intersections Currently Operating with a Peak Hour V/C of 0:77 or Greater 21
Figure 3-8: Nearby Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater 22
Figure 3-9: Airport Area Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater 22
Figure 3-10. Average Daily Traffic Volumes and Level of Service - Santa Barbara Airport Vicinity 23
Figure 4-1: Fares for Santa Barbara MTD Fixed-Route Transit Services 26
Figure 4-2: Plan Santa Barbara - Population Density (by Census Block Group) 27
Figure 4-3: Plan Santa Barbara - Employment Density 29
Figure 4-4: Local and Regional Public Transit Routes 31
Figure 4-5: Plan Santa Barbara - Regional Transit Service 33
Figure 4-6: Plan Santa Barbara - Private Carriers 35
Figure 4-7: Ridership for Local and Regional Public Transit (FY 2007) 37
Figure 4-8: MTD Operating Revenue (FY 2008) 39
Figure 4-9: Fares for Santa Barbara County Regional and Commuter Fixed-Route Services 41
Figure 5-1: Bikeways 45
Figure 6-1: Pedestrian Volumes at Surveyed Intersections (2006) 53
Figure 6-2: Locations of Collisions Involving Pedestrians (1998-2002) 55
Figure 7-1: Downtown Parking Supply and Peak-Hour Demand (Fall 2007) 59
Figure 7-2: Square Feet of Parking Area Required for Each Square Foot of Building Area for Typical Uses 60
Figure 9-1: County Criteria for Significant Changes in Auto Levels of Service – Project Impacts 69
Figure 10-1: Potential Allocation of Measure A Funds to North Coast Jurisdictions 72
Figure 10-2: Potential Allocation of Measure A Funds to South Coast Jurisdictions 72

1.0 INTRODUCTION

1.1 What is *Plan Santa Barbara*?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community-based planning process called *Plan Santa* Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the *Plan Santa Barbara* process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. This transportation planning consultant team will assist City staff in developing and analyzing cost-effective strategies that can reasonably be expected to reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

1.2 What is this Transportation Existing Conditions Report About?

In order to better understand where the opportunities exist for reducing traffic congestion, the transportation consultant team developed this "Transportation Existing Conditions" Report. This report assesses the current state of the city of Santa Barbara's multimodal transportation system by examining existing City policies, programs, and infrastructure related to automobile use, public transportation, bike and pedestrian facilities, parking, and transportation demand management.

Our evaluation of the city of Santa Barbara's current multimodal transportation system suggests that City streets currently experience limited locations and times of high traffic congestion, particularly near freeway interchanges. The City's policies are accomplishing significantly more than many other cities in California and nationwide in reducing traffic congestion and promoting more trips by carpool, transit, bicycle, and walking. Indeed, the city of Santa Barbara is seen in many areas as a national leader in multi-modal transportation, with a long history of planning for and investing in bicycle and pedestrian facilities and transit rider-ship levels comparable to cities much larger than Santa Barbara.

However, congestion on some local arterials (e.g., Upper State Street) and more significant regional congestion on U.S. Highway 101 associated with long-distance commuting continue to pose a challenge to maintaining the high quality of life and economic competitiveness of the city of Santa Barbara and the South Coast region. The automobile is currently the primary mode of travel for most trips to, through, and within the city of Santa Barbara and the surrounding region, and this is expected to continue to be true for the foreseeable future.

But this doesn't mean that the choice facing Santa Barbara is between ever-increasing traffic congestion on the one hand, and reduced quality of life, housing choice, and economic opportunity on the other. Many cities around the world have implemented a wide range of strategies to encourage "low-traffic development," resulting in a demonstrated reduction in per capita vehicle trips, a decreased rate of growth in peak-hour traffic congestion, an increased use of carpooling, transit, bicycling, and walking, and a more cost-effective use of always scarce transportation resources.

1.3 What's Next?

This next phase of this study process will help the City determine which measures will have the greatest effect on vehicle trip reduction, taking social, economic and legal implications into consideration. The City and the consultant team will begin to identify relevant traffic reduction strategies for the city of Santa Barbara. Questions to be considered include the following:

- Which traffic reduction strategies are applicable in the city of Santa Barbara and the region?
- To what extent are these strategies already being implemented – or soon will be – in Santa Barbara or the region?
- Which of these strategies have previously been attempted in Santa Barbara or the region, what impact did they have, and why did they succeed or fail?
- In which cities, considering examples from throughout the world, have these traffic reduction strategies been implemented – and which ones would be useful case studies for Santa Barbara and its region?
- What is the potential of these strategies for reducing

the growth of peak-hour traffic congestion in Santa Barbara, considered in balance with their potential effects on other community goals such as maintaining the city's economic vitality, existing social diversity and citizens' ability to travel?

One of the key issues to be addressed during the next phase of the project will be the development of both "locally-focused strategies" that can be implemented by the city of Santa Barbara as well as "regionally-focused strategies" that will need to be implemented in cooperation with the City's regional partners.[1] Local and regional trips are fundamentally different, and will therefore require different kinds of traffic reduction strategies (refer to Figure 1-1).

Figure 1-1: Traffic Reduction Strategies Based on Trip Types: Within, To, From and Through Santa Barbara

Trip Origin	Trip Destination: Within Santa Barbara	Trip Destination: Outside Santa Barbara
Within Santa Barbara	**Short trips of all types, including walking, bicycling to school, shopping, etc.** Affected by land use, transportation, and parking policies. **City-wide trips.** Affected by transit, shuttle, bicycle, and walking alternatives via land use and transportation policy.	**Primarily work trips, social, recreational and shopping trips.** The primary local strategy is to improve transit and transit-oriented land use. Affected by residential parking policy, land use policy, transit and ride-share services.
Outside Santa Barbara	**Primarily work and shopping trips.** Affected by workplace policies – TDM, parking supply and pricing, retail parking strategies, transit accessibility.	**Through trips of all types.** Most factors affecting travel mode are outside of City's influence, except through road pricing or road use restrictions.

[1] The success of traffic management strategies will in many ways depend on collaboration with the City's regional partners, such as the County of Santa Barbara, other cities in the region, Santa Barbara County Association of Governments (SBCAG), Air Pollution Control District (APCD), University of California at Santa Barbara (UCSB), and other public agency and private sector partners.

2 TRANSPORTATION & DEMOGRAPHIC PROFILE

2.1 Overview

Santa Barbara residents' demographic characteristics offer important background information concerning the baseline conditions that affect everyday travel choices. Factors such as household income distribution, commuter mode splits, and vehicle ownership patterns are important indicators of the likelihood that a person will choose to drive (thereby making a personal contribution to local and regional traffic congestion).

This section provides a "transportation and demographic profile" of city of Santa Barbara residents and employees, based on the most recent and reliable U.S. Census data available. Census data for the city of Santa Barbara is then compared to telephone survey data for the County of Santa Barbara from SBCAG's "2007 Commuter Profile" as well as to 2000 Census data for the United States as a whole and the State of California to highlight how the city of Santa Barbara compares and contrasts to the national and state averages.

2.2 General Demographics

Santa Barbara is a moderately urbanized city with a population of approximately 90,000 in 2008 (California Department of Finance). Like many jurisdictions in Southern California, the City has a large Latino population, comprising almost one-third of residents (American Community Survey 2006).

2.3 Transportation Modes

According to the 2000 Census, 66% of Santa Barbara's employed residents drive alone to work, with another 13.6% choosing to carpool. Public transportation, biking and walking account for roughly 14% of commute trips (refer to Figure 2-3). These overall resident commuting figures are very similar to the mode split of those workers employed within the city of Santa Barbara. Worker flow data from the 2000 Census reveal that nearly two-thirds of Santa Barbara residents also work in Santa Barbara, leading to similar numbers.

By comparison, the United States has a drive alone rate that is 20% (13.4 percentage points) higher than that of Santa Barbara residents. The State of California has a drive alone rate of 71.8% which is lower than the national

rate but is 5.8 percentage points higher than Santa Barbara residents.

In addition to vehicular means of travel, Santa Barbara residents walk to work at a rate of more than double the state and national average, and bike at a rate over five times as high as both the state and national average.

As shown in Figures 2-1 and 2-2, a very strong correlation exists in the city of Santa Barbara between income and means of transportation to work. While less than 5% of all commute trips are by public transit, more than 40% of those whose income is 150% or below of the Federal Poverty Level rely on transit to get to work. Likewise, a much higher percentage, 24%, of individuals with low-income walk to work. Overall, the median income of those who use public transit to get to work is only 40% of the median income of all working residents in the county, and the median income of those who walk is only 71% that of all working residents.

Figure 2-1: Means of Transportation to Work for City of Santa Barbara Residents Whose Income is 150% or below of the Federal Poverty Level*

Commute Mode	Income 150% or below	All Workers
Car, truck, or van - drove alone:	11.2%	65%
Car, truck, or van - carpooled:	9.9%	10%
Public transportation (excluding taxicab):	40.7%	4.4%
Walked:	23.8%	5.2%
Taxicab, motorcycle, bicycle, or other means:	10.4%	5.4%
Worked at home:	7.4%	9.5%

Source: U.S. Census Bureau, 2006 American Community Survey
** 12.6% of all workers fall into this category*

At the same time, there are a significant number of regional commuters driving and taking transit into Santa Barbara everyday (refer to Figure 2-4). Data from SBCAG's "2007 Commuter Profile" indicate that, although 92% of Santa Barbara County commuters both live and work in Santa Barbara County, 10% of respondents reported moving a farther distance from work in the past four years in order to obtain more affordable housing.

Figure 2-2: Median Earnings Compared to Means of Transportation to Work for City of Santa Barbara Residents

	Median Income	Percent of All Residents	Percent less than Median
Total:	$30,854		
Car, truck, or van - drove alone	$33,076	107%	-7.2%
Car, truck, or van - carpooled	$27,358	89%	11%
Public transportation (excluding taxicab)	$12,215	40%	60%
Walked	$21,823	71%	29%
Taxicab, motorcycle, bicycle, or other means	$32,393	105%	-5.0%
Worked at home	$37,990	123%	-23%

Source: U.S. Census Bureau, 2006 American Community Survey

Figure 2-3: Transportation Mode Summary - Commuting to Work

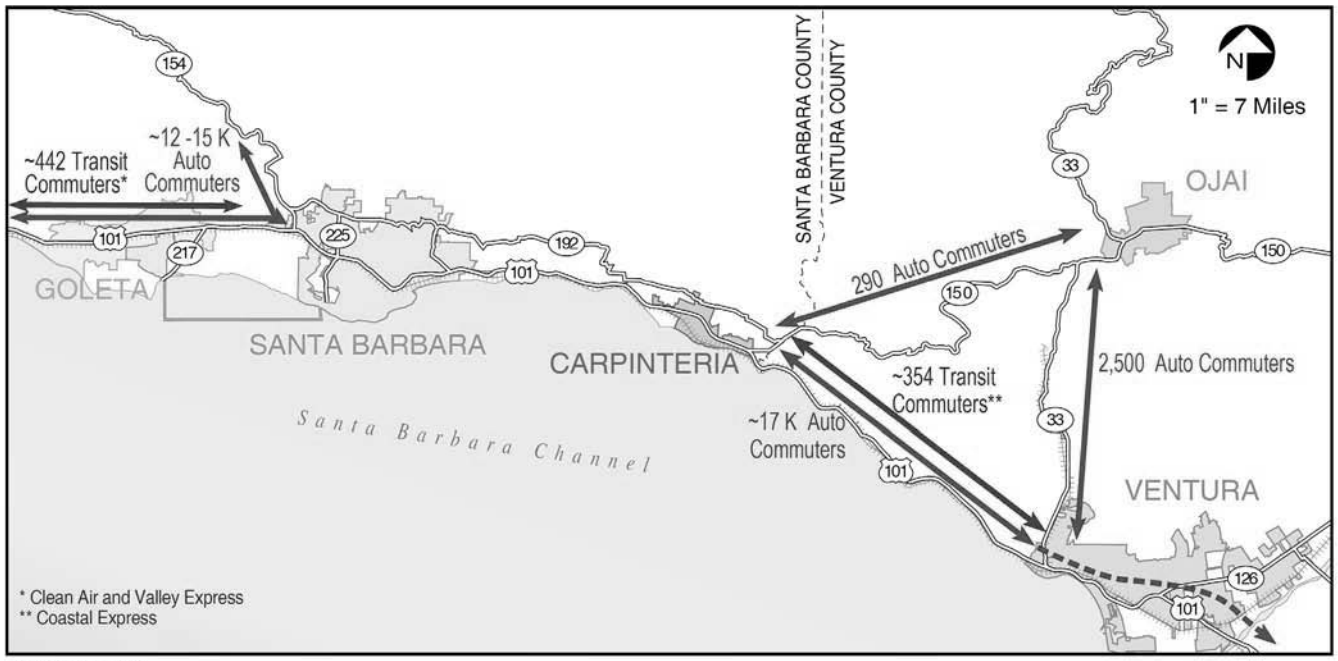
	Employees Residing in the City of Santa Barbara	Employed within the City of Santa Barbara	Employees Residing in the County of Santa Barbara	Employees Nationwide
Car, truck, or van -- drove alone	66.0%	68.8%	70.7%	79.4%
Car, truck, or vanpooled/ carpooled	13.6%	14.1%	15.4%	8.7%
Public transportation	4.5%	4.0%	3.8%	4.4%
Biked	3.4%	3.2%	2.3% (winter) 2.7% (summer)	0.6%
Walked	6.2%	4.8%	2.7%	2.7%
Other means (e.g., taxi/ motorcycle)	0.7%	0.8%	0.6%	1.0%
Worked at home	5.5%	4.3%	4.5%	3.1%

Source for Santa Barbara residents and employees and nationwide data: 2000 Census.
Source for County of Santa Barbara commuter data: SBCAG Commuter Profile, June 2007.

2.4 Vehicle Ownership

The lower reliance on the automobile in Santa Barbara is reflected in vehicle ownership rates. Citywide, over half of households either own one vehicle ("low-car households") or no vehicles ("no-car households"), 14% higher than the national average. However, there is a large discrepancy in the number of household vehicles between rental and ownership homes (refer to Figure 2-5 and Figure 2-6). Whereas

Figure 2-4: Regional Commute Patterns



Notes and Sources:
1) Auto Commuters: Interview with County transportation staff and SBCAG "Travel Trends Report" (Dec. 2007).
2) Transit Commuters: SBCAG "Travel Trends Report" (Dec. 2007); Method used to estimate transit commuters was as follows:
FY 06-07 total annual ridership numbers for commuter transit services (Coastal Express, Clean Air Express, and Valley Express) was divided by 240 weekdays per year to derive total transit ridership per weekday. Assuming each transit commuter takes 2 transit trips (AM and PM), total transit ridership per weekday on commuter services was then divided by 2 to convert total transit trips into total transit commuters. Because the Coastal Express offers non-commuter service as well (mid-days, weekends, etc), this methodology likely understates total transit commuters on the 101 corridor between Ventura and Santa Barbara, but is an order of magnitude estimate based on the best available data.

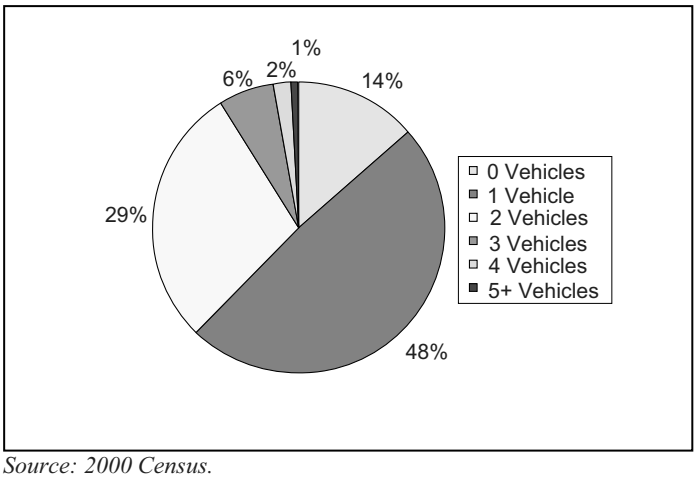
over 60% of renter-occupied households own zero or one vehicle, this number drops to just 34% for owner-occupied homes.

These varying rates of vehicle ownership are reflected in the separate *average vehicle ownership* for renter households and owner households, compared to average city-wide vehicle ownership (refer to Figure 2-7). It is important to note that those households owning the most number of vehicles (owner-occupied) still have on average fewer than the commonly-reported "two cars per household" rule of thumb for Southern California communities. While this is a generalized rule of thumb that does not take into account differences in "average household size" in different communities, it does support other evidence that suggests that Santa Barbara households *on average* already own fewer cars and drive them less than typical Southern California communities. The nearby cities of Ventura and Oxnard support this idea: in Oxnard and Ventura the average vehicle ownership for owner-occupied units is 2.18 and 1.99, respectively.

For comparison, the SBCAG's 2007 Commuter Profile telephone survey found that 85% of Santa Barbara County commuters "always" have a vehicle available to get to work, 6% "sometimes" do, and 9% "never" do. This is a noticeable drop from the 2002 SBCAG's Commuter Profile Survey, which reported that 91% of Santa Barbara residents "always" have access to a vehicle, 5% "sometimes" do and 4% "never" have access to a vehicle.

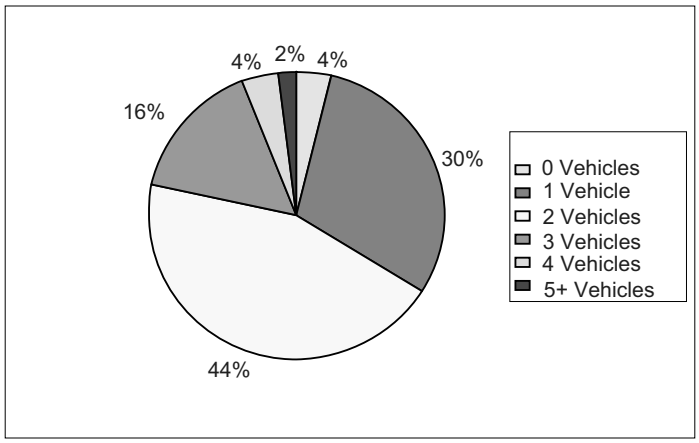
The nearby counties of Ventura and San Luis Obispo experienced similar trends with the percentage of commuters "always" having a vehicle dropping between 2002 and 2007. In 2002 the percentage of commuters "always" having a vehicle in Ventura County was 93% and in 2007 the rate dropped to 88%. For San Luis Obispo County the percentage of commuters "always" having a vehicle in 2002 was 95%, dropping to 93% in 2007.

Figure 2-5: Renter Household Vehicle Ownership



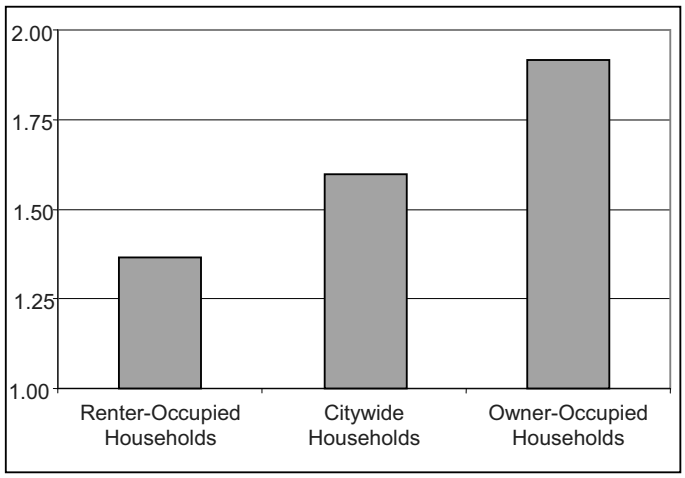
Source: 2000 Census.

Figure 2-6: Owner Household Vehicle Ownership



Source: 2000 Census.

Figure 2-7: Average Household Vehicle Ownership



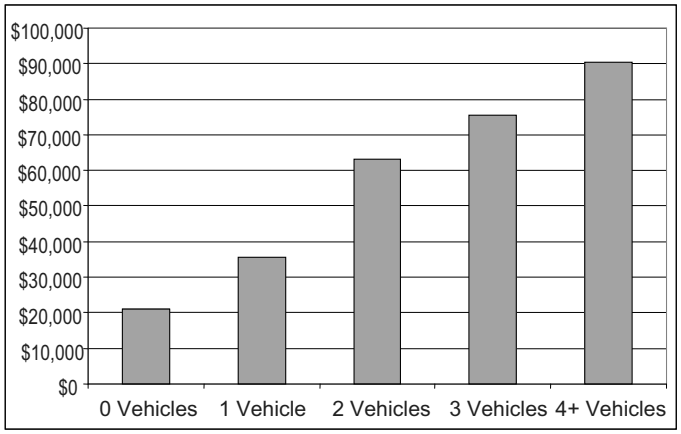
Source: 2000 Census.

Figure 2-9 illustrates the spatial distribution of "no car households" in Santa Barbara and the region.

2.5 Household Income

While 2000 Census data show that Santa Barbara resident's per capita income is 40% above the national average, there are wide variations in income with over 13% of the population living below the Federal poverty level. National data consistently show a direct relationship between income and vehicle ownership. Figure 2-8 illustrates the connection between household income and vehicle ownership in Santa Barbara: while the median annual income of a household with no vehicles is roughly $20,000, the median income of a household with two vehicles is over three times that figure ($63,150)[2].

Figure 2-8: Santa Barbara Household Vehicle Ownership by Household Income



Source: 2000 Census.

For comparison, 2000 Census data indicates that 34% of Santa Barbara County households have annual incomes of $25,000 or less. Figure 2-10 illustrates the spatial distribution of low-income households in Santa Barbara and the region.

2.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the aim of reducing the rate of growth of peak-hour vehicle trips:

- Compared to national averages, Santa Barbara residents and workers already have a relatively lower rate of drive-alone commuting and relatively higher rates of commuting by alternative modes.
- Santa Barbara residents also have lower-than-average rates of vehicle ownership with over one-third of owner households and nearly two-thirds of renter households owning either one or no cars.

[2] The 2000 US Census defines a household as all the people who occupy a housing unit as their usual place of residence.

- The demographics of Santa Barbara and its surrounding region (with concentrations of both high-income households and low-income households) suggest that programs to encourage use of alternative modes may need to be tailored to special markets rather than "one-size-fits-all." For example:
    - Programs to reduce traffic congestion may need to emphasize financial incentives to attract low-income auto commuters to alternate modes, while emphasizing time-savings and amenities to attract higher-income auto commuters.
    - In addition, transit services themselves may need to be tailored to serve both "transit-dependent" riders (who are more likely to be low-income, travel during "off-peak" non-commute hours, and make shorter/local trips) and "choice" riders (who are more likely to be higher income, travel during "peak" commute hours, and make longer/regional trips).
- In addition to the demographic issues discussed in this section, Santa Barbara has other attributes that make alternative transportation more feasible than in other areas. For example:
    - The geography of the City (with mountain ranges and a narrow coastal plain creating a limited number of regional travel corridors and a land use pattern which concentrates origin and destinations) can contribute to higher usage of alternate modes (versus a land use pattern that resembles a "spider web" or "hub and spoke", with multiple regional travel corridors and an infinite number of origins and destinations scattered throughout the region).
    - In addition, the political and cultural environment in Santa Barbara is strongly supportive of environmentally-friendly policies and programs.
    - A large student population (a segment that is more likely to utilize alternative modes) lives in Santa Barbara and the surrounding areas, creating a baseline demand for transit, bicycling, and walking.
- Finally, similar to many communities, the number of motorcycle/scooter commuters in Santa Barbara is currently quite small according to Census data. However, with the increasing price of gas, evidence suggests that there has been an increase in motorcycle/scooter usage nationwide because these vehicles are more fuel efficient than other motorized vehicles. Motorcycles/scooters also make more efficient use of roadway and parking capacity, so while there is likely no need to develop a specific marketing or incentive program to encourage motorcycle/scooter use, the city of Santa Barbara should ensure that adequate on- and off-street parking exists to meet the demand for two-wheeled vehicles. Unfortunately, the "per-person-mile" emissions of motorcycles/scooters is typically higher than other modes (depending on the motorcycle/scooter trip length, age, engine size, pollution control equipment, maintenance record, and aftermarket modifications), so their positive impacts on reducing traffic and parking congestion can be offset by their negative impacts on air pollution.

3 AUTOMOBILES

3.1 Vehicular Circulation in the Santa Barbara Area

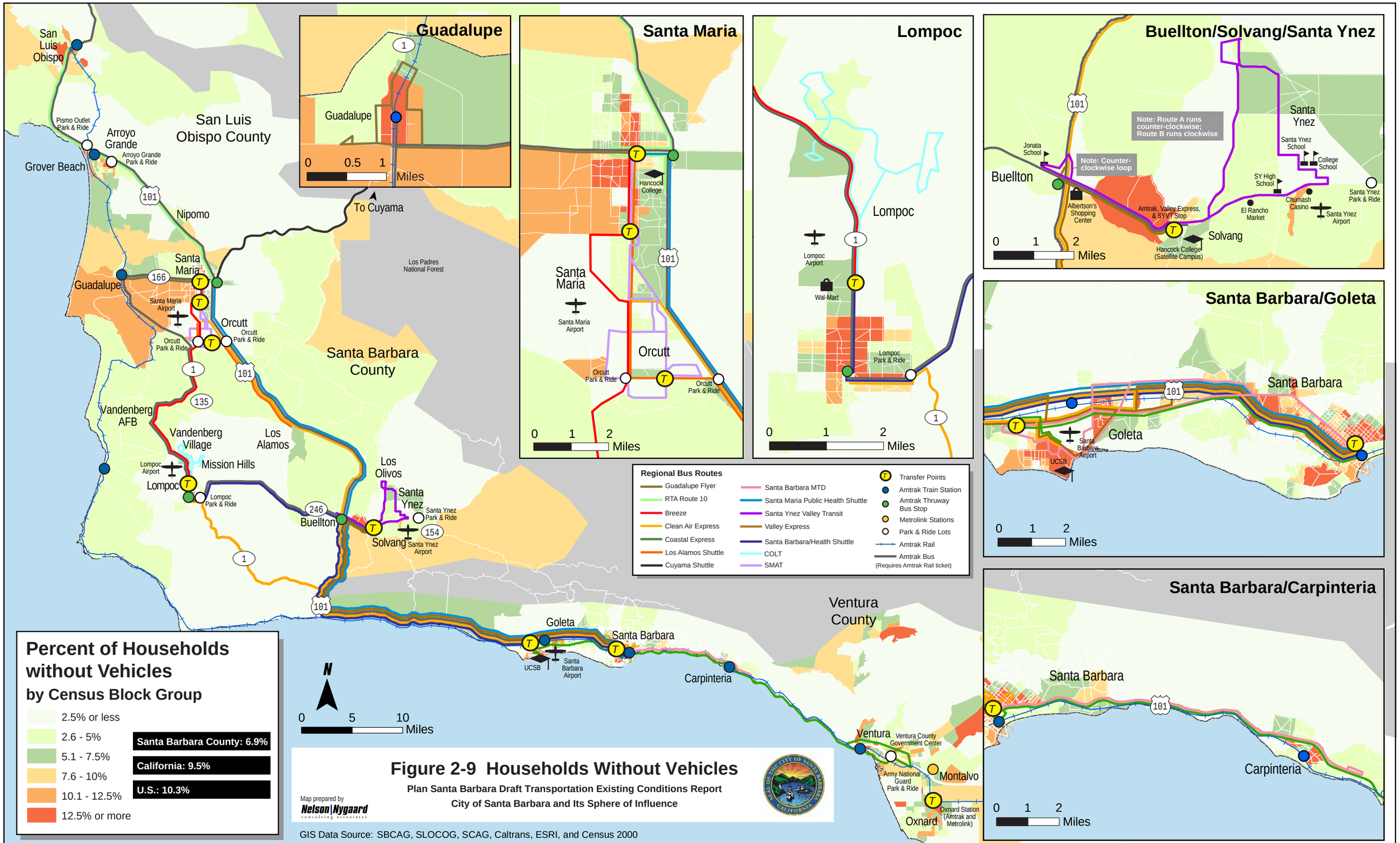
The Santa Barbara area is a long and narrow coastal plain, constrained by the Santa Ynez Mountains to the north and the Pacific Ocean to the south. The City is roughly bisected by U.S. Highway 101, which serves as the primary link for automobile travel between Santa Barbara and adjacent jurisdictions. Because of these geographic constraints, few other options exist for automobile traffic into and out of the area, and as such, most inter-regional automobile commuters into and out of the area must use U.S. Highway 101.

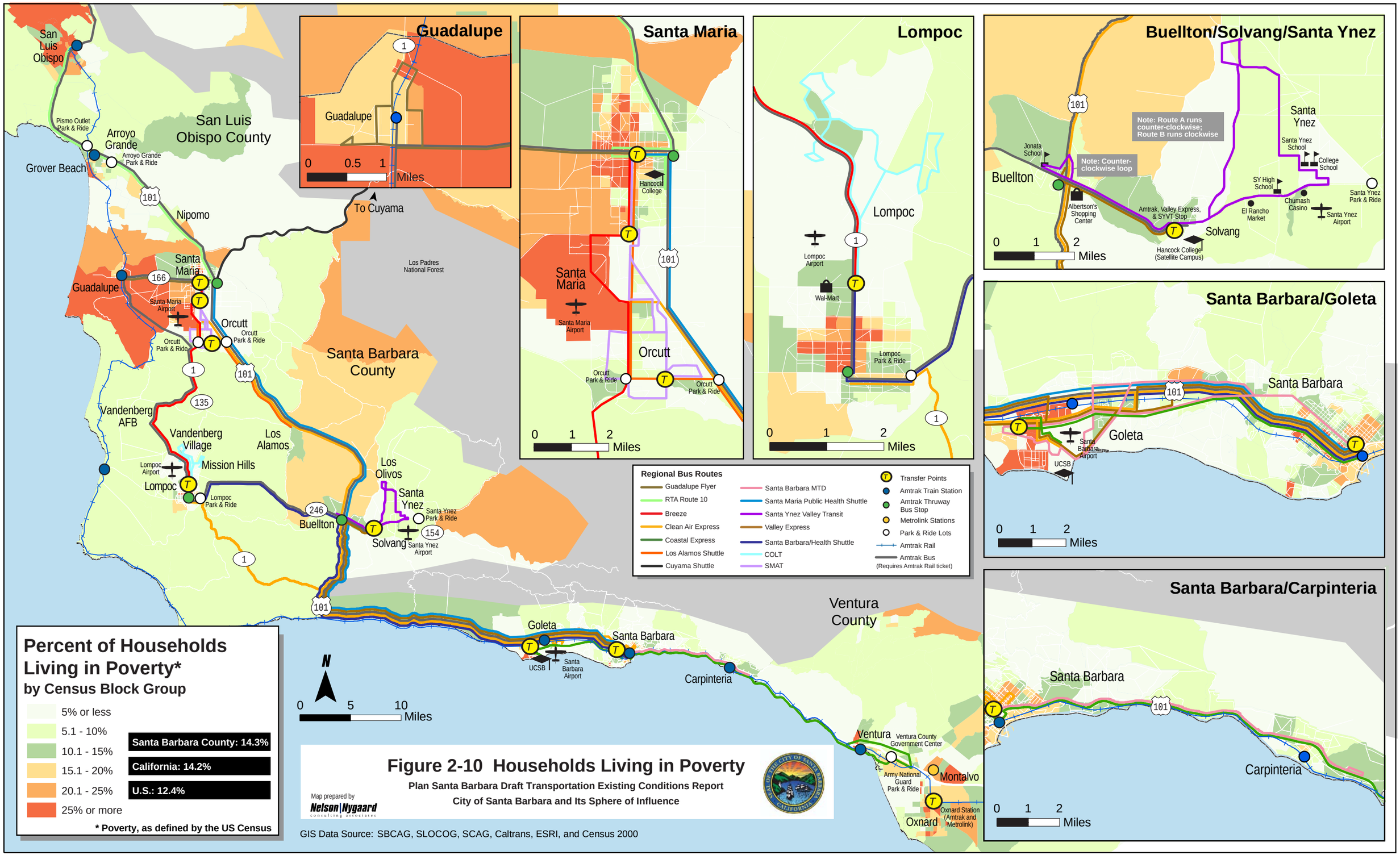
The city of Santa Barbara is mostly built-out, and is anticipated to experience predominately infill development along existing corridors in the future. The following section describes sub-areas of the City and the transportation corridors that serve them, highlighting the existing land use and street and automobile network. The City has identified a number of possible locations for future development, which are also described in greater detail in this section.

3.1.1 Downtown

The streets in the central area of the City form a grid where the streets run northeast/southwest and northwest/southeast. Block faces are short, and one-way couplets such as Chapala and De La Vina streets are used to eliminate left-turn conflicts and boost traffic capacity on streets that are fairly narrow, typically two lanes.

State Street acts as the spine of Santa Barbara, traveling


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc
Lompoc Airport
Wal-Mart
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Santa Ynez
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Santa Ynez School
College School
SY High School
Chumash Casino
El Rancho Market
Santa Ynez Park & Ride
Santa Ynez Airport
Solvang
Hancock College (Satellite Campus)
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Los Padres National Forest
Santa Barbara County
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
101
166
135
246
154
1
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Percent of Households without Vehicles
by Census Block Group
2.5% or less
2.6 - 5%
5.1 - 7.5%
7.6 - 10%
10.1 - 12.5%
12.5% or more
Santa Barbara County: 6.9%
California: 9.5%
U.S.: 10.3%
N
0 5 10 Miles
Figure 2-9 Households Without Vehicles
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000


Guadalupe
Guadalupe
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0 0.5 1 Miles
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
101
0 1 2 Miles
Lompoc
Lompoc
Lompoc Airport
Wal-Mart
Lompoc Park & Ride
1
0 1 2 Miles
Buellton/Solvang/Santa Ynez
101
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Solvang
Hancock College (Satellite Campus)
Santa Ynez
Santa Ynez School
College School
SY High School
Chumash Casino
El Rancho Market
Santa Ynez Airport
Santa Ynez Park & Ride
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
101
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
101
Nipomo
To Cuyama
Los Padres National Forest
Santa Maria
166
Guadalupe
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
1
101
135
Santa Barbara County
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Los Olivos
Lompoc Airport
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Santa Ynez
Santa Ynez Park & Ride
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Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
N
0 5 10 Miles
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Santa Barbara/Carpinteria
Santa Barbara
101
Carpinteria
0 1 2 Miles
Percent of Households Living in Poverty*
by Census Block Group
5% or less
5.1 - 10%
10.1 - 15%
15.1 - 20%
20.1 - 25%
25% or more
Santa Barbara County: 14.3%
California: 14.2%
U.S.: 12.4%
* Poverty, as defined by the US Census
Figure 2-10 Households Living in Poverty
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000

from the Pacific Ocean northwest to East San Roque, where it turns west along Upper State Street, eventually extending beyond the western City limit, becoming Hollister Avenue on its way into the eastern Goleta Valley. Through downtown Santa Barbara, State Street is generally two lanes, lined with a mixture of retail and commercial land uses in the core with some residential uses at the northwestern fringe. While much of the retail land use in downtown Santa Barbara is focused on State Street, parking is provided in a series of surface lots and structures accessed via parallel Chapala Street and Anacapa Street, allowing State Street's buildings to directly face the street with minimal setbacks from the curb. This situation provides a pleasing atmosphere for pedestrians while minimizing their conflicts with vehicles needing to turn to access parking.

Carrillo Street links the Mesa, the Westside, U.S. Highway 101 and Downtown Santa Barbara, running perpendicular to State Street. It is generally four lanes through downtown, except for a brief stretch between De la Vina Street and U.S. Highway 101 where it expands to five lanes, providing three lanes of travel for motorists heading from downtown to the highway. Carrillo Street is lined with predominantly retail land uses between U.S. Highway 101 and Anacapa Street, where it transitions to primarily office and service commercial land uses as it heads northeast. Carrillo Street acts as a major transit corridor, with multiple buses traversing this corridor on an hourly basis to access the Downtown Transit Center from U.S. Highway 101, the Westside, and the Mesa. The City has identified this corridor as one that may accommodate future growth.

Outside the principal corridors and the one-way streets, most corridors in the downtown grid have similar characteristics for the motorist. These corridors are generally two lanes and lined by either residential or commercial land uses. Vehicular traffic is able to filter through the existing grid network in a direct and efficient manner.

3.1.2 Upper State Street

Outside of the downtown towards the northwest, the roads become wider and the block faces longer. The Upper State Street area stretches from roughly Alamar Avenue on the east to the western City limit and beyond to the eastern Goleta Valley, and from U.S. Highway 101 on the south to northern City limits. The area is characterized by a street network where traffic must make its way to the larger arterials from disconnected local streets and cul-de-sacs before proceeding to its ultimate destination.

Upper State Street serves as the primary east-west corridor for vehicular travel in this area, being generally four lanes with intermittent landscaped medians. This corridor is lined by most of the area's retail and commercial buildings, many of which are set back from the street behind their parking. This parking is often accessed by driveways directly linked to State Street, which creates frequent conflict points between vehicles attempting to use the street as a throughway and vehicles attempting to access and exit the buildings. With vehicles regularly driving across the sidewalk, the pedestrian's experience is greatly diminished. Traffic flow is reduced while turning vehicles block through traffic as they wait in the roadway for pedestrians to clear driveways, and through traffic slows behind drivers who must reduce their speed to successfully execute the turn maneuver into driveways that are often narrow.

The *Upper State Street Study* (City of Santa Barbara, March 2007) identified the key issues leading to traffic congestion in this corridor and recommended a set of potential solutions to improve traffic flow, including gradually decreasing the number of driveway access points through incremental redevelopment and, where possible without obstructing mountain views, requiring new development to place parking and access behind the building. These solutions would help the Upper State Street corridor accommodate the potential future growth that may occur here.

Los Positas Road, which is four lanes south of State Street and becomes San Roque Road with two lanes north of State Street, Hope Avenue, which is two lanes, and La Cumbre Road, which is four lanes south of State Street and two lanes north of State Street, provide the primary north-south vehicle corridors in this area and access to Highway 101.

3.1.3 Eastside

Traveling northeast from downtown Santa Barbara on Anapamu Street, motorists who follow the gentle bend in the road will find themselves driving down the Eastside's principal thoroughfare, Milpas Street, which passes under the highway and ends at the beach. On this route, Milpas Street is two lanes and lined with residential land uses until it reaches Canon Perdido Street. From Canon Perdido Street to Calle Puerto Vallarta, it opens to four lanes and is lined primarily with neighborhood-serving commercial and retail land uses. Like downtown, blocks are short and, with the exception of larger neighborhood shopping cen-

ters, most of the buildings are pulled up to the curb.

However, unlike downtown, these buildings are often served by their own parking lots accessed from Milpas Street or the side streets connecting to Milpas Street. A few larger supermarkets are set back from the street with their parking in front. The parking access here creates the same type of conflicts seen along Upper State Street, though the shorter block lengths are more amenable to pedestrians. This corridor has also been identified by the City as one that may accommodate future growth.

The one-way couplet of Gutierrez and Haley Streets also connects the Eastside to downtown Santa Barbara.

3.1.4 Other Areas

Outside of the areas mentioned, the route, directness, and connectivity of the roadway network typically follow the physical geographic setting. These other areas are largely residential, and commercial activity, if any, is centralized along the primary corridors, or at the intersection of primary corridors.

Areas in the foothills to the north are generally served by narrow and winding roads, which are usually two lanes. Foothill Avenue (Highway 192) and Alameda Padre Serra, both with two lanes, provide the primary access to residential streets in these neighborhoods.

The Westside, situated in a basin between the hillsides of the Mesa and the freeway, has a grid system of roads similar to the downtown area. Two-lane San Andres Street is the primary corridor and is lined with commercial and retail land uses in the blocks approaching the intersection with Micheltorena Street, which in turn connects this area to downtown across U.S. Highway 101. Mission Street also acts as a primary route for traffic between the western edge of the Westside and Highway 101.

Traffic on the Mesa uses a small number of larger arterial roadways to access smaller winding local streets that traverse the level mesa-top and hillsides. Four-lane Cliff Drive (formerly SR 225), Shoreline Drive, (recently narrowed from four to two lanes between Loma Alta and La Marina) and becoming two-lane Meigs Road provide access to the residential streets in this area. Retail and commercial centers are located around the intersection of Cliff Drive with Meigs Road/Shoreline Drive.

Traffic in Montecito uses a series of smaller roads to access two-lane arterials connecting it to the freeway and the City. Retail and commercial land uses are generally confined to Coast Village Road, which is part of the city of Santa Barbara, while Hot Springs, Olive Mill, and San Ysidro Roads provide access to unincorporated County residential streets in this area. All of these streets are two lanes.

3.2 Existing Policy Framework

The following section highlights aspects of the existing governmental policy framework that are pertinent to automobile travel within the city of Santa Barbara. A discussion of the overall transportation policy framework in the area can be found in Appendix A of this report.

3.2.1 City Circulation Element

The city of Santa Barbara's General Plan Circulation Element was adopted in 1998 and sets forth a comprehensive vision of Santa Barbara's desired transportation system. The Circulation Element addresses all modes of transportation, including the automobile, transit, pedestrians, and bicycles. In addition, the 1998 Circulation Element addresses issues such as economic vitality, equality of modes of transportation, parking, and the relationship of land use and new development to transportation.

In regards to roadways and automobile use, the Circulation Element retains the roadway classification system from the original older element that it replaces, although this system does not contain policy direction or standards associated with these classifications. This system utilizes five categories of streets: freeway, primary arterial, minor arterial, collector street, and local street. These classifications were based on traffic volumes in vehicles per day, right-of-way width, and design features such as the number of travel lanes, presence of driveway access and on-street parking. Historically, the volume of vehicular traffic was the primary basis by which a City qualified for funding from the federal or state governments. However, the 1998 Circulation Element focuses upon broadening mobility options available to residents.

A discussion of a possible alternative classification system that takes into account other considerations outside of vehicular traffic was discussed in the 1998 Circulation Element (refer to Section 9.2). However, this alternative functional classification system has not yet been implemented, and the City does not specifically designate a vehicular functional classification system beyond the regional Congestion Management Plan system in its Circulation Element.

3.2.2 City Thresholds of Significance

3.2.2.1 Circulation Element

The 1998 Circulation Element discusses traffic impact analysis for development projects in the city of Santa Barbara and identifies significance criteria for intersections based on two primary variables; Level of Service (LOS) and Volume of vehicles/Capacity of road (V/C). LOS is measured on a scale from LOS A to LOS F, where LOS A represents free flow activity and LOS F represents overcapacity operation (see section 3.3.1 for further explanation of LOS). According to the General Plan, an intersection must have a LOS "C" or better, which is equivalent to a V/C of 0.8 or 80% or less, to be considered acceptable.

The Circulation Element also highlights the applicable effect of Measure E (Charter non-residential growth limit amendment) on traffic impact analysis, and notes that the restrictive criteria that must be met could prevent compact development that may actually reduce vehicle trips as follows:

- *Land use patterns directly affect the transportation choices that people make. A compact, pedestrian oriented development pattern will provide a greater variety of transportation choices by facilitating modes of transportation other than the automobile. This happens because people can live and work in close proximity to transportation centers and facilities. Conversely, a low-density, sprawling development pattern that segregates residential and non-residential uses limits transportation options and increases dependence on the automobile for mobility. This land use pattern, commonly known as Urban Sprawl, can be seen in many post World War II communities such as Los Angeles and San Jose.*
- *Currently, the amount and density of development that can occur in the City is governed by different sets of regulations. Passed by the voters in 1989, Measure E was incorporated into the City Charter as Charter Section 1508. This Charter Section not only places a ceiling on the total amount of non-residential square footage developed in the City until the year 2010, it also states that new non-residential construction can only occur where it will not cause a significant and unmitigated adverse impact on the City's water resources and traffic within the City, or the supply of affordable housing on the South Coast. However, because Measure E has not been incorporated into the City's Local Coastal Program it cannot be used for the purpose of making findings regarding the consistency of any project with the certified Local Coastal Program. Such a use would require the provisions of Measure E to be certified through the Coastal Commission through an amendment to the City's Local Coastal Program.*
- *Traffic impacts are currently determined in two different ways. The first way that traffic impacts are determined is by adopted Level of Service (LOS) standards for signalized City intersections. Currently, signalized intersections are considered impacted if they exceed the City's LOS goal of C, which carries a V/C of 0.80. However, for the purposes of environmental assessment in the city of Santa Barbara under the California Environmental Quality Act (CEQA), a signalized intersection is considered impacted if a project causes the V/C to exceed 0.77. By state law, in any case where a project results in a significant traffic impact, an environmental impact report must be prepared.*[3]

3.2.2.2 Adopted City Traffic Impact Assessment Criteria

Traffic impacts are determined for any development project in the City using the following impact significance criteria. A project that is estimated to result in a net traffic increase that exceeds these thresholds would typically be required to prepare an Environmental Impact Report (EIR) under CEQA (unless it was exempted statutorily, via a "statement of overriding considerations," or another mechanism). The stringent nature of these impact criteria, which are more rigorous than the Circulation Element criteria, has greatly influenced development in the City over the last two decades. The criteria are:

- Project-Specific Significant Impact: A project-specific significant impact occurs when:
  (a) Project peak-hour traffic would cause an intersection to exceed 0.77 V/C (per the General Plan language above), or
  (b) The V/C of an intersection would be increased by 0.01 (1%) or more as a result of project peak-hour traffic.
- Significant Cumulative Contribution: A project would result in a significant contribution to cumulative traffic when:
  (a) Project peak-hour traffic together with other cumulative traffic from existing and reasonably foreseeable pending projects would cause

[3] Excerpted from Chapter 11: Traffic Standards from the city of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.

an intersection to exceed 0.77 V/C, or

(b) Project would contribute traffic to an intersection already exceeding 0.77 V/C.

Given the more stringent nature of impact criteria and levels of significance under CEQA, projects which are likely to require an EIR, such as the Santa Barbara Cottage Hospital expansion project, will use CEQA guidelines when conducting their traffic impact analysis.

3.2.3 Congestion Management Plan

The Congestion Management Plan (CMP) is required by law (California State Government Code Section 65089), for all urban counties in the State. The CMP for Santa Barbara County is administered by the Santa Barbara County Association of Government. The goal of the CMP is to reduce or maintain current congestion levels through supply side measures, such as capital improvements, and demand side measures, such as travel demand management (TDM) programs and coordinated local jurisdiction land use planning. To measure the effectiveness of the CMP, certain key roadways are selected for regular monitoring. This designated roadway system includes all State Highways and principal arterials within the city of Santa Barbara (refer to Figure 3-1).[4]

The city of Santa Barbara must maintain a certain level of service, or congestion level, on streets designated in the CMP in order to receive funding from various Federal and State transportation and air quality funding programs (Government Code Section 65089.2). In general, LOS D or better is the CMP standard for roadways and intersections, but the CMP recognizes that some facilities are currently operating at LOS E or below. Where facility traffic levels exceed this standard, the CMP requires that agencies adopt a Deficiency Plan to improve operation of the facility. Agencies that fail to do so are out of conformity. As of the most recent CMP, the city of Santa Barbara was in conformity because all of its facilities which exceed CMP standards had adopted Deficiency Plans.[5]

At the project level, if a proposed development is located adjacent to or near one of the CMP designated highways and arterials, then the proposed development must also meet the CMP specified thresholds of significance.

Figure 3-1: CMP Designated Highways and Arterials; City of Santa Barbara

Street	Segment
State Highways:[a]	
Highway 101	(within City limits)
State Route 144	(portions of Milpas St., Mason St., Salinas St., and Sycamore Cyn. Rd.)
State Route 192	(portions of Sycamore Cyn. Rd., Stanwood Dr., Mission Ridge Rd., Mountain Dr., and Foothill Rd.)
State Route 225	(portions of Las Positas Rd., Cliff Dr., and Castillo St.)
Principal Arterials:[a]	
State Street	De la Vina St. to Hollister Ave.
Las Positas Road	Highway 101 to State St.
Chapala Street	Gutierrez St. to Mission St.
De La Vina Street	Mission St. to State St
Mission Street	Highway 101 to Anacapa St.
Anacapa Street	Cliff Drive to Anacapa St.
Carrillo Street/ Meigs Road	Highway 101 to Milpas St.
Haley Street	Bath St. to Milpas St
Gutierrez Street	Cabrillo Blvd. to Haley St
Milpas Street	Haley St. to Cabrillo Blvd
Garden Street	Haley St. to Cabrillo Blvd
Hollister Avenue	San Pedro Creek to Los Carneros Rd
Fairview Avenue	Placencia St. to Olney St.

[a] *Chapter 10: Mobility from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.*

In addition, the CMP provides its own classification system used when determining eligibility for funding rather than the classification system contained within the City's Circulation Element. However, the Inter-modal Surface Transportation Efficiency Act (ISTEA), passed in 1991, established new policies that fund a variety of modes of transportation, including cars, trucks, buses, trains, bicycles, and walking. ISTEA requires the comprehensive planning of appropriate modes of transportation for natural and built environments and air quality standards.

3.3 Existing Traffic Conditions

Because traffic flow on urban arterials is most constrained at intersections, detailed traffic flow analyses typically focus on the operating conditions of critical intersections during peak travel periods. Thus the bulk of the following analysis focuses on intersection operations. However, in some instances, congestion along major road corridors can be related to the interaction between closely spaced signals and other factors such as a large number of driveways, pedestrian activity, transit operations, etc. Several such corridors exist in the City, including Upper State

[4] Excerpted from Chapter 10: Mobility from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.

[5] Congestion Management Plan. SBCAG, 2003

Street and Carrillo Street between U.S. Highway 101 and Milpas Street.

This section describes the methodology used to assess the traffic conditions for each of the intersections analyzed in the study, and reports the operating conditions at each, indicating V/C in the case of signalized intersections, average delay in the case of stop-controlled intersections, and LOS for all intersections. This study analyzes and reports the following types of intersections:

- *Plan Santa Barbara* study intersections within the City, and
- Intersections in the adjacent unincorporated communities of Goleta and Montecito which may be affected by traffic generated by future growth within the city of Santa Barbara; and
- Intersections within the boundaries of the City Municipal Airport as well as those within the adjacent city of Goleta that may be affected by future growth within Santa Barbara jurisdiction.

Although there are many signalized intersections within and adjacent to the City, this study focuses on those along major transportation corridors likely to be affected by traffic generated by future growth and development permitted under *Plan Santa Barbara*, particularly those that are currently congested or have the potential to become congested in the future.

3.3.1 LOS Analysis in the City of Santa Barbara

Level of Service is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at LOS A to overloaded conditions at LOS F. LOS C with a V/C ratio of 0.77 or less is the acceptable level of service in the city of Santa Barbara. For unsignalized intersections, LOS C is used as the minimum acceptable LOS.

The city of Santa Barbara uses the "Intersection Capacity Utilization" (ICU) method (Transportation Research Board 1980) of intersection capacity analysis to determine the intersection V/C ratio and corresponding LOS for the given turning movements and intersection characteristics at signalized intersections. Figure 3-2 defines the ranges of V/C ratios and their corresponding LOS using the ICU method.

For unsignalized intersections, the city of Santa Barbara uses the Highway Capacity Manual (HCM) unsignalized intersection methodology (Transportation Research Board 2000) to determine average approach delay and corresponding LOS for the given turning movements and intersection characteristics. Figure 3-3 defines the ranges of average delay and their corresponding LOS using the HCM method.

Figure 3-2: Level of Service Definitions for Signalized Intersections

LOS	V/C	Definition
A	0.000-0.600	EXCELLENT. No Vehicle waits longer than one red light and no approach phase is fully used.
B	0.601-0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701-0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801-0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901-1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Source: Transportation Research Circular No. 212, Interim Materials on Highway Capacity, Transportation Research Board 1980.

Figure 3-3: Level of Service Definitions for Unsignalized Intersections (2000 Highway Capacity Manual Unsignalized Method)

Level of Service	Average Control Delay per Vehicle (seconds)
A	$\leq$ 10.0
B	> 10.0 and $\leq$ 15.0
C	> 15.0 and $\leq$ 25.0
D	> 25.0 and $\leq$ 35.0
E	> 35.0 and $\leq$ 50.0
F	> 50.0

Source: Highway Capacity Manual, Transportation Research Board, 2000.

3.3.2 Plan Santa Barbara Study Intersections

The City Transportation Planning staff, in consultation with Fehr & Peers, selected 52 key intersections in the City for detailed study (refer to Figures 3-4 and 3-5).

Figure 3-4: Year 2008 Weekday Existing Conditions, Plan Santa Barbara Study Intersection Levels of Service

	Intersection	Peak Hour	Existing Conditions Delay or V/C	LOS
1	Olive Mill Road &	AM	13	B
	Coast Village Road [b]	PM	18	C
2	Hot Springs Road &	AM	20	C
	Coast Village Road [b]	PM	25	C
3	Cabrillo Boulevard &	AM	20	C
	U.S. Highway 101 SB Ramp [b]	PM	15	B
4	Milpas Street &	AM	0.367	A
	U.S. Highway 101 SB On Ramp [a]	PM	0.526	A
5	Milpas Street &	AM	0.683	B
	U.S. Highway 101 SB Off Ramp [a]	PM	0.771	C
6	Milpas Street Roundabout [c]	AM	15	B
		PM	14	B
7	Milpas Street &	AM	0.592	A
	Quinientos Street [a]	PM	0.715	C
8	Milpas Street &	AM	0.520	A
	Gutierrez Street [a]	PM	0.582	A
9	Milpas Street &	AM	0.479	A
	Haley Street [a]	PM	0.641	B
10	Cabrillo Boulevard &	AM	0.298	A
	Garden Street [a]	PM	0.370	A
11	Yanonali Street &	AM	0.431	A
	Garden Street [a]	PM	0.491	A
12	U.S. Highway 101 SB Ramps &	AM	0.640	B
	Garden Street [a]	PM	0.929	E
13	U.S. Highway 101 NB Ramps &	AM	0.575	A
	Garden Street [a]	PM	0.748	C
14	Gutierrez Street &	AM	0.675	B
	Garden Street [a]	PM	0.808	D
15	Cabrillo Boulevard &	AM	0.303	A
	State Street [a]	PM	0.420	A
16	Gutierrez Street &	AM	0.288	A
	State Street [a]	PM	0.383	A
17	Cabrillo Boulevard &	AM	0.357	A
	Castillo Street [a]	PM	0.598	A
18	Montecito Street &	AM	0.691	B
	Castillo Street [a]	PM	0.763	C
19	Haley Street &	AM	0.552	A
	Castillo Street [a]	PM	0.784	C
20	Haley Street &	AM	0.538	A
	Bath Street [a]	PM	0.697	B
21	Carrillo Street &	AM	0.474	A
	Anacapa Street [a]	PM	0.618	B
22	Carrillo Street &	AM	0.445	A
	Chapala Street [a]	PM	0.635	B
23	Carrillo Street &	AM	0.551	A
	De la Vina Street [a]	PM	0.636	B
24	Carrillo Street &	AM	0.551	A
	Bath Street [a]	PM	0.540	A
25	Carrillo Street &	AM	0.664	B
	Castillo Street [a]	PM	0.666	B
26	Carrillo Street &	AM	0.773	C
	U.S. Highway 101 NB Ramp [a]	PM	0.842	D
27	Carrillo Street &	AM	1.023	F
	U.S. Highway 101 SB Ramp [a]	PM	0.962	E
28	Carrillo Street &	AM	0.682	B
	San Andres Street [a]	PM	0.755	C
29	Micheltorena Street &	AM	0.608	B
	San Andres Street [a]	PM	0.613	B
30	Mission Street &	AM	27	D
	Modoc Road [b]	PM	29	D
31	Mission Street &	AM	0.938	E
	U.S. Highway 101 SB Ramps [a]	PM	0.969	E
32	Mission Street &	AM	0.858	D
	U.S. Highway 101 NB Ramps [a]	PM	0.812	D
33	Mission Street &	AM	0.512	A
	Castillo Street [a]	PM	0.554	A
34	Mission Street &	AM	0.556	A
	Bath Street [a]	PM	0.606	B
35	Mission Street &	AM	0.524	A
	De la Vina Street [a]	PM	0.558	A
36	Mission Street &	AM	0.719	C
	State Street [a]	PM	0.697	B
37	Meigs Road &	AM	0.621	B
	Cliff Drive [a]	PM	0.688	B
38	Las Positas Road &	AM	30	D
	Cliff Drive [b]	PM	23	C
39	Las Positas Road &	AM	0.671	B
	Modoc Road [a]	PM	0.730	C
40	Las Positas Road &	AM	0.812	D
	U.S. Highway 101 SB Ramps [a]	PM	0.947	E
41	U.S. Highway 101 NB Ramp &	AM	0.798	C
	Calle Real [a]	PM	0.683	B
42	Alamar Avenue &	AM	0.495	A
	State Street [a]	PM	0.563	A
43	De la Vina Street &	AM	0.465	A
	State Street [a]	PM	0.535	A
44	Las Positas Road &	AM	0.637	B
	State Street [a]	PM	0.772	C
45	Hitchcock Way &	AM	0.477	A
	State Street [a]	PM	0.671	B
46	Hope Avenue &	AM	0.511	A
	State Street [a]	PM	0.661	B
47	La Cumbre Road &	AM	0.600	A
	State Street [a]	PM	0.853	D
48	Hope Avenue &	AM	0.589	A
	U.S. Highway 101 NB Ramp/Calle Real [a]	PM	0.765	C
49	La Cumbre Road &	AM	0.605	B
	U.S. Highway 101 SB Ramps [a]	PM	0.668	B
50	La Cumbre Road &	AM	0.539	A
	Calle Real [a]	PM	0.663	B
51	SR 154 &	AM	0.531	A
	Calle Real [a]	PM	0.730	C
52	SR 154 &	AM	0.417	A
	U.S. Highway 101 SB On Ramp [a]	PM	0.400	A

[a] Intersection is controlled by signal and uses ICU methodology
[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology
[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- 34000 Average Daily Traffic (ADT) Count and Location

Level of Service (LOS)
- A – B
- C
- D
- E
- F
- No Data

Intersection LOS Peak Hour
AM → ◐ ← PM

Sources: Fehr & Peers 2008; Envicon Corp. 2007, *Santa Barbara Botanic Garden Vital Mission Plan DEIR*; SAIC 2006, *Saint Athanasius Antiochian Orthodox Church Complex FEIR*; SBCAG 2007, *Santa Barbara County Congestion Management Program*; Caltrans 2007, *2006 Traffic Volumes on California State Highways*; County of Santa Barbara 2007, *County of Santa Barbara 2006 Roadway Traffic Volumes*; County of Santa Barbara 2006, *Westmont College Master Plan FSEIR*; Crawford Multari & Clark Associates 2008, *UCSB Long Range Development Plan DEIR*.

Figure 3-5 Level of Service and Average Daily Traffic Volumes

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Fehr and Peers

SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

Scale: 1" = 1,800'

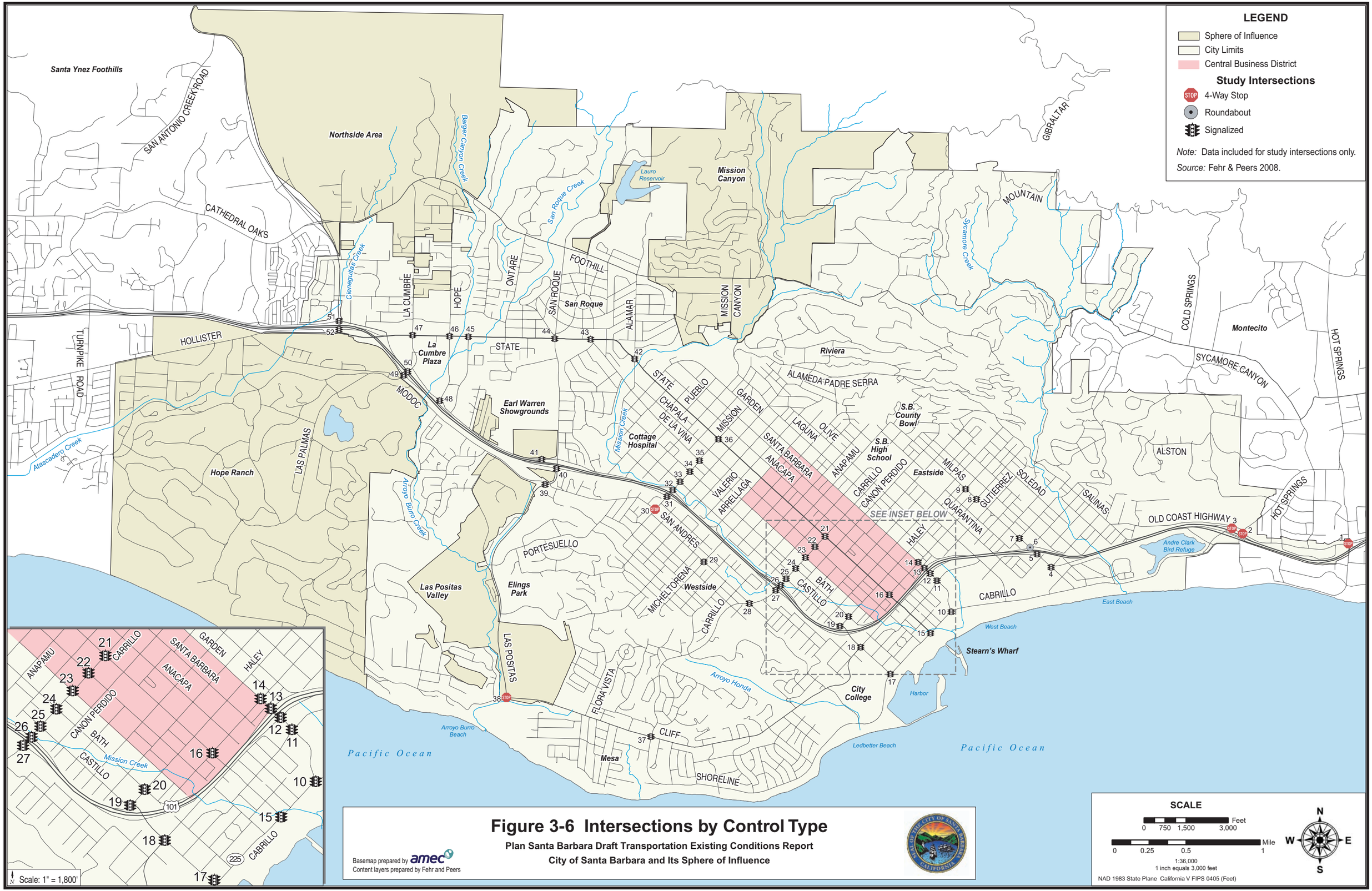


Figure 3-6 Intersections by Control Type

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Fehr and Peers

These intersections were selected based on existing congestion as identified in previous studies or by City staff, location along key arterials or corridors and/or potential to be affected by future growth and development associated with Plan Santa Barbara. Weekday morning and evening peak period traffic counts (7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.) were conducted at each of the study intersections between Tuesday, March 11 and Thursday, March 13, 2008. Peak periods coincide with heaviest commute hours, and the peak one hour within the peak period is used to define maximum congestion levels at intersections. These counts were used to analyze operating conditions at the Plan Santa Barbara study intersections. A list of the Plan Santa Barbara study intersections with the results of the LOS analysis is provided in Figure 3-4, and LOS is graphically represented in Figure 3-5.

Traffic data collection is an exercise in sampling. Significant singular events, such as a traffic collision or Santa Barbara's annual Fiesta, or common broader events, such as holidays and school vacations, will have a noticeable impact on traffic flow. Collective minor variations in the everyday routines of the City's populace should not be overlooked, however, as they can cause traffic volumes to vary considerably from their daily and weekly historic averages, often as much as 10-15%. Such variations may affect intersections such as those near City College (e.g., Castillo/Montecito streets) where congestion may vary depending upon the time of year, with higher congestion levels associated with the start of the semester or finals and lower levels at other times.

The *Plan Santa Barbara* count program was conducted to minimize the effects that major foreseeable events, such as school spring breaks, would have on the results. However, certain intersections may appear to have a better or worse LOS than previous analysis because of daily fluctuation in traffic.

As shown in Figure 3-7, the following intersections are currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours. The greatest levels of congestion are generally found at freeway interchanges or intersections approaching freeway interchanges.

Figure 3-7: Plan Santa Barbara Study Intersections Currently Operating with a Peak Hour V/C of 0:77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Milpas St	U.S. Highway 101 SB Off Ramp	PM
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	Both
Carrillo St	U.S. Highway 101 SB Ramp	Both
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	AM [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State St	PM
La Cumbre Rd	State St	PM

Note: [a] For unsignalized intersections, LOS C was taken as the minimum acceptable LOS.

3.3.3 Nearby Intersections

Santa Barbara is generally bordered by unincorporated County communities; to the east is the semi-rural community of Montecito and to the west are the more urban neighborhoods of the eastern Goleta Valley and the city of Goleta. Traffic generated within the City uses a number of the arterials and key intersections in these boundary areas, and growth permitted under *Plan Santa Barbara* could add to congestion at these facilities. As a result, the consultant team conferred with County and City staff and identified those boundary area intersections with the highest potential to be affected by traffic generated by growth and development permitted under *Plan Santa Barbara*.

Intersections in the boundary and airport area were not subject to new traffic counts by the project team. Rather, this study primarily relies on data obtained from existing sources, including recent traffic counts and LOS analysis performed by SBCAG for CMP monitoring, and traffic counts and LOS analysis from a number of recent EIRs prepared for development projects in these areas. The majority of these intersections generally operate at acceptable levels of service, a V/C ratio of 0.77 or less, during the P.M. peak hour (refer to Figures 3-6 and 3-10).

As shown in Figure 3-8, one nearby intersection is currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours.

Figure 3-8: Nearby Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Mission Canyon Rd	Foothill Road	PM [a]

Note: [a] For unsignalized intersections, LOS C was taken as the minimum acceptable LOS.

3.3.4 Airport Area Intersections

The City's municipal airport is surrounded by the incorporated city of Goleta. Future growth and development at the airport and adjacent Commercial/Industrial Specific Plan, although not a primary focus of *Plan Santa Barbara*, has the potential to affect both airport and city of Goleta intersections. As a result, the consultant team conferred with staff from Santa Barbara County, the city of Goleta, and the city of Santa Barbara to identify those airport area intersections with the highest potential to be affected by traffic generated by growth and development permitted at the airport.

Intersections in the area were not subject to new traffic counts by the project team. Rather, this study relies on data obtained from the recent *University of California Santa Barbara (UCSB) Long Range Development Plan DEIR* (March, 2008), which studied surface street intersection operating conditions during the p.m. peak period and freeway ramp operating conditions during both the a.m. and p.m. peak periods. Arterial roadways and intersections surrounding the airport experience relatively high traffic volumes and associated congestion, with seven intersections that exceed the City's standard of V/C ratio 0.77/ LOS C (refer to Figure 3-10).

As shown in Figure 3-9, several airport area intersections are currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours.

Figure 3-9: Airport Area Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Storke Rd	Hollister Av	PM
Storke Rd	U.S. Highway 101 NB Ramps	Both
Storke Rd	U.S. Highway 101 SB Ramps	Both
Los Carneros Rd	U.S. Highway 101 NB Ramps	PM
Los Carneros Rd	U.S. Highway 101 SB Ramps	PM
Fairview Av	U.S. Highway 101 NB Ramps	Both
Fairview Av	U.S. Highway 101 SB Ramps	PM

3.4 Existing Roadway Segment Traffic Volumes

Daily traffic counts for 25 roadway segments were conducted as part of this study of existing conditions. In addition, daily traffic counts outside the City in or near the City's sphere of influence were collected from a variety of sources, including the Santa Barbara County Count Program and various EIRs. Daily traffic volumes for the U.S. Highway 101, State Route (SR) 154, and sections of SR 192 were collected from Caltrans. Daily traffic volumes are illustrated in Figures 3-4 and 3-5.

The volume maps illustrate the large number of regional trips entering and leaving Santa Barbara. The greatest volumes on the freeway occur between downtown and the medical district, the area with the largest concentration of employment in the City. Surface streets also illustrate this pattern, with the volumes increasing as the observed route approaches the freeway.

3.4.1 Surface Streets

Within the city of Santa Barbara, daily traffic volumes range from a high of 32,440 vehicles on Carrillo Street northeast of U.S. Highway 101 to a low of 4,170 vehicles on Loma Alta Drive north of Colonel Street. The street segments with the greatest traffic volumes are typically those approaching U.S. Highway 101 interchanges, with Mission Street and Carrillo Street carrying more than 30,000 vehicles per day, and Las Positas Road, Garden Street, and Milpas Street carrying more than 20,000 vehicles per day.

Just outside the City limits, Hollister Avenue west of Modoc Road carries 17,780 vehicles per day, while La Cumbre Road south of SR 192 carries 4,850 vehicles per day.

3.4.2 Freeways and State Highways

U.S. Highway 101 is the only freeway within the Santa Barbara City limits. In Santa Barbara the volumes range from a high of 133,000 vehicles per day between Mission Street and Las Positas Road (which is also the highest volume in the greater Santa Barbara area), to a low of 85,000 vehicles per day between Olive Mill Road and Coast Village Road/Cabrillo Boulevard.

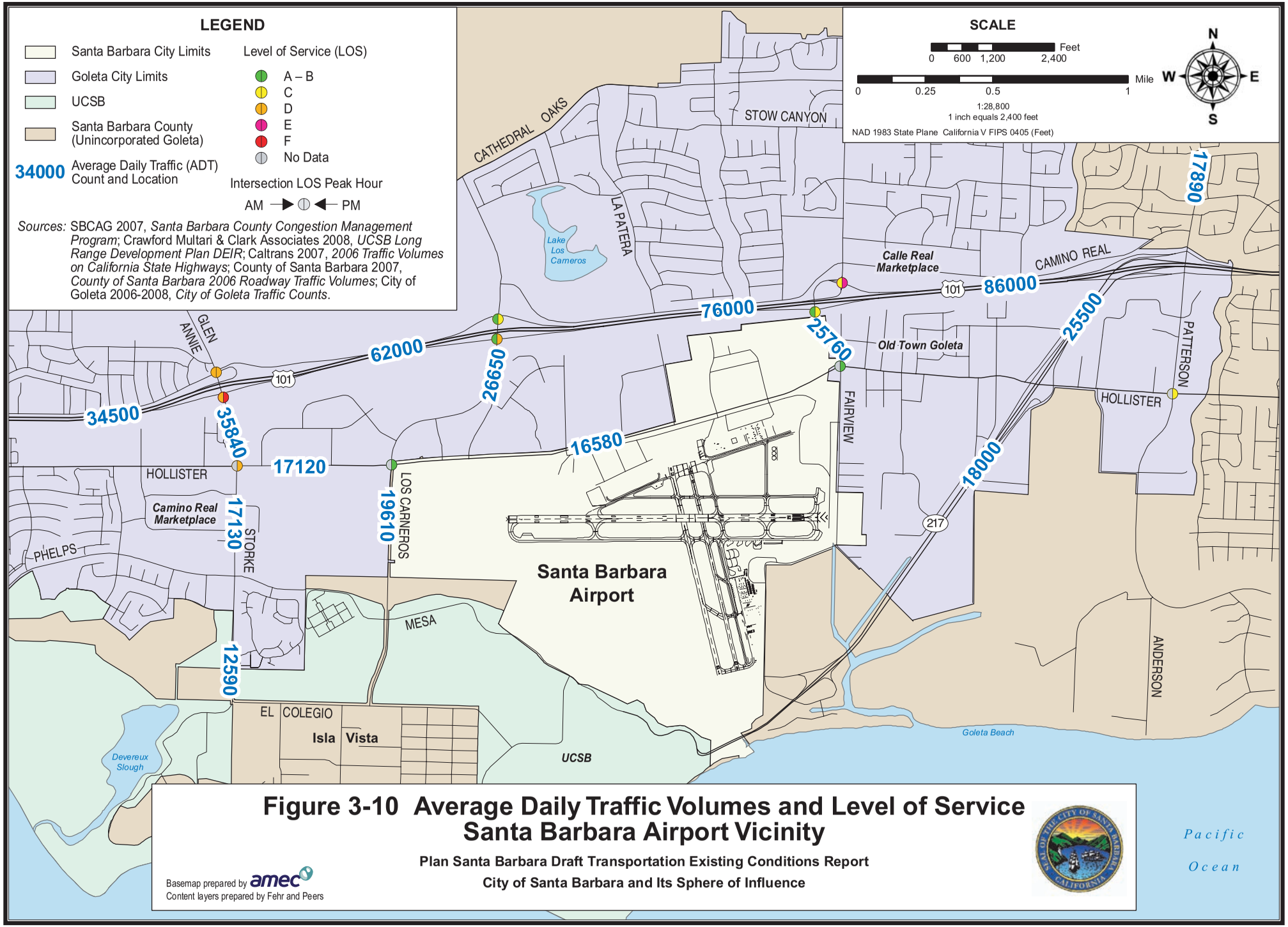


Figure 3-10 Average Daily Traffic Volumes and Level of Service Santa Barbara Airport Vicinity

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Content layers prepared by Fehr and Peers

When approaching Santa Barbara from the north, volumes on U.S. Highway 101 increase continuously as they approach Las Positas Road to Mission Street segment. Coming from the south, volumes generally increase as they approach downtown, decrease briefly after the Garden Street interchange and increase again leading into the Mission Street to Las Positas Road segment.

Just inside the City limits, SR 154 carries 18,000 vehicles per day south of the junction with SR 192, and SR 192 carries 15,060 vehicles per day just east of the junction with SR 154 (refer to Figure 3-5).

3.5 Currently Programmed Roadway Improvements

Currently funded major roadway improvements in the City are centered on and around U.S. Highway 101 between Milpas Street and Hot Springs Road. This project will construct an additional lane of travel on the freeway in each direction and reconfigure certain freeway ramps and nearby intersections to improve traffic flow through the area. Construction began in June 2008 and will be completed in 2012. The project will proceed in four stages, detailed below[6]:

Stage 1 (2008-2009)
1. Replace Milpas bridges
2. Milpas off-ramp improvements
3. Southbound Milpas hook off-ramp
4. Replace Sycamore creek bridge
5. Cabrillo to Salinas merge lane
6. Tennis stadium sound wall
7. Third southbound lane
8. Old Coast Highway sidewalk
9. Montecito Roundabout (Old Coast Hwy/Hot Springs Road/Coast Village Road)
10. Multipurpose path

Stage 2 (2009-2010)
11. Third southbound lane over Milpas
12. Cacique under crossing
13. Close southbound on-ramp

Stage 3 (2010-2011)
14. Salinas to Alisos sound wall
15. Third northbound lane from Salinas to Milpas

Stage 4 (2011-2012)
16. Third northbound lane over Milpas
17. Connect Cacique Street
18. Multipurpose path

This project will help relieve a notable choke point for traffic entering and exiting Santa Barbara from the south by increasing capacity on the freeway and improving flow on roadways leading to freeway ramps. This project will be built with funds from Measure D. For a detailed discussion of Measure D see section 10.1 of this report.

In addition to this major freeway widening project, additional funded projects currently under construction include the addition of a new lane to the northbound onramp onto US Highway 101 at Carrillo Street and safety improvements to the Mission Street US Highway 101 underpass which include sidewalk and bike path improvements. Frontage improvements to the entire length of Cliff Drive (SR 225) are also planned and designed to bring this four lane road up to current standards prior to the State relinquishing ownership to the city of Santa Barbara.

3.6 Key Issues and Opportunities

3.6.1 Regional Automobile Travel

The high demand for regional travel, and its associated strain on the local and regional road network, is the most significant transportation challenge facing the city of Santa Barbara in developing future land uses, goals and policies for *Plan Santa Barbara*. The greatest demand for roadway facilities in the city of Santa Barbara is generally approaching freeway interchanges, and traveling on the freeway itself. This pattern of traffic suggests that a great deal of the travel in the city of Santa Barbara is regional in nature.

This regional travel demand is related to both commuting within the South Coast, and between the South Coast and outlying housing market areas (e.g., Ventura County). Within the South Coast, regional travel involves commutes between the City and employment opportunities at UCSB and Goleta industrial parks, inbound commutes from other South Coast communities to employment in the City, particularly within downtown, and more specialized trips such as travel from student housing in Isla Vista to City College. Although precise data for the City is unavailable, regional commuting into the South Coast from Ventura, Santa Ynez, Lompoc and Santa Maria is estimated to involve approximately 25,000 daily trips by automobile (refer to Figure 2-4). Both travel within the South Coast and regional commuting are related to the high cost of housing in the City combined with the large number of jobs.

[6] Detailed construction project staging information taken from SBroads.com, June, 2008.

3.6.2 Local Automobile Travel

Within the City, traffic congestion on surface streets arises from two principal sources. While the experience for the motorist is largely the same – delay, and in some cases stop-and-go traffic – the source of the problem and potential solutions are quite different.

First, demand for regional travel leads to high volumes on roadways approaching the freeway, mainly during peak commuting periods. The congestion experienced on these roadways results primarily from demand that exceeds the available capacity. This sort of congestion is seen on roadway segments such as Carrillo Street between Chapala Street and the freeway, and Milpas Street as it approaches the freeway.

The second source of congestion on surface streets in the City results from design issues. Disconnected local streets such as cul-de-sacs force more local traffic onto larger through-streets, while frequent driveways and traffic signals, and conflicts between pedestrians and automobiles can all create friction and slow traffic flow, effectively lowering the carrying capacity of the roadway. In this case, excess demand is not the problem, but drivers with different purposes interacting on the same roadway facility that is well equipped to handle one purpose or another, but not all simultaneously. This sort of problem is seen most clearly on Upper State Street and is well documented in the *Upper State Street Study* (City of Santa Barbara 2007).

3.6.3 Development Review

The current development review process, as it relates to automobile traffic, creates a substantial barrier to new development in areas with existing traffic congestion. The unintended and potentially counter-productive consequences that this sort of impact criteria can have are highlighted in the Constraints section of Chapter 11 of the 1998 Circulation Element, and are quoted below:

- *The current method for determining traffic impacts acts as a constraint to development in areas where intersections are at or near the maximum allowable capacity. Impacted intersections are typically located near freeway on/off-ramps, Downtown, or near commercial centers. Ironically, it is these compact and higher density areas that will most easily facilitate transit and alternate modes of transportation. In addition, the inability of small businesses to expand in locations at or near impacted intersections may result in the relocation of those businesses to lower density or outlying areas that may not be as suitable for alternative modes of transportation. This will, in turn, increase the reliance on the automobile in these areas and possibly contribute to a sprawling development pattern. In addition, the charter section requirement that new development occur only where it does not cause a significant and unmitigated adverse impact on traffic also acts as a constraint. Traditionally, the methods to mitigate traffic impacts involved improvements to streets, such as street widening, turn lanes, or striping. In a city such as Santa Barbara that is mostly developed, many of these mitigation methods may no longer be feasible or desirable.*[7]

3.6.3.1 Opportunities

Demand for transportation is rooted in land use patterns. Certain patterns will result in a higher demand for longer distance automobile transportation. Congestion from this type of travel pattern may be relieved by increasing roadway supply, such as expanding roadway facilities. However, this approach may not solve the problem entirely and the steps necessary to do so may not be desirable or economically feasible. It may also be necessary to manage the demand for automobile use with a variety of land use changes and Transportation Demand Management (TDM) programs, which encourage alternative modes of transportation. Protecting and enhancing the quality of life in Santa Barbara is related to maintaining mobility and mobility options. A combination of local efforts and regional initiatives will be necessary to maintain and improve Santa Barbara's mobility, including:

- Consideration of new land use patterns and development trends to provide appropriate housing in close proximity to traffic generators or attractors such as employment, shopping, education and entertainment. This may require changes in both historic and recent development trends, including development of mixed use projects geared towards Santa Barbara's workforce, development of more rental and affordable housing (e.g., smaller units) within walking distance of downtown, and provision of employee or student housing near employment or educational centers.
- Consideration of other urban design variables that promote walking and bicycling while reducing vehicular traffic friction. Where possible, such measures may include; parking accessed from alleys as opposed to frequent sidewalk curb cuts,

[7] Excerpted from Chapter 11: Traffic Standards from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara, 1998.

connecting residential streets and decreasing the number of cul-de-sacs.

- Continued improvements in both local and regional transit to increase service frequency and convenience to attract more non-transit dependent riders.
- Consideration of improvements or adjustments to existing TDM and parking programs to encourage and foster transportation choices that relieve roadway congestion.
- Completion of key regional transportation improvements, such as those planned for the U.S. Highway 101 corridor or companion rail and regional bus service improvements.

4 PUBLIC TRANSIT

4.1 Overview

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Key aspects of Santa Barbara's transit service relevant to this project are summarized below. Background information for reference is illustrated in the following maps:

- Population densities for Santa Barbara and the region are shown in Figure 4-2.
- Employment densities for Santa Barbara and the region are shown in Figure 4-3.
- Local MTD transit routes and regional routes serving Santa Barbara are shown in Figure 4-4.
- Regional public transit routes are shown in Figure 4-5.
- Private transit carriers are shown in Figure 4-6.
- Ridership for the top 5 local transit routes and regional routes serving Santa Barbara are shown in Figure 4-7.

4.2 Fixed-Route Transit Service

4.2.1 MTD

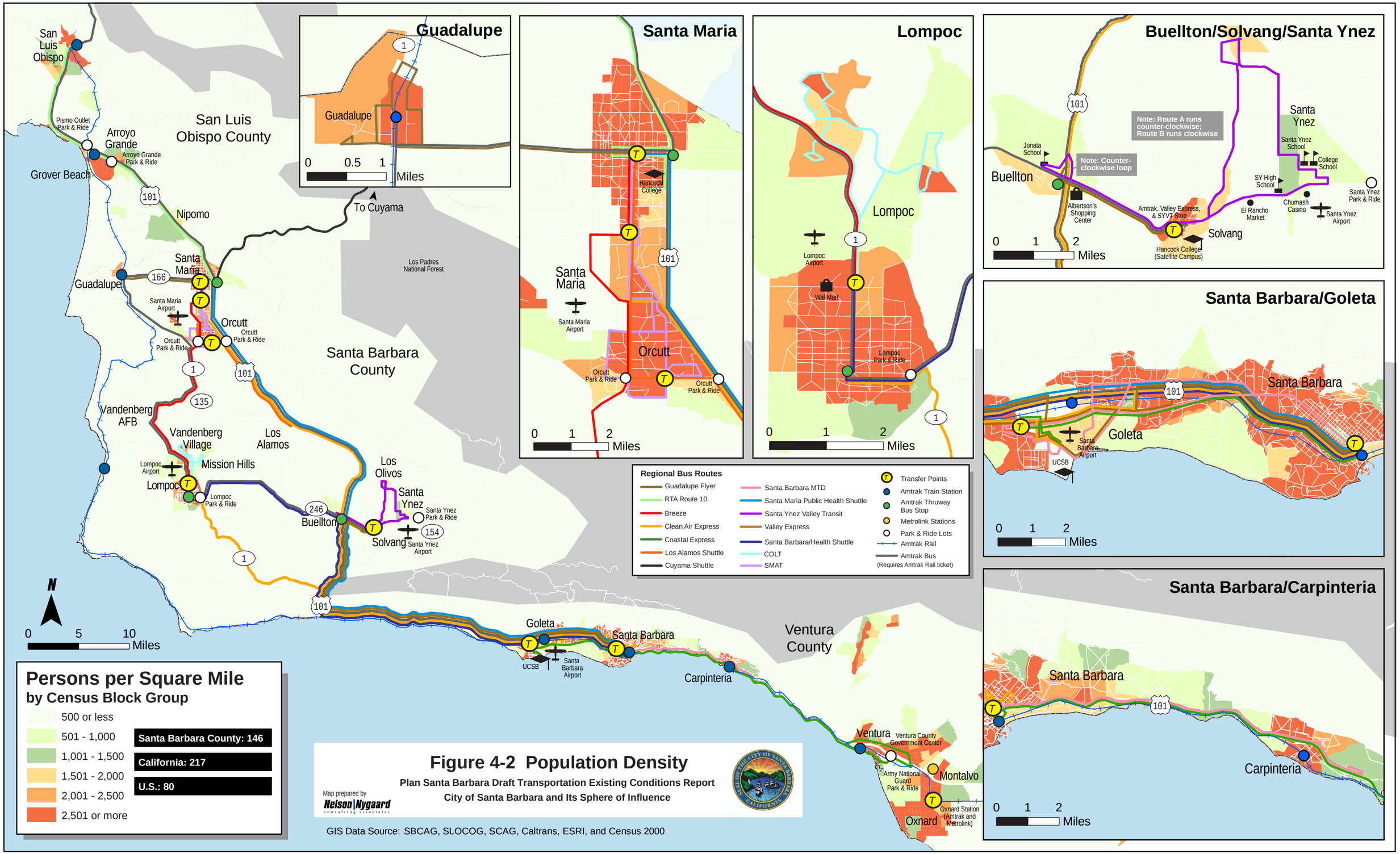
Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles. MTD operates weekdays from 5:25 am to midnight, 6:00 am to 11:20 pm Saturdays, and 6:20 am to 10:00 pm on Sunday. The Federal Transit Administration recognizes Santa Barbara as a small Transit-intensive Community, with an especially high level of transit service and ridership for a small city. As of FY 2007, MTD provided about 7.5 million rides annually. This level of ridership is very strong for a community of this size, which normally represents the ridership of a region with ten times the population of MTD's service area.

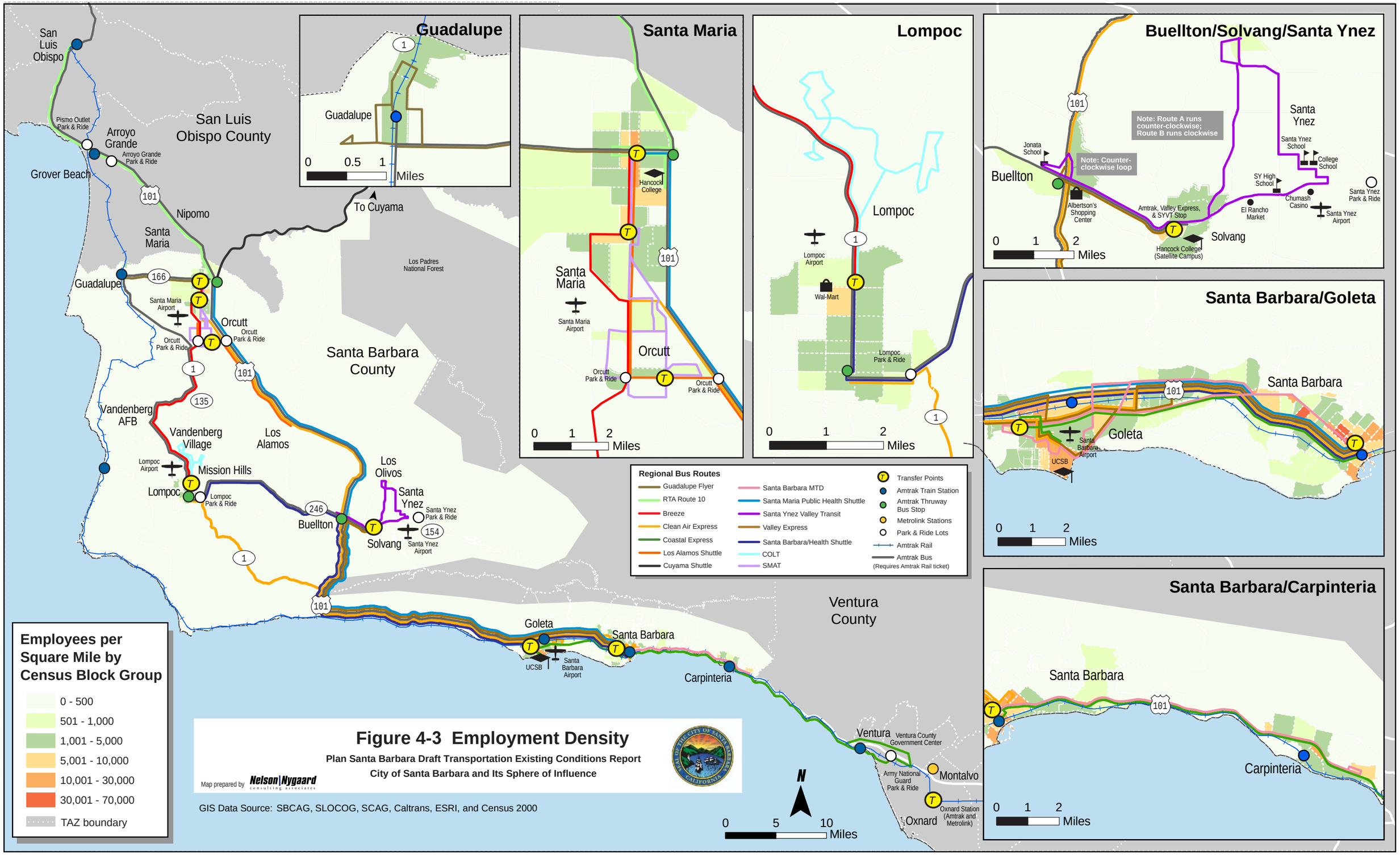
MTD on-time performance (as measured at the Downtown Transit Center) is approximately 95%, which is considered to be a very successful performance level. A GPS system coming online in the next few months will allow MTD to track on-time performance system-wide.[8] Within the MTD system, routes 1, 2, 6, 11, and the 24 Express have the highest ridership (refer to Figure 4-1).

Figure 4-1: Fares for Santa Barbara MTD Fixed-Route Transit Services

Fare Type	Price
Cash Fares	
Regular One-Way Fare	$1.25
Seaside Shuttle	$0.25
Downtown-Waterfront	$0.25
Valley Express	$4.00
Seniors (age 62 and over)	$0.60
ADA and Persons with Disabilities	$0.60
Persons who are blind	Free
Children (45 inches or less)	Free
UCSB/SBCC Students	Free
10-Ride Pass	
Adult	$10.00
Youth (K-12)	$7.50 (valid Monday - Friday)
Seniors and Persons with Disabilities	$5.00
Medicare Cardholders	$5.00
Santa Ynez Valley Express	$35.00
ADA Complementary Paratransit	$20.00 (service operated by Easy Lift)
Unlimited 30-Day Pass	
Adult	$41.00
Youth (K-12)	$32.00
Seniors and Persons with Disabilities	$18.00
Medicare Cardholders	$18.00
Santa Ynez Valley Express	$120.00 (includes regular local services)
ADA Complementary Paratransit	Not Available

[8] Santa Barbara Metropolitan Transit District website (http://www.sbmtd.gov), MTD Short Range Transit Plan: FY 2006 to FY 2010, and interviews with MTD staff.


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc Airport
Wal-Mart
Lompoc
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Solvang
Hancock College (Satellite Campus)
El Rancho Market
Chumash Casino
Santa Ynez
Santa Ynez School
College School
SY High School
Santa Ynez Park & Ride
Santa Ynez Airport
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Los Padres National Forest
Santa Barbara County
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
N
0 5 10 Miles
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Persons per Square Mile
by Census Block Group
500 or less
501 - 1,000
1,001 - 1,500
1,501 - 2,000
2,001 - 2,500
2,501 or more
Santa Barbara County: 146
California: 217
U.S.: 80
Figure 4-2 Population Density
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc Airport
Wal-Mart
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Hancock College (Satellite Campus)
Solvang
El Rancho Market
Chumash Casino
SY High School
Santa Ynez School
College School
Santa Ynez
Santa Ynez Airport
Santa Ynez Park & Ride
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Santa Maria
Guadalupe
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Los Padres National Forest
Santa Barbara County
Vandenberg AFB
Vandenberg Village
Los Alamos
Lompoc Airport
Mission Hills
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
Ventura County
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Employees per Square Mile by Census Block Group
0 - 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 30,000
30,001 - 70,000
TAZ boundary
Figure 4-3 Employment Density
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by Nelson|Nygaard consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000
N
0 5 10 Miles

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- T Downtown Transit Center
- A Amtrak Station

MTD Bus Routes

1	West – San Andres	25	Ellwood
2	East – Milpas/Salinas	27	UCSB Shuttle
3	Oak Park Shuttle	32	Harbor Waterfront Shuttle
4	Mesa Loop	36	Seaside Winter Shuttle
5	Mesa/La Cumbre Connection	37	Crosstown Shuttle
6	State/Hollister	50	Carrillo Lot Shuttle
8	Health Care Link	81	SYVE CoHealth/SBCH/ SBCC
9	Old Town Goleta Shuttle	82	SYVE Hollister Avenue
10	Cathedral Oaks	83	SYVE UCSB
11	Downtown/UCSB	84	SYVE Downtown SB
16	City College Shuttle	12X	Goleta Express
17	SBCC/Mesa to Downtown	15X	SBCC/UCSB Express
20	Carpinteria	21X	Carpinteria Express
22	Old Mission	24X	UCSB Express
23	Winchester Canyon		

Sources: Santa Barbara MTD; SBCAG; VISTA; Pacific Surfliner, *Bus Route Maps.*

To Goleta, Santa Maria, and Solvang

Northside Area
Bargar Canyon Creek
Cieneguitas Creek
San Roque Creek
Lauro Reservoir
Mission Canyon
La Cumbre Plaza
Earl Warren Showgrounds
Cottage Hospital
Sansum
Hope Ranch
Las Positas Valley
Elings Park
Westside
Eastside
Riviera
Montecito
Alston
Mesa
Arroyo Burro Beach
Atascadero Creek
Arroyo Burro Creek
Arroyo Honda
Andre Clark Bird Refuge
East Beach
West Beach
Stearn's Wharf
Harbor
Ledbetter Beach
City College
S.B. County Bowl
S.B. County Admin.
S.B. High School
City Hall
Paseo Nuevo
Pacific Ocean

101 192 225 217

HOLLISTER TURNPIKE ROAD MODOC LA CUMBRE HOPE ONTARE SAN ROQUE FOOTHILL ALAMAR MISSION CANYON STATE PUEBLO CHAPALA DE LA VINA GARDEN LAGUNA MISSION ANACAPA SANTA BARBARA ALAMEDA PADRE SERRA ANAPAMU CARRILLO CANON PERDIDO OLIVE MILPAS GUTIERREZ SOLEDAD SALINAS QUARANTINA HALEY COTA DE LA GUERRA FIGUEROA ARRELLAGA MICHELTORENA BATH CASTILLO SAN ANDRES LAS PALMAS PORTESUELLO LAS POSITAS FLORA VISTA CLIFF SHORELINE SYCAMORE CANYON HOT SPRINGS OLD COAST HIGHWAY To Ventura CABRILLO

SEE INSET ABOVE

Inset: City of Goleta

City of Goleta
HOLLISTER
FAIRVIEW
LOS CARNEROS
MESA
Santa Barbara Airport
UCSB
Inset map same scale as main map

Inset: S.B. High School / S.B. County Admin. / Paseo Nuevo / City Hall

Scale: 1" = 1,800'

REGIONAL SERVICE:

Valley Express
Santa Barbara Transit Center to/from Solvang, via 101

Clean Air Express
Santa Barbara Transit Center to/from Santa Maria, via 101

Coastal Express
Goleta – Santa Barbara Transit Center – Ventura, via 101

SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

Figure 4-4 Local and Regional Public Transit Routes

Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

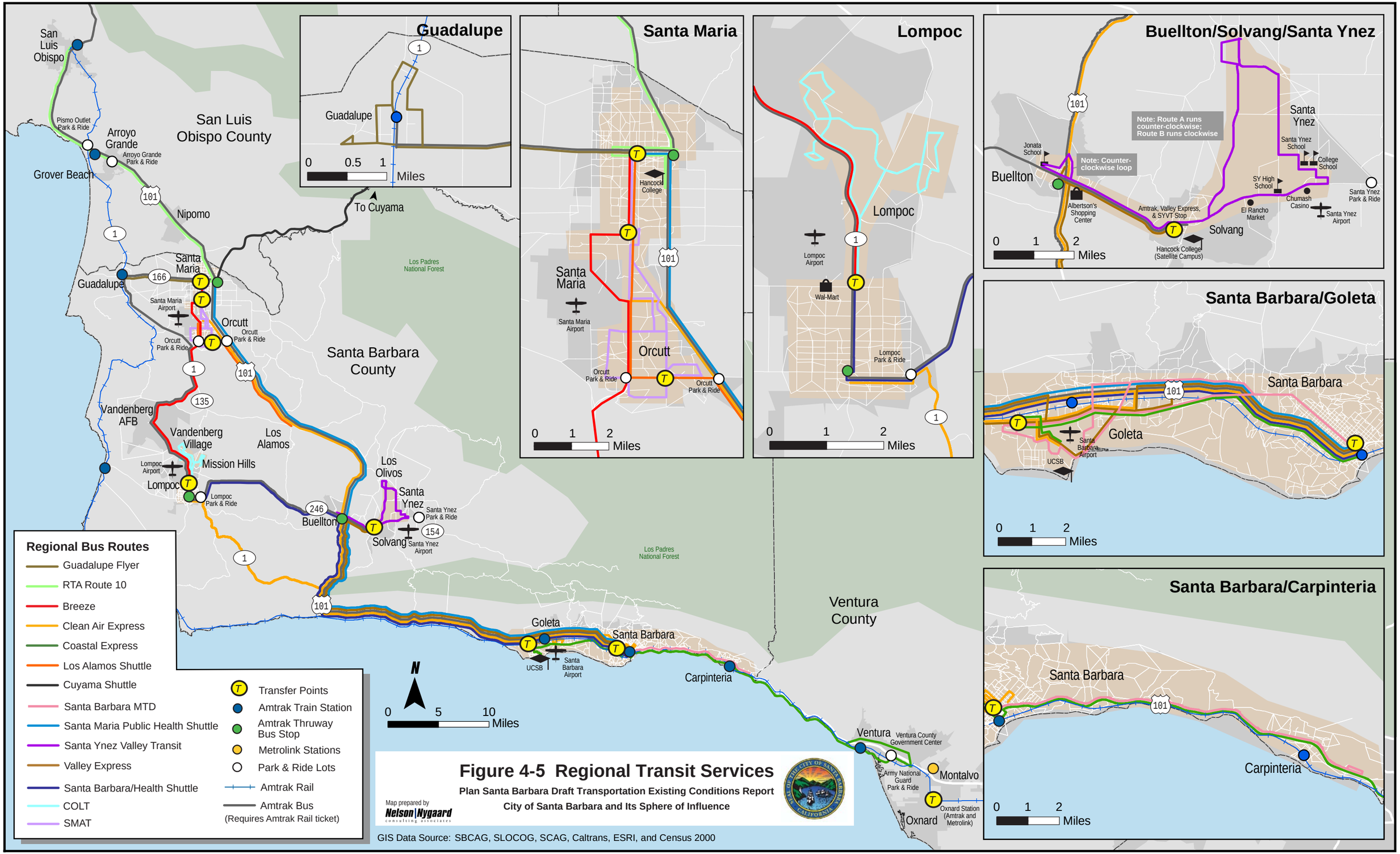


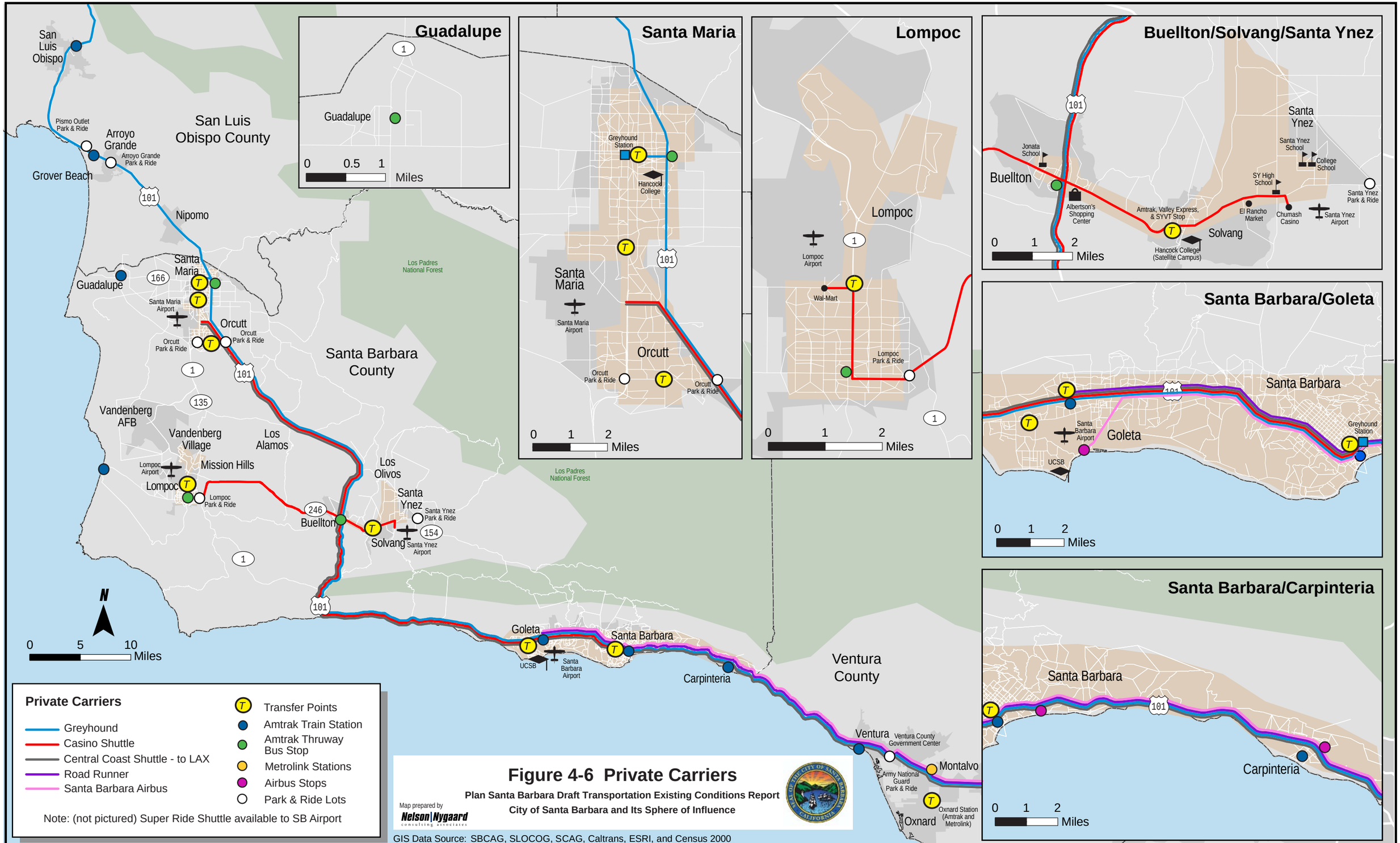
Figure 4-5 Regional Transit Services

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Map prepared by Nelson\Nygaard consulting associates

GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000


Guadalupe
Santa Maria
Lompoc
Buellton/Solvang/Santa Ynez
Santa Barbara/Goleta
Santa Barbara/Carpinteria
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Santa Barbara County
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Los Padres National Forest
Greyhound Station
Hancock College
Wal-Mart
Lompoc Park & Ride
Jonata School
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Hancock College (Satellite Campus)
El Rancho Market
Chumash Casino
SY High School
Santa Ynez School
College School
Goleta
Santa Barbara
Santa Barbara Airport
UCSB
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Montalvo
Army National Guard Park & Ride
Oxnard
Oxnard Station (Amtrak and Metrolink)
0 5 10 Miles
0 0.5 1 Miles
0 1 2 Miles
N
Private Carriers
Greyhound
Casino Shuttle
Central Coast Shuttle - to LAX
Road Runner
Santa Barbara Airbus
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Airbus Stops
Park & Ride Lots
Note: (not pictured) Super Ride Shuttle available to SB Airport
Figure 4-6 Private Carriers
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000

Route 11 – State/Hollister/UCSB/Airport
Total Passengers - 978,724
Main Streets of Route – Hollister & State
Annual Trips – 26,963

Route 6 – State/Hollister/Goleta
Total Passengers - 794,481
Main Streets of Route – Hollister & State
Annual Trips – 20,234

Route 2 – Eastside
Total Passengers - 712,794
Main Streets of Route – Anapamu & Milpas
Annual Trips – 41,007

Route 24X – UCSB Express
Total Passengers - 484,521
Main Streets of Route – Hollister & El Colegio
Annual Trips – 18,154

Route 1 – Westside
Total Passengers - 500,638
Main Streets of Route – San Andres & Carrillo
Annual Trips – 38,814

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- (T) Downtown Transit Center
- (A) Amtrak Station

Sources: Santa Barbara MTD 2007; SBCAG Traffic Solutions 2007.

Figure 4-7 Ridership for Local and Regional Public Transit (FY 2007)

Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

SCALE

0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

MTD operates several specialized services, in addition to its standard fixed-route service, including the Seaside Shuttle and the Downtown-Waterfront shuttle, and the Santa Ynez Valley Express as shown in Figures 4-4 and 4-5. The MTD operates two shuttles to provide connections to two Amtrak Stations in Santa Barbara County. The Santa Barbara station is served by the Downtown-Waterfront Shuttle and the Carpinteria Station is served by the Seaside Shuttle. The shuttles run seven days a week, with varying schedules in the winter and summer. The Valley Express is a peak-hour commuter transit service, with four trips daily between the Santa Ynez Valley and the South Coast, with stops in Solvang and Buellton.

The regular one-way fare on MTD is $1.25, and is $0.60 for seniors (age 62 and over) and people with disabilities. Persons who are blind, young children (45 inches or less in height), and students at UCSB and SBCC ride free. UCSB and SBCC student bus passes are paid for through mandatory fees imposed through their schools. A 10-ride pass is available for $10, or $7.50 for youth (K-12) and $5.00 for seniors, Medicare cardholders, and persons with disabilities. A 30-day pass allowing for unlimited rides is available for $41, or $32 for youth (K-12) and $18 for seniors, persons with disabilities, and Medicare cardholders.

Certain routes/services provided by MTD have their own fares (refer to Figure 4-1). The one-way cash fare on the Seaside Shuttle and Downtown-Waterfront route cost $0.25, with no discount available for any passenger type. The one-way cash fare for the Santa Ynez Valley Express is $4, with a 10-ride pass available for $35 and an unlimited 30-day rolling pass available for $120. The 30-day pass includes unlimited rides on other MTD routes. In Fiscal Year 2008, MTD anticipates $18,419,500 in total revenue for operations. As shown in Figure 4-8, the most significant proportion (more than one-third) comes from passenger fares. A nearly equal proportion (about one-third) comes from the Transportation Development Act – Local Transportation Fund (TDA-LTF).

Between Fiscal Years 1995 and 2004, the annual number of passengers on MTD increased gradually from 6 million to 7 million and annual revenue hours[9] increased from 160,000 to 180,000. Ridership on an hourly basis remained fairly consistent, with between 35 and 40 passengers per revenue hour.[10] While no hard data exists, it is suspected that in addition to ongoing service enhancements, the recent increases in transit ridership are primarily due to the recent increase in gas prices during the same time period. In theory, the rise in gas prices increases the "marginal" per-trip costs of an auto trip enough to outweigh the "time penalty" associated with travel on alternative modes, causing price-sensitive auto commuters to take transit, walk, or bike (or forgo the trip altogether) more often. Operating expenses for MTD have been rising however, with a nine percent increase between 2003 and 2004 due primarily to higher fuel costs. The farebox recovery ratio for MTD was 39.6% in FY 2004, just below the MTD standard of 40%. The increase in farebox recovery, despite increasing operating costs, was due to a fare increase in 2004: one-way cash fares were increased from $1.00 to $1.25, though discounted 10-ride and 30-day passes were also introduced at that time.

Figure 4-8: MTD Operating Revenue (FY 2008)

Source of Revenue	Revenue	Percentage of Total
Passenger Fares		
Core Service	$6,461,300	35.0%
Valley Express and SCTP	$301,700	1.6%
Non-Transportation Income	$594,800	3.2%
Local Operating Assistance	$338,400	1.8%
Property Tax Revenue	$725,900	3.9%
TDA - Local Transportation Fund	$6,325,300	34.0%
FTA 5307 Operating Assistance	$3,038,200	16.0%
FTA CMAQ Operating Assistance	$633,800	3.4%
Total Operating Revenue	*$18,419,500*	*100.0%*

As of FY 2007, MTD provided about 7.5 million rides annually, with ridership expected to increase to 7.6 million in FY 2008, and increase to 7.7 million by FY 2010. Increasing gas prices are expected to further induce ridership growth; though the increase in fuel costs will also impact operating costs for MTD. Pending and planned improvements are discussed in Section 10.3.1.1.

4.2.2 Regional/Commuter Transit Service

In addition to the MTD's Valley Express discussed above, additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal

[9] Annual Revenue Hours refers to the total number of hours buses are in operation and carrying passengers during the Fiscal Year (e.g., it does not include time spent driving—or idle—but not carrying passengers.

[10] Sources: Santa Barbara Metropolitan Transit District website (accessed at http://www.sbmtd.gov in June 2008) and MTD's *Short Range Transit Plan: FY 2006 to FY 2010*.

Express (the latter co-managed by the Ventura County Transportation Commission). These and other commuter bus services are described below.

4.2.2.1 Clean Air Express

The Clean Air Express operates commuter bus service from Santa Maria to Goleta and Santa Barbara, and from Lompoc to Goleta and Santa Barbara, generally employing 40-passenger capacity buses. Eleven total bus trips connect these destinations each morning and afternoon/evening: six trips to/from Lompoc, and five trips to/from Santa Maria. The Clean Air Express operates Monday through Friday, excluding approximately ten holidays per year. The one-way cash fare on the Clean Air Express is $7, with a 10-ride ticket book available for $50 and a monthly pass available for $140, providing unlimited rides. No discounts are offered to seniors, youth, or persons with disabilities. Ridership in FY 2006-07 was around 185,642 boardings (up 13% from the previous year; again while no hard data exists, it is suspected that in addition to ongoing service enhancements the recent increases in transit ridership are primarily due to the recent increase in gas prices during the same time period). Although there is 25% capacity remaining with current service levels, approximately 15 passengers daily are denied boarding daily due to already full buses on the more popular routes. The market for the Clean Air Express is estimated by SBCAG staff to be about 95% "choice" riders (versus "transit dependent" riders) with about 97% or more of these choice riders using the service for commuter trips.

4.2.2.2 Coastal Express

The Coastal Express was initiated in 1991, operating under a joint agreement between SBCAG and the Ventura County Transportation Commission (VCTC). The Coastal Express operates between Ventura and the South Coast, with 38 daily trips, including timed transfers at the Santa Barbara Transit Center to the MTD route 24X serving UCSB (express bus). Nine trips in each direction operate on Saturdays and Sundays. The one-way cash fare on the Coastal Express is $2, with a discount offered to seniors, persons with disabilities, and users with a "Go Ventura" monthly pass. An increase in fares will occur in August 2008.

The Coastal Express had a farebox recovery ratio of 65% in 2007. The Coastal Express has experienced consistent and strong ridership growth since initiation. Ridership in Fiscal Year 2006-07 was 179,300 trips (up 13% from the previous year), and is expected to rise to almost 200,000 trips in FY 2007-08.

According to a passenger survey conducted in 2007, rider satisfaction is high, with 98% or higher satisfied with overall service. Work trips account for 83% of all trips on the Coastal Express and almost three-quarters of weekday riders use the bus four or more days per week. Fifty-nine percent of passengers live in Ventura, with the next most common city being Oxnard (18%). Santa Barbara is the most common destination for commuters (56.7%), with Goleta second (22.6%). The most common request for improved service was for the buses to be more frequent. The operation improvements underway for Highway 101, between Milpas Street and Hot Springs Road/Cabrillo Boulevard will improve transit speeds and reduce transit travel times along this important commute corridor.

4.2.2.3 City of Lompoc COLT Reservation-Only Service

The City of Lompoc provides reservation-only bus service from Mission Plaza in Lompoc to the Santa Barbara Transit Center, with one round-trip on Tuesdays and Thursdays. The one-way cash fare is $4, with no discounts or multi-ride passes available. No data was available on ridership or trip purpose, but the current scheduling of this service means that it is likely not highly utilized by commuters.

4.2.2.4 Bill's Bus

Bill's Bus is a private operator providing late-night transportation between Isla Vista and downtown Santa Barbara. Three buses depart Isla Vista hourly in the evening and two return later in the evening. An additional route is in operation between Isla Vista and Goleta on Wednesdays. It is provided as a transportation alternative to help reduce drinking and driving by students at UCSB and has been in operation since 1991. Fares are $6 one-way and $10 round-trip.

Fares for Santa Barbara County regional/commuter transit service are summarized in Figure 4-9.

4.2.2.5 Other Regional Transit

There are other regional transportation options in Santa Barbara as well, although many of these services are not feasible for most commuter trips due to infrequent schedules, relatively high fares, and/or limited destinations served.

Amtrak serves Santa Barbara with passenger rail service

Figure 4-9: Fares for Santa Barbara County Regional and Commuter Fixed-Route Services

Fare Type	Price	Description of Service
Clean Air Express		Weekday commuter service from Lompoc to Goleta (4 buses) and Santa Barbara (2 buses), and from Santa Maria to Goleta (3 buses) and Santa Barbara (2 buses). No reverse commute service offered.
Regular One-Way Fare	$7.00	
10-ride ticket book	$50.00	
VISTA Coastal Express		Bi-directional service (commute and reverse commute), with 38 daily trips Monday-Friday and nine trips in each direction on both Saturday and Sunday.
Regular One-Way Fare	$2.00	
Senior/Disabled	$1.00	
City of Lompoc (COLT)		One trip to Santa Barbara each Tuesday and Thursday morning, with return trip that afternoon.
All passengers	$4.00	
Bill's Bus		Late-night private bus between Isla Vista and Santa Barbara, to reduce driving and driving, Tuesday-Saturday evenings. Additional bus to Goleta Wednesdays.
One-way cash fare	$6.00	
Round-trip ticket	$10.00 ($6.00 to Goleta)	

along the Coast Starlight and Pacific Surfliner Routes. The Amtrak station is located in downtown Santa Barbara at 209 State Street. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips, and carries 2.65 million passengers annually (data on what proportion of those trips were commuter trips to and from Santa Barbara is not available). The Pacific Surfliner is an "Amtrak California" service and is subsidized and administered by the Caltrans Division of Rail. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara.

Greyhound provides intercity bus transportation with destinations throughout the County. There are four daily northbound and southbound trips. Buses stop at the Greyhound Bus Station adjacent to the MTD Transit Center in downtown Santa Barbara.

Santa Barbara Airbus[11] is a private motorcoach operator, providing transportation between Santa Barbara and Los Angeles International Airport. Travel time is less than 3 hours. Seven trips are made in each direction, seven days a week. Buses stop at the Bistro 1111 Restaurant on E. Cabrillo Blvd in Santa Barbara. Fares are $44-48 one-way and $84-90 round-trip per person, with discounts available for larger parties.

Santa Barbara Airport[12] provides domestic flights through six airlines, including non-stop services to twelve cities. The airport is located to the west of the city of Santa Barbara, surrounded by the city of Goleta.

4.3 Demand Responsive Service

4.3.1 Easy Lift Paratransit

Easy Lift[13] is a private non-profit corporation providing curb-to-curb ADA paratransit service for older adults and persons with disabilities. Its service area is within ¾ mile of all MTD fixed-route bus stops. The one way fare is $2. Easy Lift operates under a memorandum of understanding with MTD. Its hours are Monday through Friday from 5:25 am to midnight, Saturdays from 6:00 am to 11:20 pm and Sundays from 6:20 am to 10:45 pm.

4.3.2 Community Transportation Services

The County of Santa Barbara Health Bus provides transportation for medical-related trips between several North County communities and medical facilities in the Santa Barbara and Goleta area. Reservations are required, preferably two days in advance. The service is available every Tuesday and Friday, as well as two Mondays and two Thursdays per month. Prices vary from $2 to $6, depending on distance traveled.

4.3.3 Taxi Services

Five private taxi companies are located in the city of Santa Barbara, including:

- Blue Dolphin Cab
- Crown Cab Company
- Fly by Night Taxi Company
- Beachside Taxi
- Rockstar Taxi and Limousine

[11] Source: Santa Barbara Airbus website (accessed at www.santabarbaraairbus.com in May 2008).
[12] Source: Santa Barbara Municipal Airport website (accessed at www.flysba.com in May 2008).
[13] Source: Easy Lift website (accessed at www.easylift.org in May 2008).

Several other taxi companies are located in nearby communities and provide service to Santa Barbara. No information was available on taxi usage or travel patterns.

4.4 MTD Policies[14]

MTD carries the overwhelming majority of transit trips for Santa Barbara residents and commuters, and worker flow data from the 2000 census reveal that nearly two-thirds of Santa Barbara residents also work in Santa Barbara.

Therefore, MTD policies play a critical role in reducing congestion on local streets and to a lesser extent regional highway congestion (whereas the regional commuter services will have a larger impact on congestion on 101 and other regional highways).

For this reason, the relevant MTD goals and performance measures are highlighted below. Other policies relevant to transit service (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

4.4.1 MTD Goals

The following goals, adopted by the MTD Board of Directors, provide the direction to fulfill the mission statement and meet the needs of the public:

- MTD shall provide a reliable, safe, comfortable and attractive means of transportation to those who lack other options, including elderly persons, persons with disabilities, students, and economically disadvantaged persons; and to those who use mass transit by choice.
- MTD shall maintain fares at the lowest feasible level that enables the recovery of operating expenses consistent with the financial plan contained in the adopted Short Range Transit Plan.
- MTD shall ensure the responsible expenditure of public funds, and shall continually seek improvements in its operating efficiency.
- MTD shall treat all individuals with fairness and respect, including passengers, employees, and all others involved in MTD activities.
- MTD shall work cooperatively with businesses, individuals, community organizations, and government agencies in planning and developing the best transit service possible within the limits of available funding.
- MTD shall comply with regional, state and federal goals of reducing traffic emissions and congestion through provision of an attractive alternative to the personal automobile.
- MTD shall continue to acquire feasible alternatively-fueled buses.
- MTD shall seek all reasonable means to satisfy public transportation needs.

4.4.2 MTD Performance Standards

The following performance standards provide a means to measure the success of MTD in meeting the goals:

- At least 95% of all MTD revenue trips shall depart no more than 5 minutes late.
- At least 98% of all MTD scheduled revenue trips shall be completed.
- The MTD system shall carry an average of not less than 36 passengers per revenue hour for any 3-year period.
- The MTD system shall carry an average of not less than 2.5 passengers per revenue mile for any 3-year period.
- MTD shall maintain at least a 40% farebox recovery ratio over any 3-year period.
- The MTD systemwide spare ratio shall not exceed 20%.
- MTD revenue vehicles shall travel a minimum of 8,000 miles between breakdowns. (A breakdown requires a vehicle exchange.)
- The MTD shall limit annual passenger transfers to 20% of total annual ridership.
- Passenger complaints shall average no more than 1 complaint per 10,000 MTD passenger boardings.

4.5 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips:

- Per capita ridership on current MTD service is quite high, and ridership has grown as new service is added. This suggests that any future potential increases in MTD ridership will occur most cost-effectively during off-peak periods when surplus capacity (i.e. empty seats) currently exists (similar to the tourist industry strategy of increasing demand during the non-peak travel months, or "growing the shoulders"). If MTD peak-period ridership continues to increase, it will require the addition of more peak-period service on some

[14] Source: MTD's *Short Range Transit Plan: FY06 to FY10*.

routes to accommodate the demand, which is more expensive.

- MTD operating costs are anticipated to increase largely as a result of increasing fuel costs, as well as costs associated with adding new peak period service, as discussed above.
- MTD transit ridership is higher than for cities of similar size (as mentioned above, MTD has ridership comparable to a city with a population of 1 million residents). In addition to the high-quality service that MTD provides, factors that contribute to this higher-than-average ridership likely include Santa Barbara's unique geography, a political and cultural environment that is strongly supportive of environmentally-friendly policies and programs, and a large student population. Combined, these factors suggest that while it is still best practice to allow for appropriate increases in densities along major transit corridors and around major transit hubs, overall density in Santa Barbara may not need to be as high as the rule of thumb for "transit-supportive" densities that is often applicable to other cities.
- Like many transit operators, MTD policy goals are largely focused on meeting the needs of "transit-dependent" market segment. Considering the demographics of Santa Barbara (with a large proportion of high-income households), one potential opportunity to help achieve the *Plan Santa Barbara* goal of reducing traffic congestion is to consider options for increasing MTD ridership among the "choice" riders, through targeted marketing/branding, upgraded passenger amenities, and more commuter-focused and/or special event services.
- While some capacity exists on current regional bus transit services, ongoing increases in ridership (including strong ridership gains over the past several year period coinciding with rising gas costs) is already resulting in certain routes being oversubscribed and potential riders denied boarding. This trend suggests that the frequency and/or service span of regional transit services will need to increase to meet current and future expected demand.
- One niche transit market that could be better exploited is business and leisure travelers to and from the airport; more frequent and potentially express service to and from the airport and major regional destinations would need to be created and well-marketed to grow the ridership.
- Existing rail service to and from Santa Barbara is not a feasible option for most commuter trips; short-term solutions to adjust existing Pacific Surfliner peak period schedules to be more "commuter friendly" should be pursued, in addition to long-term efforts to initiate dedicated commuter rail service in the Santa Barbara County region.
- Transit service frequency (headways), hours of operation (span), and on-time performance (schedule reliability) are generally cited as the main determinants as to whether people will choose to commute by transit. For example, running more frequent buses reduces crowding both at the transit stops and on-board the transit vehicles, which helps ensure that fewer potential passengers get left behind at stops ("pass-bys"), more passengers are able to find a seat once on-board, and passengers can enter and exit the vehicle safely and comfortably. While available data suggest that existing transit serving Santa Barbara has a good on-time performance record, many existing transit services have limited frequency (e.g., buses that have 30 minute headways) and limited operating hours that may not serve commuters as well as they could.
- While existing regional commuter transit focuses on capturing so-called "choice" riders (e.g., those who have the choice to drive a car for their trip), existing local transit service in Santa Barbara appears to target so-called "transit dependent" riders. In addition, existing routing focuses on geographic coverage (e.g., spreading out service to all parts of Santa Barbara) and is downtown-focused, with nearly all routes terminating at the downtown Transit Center. Additional analysis of the potential impact of transit service changes to reduce peak-hour vehicle trips will be explored in greater detail in the next phase of the project.
- Securing operating funds for existing and potential expansions of service continues to be a significant challenge for transit operators serving Santa Barbara. Transit fares cover a portion of costs, and the most recent increase in MTD fares

did not impact ridership. However, other funding sources are also crucial, including federal transit operating assistance (Section 5307) and State Transportation Development Act funds. Congestion Management Air Quality (CMAQ) funds can also be used to support increased transit service, though most often on short-term basis. If they renewed in the November elections, local measure A and D funds will also help support transit enhancements.

5 BICYCLING CONDITIONS[15]

5.1 Overview

Bicycling has been a part of Santa Barbara's transportation system since 1869, when a local resident and businessperson rode a high-wheel "velocipede" bicycle down State Street. Today, the city of Santa Barbara is known as a national leader in promoting bicycling as a form of recreation for residents and visitors, and as a viable choice for everyday transportation to work, school, shopping, and other trips. This leadership position is the result of the City's long history of planning for bicyclists and investing in bicycling infrastructure, beginning in 1974 with the adoption of the City's first official "Proposed Bikeway Master Plan". In addition to the City's efforts to improve bicycling conditions within city boundaries through the 1998 Bicycle Master Plan and 2003 update, several other regional partners—including SBCAG, MTD, UCSB, and the County—have played an important role in making it more feasible to bicycle to and from Santa Barbara. These efforts have resulted in the city of Santa Barbara receiving a "Bicycle-Friendly Cities" Silver designation. The region's mild climate, beautiful natural scenery, and demographic profile also help make bicycling a feasible and attractive transportation option.

[15] Sources consulted for the bicycling section include: Interviews with transportation staff at the City of Santa Barbara, Santa Barbara County, and SBCAG; "City of Santa Barbara Bicycle Master Plan" (October 1998) and "2003 Supplement to the 1998 Bicycle Master Plan" (December 2003); SBCAG Traffic Solutions' "Santa Barbara County Bike Map" (2006); City of Santa Barbara Municipal Code, Title 10: Transportation and Parking and Title 28: Zoning Ordinance; SBCAG Metro Transportation Plan (January 2005); Santa Barbara Bicycle Coalition website (accessed at www.sbbike.org in May 2008); Santa Barbara Bikestation website (accessed at www.bikestation.org/santabarbara/index.asp in May 2008; Bici Centro (Bicycle Center) website (accessed at www.bicicentro.org in May 2008); Amtrak's Pacific Surfliner website (accessed http://www.amtrak.com/servlet/ContentServer?pagename=Amtrak/am2Route/Vertical_Route_Page&c=am2Route&cid=1081256322013&ssid=132 in May2008); and Santa Barbara Car Free's bicycling website (accessed at www.santabarbaracarfree.org/bike.htm in May 2008).

5.2 Facilities

One of the most important incentives to more people to choose bicycling for more of their trips is to provide safe and convenient facilities for bicyclists, including:

- A comprehensive network of bicycle paths, lanes, and routes that connects the places that people want and need to get to.
- Reasonable accommodation of bicycles on transit, to help fill in actual or perceived gaps in the bicycle network (due to lack of dedicated bicyclist facilities, difficult terrain, or high auto volumes). Transit accommodation of bikes is also important to provide bicyclists with a "Plan B" option for getting both themselves and their vehicle around if unanticipated circumstances prevent them from riding their bike (such as mechanical failure or inclement weather).
- Secure, well-located, and adequate bicycle parking so bicyclists can feel confident that there will be a place at or near their final destination to leave their bike (and that their bike will still be there when they return).
- Other bicycle-supportive facilities and programs, such as 'bike stations' (with showers and lockers) and bicycle safety and repair classes.

Santa Barbara's existing bicycle facilities are described below.

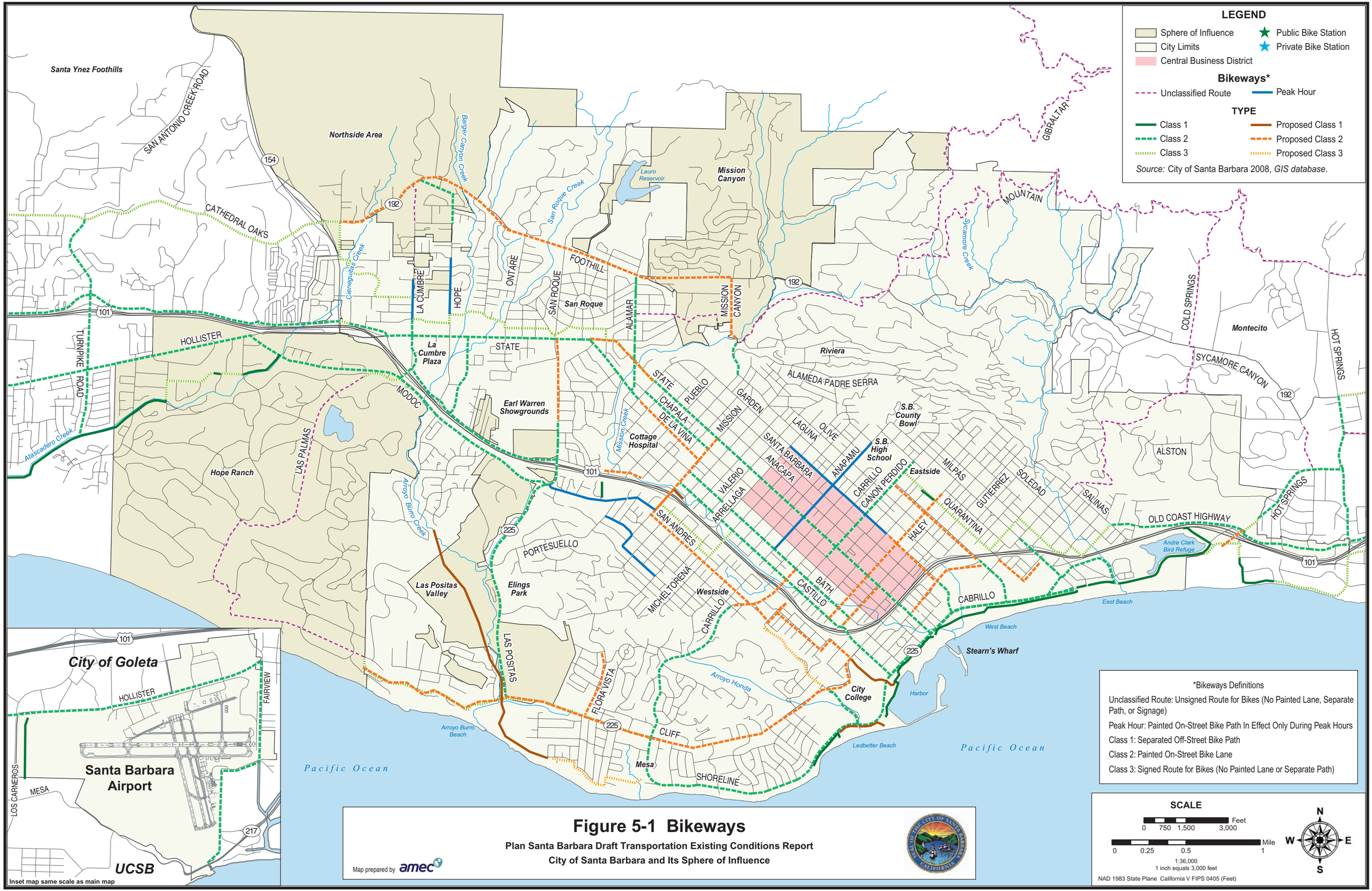
5.2.1 Bicycle Network

5.2.1.1 Bicycle Routes

The city of Santa Barbara has a comprehensive bicycle network (refer to Figure 5-1) that connects nearly every part of the City, with approximately 28 miles of Class II bikeways (painted on-street bike lanes)[16] and 6 miles of Class I bikeways (separated off-street bike paths). These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Major regional bicycle routes in the South Coast urban area include:

- Foothill Route
- Cross Town Route
- State Street Route
- North Goleta Route
- Maria Ignacio Route
- Coast Route

[16] It is worth noting that as recently as 15 years ago, the number of miles of Class II bikeways in Santa Barbara was just half the current lane-miles.


LEGEND
Sphere of Influence
City Limits
Central Business District
Public Bike Station
Private Bike Station
Bikeways*
Unclassified Route
Peak Hour
TYPE
Class 1
Class 2
Class 3
Proposed Class 1
Proposed Class 2
Proposed Class 3
Source: City of Santa Barbara 2008, GIS database.
Santa Ynez Foothills
SAN ANTONIO CREEK ROAD
Northside Area
Barger Canyon Creek
Lauro Reservoir
Mission Canyon
GIBRALTAR
MOUNTAIN
Sycamore Creek
CATHEDRAL OAKS
154
192
Cieneguitas Creek
LA CUMBRE
HOPE
ONTARE
San Roque Creek
FOOTHILL
San Roque
ALAMAR
MISSION CANYON
COLD SPRINGS
Montecito
HOT SPRINGS
SYCAMORE CANYON
101
TURNPIKE ROAD
HOLLISTER
La Cumbre Plaza
STATE
Riviera
ALAMEDA PADRE SERRA
MODOC
Earl Warren Showgrounds
PUEBLO
GARDEN
CHAPALA
DE LA VINA
MISSION
LAGUNA
OLIVE
S.B. County Bowl
S.B. High School
ANAPAMU
SANTA BARBARA
ANACAPA
CARRILLO
CANON PERDIDO
Eastside
MILPAS
GUTIERREZ
SOLEDAD
SALINAS
ALSTON
Alsacadero Creek
Hope Ranch
LAS PALMAS
Cottage Hospital
Mission Creek
Arroyo Burro Creek
VALERIO
ARRELLAGA
QUARANTINA
HALEY
OLD COAST HIGHWAY
Andre Clark Bird Refuge
225
PORTESUELLO
SAN ANDRES
MICHELTORENA
Las Positas Valley
Elings Park
Westside
BATH
CASTILLO
CABRILLO
East Beach
West Beach
Stearn's Wharf
LAS POSITAS
FLORA VISTA
Arroyo Honda
City College
Harbor
CLIFF
Arroyo Burro Beach
Ledbetter Beach
Pacific Ocean
Mesa
SHORELINE
City of Goleta
FAIRVIEW
Santa Barbara Airport
LOS CARNEROS
MESA
217
UCSB
Inset map same scale as main map
*Bikeways Definitions
Unclassified Route: Unsigned Route for Bikes (No Painted Lane, Separate Path, or Signage)
Peak Hour: Painted On-Street Bike Path In Effect Only During Peak Hours
Class 1: Separated Off-Street Bike Path
Class 2: Painted On-Street Bike Lane
Class 3: Signed Route for Bikes (No Painted Lane or Separate Path)
SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)
N
W
E
S
Figure 5-1 Bikeways
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by amec

Currently, gaps in the bicycle network exist where there are no dedicated bike facilities (such as on-street painted bike lanes or off-street separated bike paths). Most of the segments in the bike network that do not have dedicated bike facilities are located on streets that generally have low auto volumes where most committed cyclists will be comfortable sharing the same lane as automobile traffic. However, new or potential bicycle commuters can have safety concerns on sharing road with automobiles, particularly on higher speed routes. These concerns may represent an incremental barrier to broadening bicycle commuting. Major gaps in the bike network dedicated bicycle facilities include:

- Downtown, east of State Street lacks dedicated bike lanes. Cyclists must compete with high speed automobiles and parking on Anacapa/Santa Barbara streets or parked cars of Garden, Laguna or Olive streets.
- The State Street route downtown can be frequently interrupted by pedestrian signals, causing delays to bike commuters
- The underpasses at Castillo, Carrillo and Mission present challenges to cyclists due to congestion, narrow or non-existent bike lanes and drivers turning across the path of bike travel to enter the freeway
- A gap exists on middle State Street between De La Vina and Alamar where cyclists compete with parked cars and relatively high speed traffic
- East-west connections downtown parallel to State Street (the one way couplets of Bath/ Castillo and Chapala/De La Vina are good bike routes but do not have dedicated bike facilities over significant portions)
- Portions of the Coast Route (the ½ mile Canyon section through Hope Ranch is especially narrow)[17]
- Portions of the Foothill Route in the San Roque area from La Cumbre Road to Mission Canyon

In addition, bicycle facilities within Santa Barbara are part of the regional bicycle network as well as the Pacific Coast Bike Route (which runs along the entire west coast). As of 2005, Santa Barbara County had 123 miles of bicycle routes, including Class I (separated bike path or trail), Class II (painted on-street bike lane), Class III (signed on-street route with no painted lane or separate path), and Class IV (which are County designated and maintained off-road, unpaved facilities). Most of the bicycle facilities in the region are Class II on-street painted bike lanes.

5.2.1.2 Bicycle Signage

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. All free-standing signage includes the name of the route and a recognizable logo; some signs also include directional and distance information. Routes through residential neighborhoods where freestanding signage might not be desired are marked with graphic pavement markings to guide bicyclists along the designated route.

5.2.2 Bicycle-Transit Accessibility

5.2.2.1 Local and Regional MTD Buses

With MTD's "Bike and Bus" program, all of the agency's local and regional buses (with the exception of electric shuttles) have bike racks installed on the front of the vehicle that can accommodate up to two bicycles. Instructions for using the racks are posted directly on the racks and a full explanation is included in MTD's schedule book (although no information was found on the MTD website). Barriers to usage that exist with some bike-on-bus programs (such as a registration fee or training session) are not part of the MTD's program.

5.2.2.2 Regional Buses

As discussed in the transit section, SBCAG and VCTC operate regional commuter buses to and from Santa Barbara. Both of these services allow bicycles to be stowed in the exterior luggage holds of the charter-style commuter buses, although very little information about this option was available on the buses' respective websites. The City's Bicycle Master Plan indicates that these racks were oversubscribed.

5.2.2.3 Regional Rail

As discussed in the transit section, the schedule for the regional Pacific Surfliner (operated by Amtrak) provides the best rail option for regional commuters. According to Amtrak, most Pacific Surfliner cars are equipped with bicycle racks accommodating up to three bicycles per car. While not required, a space can be reserved in advance for a fee ranging from $5 to $10 fee depending on length of trip.

[17] This section is located in the County.

5.2.3 Bicycle Parking

5.2.3.1 On-Street (Sidewalk) Parking

The vast majority on on-street sidewalk bike parking in Santa Barbara, particularly downtown, is provided via the "Hitching Post Program." Under this program, businesses or institutions can request bicycle parking, and the City will supply and install one or more "hitching post" style racks at cost along the curb edge of the sidewalk. The rack must be installed according to the City's bicycle parking standards in Title 28 of the Municipal Code (discussed in detail below). Once installed, the racks are considered public property and may be removed or relocated at the City's discretion. Hitching posts are intended for "short-term" bicycle parking and are found throughout town, largely concentrated in downtown and the waterfront areas according to the city's Bicycle Master Plan.

The Bicycle Master Plan also indicates that on-street (sidewalk) and off-street lockers are provided for "long-term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. Some of the lockers are available for rent on a monthly basis while some are for short-term use accessed with a small deposit.

5.2.3.2 Off-street parking

Bicycle parking requirements for development projects

Chapter 28.90 (Automobile Parking Requirements) of the City's Municipal Zoning Code contain the following bicycle parking requirements for non-residential development projects:

- Requires that bicycle parking be provided for all commercial and industrial uses identified in the zoning code (Sec. 28.90.001.16)
- Specifies siting and design standards for bike parking which conform to best practices, including requiring that racks have two points of contact (for locking both the frame and wheel) and are located in an area that is conveniently-accessible, paved (to accommodate all weather conditions), and lighted at night (Sec. 28.90.045.5)
- Indicates the land use types where bicycle parking is (and is not) required (Section 28.90.100.J).
- Specifies that bicycle parking be provided at the ratio of one (1) bicycle parking space for each seven (7) vehicle parking spaces, as required by the Zoning Code (Section 28.90.100.L).
- An exception to the above bicycle parking requirement (one bike parking space for every seven automobile parking spaces) is made for schools and child care centers, where bicycle parking is required, but "at a rate determined by the school"; or in the case of institutions of higher education "at a rate determined by the governing body of the educational institution" (Section 28.90.100.J).
- No bicycle parking is required for single family or multi-family residential projects.

Enhanced bicycle parking provided by employers

Some Santa Barbara employers exceed the Municipal Code's minimum parking requirements by offering enhanced bicycle parking and other supportive facilities to their employees. Our research suggests that enhanced bicycle parking is provided in order to meet existing bicycling parking demand from current bicycle commuters, but also to encourage more employees to commute by bike. For example, the County of Santa Barbara provides a secure "bicycle cage" parking facility at its Anapamu Street facility. Raytheon, Santa Barbara's largest private employer, provides employees with a covered "bike cage" facility that has both a locked door (with a combination given only to employees) and visibility from a nearby security guard.

Other important off-street parking facilities

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara (part of the National Bikestation Network) is located in the Granada Garage and provides secure indoor parking for 78 bicycles. The Bikestation is more than just a bicycle parking garage; it also offers a private shower, changing room/bathroom, lockers for storing clothes or bags, and repair equipment (including tools, a work stand, and air compressor). Bicycles can be rented as part of the "Green Bike Program" and bicycle accessories can be purchased. In addition, transit and bicycling information and maps are available. Access is restricted solely to members, but members have access 24 hours a day, 7 days a week. Membership rates range from $1/day (purchased in $10 increments), $12/month, or $96/year (all users pay a $20 annual administrative fee). The Bikestation's operations are partially funded by the City's Downtown Parking Program.

The City's Bicycle Master Plan indicates that other types of bicycle parking are installed at public facilities such as parks, schools, and public buildings. As mentioned above,

the Bicycle Master Plan also indicates that on-street (sidewalk) and off-street lockers are provided for "long-term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. Some of the lockers are available for rent on a monthly basis while some are for short-term use accessed with a small deposit.

Bicycle parking is provided at both of the multimodal transit centers downtown, the Santa Barbara Amtrak Station and the MTD Transit Center.

5.2.4 Other Bicycle-Supportive Facilities and Programs

Other public, non-profit, and private-sector bicycle programs, facilities and infrastructure include:

- The city of Santa Barbara employs a full-time bicycle coordinator, maintains a bicycle pool that employees can use, and offers Bikestation memberships to full-time employees.
- The City's Bicycle Master Plan indicates that there are seven "end-of-trip" facilities that provide showers and/or lockers for bicycle commuters. These are located in and around the commercially-zoned areas of downtown. All require users to be either an employee or registered member.
- Bici Centro (Spanish for Bike Center), a community-based multilingual bike repair shop that provides low to no-cost education and training programs related to bicycle repair and safety.
- Santa Barbara Bicycle Coalition's CycleSmart program offering safety training for youth and adult cyclists.
- Santa Barbara Car Free "bicycle tourism" promotional activities.
- Numerous private-sector bicycle rental companies, guided bicycle tour companies, and bicycle sales/repair shops.

5.3 Policies

The most important policy document governing bicycling in Santa Barbara is the City's Bicycle Master Plan. This Council-adopted policy document provides clear direction for encouraging increase bicycling within, to, and from Santa Barbara. Policies relevant to *Plan Santa Barbara* are listed below:

Policy 1.1 The City shall educate bicyclists and motorists about the appropriate use of the bicycle on City streets.

Policy 1.2 The City shall promote the bicycle as an important alternative form of transportation for all, and promote Santa Barbara's image as being among the most livable cities for bicycling.

Policy 1.3 The City shall create incentives for all employees to commute to work by bicycle and encourage local businesses to do the same.

Policy 2.1 The City shall expand the bikeway network to increase ridership for bicycle transportation and recreation.

Policy 2.2 The City shall maintain the bikeway network.

Policy 2.3 The City shall enhance the bikeway network.

Policy 2.4 The City shall collect data to assist in bicycle planning and evaluation of existing projects.

Policy 3.1 Parking for bicycles shall be required in private development, construction, or reconstruction projects.

Policy 3.2 The City shall increase the number of secure, convenient, and attractive bicycle parking and storage facilities on public property.

Policy 3.3 The City shall require all development projects to be designed to meet the needs of people who ride bicycles, as appropriate.

Policy 3.4 The City shall encourage transit providers to increase the use of bicycles in conjunction with transit.

Other policies relevant to bicycling (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

5.4 Volumes

Bicycling is a small but important part of Santa Barbara's transportation system. As discussed above, the region's mild climate, beautiful natural scenery, and demographic profile help make cycling a feasible and attractive transportation option. The demographic profile at the beginning of this report noted that 2000 Census data suggests that 3.4% of the city of Santa Barbara residents commute to work by bicycle. SBCAG's 2007 Commuter Profile Report suggests that 2.7% of County residents commute by bicycle.

The most recent data on bicycle volumes at specific inter-

sections are the bicycle trip counts that were conducted in 1973 for the City's 1974 Bikeway Master Plan and in 1996-97 for the 1998 Bicycle Master Plan. The 1998 Bicycle Master Plan found that:

- The peak hours of bicycle travel are from 4 p.m. to 6 p.m.
- In the peak hours of travel, the City saw an overall increase (19%) in bicycle volumes from the year 1973 to 1997, after adjusting for population increase.
- In the peak hours of travel, streets with bike lanes had 47% overall increase in cyclists from 1973 to 1997, after adjusting for population increase.
- In the peak hours of travel, cycling on all other streets (those without bike lanes) declined overall by 1% from 1973 to 1997, after adjusting for population increase.

In general, the bicycle trip counts that were conducted in 1973 and in 1996-97 suggest that historically, bicycle volumes were highest downtown (especially along the State Street corridor) and along the waterfront. No additional or more recent data on bicycle volumes is available to our knowledge.

Surveys undertaken as part of the City's 1998 Bicycle Master Plan indicated that the top two obstacles preventing more people from commuting by bicycle were "Dangerous traffic conditions" and "Not enough bike lanes on street."

5.5 Safety Issues

The City's 1998 Bike Master Plan identifies "trouble spots" for bicyclists based on reported collision and public accident records from the Santa Barbara Police Department. In general, this data suggest that historically, bicycle collisions were highest downtown (especially along the State Street corridor) and along the waterfront. It is not clear from the plan if these data was adjusted to account for higher bicycle volumes in these areas (i.e., relative number of bicycle collisions per bicycle trip, rather than absolute numbers of collisions).

In addition to traffic collisions, one of the other safety hazards for bicyclists is poor pavement conditions, including both degraded pavement conditions and debris. The City's 1998 Bicycle Master Plan identifies then current road maintenance and street sweeping cycles as not being specifically tailored to maintaining the bicycle network. The report identified a need to establish a reporting mechanism for road conditions affecting cyclists and increase funding for street sweeping in order to keep existing and new bike lanes clear of debris.

5.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- Santa Barbara already has a fairly comprehensive bike network, with the exception of the major gaps noted in Section 5.2.1.1. In addition, there are many regional bicycle routes that allow people to travel by bicycle to and from destinations outside of Santa Barbara. Filling in the remaining gaps in the bike network will involve difficult trade-offs of how right-of-way is allocated to different modes.
- It is unclear if the current "1:7" requirement for off-street bicycle parking (1 bicycle parking space for every 7 auto parking spaces) is meeting the needs in all areas; applying this single ratio citywide could be resulting in oversupply in some areas and undersupply in areas with a higher than average rates of bicycle commuting.
- Santa Barbara already has a number of public- and private-sector programs to encourage bicycling as a viable mode of everyday transportation; additional opportunities to expand bicycling in order to reduce peak-hour vehicle trips may include:
  - Many communities find that a significant amount of their peak-hour traffic is due to parents driving their children to school. Expansion of the existing Safe Routes to School program could ensure that more school-aged youth that live within near the school could safely walk or bike to school. Adjusting school opening and closing hours to hours outside the peak congestion times could help reduce cyclists' exposure to vehicle traffic.
  - Expand membership in the existing Bikestation through increased marketing, incentives, high quality equipment and maintenance, and implement a network of Bikestations located at key activity centers and destinations.
  - Create a "bike share" program similar to those developed in a numbers of communities of all sizes around the world (ranging from Paris to Tulsa). Such a program would require a network of on-street bike rental stands throughout the City and allow for short-term bicycle rental for casual trips. It will be important to partner

with existing bicycle rental companies to involve them in the creation of such a program.

- Create a "bike-and-fly" program at the airport, starting with installing bicycle parking and marketing, with consideration of an end-of-trip facility to allow bicyclists to box their bike, shower, and/or change clothes at the airport.
- More coordination between City, County, UCSB, SBCAG, other South Coast cities and entities to improve and expand bike paths and routes that cross jurisdictions.

6 PEDESTRIAN CONDITIONS[18]

6.1 Overview

Santa Barbara is in many ways a pedestrian friendly city, with a fairly continuous pedestrian network, pedestrian connectivity in almost all areas of the city, high-quality pedestrian amenities in many areas, and low per-capita rates of pedestrian collisions with vehicles. The city of Santa Barbara has invested heavily in the pedestrian realm, going beyond the provision of pedestrian pathways to fund pedestrian lighting, street furniture, and other projects to improve pedestrian comfort, convenience, and safety, particularly within the Central Business District and along the waterfront. As described above for bicycling, the City's many mixed-use areas, proximity of residential neighborhoods to the downtown, mild climate and demographic profile also help make walking a feasible and attractive transportation option. Like many cities, the city of Santa Barbara is engaged in ongoing efforts to ensure that the pedestrian network is fully accessible to all Santa Barbara residents and visitors through installation of missing sidewalk segments, curb ramps, and other pedestrian infrastructure.

6.2 Facilities

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service.

Deficiencies in the City's pedestrian facilities were identified in a community survey undertaken as part of the Pedestrian Master Plan. The results of the survey identified the following pedestrian facility improvement issues:

- Sidewalk continuity and connectivity
- Safety in crossing intersections
- Lighting at night
- General aesthetics for a pleasant walking environment

In addition, the Pedestrian Master Plan identifies the ongoing need to make the pedestrian network fully accessible, including accessibility improvements such as better maintained pavement surfaces, installation of additional curb ramps, removal of sidewalk obstructions, audible pedestrian signals, and accessible transit stops.

The City has several programs to address deficiencies in pedestrian facilities, including:

- City Mobility Coordinator (receives safety complaints, coordinates response)
- Safe Routes to Schools Program
- Curb Ramp Installation Program
- Development of design guidelines, engineering standards, and pedestrian-supportive zoning

The City has also developed a Neighborhood Traffic Management Program to implement traffic calming, improve programs to reduce cut-through traffic and improve pedestrian safety. The Oak Park neighborhood is the first area to be addressed under this program. Despite significant public outreach and discussions, a ballot measure in 2005 was not able to achieve sufficient support for continuation of the program, although some improvements that were supported by the community were made. The St. Francis neighborhood went through a similar community-based planning process, including a design charrette and adoption of a neighborhood mobility plan. A construction contract was awarded in September 2007, and some traffic calming devices have been installed between St. Francis and Santa Barbara High.[19]

The city of Santa Barbara's "Sidewalk Missing Links" program has identified missing sidewalks throughout the city and uses funds from Measure D (sales tax) as well as State and Federal grants to fund improvements to the pedestrian network. The Sidewalk Missing Links program undertakes about $1 million in sidewalk improvements annually. In addition, the Redevelopment Agency has a

[18] Sources for this section include: Interviews with City transportation staff; City of Santa Barbara Pedestrian Master Plan (July 2006); City of Santa Barbara Conditions, Trends, and Issues (CTI) Report (2005); City of Santa Barbara Redevelopment Agency's Public Infrastructure and Amenities website (accessed at www.santabarbaraca.gov/Resident/Home/Redevelopment/success_infrastructure.htm?js=false in May 2008).

[19] Sources: Interviews with City transportation staff and the City's Neighborhood Traffic Management Program website (accessed at www.santabarbaraca.gov/Resident/Transportation_and_Parking/OPNTM/how.htm in May 2008).

long history of investing in pedestrian facilities. Major projects funded in the past 15 years include:

- State Street Sidewalk Improvements
- State Street Pedestrian Crosswalks
- Downtown Pedestrian Street Lighting
- Lower State Street Revitalization
- Cabrillo Boulevard Pedestrian Lighting
- Improvements to the Cul de Sacs at 300 Block of Santa Barbara, Anacapa and Chapala Streets
- Sidewalk along West Carrillo to link Alta Mesa to the Westside

6.3 Policies

The most important policy document governing pedestrian conditions in Santa Barbara is the City's Pedestrian Master Plan. The most relevant policies from this plan are listed below:

Policy 1.1 The City shall expand the sidewalk network to increase walking for transportation and recreation.

Policy 1.2 The City shall improve pedestrian safety and comfort at intersections.

Policy 1.3 The City shall enhance pedestrian corridors.

Policy 1.4 The City shall work to eliminate U.S. Highway 101 as a barrier to pedestrian travel.

Policy 1.5 The City shall assist neighborhoods that desire to improve pedestrian access to, from, and within their neighborhood.

Policy 1.6 The City shall support the establishment and construction of urban trails to enhance circulation and provide recreational opportunities through parks and open spaces.

Policy 1.7 The City shall maintain, protect, and improve sidewalk facilities on an on-going basis and during public and private construction projects.

Policy 1.8 The City shall work with transit providers to develop high quality and pedestrian accessible transit stops.

Policy 1.9 The City shall work to make the pedestrian environment accessible to those with disabilities, children, and the elderly.

Policy 2.1 The City shall assist in the development of a Safe Routes to School program.

Policy 2.2 The City shall develop and maintain maps that identify the most appropriate routes for children to walk to school.

Policy 2.3 The City shall identify and fund programs and improvements that will make it safer and more attractive for students to walk to school.

Policy 3.1 The City shall protect, preserve, and enhance the paseo network.

Policy 3.2 The City shall expand the network of paseos.

Policy 4.1 The City shall establish and maintain pedestrian design guidelines.

Policy 5.1 The City shall encourage people to walk through education and awareness efforts.

Policy 5.2 The City shall work to enforce laws that protect pedestrians.

Policy 6.1 The City shall incorporate the Pedestrian Master Plan into the land development process.

Policy 6.2 The City shall pursue revisions to the Zoning Ordinance that will help implement the Plan.

Policy 6.3 The City shall incorporate pedestrian projects into its Capital Improvement Program (CIP).

Policy 6.4 The City shall maximize the amount of financial resources available for pedestrian projects.

Other policies relevant to pedestrian conditions (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

6.4 Volumes

Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. As part of the 2006 Pedestrian Master Plan, pedestrian counts at particular intersections were taken between July and September 2003 in order to understand the highest volume pedestrian flows. The spatial distribution of pedestrian volumes (refer to Figure 6-1) identifies Downtown as having the highest pedestrian volumes and the Eastside the next highest.

The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. Respondents to a

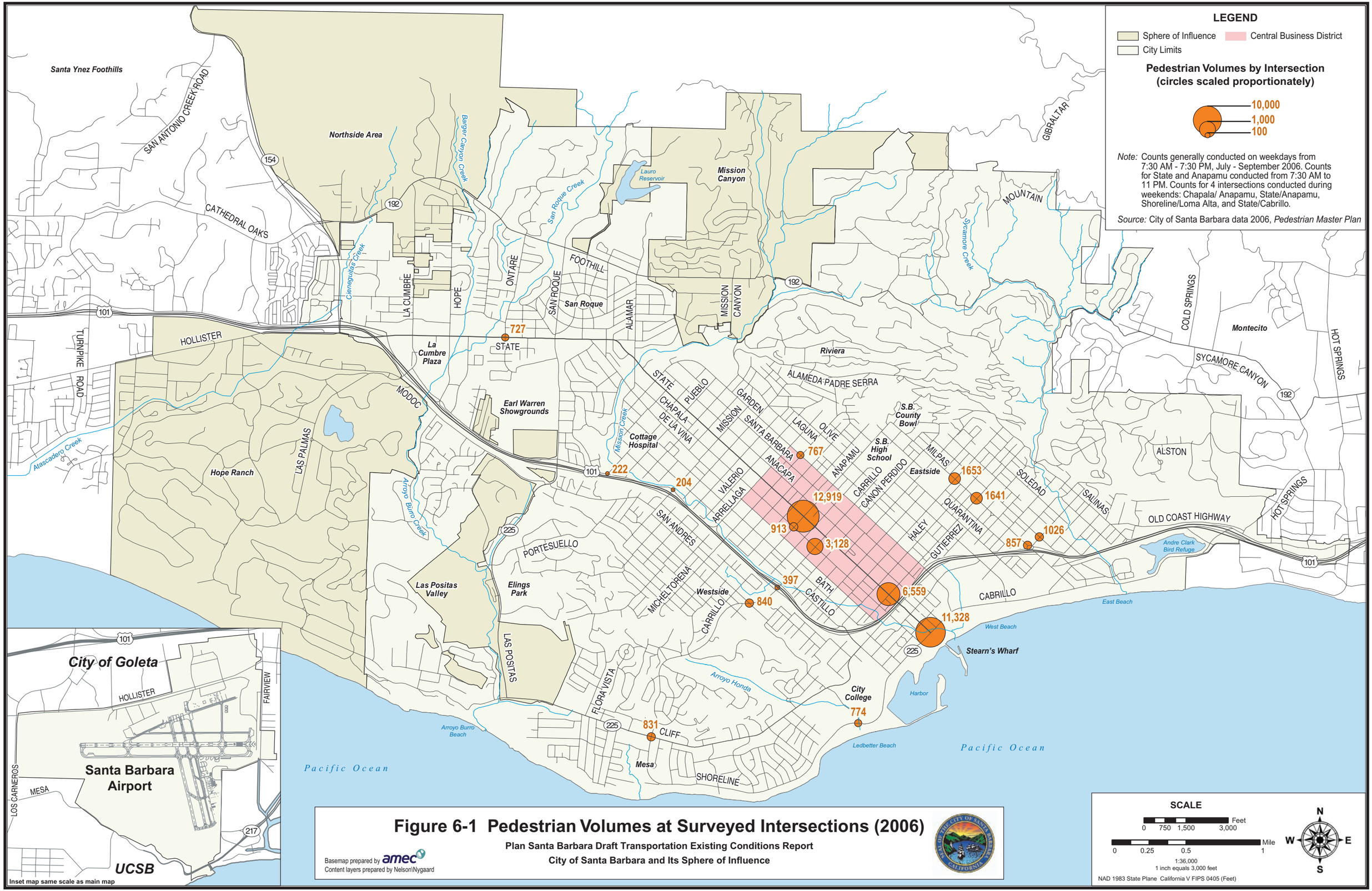


Figure 6-1 Pedestrian Volumes at Surveyed Intersections (2006)

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

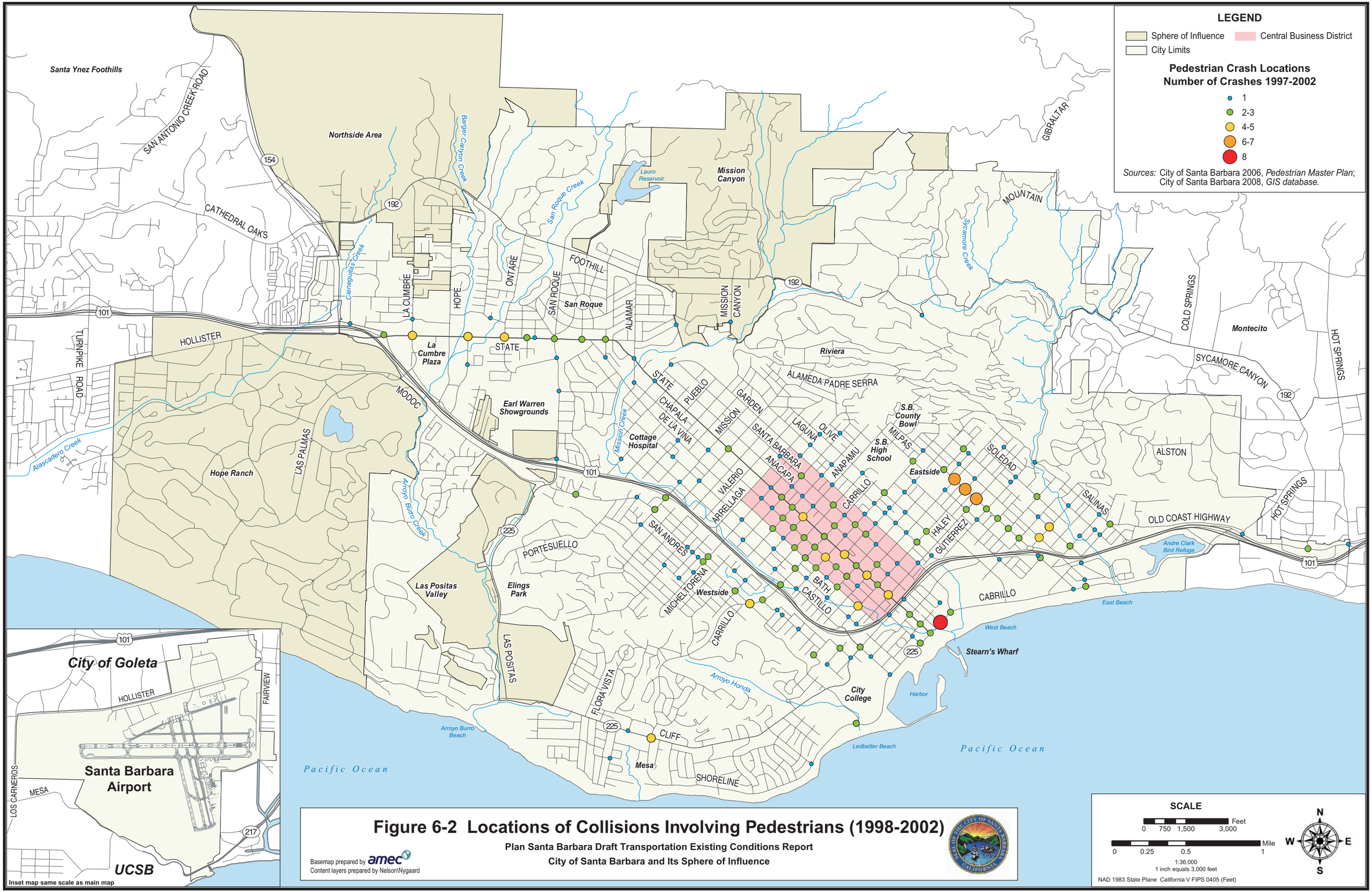


Figure 6-2 Locations of Collisions Involving Pedestrians (1998-2002)

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

survey undertaken as part of the 2006 Pedestrian Master Plan were asked to name the top reasons they don't walk more often; the top responses relevant to this report were:

- Destination too far
- High traffic volumes or speeds
- Inadequate separation from traffic
- Autos do not yield to pedestrians
- No sidewalk

6.5 Safety Issues

Overall, Santa Barbara offers a safe environment for people to walk, with a per capita pedestrian collision rate nearly 50% lower than the average for other California cities. Nonetheless, a total of 428 pedestrian-involved collisions were reported to police between 1998 and 2002. Figure 6-2 shows the spatial distribution of pedestrian collisions for these years.

By time of day, collisions involving pedestrians peaked during the evening commute. Additionally, over a quarter (28%) of collisions involving pedestrians occurred before sunrise or after sunset. As an indicator of fault, 64% of post-collision citations were given to drivers, and 36% to pedestrians. The most common violation leading to a pedestrian-vehicle crash was "Vehicle failed to yield to pedestrian in crosswalk." suggesting that increased education and enforcement of crosswalk yield violations could reduce this type of pedestrian-involved collision.

6.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- Overall, Santa Barbara already has a relatively well-developed pedestrian realm characterized by a fairly continuous pedestrian network, pedestrian connectivity in almost all areas of the city, high-quality pedestrian amenities in many areas, and low per-capita pedestrian collision rates.
- Significant areas with high pedestrian volumes where pedestrian connectivity or amenity is less than ideal include: crossings of U.S. Highway 101, Upper State Street, the waterfront area, Cabrillo (where tourists scramble across the street), Anacapa, Milpas (open campus lunch trips from Santa Barbara High), and Cliff Drive. Pedestrian linkages between Alta Mesa and the Westside to Downtown are also intermittent, with the heavily used unpaved path along Loma Alta targeted for improvement. Pedestrian linkages between Veronica Springs and other Las Positas Valley neighborhoods and Arroyo Burro Beach Park, Elings Park and the Douglas Family Preserve are also intermittent. Remediating these and other "missing links" in the pedestrian network—with prioritization of improvements for intersections and corridors with higher-than-average rates of pedestrian volumes, collisions, or both—is an ongoing process that will require sustained funding.
- The City's pedestrian mode share for commuting to work is already higher than the national and state averages (refer to Figure 2-1). Walking is usually a viable mode for short-distance ("micro-level") trips (refer to Figure 1-1). For this reason, the most effective way for walking to help the City achieve its policy goal of reduced peak-hour vehicle trips is to facilitate more mixed-use, moderate-density development in existing urbanized areas, in order to put more origins and destinations within short walking distance of each other.
- Many communities find that a significant amount of their peak-hour traffic is due to parents driving their children to school. Expansion of the existing Safe Routes to School program could ensure that more school-aged youth that live within near the school could safely walk or bike to school.
- Based on pedestrian surveys and collision data, increased enforcement and education regarding moving violations that endanger pedestrian safety would complement Santa Barbara's investments in pedestrian infrastructure and amenities.

7 AUTOMOBILE PARKING[20]

7.1 Overview

Research has shown that the availability and price of parking is one of the single largest determinants of the decision to drive or travel by some other mode. Beginning with its

[20] Sources: Interviews with city transportation and parking program staff; City of Santa Barbara Municipal Code, Title 10: Transportation and Parking and Title 28: Zoning Ordinance; City of Santa Barbara "Lot Information Sheet" (undated); City of Santa Barbara "Bi-Annual Occupancy Graphs" (September 2007); City of Santa Barbara Waterfront Area Transportation Study (May 2001); SBCAG 2007 Commuter Profile Report (June 2007).

1979 Transportation Management Plan — which recognized the fact that the City can't feasibly accommodate all commuters who might choose to drive downtown—the city of Santa Barbara has been active in promoting parking management strategies to balance the needs of all motorists. The public parking system (including on-street parking and off-street lots and garages downtown and in the Waterfront area) is designed so that visitors' and shoppers' short-term parking needs are prioritized, while long-term commuter parking is deemphasized.

In addition, the City has established numerous residential parking permit districts to protect residents from spillover parking problems caused by non-residents parking in neighborhood areas. Santa Barbara has fairly conventional off-street parking requirements for new development, while many other communities have found that such requirements do not reflect actual demand and often act as a barrier to high-quality, "low-traffic" development.

7.2 Facilities

7.2.1 Downtown Parking

7.2.1.1 Off-Street Parking

There are fourteen off-street lots and garages in the downtown area (two of which are devoted solely to commuters) comprising over 3,300 off-street parking spaces. Parking in the non-commuter lots is free for the first 75 minutes (150 minutes for motorists displaying a disability placard) and $1.50 per hour thereafter. There are no time limits on the length of stay. Parking facilities are open 24 hours a day, 7 days per week, but priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm.

The City sells commuter/monthly parking passes in 12 short-term lots and garages, but to maintain parking availability for short-term parking needs closest to the downtown area, monthly passes for commuters are progressively less expensive the further the parking lot is from downtown. Passes range from $100-150 monthly and include free travel on downtown and waterfront shuttles. To ensure that there will always be short term parking available in short-term lots, the city stops selling monthly passes when a lot reaches 85% occupancy.

The two downtown commuter lots are dedicated exclusively to commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). Purchase of a monthly pass at either lot also includes free travel on downtown and waterfront shuttles.

Parking facilities and the "75 minutes free" are funded via the Downtown Parking Benefit and Improvement Assessment District, in which property owners pay an annual assessment derived by formula based on their proximity to (e.g., their "benefit" from) off-street public lots and facilities.

During the peak demand hour for the downtown parking system, average occupancy for the 3,200 short-term parking spaces is 69%, with occupancy for individual facilities ranging from 36% to 93% (refer to Figure 7-1). In other words, while individual parking facilities may have high occupancy rates at particular peak periods, there are over 1,000 off-street short-term parking spaces available at the peak demand hour for the entire downtown parking system as a whole.

This situation described above suggests that parking deficits in downtown Santa Barbara are not the result of a supply problem, but rather a distribution problem. Many communities have found that parking distribution problems can be solved without adding new supply, through such strategies as demand-responsive rather than flat-rate pricing (e.g., prices are higher at times and locations where demand is high, and lower or free at times and locations when demand is low). Santa Barbara's existing transit shuttles/circulators are also a partial solution to address the distribution problem in that they provide another option for people who don't want to walk from peripheral parking locations to their ultimate destination. However, the frequency of this service varies and delays may contribute to resistance to parking in outlying locations.

7.2.1.2 On-Street Parking

On-street parking is free downtown for limited durations, ranging from 15-75 minutes depending on the street. Generally speaking, 75-minute time limits are in effect in the first two blocks off of the State Street corridor and in close proximity to the off-street public lots and garages in order to match the "75-minutes" free time limit for these off-street facilities. Outside of downtown parking is free up to 90 minutes.

No data was available on the total supply or recent demand of downtown on-street parking. However, anecdotal observations indicate that major downtown employers such as the County, City and retail businesses along State Street with limited or no employee parking are major users of downtown and nearby residential neighborhood on-street parking.

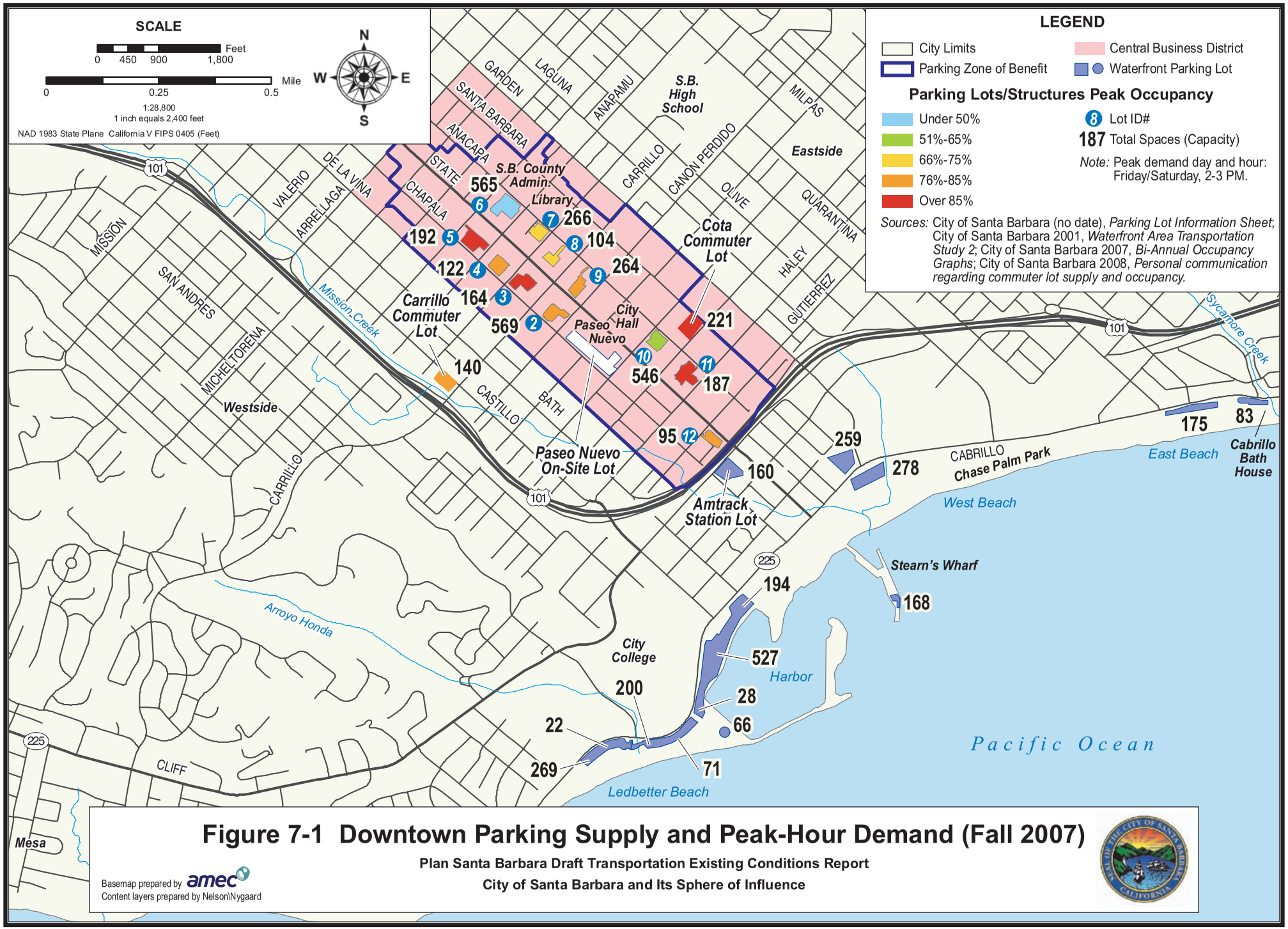


Figure 7-1 Downtown Parking Supply and Peak-Hour Demand (Fall 2007)

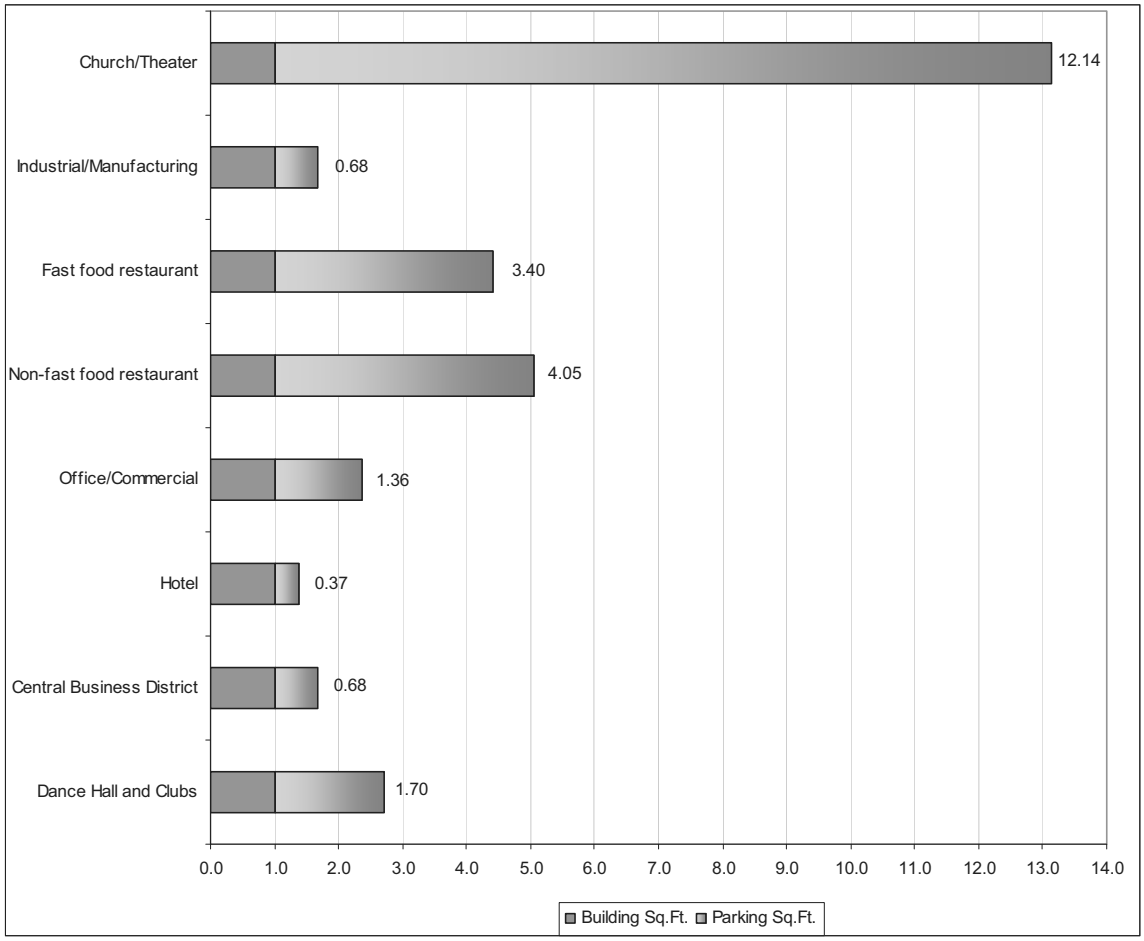
Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Content layers prepared by Nelson\Nygaard

Figure 7-2: Square Feet of Parking Area Required for Each Square Foot of Building Area for Typical Uses



Source: City of Santa Barbara Municipal Code, Title 28.

7.2.2 Residential Parking Permit Program

The city of Santa Barbara has a fairly typical residential permit parking program to prevent non-resident parking spillover problems in residential areas. The program was created following the 1980 decision to reduce parking requirements for the Downtown core in anticipation that some downtown employees might park in the downtown-adjacent residential neighborhoods. There are currently 9 residential permit parking areas. Residential parking permits are available for $15/month, up to three resident permits and one guest permit per household. The City finds that this ratio leaves a reasonable ratio of free to occupied on-street parking in residential neighborhoods.

7.2.3 Waterfront Parking

Waterfront parking lots also charge more for proximity to popular destinations. The beach lots closest to downtown, the main harbor and the beach charge $1.50/hour, while the lots further away charge $2 for 3 hours ($0.66/hour). There is a maximum daily charge of $7 or $9. Annual passes are also available for $95, and are prorated depending on the time of year they are purchased. Waterfront parking is managed by the Waterfront Department.

7.3 Policies

7.3.1 Minimum Parking Requirements for New Development

The city of Santa Barbara's existing minimum parking requirements are fairly typical for Southern California cities. Santa Barbara's minimum parking requirements often require more than one square foot of parking area for every square foot of building (refer to Figure 7-2). While the City has reduced requirements for new development in the Central Business District (as described below), many cities have found that excessive minimum parking requirements (which essentially function as a development impact fee) are a barrier to high-quality development (af-

fecting the density, mix of uses, and design of new development), that can undermine their policies goals of creating "low-traffic" development.

In general, the code-required parking is interpreted to be the same as the actual parking demand. The City's current identified parking requirements for new development are generally not tailored to various uses in different parts of the City.

7.3.2 Parking Benefit and Improvement Assessment District

Reduced parking requirements are permitted for new development in the "delineated zone" of the Central Business District. This is in recognition of the mixed-use, compact, walkable, and transit-intensive character of downtown as well as the revenues derived from the Downtown Parking Benefit and Improvement Assessment District (PBIAD) for downtown parking facilities. Within the PBIAD, property owners pay an annual assessment based on their proximity to (e.g., their "benefit" from) off-street public lots and facilities. Revenues are used to construct, operate, and maintain downtown public parking facilities.

This arrangement resembles a parking in-lieu fee, where developers pay a fee at the time of project entitlement in exchange for reductions in the project's parking requirements, and revenues are used to construct and maintain parking or, increasingly, fund multimodal improvements. The key differences are that Santa Barbara's assessment is 1) paid annually, 2) paid by all property owners and not just new development projects, and 3) assessed on new development projects even if they are required to fully meet their on-site parking requirements (which the City requires when adjacent off-street public parking facilities consistently experience 85% occupancy or above).

7.4 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips:

- The city of Santa Barbara is a recognized leader in the management of off-street parking for downtown, in two areas especially:
    - Prioritizing the provision of short-term parking for visitors and shoppers over long-term commuter parking.
    - Using any surplus parking revenues (net of parking facility operations and maintenance costs) to fund transit service enhancements and free transit passes for downtown employees and City employees working downtown.
- The pricing of off-street parking facilities downtown could be evaluated for its impact on inducing additional peak-hour vehicle trips. For example, the low prices of monthly commuter passes ($30-$40) at commuter lots equate to $1.50 to $2 per day, much lower than the cost of a regional transit trip and likely much lower than the financial value of the land considering downtown Santa Barbara's high land values. In addition, the flat-rate pricing and lack of time limits at short-term (combined with the first 75 minutes free) at downtown off-street lots and garages may not provide a great enough incentive to deter commuter parking. Alternatives include progressive tiered-rate pricing (e.g., the 3rd hour is priced higher that the 2nd, the 4th hour is priced higher than the 3rd, and so on) and/or demand-responsive pricing in which prices are set for each facility based on average historical demand patterns at that facility.
- One area in which Santa Barbara differs from other communities is in the management of on-street parking, relying on time limits rather than demand-responsive pricing (e.g., pricing parking based on demand patterns) to promote turnover. While the reduction of on-street time limits from 90 minutes to 75 minutes reduced employees shuffling cars from space to space, this phenomenon is still prevalent. With off-street parking priced after the first 75 minutes and on-street parking free, motorists may have a financial incentive to cruise for free on-street parking. Other communities have found metering a more cost-effective (and visitor-friendly) strategy for managing on-street parking. Some portion of any net revenue generated by pricing on-street parking could be invested in pedestrian improvements or multi-modal programs (e.g., increased marketing of off-street parking options and increased frequency of transit service).
- Santa Barbara's current residential permit parking program relies on time limits to reduce non-resident parking spillover problems in residential neighborhoods; some communities have found that in neighborhoods where on-street parking ca-

pacity exists during the day, it is more cost-effective option to sell on-street parking to non-residents at market rate prices while continuing to allow residents with permits to park exempt from time limits or pricing.

- SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace; one opportunity for the city of Santa Barbara to reduce peak-hour vehicle trips would be to develop enforcement mechanisms with the State's existing parking cash-out law, which requires certain employers to offer their employees the option to either a) "cash out" the financial value of any employer-provided parking that they don't use or b) price employer-provided parking and give all employees a monthly transportation allowance that they can spend on employee parking or other modes commuting (similar to the existing Cottage Hospital program in which parking is priced, all employees receive a transportation subsidy, and employees who don't use the parking can use the cash to offset their transit commuting costs). Alternatively, the city of Santa Barbara could develop a local parking cash-out ordinance that would apply to more types of employers than does the State law.
- Currently, the city of Santa Barbara requires parking demand studies for larger developments. MEA traffic analysis procedures also provide for traffic impact analysis based on demand. In addition, modifications to the existing minimum parking requirements can be requested by project sponsors and are sometimes approved. Further analysis could be undertaken to evaluate how existing parking requirements compare to actual demand patterns in Santa Barbara, peer communities, and/or national averages. This analysis will be an important component in support of the Plan Santa Barbara goal of reducing peak-hour vehicle trips.
- Currently only the Granada Garage is able to monitor real-time occupancy data, and that data is displayed at the garage entrance. City parking staff are currently pursuing implementation real-time occupancy monitoring equipment at all downtown off-street parking facilities; some communities have found that providing information on parking availability to motorists on-site via facility signage can help reduce traffic congestion caused by cruising for parking. In addition, providing this information before motorists begin their trip via website or phone can help motorists decide whether to drive or take some other mode if parking isn't available.

8 TRANSPORTATION DEMAND MANAGEMENT

8.1 Overview

"Transportation Demand Management" (or TDM) is a somewhat arcane term that simply means investing in cost-effective programs that will create incentives and encourage more people to either:

- Shift more of their *auto* trips to times of day that have less congestion (or avoid the auto trip altogether through strategies such as telecommuting).
- Shift more of their *overall* travel to modes that create less congestion (carpool, transit, bicycle, or on foot).

TDM programs recognize that transportation resources are always scarce and that construction or technology projects to widen roadways or improve traffic flow are typically quite expensive on a "per trip accommodated" basis. For this reason, the most effective TDM programs are based on the principle that it is often cheaper to pay people not to drive (or give them some other incentive that they value such as priority parking for carpools, additional vacation time, etc.) than it is to accommodate their vehicle trip.

Some TDM programs include marketing and education programs to ensure that commuters are aware of the alternatives to driving. These have proven effective, although the most significant impacts are seen when general marketing is supplemented with personalized outreach (such as telephone or even door-to-door contact providing "Transit Starter Kits" and individualized transit commute plans).

The city of Santa Barbara, the County of Santa Barbara, and SBCAG all have active TDM programs as described below. (Note that while parking management programs are an important part of most TDM programs, parking management policies are described in the parking section above).

8.2 Citywide TDM Programs[21]

The city of Santa Barbara has several TDM requirements for new businesses and new development projects, including:

- TDM plans may be applied by the City as a condition of approval for development projects that: a) request an adjustment (or "modification") from the City's existing minimum parking requirements, b) need to mitigate significant traffic effects associated with the project; or c) propose TDM measures as project benefits. For those projects that establish TDM plans, there is no post-occupancy monitoring or enforcement mechanism to ensure compliance with or evaluate the effectiveness of the TDM plans.
- Transportation demand management has been required for new business licenses for the past 15 years. To receive their business permit, new businesses must offer free transit passes to their employees, and provide reserved parking spaces for carpools and vanpools. Downtown businesses that predate the transportation demand features of the business permit approvals process can qualify for 90-day transit passes at a steeply discounted rate of $45 per employee as part of the Downtown Bus Pas Program described below. There is no monitoring for compliance with the program.
- As discussed in the transit and parking sections of this report, the City also funds a "Bus Pass Program" which provides steeply discounted MTD bus passes for any downtown employee that requests them. The program is funded from net revenues from downtown parking facilities.

Though the City's Work Trip Reduction Incentive program (or "WorkTRIP"), the City has a number of TDM measures in place for specifically geared towards City employees:

- The "My Ride" program provides free MTD transit passes for City employees (regardless of the employees' work location) for use on any transit trip (i.e. not just for commute trips). In the period from July 1 to December 31, 2007, 165 City employees used their MyRide passes for a total of 9,098 MTD transit trips. This program is funded by net revenues from downtown parking facilities and non-capital transportation funds.
- In addition to receiving free MTD transit passes through the My Ride program, City employees can select from one more of the following commuter benefits:
  - 75% subsidy for costs of a full vanpool or 75% subsidy of monthly or ten-ride passes for long-distance transit services (such as the Coastal Express and Clean Air Express). Approximately 60 City employees participate in this program.
  - "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rests of the vehicle costs funded by the department providing the vehicle. This program is currently paid for with non-capital transportation funds, but over time it is envisioned that the funding responsibility will be shared by all departments on a pro rata basis according to the total number of employees in each department. This program is in its second year and currently has 53 City employees in 18 registered carpools.
  - City employees who commute by bicycle are offered steeply discounted annual or per use memberships in the downtown Bikestation, which offers secure bicycle parking and other amenities for bike commuters (as described in detail on the bicycle section of this report). Currently 17 City employees are Bikestation members.
- The City offers a 9/80 work schedule to all employees. Eighty-one percent of City employees participate, resulting in a significant reduction in commute trips made by City employees due to the elimination of many commute trips on alternating Fridays. In addition, City employees participating in the 9/80 schedule have a reduced impact on peak hour traffic congestion, because the program results in their commute trips occurring outside of conventional peak commuting hours.
- Through SBCAG Traffic Solutions' FlexWork program, the City offers flexible work schedules and telecommuting options to any employee whose supervisor approves.
- The City has recently explored the feasibility of partnering with a carsharing organization that would potentially replace some portion of the City's fleet vehicles and make these vehicles available to the general public when not needed by City employees. While those negotiations did not result in the establishment of a carsharing program, the City did recently change its "vehicle use policy" – which formerly permitted use of City

[21] Sources: Interviews with City TDM and parking program staff.

fleet vehicles only for work-related trips, unplanned overtime, medical appointments, and approved emergency trips – to also allow for occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies. This revised policy allows employees to feel more confident that they can regularly commute to work by transit, on bicycle, or by walking, because they know that a car will be available to them during the work day if needed.

- In addition, the City has a number of other TDM programs, including:
  - Preferential parking for carpools and vanpools.
  - A City purchased and maintained fleet of bicycles located at many work sites for use during business hours.
  - Secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations.
  - "Urban cycling training" to build confidence in novice bike commuters, teach safe riding skills, assist with route planning, and provide related support and encouragement.

Some evaluation of the impacts of the City's TDM programs has been done, including:

- SBCAG Traffic Solutions' "TS Online" (www.trafficsolutionsonline.info) is used by City employees to register their participation in the various TDM programs and to log how many days they traveled to work each week by alternative modes (i.e. not in a single-occupant vehicle). This self-reporting is required in order for employees to continue receiving WorkTRIP benefits. City employees are additionally encouraged to be consistent in logging the days they commute by alternative modes through the "Green Commute Challenge" weekly raffle, in which two randomly selected employees who have logged one or more commute trips by alternative modes in the previous week are given $50 gift cards to local businesses.
- There are currently 310 registered City employees on TS Online, meaning that 310 out of a total of 1,727 City employees (about 1,200 full-time equivalents) are participating in some aspect of the City's WorkTRIP TDM program.
- The TDM impacts of the City's WorkTRIP program for the 14-week period of 4/15/08 through 7/27/08 (as estimated by TS Online calculations) include the following:[22]
  - Total vehicle trips eliminated: 5,418
  - Total vehicle miles eliminated: 164,939
  - Total pounds of vehicle emissions reduced: 152,558
- In addition, the City conducts an annual survey of City employees' commute patterns. While participation is voluntary, the survey has an extraordinarily high response rate of 30%. A significant shortcoming of these kinds of surveys is due to "self-selection bias," as those who respond are disproportionately more likely to be using alternative modes because they are motivated to report what is working (and not working) with the City's transportation benefit programs. For this reason, the overall mode split of the City workforce is not reported here, and is assumed to be comparable to mode splits reported for all residents and workers in the city of Santa Barbara, as described in the demographics section of this report.

One City practice that potentially undermines the effectiveness of its WorkTRIP program is the provision of free parking to City employees in the two downtown commuter parking lots as well as at certain city building (such as the parking lots at the Public Works Building, Water Treatment Facility, and City Hall). In addition, those employees who don't have access to free *off*-street parking can usually find free all-day parking *on*-street (with the exceptions of the Library and the Carrillo Recreation Center which are the only City facilities without free parking available nearby). Even when on-street parking has 2-hour time limits, employees can still park all day for free on the street by simply leaving work every 2 hours and moving their cars to a different on-street space (i.e. the "2-hour shuffle").

[22] It is worth noting that City transportation staff believe there is significant under-reporting of alternative commuting due to the fact that the calculations are based on employee self-reporting. Source: "Work Trip Reduction Incentive Program Update," City of Santa Barbara Council Agenda Report, 3/25/08.

8.3 Downtown Specific TDM Programs[23]

8.3.1 Downtown Bus Pass Program

The Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. To be eligible, an employee must work within the area circumscribed by De La Vina Street, Garden Street, Mason Street, and Sola Street. Certain private employers and employees from other public agencies are excluded from this program if they provide their own bus pass program. City employees receive their bus-pass for free. Currently, 264 workers are actively enrolled in the bus pass program, including 92 City employees and 178 Downtown employees. The program is funded by revenue generated at parking lots and garages in the downtown area.

8.3.2 Downtown Parking Program

The Downtown Parking Program manages 12 short-term public parking lots and garages and two commuter lots. In the short-term lots and garages, parking is free for the first 75 minutes, but $1.50 per hour thereafter. A portion of the parking revenue goes to support additional peak-hour transit service as well as the Downtown Bus Pass Program, installation of bike lockers, and other multimodal amenities in the downtown area.

8.4 Santa Barbara County Employee Programs[24]

Onsite parking for County employees working downtown has an estimated *ten-year* waiting list for a permit. Employees who still drive and do not wish to pay for parking in public lots either park on-street in surrounding residential neighborhoods, park on-street in commercial areas and move their car every 75 minutes, or park in commuter satellite lots and take an MTD shuttle into downtown.

While the County has not yet explored the option of charging employees for parking or offering parking-cash out as a strategy to reduce demand, the County has developed several TDM strategies as part of its "Commuter Benefits/Alternative Work Schedules" program in order to both reduce parking demand and to provide a fringe benefit for employees. This program is geared toward promoting a) commuting by transit bus or vanpool, b) working at an alternative site part or full-time or, c) changing work hours to avoid peak-period commuting. While the program is focused on employees who commute into Santa Barbara from North County or from Ventura County, any employee can participate in any of the program incentives, which include the following:

- County employees can receive an additional two days of vacation per year if they use alternative transportation for 80% of their commute trips in a pay period.
- The County will provide a $10 subsidy each month to help offset the cost of a transit pass. Pre-tax commuter checks are also available for employees, for a total combined pre-tax benefit of up to $115.

Though the supply of individual parking permits is highly constrained, carpool/vanpool passes can be obtained for day-to-day use of the County Administration Building lot (220 spaces) or the Garden Street lot (177 spaces), on a space-available basis. The driver must be a regular employee with at least one year of service with the County, and must have the other passengers in the vehicle when they park. A commuter permit must be obtained in advance from the County General Services department.

With department and supervisor approval, County employees can arrange for an "alternative work schedule" in which employees work either a flexible schedule or a compressed work week and/or "telecommute" by gaining access to the County's Virtual Private Network (VPN) in order to have access to the County computer network at home.

8.5 SBCAG Traffic Solutions TDM Programs[25]

SBCAG Traffic Solutions has developed several programs to support reduction in regional vehicle commuter trips, including bicycle programs, commuter buses (described in the transit section) emergency ride home programs, vanpool formation, carpool matching, and an employer consulting program. Altogether, SBCAG estimates that its Traffic Solutions programs had the following impact in FY 2006-07:

[23] Sources: Interviews with City TDM and parking program staff and the City's Downtown Bus Pass Program website (accessed at www.santabarbaraca.gov/Business/Transportation_and_Parking/Downtown_Parking/BUS_PASS.htm in May 2008).

[24] Sources: Interviews with County TDM Benefits staff and County TDM Benefits website (accessed at www.sbcountyhr.org/benefits/commuterbenefits.html in May 2008).

[25] Sources: SBCAG program materials, interviews with SBCAG staff, SBCAG FY 2006-07 Annual Report (October 2007), and SBCAG website (accessed at www.trafficsolutions.info/default.htm in May 2008).

- 489,536 fewer automobile trips
- 19.7 million fewer vehicle miles traveled
- 887,382 fewer gallons of gasoline consumed
- $8.8 million in commuter cost savings
- 7,570 metric tons of pollutants removed

The Flexwork SB program appears to have achieved an especially noticeable reduction in peak-hour vehicle trips. The Flexwork SB Program, administered by SBCAG, was developed with the overall goal to stimulate more telecommuting and flexible work schedules countywide, to reduce peak period traffic congestion, improve air quality, and assist employers in addressing high staff turnover that results from long distance commutes. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

Phase 1 of the program was funded by Federal Congestion Mitigation and Air Quality (CMAQ) funds, and completed implementation in 2006. It is estimated to result in 109,000 fewer peak hour trips each year (73,000 from U.S. Highway 101 south to Ventura) and approximately 1.5 million fewer vehicle miles traveled (VMT). At the completion of Phase 1 in 2006, the FlexWork program had 363 participants each month.

Approximately 8,700 employees are impacted by the FlexWork Santa Barbara Phase 1 program. Phase 2 of the program seeks to expand the level of participation by these employers, focusing on recruiting employers who meet the following criteria:

- Private sector employers located near the project corridor in the Downtown area and on both sides of U.S. Highway 101 in Santa Barbara.
- Private sector employers with large numbers of employees traveling through the project corridor, located in Goleta, Summerland and Carpinteria.
- Employers that participated in FlexWork Phase I that have the potential to further expand their Flexwork programs, such as Cottage Health System, the county of Santa Barbara and the city of Santa Barbara.
- Commitment from participating employers: Employers that are selected to participate in Phase II will be required to commit to implementing a pilot flexwork program consisting of a minimum number of employee participants.[26]

In addition, to its role as a consultant to employers, SBCAG Traffic Solutions staff also provides ad hoc technical assistance to cities that wish to include TDM strategies in policy and regulatory documents. In a similar fashion, developers often contact Traffic Solutions staff (usually at the recommendation of entitling agencies or local business organizations such as the Chamber of Commerce) to get assistance with crafting appropriate TDM strategies to reduce peak-hour vehicle trips associated with their development.

8.6 Private-Sector TDM Programs

Interviews with public agency staff revealed that several private-sector employers implement TDM programs, including:

- Cottage Hospital in Santa Barbara has a "parking cash-out" program in which all employees are paid an additional $75/month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75). Employees who don't drive to work or who drive less frequently receive additional take-home pay, while employees who must drive everyday are no worse off then if parking was free.
- Raytheon, the largest employer in Santa Barbara, provides heavily subsidized carpool/vanpools for employees, as well as bicycle parking, showers, and change rooms to encourage bicycle commuting.

8.7 Other TDM Programs

8.7.1 UCSB TDM Programs[27]

UCSB offers a wide range of TDM programs to encourage students, faculty, and staff to use alternative modes through its Transportation Alternatives Program (or TAP program), including:

- Free MTD rides for UCSB students from 7 days before the first day of classes until the last day of final examinations, funded by a mandatory student fee
- 50% discounted monthly MTD pass for faculty/staff

[26] Source: SBCAG website (accessed at www.sbcag.org/Newswire/2006/08-06.htm in June 2008) and FlexWork Phase I Final Report (July 20, 2006).
[27] Sources: UCSB Transportation Alternatives Program (TAP) website (accessed at www.tap.ucsb.edu in May 2008) and interviews with SBCAG staff.

- Carshare program operated by ZipCar (2 or 3 vehicles) offered to all students, faculty and staff, and at discounted rate for TAP enrollees
- Flex schedules and telecommuting for certain staff
- No charge vanpool program
- Bicycling promotion programs
- Free parking pass for TAP registered carpools and vanpools
- 57 hours of complimentary campus parking per quarter for TAP registered students (to allow individuals who have given up their parking pass as part of the TAP program to drive on those occasions when they need to)
- Emergency Ride Home program

The program is funded through fines and forfeitures revenue collected by Transportation and Parking Services.

8.7.2 City College TDM Programs[28]

Anecdotal information suggests that Santa Barbara City College (SBCC) students are a major source of traffic congestion on City streets and on U.S. Highway 101, with as many as 3,000 students, faculty and staff living within 10 miles of campus. SBCC offers a wide range of TDM programs to encourage students, faculty, and staff to use alternative modes through its Alternative Transportation Program, including:

- Free MTD rides for SBCC students from 7 days before the first day of classes until the last day of final examinations.
- SBCC dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai).
- Carpool matching program (called GreenRide) to find other interested carpoolers who live nearby and have similar schedules and preferences.
- Priority parking spaces closer to classrooms and administrative offices for carpools.

8.7.3 APCD's "Santa Barbara Car-Free" Program[29]

The Santa Barbara County Air Pollution Control District (APCD) leads a cooperative TDM program called "Santa Barbara Car Free" which promotes sustainable "car-free" or "car-light" tourism in the Santa Barbara region. Program materials, including a visitors map and guide, highlight "How to travel *to* Santa Barbara car free" and "How to travel *around* Santa Barbara car free." The program is considered a model program and has won state and national awards, including an Environmental Award from the U.S. Environmental Protection Agency Region 9 and a Marketing Excellence Award for "Best Niche Marketing: Eco-Tourism" from the California Travel and Tourism Commission (CTTC).

8.8 Policies[30]

The most important TDM policies are from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan, and these are summarized in Appendix A. SBCAG has additional TDM policies relevant for the *Plan Santa Barbara* project, which are listed below:

SBCAG Traffic Solutions – Program Objectives

- To provide a countywide TDM program, regional commuter bus service and ridesharing information.
- To develop programs benefiting the public and to provide information about transportation choices through education, outreach and public participation.
- To promote cooperative relationships with local businesses, government agencies, and community groups and individuals to expand participation in commuter programs.

8.9 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips. Specific opportunities will then be described and analyzed in greater detail in the next stage of development of the Plan.

- The city of Santa Barbara, the county of Santa Barbara, and SBCAG all have active TDM programs that operate at the local and regional levels to reduce peak-hour commuting by public-sector employees.
- While some programs develop comprehensive performance measures of their TDM program, it was not possible to get performance measures for many programs. At a minimum, TDM programs

[28] Source: SBCC Alternative Transportation website (accessed at: www.sbcc.edu/commute/index.php?sec=2434 in May 2008) and interviews with SBCAG staff.

[29] Source: Santa Barbara Car-Free brochure and website (Accessed at www.SantaBarbaraCarFree.org in May 2008).

[30] Source: Source: SBCAG Traffic Solutions website (www.trafficsolutions.info), accessed on June 18, 2008.

should be organized to monitor and report participation rates, estimates of peak-hour vehicle trips reduced, and net cost-per-peak-hour-trip-avoided figures (potentially including estimates of the financial value of reduced social and environmental externalities).

- As discussed in the parking section, a more robust parking management program for on-street public parking, public- and private-sector employers, and at educational institutions could be an important part of reducing peak-hour vehicle trips. The cost for parking and the ability of the City to minimize long-term use of short-term parking spaces will be key factors impacting the level of auto use downtown and elsewhere.
- One opportunity for the City and/or County to consider pursuing is partnering with a carshare provider (such as ZipCar that has a car share "pod" at UCSB) to convert some or all of their motor pools to shared use vehicles that would be available to employees when needed and available to members of the public at other times. For example, the City has a total motor vehicle pool of 529 vehicles at a cost of over $4 million annually.[31] Several communities including Berkeley, California and Philadelphia, Pennsylvania, have seen savings from such a program, with no decrease in vehicle availability for employees. Several carsharing pods scattered downtown could allow more households to live without a car knowing that a car is available when needed.
- TDM requirements for new development and employers: As part of a jurisdictions' quasi-judicial "police powers" authority to maintain and enhance the public interest, it can require new development to: a) create transportation demand management plans, b) implement a full range of TDM programs and policies (such as free transit passes, unbundling of parking prices, carsharing, etc.), c) establish and achieve performance measures (participation rates, levels of investment, mode split targets, etc.), d) conduct regular monitoring and reporting on the effectiveness of the TDM plan in meeting the performance measures. The mechanism for implementing these requirements includes "conditions of approval" or a stand-alone development agreement, and jurisdictions are able to assess penalties for non-compliance or non-attainment of the performance measures, just as with any other condition of approval or provision in a stand-alone development agreement. Consideration of a more comprehensive package of TDM requirements as part of the development approval process in Santa Barbara could be initiated to support *Plan Santa Barbara*'s policy goal of reducing the future rate of growth in traffic congestion.
- TDM requirements for existing development and employers: Senate Bill 437 (Lewis) was adopted by the California State Legislature in October, 1995 (Health and Safety Code Section 40717.9). SB 437 declares that public agencies "shall not require an employer to implement an employee trip reduction program unless the program is expressly required by federal law and the elimination of the program will result in federal sanctions or the loss of federal transportation funds." SB 437 was enacted specifically in response to the repeal of the 1990 Amendments to the federal Clean Air Act "employee trip reduction programs", and does not mention the much broader term "transportation demand management." It applies only to this one specific technique of "trip reduction programs", not to all types of TDM policies, programs and requirements. To emphasize this point, SB 437 includes this statement: "*Nothing in this section shall preclude a public agency from regulating indirect sources in any manner that is not specifically prohibited by this section, where otherwise authorized by law.*" The term "indirect source" is not defined in state law but is broadly defined in federal law to mean "a facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution…" Some jurisdictions in California have interpreted SB 437 to mean that only new employers and development, and not existing ones, can be required to implement TDM programs. To the consultant's knowledge, there is no case law or published legal opinion supporting this interpretation. Consideration of incentives for large employers and developments to encourage voluntary participation in the TDM programs of a citywide Transportation Management Association could be initiated as an important first step to support *Plan Santa Barbara*'s policy goal of reducing the future rate of growth in traffic congestion. Consideration of citywide Transportation Management Ordinance that would require large developers and large employers to gradually come into compliance with the TDM requirements of

[31] Source: City of Santa Barbara Department of Public Works Annual Report FY 2006-07.

the ordinance would also be an effective tool for reducing the future rate of growth in traffic congestion in Santa Barbara.

- Currently the city of Santa Barbara doesn't have a transportation impact fee of any kind; such a fee could be imposed to support the policy goals of this project if a) the fee assessment was based on number of auto trips generated and b) the fee revenue was dedicated to multimodal programs and projects that reduce peak hour vehicle trips.
- SBCAG Traffic Solutions' currently ad hoc assistance to cities and developers with TDM planning and implementation could be formalized and made part of its official mission (similar to its "clearinghouse" role in providing TDM assistance to employers in Santa Barbara County).
- School-age children (K-12) ride free on MTD buses and MTD provides supplemental "boost" shuttle circulators directly serving some primary and secondary schools, but opportunities may exist to increase the ability of MTD to provide transportation services to and from school. Many parents instead drive their children, or older students may drive their own cars, causing traffic congestion near schools at the beginning and end of the school day. Another potential strategy with a lower cost would be to focus on increasing the walking and bicycling rates of students who live close enough to school to walk or bike.

9 PERFORMANCE MEASURES AND STREET CLASSIFICATION SYSTEM

9.1 Existing Transportation Performance Measures

9.1.1 Existing City Transportation Performance Measures

According to the city of Santa Barbara's 1998 Circulation Element, traffic impacts for new development and infrastructure projects can be calculated in two different ways. The first method examines traffic impacts by adopted automobile Level of Service (LOS) standards at signalized intersections. Currently, a signalized intersection is considered impacted if it exceeds the City's goal of LOS C, equivalent to a traffic volume to capacity ratio (V/C) of 0.70 to 0.80. The second approach examines signalized intersections for the purposes of environmental assessment under the California Environmental Quality Act (CEQA), which states that a project will impact an intersection if the V/C ratio exceeds 0.77, at which point an environmental impact report must be prepared.

9.1.2 Limitations of Existing City Performance Measures

In addition to defining current performance standards for traffic, the City's Circulation Element simultaneously realizes its shortcomings and questions the sole reliance on automobile LOS as a measure of success of the transportation system. In its "Constraints" section, the Element states that current standards restrict development near intersections that are at or near maximum capacity. These intersections are often near commercial centers or downtowns, which most easily facilitate transit and alternative modes of transportation. By effectively prohibiting moderate or higher-density residential and commercial development in these areas, current performance measures may inadvertently push development to outlying areas where development is not as well-served by transit and walking and bicycling trips are less feasible. The "Constraints" section concludes by stating that sole reliance on automobile LOS standards and mitigating traffic impacts through wider streets or new turn lanes simply isn't feasible or desirable in Santa Barbara. These widening projects compound problems by making roadways less attractive and safe for pedestrians and bicyclists.

9.1.3 Existing County Performance Measures

The county of Santa Barbara standards for determining significant traffic project-level impacts are very similar to those of the City. The County declares that a project will have a substantial impact if an intersection's automobile LOS falls below C. In addition, a project can also have a significant impact if the following criteria (refer to Figure 9-1) are met:

Figure 9-1: County Criteria for Significant Changes in Auto Levels of Service – Project Impacts

Intersection Level of Service (Including Project)	Increase in V/C or Trips Greater Than
LOS A	0.20
LOS B	0.15
LOS C	0.10
LOS D	15 Trips
LOS E	10 Trips
LOS F	5 Trips

9.1.4 Existing Congestion Management Plan Performance Measures

SBCAG's 2003 Congestion Management Plan (CMP) states that per Section 65089(b) (1) (B) of the California statute, the CMA is bound to establish a traffic LOS standard no lower than LOS E. If a segment or intersection has been deemed not in compliance, a deficiency plan must be created to bring the area back up to standard. As such, SBCAG labels intersections and segments falling below LOS C to have significant impacts.

However, the CMP has also included a chapter highlighting its "Transportation System Performance Element." This section does not trigger deficiency plans in the same way as the standard model, but it does prescribe five measures that should be used as guidelines in gauging transportation performance. The CMP readily admits that, "no single performance measure currently in use adequately addresses all aspects of system performance" and in order to address this shortcoming the following measures were included:

- Weighted Arterial Intersection LOS
- Weighted Freeway Interchange LOS
- Weighted Uninterrupted Segment LOS
- Transit Boarding Opportunity
- Regional Bikeway Completion Ratio

No data was available to assess whether these or other performance measures have been implemented.

9.2 Existing City Street Classification System

Chapter 10 of the city of Santa Barbara's 1998 General Plan Circulation Element seeks to create a street classification system that integrates all modes of transportation. The City's previous 1988 Interim Circulation Element used the standard street classification system from the Institute of Transportation Engineers (ITE) that prioritized automobile movement above all other modes. The new Element seeks to remedy this imbalance by creating a system that emphasizes intermodal connections resulting in a City in which, "automobile use is a choice, not a necessity."

In order to address this deficit in the City's existing street classification system, the 1998 Circulation Element proposed a street classification system which deviates from the ITE street categorization (freeway, primary arterial, minor arterial, collector street, local street) and instead focuses on creating streets that are designed to conform to their surrounding land uses. Or, as the Element states, streets will be classified, "based on their purpose and function." The Element outlines four different types of "corridors" distinguished by their functionality. Each of these corridors possesses design features that correspond to the predominant land use present to ensure efficient and equal mobility access:

- Residential
- Commercial
- Multiple/mixed purpose
- Gateway

9.3 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- The primary transportation performance measure in use by the City, the County, and SBCAG for regional facilities is automobile LOS, which focuses on only one mode (the automobile) and only one dimension of the motorists' travel experience (seconds of delay at intersections).
- These performance measures provide no basis for evaluating the performance of other modes, nor do they assess other factors that are an important part of the travel experience (such as safety). In other words, automobile LOS measures one dimension of system "failure" but provides no guidance as to what constitutes success in conformance with the City's multimodal policy goals.
- City and SBCAG policy documents recognize the limitations of automobile LOS, but no data is available to know if any reforms have been implemented; many other US communities (e.g., Gainesville, FL, Baltimore, MD) of all sizes have pursued the implementation of performance measures for multiple modes and multiple dimensions of travel. These performance measures range from converting from LOS measures of "total vehicle throughput" to "total person throughput" measures, or something as simple as setting safety goals on key bicycle and pedestrian corridors (such as a 5% reduction in bicycle collisions per year on the City's core bicycle network).
- The City's current street classification system is

based on traditional functional classification which primarily accounts for daily auto volumes that the street is expected to handle (Average Daily Traffic, or ADT). Other cities, such as Seattle and Denver, have found the reclassification of streets based on the principle that different types of streets have different purposes (and not all streets can serve all modes equally well) to be an effective way to enhance mobility. Such street classification systems are typically informed by both the adjacent land use pattern of each street and its relative importance as part of the primary auto, transit, bike, and pedestrian network. A similar street classification system could be an opportunity for Santa Barbara to help achieve their stated goals of promoting the use of non-drive-alone modes to reduce peak-hour vehicle congestion.

10 PENDING AND PLANNED IMPROVEMENTS

10.1 Measure D Funded Projects[32]

Measure D was passed by the voters of Santa Barbara County in November of 1989 to improve transportation infrastructure in the county. Measure D provides for a one-half cent sales tax increase over a period of twenty years and dedicates these revenues solely to fund transportation projects and programs. Under Measure D, $270 million in sales tax revenues have been collected since April 1990. Sales tax revenues will continue to be collected until the program sunset date in April 2010.

Passage of Measure D by the voters was preceded by approval of the Measure D Expenditure Plan by SBCAG, the county of Santa Barbara and each of the cities. The Measure D Expenditure Plan defined how the sales tax revenues would be distributed. Local agencies receive 70% of the revenues for local street repair funding, 29.5% funds regional highway and transit projects, and the remaining 0.5% is used for specialized transit services.

The funds for regional highway and transit projects to date total $169.9 million. Of this amount, just $1.8 million – or 1% of the total – is devoted to transit, the rest is largely spent on freeway realignments and road widenings. Measure D devotes $4.68 million, or 0.8% of its funding to transit services. These services include on-going inter-regional transit service between Ventura and Santa Barbara counties and intercity service from Lompoc and Santa Maria to Goleta and Santa Barbara. Non-Measure D funds also contribute a substantial amount to various projects.[33]

10.2 Proposed Measure A Funding Program[34]

Measure A (the extension of Measure D which sunsets in April 2010) is a proposed one-half cent sale tax which would provide more than $1 billion in revenues for transportation projects in Santa Barbara County over 30 years. If approved by a two-thirds majority of voters in November 2008, Measure A would relieve traffic congestion and improve safety on U.S. Highway 101 by providing $140 million in matching funds to widen the freeway from two to three lanes south of Santa Barbara.

The Measure A Investment Plan would also provide $455 million each for the North County and South Coast for high priority transportation projects and programs to address the current and future needs of local communities. In both regions, the plan provides funding for:

- Local street improvements such as pothole repairs and synchronized traffic signals.
- Increasing senior and disabled accessibility to public transit.
- Building safer walking and bike routes to schools.
- Providing increased opportunities for carpool and vanpool programs.

The local sales tax revenues would be matched by an estimated $522 million in federal and state gas taxes, developer fees, and other sources. Of the total $1.05 billion, 28.19% is designated to be spent on alternative modes of transportation—a significant increase from multimodal funding under Measure D. It should be noted that there is a wide discrepancy in the amount of alternative transportation funding between North and South Counties, 17.15% and 47.92% respectively, of the $455 million allotted for each.

Programs and projects contained in the Measure D In-

[32] Source: SBCAG Measure D website (Accessed at www.sbcag.org/PDFs/measureD/Measure_D_Overview.pdf in May 2008).

[33] Source: SBCAG Transportation Funding Guide for Santa Barbara County (Accessed at: http://www.sbcag.org/PDFs/measuredrenewal/Handouts/August/Transportation%20Funding%20Guide.pdf in June 2008)

[34] Source: SBCAG Measure A website (Accessed at www.measurea2008.org/PDFs/Measure%20A%20Investment%20Plan.pdf in May 2008).

vestment Plan that are relevant to this report are summarized below:

- North Coast Programs:
- Specialized Transit for Elderly and Disabled: $4,500,000
- Safe Routes to School, Bicycle & Pedestrian Program: $3,000,000
- Carpool and Vanpool Program: $2,000,000
- Interregional Transit Program: $22,500,000
- Local Street and Transportation Improvements: $341,000,000

Revenues would be allocated to cities and the County based on their proportionate share of the North County population after each jurisdiction has received a $100,000 annual base allocation. Figure 10-1 is an estimate of how much each jurisdiction can expect to receive for local street and transportation improvements.

Figure 10-1: Potential Allocation of Measure A Funds to North Coast Jurisdictions

North Coast Jurisdictions	Net 30 Year Allocation	Alternative Transportation
Buellton	$9,928,000	5%
Guadalupe	$12,504,000	5%
Lompoc	$65,421,000	15%
Santa Maria	$137,205,000	15%
Solvang	$11,164,000	15%
County of Santa Barbara (unincorporated North County)	$104,778,000	10%
North Coast Total	**$341,000,000**	**12.81%**

Each jurisdiction must spend a minimum percentage of their funds on eligible alternative transportation projects according to the percentages identified in the table above. This requirement must be met by the fifth year of the program, and every fifth year thereafter.

- South Coast Programs:
- Safe Routes to School Program: $13,000,000
- Specialized Transit for Elderly and Disabled: $6,000,000
- Carpool and Vanpool Program: $7,000,000
- South Coast Transit Operations Program: $58,000,000 for costs related to operating general public bus services, planning, marketing and promotions directly allocated to Santa Barbara MTD.
- South Coast Transit Capital Program: $27,000,000 transit capital projects directly allocated to Santa Barbara MTD for general public bus services
- Interregional Transit Program: $25,350,000
- Regional Bicycle and Pedestrian Program: $13,000,000
- Commuter & Passenger Rail Planning & Service Improvements: $25,000,000
- Local Street & Transportation Improvements $273,150,000

Revenues would be allocated to cities and the County based on their proportionate share of the South Coast population after each jurisdiction has received a $100,000 annual base allocation. Figure 10-2 shows the net allocation that each jurisdiction would receive for local street and transportation improvements.

Figure 10-2: Potential Allocation of Measure A Funds to South Coast Jurisdictions

South Coast Jurisdictions	Net 30 Year Allocation	Percent of Gross Allocation to MTD
Carpinteria	$22,777,000	7.96%
Goleta	$42,913,000	13.18%
Santa Barbara	$104,054,000	26.05%
County of Santa Barbara (unincorporated South Coast)	$102,906,000	11.12%
South Coast Total	**$272,650,000**	**16.88%**

Each jurisdiction must contribute a percentage of their gross allocation, specified in the table above, to the South Coast Transit Operations Program which would directly allocate funds to the Santa Barbara MTD. Each South Coast city and the county of Santa Barbara must expend a minimum of 10% of their Net 30 Year Allocation on eligible alternative transportation projects. This requirement must be met by the fifth year of the program, and every fifth year thereafter.

For both the North County and the South Coast, use of potential Measure A Local Street and Transportation Improvement program funds for multimodal transportation projects would be governed by the following guidelines:

- Local Street and Transportation Improvement funding may be expended by city councils and the board of supervisors on the following uses to meet the prescribed alternative modes percentage.
- Maintenance, repair, construction and improvement of bicycle and pedestrian facilities, excluding maintenance of Class 2 bikeway facilities.
- Safe Routes to School improvements.
- Reduced transit fares for seniors and the disabled.
- Bus and rail transit services and facilities.
- Education and incentives designed to reduce single occupant auto trips.

- The County of Santa Barbara may count expenditures on Class 2 bikeway maintenance toward its alternative transportation percentage but these expenditures may not exceed 50% of the County's prescribed percentage.

10.3 Other Planned Improvements[35]

10.3.1 Transit Improvements

10.3.1.1 MTD Fixed-Route Service

MTD has experienced strong ridership growth recently, to the extent that passengers must sometimes wait for a subsequent bus during times of peak demand. In 2007, MTD introduced additional buses on several high-demand routes and a new route called the Mesa Loop (refer to Figure 4-4). Ridership is expected to remain strong and continue to grow over time, and MTD intends to pursue additional strategies to increase transit service to meet this demand. The following services were programmed in the MTD's most recent Short Range Transit Policies (SRTP) for implementation between FY 2006 and FY 2010:

- Calle Real/Old Town Shuttle (in Goleta) – in service as of June 2008
- Isla Vista/UCSB Shuttle (in unincorporated county) – not yet in service

The SRTP also includes a list of potential additional enhancements to service if additional funding were secured.[36]

10.3.1.2 Regional Rail

Travel demand is high along the 101 corridor in Santa Barbara and is expected to grow in the future. Demand is especially strong for peak hour commute trips from Ventura to the city of Santa Barbara, due to the concentration of employment in the city of Santa Barbara and relatively lower cost of living in Ventura County. Travel demand between Santa Barbara and Los Angeles is also strong, and expected to grow over time.

In addition to the commuter bus services provided by Coastal Express, several planning processes have explored opportunities to improve rail service along this corridor, including the 2005 Metropolitan Transportation Plan and the LOSSAN North Corridor Strategic Plan. Increased service during peak hour commute times is an especially important goal.

10.3.2 Bicycle Facilities Improvements

The city of Santa Barbara's 2005 Conditions, Trends, and Issues (CTI) Report identified the following planned and proposed improvements:

- *Gutierrez/Haley Streets Bike Lanes:* Add bicycle lanes to each street on this one way couplet.
- *Bicycle Improvement Program:* Ongoing improvements including bicycle parking, signage, and a maintenance hotline; additionally will fund the Garden Street bicycle lanes through the U.S. Highway 101 interchange (underway).
- *Mission Interchange Bicycle Improvements:* Bicycle lanes from Modoc Road to Castillo Street through the Mission Interchange (portions currently under construction).
- Capital Improvements List*:*

  Multi-Purpose Path Next to Rails Plan: Investigate use of Union Pacific right-of-way for a multi-purpose pathway/bike route connecting Atascadero Bike Path to downtown.

  Citywide Corridor Improvement Plan: A citywide inventory and review of corridors requiring improvements.

  Westside Bikeway Plan: Develop a plan to improve bike connections to, from, and within the Westside.

10.3.3 Pedestrian Facilities Improvements

The city of Santa Barbara's "Sidewalk Missing Links" program has identified missing sidewalks throughout the city and uses funds from Measure D (sales tax) as well as state and Federal grants to fund improvements to the pedestrian network. The Sidewalk Missing Links program undertakes about $1 million in sidewalk improvements annually. The city of Santa Barbara's 2005 CTI Report identified the following planned and proposed improvements:

- *Citywide Corridor Improvement Plan:* A citywide inventory and review of corridors requiring improvements.
- *Mission Interchange Pedestrian Improvements:* Improve pedestrian conditions on Mission Street between Modoc Road and Castillo Street (portions currently under construction).

[35] Sources for this section include: MTD Short-Range Transit Plan FY 2006-10 (May 2005); SBCAG Metropolitan Transportation Plan (2005); Caltrans/LOSAAN Rail Corridor Agency's North Corridor Strategic Plan (October 2007); and City of Santa Barbara's Transportation Conditions, Trends, and Issues (CTI) Report (2005).

[36] Source: Table 18 on page 57 of MTD Short-Range Transit Plan FY 2006-10 (May 2005).

- *Carrillo Street Pedestrian Walkway:* Construct all missing sidewalk links on Carrillo Street between San Andres and Cliff Drive (portions currently under construction).
- *Cabrillo Boulevard Sidewalk Improvements:* Repair sidewalks and make pedestrian improvements along Cabrillo Boulevard from State Street to Milpas Street and in front of the Cabrillo Arts Center.
- *Loma Alta Drive Sidewalk:* Construct sidewalk on Loma Alta Drive from Canon Perdido Street to Cornel Road on the downhill side of the road, Including street lights and retaining walls (under environmental review).
- *Ortega Corridor Improvements:* Construct enhanced street crossings, landscape, street furniture and lighting between Chapala Street and the Ortega Pedestrian Overcrossing.
- *Anapamu Corridor Improvements:* Construct enhanced street crossings, landscape, street furniture and lighting between Chapala Street and the Anapamu Pedestrian Overcrossing.
- *Alameda Padre Serra Sidewalk Feasibility Plan:* Conduct a pedestrian study and prepare a cost estimate to construct a sidewalk on Alameda Padre Serra between Los Olivos Street and Salinas Street.

11 TRANSPORTATION FUNDING SOURCES

In addition to Measure D regional sales tax revenues distributed by SBCAG, Federal transit funds allocated directly to transit operators, and ad hoc grant awards, the transportation improvements in Santa Barbara are generally funded via the following sources:

- Local funding sources:
  - Utility Users' Tax. A specific portion of the utility users' tax is dedicated to transportation.
  - General Fund. The Streets and Transportation Department is funded from the General Fund, and the Streets Capital Program receives a pre-determined portion of General Fund revenues. The largest revenue sources for the General Fund are Sales Tax, Transient Occupancy Tax, Utility Users' Tax, and Property Tax.
  - Downtown Parking Fund. This enterprise fund collects revenues and manages parking in the Downtown area. It is administered by a division of the Public Works Department, manages downtown parking supply and "looks for innovative and practical ways to clear congestion, air pollution and a better quality of life in the downtown district." In addition to constructing and maintaining parking facilities, the Fund also supports efforts to encourage commuters to choose alternative transportation. It funds a Crosstown Shuttle and free bus passes for qualifying downtown workers.
  - Downtown Parking & Business Improvement Area District. An annual assessment on downtown properties (based on proximity to public parking lots and garages) is used to subsidize 75-minutes of free parking in downtown parking facilities.
- State funding sources:
  - Gas Tax revenues from the State, which are distributed on a per capita basis, are accounted for in the Gas Tax Fund and then transferred to the General Fund for use in funding street operations and maintenance. These are legally restricted to use in the City's streets program.
  - Traffic Safety Fund. Pursuant to State law, all fines and forfeitures received from citations issued by City officers for vehicle code violations must be deposited into a special Traffic Safety Fund and must be used for traffic control, law enforcement, accident prevention, etc. Once recorded in this Fund, they are transferred to the General fund and expended by Public Works for Traffic Signals.
  - Bicycle Transportation Account. Caltrans awards about five million dollars in grants annually to eligible bicycle facility projects that are supported by a Bikeway Master Plan.
- Federal funding sources:
  - Transportation Development Act (TDA) Funds. The City receives TDA (Article 3) funds annually for restricted use in support of alternative transportation, including sidewalks and bikeways.

APPENDIX A: POLICY FRAMEWORK

This section summarizes the two key policy documents affecting transportation and parking conditions in the City of Santa Barbara and surrounding region that were not specifically summarized elsewhere in this report. These two key policy documents are the City's General Plan Circulation Element and SBCAG's Metropolitan Transportation Plan.

A.1 City of Santa Barbara General Plan Circulation Element

In California, every City and County is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community. Implicit in their name, General Plans are usually more general in nature, articulating a broad vision of the future while leaving specific implementation details to be developed in later planning processes and documents (e.g. zoning codes, municipal codes, neighborhood plans, corridors plans, and the like).

General Plans consist of a number of chapters called "Elements" that cover a variety of issues such as land use, housing, noise pollution, air quality, etc. Transportation and parking is addressed in the Circulation Element. The City of Santa Barbara's last General Plan was adopted in 1998 and the Circulation Element lays out a comprehensive vision of Santa Barbara's desired transportation system. The City's goals and policies that are particularly relevant to this report are listed below.

A.1.1 Goals & Policies

- Goal 1: Provide a Transportation System that Supports Economic Vitality
  - Policy 1.1.1: Optimize access and parking for customers in business areas by implementing policies of the Circulation Element aimed at reducing dependence upon the automobile, and improving and increasing pedestrian, bicycle use, and transit use.
  - Policy 1.1.3: Enhance alternative transportation services and infrastructure access between residential, recreational, educational, institutional and commercial areas.
- Goal 2: Strive to Achieve Equality of Choice Among Modes
  - Policy 2.1.4: Work with outside agencies, employees, and employers to optimize the use of alternative travel modes to reduce the use of the automobile, especially during peak periods of congestion.
  - Policy 2.1.6: Manage the parking supply and work to increase the use of alternative forms of travel to increase the availability of parking and access to the Downtown area.
  - Policy 2.1.10: Develop urban design standards that will facilitate the use of alternative means of travel and reduce dependency upon the automobile. The standards shall address linkages throughout the City, such as walkways, bikepaths, and transit.
- Goal 3: Increase the Availability and Use of Transit
  - Policy 3.1: The City shall promote the development, improvement, expansion, and increased ridership of transit within the City, including the development of new forms of transit as they become available.
  - Policy 3.3: The City shall support increases in regional transit services.
  - Policy 3.4: The City shall work to improve and expand intermodal connections.
- Goal 4: Increase Bicycling as a Transportation Mode
  - Policy 4.2: The City shall work to expand, enhance, and maintain the system of bikeways to serve current community needs and to develop increased ridership for bicycle transportation and recreation.
  - Policy 4.4: The City shall continue to use parking restrictions to create peak commute hour capacity for bicycle traffic. Public hearings shall be held prior to the creation of new parking restrictions.
  - Policy 4.5: The City shall actively promote the safe use of bicycles as an efficient and affordable mode of transportation.
- Goal 5: Increase Walking and Other Paths of Travel
  - Policy 5.1: The City shall create an integrated pedestrian system within and between City neighborhoods, schools, recreational areas, commercial areas and places of interest.
  - Policy 5.2: The City shall link pedestrian paths with other alternative modes of transportation.
  - Policy 5.5: The City shall create and foster a pedestrian friendly environment through

physical and cultural improvements and amenities.

- Goal 6: Reduce the Use of the Automobile for Drive-Alone Trips
  - Policy 6.1: The City shall continue to support efforts to expand Transportation Demand Management Programs.
  - Policy 6.2: The City shall set an example as a model employer to reduce the use of the single occupancy vehicle.
  - Policy 6.3: The City shall support and promote regional programs that reduce the use of the single occupancy vehicle.
- Goal 7: Increase Access by Optimizing Parking Citywide
  - Policy 7.2: The City shall improve ways to utilize existing parking and create new parking opportunities through partnerships and cooperation.
  - Policy 7.3: The City shall continue to operate a Residential Parking Permit Program.
  - Policy 7.4: The City shall update its Parking Requirements and Design Standards to optimize its parking resources and to encourage increased use of alternative transportation.
- Goal 8: Increase Parking Availability and Access for Downtown Customers
  - Policy 8.2: The City shall manage the Downtown parking supply to reduce the need for employee parking while increasing the availability of customer parking and working with the County of Santa Barbara to address parking needs.
  - Policy 8.5: The City shall promote/facilitate the development of housing to decrease the need for parking through an increased walking/biking population that lives, works, and shops in the Downtown.
- Goal 9: Develop Special Policies Related to Transportation and Parking in the Coastal Zone
  - Policy 9.1: The City shall encourage use of alternative modes of transportation, especially non-motorized options, in and around the Coastal Zone.
  - Policy 9.3: The City shall coordinate parking lot access and alternative modes of transportation.

A.2 SBCAG Metropolitan Transportation Plan

Many of the issues that face local governments and the people they serve, such as traffic, housing, air quality, and growth, extend beyond jurisdictional boundaries. The Santa Barbara County Association of Governments (SBCAG) is an association of city and county governments in Santa Barbara County that provides a forum for regional collaboration and cooperation on problems that impact multiple communities and jurisdictions in Santa Barbara County. A particular focus of SBCAG's work is transportation; as such SBCAG plays several regional roles relevant to this report:

- Metropolitan Planning Organization (MPO): MPOs are responsible for regional transportation planning and programming activities required under federal law. This includes development of long range transportation plans and multi-year funding programs, and the selection and approval of transportation projects using federal funds.
- Regional Transportation Planning Agency (RTPA): RTPAs are the multi-modal transportation planning, programming, and funding agency required by state statutes. This includes the annual allocation of state Transportation Development Act (TDA) funds.
- Congestion Management Agency (CMA): CMAs develop and implement the county-wide Congestion Management Program (CMP). A CMP is required of all urban counties in California to evaluate the transportation impacts of local land use decisions and coordinate regional solutions.
- Local Transportation Authority (LTA): SBCAG is the administrator of a ½ cent county-wide sales tax authorized by voter approval in 1989 (Proposition D) and up for reauthorization in November of 2008 (Proposition A).
- Traffic Solutions Program: SBCAG manages and funds Traffic Solutions, a county-wide Transportation Demand Management (TDM) program.

In its role as the RTPA for Santa Barbara County region, SBCAG is tasked with developing a Regional Transportation Plan, or RTP, laying out regional transportation goals and priorities. SBCAG's most recent RTP, the 2005 Metropolitan Transportation Plan, lists the following goals, policies, and objectives relevant to this report.

A.2.1 Goals

- Provide a comprehensive multimodal transportation system of facilities and services that is balanced, coordinated, safe, cost effective, and environmentally sound and that meets the public's need for the movement of people, information,

goods, and services that is consistent with the social, economic, and environmental goals and policies of the region.

- Preserve and maintain the existing transportation system, emphasizing safety and efficiency.
- Promote alternative forms of transportation to reduce traffic congestion and air pollution.
- Make the most efficient use of limited transportation funds.
- Enhance the movement of goods and services within the region.
- Encourage land use and growth patterns that enhance the livability of our communities for current and future generations.

A.2.2 Policies and Objectives

A.2.2.1 Regional Policies for System Integration

- Policy 1. The RTP shall provide for a coordinated multimodal system designed to serve the travel requirements of the region and should, where feasible, provide the citizens of individual communities with a realistic choice of travel modes.
- Policy 2. The planning, construction, and operation of transportation facilities and of the system as a whole shall:
  - Be coordinated with land use planning
  - Be consistent with other regional policies
  - Enhance access, circulation, and safety (including seismic considerations)
  - Minimize social, economic, and environmental impacts
  - Be consistent with applicable federal, state and local energy conservation programs, goals and objectives
  - Preserve existing investments in the system by emphasizing life cycle cost principles in investment decisions in order to reduce annualized capital and maintenance costs of transportation facilities
  - Be consistent with the approved California Transportation Plan
  - Give special attention to the needs of elderly and disabled individuals for improved transportation accessibility and removal of physical barriers, including provisions required under the 1990 Americans with Disabilities Act (ADA)
  - Facilitate freight and goods movement
  - Provide for improved ground access to the airports and rail terminals in the region
  - Be compatible with the surrounding area
  - Encourage private sector participation where feasible
- Policy 3. The RTP shall encourage the completion of emergency preparedness plans that address the transportation needs of the elderly and/or disabled members of the population.
- Objective 4.1 Encourage jurisdictions and transit agencies to secure private funding to subsidize transportation improvements in exchange for advertising on transit vehicles, bus shelters and benches, and bicycle maps.
- Objective 4.2 Encourage the coordination of transportation services provided by various community and human service agencies to maximize vehicle use, improve efficiency, and increase the level of service provided where needed, when resources are available.
- Policy 5. Air Quality**.** The RTP shall be consistent with the air quality goals of the region.
  - *Objective 5.2* The RTP shall promote the use of alternative fuels and vehicle fleet modifications to zero/low emission alternative fuel vehicles; improved vehicle efficiency; and, the application of advanced transportation and energy technologies to reduce vehicular emissions and energy consumption.
- Policy 6. Land Use. The RTP shall emphasize the importance of land use decisions on the transportation system and include recommendations that local agencies:
  - Objective 6.1 Make land use decisions that adequately address necessary regional transportation issues and adopt improvement proposals that are consistent with the RTP and local land use policies.
  - Objective 6.2 Require mitigation of the traffic impacts of new land development through on-site improvements for all modes of transportation, contribution to or construction of offsite improvements, provision of facilities for all modes of transportation, and incentives to encourage the use of alternative transportation modes.
  - Objective 6.3 Implement the Jobs/Housing Policy recommendations in the region's Congestion Management Program and Jobs Housing Study.
- Policy 7. Transportation System Management (TSM) / Transportation Demand Management (TDM). Increase transportation system efficiency, improve mobility, reduce travel demand and provide for improved air quality through the imple-

mentation of system management and demand management strategies and Intelligent Transportation System (ITS) applications.

- Policy 7.1. The RTP shall encourage alternatives to the automobile and increase the efficiency of automobile usage through inclusion of operational improvements (e.g., fuel-efficient signal timing, left turn lane channelization, ramp metering for Route 101, etc.); and the Transportation Demand Management (TDM) requirements of the region's CMP and the 1994 and 1998 Clean Air Plans.
- Policy 7.2. The RTP will support the maintenance and expansion of the Traffic Solutions TDM programs budget.
- Objective 7.2 SBCAG's Traffic Solutions staff shall work with employers to encourage commuting during off-peak hours or by a travel mode other than the single occupant auto, increase educational marketing efforts, including TV and radio public service announcements concerning bicycling safety, commuting tips and Traffic Solutions services, expand outreach and contacts with companies in Santa Barbara County, and expand public outreach on alternative forms of transportation (e.g., APCD's [Air Pollution Control District] "Take a vacation from your car" program). Traffic Solutions shall also identify/implement new and innovative TDM programs, such as start-up subsidies for vanpools, elementary school education programs and regional bus pass programs.

- Policy 8. Intelligent Transportation Systems. SBCAG shall promote transportation strategies that encourage the application of telecommunications technologies to improve transportation.
  - *Objective 8.1* Participate in implementing the Central Coast Intelligent Transportation Systems Strategic Deployment Plan.
  - *Objective 8.2* Encourage acceptance of the regional architecture developed in the ITS Deployment Plan as the common structure for development of ITS throughout our region.
  - Objective 8.3 Work with Caltrans, CHP, local agencies and transit providers to maintain and enhance the regional ITS architecture.
  - Objective 8.4 The RTP shall contain an Intelligent Transportation System (ITS) component that includes telecommuting, Smart Call boxes, changeable message signs, and other applications of information technology.
- Policy 10. Environmental Justice. Ensure compliance with the DOT and FTA/FHWA environmental justice policy.
  - Objective 10.3 Analyze the impacts of the RTP on accessibility and mobility of minority and low-income populations.
  - Objective 10.4 Identify the distribution of RTP environmental impacts (noise, traffic congestion, air quality) in relation to the location of minority and low-income populations.
  - Objective 10.5 Take steps to propose mitigation measures or consider alternative approaches when disproportionately high and adverse impacts on minority or low-income populations are identified.
  - Objective 10.6 Continue to evaluate and respond as necessary to environmental justice issues that arise during the implementation of regional plans.

A.2.2.2 Multi Modal Policies and Objectives

Bicycling

- Policy 11. The RTP shall promote bicycling as a means to decrease auto-use, air pollution, and traffic congestion.
  - Objective 11.1 Promote the development of the regional bikeway system adopted in SBCAG's Regional Bikeway Study, with emphasis on linking gaps in the bikeway system to provide for regional connectivity.
  - Objective 11.2 Update and upgrade SBCAG's Regional Bikeway Study to a full plan status, including a chapter for each jurisdiction consistent with the state Bicycle Lane Account requirements to ensure their eligibility for Bicycle Lane Account funding;
  - Objective 11.3 Encourage local jurisdictions to adopt a capital improvement program for bikeways with a funding commitment policy to support the program.
  - Objective 11.4 Encourage the jurisdictions to include in their capital programs projects to construct commuter bikeways (i.e., between residential areas and schools, and residential areas and business areas).
  - Objective 11.5 Encourage local agencies to use the policies and standards adopted in the Regional Bikeway Study in completing future bikeways (use of a consistent set of policies and standards regionwide will reduce inter-jurisdictional issues in developing bicycle facilities and increase the safety of the facilities).

- Objective 11.6 Encourage the implementation of signal-actuating mechanisms for bicycles at all major signalized intersections.
- Objective 11.7 Encourage the implementation of bicycle safety and bicycle education programs.
- Objective 11.8 Encourage local jurisdictions to provide for Class II bike lanes as part of roadway improvement projects where feasible.

- Policy 12. The RTP shall encourage the jurisdictions to program funds to improve the safety of bikeways, including projects to mitigate identified bicycle/vehicle conflict problem areas.
- Policy 13. The following SBCAG Bicycle Funding Policies (approved 8/20/98) shall guide SBCAG programming decisions for bicycle facilities:
  - Policy 13.1. Determine that projects supportive of the SBCAG Regional Bikeway Study will be given priority for the use of bikeway funds.
  - Policy 13.2. Establish goal to program at least 10% of TEA 21 flexible funds from the Regional STP, CMAQ and TEA funds for these bikeway projects.

Transit

- Policy 14. The RTP shall promote the expansion of public transit services within the county to meet the mobility needs of the residents for access to essential services, educational, recreational and employment opportunities as a means to reduce air pollution, traffic congestion, and parking problems.
  - Objective 14.1 Include in the RTP Action Element projects to implement improvements identified in the transit agencies' Short Range Transit Plans and Transit Development Plans to meet existing and forecast ridership needs over the short term planning period, as well as those identified to meet forecast ridership needs consistent with projected population increases over the twenty year RTP planning period.
  - Objective 14.2 Incorporate projects in the RTP Action Element that foster the use of alternative fuels and advanced technologies to reduce vehicle emissions.
  - Objective 14.3 Include projects in the RTP Action Element to implement improvements identified through the annual Unmet Transit Needs public hearings.
  - Objective 14.4 Encourage the adoption of transit oriented standards and criteria to be used by local jurisdictions in their land use approval process.
  - Objective 14.5 Ensure that transit projects included in the Action Element are consistent with the provisions of the ADA of 1990.
  - Objective 14.6 Encourage intermodality by including projects in the Action Element such as bike lockers at park and ride lots and transit facilities and bike racks on buses.
  - Objective 14.7 Support federal and state transportation legislation that continues funding support for transit, particularly for operating expenses commensurate with transit's expanded role in addressing congestion and improving air quality.

Pedestrian Facilities

- Policy 15. The RTP shall promote the provision of pedestrian facilities to meet the mobility needs of the residents for access, and recommend the design/safety objectives below be followed in planning and implementing new pedestrian facilities.
  - Objective 15.1 New pedestrian accessways and revisions to existing accessways over or under Route 101 where possible should include provisions for bicycles.
  - Objective 15.2 Pedestrian accessways over or under Route 101, whether new or revised, should be designed to provide accessible use by the disabled, consistent with the Americans with Disabilities Act (ADA) requirements.
  - Objective 15.3 Pedestrian accessways must include lighting to encourage use; existing underpasses are dark, and should be modified.
  - Objective 15.4 Design of pedestrian facilities should include separation of pedestrians from traffic through elevated walkways or other means of separation; where a devil strip does not separate sidewalks, sidewalks should be wide enough to provide reasonable separation from traffic.

Street and Road System

- Policy 16. For highways, streets and roads, the RTP shall give the highest priority to upgrading existing facilities to eliminate or mitigate high accident situations or congestion, based on the Level

of Service standards of the Congestion Management Program (CMP).

- Policy 16.1 Due consideration should be given to examining alternative forms of transportation in addressing congestion problems.
- Policy 16.3 Due to overriding cost and environmental considerations, Route l54 shall not be expanded to provide more than two through lanes, except that passing lanes should be added where appropriate.

Rail

- Policy 17. The RTP shall provide for increased availability of intercity passenger rail service as a mode of public transportation to serve the region.
  - Policy 17.1 SBCAG shall support federal and state policies and programs that maintain or expand the level of passenger rail service, the acquisition of rolling stock, and the rehabilitation/upgrade of railways.
  - Policy 17.2 SBCAG shall support AMTRAK in the process of increasing rail passenger train service to and within Santa Barbara.
  - Policy 17.3 SBCAG shall monitor the need for passenger rail commute service.

Airports

- Objective 16.2 The RTP shall provide for improved multimodal ground access to the airports in the county where appropriate.

Performance Measures/Monitoring

- Policy 19. Performance Measures. To ensure the RTP achieves the goals and policies SBCAG shall implement a transportation system performance monitoring program (TSPM) that assesses by mode and as appropriate, the nine desired outcomes of system performance, namely, mobility, sustainability, safety, reliability, economic well-being, equity, cost-effectiveness and environmental quality. The RTP's TSPM program is described in Chapter 7.

APPENDIX I-2

MODEL DEVELOPMENT REPORT

Model Development Report

City of Santa Barbara Travel Demand Forecasting Model

Submitted by:

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February 25, 2009

FEHR & PEERS
TRANSPORTATION CONSULTANTS

CITY OF SANTA BARBARA TRAVEL DEMAND FORECASTING MODEL
MODEL DEVELOPMENT REPORT

February 25, 2009

Submitted to:

AMEC

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Ref: LA08-2253

TABLE OF CONTENTS

1. INTRODUCTION 1

Background 1

Study Area and Roadway Classification 1

General Discussion of the TDF Model 3

Organization of this Report 4

2. COMPONENTS OF THE MODEL 6

File and Folder Structure 6

Overall Model Components 9

3. SUMMARY OF THE INPUT DATA 14

Data Collection 14

Traffic Analysis Zone (TAZ) System 14

Land Use Data 15

Special Generators 16

Roadway Network 17

4. DESCRIPTION OF THE MODEL CALIBRATION PROCESS 18

Trip Generation rates 18

Trip Distribution (Gravity Model) 32

Trip Assignment 36

5. MODEL RESULTS AND DAILY VALIDATION 39

Land Use 39

Trip Generation 39

Trip Assignment 40

Dynamic Validation 48

6. PEAK HOUR MODEL SPECIFICATIONS 56

7. PEAK HOUR MODEL VALIDATION RESULTS 57

APPENDICES

Appendix A: Traffic Analysis Zone (TAZ) Boundary Map

Appendix B: Base Year Land Use Data by TAZ

Appendix C: Roadway Network Information

Appendix D: City of Santa Barbara TDF Model Trip Generation Summary

Appendix E: City of Santa Barbara TDF Model Friction Factor Curves

Appendix F: Validation Summary Reports

Appendix G: Santa Barbara Model Resource File

LIST OF FIGURES

Figure 1 Model Area 2
Figure 2 Model User Interface 6
Figure 3 File and Folder Structure 7
Figure 4 Components of Santa Barbara Travel Demand Model 10
Figure 5 Area Types 20
Figure 6 External Station Weights 35
Figure 7 Base Year (2008) Roadway Functional Class 37
Figure 8 Base Year (2008) Roadway Total Through Lanes 38
Figure 9 Daily Validation Locations 41
Figure 10 Daily Screenline Locations 42
Figure 11 2008 Model Average Daily Traffic Volumes 43
Figure 12 Daily Model Validation by Location 45
Figure 13 Daily Model Validation Scatter Plot 46
Figure 14 TAZs Used for Dynamic Validation 49
Figure 15 Peak Hour Validation Locations 59
Figure 16 Peak Hour Screenline Locations 60
Figure 17 AM Model Volumes 61
Figure 18 PM Model Volumes 62
Figure 19 AM Peak Hour Model Validation by Location 63
Figure 20 AM Peak Hour Model Validation Scatter Plot 64
Figure 21 PM Peak Hour Model Validation by Location 65
Figure 22 PM Peak Hour Model Validation Scatter Plot 66

LIST OF TABLES

Table 1 External Gateways 15
Table 2 Model Land Use Categories 15
Table 3 Typical Roadway Speeds and Capacities 17
Table 4 Daily Vehicle Trip Generation Rate Comparison 21
Table 5-1 Percent of Vehicle Trips by Trip Purpose – Area Type 1 24
Table 5-2 Percent of Vehicle Trips by Trip Purpose – Area Type 2 26
Table 5-3 Percent of Vehicle Trips by Trip Purpose – Area Type 3 28
Table 5-4 Percent of Vehicle Trips by Trip Purpose – Area Type 4 30
Table 6 Trip Generation Production and Attraction Summary 32
Table 7 Work Locations for Santa Barbara Residents 33
Table 8 Residential Locations for Santa Barbara Employees 33
Table 9 Percent of Trips by Purpose that are Internal/External 33
Table 10 Matrix of Daily Through (EE) Trips 34
Table 11 Trip Production To Attraction Ratios by Purpose 39
Table 12 Results of Daily Model Validation 44
Table 13 Results of Daily Model Validation by Volume Range 47
Table 14 Results of Dynamic Validation Tests 51
Table 15 Dynamic Validation Network Test-Remove US 101 53
Table 16 Dynamic Validation Network Test Add One Lane 54
Table 17 Dynamic Validation Network Test Remove One Lane 55
Table 18 Peak Hour Factor Comparison-NCHRP 365 56
Table 19 Results of Peak Hour Model Validation 57
Table 20 Results of Peak Hour Model Validation by Volume Range 58

1. INTRODUCTION

BACKGROUND

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The purpose of this project is to develop the City model in the TransCAD Transportation Geographic Information System (GIS) software, create the key model inputs such as land use, road network and trip generation parameters, and validate the model to current (2008) conditions. The TDF model will be used in the update of the City's General Plan and could be used to generate traffic volume forecasts and other travel demand data for various planning and engineering studies.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting data represent travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

This report describes the model development process, including the sources of data used to develop key model inputs, and presents model validation results, which measure the model's accuracy. The purpose of this report is to provide a comprehensive source of data about the model to technical professionals, such as City Staff, and other interested parties.

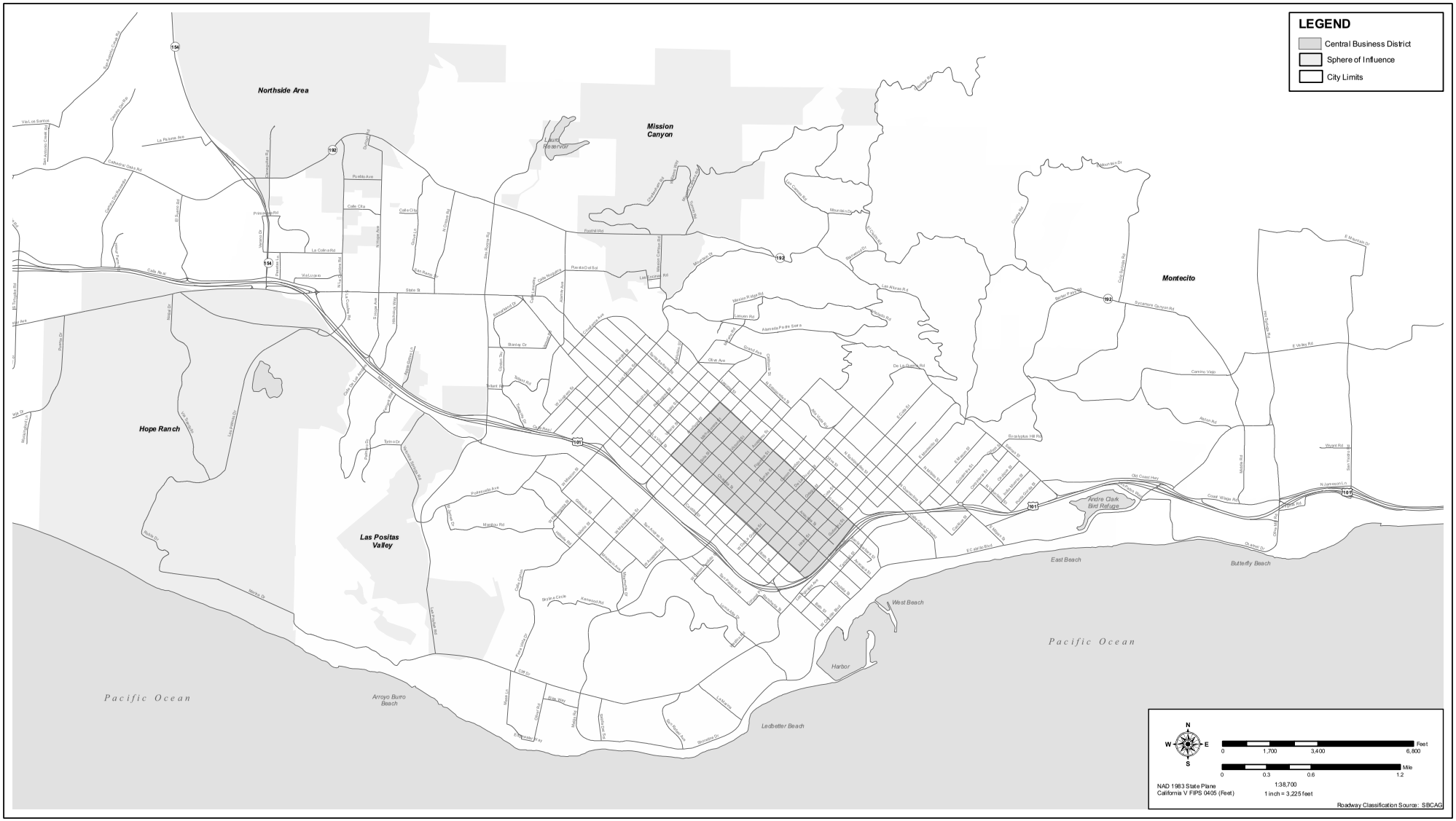
STUDY AREA AND ROADWAY CLASSIFICATION

Figure 1 shows the study area for the City travel demand forecasting model, which includes all freeways, State Routes (SRs), arterials, collector roadways, and certain key local roads. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas which are in or near the City's Sphere of Influence. The study area contains all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent which interact frequently with the City and its Sphere of Influence.

The roads shown in Figure 1 are classified in four major categories and form the primary road network that is represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside of the City. The four major road categories are described below.

<u>*Freeways*</u>: Freeways are high-capacity facilities that primarily serve long-distance travel. Access is limited to interchanges that are typically spaced at least one mile apart. US-101 is the freeway which runs directly through the Santa Barbara model area. SR 217, which is west of the study area, connects UCSB and the Santa Barbara Airport to US-101.

<u>*Highways*</u>: Roadways designated as highways are typically State highways that are not limited-access freeways. These facilities serve travel between Santa Barbara and neighboring cities. The primary highway in Santa Barbara is SR 154. SR 192 runs generally parallel to US-101 along the foothills north of the City.



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA STUDY AREA
FIGURE 1

Arterials: Roadway segments classified as arterials are major roads that provide connections within the City, between the City and neighboring areas, or through the City (cut-through traffic). Arterials in Santa Barbara typically have two lanes in each direction, with travel speeds of 35 miles per hour (mph). Arterials are further classified as Major or Minor. Section 3 contains details on the distinction between these classes.

Collectors: Collectors are facilities that connect local streets to the arterial and highway system, and may also provide direct access to some local land uses. Collectors typically have one lane in each direction, with speeds of around 25-30 mph.

GENERAL DISCUSSION OF THE TDF MODEL

This section summarizes the answers to commonly asked questions related to TDF models and how the City can use a TDF model.

What is a TDF Model?

A TDF model is a computer program that simulates traffic levels and patterns for a specific geographic area. The program consists of input files that summarize the area's land uses, street network, travel characteristics, and other key factors. Using this data, the model performs a series of calculations to determine the amount of trips generated, where each trip begins and ends, and the route taken by the trip. The model's output includes projections of traffic volumes on major roads, and peak hour turning movements at certain key intersections.

How is a TDF Model Useful?

The City TDF model will be a valuable tool for the preparation of long-range transportation planning studies, such as the *Plan Santa Barbara* General Plan Update. The travel model will be used to estimate the average daily and peak hour traffic volumes on the major roads in response to future growth assumptions, and form a consistent basis by which to analyze the different potential land use scenarios. Additionally, using these traffic projections, transportation improvements will be identified to accommodate the changing traffic patterns associated with the general plan's preferred land use alternative.

How do we know if the TDF Model is Accurate?

To be deemed accurate for projecting traffic volumes in the future, a model must first be calibrated to a year in which actual land use data and traffic volumes are available and well documented. A model is accurately calibrated when it replicates the actual traffic counts on the major roads within certain ranges of error established in the "Travel Forecasting Guidelines," (Caltrans, 1992) and it demonstrates stable responses to varying levels of inputs. The City TDF model has been calibrated to 2008 (base year) conditions using actual traffic counts, census data, and land use data compiled by City staff.

The ability of a travel model to replicate traffic counts is known as model validation. For the daily model validation, six screenlines and 159 roadway segments within the study area were included as validation locations. For the peak hour model validation, 12 screenlines and 187 roadway segments within the study area were included. Traffic counts at these locations were compared with the base year daily, AM peak hour, and PM peak hour model projections to determine the model's accuracy.

Is the City of Santa Barbara TDF Model Consistent with Standard Practices?

The City of Santa Barbara TDF model is consistent in form and function with the standard traffic forecasting models used in the transportation planning profession. The model includes a land use/trip generation module, a gravity-based trip distribution model, and a capacity-restrained equilibrium traffic assignment process. The travel model utilizes Version 5.0 of the TransCAD Transportation GIS software, which is consistent with many of the models used by local jurisdictions in California and throughout the nation. The Santa Barbara County Association of Governments (SBCAG), the Metropolitan Planning Organization for Santa Barbara County, maintains the current regional travel demand model in TransCAD.

How Can the TDF Model be Used?

The TDF model can be used for many purposes related to planning and design of the City's transportation system. The following is a partial listing of the potential uses of the TDF model.

- To update the General Plan
- To update the Street Master Plan
- To update the city-wide traffic impact fee program
- To evaluate the traffic impacts of area-wide land use plan alternatives
- To evaluate the shift in traffic resulting from a roadway improvement
- To evaluate the traffic impacts of land development proposals
- To determine trip distribution patterns of land development proposals
- To support the development of transportation sections of Environmental Impact Reports (EIRs)
- To support the preparation of project development reports for Caltrans

ORGANIZATION OF THIS REPORT

This report is organized into the following seven sections:

- Section 1 – Introduction
- Section 2 – Components of the Model
- Section 3 – Summary of the Input Data
- Section 4 – Description of the Model Calibration Process
- Section 5 – Model Results and Daily Validation
- Section 6 – Peak Hour Model Specifications
- Section 7 – Peak Hour Model Validation

A technical appendix is also attached, which contains model development information that is referenced in the report.

2. COMPONENTS OF THE MODEL

The Santa Barbara travel demand model utilizes the TransCAD 5.0 modeling software. Following is a description of the file and folder structure, followed by a detailed description of the model components.

FILE AND FOLDER STRUCTURE

Figure 2 shows the model user interface (UI). The buttons on the user interface activate the various steps in the model. By default, users can run all model steps in a single operation by pressing the "Trip Generation" button. Users can complete these steps one at a time by checking the "Stop after stage" box and pushing the various buttons in sequence.

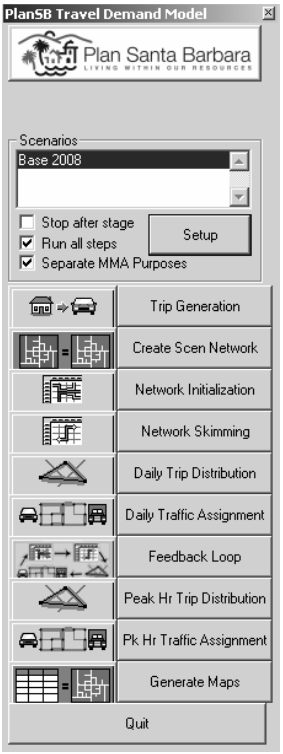


Figure 2 – Model User Interface

The model requires that some UI setup files (shown in the upper portion of Figure 3) be stored in the TransCAD software folder along with the TransCAD program. The model input files and output files can be stored either on the user's hard drive or in a local area network (shown in the lower portion of Figure 3). The model setup files are described in detail below.

1. **Add-ins.TXT**: This setup file stores the information about where the script is stored and the name of the model scenario. The contents should look like this:

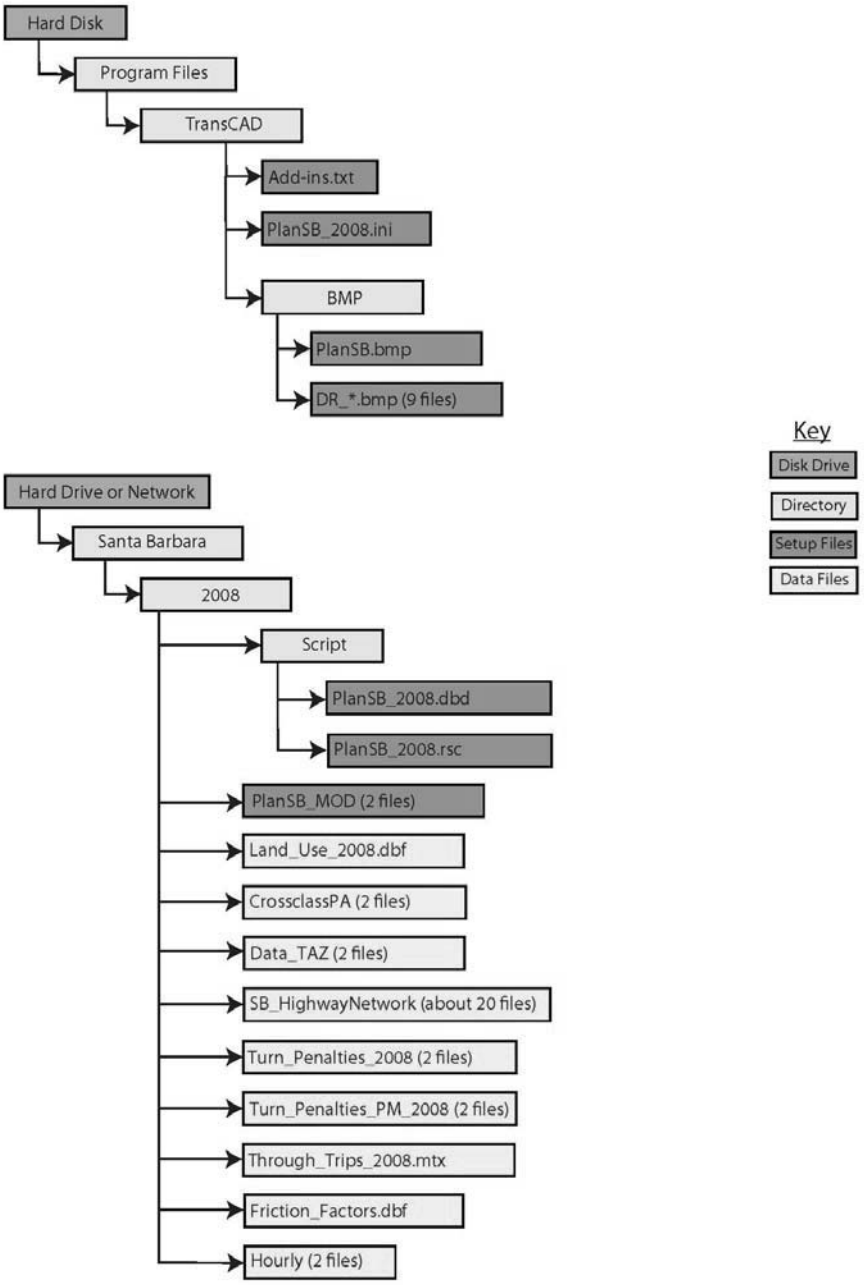
M, gisdk\\toolbox\\gisdk, GISDK Start Toolbox, GIS Developer's Kit
D, plansb_2008_ui, PlanSB Model, PlanSB - 2008

2. **SB_2008.INI**: This setup file stores the paths for some setup files and the model folder. The contents should look like this:

[Model Table]
C:\SBModel\2008\MOD_2008.bin
[UI File]
C:\Program Files\TransCAD\plansb_2008_ui.dbd
[Scenario File]
C:\SBModel\2008\Scenario_SB.arr
[Data Directory]
C:\SBModel\2008\

3. **Model Batch Script**: The model script, which is also known as the "resource" file (SB_2008.rsc), controls the overall model flow and also produces a user interface similar to the one shown in Figure 2. The model script is written in a scripting language called GISDK, which is used to set up and run TransCAD models. Because TransCAD script is a compiled language, the model script has been compiled and saved as plansb_2008_ui.* (seven files).

Figure 3 File and Folder Structure



4. **BMP Files:** The Plan Santa Barbara logo (PlanSB.BMP) and icons (DR_*.BMP) for the buttons should be stored in the BMP folder under TransCAD program folder**.**

5. **MOD_2008.BIN**: This setup file stores the names of the model input and output files, the model parameters, and other setup information.

OVERALL MODEL COMPONENTS

The model consists of three kinds of components:

Input Data – Input Data are files that represent different aspects of the City's road system, land use, and travel characteristics.

Model Steps – The model steps are the mathematical calculations the model completes in determining traffic flows. These steps are performed by model batch script.

Model Outputs – Model Outputs are data files produced by the model, and some are inputs to other steps in the model.

Figure 4 shows the relationship between input files and output files. The individual components are described below for each step of the TDF model (Trip Generation, Daily Trip Distribution, and Trip Assignment).

Trip Generation

1. **Land Use Table (Land_Use_2008.DBF)**: This input file stores the land use characteristics of the traffic analysis zones (TAZs) and the external station weights.

   The land use data includes such items as the number of single-family and multi-family dwelling units (DUs), and the square footage of commercial, office, industrial, and other non-residential land uses.

   External station weights (or factors) show the relative amount of traffic to and from each external station. These factors are used to distribute the internal-external and external-internal trip productions and attractions to the areas external to the travel model.

2. **Trip Generation Rates (CrossClassPA.BIN)**: This input file stores the trip generation rates by trip purpose. For example, home-based work and home-based other trips generated per single-family dwelling unit have separate trip generation rates.

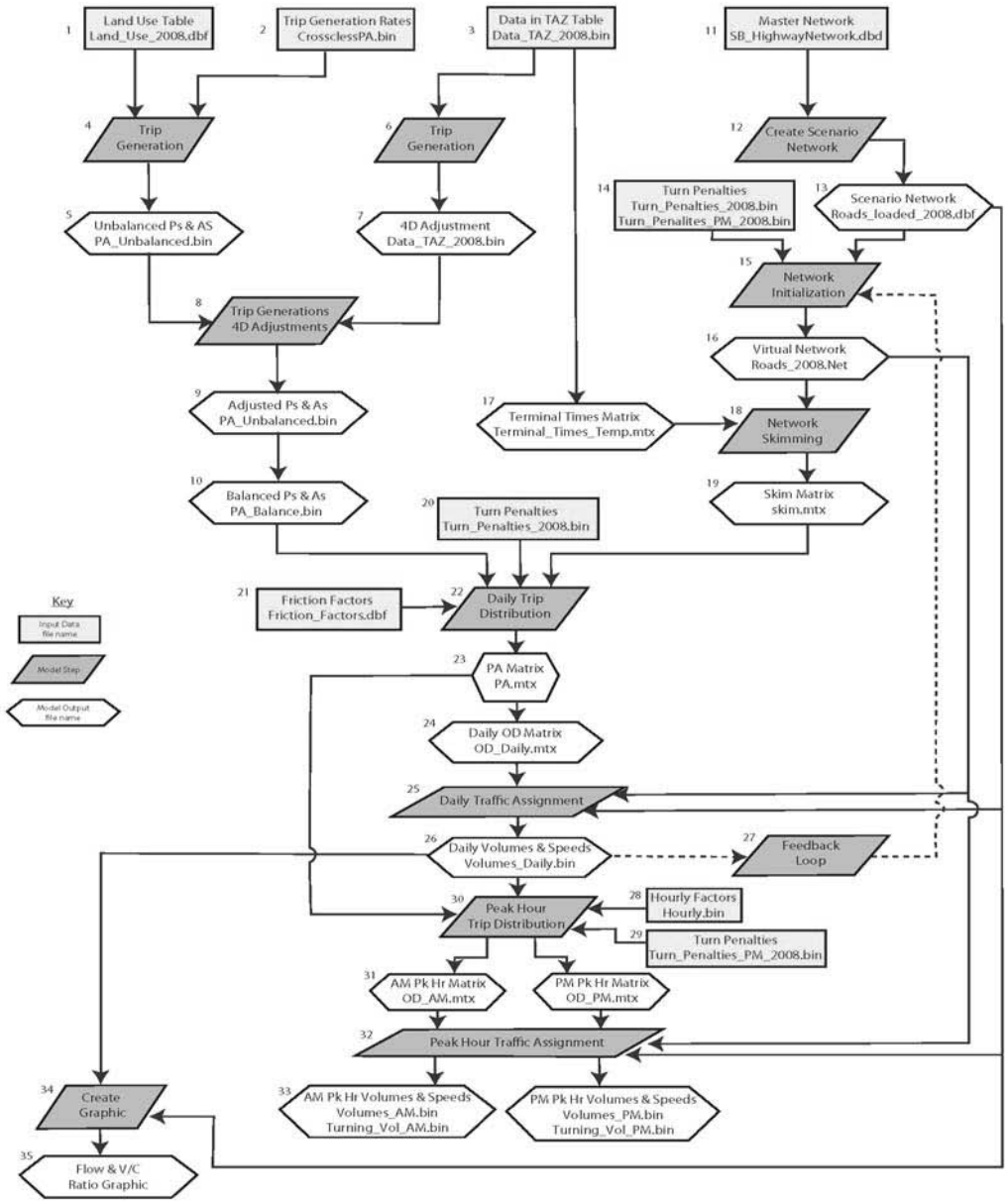
3. **Data in TAZ (Data_TAZ_2008.BIN)**: This input file stores the model input data in TAZ format other than land use. This data includes terminal times and 4D inputs.

   The terminal times represent the time needed at the start and end of each trip to accomplish tasks such as looking for a parking place and walking from the car to the destination. These values are added to the travel time value in the skim matrix for each TAZ.

   This data also stores information about the elasticities of trip-generation to the Density, Diversity, and Design characteristics of each TAZ. It also stores data on a Base Case and a Scenario for comparative purposes.

4. **Trip Generation**: This step multiplies the land use table by the trip generation rates to produce an initial estimate of trip ends. The model then balances the trip production and attraction estimates based on the script file. The model will hold to either productions or attractions, and then factor the other estimate up or down until it equals the selected control. For most trip purposes, the model's default is to adjust attractions to balance to productions. See Section 4 for details about trip balancing.

Figure 4 Components of Santa Barbara Travel Demand Model



5. **Unbalanced Trip Ends (PA_Unbalanced.BIN)**: This output file stores the vehicle trip productions and attractions by trip purpose before the trip-end balancing procedure.

6. **Compare 4D Characteristics**: This step is a part of trip generation that calculates the 4D adjustment factors.

7. **4D Adjustment (Data_TAZ_2008.BIN)**: This file stores the updated 4D adjustment factors.

8. **4D Adjustment Step**: This step is a part of trip generation that applies the 4D adjustment factors to the unbalanced trip ends.

9. **Adjusted Trip Ends (PA_Unbalanced.BIN)**: This file stores the adjusted trip ends by the 4D factors before the trip-end balancing procedure.

10. **Balanced Trip Ends (PA_Balanced.BIN)**: This output file stores the model estimate of vehicle trips for each trip purpose that begin or end in each TAZ.

Create Scenario Network

11. **Master Network (SB_HighwayNetwork.DBD)**: This input file is a master highway network that contains highway networks for all scenarios (existing roadways and future roadway improvements). This is a family of files showing the length, location, free-flow speed, capacity, and other characteristics of the roadways in the study area.

12. **Create Scenario Network Step**: This step creates a scenario-specific highway network file from the master highway network file.

13. **Scenario Network (Roads_Loaded_2008.DBD)**: This output file is a scenario-specific network generated in the Master Network step. This is a family of files showing the length, location, free-flow speed, capacity, and other characteristics for the specific model year. The volume flow attributes are added, but not populated with values until step 31 has completed.

Network Initialization

14. **Turn Penalty Table (Turn Penalties_2008.BIN)**: This input file stores the turning prohibition or delay for specific turning movements in the model network. A second turn penalties file **(Turn Penalties_PM_2008)** is used to store turning prohibitions that are in place only during the PM peak hour assignment.

15. **Network Initialization Step**: In this step, the model takes the highway network data and converts it into a format used by TransCAD. Some basic characteristics of the input data are also checked (e.g., no two links can have the same ID number), and an error message may occur if the model detects problems.

16. **Virtual Network (Roads_2008.NET)**: This output file is a special TransCAD data structure that stores the important highway network data and the turn penalty information.

Network Skimming

17. **Terminal Times Matrix (Terminal Times_Temp.MTX)**: This is a temporary output file that stores the terminal times values in a matrix format.

18. **Network Skimming Step**: This step measures travel times for all possible routes between each pair of TAZs, based on the information contained in the highway network, and determines the shortest route. Then it adds the terminal times.

19. **Skim Matrix (SKIM.MTX)**: This output file stores the shortest travel time path between each pair of TAZs, including the terminal times. The data is stored in the form of a TAZ-to-TAZ matrix, with each cell showing the shortest travel time in minutes between each pair of zones.

Daily Trip Distribution

20. **Friction Factors (Friction_Factors.DBF)**: This input file contains factors determining the relative attractiveness (by trip purpose) of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ.

21. **Through Trips (Through_Trips_2008.MTX)**: This input file contains the number of through trips, in the form of an origin-destination (OD) matrix for external TAZs.

22. **Daily Trip Distribution Step**: This step uses four input files from Steps 10, 19, 20, and 21 to determine how trips are distributed among productions and attractions. It then converts them to the origin-destination pairs for the 24-hour period.

23. **Production-Attraction Matrix (PA.MTX)**: This output file contains the trips from the trip generation plus the through trips. This is an intermediate product before determining the directionality of trips.

24. **Daily OD Matrix (OD_DAILY.MTX)**: This output file stores the daily OD trips.

Daily Traffic Assignment

25. **Daily Traffic Assignment Step**: The model uses an iterative assignment process whereby the quickest route is determined for each of the trips in the daily OD matrix, taking into account congestion caused by other trips.

26. **Daily Volumes (Volumes_Daily.BIN)**: This output file stores the daily model volumes and speed on each link.

Feedback Loop

27. **Feedback Loop**: In this step, the model feeds the congested travel time back into the network initialization step and repeats steps 15 through 26.

Peak Hour Trip Distribution

28. **Hourly Factors (Hourly.BIN)**: This input file factors the daily OD matrix into the AM and PM Peak Hour OD matrices.

29. **Peak Hour Trip Distribution Step**: The model uses an iterative assignment process that determines the quickest route for each trip in the AM and PM peak hour OD matrices, taking into account congestion caused by other trips.

30. **AM and PM Peak Hour OD Matrices (OD_AM.MTX, OD_PM.MTX)**: These output files store the number of trips between each OD pair for the AM and PM peak hours.

Peak Hour Traffic Assignment

31. **Peak Hour Traffic Assignment Step**: The model uses an iterative assignment process that determines the quickest route for each trip in the AM and PM peak hour OD matrices, taking into account congestion caused by other trips.

32. **AM and PM Peak Hour Volumes (Volumes_AM.BIN, Volumes_PM.BIN, Turning_Vol_AM.BIN, Turning_Vol_PM.BIN):** Volumes_AM.BIN and Volumes_PM.BIN store the AM and PM peak hour model volumes and speed on each link. Turning_Vol_AM.BIN and Turning_Vol_PM.BIN store the turning movement volumes at the study intersections for the AM and PM peak hours. The link volumes are copied into the Roads_Loaded_2008.DBD file.

Create Graphic

33. **Create Graphic Step**: This step automatically produces a network map showing the traffic volume as a bandwidth and congestion as a color code.

34. **Flow and V/C Ratio Graphic**: Most users will find it useful to produce this graphic, which shows daily traffic volumes as a bandwidth and the volume/capacity ratio as a color code. Users can save this graphic as an image file such as JPEG or BMP for use with other software package, such as embedding it in a report done in Microsoft Word.

3. SUMMARY OF THE INPUT DATA

DATA COLLECTION

A comprehensive data collection effort was undertaken at the outset of the *Plan Santa Barbara* process. The results of this effort are largely contained in the *Plan Santa Barbara: Transportation Existing Condition Report* (AMEC, 2008). This report served to guide the overall model development process by documenting the demographic profile, commute patterns, travel trends and traffic conditions which currently exist in Santa Barbara. In addition, certain data from this report were used directly in the model development process, such as traffic counts and household vehicle ownership data.

Other data sources include SBCAG for roadway network and regional travel data, Caltrans and the County of Santa Barbara for traffic count data, and the City of Santa Barbara for land use, and roadway network data.

TRAFFIC ANALYSIS ZONE (TAZ) SYSTEM

Travel demand models use traffic analysis zones (TAZs) to subdivide the study area for the purpose of connecting land uses to the road network. The TAZs represent physical areas containing land uses that produce or attract vehicle-trip ends. Since the Santa Barbara County Association of Governments (SBCAG) is the Metropolitan Planning Organization (MPO) for the area, the TAZ system for the Santa Barbara model was developed to nest within the regional model TAZ system. After reviewing the TAZ layer used in the SBCAG regional model, along with the roadway network and recent aerial photographs, a set of TAZ boundaries was created for the Santa Barbara model to achieve the following local area enhancements.

- A number of large TAZs were subdivided which allows for a more detailed assignment of local traffic to the highway network. This level of detail is necessary to forecast traffic volumes at the turning movement level.
- Considerable detail was added to the TAZ system in the downtown street grid to allow for a detailed traffic assignment and a more accurate calculation of the 4D variables.
- TAZs were created to be consistent with large developments such as Paseo Nuevo and La Cumbre Plaza.

The resulting 2008 model TAZ system includes 460 zones in the model area. Detailed maps showing the TAZ numbers in all portions of the model area are included in Appendix A. Also included in the TAZ structure are the external stations or gateways at points where major roadways provide access into the model area. These stations capture the traffic entering, exiting, or passing through the model area. Table 1 contains a list of the eight external gateways numbered from 1001 to 1010 that were established for this model (see map in Appendix A).

To provide flexibility in future model applications, the City of Santa Barbara model will include 51 unused TAZs. These TAZs (numbered 750 to 800) can be used to provide greater detail in the model for future specific applications.

TABLE 1 EXTERNAL GATEWAYS	
Gateway Number	**Gateway Description**
1001	Hollister Avenue west of Turnpike Road
1002	US-101 west of Turnpike Road
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)
1004	Cathedral Oaks Road west of Turnpike Road
1005	State Route 154 north of State Route 192
1006	State Route 192 west of Sheffield Drive
1007	Sheffield Drive north of Ortega Hill Road
1008	Ortega Hill Road east of Ortega Ridge Road
1009	US-101 east of Sheffield Drive
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)
Source: Fehr & Peers, 2008.	

LAND USE DATA

One of the primary inputs to the travel model is the land use data. This data is instrumental in estimating trip generation. This model primarily uses the City's parcel-level land use database (maintained in a GIS format) as the source for information on how much development currently exists within each TAZ. These data were supplemented by County parcel-based data and SBCAG TAZ-based data for areas in and bordering the Sphere of Influence.

The City of Santa Barbara TDF model employs twenty-eight land use data categories for each traffic zone, as shown in Table 2. A complete list of the land uses by TAZ and information relating to the land use codes that were aggregated to each of the model land use categories is included in Appendix B.

TABLE 2 MODEL LAND USE CATEGORIES	
Residential	
Land Use Type	**Units**
Single-Family (SF)	Dwelling Units
Multi-Family Zero Cars (MF_0)	Dwelling Units
Multi-Family One Car (MF_1)	Dwelling Units
Multi-Family Two Cars (MF_2)	Dwelling Units
Multi-Family Three or More Cars (MF_3P)	Dwelling Units

TABLE 2 MODEL LAND USE CATEGORIES (CONT)	
Non-Residential	
Land Use Type	**Units**
Commercial Services	Thousand Square-feet
Entertainment	Thousand Square-feet
Auto Related	Thousand Square-feet
Restaurant	Thousand Square-feet
Retail	Thousand Square-feet
Lodging	Thousand Square-feet
Office	Thousand Square-feet
Institutional	Thousand Square-feet
Industrial	Thousand Square-feet
Hospital	Thousand Square-feet
Religious Facilities	Thousand Square-feet
Police and Fire Services	Thousand Square-feet
Elementary and Middle School	Students
High Schools	Students
Colleges	Students
Recreation (Parks and Beaches)	Relative Popularity[2]
Golf	Acres
SBCAG_Agricultural[1]	Employees
SBCAG_Industrial[1]	Employees
SBCAG_Commercial[1]	Employees
SBCAG_Office[1]	Employees
SBCAG_Service[1]	Employees

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

SPECIAL GENERATORS

Special generators are used for unique land uses that cannot be adequately represented by one of the standard land use categories. The trip ends for special generators are determined outside

the model process for each specific use and added to the results of the standard trip generation procedure. There are no special generators currently used in the 2008 Santa Barbara model.

ROADWAY NETWORK

The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes; arterials, collectors, and a selection of local roads within the study area (see Figure 1).

The roadway network database received from SBCAG includes street name, distance, functional class, speed, capacity, and number of lanes. These attributes were checked using maps, aerial photographs, and other data provided by the City. Table 3 shows the initial roadway speeds, lanes and capacities used for each roadway class in the model.

TABLE 3
TYPICAL ROADWAY SPEEDS AND CAPACITIES

Roadway Classification[1]	Speed (MPH)	Total Through Lanes	Lane Capacity (Vehicles per hour per lane)	Total Facility Capacity (Vehicles per hour)
Freeway	65	4	2,000	8,000
Highway	50	4	1,200	4,800
Major Arterial	35	4	900	3,600
Minor Arterial	35	4	750	3,000
Collector	30	2	600	1,200
Local	25	2	600	1,200
Ramp	30	1	1,800	1,500
Centroid Connector[2]	30	2	10,000	20,000

[1] SBCAG, 2004.

[2] Centroid connectors are abstract representations of the starting and ending point of each trip, and thus should have no capacity constraints.

Source: Fehr & Peers, 2008.

Additional Roadway Attributes

For a representative sample of network links, current daily, AM peak hour, and PM peak hour traffic counts have been coded for validating the model. The traffic count data was collected from several sources including Caltrans, the County, the City, and a comprehensive set of traffic counts conducted in March, 2008. Count location tables and maps are provided in Appendix C.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions.

4. DESCRIPTION OF THE MODEL CALIBRATION PROCESS

Model calibration is the process by which parameters are set based on a comparison of travel estimates computed by the model with actual data from the area being modeled. This section provides a general description of the calibration steps and the adjustments made during the process to achieve accuracy levels that are within Caltrans' guidelines. For detailed information regarding the specified modeling steps, refer to the TransCAD model control file that is included in Appendix G.

TRIP GENERATION RATES

Trip generation rates relate the number of vehicle trips going to and from a site to some measure of the intensity of use at the site. Each trip has two ends, a "production" and an "attraction" end. By convention, all trips with one end at a residence are defined as being "produced" by the residence and "attracted" to the other use (workplace, school, retail store, etc.), and are called "Home-Based" trips. Trips that do not have one end at a residence are called "Non-Home-Based" trips.

There are five trip purposes used in the Santa Barbara model:

1. Home-Based Work (HBW): trips between a residence and a workplace.
2. Home-Based Other (HBO): trips between a residence and any other destination.
3. Non-Home-Based (NHB): trips that do not begin or end at a residence, such as traveling from a workplace to a restaurant, or from retail store to a bank.
4. Golf (GOLF): trips to and from golf courses.[1]
5. Recreational (REC): trips to and from the beaches, parks and other attractions (such as the Mission) in the model area.

Trip generation rates are initially defined for total trips and later split by trip purpose, for both productions and attractions.

The most widely used source for vehicle trip generation rates in the transportation planning field is the ITE *Trip Generation Manual*. The 2008 trip generation rates were initially based on residential trip generation surveys, the SBCAG regional model, recently calibrated models in similar areas, and the ITE *Trip Generation Manual*. The rates were calibrated to account for local conditions based on counts, production-to-attraction balancing, and to account for the difference between ITE and model land use definitions.

[1] Although GOLF trips account for only a negligible percentage of the total daily trips in Santa Barbara, the unique peaking characteristics and large land coverage of these areas require that these trips be handled specially to ensure an accurate assignment in the immediately surrounding areas during the peak hours.

Further Refinement

In addition to the standard trip generation procedures, certain enhancements were added to the Santa Barbara model to better capture local trip making characteristics and provide the ability to test certain policy options for future development scenarios. These enhancements include dividing the model area into four "area types" and cross-classifying multifamily households by auto-ownership.

Area Types

The model area contains a variety of development patterns, each with different land use characteristics and associated trip making patterns. To account for these differences, the model area was divided into four "area types". The four area types, which are shown in Figure 5, have their own associated trip generation rates and internal/external trip making characteristics. Trip generation rates for each land use in each area type are shown in Table 4.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 5

TABLE 4 DAILY VEHICLE TRIP GENERATION RATE COMPARISON					
Residential[1]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Single-Family (SF)	Dwelling Units	8.05	10.56	11.98	11.98
Multi-Family Zero Cars (MF_0)	Dwelling Units	3.03	3.55	4.02	4.02
Multi-Family One Car (MF_1)	Dwelling Units	4.23	5.39	6.18	6.18
Multi-Family Two Cars (MF_2)	Dwelling Units	5.96	7.04	8.08	8.08
Multi-Family Three or More Cars (MF_3P)	Dwelling Units	7.60	8.89	10.24	10.24
Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Commercial Services	Thousand Square-feet	100.10	115.20	128.40	128.40
Entertainment	Thousand Square-feet	36.40	43.20	48.15	48.15
Auto Related	Thousand Square-feet	16.38	17.28	19.26	19.26
Restaurant	Thousand Square-feet	100.10	139.20	136.05	136.05
Retail	Thousand Square-feet	32.76	45.18	40.28	40.28
Lodging	Thousand Square-feet	2.73	2.11	3.75	3.75
Office	Thousand Square-feet	8.27	11.59	12.92	12.92
Institutional	Thousand Square-feet	45.50	48.00	53.50	53.50
Industrial	Thousand Square-feet	4.25	4.48	5.00	5.00

TABLE 4
DAILY VEHICLE TRIP GENERATION RATE COMPARISON
(CONT)

Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Hospital	Thousand Square-feet	N/A	12.48	N/A	N/A
Religious Facilities	Thousand Square-feet	8.29	8.75	9.75	9.75
Police and Fire Services	Thousand Square-feet	8.65	9.12	10.17	10.17
Elementary and Middle School	Students	1.81	1.91	2.13	2.13
High Schools	Students	N/A	0.64	N/A	0.72
Colleges	Students	N/A	0.25	0.28	N/A
Recreation (Parks and Beaches)	Relative Popularity[3]	N/A	N/A	N/A	N/A
Golf	Acres	N/A	N/A	4.75	4.75
SBCAG_Agricultural[1]	Employees	N/A	N/A	3.95	3.95
SBCAG_Industrial[1]	Employees	N/A	N/A	2.04	2.04
SBCAG_Commercial[1]	Employees	N/A	N/A	3.92	3.92
SBCAG_Office[1]	Employees	N/A	N/A	1.07	1.07
SBCAG_Service[1]	Employees	N/A	N/A	5.39	5.39

[1] The ITE manual does not stratify multifamily dwelling units by auto-ownership. ITE multifamily rates range from 4.18 to 6.72 depending on the dwelling type. Rates based on auto-ownership were developed from 2000 National Household Travel Survey (NHTS) data for the City of Santa Barbara. NHTS rates range from a minimum of 0.69 to a maximum of 11.75.

[2] Not all non-residential land use categories are present in each area type. 2008 trip generation rates were only developed for land uses present in 2008 in each area type.

[3] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Area type 2 represents the remaining "grid" portion of the City. This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center which attracts trips from outside areas.

Multi-Family Unit Vehicle Ownership

In order to test certain potential policy alternatives, multi-family dwelling units were divided into four types representing varying levels of automobile ownership. Auto-ownership data for each census tract in Santa Barbara was obtained from the 2000 National Household Travel Survey, which is conducted by the United States Census Bureau. The percentage of households representing each level of automobile ownership was calculated and the total number of multifamily units in each census tract was apportioned to the relevant multi-family trip generation category based on this percentage.

After the total vehicle trips are calculated for each land use type, they are split into the five trip purposes described above. The distribution of trips by purpose was based on the SBCAG model and recent data from the 2000 National Household Travel Survey and was compared to similar regions. The results by land use category for the 2008 model are presented in Tables 5-I through 5-4.

For example, based on Table 4 a neighborhood in area type 4 consisting of 10 single-family dwelling units would generate 120 daily vehicle trips. Splitting these trips into the various purposes based on Tables 5-I through 5-4 would result in 22 trips traveling between home and work, 62 trips between home and anything other than work (e.g., shopping, bank, visiting friends), 35 trips between two non-home locations (e.g., going from work to a restaurant), half a trip between home and a golf course, and remaining one and a half trips between home and a recreational area.

Table 6 compares preliminary travel model productions and attractions by trip purpose to the final productions and attractions after trip balancing. The HBW, HBO, GOLF, and REC purposes are balanced to productions while the NHB purposes are balanced to attractions. The AM and PM peak hour trip tables are created by factoring the daily production-attraction trip table as described in Section 6.

TABLE 5-1
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 1

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	15.65%	N/A	45.00%	7.00%	25.00%	5.00%	0.35%	N/A	2.00%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.00%		47.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family Two Cars (MF_2)	12.25%		47.50%	5.00%	30.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		50.00%	5.00%	29.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	18.00%	N/A	32.00%	15.00%	35.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		31.75%	18.00%	44.00%	0.00%		0.25%	
Lodging	9.00%	2.00%	27.00%	10.00%	20.00%	11.00%	0.25%		20.75%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		20.00%		18.00%	16.00%	46.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-1
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 1
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	33.00%	20.00%	45.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		17.00%		10.00%	30.00%	43.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools[3]										
Colleges[3]										
Recreation (Parks and Beaches)[3]										
Golf3										
SBCAG_Agricultural[1,3]								N/A		
SBCAG_Industrial[1,3]										
SBCAG_Commercial[1,3]										
SBCAG_Office[1,3]										
SBCAG_Service[1,3]										

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-2
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 2

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	16.00%	N/A	46.65%	6.00%	24.00%	5.00%	0.35%	N/A	2.00%	N/A
Multi-Family Zero Cars (MF_0)	9.00%		53.00%	5.00%	28.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	18.00%		48.00%	3.00%	28.00%	2.00%	0.00%		1.00%	
Multi-Family Two Cars (MF_2)	13.50%		48.50%	5.00%	28.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	11.75%		50.00%	5.00%	28.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	19.00%	N/A	35.00%	15.00%	31.00%	0.00%	N/A	0.00%	N/A
Entertainment		3.00%		46.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		46.00%	3.00%	49.00%	0.00%		0.00%	
Restaurant		2.00%		45.50%	16.00%	36.00%	0.00%		0.50%	
Retail		6.00%		44.00%	19.75%	30.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		18.00%	16.00%	52.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital		38.00%		35.00%	20.00%	7.00%	0.00%		0.00%	

TABLE 5-2
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 2
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	45.00%	20.00%	33.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges		20.00%		70.00%	5.00%	5.00%	0.00%		0.00%	
Recreation (Parks and Beaches)[3]										
Golf[3]										
SBCAG_Agricultural[1,3]								N/A		
SBCAG_Industrial[1,3]										
SBCAG_Commercial[1,3]										
SBCAG_Office[1,3]										
SBCAG_Service[1,3]										

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-3
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 3

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	18.00%	N/A	46.65%	6.00%	23.00%	5.75%	0.35%	N/A	1.25%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	39.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.75%		48.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Two Cars (MF_2)	12.75%		50.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		52.00%	5.00%	27.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	17.00%	N/A	36.00%	15.00%	32.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		44.00%	19.75%	30.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		40.00%	16.00%	30.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-3
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 3
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%		33.00%	20.00%	45.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges		20.00%		70.00%	5.00%	5.00%	0.00%		0.00%	
Recreation (Parks and Beaches)[3]										
Golf		0.00%		0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
SBCAG_Agricultural[1]		62.00%		0.00%	4.00%	34.00%	0.00%	N/A	0.00%	
SBCAG_Industrial[1]		66.00%		0.00%	5.00%	29.00%	0.00%		0.00%	
SBCAG_Commercial[1]		16.00%		42.00%	8.00%	34.00%	0.00%		0.00%	
SBCAG_Office[1]		39.00%		0.00%	10.00%	51.00%	0.00%		0.00%	
SBCAG_Service[1]		35.00%		26.00%	10.00%	29.00%	0.00%		0.00%	

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-4
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 4

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	18.00%	N/A	45.65%	6.00%	23.00%	5.75%	0.35%	N/A	1.25%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.75%		48.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Two Cars (MF_2)	12.75%		50.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		52.00%	5.00%	27.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	17.00%	N/A	32.00%	15.00%	36.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		39.00%	19.75%	35.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		18.00%	16.00%	52.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-4
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 4
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	45.00%	20.00%	33.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges[3]										
Recreation (Parks and Beaches)										
Golf		0.00%		0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
SBCAG_Agricultural[1]		62.00%		0.00%	4.00%	34.00%	0.00%	N/A	0.00%	
SBCAG_Industrial[1]		66.00%		0.00%	5.00%	29.00%	0.00%		0.00%	
SBCAG_Commercial[1]		16.00%		42.00%	8.00%	34.00%	0.00%		0.00%	
SBCAG_Office[1]		39.00%		0.00%	10.00%	51.00%	0.00%		0.00%	
SBCAG_Service[1]		35.00%		26.00%	10.00%	29.00%	0.00%		0.00%	

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 6
TRIP GENERATION PRODUCTION AND ATTRACTION SUMMARY

Purpose	Estimated Productions	Estimated Attractions	Final Productions	Final Attractions
Home-Based Work (HBW)	40,329	40,199	40,329	40,329
Home-Based Other (HBO)	140,512	136,160	140,512	140,512
Non-Home-Based (NHB)	137,806	137,185	137,185	137,185
Golf (GOLF)	1,105	1,135	1,105	1,105
Recreational (REC)	6,625	6,625	6,625	6,625
IX	106,682	N/A	103,865	103,865
XI	N/A	140,197	136,165	136,165
		Total	565,786	565,786

Source: Fehr & Peers, 2008.

TRIP DISTRIBUTION (GRAVITY MODEL)

Once the trip generation step has determined the number of trips that originate and terminate in each zone, the trip distribution process determines the specific destination of each originating trip. The destination may be within the zone itself, resulting in an intra-zonal trip. If the destination is outside of the zone of origin, it is an inter-zonal trip. Internal-internal (I-I) trips originate and terminate within the model area. Trips that originate within but terminate outside of the model area are internal-external (I-X), and trips that originate outside and terminate inside of the model area are external-internal (X-I). Trips passing completely through the model area are external-external (E-E).

The trip distribution model uses the gravity equation to distribute trips to all zones. This equation estimates an accessibility index for each zone based on the number of attractions in each zone and a friction factor, which is a function of travel time between zones. Each attraction zone is given its pro-rata share of productions based on its share of the accessibility index. This process applies to the I-I, I-X, and X-I trips. The E-E trips are added to the trip table prior to final assignment.

Friction Factors

Friction factors, also known as travel time factors, determine the relative attractiveness of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ. These factors are used in the trip distribution stage of the model. Friction factors reported in national modeling reference documents such as National Cooperative Highway Research Program (NCHRP) 365, and modified based on local conditions and comparison with the SBCAG model, were used in the 2008 Santa Barbara model. See Appendix E for friction factor curves.

Trips between the Santa Barbara Area and External Areas

One of the important inputs to a travel model is an estimate of the amount of travel between the study area and neighboring areas outside the model. These are typically called internal-external, or I-X/X-I, trips.

The United States Census Bureau surveys residential and work locations at the place level. Table 7 illustrates the distribution of work locations for Santa Barbara residents, while Table 8 illustrates the distribution of residential locations for Santa Barbara employees.

TABLE 7
WORK LOCATIONS FOR SANTA BARBARA RESIDENTS

Year	Percent Working Inside Santa Barbara	Percent Working Outside Santa Barbara
2000	63%	37%

Source: U.S. Census Bureau.

TABLE 8
RESIDENTIAL LOCATIONS FOR SANTA BARBARA EMPLOYEES

Year	Percent Living Inside Santa Barbara	Percent Living Outside Santa Barbara
2000	49%	51%

Source: U.S. Census Bureau.

Based on this data, the proportion of HBW trips entering and leaving the study area was estimated. For non-work trip purposes, information from the SBCAG Regional Model was used to develop an initial estimate the percent of HBO and NHB trips that travel between Santa Barbara and other areas. These estimates were then refined using the City's land use database. Table 9 summarizes the proportion of trips by purpose and area type that are assumed to have one end outside the model area.

TABLE 9
PERCENT OF TRIPS BY PURPOSE THAT ARE INTERNAL/EXTERNAL FOR EACH AREA TYPE

Purpose	Area Type 1		Area Type 2		Area Type 3		Area Type 4	
	[1]P	[2]A	P	A	P	A	P	A
Home-Based Work (HBW)	20%	41%	27%	45%	40%	49%	44%	49%
Home-Based Other (HBO)	18%	38%	19%	30%	32%	31%	20%	33%
Non-Home-Based (NHB)	21%	21%	21%	20%	23%	24%	21%	24%
Golf (GOLF)	0%	40%	0%	40%	0%	35%	0%	35%
Recreational (REC)	0%	30%	0%	30%	0%	20%	0%	20%

Notes:
[1]P=Production
[2]A=Attraction

Source: Fehr & Peers, 2008.

After the number of I-X/X-I trips is estimated, those trips are distributed to the stations around the perimeter of the model area using external station weights. These external station weights are based on City, County, and Caltrans traffic count data and the SBCAG Regional Model. The resulting external station weights are presented on Figure 6.

Through Trips

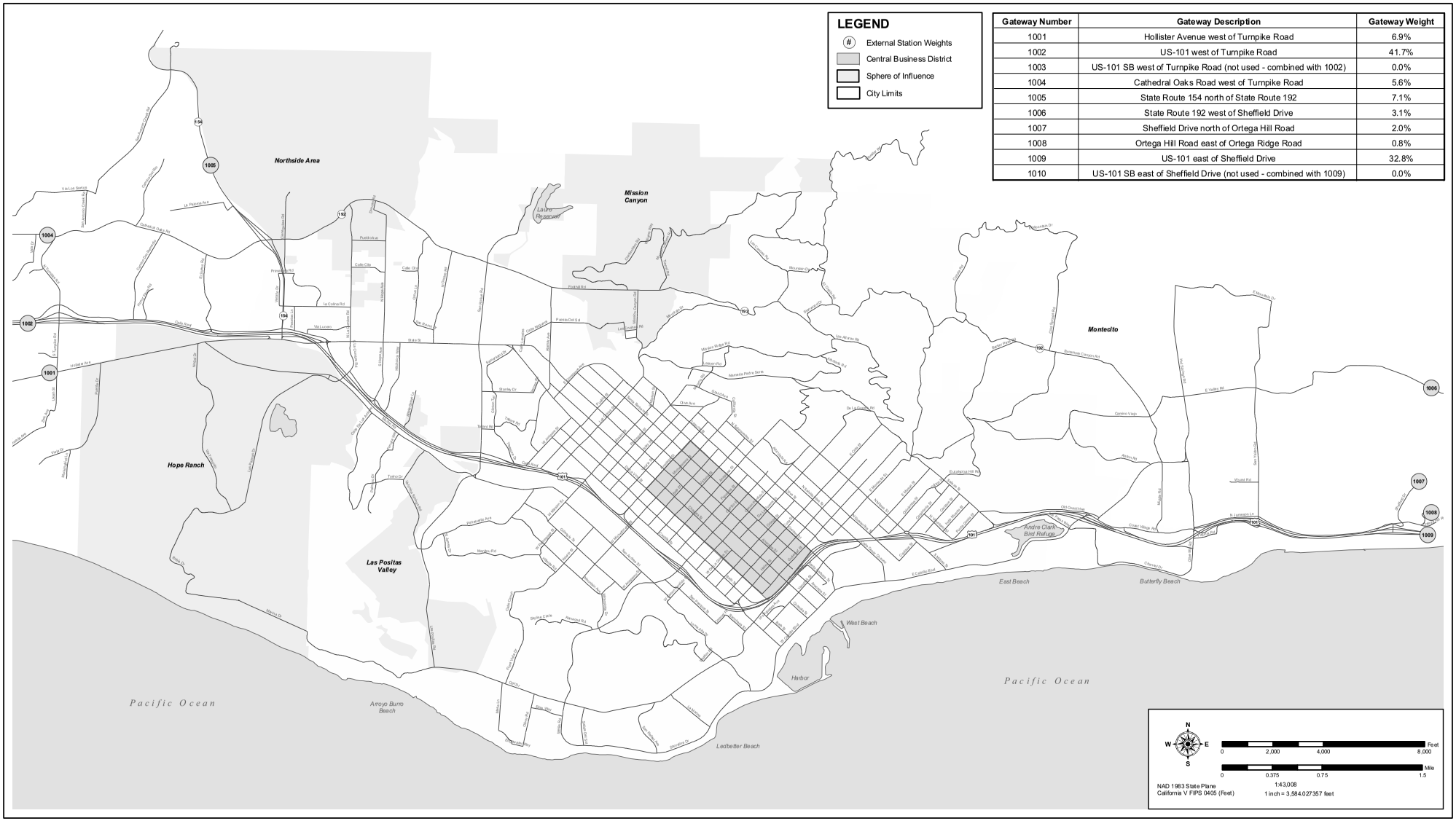
Through trips (also called external-external, or EE trips) are those that pass through the study area without stopping inside the study area. The major flows of through traffic in the Santa Barbara area use US-101 and SR 154, with lower volumes of through traffic using SR 192. The majority of through trips use US-101 for at least a portion of their journey, even if they do not enter or exit the model area along this route. The size of these flows was estimated based on Caltrans traffic counts and the SBCAG Regional Model. The through trips were modified in conjunction with the external station weights so that results at the gateways accurately represented observed data. The resulting through trip matrix is summarized in Table 10.

TABLE 10
MATRIX OF DAILY THROUGH (EE) TRIPS

Destination / **Origin**	Hollister Ave west of Turnpike Rd	Hwy 101 west of Turnpike Rd	Cathedral Oaks Rd west of Turnpike Rd	Hwy 154 north of Hwy 192	Ortega Hill Rd north of Ortega Ridge Rd	Hwy 101 east of Sheffield Dr	**Total**
Hollister Ave west of Turnpike Rd		0	0	0	55	265	**320**
Hwy 101 west of Turnpike Rd	0		0	0	285	10120	**10405**
Cathedral Oaks Rd west of Turnpike Rd	0	0		0	30	75	**105**
Hwy 154 north of Hwy 192	0	0	0		30	830	**860**
Ortega Hill Rd east of Ortega Ridge Rd	55	285	30	30		0	**400**
Hwy 101 east of Sheffield Dr	265	10120	75	830	0		**11,290**
Total	**320**	**10405**	**105**	**860**	**400**	**11,290**	**23,380**

Note: All trips are rounded to the nearest 5 and external gateways with less than 100 trips are not shown on the above table.

Source: SBCAG



Gateway Number	Gateway Description	Gateway Weight
1001	Hollister Avenue west of Turnpike Road	6.9%
1002	US-101 west of Turnpike Road	41.7%
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)	0.0%
1004	Cathedral Oaks Road west of Turnpike Road	5.6%
1005	State Route 154 north of State Route 192	7.1%
1006	State Route 192 west of Sheffield Drive	3.1%
1007	Sheffield Drive north of Ortega Hill Road	2.0%
1008	Ortega Hill Road east of Ortega Ridge Road	0.8%
1009	US-101 east of Sheffield Drive	32.8%
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)	0.0%

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PLAN SANTA BARBARA EXTERNAL STATION WEIGHTS
FIGURE 6

TRIP ASSIGNMENT

The trip assignment process determines the route that each vehicle-trip follows to travel from origin to destination. The model selects these routes in a manner that is sensitive to congestion and the desire to minimize overall travel time. It uses an iterative, capacity-restrained assignment and equilibrium volume adjustments. This technique finds a travel path for each trip that minimizes the travel time, with recognition of the congestion caused by all other trips.

The general assignment process includes the following steps.

- Assign all trips to the links along their selected paths.
- After all assignments, examine the volume on each link and adjust its impedance based on the volume-to-capacity ratio.
- Repeat the assignment process for a set number of iterations or until specified criteria related to minimizing travel delays are satisfied.

Calibration of the roadway network included modification of the centroid connectors to more accurately represent the location at which traffic accessed the local roads, adjusting speeds from the posted speed limit to adjust the attractiveness of the route and better reflect the prevailing speed of traffic, and refining the turn penalties. Figure 7 and Figure 8 show the calibrated functional class and lanes.

Turn Penalties

Turn penalties are used to prohibit or add delay to certain turning movements. The Santa Barbara model prohibits traffic from getting off a freeway ramp and then immediately getting back on, as well as prohibits traffic from making turns across a median. In addition, all U-turns are prohibited throughout the model area in order to avoid counter-intuitive traffic routing. The PM peak hour assignment also prohibits left turns onto and off of State Street in the Central Business District.

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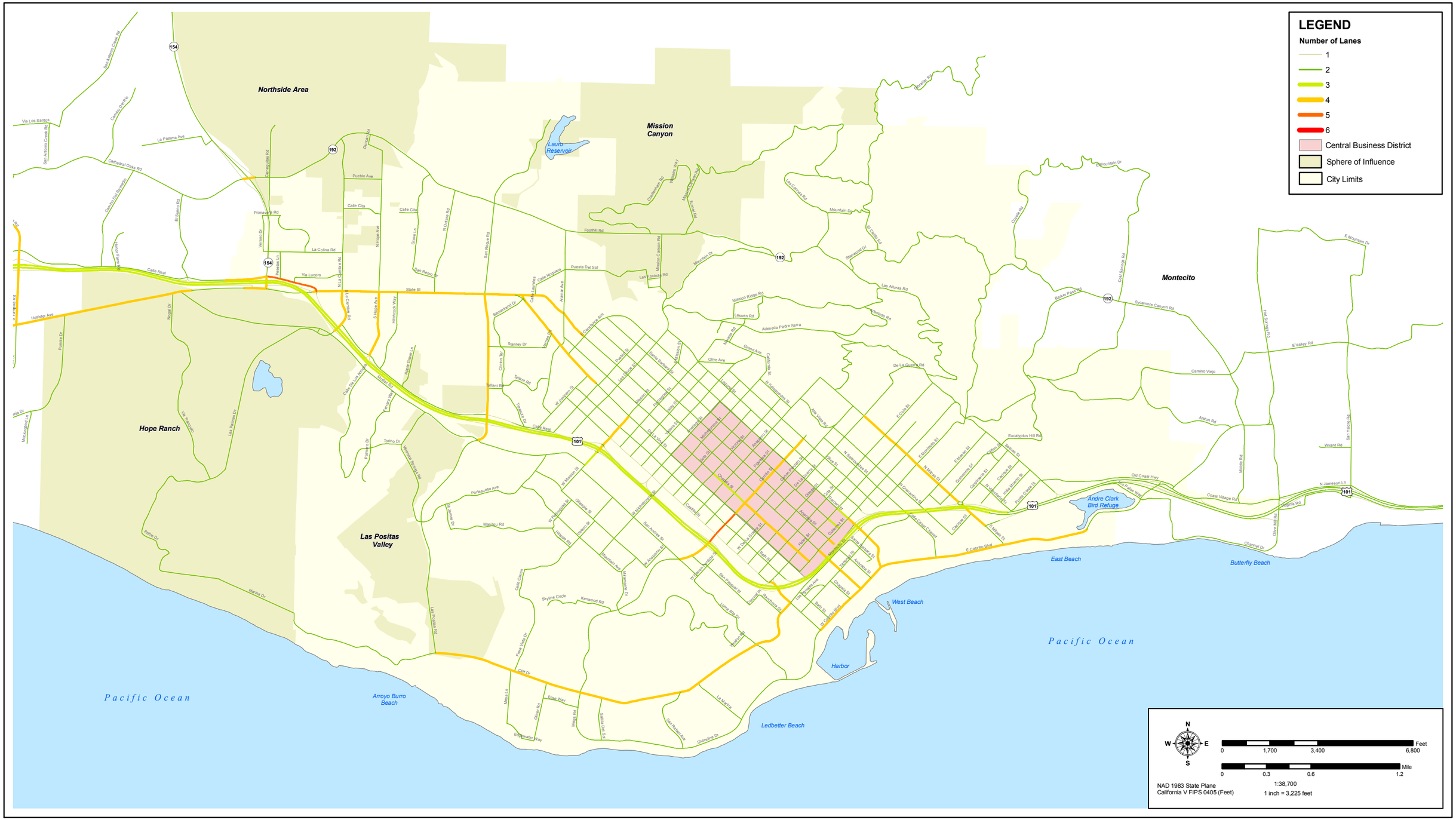
PLAN SANTA BARBARA BASE YEAR (2008) ROADWAY FUNCTIONAL CLASSIFICATION
FIGURE 7



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PLAN SANTA BARBARA BASE YEAR (2008) ROADWAY TOTAL THRU LANES

FIGURE 8

5. MODEL RESULTS AND DAILY VALIDATION

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. While most model validation guidelines focus on the performance of the trip assignment function in accurately assigning trips to the roadway network, it is good modeling practice to examine the outputs from each step of the modeling process for reasonableness, and to compare them against existing data if available. This section describes the reasonableness and validation checks that have been performed for the 2008 Santa Barbara TDF model.

LAND USE

Detailed parcel level land use data for the Santa Barbara model was researched and compiled by City staff. The land use database was created to represent March 2008 conditions.

TRIP GENERATION

One of the basic assumptions of any travel model is that the total number of local trips (internal-to-internal, or I-I) produced is equal to the total number of local trips attracted. If the totals are not equal, the model will typically adjust the attractions to match the productions. While it is never possible to achieve a perfect match between productions and attractions prior to the automatic balancing procedure, the existence of a substantial mismatch in one or more trip purposes indicates that either land use inputs or trip generation factors may be in error.

Table 11 summarizes the local trip productions and attractions from the Santa Barbara travel model for each trip purpose, prior to the application of the automatic balancing procedure. Guidelines published by Federal Highway Administration's Transportation Model Improvement Program (TMIP) and NCHRP suggest that, prior to balancing, the number of productions and attractions should match to within plus or minus 10% (i.e., the production-to-attraction ratio should be within the range of 0.90 to 1.10). The results shown in Table 11 indicate that the 2008 model meets the published guidelines for all trip purposes.

TABLE 11
TRIP PRODUCTION TO ATTRACTION RATIOS BY PURPOSE

Trip Purpose	Production/Attraction Ratio	Percent of Total Daily Vehicle Trips	
		2008 PlanSB Model	California[1]
Home-Based Work (HBW)	1.00	15%	21%
Home-Based Other (HBO)	1.01	43%	48%
Non-Home-Based (NHB)	1.00	41%	31%
Golf (GOLF)	0.97	Negligible[2]	N/A
Recreational (REC)	N/A	2%	N/A
Total		101%	100%

[1] *2000-2001 California Statewide Household Travel Survey Final Report*, June 2002.
[2] Although GOLF trips account for only a negligible percentage of the total daily trips in Santa Barbara, the unique peaking characteristics and large land coverage of these areas require that these trips be handled specially to ensure an accurate assignment in the immediately surrounding areas during the peak hours.
Note: May not total 100% due to rounding.
Source: Fehr & Peers, 2008

In addition to production and attraction balancing, the percent of total trips for each purpose were checked for reasonableness. Typical values are provided below:

- HBW trips 18% to 27% of all trips
- HBO trips: 47% to 54% of all trips
- NHB trips: 22% to 31% of all trips

While the Santa Barbara Model falls slightly outside of these ranges, the trip purpose percentages in the 2008 Santa Barbara model are generally reasonable and reflect a greater degree of trip chaining in Santa Barbara due to its long and narrow physical geography. This information, in conjunction with the trip generation rate comparisons and trip purpose distributions discussed in Section 4, indicates that the trip generation component of the Santa Barbara model is performing reasonably.

TRIP ASSIGNMENT

The most critical static measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. Caltrans has established certain trip assignment guidelines for models to be deemed acceptable for forecasting future year traffic. This section describes the model performance in comparison to the standards discussed in Travel Forecasting Guidelines (California Department of Transportation, November 1992).

The validity of the Santa Barbara travel model was tested for daily, AM and PM peak hour conditions. Model volumes were compared to existing traffic counts at 159 individual count sites shown on Figure 9, and at 6 screenlines shown on Figure 10. Daily screenlines were selected to correspond with the major flows into and out of the City at available data points. The remainder of this section contains a summary of the validation results, while Appendix F contains a detailed report of all validation comparisons.

Link volume results from the model runs were examined and checked for reasonableness. Links were identified where model results varied substantially from the observed counts, and the characteristics of those links were reviewed with City staff to ensure that the link attributes accurately reflected local operating conditions. In some cases, link characteristics such as speeds were modified based on local input. Figure 11 shows the daily link volumes resulting from the 2008 Santa Barbara travel demand model.

Comparison Techniques

Travel model accuracy is usually tested using four comparison techniques.

- The volume-to-count ratio is computed by dividing the volume assigned by the model and the actual traffic count for individual roadways (or intersections) area-wide.
- The maximum deviation is the difference between the model volume and the actual count divided by the actual count.
- The correlation coefficient estimates the correlation between the actual traffic counts and the estimated traffic volumes from the model.
- The percent root mean square error (RMSE) is the square root of the model volume minus the actual count squared divided by the number of counts. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model.

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PLAN SANTA BARBARA DAILY VALIDATION COUNT LOCATIONS
FIGURE 9

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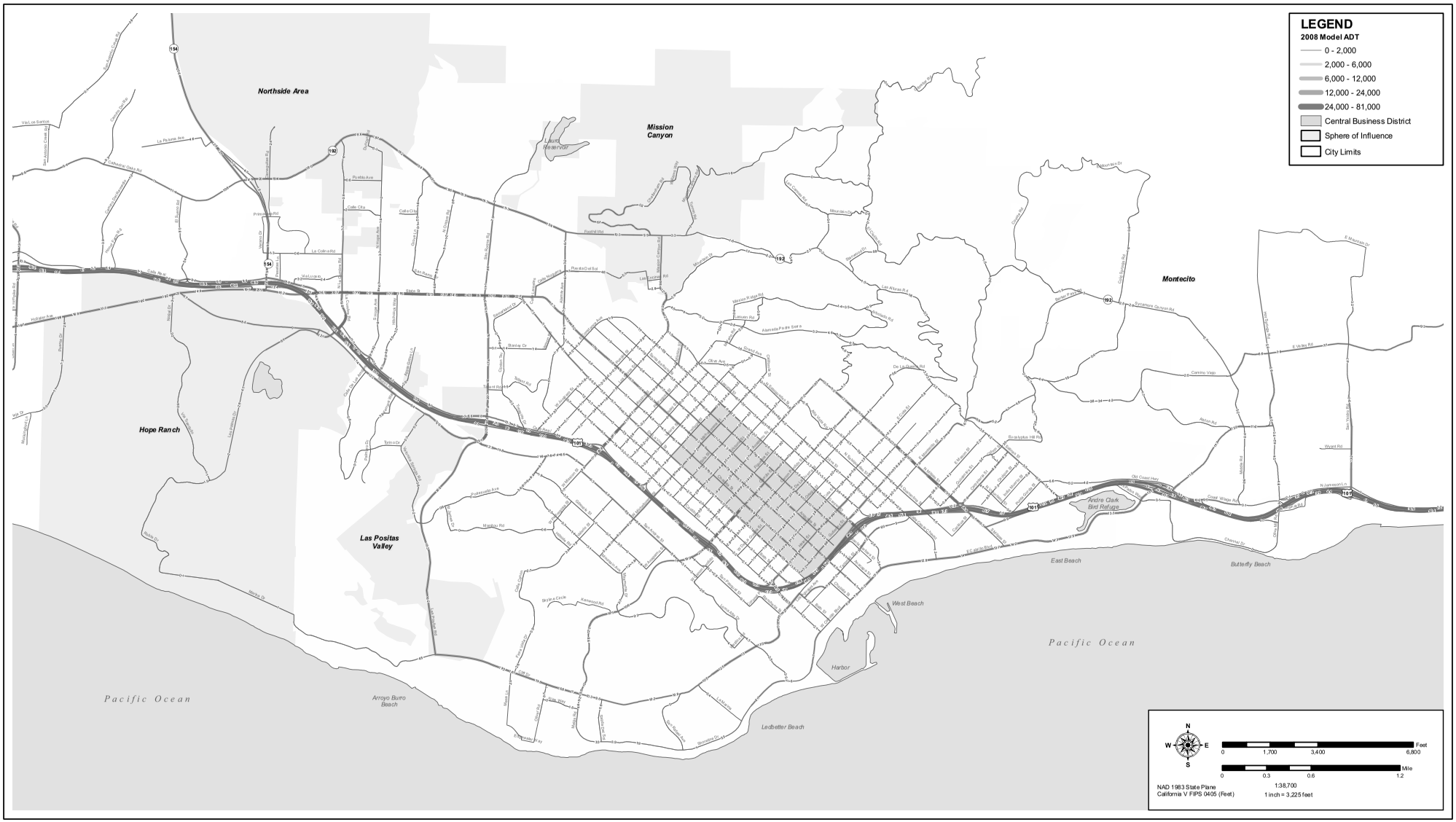
PLAN SANTA BARBARA DAILY SCREENLINE LOCATIONS
FIGURE 10



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PLAN SANTA BARBARA 2008 AVERAGE DAILY TRAFFIC VOLUMES

FIGURE 11

In addition to these tests, the model's stability was tested to verify that reasonable output responses occurred based on varying input variables.

Validation Guidelines

For a model to be considered accurate and appropriate for use in traffic forecasting, it must replicate actual conditions to within a certain level of accuracy. Since it would be impossible for any model to precisely replicate all counts, validation guidelines have been established by Caltrans and other agencies. Key validation standards for daily travel models based on the Caltrans guidelines are summarized below.

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).
- All of the roadway screenlines should be within the maximum desirable deviation, which ranges from approximately 15 to 64 percent depending on total volume.
- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts.
- The correlation coefficient between the actual ground counts and the estimated traffic volumes should be greater than 88 percent.

Although not stated in the Caltrans standards, an additional Fehr & Peers validation guideline was applied to the 2008 Santa Barbara travel model.

- The RMSE should not exceed 40 percent.

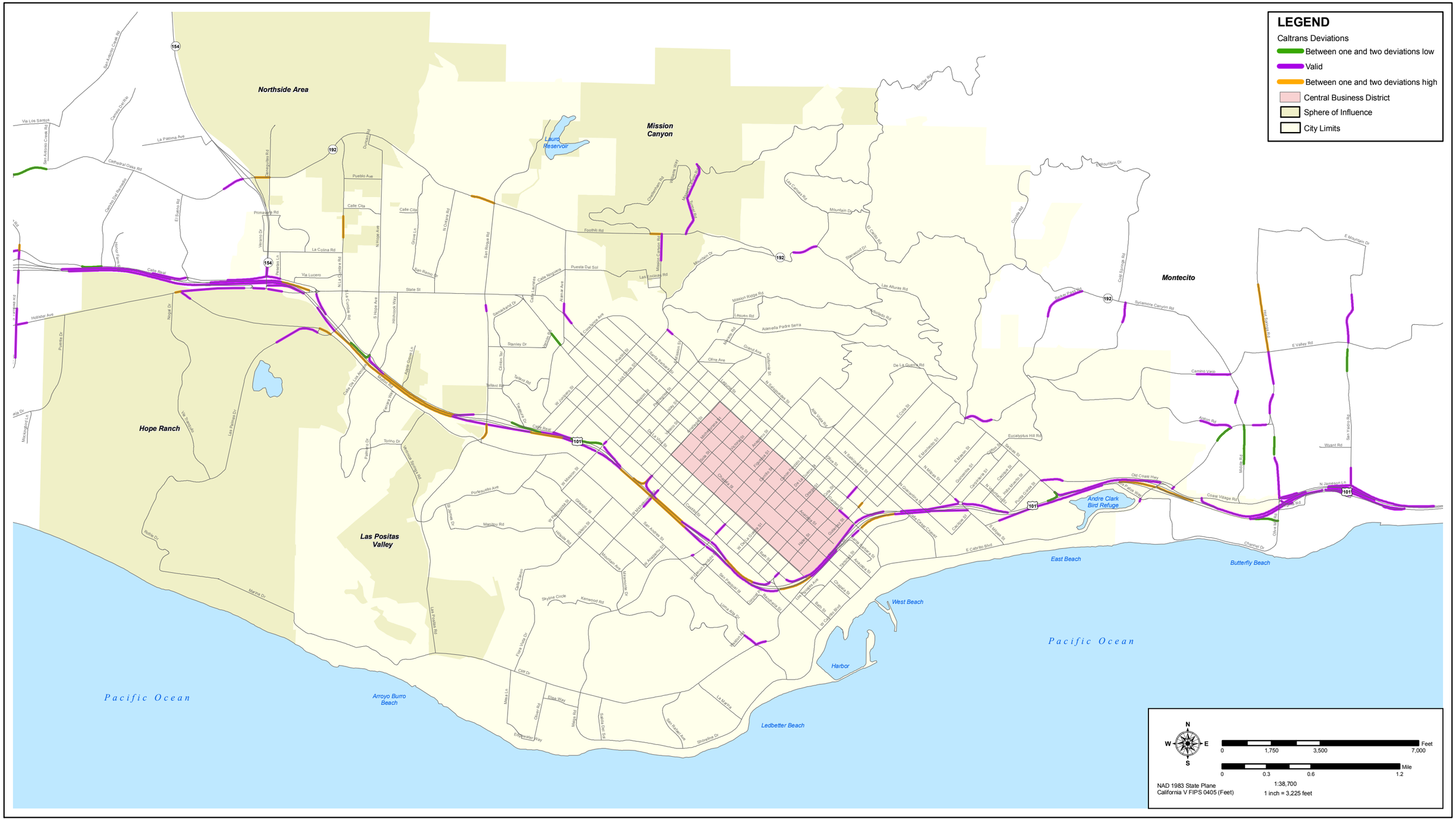
Static Validation Results

Scripts and spreadsheets were created to compute the validation results for roadway links in the Santa Barbara travel model. The results for daily conditions are summarized in Table 12 below, while the detailed spreadsheets are presented in Appendix F. The model deviation by geographic location is shown on Figure 12. Figure 13 shows a scatter plot of count and model volumes compared to Caltrans' allowable error. The model performs well, exceeding all guidelines for overall model accuracy.

TABLE 12
RESULTS OF DAILY MODEL VALIDATION

Validation Item	Criterion for Acceptance	Model Results
Count Locations	N/A	159
% of Links Within Caltrans Standard Deviations	At Least 75%	77%
% of Screenlines Within Caltrans Standard Deviations	100%	100%
2-way Sum of All Links Counted	Within ± 10%	9%
Correlation Coefficient	Greater than 88%	99%
RMSE	40% or less	23%

Source: Fehr & Peers, 2008.



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PLAN SANTA BARBARA MODEL VALIDATION BY LOCATION
FIGURE 12

FIGURE 13
DAILY MODEL VALIDATION SCATTERPLOT

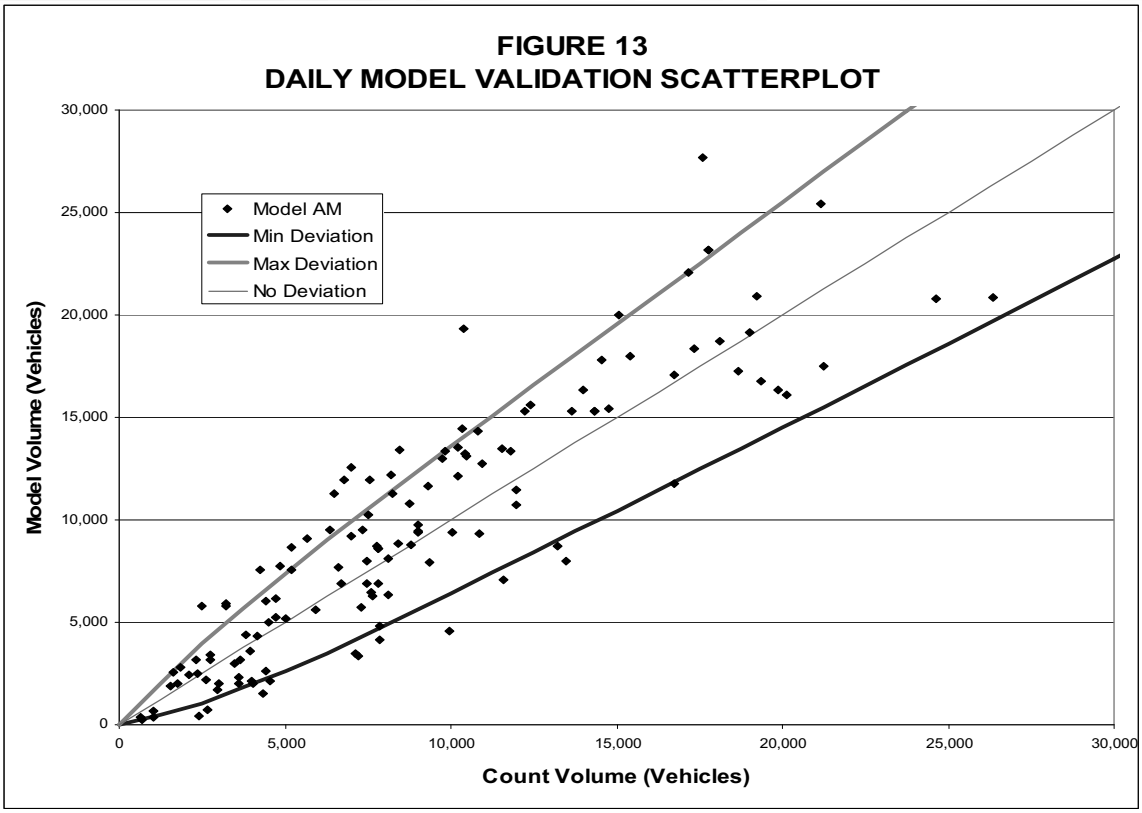
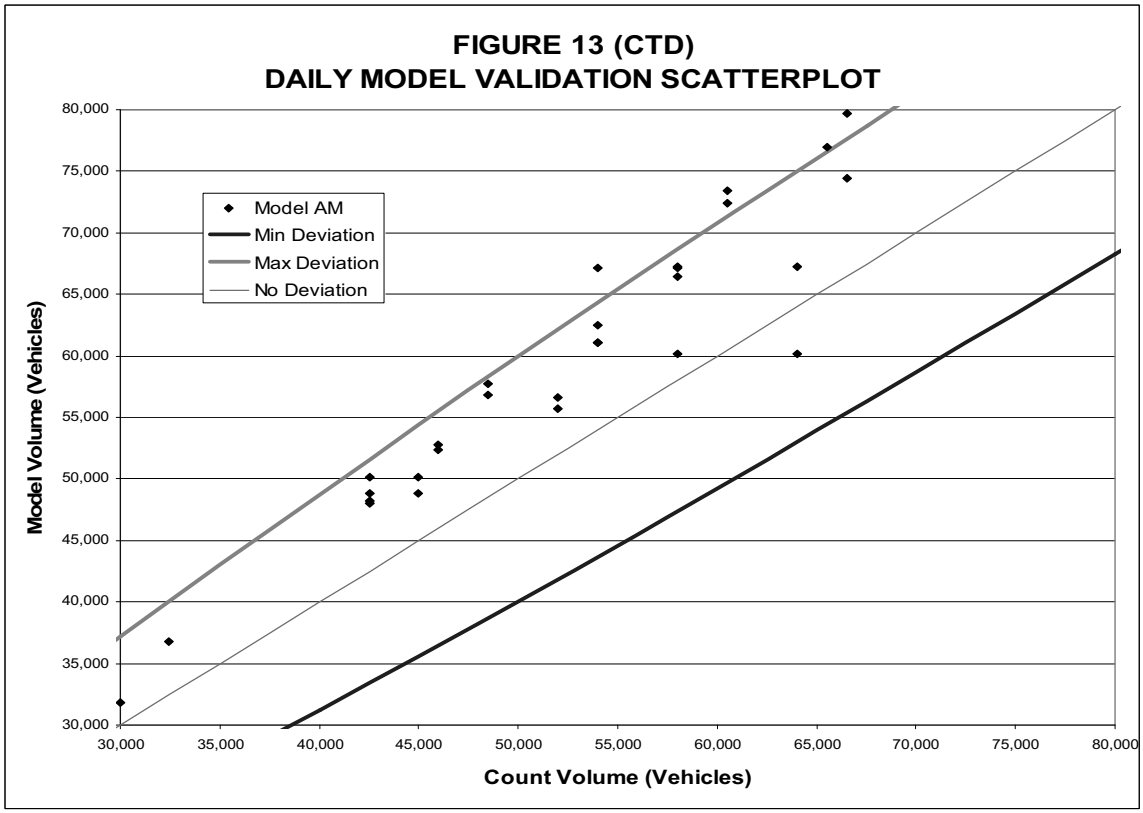


FIGURE 13 (CTD)
DAILY MODEL VALIDATION SCATTERPLOT



In addition to model-wide statistics, the results are aggregated by count volume range, as shown below.

Because the traffic volumes carried by facilities with the same functional class can vary substantially, it is our standard practice to calculate model validation statistics by traffic volume range. This ensures that the model performs well on mid- and high-volume facilities, which are the primary focus of most travel forecasting efforts. These results are shown in Table 13.

TABLE 13
RESULTS OF DAILY MODEL VALIDATION BY VOLUME RANGE

Count Volume Range	Count Locations	Volume-to-Count		RMSE	
		Criteria[1]	Model	Criteria[2]	Model
Less than 1,000	1	± 200%	**-206%**	116%	67%
1,000 to 2,499	10	± 100%	5%	116%	48%
2,500 to 4,999	27	± 50%	1%	116%	48%
5,000 to 9,999	44	± 25%	11%	43%	35%
10,000 to 19,999	41	± 20%	9%	28%	26%
20,000 to 24,999	8	± 20%	-4%	25%	16%
25,000 to 39,999	0	± 15%	N/A	25%	N/A
40,000 to 49,999	10	± 15%	13%	30%	15%
50,000 to 59,999	10	± 10%	**12%**	30%	14%
60,000 to 89,999	8	± 10%	**12%**	19%	17%

[1] Travel Model Improvement Program, Federal Highway Administration.

[2] A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for the National Association of Regional Councils, Harvey, G. et al., Washington, D.C. July 1993.

Note: Bold indicates where criteria are not met.

The model performs quite well on those validation criteria. This is a result of the validation and checking of the inputs at each step of the model development process, including a complete database of 2008 land use, 2000 US Census data, 2000 National Household Travel Survey data, the use of the SBCAG Regional Model, and locally adjusted trip generation rates.

DYNAMIC VALIDATION

The traditional approach to the validation of travel demand models is to compare the link volumes for the model's base year to actual traffic counts taken in the same year. This approach provides information on a model's ability to reproduce a static condition. However, models are seldom used for static applications; by far the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Therefore, another test of a model's accuracy would focus on the model's ability to predict realistic differences in outputs as inputs are changed; in other words, "dynamic" validation rather than static validation.

Land Use Changes

A basic form of dynamic validation is to vary the amounts of a particular land use type and compare the magnitude and direction of change from the original forecast. Of particular interest are the resulting changes in:

- Vehicle Trips (VT)
- Change in VT per land use unit change (VT/DU or KSF)
- Vehicle Miles Traveled (VMT)
- Change in VMT per land use unit change (VMT/DU or KSF)
- Vehicle Hours Traveled (VHT)
- Change in VHT per land use unit change (VHT/DU or KSF)
- Vehicle miles traveled per vehicle trip (VMT/VT)

This form of dynamic validation was performed on the Santa Barbara model by adjusting the number of multi-family one car dwelling units and the retail development in TAZs 41, 320, 370, and 297. These zones were selected due to their geographic location, the existing land use mix within the zone, and to test one zone from each of the four area types. To isolate each of these changes, tests were done sequentially, changing one item at a time.

Figure 14 shows the location of the zones that were used for dynamic validation. Zone 41 is located downtown near Chapala Street/Ortega Street and contains a broad mix of residential and non-residential land uses. Zone 320 is located in the Westside and contains residential and retail land uses. Zone 370 is located on the Riviera and contains single family land uses and an elementary school. Zone 297 is located in the Upper State Street Area and contains a broad mix of residential and non-residential land uses. The values added to a zone were selected based on the interaction with adjacent land use, and to determine if the model is sensitive to the location and magnitude of various land use changes. The results are shown in Table 14.

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PLAN SANTA BARBARA TAZs USED FOR DYNAMIC VALIDATION

FIGURE 14

TABLE 14
RESULTS OF DYNAMIC VALIDATION TESTS

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Residential Land Use Results – Multifamily Unit with 1 Car								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 DU	595,482	3.0	2,500,903	9.0	59,667	-1.0	4.20
	Added 25 DUs	595,557	3.1	2,501,338	17.8	59,690	0.9	4.20
	Added 50 DUs	595,635	3.1	2,501,440	10.9	59,698	0.6	4.20
320 - Westside	Added 1 DU	595,483	4.0	2,501,123	229.0	59,680	12.0	4.20
	Added 25 DUs	595,581	4.1	2,501,403	20.4	59,695	1.1	4.20
	Added 50 DUs	595,683	4.1	2,501,683	15.8	59,706	0.8	4.20
370 - Riveria	Added 1 DU	595,484	5.0	2,500,913	19.0	59,669	1.0	4.20
	Added 25 DUs	595,595	4.6	2,501,488	23.8	59,707	1.6	4.20
	Added 50 DUs	595,712	4.7	2,501,935	20.8	59,713	0.9	4.20
297 - Upper State Street	Added 1 DU	595,484	5.0	2,500,906	12.0	59,668	0.0	4.20
	Added 25 DUs	595,595	4.6	2,501,485	23.6	59,702	1.4	4.20
	Added 50 DUs	595,711	4.6	2,501,968	21.5	59,703	0.7	4.20
Retail Land Use Results								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 KSF	595,499	20.0	2,501,174	280.0	59,683	15.0	4.20
	Added 10 KSF	595,684	20.5	2,501,615	72.1	59,710	4.2	4.20
	Added 50 KSF	596,501	20.4	2,504,277	67.7	59,816	3.0	4.20

TABLE 14 RESULTS OF DYNAMIC VALIDATION TESTS (CONT)								
TAZ	**Scenario**	**Vehicle Trips (VT)**	**Change in VT/DU or KSF Change**	**Vehicle Miles Traveled (VMT)**	**Change in VMT/DU or KSF Change**	**Vehicle Hours Traveled (VHT)**	**Change in VHT/DU or KSF Change**	**VMT/VT**
Retail Land Use Results								
320 - Westside								
	Added 1 KSF	595,502	23.0	2,501,190	296.0	59,686	18.0	4.20
	Added 10 KSF	595,707	22.8	2,501,932	103.8	59,706	3.8	4.20
	Added 50 KSF	596,618	22.8	2,505,330	88.7	59,852	3.7	4.20
370 - Riveria	Added 1 KSF	595,550	71.0	2,501,174	280.0	59,685	17.0	4.20
	Added 10 KSF	595,686	20.7	2,501,955	106.1	59,708	4.0	4.20
	Added 50 KSF	596,513	20.7	2,505,378	89.7	59,828	3.2	4.20
297 - Upper State Street	Added 1 KSF	595,501	22.0	2,501,204	310.0	59,684	16.0	4.20
	Added 10 KSF	595,702	22.3	2,504,967	407.3	59,721	5.3	4.21
	Added 50 KSF	596,594	22.3	2,505,739	96.9	59,868	4.0	4.20

Source: Fehr & Peers, 2008.

- The change in VT per added DU ranges from 3.0 – 5.0. This is reasonable given the mix of land uses in the various zones and the different trip generation rates of each area type. Within each individual area type there is very little variability, showing stable trip generation across the range of land use magnitudes. The average vehicle trips per added DU are lowest for zone 41 due to the abundance of other land uses for the residents to interact with.

- Adding a single DU to the model is a test of how much noise (random error) is in the model. Total VMT changed by between 9 and 229 vehicle-miles per day per dwelling unit added, depending on the zone it was added to. Three of the four zones behaved very well with zones 41, 370 and 297 showing the appropriate increases in VMT relative to the land use mix surrounding these zones. Zone 41 has the lowest increase in VMT, while zone 370 has the highest and zone 297 falls in between. Only zone 320 returns

unreasonable results. However, with only a modest increase in dwelling units in this zone, representing a realistic level of development, the model performed as expected.

- The VHT per DU change is fairly stable around -1.0 to 1.4, with the exception of adding to zone 320. However, the noise at this extremely small level of change is no longer present if increased to a normal level of development

- As shown in Table 14, the VMT/VT is very stable and typically is around 4.2. This measure is used to reduce the influence of vehicle trip generation differences between land use types by normalizing the trip distance by total trips. As land use is added near existing compatible uses, the distance traveled decreases slightly. The opposite is also true: as land use is removed from nearby uses or added further from compatible uses, the distance traveled increases.

Roadway Network Changes

The final dynamic validation test was to see how the model would respond to changes in the road network. For these tests, we removed a key segment of the freeway and added/removed lanes on a Carrillo Street segment with particularly high demand. To isolate each of these changes, only one of the tests was done at a time. The description and results of each test are below and are shown on Tables 15 through 17.

- Remove Freeway Segment – Remove the segment of US-101 between Garden Street and Bath Street: Traffic that used this segment shifts to alternate routes. Routes parallel to the freeway, as well as routes approaching and departing from the freeway are impacted by this shift in traffic. The impact of this change is isolated to an appropriate area given the number and location of alternate freeway ramps on either side of the removed segment.

- Add Lanes to Key Segment – Carrillo Street was increased by one lane in each direction between US-101 Lane and Santa Barbara Street: The change in volume is isolated to a small area and the magnitude of increase in volume on Carrillo Street is roughly the same as the reduction on the adjacent segment of Bath Street which connects to the adjacent southbound freeway ramp. This is reasonable given the increase in primarily local traffic routes, and the prevailing congestion on Carrillo Street.

- Remove Lanes on Key Segment – Carrillo Street was reduced by one lane in each direction between US-101 and Santa Barbara Street: By reducing the capacity of the primary link between the Central Business District and the, traffic shifts on major roadways throughout the City. Due to the importance of Carrillo Street to the transportation system of the City, local trips divert to other internal routes, and regional trips exit the freeway at the neighboring freeway ramps.

TABLE 15
DYNAMIC VALIDATION NETWORK TEST - REMOVE US-101 SOUTHBOUND SEGMENT BETWEEN US-101 GARDEN STREET AND BATH STREET

Roadway	Segment	Volume with Existing US-101 Segment	Volume Without US-101 Segment	Ratio
US 101 southbound (36714)	Garden Street to Bath Street	58,507	-	-
Salinas St	w/o Carpinteria St	7,705	6,845	0.89
Milpas St	n/o Roundabout	30,852	30,656	0.99
Garden St	n/o Gutierrez St	20,817	23,638	1.14
Santa Barbara St	n/o Gutierrez St	8,584	8,180	0.95
Anacapa St	n/o Gutierrez St	4,183	3,811	0.91
Chapala St	n/o Gutierrez St	4,874	16,824	3.45
De La Vina St	n/o Gutierrez St	3,970	6,274	1.58
Bath St	n/o Haley St	3,462	1,530	0.44
Castillo St	n/o Haley St	2,276	8,165	3.59
Carrillo St	n/o Castillo St	40,133	45,915	1.14
Mission St	n/o Castillo St	23,695	21,400	0.90
Arellega St	n/o Castillo St	10,478	8,758	0.84
Total		161,029	181,996	1.13

Note: total for volume with US-101 segment does not include freeway segment volume
Source: Fehr & Peers, 2008

TABLE 16
DYNAMIC VALIDATION NETWORK TEST - ADD ONE LANE IN EACH DIRECTION ON CARRILLO STREET BETWEEN US-101 AND SANTA BARBARA STREET

Roadway	Segment	Volume with Existing Carrillo Street Lane Geometry	Volume After Adding One Lane	Ratio
Carrillo St	s/o Castillo St	44,281	46,693	1.05
Salinas St	w/o Carpinteria St	7,705	7,699	1.00
Milpas St	n/o Roundabout	30,852	30,907	1.00
Garden St	n/o Gutierrez St	20,817	20,486	0.98
Santa Barbara St	n/o Gutierrez St	8,584	8,593	1.00
Anacapa St	n/o Gutierrez St	4,183	4,186	1.00
Chapala St	n/o Gutierrez St	4,874	4,770	0.98
De La Vina St	n/o Gutierrez St	3,970	3,824	0.96
Bath St	n/o Haley St	3,462	3,101	0.90
Castillo St	n/o Haley St	2,276	2,268	1.00
Carrillo St	n/o Castillo St	40,133	44,526	1.11
Mission St	n/o Castillo St	23,695	23,331	0.98
Arellega St	n/o Castillo St	10,478	10,136	0.97
Mitcheltorena St	n/o Castillo St	8,419	8,103	0.96
Total		213,729	218,623	1.02

Source: Fehr & Peers, 2008

TABLE 17
DYNAMIC VALIDATION NETWORK TEST - REMOVE ONE LANE IN EACH DIRECTION ON CARRILLO STREET BETWEEN US-101 AND SANTA BARBARA STREET

Roadway	Segment	Volume with Existing Carrillo Street Lane Geometry	Volume After Removing One Lane	Ratio
Carrillo St	s/o Castillo St	44,281	33,853	0.76
Salinas St	w/o Carpinteria St	7,705	7,699	1.00
Milpas St	n/o Roundabout	30,852	30,970	1.00
Garden St	n/o Gutierrez St	20,817	21,564	1.04
Santa Barbara St	n/o Gutierrez St	8,584	8,605	1.00
Anacapa St	n/o Gutierrez St	4,183	4,184	1.00
Chapala St	n/o Gutierrez St	4,874	4,968	1.02
De La Vina St	n/o Gutierrez St	3,970	3,678	0.93
Bath St	n/o Haley St	3,462	5,902	1.70
Castillo St	n/o Haley St	2,276	2,844	1.25
Carrillo St	n/o Castillo St	40,133	26,711	0.67
Mission St	n/o Castillo St	23,695	25,770	1.09
Arellega St	n/o Castillo St	10,478	11,331	1.08
Mitcheltorena St	n/o Castillo St	8,419	9,317	1.11
Total		213,729	197,396	0.92

Source: Fehr & Peers, 2008

6. PEAK HOUR MODEL SPECIFICATIONS

In addition to the daily model described in the earlier sections of this report, it was necessary to develop model components to address the morning (AM) and evening (PM) peak hours. (For purposes of model development and testing, the average peak hours were calculated based on traffic count data). Estimates of peak hour trips were obtained by applying a percentage factor to the daily productions and attractions for each trip purpose. The peak hour factors were calibrated to reflect trip-making relationships between the AM and PM peak hours to the daily model. In addition, recent national data from the reference document National Cooperative Highway Research Program Report 365 (NCHRP 365) was consulted to ensure that the peak hour factors used in the Santa Barbara model were within reasonable ranges.

Table 18 presents the AM and PM peak hour factors from the NCHRP 365 and the Santa Barbara model. The differences in peak hour factors between the two models are primarily due to travel characteristics in the Santa Barbara area compared to other parts of the country. The largest difference is the non-home based trip in the PM peak hour for the Santa Barbara model is higher than NCHRP 365. This is likely due to the fact that many Santa Barbara residents work within the city and the city is relatively small, allowing for a higher number of short trips to occur within a single hour.

TABLE 18
PEAK HOUR FACTOR COMPARISON - NCHRP 365 AND 2008 SANTA BARBARA MODEL

Purpose		AM Peak Hour Factors[1]		PM Peak Hour Factors[1]	
		NCHRP 365[2]	2008 Santa Barbara Model	NCHRP 365[2]	2008 Santa Barbara Model
Home-Based Work (HBW)	Production	13.8	15	0.9	0.9
	Attraction	0.6	1.25	11.4	10
Home-Based Other (HBO)	Production	5	5.5	4.2	4.25
	Attraction	0.4	1.75	3.2	3.75
Non-Home Based (NHB)	Production	1.5	1.5	9.1	3.75
	Attraction		1.5		4
Golf (GOLF)	Production	N/A	1	N/A	3
	Attraction		3		2
Recreational (REC)	Production		4		6
	Attraction		1.5		6.5
Internal-External (IX)	Production		5.75		3
	Attraction		2		5
External-Internal (XI)	Production		5.75		2
	Attraction		1		5
External-External(E-E)	Production		3		4
	Attraction		3		4

[1]. Factors represent the percent of daily traffic occurring in the peak hour.

[2]. Travel Estimation Techniques, National Cooperative Highway Research Program Report 365, 1998. Reported for 7-8 am and 5-6 pm.
Source: Fehr & Peers, 2008

7. PEAK HOUR MODEL VALIDATION RESULTS

The peak hour model volumes were compared against individual peak hour traffic counts collected specifically for this project, and other counts provided by City staff, the County, and Caltrans. Spreadsheets were created to compute the validation results for roadway links in the Santa Barbara travel model. In addition to the daily counts by hour that were used for the daily validation, intersection peak hour turning movements were collected and added to the count database for a count set of 187 locations. Because the peak hour counts were not in all the same places as the daily counts, a new set of screenlines was created to work with the peak hour count set. Figure 15 shows the peak hour validation locations and Figure 16 shows the peak hour screenline locations, while Figure 17 and Figure 18 show the link volumes resulting from the 2008 Santa Barbara model for the AM and PM peak hours, respectively. The analysis of the complete set of counts is included in Appendix F.

The final results for peak hour conditions are summarized in Table 19 below, while the detailed spreadsheets are presented in Appendix F.

TABLE 19
RESULTS OF PEAK HOUR MODEL VALIDATION

Validation Item	Criterion for Acceptance	AM Peak Hour Model Results	PM Peak Hour Model Results
Count Locations	N/A	187	187
% of Links Within Caltrans Standard Deviations	At Least 75%	77%	78%
% of Screenlines Within Caltrans Standard Deviations	100%	100%	100%
2-way Sum of All Links Counted	Within ± 10%	3%	3%
Correlation Coefficient	Greater than 88%	90%	91%
RMSE	40% or less	29%	28%

Source: Fehr & Peers, 2008.

As shown in Table 19, the 2008 Santa Barbara AM and PM peak hour models meet or exceed the guidelines for model accuracy. In addition to model-wide statistics, the results are aggregated by volume range, as shown in Table 20. The model performs quite well on those validation criteria except for the highest volume range in the PM; however, there are only three count locations within this range, so having a single location where the model volume is substantially higher than the count skews the results.

The results of the validation are due to the checking of the inputs at each step of the model development process, including a very well calibrated and validated daily model, and complete set of count data.

The AM peak hour model deviation by geographic location is shown on Figure 19, while Figure 20 shows a scatter plot of count and model volumes compared to Caltrans' allowable error. Figure 21 and Figure 22 show similar comparisons for the PM peak hour model. As these Figures show,

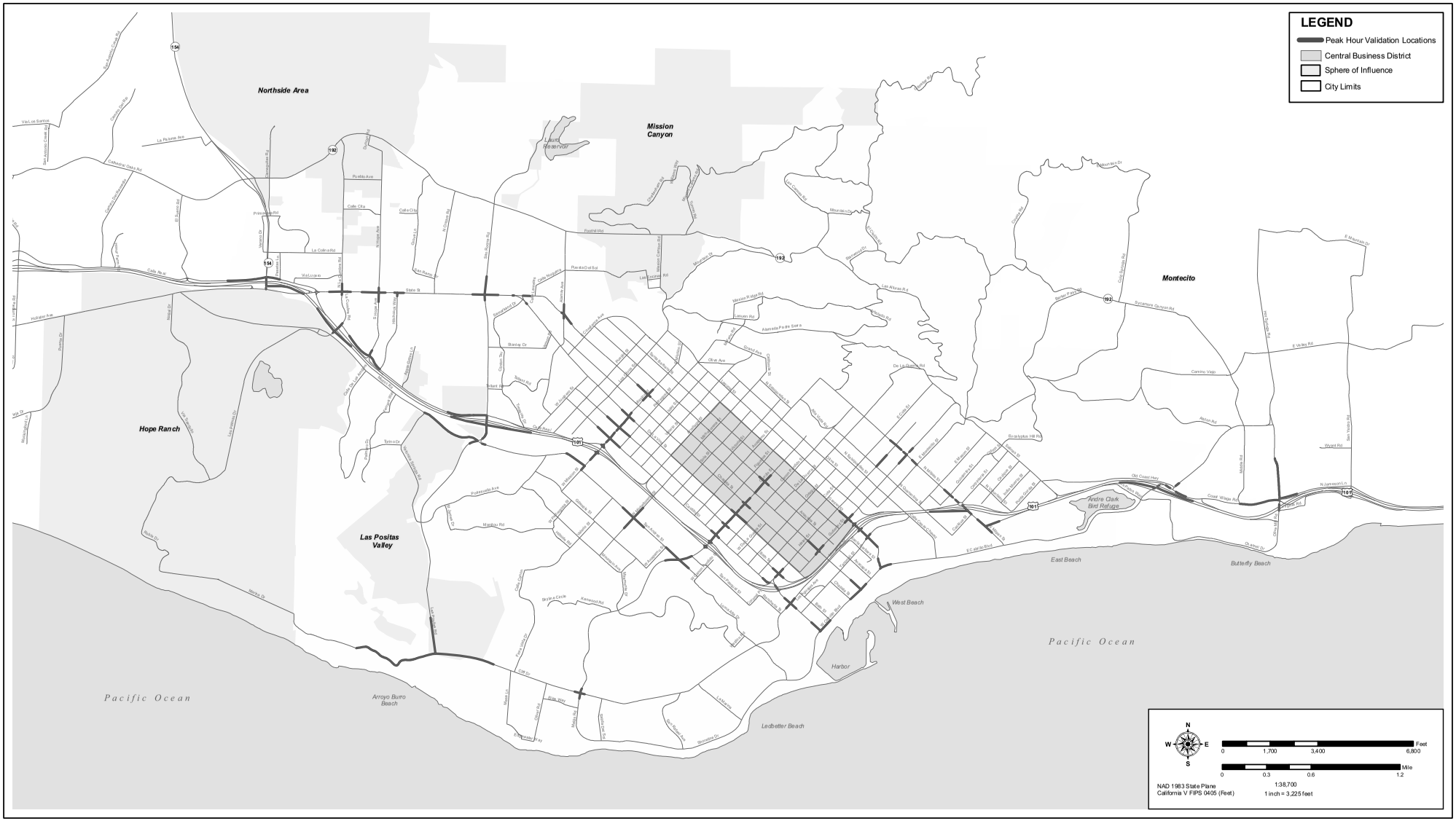
the error is distributed geographically and by count volume in a way that demonstrates the model is performing well overall.

TABLE 20
RESULTS OF PEAK HOUR MODEL VALIDATION BY VOLUME RANGE

Count Volume Range	Volume-to-Count Criteria[1]	RMSE Criteria[2]	AM Peak Hour			PM Peak Hour		
			Counts	Volume-to-Count	RMSE[2]	Counts	Volume-to-Count	RMSE[2]
100 to 250	± 100%	116%	1	32%	32%	0	N/A	N/A
250 to 499	± 50%	116%	37	9%	57%	21	9%	57%
500 to 999	± 25%	43%	66	-1%	33%	63	-5%	36%
1,000 to 1,999	± 20%	28%	73	3%	25%	75	0%	24%
2,000 to 2,499	± 20%	25%	10	8%	17%	25	12%	19%
2,500 to 3,999	± 15%	25%	0	N/A	N/A	3	**22%**	**36%**

Note: Bold indicates where criteria are not met.
[1] Travel Model Improvement Program, Federal Highway Administration.
[2] A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for the Natural Association of Regional Councils, Harvey, G. et al., Washington, D.C. July 1993.

Source: Fehr & Peers, 2008.



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PLAN SANTA BARBARA PEAK HOUR VALIDATION LOCATIONS
FIGURE 15

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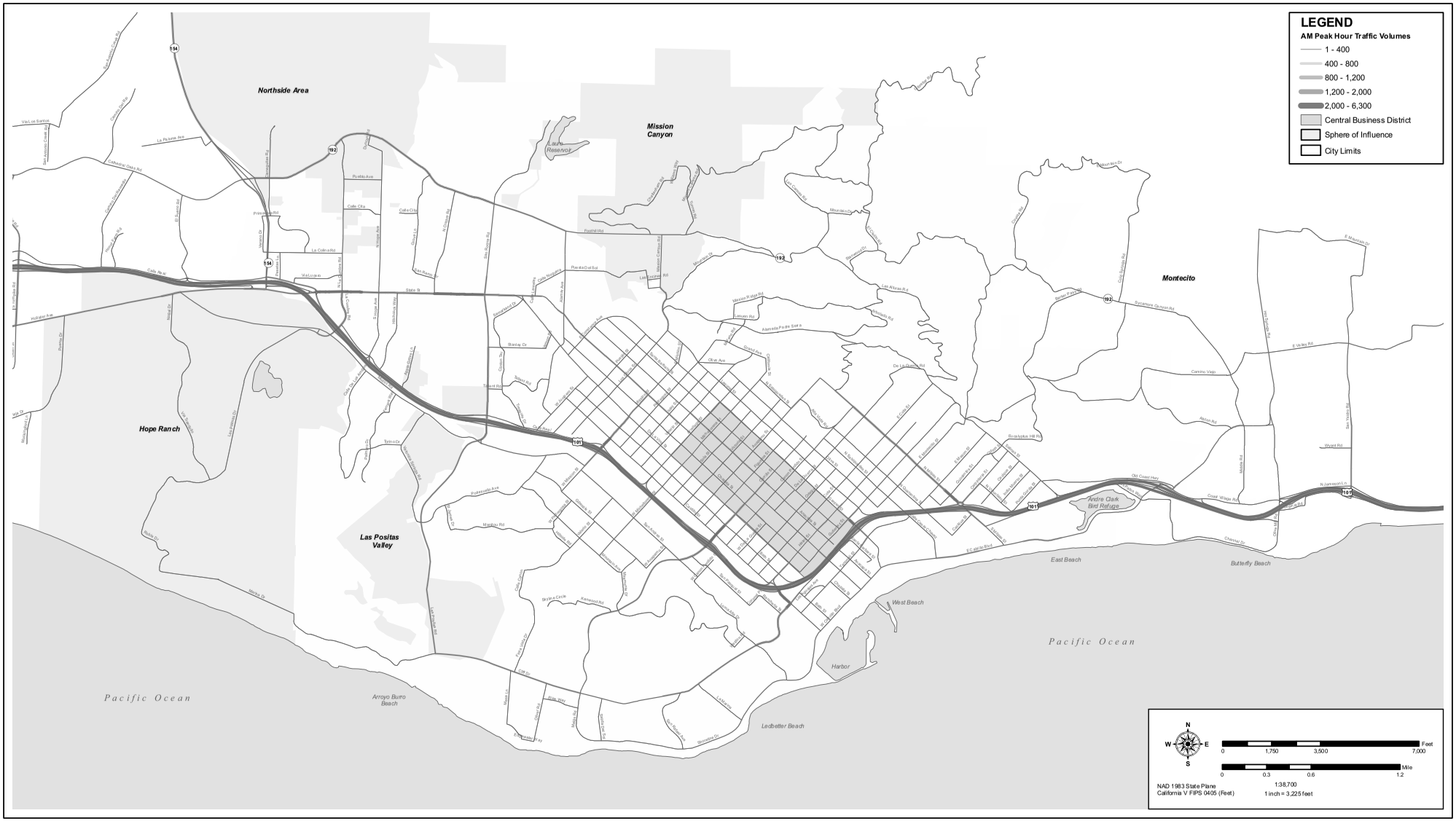
PLAN SANTA BARBARA PEAK HOUR SCREENLINE LOCATIONS
FIGURE 16



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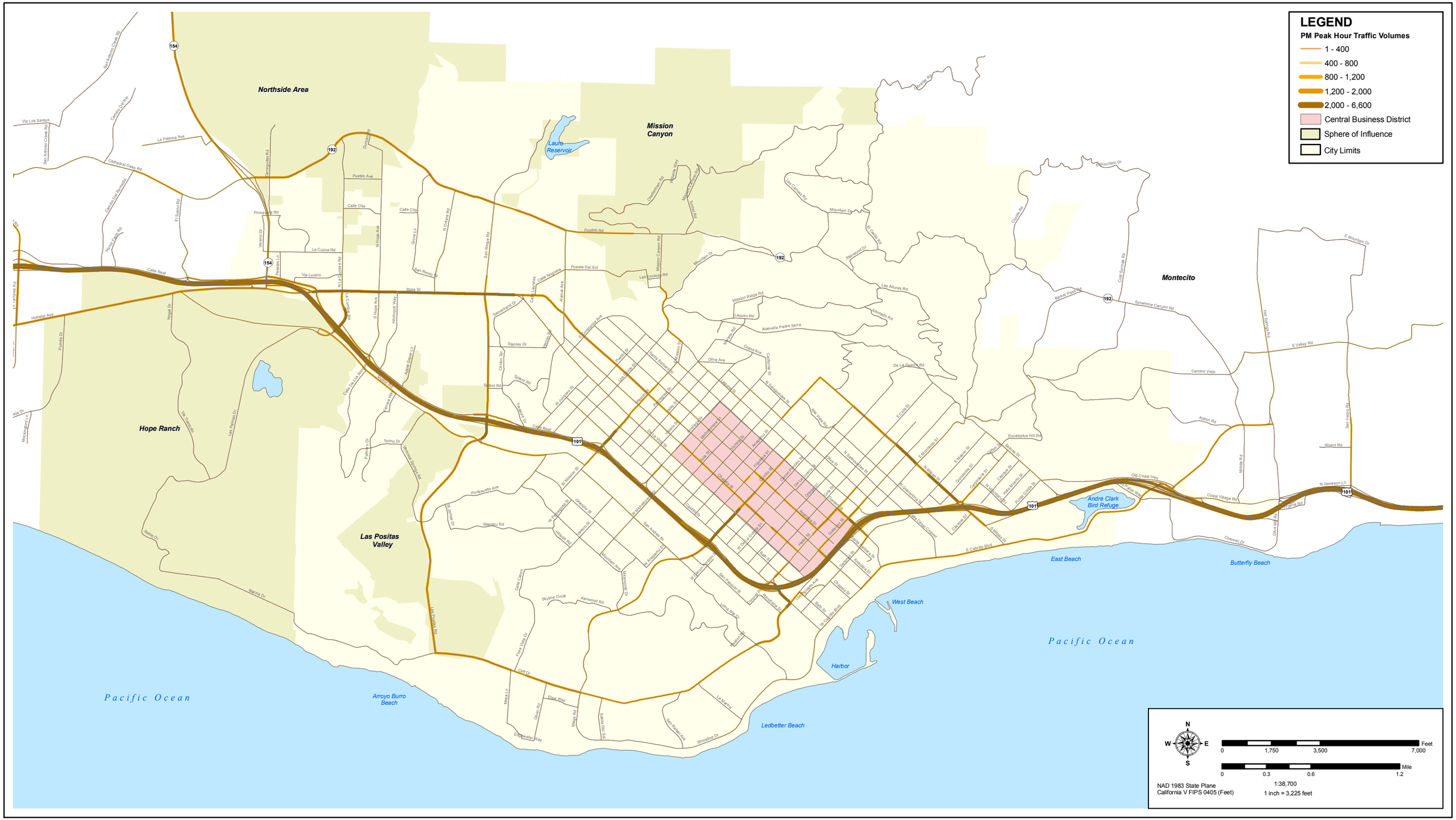
PLAN SANTA BARBARA AM MODEL VOLUMES
FIGURE 17



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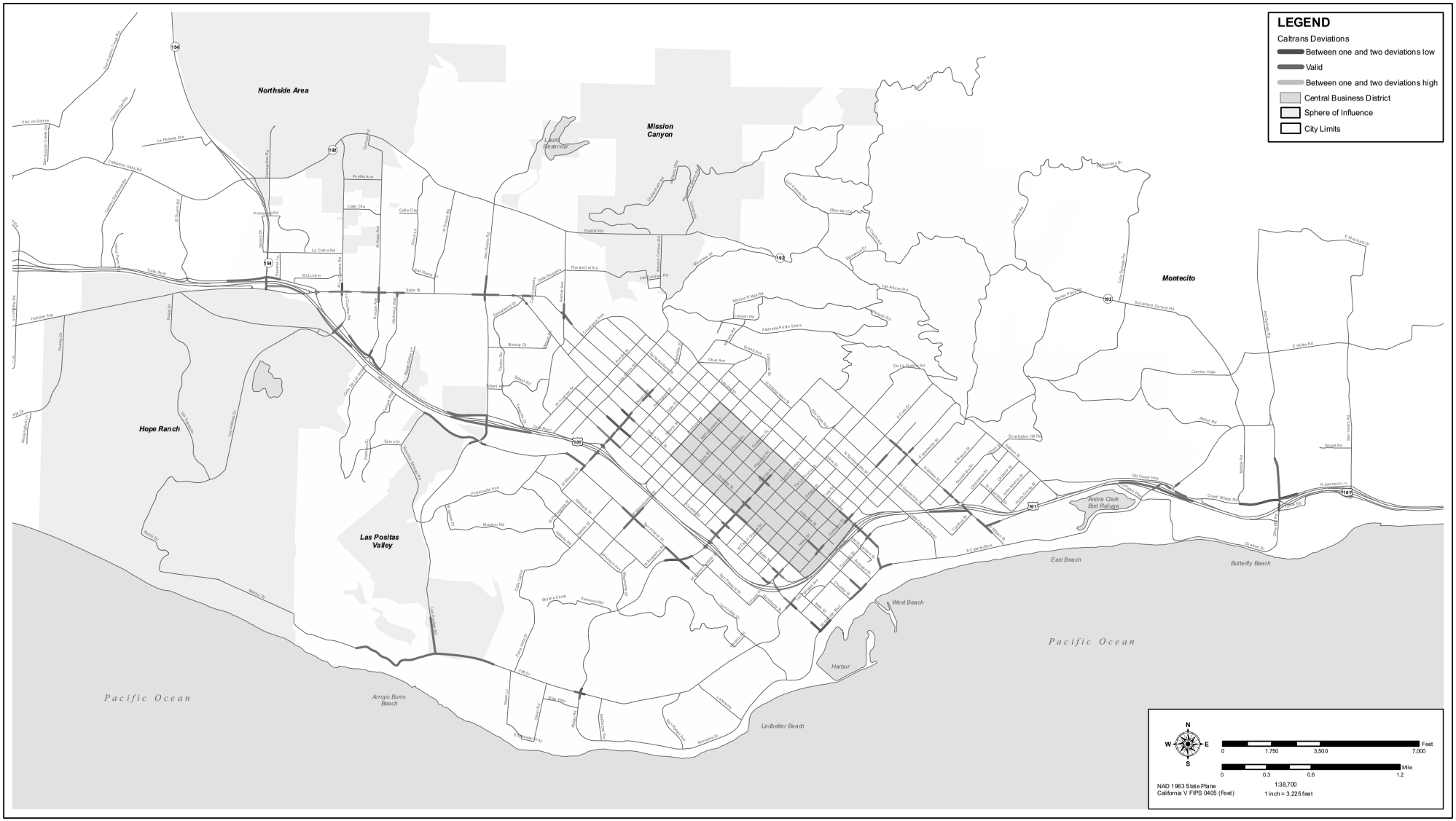
PLAN SANTA BARBARA PM MODEL VOLUMES
FIGURE 18



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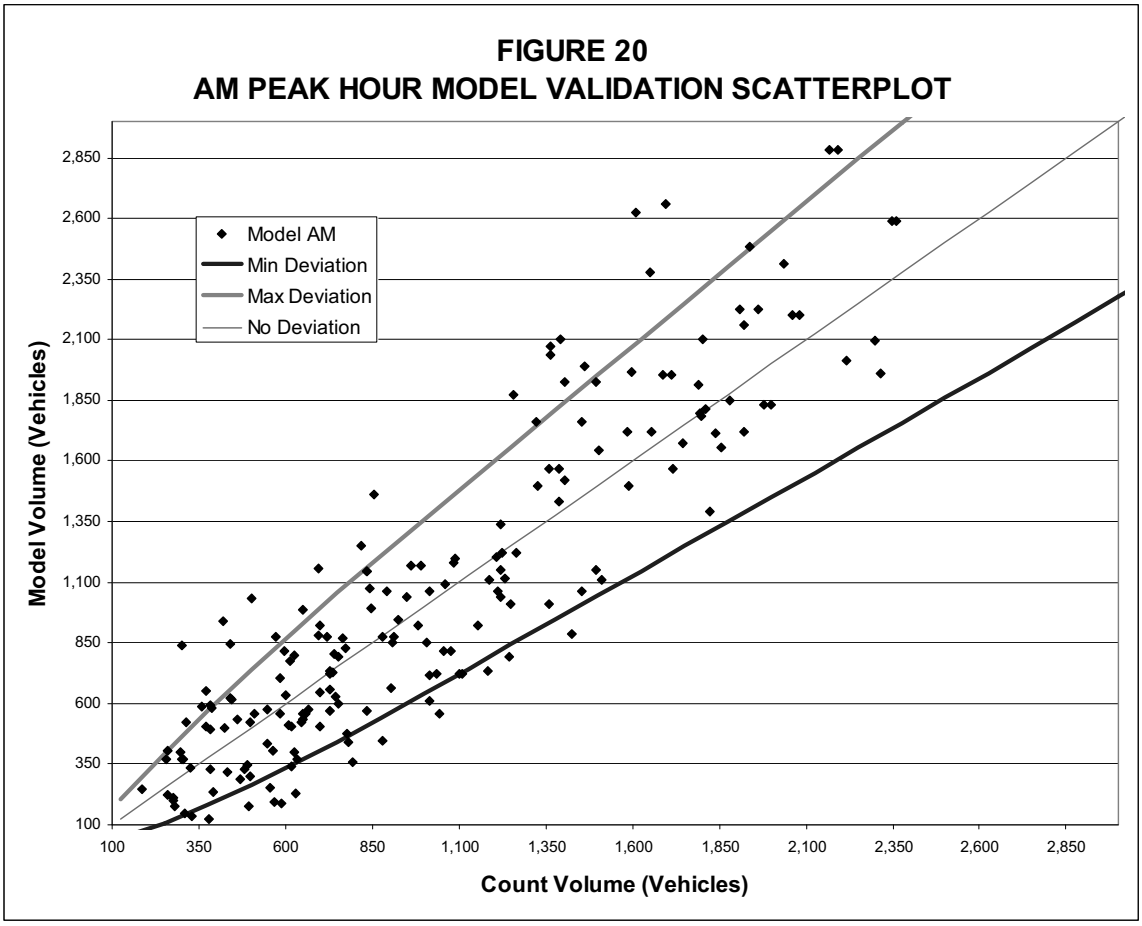
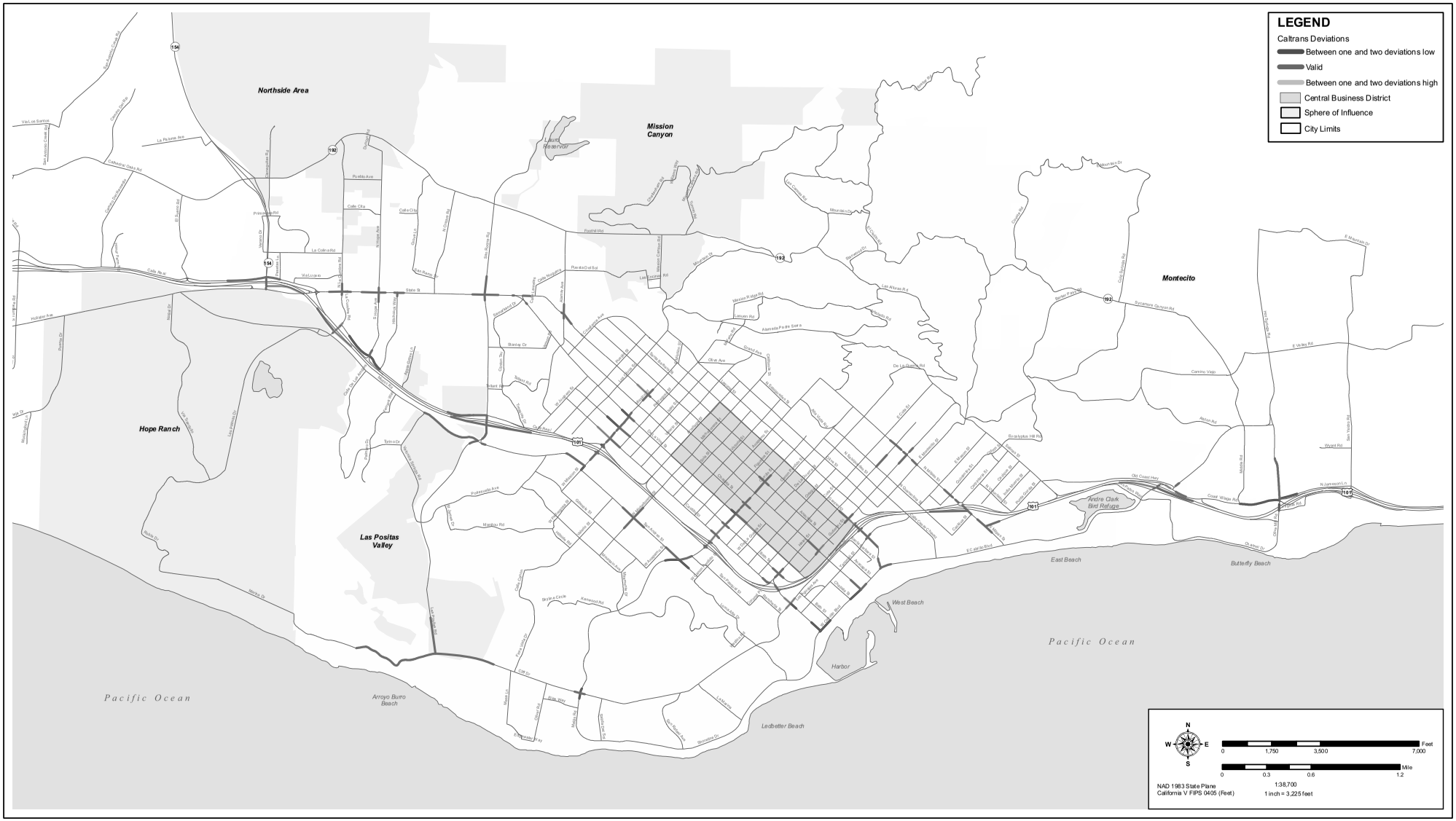
PLAN SANTA BARBARA AM PEAK HOUR MODEL DEVIATION
FIGURE 19

FIGURE 20
AM PEAK HOUR MODEL VALIDATION SCATTERPLOT





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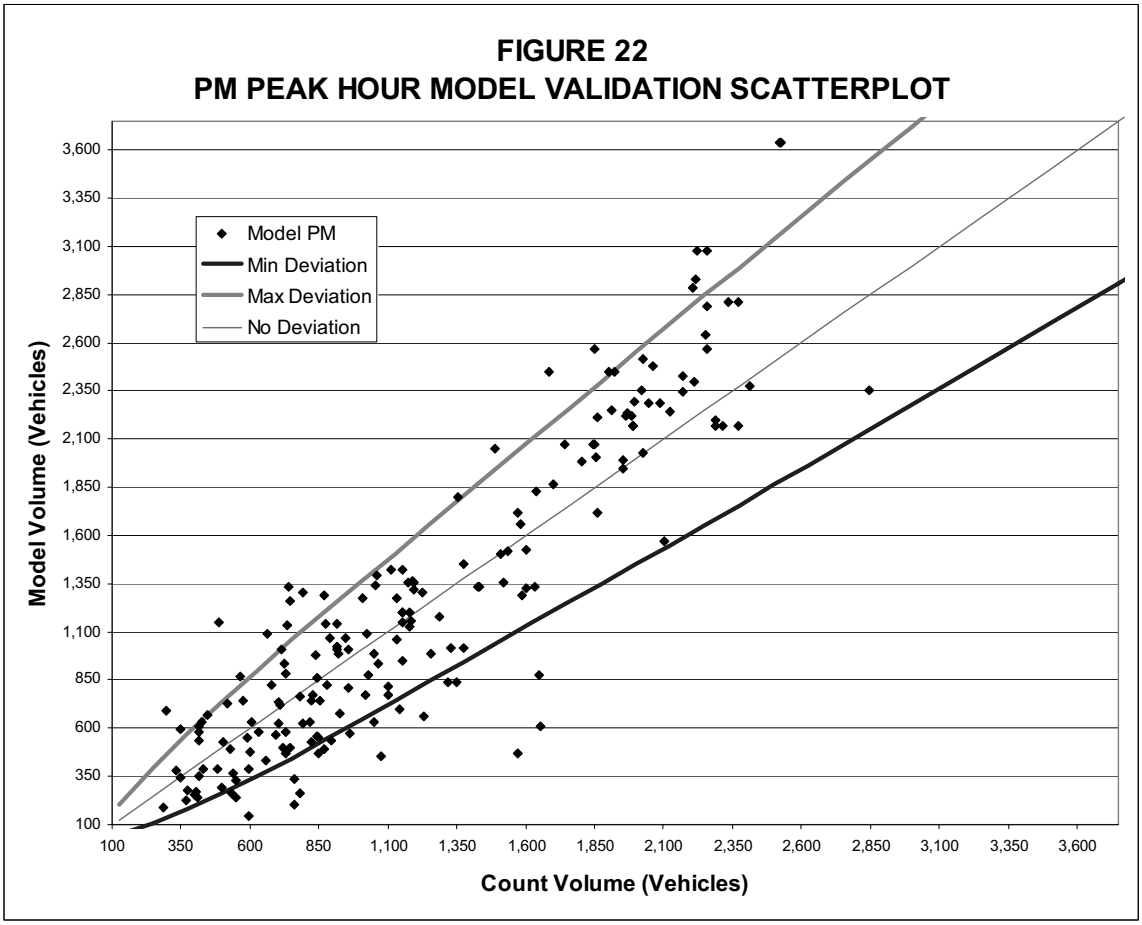
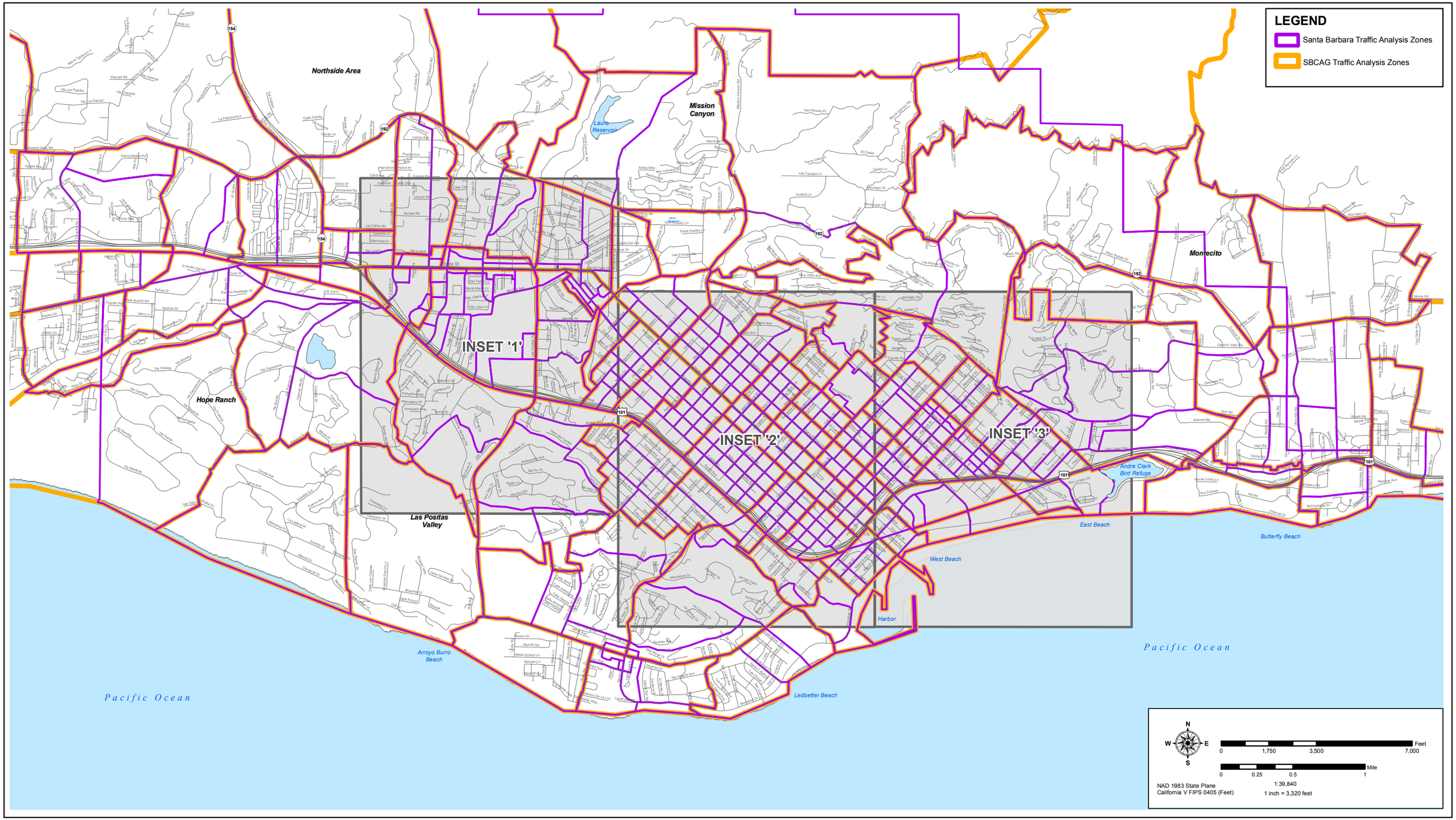
PLAN SANTA BARBARA PM PEAK HOUR MODEL DEVIATION
FIGURE 21

FIGURE 22
PM PEAK HOUR MODEL VALIDATION SCATTERPLOT



APPENDIX A:
TRAFFIC ANALYSIS ZONE (TAZ) BOUNDARY MAP



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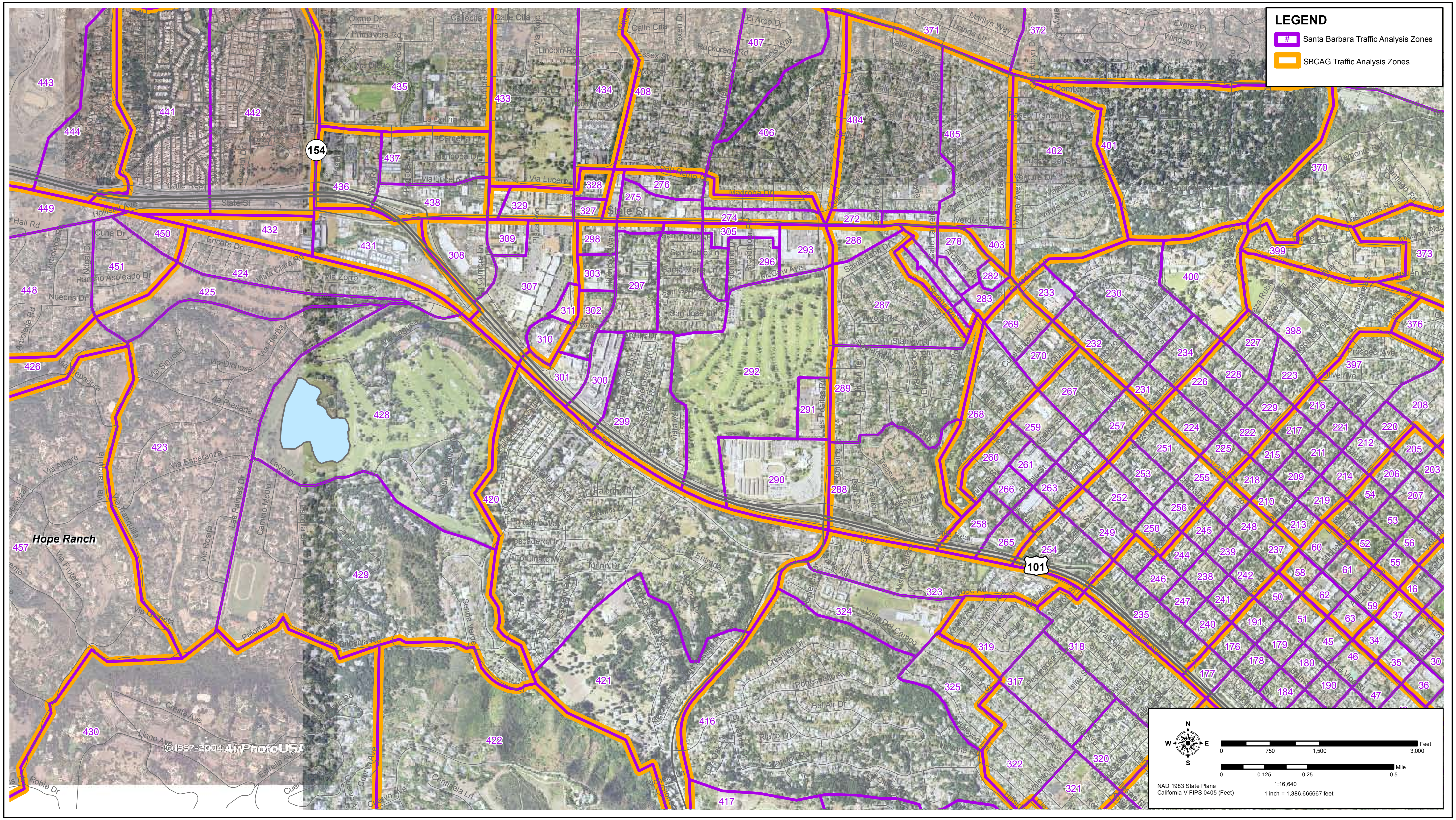
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES - KEY MAP
APPENDIX A



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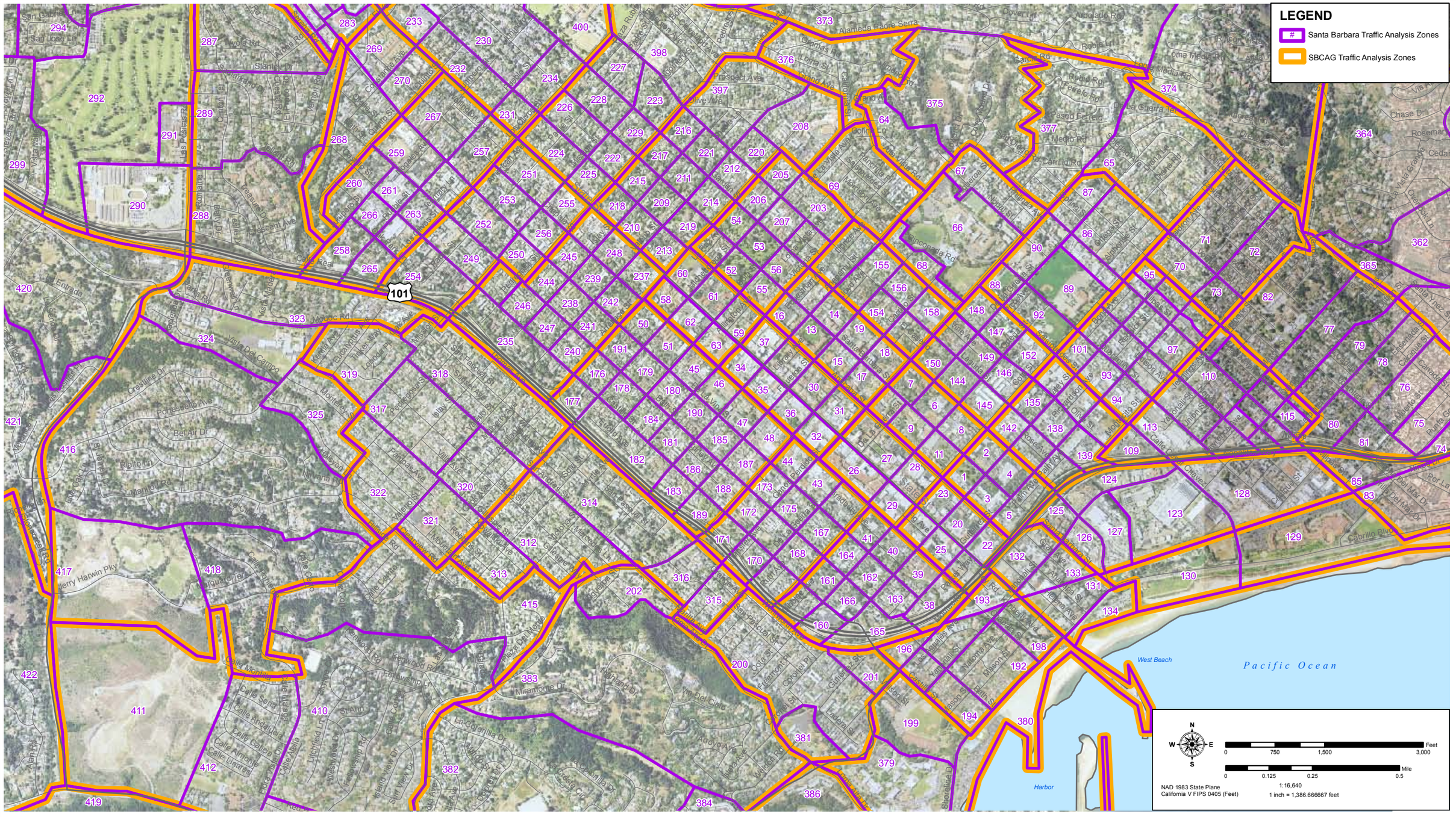
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 1



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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 2

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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 3

APPENDIX B:
BASE YEAR LAND USE DATA BY TAZ

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	LU_Spare0	LU_Spare0	LU_Spare0	LU_Spare0	IX_P	IX_A	XI_P	XI_A
1	1	CBD	7	3	6	2	1	0.000	5.213	6.727	5.168	5.353	0.000	0.000	3.522	9.104	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
2	1	CBD	0	6	14	4	2	0.000	0.000	0.000	0.000	34.333	0.000	0.000	0.000	8.425	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
3	1	CBD	9	2	5	1	1	0.000	0.000	13.456	0.000	6.760	0.000	51.679	0.000	15.453	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
4	1	CBD	0	0	0	0	0	0.000	0.000	6.253	0.000	56.524	0.000	0.000	0.000	2.417	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
5	1	CBD	4	2	8	3	1	0.000	0.000	5.035	0.000	5.468	0.000	4.230	0.000	24.240	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
6	1	CBD	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	30.044	0.000	0.000	286	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
7	1	CBD	2	3	4	2	1	0.909	0.000	0.000	1.111	0.000	0.000	45.804	0.000	0.000	69	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
8	1	CBD	4	7	15	5	2	0.000	0.000	0.000	2.006	15.691	0.000	1.158	0.000	5.785	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
9	1	CBD	2	1	2	0	0	0.000	0.000	0.000	2.645	5.779	0.000	21.860	27.691	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
10	1	CBD	0	4	10	3	1	38.355	0.000	0.000	6.551	9.941	0.000	32.323	0.875	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
11	1	CBD	2	3	7	2	1	0.000	0.000	0.000	0.000	15.397	0.000	33.248	0.000	8.441	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
12	1	CBD	6	4	27	12	3	0.000	0.000	0.000	3.313	4.233	0.000	15.653	0.000	5.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
13	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	140.658	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
14	1	CBD	9	5	16	8	2	6.237	0.000	0.000	0.000	0.000	0.000	51.240	0.000	0.000	0	0	28	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
15	1	CBD	0	0	1	0	0	29.900	0.000	0.000	0.000	4.202	0.000	40.475	0.000	2.400	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
16	1	CBD	0	0	1	0	0	0.000	0.000	0.000	2.700	5.554	0.000	29.003	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
17	1	CBD	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	68.843	11.376	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
18	1	CBD	1	2	5	2	1	0.000	0.000	0.000	2.200	0.000	13.027	111.479	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
19	1	CBD	1	6	17	8	2	0.000	0.000	0.000	0.000	1.986	0.000	45.840	0.000	2.720	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
20	1	CBD	1	1	5	1	1	0.000	6.010	5.850	0.857	52.696	5.046	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
21	1	CBD	0	3	20	6	2	0.000	0.000	0.000	3.360	41.050	0.000	6.621	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
22	1	CBD	0	1	2	1	0	0.000	0.000	5.749	0.000	27.536	0.000	4.970	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
23	1	CBD	0	0	0	0	0	1.390	1.506	3.385	27.914	34.505	29.618	17.052	0.000	0.000	0	0	0	16	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
24	1	CBD	0	3	15	3	2	0.000	23.274	5.664	5.061	15.363	37.714	13.009	0.000	0.000	90	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
25	1	CBD	0	1	4	1	0	1.500	12.258	5.202	15.697	22.731	29.750	24.747	0.000	0.000	0	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
26	1	CBD	0	0	0	0	0	0.000	0.000	0.000	3.400	349.932	0.000	95.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
27	1	CBD	0	0	0	0	0	22.005	0.989	0.000	21.281	113.046	0.000	105.048	11.943	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
28	1	CBD	0	0	0	0	0	0.000	36.218	0.000	4.400	39.716	0.000	0.000	0.000	2.930	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
29	1	CBD	0	0	0	0	0	0.000	2.760	14.657	0.000	50.310	0.000	9.993	0.000	5.321	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
30	1	CBD	0	0	0	0	0	86.613	7.006	0.000	27.291	23.659	0.000	65.339	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
31	1	CBD	0	0	0	0	0	10.776	14.208	0.000	2.459	53.732	0.000	58.535	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
32	1	CBD	0	0	0	0	0	10.079	12.756	0.000	0.000	70.763	19.883	40.376	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
33	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	14.723	0.000	16.412	162.805	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
34	1	CBD	0	0	0	0	0	0.000	21.050	0.000	12.469	31.158	0.000	13.105	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
35	1	CBD	0	0	0	0	0	0.000	3.025	0.000	6.700	51.804	0.000	38.015	2.106	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
36	1	CBD	0	0	0	0	0	7.950	0.000	0.000	6.587	73.092	0.000	29.007	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
37	1	CBD	0	0	0	0	0	0.000	43.093	0.000	14.160	37.840	0.000	19.011	0.000	0.000	100	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
38	1	CBD	0	3	12	5	2	0.000	0.000	0.000	0.000	9.677	0.000	14.180	0.000	2.258	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
39	1	CBD	5	5	19	8	4	0.000	0.000	4.063	0.000	0.000	17.342	14.200	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
40	1	CBD	11	4	15	6	3	0.000	0.000	3.247	0.000	9.089	0.000	6.523	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
41	1	CBD	6	3	14	6	3	0.000	0.000	1.633	4.082	18.234	0.000	8.080	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
42	1	CBD	3	18	44	18	8	2.024	1.212	1.643	2.438	13.797	0.000	2.163	0.000	1.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
43	1	CBD	0	2	5	2	1	0.000	0.000	1.937	0.000	15.913	0.000	86.125	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
44	1	CBD	0	1	2	1	0	0.000	0.000	15.654	3.412	14.737	11.950	54.069	0.000	4.873	0	0	23	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
45	1	CBD	8	34	88	31	6	0.000	10.481	1.156	0.000	0.000	0.000	4.029	6.345	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
46	1	CBD	0	0	0	0	0	0.000	5.734	0.000	0.000	0.000	0.000	50.195	3.098	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
47	1	CBD	1	26	89	29	6	0.000	12.490	0.000	0.000	0.000	0.000	55.548	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
48	1	CBD	0	0	0	0	0	0.000	0.000	6.678	0.000	51.400	0.000	20.503	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
49	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
50	1	CBD	9	6	16	5	2	0.000	0.000	0.000	0.000	0.000	0.000	72.012	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
51	1	CBD	4	3	7	2	1	0.000	0.000	0.000	2.211	7.865	15.000	38.387	3.520	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
52	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
53	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
54	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
55	1	CBD	1	4	32	13	3	0.000	0.000	0.000	0.000	0.000	0.000	62.420	2.683	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
56	1	CBD	1	5	38	16	4	0.000	10.062	0.000	0.000	0.000	0.000	22.280	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
57	1	CBD	4	3	28	9	2	0.000	0.000	0.000	0.000	0.000	0.000	32.292	0.000	0.000	0	0	0	15	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
58	1	CBD	2	3	13	3	2	0.000	0.000	0.000	6.500	4.256	0.000	77.723	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
59	1	CBD	2	5	36	10	4	15.168	0.000	0.000	3.483	18.113	0.000	15.414	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
60	1	CBD	0	0	3	1	0	0.000	0.000	0.000	0.000	2.240	0.000	12.948	0.000	0.000	234	0	0	15	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
61	1	CBD	0	0	0	0	0	0.000	3.415	0.000	0.000	0.000	0.000	13.942	0.000	0.000	0	0	0	47	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
62	1	CBD	0	0	2	0	0	20.554	0.000	0.000	1.500	10.464	0.000	63.659	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
63	1	CBD	0	0	1	0	0	0.000	116.082	0.000	8.557	42.762	0.000	7.785	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
64	2	Outside Downtown	40	12	50	30	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
65	2	Outside Downtown	187	4	39	25	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
66	2	Outside Downtown	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	2,555	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
67	2	Outside Downtown	34	14	78	49	18	0.000	0.000	7.264	0.000	5.772	0.000	3.993	0.000	15.298	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
68	2	Outside Downtown	19	13	38	22	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
69	2	Outside Downtown	123	20	112	63	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
70	2	Outside Downtown	33	3	24	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
71	2	Outside Downtown	110	8	61	48	16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
72	2	Outside Downtown	72	4	14	18	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
73	2	Outside Downtown	15	2	9	9	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
74	2	Outside Downtown	33	29	146	72	30	0.000	0.000	0.000	0.000	1.443	0.000	0.000	0.000	1.750	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
75	2	Outside Downtown	56	17	58	36	17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
76	2	Outside Downtown	22	37	127	80	24	0.000	0.000	0.000	0.000	1.350	0.000	5.093	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
77	2	Outside Downtown	45	23	40	70	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
78	2	Outside Downtown	31	15	39	44	7	0.000	0.000	0.000	0.600	2.795	0.000	0.000	0.000	0.350	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
79	2	Outside Downtown	58	15	33	43	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
80	2	Outside Downtown	17	5	16	10	2	0.000	0.000	0.000	0.000	15.473	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
81	2	Outside Downtown	14	10	44	22	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
82	2	Outside Downtown	85	15	38	52	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.671	0.000	550	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
83	2	Outside Downtown	5	6	103	33	9	0.000	0.000	0.000	21.261	0.000	289.791	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
84	2	Outside Downtown	0	22	201	89	31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
85	2	Outside Downtown	2	1	5	2	1	0.000	2.000	0.606	0.000	9.804	0.000	1.978	0.000	27.562	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
86	2	Outside Downtown	92	10	28	23	11	0.000	0.000	7.035	9.857	14.457	0.000	2.900	0.000	8.145	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
87	2	Outside Downtown	27	5	20	12	4	3.700	0.000	1.629	0.000	9.378	0.000	2.123	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
88	2	Outside Downtown	5	8	11	9	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
89	2	Outside Downtown	2	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	740	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
90	2	Outside Downtown	2	17	23	20	12	22.180	0.000	0.000	5.089	2.424	0.000	5.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
91	2	Outside Downtown	1	0	1	1	0	0.000	0.000	1.656	0.000	25.327	0.000	0.000	0.000	54.601	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
92	2	Outside Downtown	12	10	14	12	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
93	2	Outside Downtown	0	1	1	1	0	0.000	0.000	23.451	7.199	18.550	0.000	0.000	0.000	33.945	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
94	2	Outside Downtown	4	0	0	0	0	0.000	0.000	2.500	0.000	5.580	0.000	4.111	19.735	47.203	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
95	2	Outside Downtown	5	1	10	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	5	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
96	2	Outside Downtown	6	1	4	3	1	0.000	0.000	12.915	2.944	13.539	0.000	47.659	1.474	17.438	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
97	2	Outside Downtown	1	2	4	4	1	0.000	0.000	3.743	2.709	22.491	0.000	29.499	0.000	22.615	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
98	2	Outside Downtown	0	0	0	0	0	0.000	4.410	5.428	0.000	12.619	0.000	3.899	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
99	2	Outside Downtown	0	1	3	2	1	0.000	0.000	2.092	2.756	24.009	0.000	1.843	0.000	0.000	44	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
100	2	Outside Downtown	5	2	3	3	1	0.000	0.000	6.340	0.000	15.000	0.000	10.000	0.000	12.335	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
101	2	Outside Downtown	1	5	6	4	2	0.000	0.000	1.778	0.000	6.995	0.000	1.225	0.000	1.732	0	0	0	13	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
102	2	Outside Downtown	10	2	6	5	2	0.000	4.000	11.306	4.645	5.420	0.000	3.707	0.000	14.067	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
103	2	Outside Downtown	8	2	3	2	1	0.000	0.000	30.349	3.420	7.216	0.000	1.095	0.000	27.737	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
104	2	Outside Downtown	13	3	4	4	2	0.000	1.969	2.088	0.000	6.656	0.000	11.625	0.000	22.463	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
105	2	Outside Downtown	8	1	7	5	2	0.000	0.000	0.000	0.000	23.001	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
106	2	Outside Downtown	6	1	3	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	62	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
107	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	4.505	16.916	0.000	2.782	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
108	2	Outside Downtown	9	3	4	6	0	0.000	0.000	6.587	1.329	6.243	0.000	10.488	0.000	77.604	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
109	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	89.135	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
110	2	Outside Downtown	16	6	8	12	1	0.000	0.000	7.203	1.855	11.722	0.000	7.645	2.198	31.976	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
111	2	Outside Downtown	31	7	10	14	1	0.000	0.000	0.980	2.079	7.300	0.000	2.956	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
112	2	Outside Downtown	5	0	0	0	0	0.000	0.000	0.000	7.500	12.368	0.000	2.958	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
113	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	50.345	0.000	17.398	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
114	2	Outside Downtown	5	2	2	3	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
115	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	46.406	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
116	2	Outside Downtown	5	2	4	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
117	2	Outside Downtown	4	1	3	2	0	0.000	0.000	0.000	0.000	6.226	0.000	3.744	0.000	18.387	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
118	2	Outside Downtown	0	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	22.893	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
119	2	Outside Downtown	0	0	0	0	0	8.444	0.000	2.899	0.000	1.597	0.000	1.261	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
120	2	Outside Downtown	6	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	1.486	0.000	2.584	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
121	2	Outside Downtown	0	1	2	3	0	0.000	0.000	0.000	3.899	8.802	0.000	4.544	0.000	2.091	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
122	2	Outside Downtown	0	0	0	0	0	0.000	0.000	2.736	0.000	30.640	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
123	2	Outside Downtown	0	0	0	0	0	0.000	0.000	3.000	0.000	37.480	0.000	38.593	0.000	149.679	0	0	0	39	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
124	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	30.057	4.934	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
125	2	Outside Downtown	0	2	29	9	3	0.000	0.000	0.000	0.000	6.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
126	2	Outside Downtown	0	0	0	0	0	0.000	5.645	0.000	0.000	144.556	0.000	0.000	0.000	46.442	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
127	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	109.961	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
128	2	Outside Downtown	1	0	3	1	0	22.509	0.520	27.297	1.787	12.471	0.000	3.065	24.747	87.800	0	0	6	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
129	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	431.815	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	2	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
130	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
131	2	Outside Downtown	0	0	1	0	0	0.000	0.000	5.427	18.310	61.653	0.819	53.840	0.000	42.349	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
132	2	Outside Downtown	4	0	2	1	0	0.000	10.550	10.637	17.962	33.159	0.000	10.810	0.000	29.846	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
133	2	Outside Downtown	2	0	2	1	0	0.000	13.084	0.887	1.060	31.119	0.000	45.289	0.000	29.467	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
134	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	5	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
135	2	Outside Downtown	2	2	3	1	0	0.000	0.000	16.487	0.000	15.532	0.000	34.866	0.000	1.800	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
136	2	Outside Downtown	0	0	0	0	0	2.428	1.887	8.563	2.601	18.871	0.000	0.800	0.000	72.825	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
137	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	7.534	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
138	2	Outside Downtown	0	0	0	0	0	0.000	0.000	5.126	4.614	59.643	0.000	0.000	0.000	11.553	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
139	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	40.135	0.000	23.250	300	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
140	2	Outside Downtown	0	0	0	0	0	0.000	0.000	2.013	0.000	9.320	0.000	8.816	5.750	10.072	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
141	2	Outside Downtown	4	2	3	1	0	0.000	0.000	12.150	3.341	21.239	0.000	0.000	0.000	21.953	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
142	2	Outside Downtown	0	2	3	1	0	3.563	0.000	6.700	0.000	20.180	0.000	27.741	0.000	26.517	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
143	2	Outside Downtown	0	0	0	0	0	21.091	0.000	0.000	0.000	24.167	0.000	14.285	0.000	5.735	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
144	2	Outside Downtown	0	35	42	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
145	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	18.660	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
146	2	Outside Downtown	1	5	6	3	1	0.000	0.000	0.000	0.468	2.156	0.000	26.844	17.192	6.006	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
147	2	Outside Downtown	4	13	16	10	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
148	2	Outside Downtown	11	17	22	14	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
149	2	Outside Downtown	3	28	34	16	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
150	2	Outside Downtown	4	23	28	13	4	0.000	0.000	0.000	0.000	0.000	0.000	26.026	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
151	2	Outside Downtown	1	20	25	11	4	0.000	0.000	0.000	0.000	4.507	0.000	6.002	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
152	2	Outside Downtown	3	4	5	3	2	0.000	0.000	0.000	2.295	23.446	0.000	5.000	0.000	39.949	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
153	2	Outside Downtown	31	13	48	28	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
154	2	Outside Downtown	4	18	43	27	5	0.000	0.000	0.000	0.000	0.498	0.000	37.035	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
155	2	Outside Downtown	18	26	78	45	17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
156	2	Outside Downtown	10	14	32	21	4	0.000	0.000	0.000	0.000	0.000	0.000	14.827	0.000	0.000	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
157	2	Outside Downtown	18	9	10	5	2	0.000	0.000	0.000	0.000	0.000	0.000	84.128	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
158	2	Outside Downtown	2	0	0	0	0	2.482	0.000	0.000	0.000	0.000	0.000	79.536	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
159	2	Outside Downtown	19	3	9	7	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
160	2	Outside Downtown	0	0	0	0	0	5.601	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
161	2	Outside Downtown	11	8	27	20	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
162	2	Outside Downtown	11	6	18	14	5	0.000	0.000	0.000	0.000	7.248	0.000	0.000	0.000	0.000	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
163	2	Outside Downtown	11	6	19	14	5	0.000	0.000	1.501	0.000	4.168	0.000	25.114	0.000	3.968	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
164	2	Outside Downtown	3	12	40	30	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
165	2	Outside Downtown	3	1	5	3	1	0.000	0.000	0.000	0.000	3.914	0.000	10.150	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
166	2	Outside Downtown	6	2	7	5	2	0.000	25.595	0.000	0.000	0.000	0.000	29.080	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
167	2	Outside Downtown	7	19	34	20	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.855	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
168	2	Outside Downtown	6	15	28	16	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
169	2	Outside Downtown	20	6	11	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
170	2	Outside Downtown	4	16	20	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
171	2	Outside Downtown	3	1	3	1	0	0.000	0.000	5.710	0.000	0.000	0.000	2.520	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
172	2	Outside Downtown	4	85	107	42	15	0.000	7.059	2.012	0.000	2.027	0.000	1.398	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
173	2	Outside Downtown	1	13	16	6	2	0.000	0.000	0.485	1.925	31.429	0.000	28.230	0.000	2.066	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
174	2	Outside Downtown	5	26	33	13	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
175	2	Outside Downtown	7	16	20	8	3	0.000	0.000	2.450	1.929	1.814	0.000	20.073	0.000	2.124	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
176	2	Outside Downtown	8	21	53	18	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
177	2	Outside Downtown	2	6	17	11	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
178	2	Outside Downtown	7	15	38	13	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
179	2	Outside Downtown	8	25	64	21	6	0.000	0.000	0.000	0.000	0.767	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
180	2	Outside Downtown	0	19	49	18	3	0.000	0.000	1.323	0.000	5.316	7.522	6.391	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
181	2	Outside Downtown	8	20	57	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
182	2	Outside Downtown	20	15	55	22	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
183	2	Outside Downtown	3	6	23	6	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
184	2	Outside Downtown	14	18	46	15	4	0.000	0.000	0.000	0.000	0.000	2.469	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
185	2	Outside Downtown	9	17	52	18	6	0.000	0.000	1.155	0.000	3.711	0.000	5.357	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
186	2	Outside Downtown	20	8	25	9	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
187	2	Outside Downtown	1	10	22	8	3	0.000	4.005	0.000	4.208	30.449	0.000	7.500	0.000	0.738	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
188	2	Outside Downtown	10	17	37	14	5	0.000	0.000	2.523	1.069	12.460	0.000	3.280	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
189	2	Outside Downtown	2	1	3	1	0	0.000	0.000	0.000	0.000	0.000	0.000	1.861	0.000	0.000	0	0	1	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
190	2	Outside Downtown	3	25	50	22	2	0.000	1.000	0.000	0.000	3.383	0.000	17.055	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
191	2	Outside Downtown	5	29	47	18	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
192	2	Outside Downtown	8	32	164	56	13	21.605	0.000	0.000	3.883	0.000	98.431	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
193	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	5.512	8.109	0.000	0.000	20.454	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
194	2	Outside Downtown	0	3	18	6	1	0.000	0.000	0.000	3.820	0.000	141.618	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
195	2	Outside Downtown	3	14	71	24	6	0.000	0.949	0.000	19.180	34.550	2.305	2.127	0.000	8.750	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
196	2	Outside Downtown	0	1	4	1	0	0.000	0.000	0.000	0.000	11.346	6.754	0.000	5.927	1.707	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
197	2	Outside Downtown	2	11	57	19	5	0.000	0.000	0.000	6.122	2.160	15.960	0.936	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
198	2	Outside Downtown	6	3	21	7	2	0.000	0.000	0.000	13.186	6.372	107.014	6.126	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
199	2	Outside Downtown	1	5	25	14	3	0.000	0.000	3.402	1.690	0.000	49.041	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
200	2	Outside Downtown	107	128	329	210	85	0.000	0.000	0.000	0.960	2.954	0.000	0.000	0.000	0.000	38	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
201	2	Outside Downtown	7	9	34	21	7	0.000	0.000	0.000	2.592	0.000	2.465	0.000	2.275	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
202	2	Outside Downtown	16	9	27	22	12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
203	2	Outside Downtown	30	16	68	35	4	0.000	0.000	0.000	1.368	0.000	0.000	0.000	0.000	0.000	0	0	2	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
204	2	Outside Downtown	15	3	34	18	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
205	2	Outside Downtown	18	5	35	10	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	U_Spare0	U_Spare0	U_Spare0	U_Spare0	IX_P	IX_A	XI_P	XI_A
206	2	Outside Downtown	11	5	61	20	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
207	2	Outside Downtown	4	9	98	32	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
208	2	Outside Downtown	19	15	81	32	6	0.000	0.000	0.000	0.000	0.000	0.000	52.056	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
209	2	Outside Downtown	10	1	11	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
210	2	Outside Downtown	10	4	34	7	3	0.000	0.000	0.000	0.000	0.992	0.000	26.718	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
211	2	Outside Downtown	14	2	12	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
212	2	Outside Downtown	3	8	73	20	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
213	2	Outside Downtown	4	6	40	10	4	0.000	0.000	0.000	0.000	4.901	5.396	16.314	2.906	0.000	50	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
214	2	Outside Downtown	4	2	22	6	2	0.000	0.000	0.000	4.500	0.000	0.000	0.000	0.000	0.000	0	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
215	2	Outside Downtown	15	0	3	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
216	2	Outside Downtown	19	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
217	2	Outside Downtown	16	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
218	2	Outside Downtown	14	0	3	1	0	0.000	0.000	3.105	0.000	1.599	8.028	7.756	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
219	2	Outside Downtown	2	1	4	1	0	0.000	0.000	0.000	0.000	0.000	3.864	12.970	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
220	2	Outside Downtown	16	2	16	4	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
221	2	Outside Downtown	16	1	6	1	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
222	2	Outside Downtown	20	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
223	2	Outside Downtown	19	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
224	2	Outside Downtown	28	2	15	11	2	0.000	0.000	0.000	0.000	0.000	0.000	8.438	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
225	2	Outside Downtown	8	1	4	2	0	0.000	0.000	2.581	0.000	0.000	22.357	17.375	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
226	2	Outside Downtown	18	1	7	5	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	20	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
227	2	Outside Downtown	29	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
228	2	Outside Downtown	18	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	1,500	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
229	2	Outside Downtown	13	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
230	2	Outside Downtown	77	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
231	2	Outside Downtown	18	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
232	2	Outside Downtown	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
233	2	Outside Downtown	0	3	17	12	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	50	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
234	2	Outside Downtown	23	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	31	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
235	2	Outside Downtown	23	35	100	65	21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
236	2	Outside Downtown	13	4	15	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
237	2	Outside Downtown	6	4	16	5	2	0.000	0.000	0.000	0.000	1.784	61.294	17.104	7.800	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
238	2	Outside Downtown	6	13	30	23	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
239	2	Outside Downtown	8	17	42	29	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
240	2	Outside Downtown	9	17	42	22	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
241	2	Outside Downtown	10	12	28	15	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
242	2	Outside Downtown	14	14	36	15	4	0.000	0.000	0.000	0.000	0.000	3.529	6.820	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
243	2	Outside Downtown	6	7	34	13	3	0.000	0.000	0.000	0.000	3.700	0.000	29.070	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
244	2	Outside Downtown	9	10	32	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
245	2	Outside Downtown	8	11	43	21	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
246	2	Outside Downtown	12	8	32	17	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
247	2	Outside Downtown	13	10	24	19	7	0.000	0.000	0.000	0.000	0.000	0.000	7.892	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
248	2	Outside Downtown	0	7	28	11	3	0.000	0.000	0.000	5.504	8.084	4.190	20.386	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
249	2	Outside Downtown	14	15	73	35	8	0.000	0.000	0.000	0.000	0.000	2.000	0.000	0.000	0.000	300	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
250	2	Outside Downtown	8	7	34	16	4	0.000	0.000	0.000	1.498	8.173	4.308	3.622	0.000	0.624	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
251	2	Outside Downtown	35	3	22	11	2	0.000	0.000	0.000	1.200	5.184	0.000	27.832	0.000	0.000	48	0	0	11	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
252	2	Outside Downtown	9	15	90	36	4	0.000	0.000	0.000	5.212	2.146	0.000	19.175	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
253	2	Outside Downtown	12	8	56	27	5	0.000	1.625	0.000	1.188	8.684	0.000	19.242	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
254	2	Outside Downtown	17	34	104	70	12	0.000	0.000	1.614	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
255	2	Outside Downtown	2	4	25	11	2	0.000	0.000	3.158	0.000	7.752	0.000	45.182	0.000	3.049	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
256	2	Outside Downtown	2	1	9	4	1	1.399	0.000	0.000	1.127	22.895	0.000	3.680	0.000	6.744	0	0	0	5	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
257	2	Outside Downtown	42	3	16	8	3	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
258	2	Outside Downtown	5	4	14	7	1	0.000	0.000	0.000	0.000	0.000	0.000	40.152	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
259	2	Outside Downtown	0	11	37	22	5	2.070	0.000	0.000	0.000	0.000	0.000	100.087	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
260	2	Outside Downtown	11	19	63	37	9	0.000	0.000	0.000	0.000	0.000	4.255	73.245	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
261	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	466	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
262	2	Outside Downtown	1	1	3	1	0	1.583	0.000	0.000	0.000	0.000	36.831	22.382	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
263	2	Outside Downtown	1	1	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	81.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
264	2	Outside Downtown	9	4	13	8	0	0.000	0.000	0.000	0.000	0.000	0.000	18.559	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
265	2	Outside Downtown	6	12	44	26	3	0.000	0.000	0.000	0.000	0.000	0.000	4.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
266	2	Outside Downtown	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	14.702	0.000	0.000	100	434	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
267	2	Outside Downtown	78	9	51	25	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
268	2	Outside Downtown	40	26	106	53	17	10.540	1.741	2.834	0.000	9.709	0.000	7.786	0.000	1.382	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
269	2	Outside Downtown	3	12	67	50	13	0.000	0.933	1.140	6.843	19.174	0.000	15.142	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
270	2	Outside Downtown	20	5	28	16	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
271	4	Outside Downtown	0	0	1	1	1	5.482	0.000	3.197	8.774	19.857	0.000	11.304	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
272	4	Outside Downtown	0	0	0	0	0	0.000	2.775	0.000	2.368	27.562	6.888	2.446	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
273	4	Outside Downtown	26	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
274	4	Outside Downtown	0	0	2	1	1	4.332	0.000	0.000	17.218	14.988	13.902	17.796	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
275	4	Outside Downtown	0	0	0	0	0	0.000	0.000	3.136	4.561	0.000	52.815	64.904	0.000	0.000	0	0	5	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
276	4	Outside Downtown	4	3	36	59	22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
277	4	Outside Downtown	0	10	40	23	7	7.117	0.000	0.000	0.000	0.000	0.000	19.961	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
278	3	Outside Downtown	0	15	42	41	19	2.982	4.864	0.000	0.000	18.619	5.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
279	3	Outside Downtown	28	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
280	3	Outside Downtown	0	0	1	0	0	0.000	0.000	0.000	2.476	23.084	0.000	0.500	7.995	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
281	3	Outside Downtown	0	2	13	7	1	0.000	0.000	0.000	3.304	36.031	0.000	23.746	0.000	2.139	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
282	3	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	42.099	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
283	3	Outside Downtown	0	2	6	4	1	0.000	0.000	0.000	0.000	41.263	0.000	0.600	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
284	3	Outside Downtown	0	0	1	0	0	0.000	0.000	0.000	2.200	12.834	0.000	11.206	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
285	3	Outside Downtown	0	0	2	1	0	0.000	0.000	2.353	1.720	4.300	0.000	4.300	0.000	2.745	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
286	3	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	25	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
287	3	Outside Downtown	182	4	23	8	3	0.000	0.000	0.000	0.000	0.000	7.128	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
288	3	Outside Downtown	91	23	88	51	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
289	3	Outside Downtown	212	12	69	31	10	0.000	0.000	0.000	0.480	1.878	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
290	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
291	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	585	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
292	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	110	0	0	0	0	0	0	0.00	0.00	0.00	0.00
293	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	92.711	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
294	4	Outside Downtown	118	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
295	4	Outside Downtown	30	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
296	4	Outside Downtown	0	59	137	71	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
297	4	Outside Downtown	18	40	92	48	20	0.000	0.000	0.000	0.000	2.716	0.000	46.642	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
298	4	Outside Downtown	0	1	3	1	1	23.608	0.000	0.000	1.604	44.425	0.000	12.347	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
299	4	Outside Downtown	142	4	9	6	3	0.000	0.000	0.000	5.344	0.000	0.000	0.000	0.000	10.600	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
300	4	Outside Downtown	0	0	0	0	0	0.000	0.000	85.890	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
301	4	Outside Downtown	0	0	0	0	0	0.000	0.000	50.458	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
302	4	Outside Downtown	0	29	66	35	14	0.000	7.800	0.000	2.965	0.000	0.000	35.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
303	4	Outside Downtown	0	0	0	0	0	0.000	63.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
304	4	Outside Downtown	0	0	0	0	0	0.000	0.000	4.469	10.007	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
305	4	Outside Downtown	0	0	0	0	0	8.756	0.000	2.838	5.720	48.002	52.218	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
306	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	4.515	23.607	14.346	1.425	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
307	4	Outside Downtown	0	0	0	0	0	0.000	0.000	3.526	0.000	431.087	0.000	3.790	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
308	4	Outside Downtown	0	6	17	11	2	2.205	0.000	3.338	0.000	195.407	0.000	11.590	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
309	4	Outside Downtown	0	3	7	4	2	7.310	0.000	0.000	2.016	44.148	0.000	27.687	0.000	0.000	0	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
310	4	Outside Downtown	0	0	0	0	0	0.000	0.000	60.523	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
311	4	Outside Downtown	0	2	4	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
312	2	Outside Downtown	104	19	93	76	30	0.000	3.415	0.000	5.672	11.272	0.000	0.000	0.000	0.000	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
313	2	Outside Downtown	73	1	15	14	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
314	2	Outside Downtown	36	91	263	147	48	0.000	0.000	2.644	1.959	6.996	0.000	5.375	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
315	2	Outside Downtown	27	22	34	21	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
316	2	Outside Downtown	17	49	74	47	16	0.000	0.000	1.024	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
317	2	Outside Downtown	87	16	76	68	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	23	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
318	2	Outside Downtown	116	62	215	139	37	0.000	0.000	1.358	3.086	0.000	0.000	4.422	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
319	2	Outside Downtown	142	0	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
320	2	Outside Downtown	99	9	50	37	9	0.000	0.000	0.000	0.000	14.434	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
321	2	Outside Downtown	77	1	11	9	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	600	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
322	2	Outside Downtown	178	2	20	22	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
323	3	Outside Downtown	51	35	132	94	27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
324	3	Outside Downtown	22	8	41	45	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	545	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
325	2	Outside Downtown	116	1	7	10	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
326	4	Outside Downtown	0	5	15	8	2	0.000	0.000	1.808	0.000	0.000	0.000	7.150	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
327	4	Outside Downtown	0	0	0	0	0	12.798	0.000	0.000	0.000	0.000	0.000	18.235	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
328	4	Outside Downtown	0	14	78	47	11	0.000	0.000	0.000	0.000	0.000	0.000	10.440	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
329	4	Outside Downtown	0	0	0	0	0	15.908	0.000	0.000	6.900	0.000	31.124	58.667	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
330	3	Outskirts	790	2	14	14	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	25.000	4.000	14.000	115.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
331	3	Outskirts	15	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
332	3	Outskirts	176	2	9	6	2	0.000	40.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	50.000	217.000	67.000	149.000	131.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
333	3	Outskirts	95	0	4	4	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	27.000	117.000	7.000	16.000	15.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
334	3	Outskirts	146	13	36	13	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	500	0	0	0	0	0	0.000	65.000	2.100	10.000	98.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
335	3	Outskirts	26	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
336	3	Outskirts	42	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
337	3	Outskirts	3	1	8	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
338	3	Outskirts	0	2	14	7	1	0.000	0.000	0.000	0.000	0.000	0.000	1.858	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
339	3	Outskirts	121	54	17	8	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	18.520	1.560	7.000	75.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
340	3	Outskirts	12	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
341	3	Outskirts	25	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	3.460	0.292	1.314	13.249	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
342	3	Outskirts	25	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	3.000	0.000	1.000	13.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
343	3	Outskirts	5	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
344	3	Outskirts	66	1	5	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
345	3	Outskirts	10	2	17	9	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
346	3	Outskirts	129	1	8	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.390	4.290	0.780	4.680	73.710	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
347	3	Outskirts	0	0	0	0	0	3.844	1.728	0.000	1.310	67.392	0.000	1.248	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
348	3	Outskirts	1	1	5	3	0	2.732	0.000	4.177	9.860	72.668	55.121	104.579	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
349	3	Outskirts	1	4	38	18	2	8.026	0.000	2.861	9.740	17.523	10.500	46.056	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
350	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	1	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
351	3	Outskirts	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	9.000	3.000	5.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
352	3	Outskirts	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
353	3	Outskirts	2	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
354	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
355	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
356	3	Outskirts	166	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
357	3	Outskirts	63	0	3	6	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.208	1.000	1.240	0.832	92.560	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
358	3	Outskirts	13	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
359	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
360	3	Outskirts	180	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
361	3	Outskirts	90	50	150	151	22	0.000	0.000	3.374	0.000	0.000	0.000	11.543	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
362	3	Outskirts	79	1	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	366	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
363	3	Outskirts	193	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	1,500	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
364	3	Outskirts	227	1	3	5	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
365	3	Outskirts	32	3	8	11	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
366	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	101	0	0	0	0	0	0	0.00	0.00	0.00	0.00
367	3	Outskirts	14	4	38	18	4	0.000	2.800	0.000	6.982	7.000	0.000	14.300	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
368	3	Outskirts	49	8	45	27	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
369	3	Outskirts	349	0	5	5	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	76	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
370	3	Outskirts	124	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	230	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
371	4	Outskirts	189	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
372	3	Outskirts	655	0	6	4	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
373	3	Outskirts	376	0	3	2	1	0.000	0.000	0.000	0.000	0.000	94.277	0.000	0.000	0.000	0	0	3	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
374	3	Outskirts	332	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
375	3	Outskirts	69	2	24	15	7	0.000	0.000	0.000	0.000	0.000	0.000	1.496	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
376	3	Outskirts	105	7	40	27	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
377	3	Outskirts	217	1	15	12	6	0.000	0.000	0.000	1.335	0.752	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
378	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	3.623	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
379	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	18,000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
380	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	17.420	7.007	0.000	0.205	6.327	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	10	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
381	3	Outskirts	7	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	450	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
382	3	Outskirts	310	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
383	3	Outskirts	176	43	135	114	63	0.000	0.000	0.000	0.000	0.000	0.000	23.494	0.000	0.000	30	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
384	3	Outskirts	127	16	53	67	37	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	3	13	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
385	3	Outskirts	0	0	0	0	0	0.000	1.782	0.000	8.418	10.487	0.000	3.785	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
386	3	Outskirts	0	2	9	7	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
387	3	Outskirts	108	31	102	162	92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
388	3	Outskirts	459	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
389	3	Outskirts	338	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	7	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
390	3	Outskirts	26	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
391	3	Outskirts	111	6	38	49	19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.414	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
392	3	Outskirts	6	5	40	23	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
393	3	Outskirts	9	4	7	10	4	3.440	0.000	0.000	0.000	0.000	0.000	4.019	0.000	0.000	573	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
394	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	32.644	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
395	3	Outskirts	0	0	0	0	0	0.000	0.000	5.330	5.071	0.000	0.000	40.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
396	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	14.088	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
397	3	Outskirts	77	9	81	34	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
398	3	Outskirts	113	10	91	48	21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	535	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
399	3	Outskirts	14	1	21	16	15	0.000	8.000	0.000	0.000	0.000	0.000	84.292	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
400	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	160	0	0	19	0	0	0.000	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
401	3	Outskirts	197	3	18	14	8	0.000	6.361	0.000	0.000	0.000	0.000	0.000	69.771	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
402	3	Outskirts	321	16	84	61	30	0.000	0.000	0.000	0.000	0.000	0.000	26.417	0.000	0.000	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
403	3	Outskirts	2	8	19	19	7	0.000	0.000	0.000	0.000	0.000	5.845	21.392	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
404	4	Outskirts	335	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	905	0	0	16	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
405	4	Outskirts	241	1	2	2	1	0.000	0.000	0.000	2.178	7.839	0.000	4.231	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
406	4	Outskirts	211	1	4	3	1	0.000	0.000	0.000	2.400	0.605	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
407	4	Outskirts	94	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
408	4	Outskirts	463	0	8	17	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
409	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
410	3	Outskirts	379	3	12	8	9	0.000	0.000	0.000	0.000	4.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	U_Spare0	U_Spare0	U_Spare0	U_Spare0	IX_P	IX_A	XI_P	XI_A
411	3	Outskirts	6	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
412	3	Outskirts	159	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	490	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
413	3	Outskirts	93	17	67	34	49	0.000	0.000	0.000	4.448	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
414	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	1.786	57.900	0.000	2.573	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
415	3	Outskirts	213	3	15	16	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
416	3	Outskirts	443	0	5	8	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
417	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
418	3	Outskirts	210	0	1	1	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
419	3	Outskirts	503	1	11	9	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
420	4	Outskirts	338	77	311	181	58	0.000	7.869	2.493	2.605	17.835	0.000	5.274	0.000	0.000	0	0	0	31	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
421	4	Outskirts	80	0	0	0	0	0.000	0.000	0.000	0.000	2.004	0.000	0.000	0.000	10.100	0	0	0	11	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
422	4	Outskirts	327	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	1	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
423	4	Outskirts	142	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
424	4	Outskirts	73	6	33	23	5	0.000	0.000	0.000	0.000	0.000	0.000	5.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
425	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	380	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
426	4	Outskirts	48	0	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.110	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
427	4	Outskirts	4	1	10	17	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	5.000	1.000	1.000	1.000	9.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
428	4	Outskirts	43	0	0	0	0	0.000	20.512	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	113	0	0	0	0	0	0	0.00	0.00	0.00	0.00
429	4	Outskirts	105	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	376	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
430	4	Outskirts	214	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
431	4	Outskirts	0	0	0	0	0	0.000	0.000	2.107	0.000	6.350	0.000	0.000	9.120	41.165	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
432	4	Outskirts	0	0	2	2	0	0.000	0.000	6.459	14.620	59.635	14.832	41.808	0.000	26.309	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
433	4	Outskirts	324	6	53	28	4	0.000	0.000	0.000	0.000	0.000	0.000	22.800	0.000	0.000	0	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
434	4	Outskirts	175	9	78	80	28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	480	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
435	4	Outskirts	180	42	250	165	28	0.000	0.000	0.000	0.000	2.918	0.000	3.627	0.000	0.000	0	0	0	31	1,951	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
436	4	Outskirts	1	12	52	44	5	0.000	0.000	0.000	0.000	0.000	0.000	126.821	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
437	4	Outskirts	96	27	99	52	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.770	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
438	4	Outskirts	0	21	66	35	7	3.949	20.000	9.610	3.608	25.774	0.000	65.648	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
439	4	Outskirts	203	0	1	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	26	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
440	4	Outskirts	550	3	18	30	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	31.000	13.000	294.000	46.000	54.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
441	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	3.303	0.000	1.930	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
442	4	Outskirts	54	48	234	179	33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
443	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	2.000	0.000	0.000	1,136.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
444	4	Outskirts	130	1	6	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	1.000	0.000	0.000	364.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
445	4	Outskirts	323	1	11	16	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	67.000	10.000	23.000	429.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
446	4	Outskirts	156	0	5	9	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	33.000	5.000	11.000	208.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
447	4	Outskirts	275	6	56	79	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	53.000	8.000	18.000	338.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
448	4	Outskirts	243	2	19	24	7	0.000	0.000	1.920	3.420	2.780	4.108	3.300	0.000	0.000	0	0	0	64	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
449	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	4.079	10.206	0.000	0.000	40.552	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
450	4	Outskirts	7	0	7	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
451	4	Outskirts	31	1	6	7	2	0.000	0.000	1.462	0.000	4.060	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
452	4	Outskirts	99	1	4	3	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	2,200	0	0.000	1.500	1.000	5.300	214.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
453	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.791	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
454	4	Outskirts	30	21	94	69	84	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	1.000	264.000	0.000	5.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
455	4	Outskirts	499	3	16	19	16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	25.000	22.000	8.000	18.000	159.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
456	4	Outskirts	77	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
457	4	Outskirts	221	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
458	4	Outskirts	166	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
459	4	Outskirts	7	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
460	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
750	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
751	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
752	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
753	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
754	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
755	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
756	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
757	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
758	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
759	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
760	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
761	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
762	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
763	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
764	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
765	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
766	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
767	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
768	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
769	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
770	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
771	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
772	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
773	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
774	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
775	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
776	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
777	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
778	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
779	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
780	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
781	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
782	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
783	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
784	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
785	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
786	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
787	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
788	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
789	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
790	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
791	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
792	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
793	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
794	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
795	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
796	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
797	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
798	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
799	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
800	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
1001	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	141	52	0	0	0	0	0.00	17141.00	17458.00	0.00
1002	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	717	264	0	0	0	0	0.00	87186.00	97593.00	0.00
1003	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
1004	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	118	43	0	0	0	0	0.00	14319.00	14425.00	0.00
1005	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	138	51	0	0	0	0	0.00	16776.00	17638.00	0.00
1006	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	66	24	0	0	0	0	0.00	7994.00	7997.00	0.00
1007	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	42	15	0	0	0	0	0.00	5097.00	5097.00	0.00
1008	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	11	4	0	0	0	0	0.00	1292.00	1691.00	0.00
1009	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	513	189	0	0	0	0	0.00	62420.00	73710.00	0.00
1010	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3F	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	GREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	U_Spare0	U_Spare0	U_Spare0	U_Spare01
Total LU	**21,246**	**3,114**	**10,902**	**6,645**	**2,200**	**495**	**627**	**649**	**634**	**4,251**	**1,902**	**4,858**	**545**	**1,480**	**10,463**	**900**	**96**	**738**	**6,706**	**21,000**	**140**	**921**	**414**	**336**	**3,538**	**29**	**324**	**1,746**	**642**	**0**	**0**	**0**	**0**
Total Area 1 LU	**107**	**182**	**648**	**229**	**74**	**253**	**349**	**108**	**210**	**1,493**	**179**	**2,015**	**236**	**100**	**799**	**0**	**51**	**134**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 2 LU	**3,901**	**2,027**	**6,546**	**3,631**	**1,073**	**129**	**90**	**279**	**239**	**1,241**	**1,312**	**1,785**	**158**	**1,233**	**2,927**	**900**	**9**	**262**	**2,555**	**1,500**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 3 LU	**10,148**	**439**	**1,752**	**1,365**	**575**	**21**	**66**	**18**	**80**	**429**	**220**	**428**	**85**	**5**	**3,899**	**0**	**31**	**135**	**0**	**19,500**	**78**	**463**	**87**	**209**	**627**	**21**	**101**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 4 LU	**7,091**	**466**	**1,956**	**1,420**	**478**	**91**	**123**	**243**	**105**	**1,088**	**190**	**630**	**67**	**141**	**2,838**	**0**	**5**	**207**	**4,151**	**0**	**62**	**458**	**327**	**127**	**2,911**	**1**	**223**	**0**	**0**	**0**	**0**	**0**	**0**

APPENDIX C:
ROADWAY NETWORK INFORMATION

DISCUSSION OF MASTER NETWORK CONCEPT

The City of Santa Barbara TDF model utilizes a 'master roadway network' that includes all input roadway network data for each scenario within one input roadway model network. A pre-processor script is used to create individual roadway networks for each scenario using the master roadway network as the input network. Discussed below are the network fields that can be modified for each scenario within the City of Santa Barbara TDF model master roadway network. The post-processor script is flexible so that fields may be included or excluded as necessary.

ROADWAY NETWORK FIELDS

The City Santa Barbara TDF model consists of four (4) fields that may vary between scenarios that consist of:

- Travel Speed
- Functional Class
- Capacity
- Lanes

Each of these variables is included for each of the scenarios years within the master network by a suffix of the corresponding scenario year. The City of Santa Barbara TDF model includes two (2) scenarios that consist of the following:

- Base Year (2008)
- General Plan Build-Out (2030)

The 2008 fields are therefore: AB_Speed08/BA_Speed08/Speed08, Func_Class08, Lane_Capaciy08, andAB_Lanes08/BA_Lanes08/Lanes08. The 2030 scenario fields follow the same format. Also included within the 'master roadway network' is a construction year field (CONST_YEAR) that consists of a value representing the opening day of the facility. The values are used to define links and centroid connectors for each scenario, with the value of "2008" for all existing roadways. Facilities that are removed/replaced in the future are turned off by removing the value for lanes in the appropriate year (i.e. AB_Lanes30 if the facility is removed by 2030).

The "master roadway network" pre-processor script uses these parameters to create each scenario roadway network. Each network only contains the list of fields that are associated with the specific scenario and other fields associated with other scenarios are not copied from the master network to the new roadway network. In addition, the scenario suffix is removed for each scenario network so that only the generic field name (AB_Speed/BA_Speed/Speed, Func_Class, Lane_Capaciy, and AB_Lanes/BA_Lanes/Lanes) are listed within each of the scenario roadway networks. The scenario specific network contains the year in the name (i.e. Roads_Loaded_2008). All other fields not included in the four listed above are copied over to each scenario network and the addition/deletion of these other fields can be modified within the pre-processor script.

APPENDIX D:
CITY OF SANTA BARBARA TDF MODEL TRIP GENERATION SUMMARY

SANTA BARBARA CROSS CLASSIFICATION TABLES

Input Table for Area 1

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	Total
1	DU	SF_DU	**8.05**	15.65%	45.00%	25.00%	0.35%	2.00%		7.00%	5.00%			100%
2	DU	MF_DU_0	**3.03**	8.00%	53.00%	29.00%		1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**4.23**	14.00%	47.00%	29.00%		1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**5.96**	12.25%	47.50%	30.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**7.60**	10.75%	50.00%	29.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**100.10**			15.00%			18.00%	32.00%	35.00%			100%
7	KSF	ENTNMT	**36.40**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**16.38**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**100.10**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**32.76**			18.00%		0.25%	6.00%	31.75%	44.00%			100%
11	KSF	HOTEL	**2.73**	9.00%	27.00%	20.00%	0.25%	20.75%	2.00%	10.00%	11.00%			100%
12	KSF	OFFICE	**8.27**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**45.50**			16.00%			20.00%	18.00%	46.00%			100%
14	KSF	INDUSTRL	**4.25**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**1.81**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**11.83**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**8.65**			30.00%			17.00%	10.00%	43.00%			100%
18	KSF	CHURCH	**8.29**			20.00%			2.00%	33.00%	45.00%			100%
19	enroll	HS	**0.61**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.24**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.54**						62.13%	0.00%	37.87%			100%
22	emp	COMEMPFUL	**4.04**						16.89%	46.62%	36.49%			100%
23	emp	INDEMPFUL	**3.36**						69.38%	0.00%	30.62%			100%
24	emp	OFFEMPFUL	**1.74**						39.27%	0.00%	60.73%			100%
25	emp	SEREMPFUL	**3.33**						37.16%	29.78%	33.06%			100%
26	KSF	REC	**0.91**										100%	100%
27	AC	GOLF_AC	**4.59**									100%		100%
28	prd	EX_REC	**1.00**					100%						100%
29	prd	EX_GOLF	**1.00**				100%							100%
			IX, XI	**20.0%**	**18.0%**	**21.2%**	**0.0%**	**0.0%**	**41.0%**	**38.0%**	**21.0%**	**40.0%**	**30.0%**	
			Internal	80.0%	82.0%	78.8%	100.0%	100.0%	59.0%	62.0%	79.0%	60.0%	70.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 2

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	Total
1	DU	SF_DU	**10.56**	16.00%	46.65%	24.00%	0.35%	2.00%		6.00%	5.00%			100%
2	DU	MF_DU_0	**3.55**	9.00%	53.00%	28.00%		1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**5.39**	18.00%	48.00%	28.00%		1.00%		3.00%	2.00%			100%
4	DU	MF_DU_2	**7.04**	13.25%	48.50%	28.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**8.89**	11.75%	50.00%	28.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**115.20**			15.00%			19.00%	35.00%	31.00%			100%
7	KSF	ENTNMT	**43.20**			15.00%			3.00%	46.00%	36.00%			100%
8	KSF	AUTO	**17.28**			3.00%			2.00%	46.00%	49.00%			100%
9	KSF	RESTRNT	**139.20**			16.00%		0.50%	2.00%	45.50%	36.00%			100%
10	KSF	RETAIL	**45.18**			19.75%		0.25%	6.00%	44.00%	30.00%			100%
11	KSF	HOTEL	**2.11**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**11.59**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**48.00**			16.00%			14.00%	18.00%	52.00%			100%
14	KSF	INDUSTRL	**4.48**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**1.91**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**12.48**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**9.12**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**8.75**			20.00%			2.00%	45.00%	33.00%			100%
19	enroll	HS	**0.64**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.25**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.62**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.26**			8.00%			18.00%	40.00%	34.00%			100%
23	emp	INDEMPFUL	**3.54**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**1.83**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.51**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**0.96**										100%	100%
27	AC	GOLF_AC	**4.84**									100%		100%
28	prd	EX_REC	**1.00**					100%						100%
29	prd	EX_GOLF	**1.00**				100%							100%
			IX, XI	**27.0%**	**19.0%**	**21.2%**	**0.0%**	**0.0%**	**45.0%**	**30.0%**	**20.3%**	**40.0%**	**30.0%**	
			Internal	73.0%	81.0%	78.8%	100.0%	100.0%	55.0%	70.0%	79.7%	60.0%	70.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 3

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					Total
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	
1	DU	SF_DU	**11.98**	18.00%	45.65%	23.00%	0.35%	1.25%		6.00%	5.75%			100%
2	DU	MF_DU_0	**4.02**	8.00%	53.00%	29.00%	0.00%	1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**6.18**	14.75%	48.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**8.08**	12.75%	50.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**10.24**	10.75%	52.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**128.40**			15.00%			17.00%	36.00%	32.00%			100%
7	KSF	ENTNMT	**48.15**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**19.26**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**136.05**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**40.28**			19.75%		0.25%	6.00%	44.00%	30.00%			100%
11	KSF	HOTEL	**3.75**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**12.92**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**53.50**			16.00%			14.00%	40.00%	30.00%			100%
14	KSF	INDUSTRL	**5.00**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**2.13**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**13.91**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**10.17**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**9.75**			20.00%			2.00%	33.00%	45.00%			100%
19	enroll	HS	**0.72**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.28**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.81**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.75**			8.00%			16.00%	42.00%	34.00%			100%
23	emp	INDEMPFUL	**3.95**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**2.04**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.92**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**1.07**										100.00%	100%
27	AC	GOLF_AC	**5.39**									100.00%		100%
28	prd	EX_REC	**1.00**					100.00%						100%
29	prd	EX_GOLF	**1.00**				100.00%							100%
			IX, XI	**40.0%**	**32.0%**	**22.5%**	**0.0%**	**0.0%**	**49.0%**	**31.0%**	**24.0%**	**35.0%**	**20.0%**	
			Internal	60.0%	68.0%	77.5%	100.0%	100.0%	51.0%	69.0%	76.0%	65.0%	80.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 4

Prod Factor= Attr Factor=

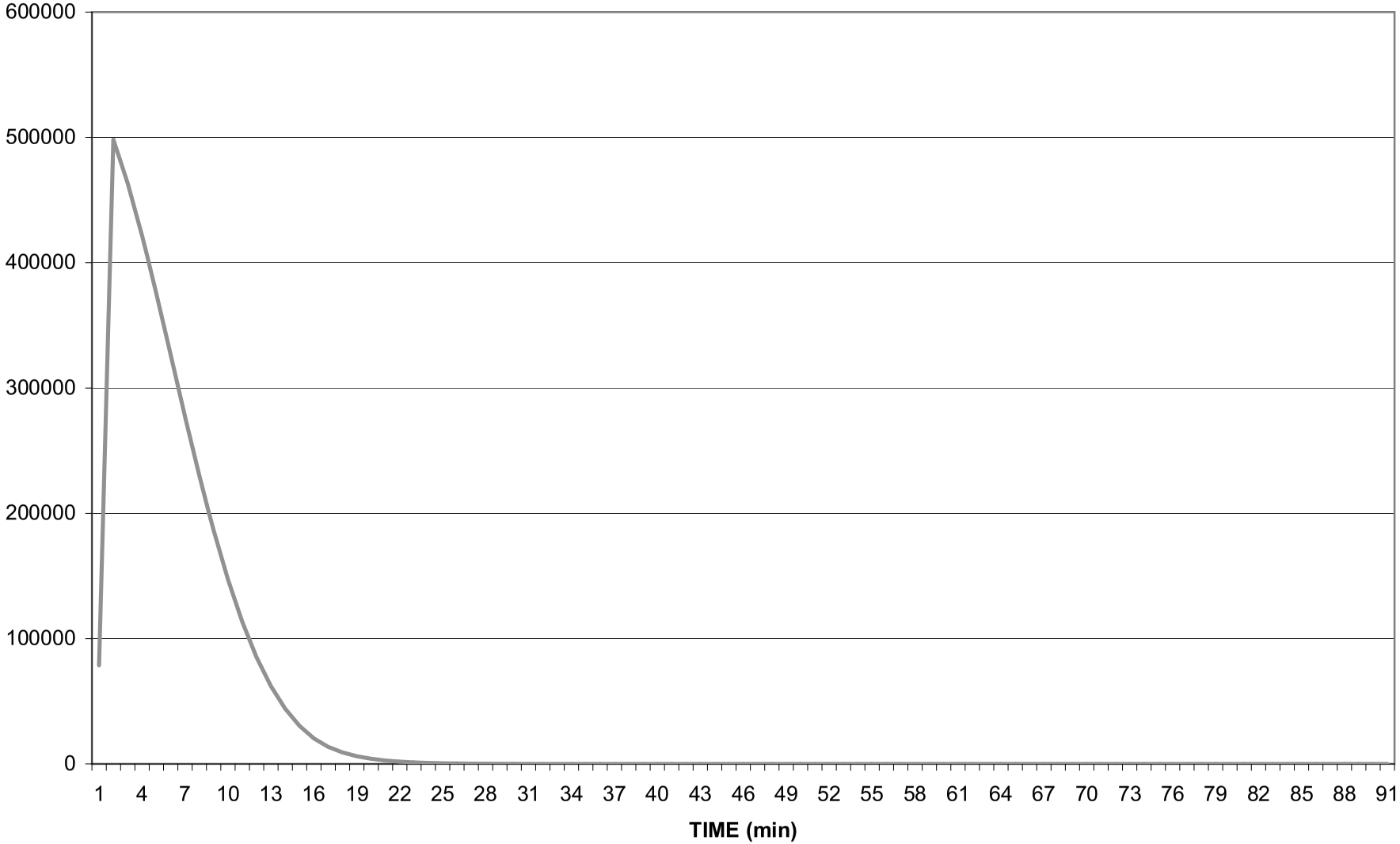
Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					Total
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	
1	DU	SF_DU	**11.98**	18.00%	45.65%	23.00%	0.35%	1.25%		6.00%	5.75%			100%
2	DU	MF_DU_0	**4.02**	8.00%	53.00%	29.00%	0.00%	1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**6.18**	14.75%	48.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**8.08**	12.75%	50.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**10.24**	10.75%	52.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**128.40**			15.00%			17.00%	32.00%	36.00%			100%
7	KSF	ENTNMT	**48.15**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**19.26**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**136.05**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**40.28**			19.75%		0.25%	6.00%	39.00%	35.00%			100%
11	KSF	HOTEL	**3.75**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**12.92**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**53.50**			16.00%			14.00%	18.00%	52.00%			100%
14	KSF	INDUSTRL	**5.00**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**2.13**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**13.91**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**10.17**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**9.75**			20.00%			2.00%	45.00%	33.00%			100%
19	enroll	HS	**0.72**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.28**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.81**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.75**			8.00%			16.00%	42.00%	34.00%			100%
23	emp	INDEMPFUL	**3.95**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**2.04**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.92**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**1.07**										100.00%	100%
27	AC	GOLF_AC	**5.39**									100.00%		100%
28	prd	EX_REC	**1.00**					100.00%						100%
29	prd	EX_GOLF	**1.00**				100.00%							100%
			IX, XI	**44.0%**	**20.0%**	**21.2%**	**0.0%**	**0.0%**	**49.0%**	**33.0%**	**24.0%**	**35.0%**	**20.0%**	
			Internal	56.0%	80.0%	78.8%	100.0%	100.0%	51.0%	67.0%	76.0%	65.0%	80.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Output Table for All Areas

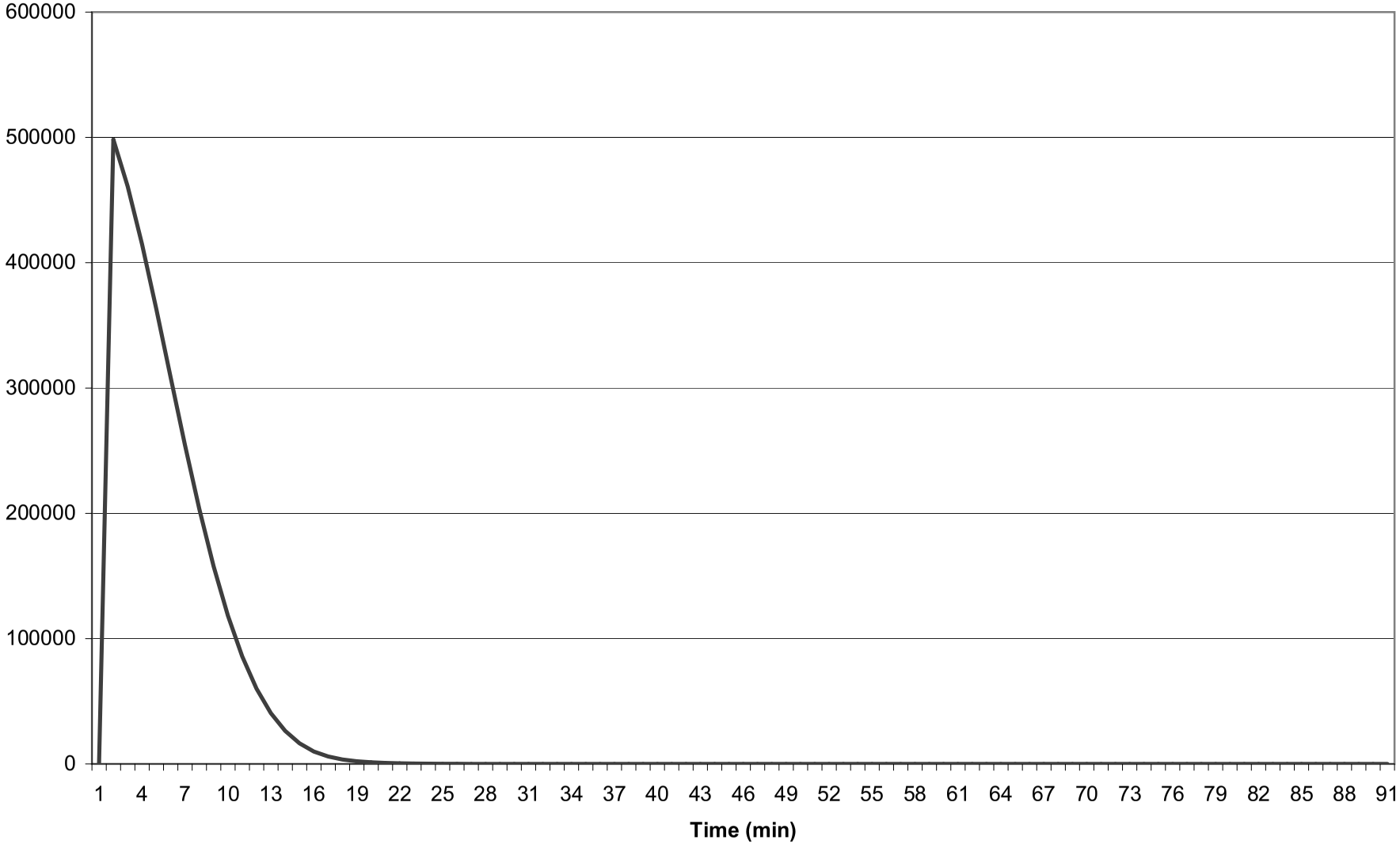
[Area Type	[Employme	LU_Type	LU_Unit	R_HBW_P	R_HBO_P	R_NHB_P	R_GOLF_F	R_REC_P	R_HBW_A	R_HBO_A	R_NHB_A	R_GOLF_/	R_REC_A	R_HBW_IX	R_HBO_IX	R_NHB_IX	R_GOLF_I	R_REC_IX	R_HBW_X	R_HBO_XI	R_NHB_XI	R_GOLF_)	R_REC_XI
1	1	SF_DU	DU	1.008	2.972	1.586	0.028	0.161	0.000	0.350	0.318	0.000	0.000	0.252	0.652	0.427	0.000	0.000	0.000	0.214	0.085	0.000	0.000
1	2	MF_DU_0	DU	0.194	1.317	0.692	0.000	0.030	0.000	0.094	0.096	0.000	0.000	0.048	0.289	0.187	0.000	0.000	0.000	0.058	0.025	0.000	0.000
1	3	MF_DU_1	DU	0.474	1.631	0.967	0.000	0.042	0.000	0.131	0.134	0.000	0.000	0.118	0.358	0.261	0.000	0.000	0.000	0.080	0.036	0.000	0.000
1	4	MF_DU_2	DU	0.584	2.322	1.409	0.015	0.060	0.000	0.185	0.188	0.000	0.000	0.146	0.510	0.380	0.000	0.000	0.000	0.113	0.050	0.000	0.000
1	5	MF_DU_3P	DU	0.653	3.115	1.736	0.019	0.076	0.000	0.236	0.240	0.000	0.000	0.163	0.684	0.468	0.000	0.000	0.000	0.144	0.064	0.000	0.000
1	6	COM_SERV	KSF	0.000	0.000	11.827	0.000	0.000	10.631	19.860	27.678	0.000	0.000	0.000	0.000	3.188	0.000	0.000	7.387	12.172	7.357	0.000	0.000
1	7	ENTNMT	KSF	0.000	0.000	4.301	0.000	0.000	0.430	10.607	10.352	0.000	0.000	0.000	0.000	1.159	0.000	0.000	0.298	6.501	2.752	0.000	0.000
1	8	AUTO	KSF	0.000	0.000	0.387	0.000	0.000	0.193	5.586	5.176	0.000	0.000	0.000	0.000	0.104	0.000	0.000	0.134	3.423	1.376	0.000	0.000
1	9	RESTRNT	KSF	0.000	0.000	11.433	0.000	0.501	1.181	29.169	28.468	0.000	0.000	0.000	0.000	3.081	0.000	0.000	0.821	17.878	7.568	0.000	0.000
1	10	RETAIL	KSF	0.000	0.000	4.645	0.000	0.082	1.160	6.449	11.387	0.000	0.000	0.000	0.000	1.252	0.000	0.000	0.806	3.952	3.027	0.000	0.000
1	11	HOTEL	KSF	0.197	0.604	0.430	0.007	0.566	0.032	0.169	0.237	0.000	0.000	0.049	0.133	0.116	0.000	0.000	0.022	0.104	0.063	0.000	0.000
1	12	OFFICE	KSF	0.000	0.000	1.238	0.000	0.000	2.685	0.359	1.242	0.000	0.000	0.000	0.000	0.334	0.000	0.000	1.866	0.220	0.330	0.000	0.000
1	13	INSTNL	KSF	0.000	0.000	5.734	0.000	0.000	5.369	5.078	16.535	0.000	0.000	0.000	0.000	1.546	0.000	0.000	3.731	3.112	4.395	0.000	0.000
1	14	INDUSTRL	KSF	0.000	0.000	0.167	0.000	0.000	1.605	0.000	1.041	0.000	0.000	0.000	0.000	0.045	0.000	0.000	1.115	0.000	0.277	0.000	0.000
1	15	ELEM_STU	enroll	0.000	0.000	0.071	0.000	0.000	0.053	0.954	0.072	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.037	0.585	0.019	0.000	0.000
1	16	HOSPITAL	KSF	0.000	0.000	1.864	0.000	0.000	2.652	2.567	0.654	0.000	0.000	0.000	0.000	0.502	0.000	0.000	1.843	1.573	0.174	0.000	0.000
1	17	SAFETY	KSF	0.000	0.000	2.043	0.000	0.000	0.867	0.536	2.937	0.000	0.000	0.000	0.000	0.551	0.000	0.000	0.603	0.329	0.781	0.000	0.000
1	18	CHURCH	KSF	0.000	0.000	1.306	0.000	0.000	0.098	1.696	2.947	0.000	0.000	0.000	0.000	0.352	0.000	0.000	0.068	1.040	0.783	0.000	0.000
1	19	HS	enroll	0.000	0.000	0.024	0.000	0.000	0.054	0.284	0.024	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.037	0.174	0.006	0.000	0.000
1	20	COLLEGE	enroll	0.000	0.000	0.009	0.000	0.000	0.028	0.103	0.009	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.019	0.063	0.002	0.000	0.000
1	21	GREMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.564	0.000	0.460	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.392	0.000	0.122	0.000	0.000
1	22	OMEMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.403	1.168	1.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.280	0.716	0.310	0.000	0.000
1	23	NDEMPFUI	emp	0.000	0.000	0.000	0.000	0.000	1.374	0.000	0.812	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.955	0.000	0.216	0.000	0.000
1	24	FFEMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.403	0.000	0.834	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.280	0.000	0.222	0.000	0.000
1	25	EREMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.730	0.615	0.870	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.507	0.377	0.231	0.000	0.000
1	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.637	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.273
1	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.835	0.000
1	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	1	SF_DU	DU	1.233	3.990	1.996	0.037	0.211	0.000	0.444	0.421	0.000	0.000	0.456	0.936	0.538	0.000	0.000	0.000	0.190	0.107	0.000	0.000
2	2	MF_DU_0	DU	0.233	1.525	0.783	0.000	0.036	0.000	0.124	0.113	0.000	0.000	0.086	0.358	0.211	0.000	0.000	0.000	0.053	0.029	0.000	0.000
2	3	MF_DU_1	DU	0.708	2.094	1.188	0.000	0.054	0.000	0.113	0.086	0.000	0.000	0.262	0.491	0.320	0.000	0.000	0.000	0.048	0.022	0.000	0.000
2	4	MF_DU_2	DU	0.681	2.764	1.552	0.018	0.070	0.000	0.246	0.224	0.000	0.000	0.252	0.648	0.418	0.000	0.000	0.000	0.106	0.057	0.000	0.000
2	5	MF_DU_3P	DU	0.763	3.600	1.961	0.022	0.089	0.000	0.311	0.284	0.000	0.000	0.282	0.845	0.528	0.000	0.000	0.000	0.133	0.072	0.000	0.000
2	6	COM_SERV	KSF	0.000	0.000	13.611	0.000	0.000	12.038	28.224	28.473	0.000	0.000	0.000	0.000	3.669	0.000	0.000	9.850	12.096	7.239	0.000	0.000
2	7	ENTNMT	KSF	0.000	0.000	5.104	0.000	0.000	0.713	13.910	12.400	0.000	0.000	0.000	0.000	1.376	0.000	0.000	0.583	5.962	3.152	0.000	0.000
2	8	AUTO	KSF	0.000	0.000	0.408	0.000	0.000	0.190	5.564	6.751	0.000	0.000	0.000	0.000	0.110	0.000	0.000	0.156	2.385	1.716	0.000	0.000
2	9	RESTRNT	KSF	0.000	0.000	17.544	0.000	0.696	1.531	44.335	39.954	0.000	0.000	0.000	0.000	4.728	0.000	0.000	1.253	19.001	10.158	0.000	0.000
2	10	RETAIL	KSF	0.000	0.000	7.028	0.000	0.113	1.491	13.914	10.806	0.000	0.000	0.000	0.000	1.894	0.000	0.000	1.220	5.963	2.747	0.000	0.000
2	11	HOTEL	KSF	0.154	0.462	0.200	0.000	0.422	0.023	0.148	0.320	0.000	0.000	0.057	0.108	0.054	0.000	0.000	0.019	0.063	0.081	0.000	0.000
2	12	OFFICE	KSF	0.000	0.000	1.735	0.000	0.000	3.506	0.568	1.756	0.000	0.000	0.000	0.000	0.467	0.000	0.000	2.868	0.243	0.446	0.000	0.000
2	13	INSTNL	KSF	0.000	0.000	6.050	0.000	0.000	3.696	6.048	19.901	0.000	0.000	0.000	0.000	1.630	0.000	0.000	3.024	2.592	5.059	0.000	0.000
2	14	INDUSTRL	KSF	0.000	0.000	0.177	0.000	0.000	1.578	0.000	1.108	0.000	0.000	0.000	0.000	0.048	0.000	0.000	1.291	0.000	0.282	0.000	0.000
2	15	ELEM_STU	enroll	0.000	0.000	0.075	0.000	0.000	0.053	1.137	0.076	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.043	0.487	0.019	0.000	0.000
2	16	HOSPITAL	KSF	0.000	0.000	1.966	0.000	0.000	2.608	3.058	0.697	0.000	0.000	0.000	0.000	0.530	0.000	0.000	2.134	1.310	0.177	0.000	0.000
2	17	SAFETY	KSF	0.000	0.000	2.155	0.000	0.000	0.752	0.638	3.272	0.000	0.000	0.000	0.000	0.581	0.000	0.000	0.616	0.274	0.832	0.000	0.000
2	18	CHURCH	KSF	0.000	0.000	1.378	0.000	0.000	0.096	2.755	2.301	0.000	0.000	0.000	0.000	0.371	0.000	0.000	0.079	1.181	0.585	0.000	0.000
2	19	HS	enroll	0.000	0.000	0.025	0.000	0.000	0.053	0.338	0.026	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.043	0.145	0.007	0.000	0.000
2	20	COLLEGE	enroll	0.000	0.000	0.010	0.000	0.000	0.027	0.122	0.010	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.022	0.052	0.003	0.000	0.000
2	21	GREMPFU	emp	0.000	0.000	0.051	0.000	0.000	0.553	0.000	0.440	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.453	0.000	0.112	0.000	0.000
2	22	OMEMPFU	emp	0.000	0.000	0.269	0.000	0.000	0.422	1.193	1.155	0.000	0.000	0.000	0.000	0.072	0.000	0.000	0.345	0.511	0.294	0.000	0.000
2	23	NDEMPFUI	emp	0.000	0.000	0.140	0.000	0.000	1.286	0.000	0.819	0.000	0.000	0.000	0.000	0.038	0.000	0.000	1.052	0.000	0.208	0.000	0.000
2	24	FFEMPFU	emp	0.000	0.000	0.144	0.000	0.000	0.393	0.000	0.746	0.000	0.000	0.000	0.000	0.039	0.000	0.000	0.322	0.000	0.190	0.000	0.000
2	25	EREMPFU	emp	0.000	0.000	0.277	0.000	0.000	0.676	0.639	0.812	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.553	0.274	0.207	0.000	0.000
2	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.672	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288
2	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.903	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.935	0.000
2	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	1	SF_DU	DU	1.294	3.720	2.136	0.042	0.150	0.000	0.496	0.524	0.000	0.000	0.863	1.751	0.620	0.000	0.000	0.000	0.223	0.165	0.000	0.000
3	2	MF_DU_0	DU	0.193	1.450	0.904	0.000	0.040	0.000	0.139	0.122	0.000	0.000	0.129	0.682	0.263	0.000	0.000	0.000	0.062	0.039	0.000	0.000
3	3	MF_DU_1	DU	0.547	2.019	1.294	0.015	0.062	0.000	0.213	0.188	0.000	0.000	0.365	0.950	0.376	0.000	0.000	0.000	0.096	0.059	0.000	0.000
3	4	MF_DU_2	DU	0.618	2.747	1.690	0.020	0.081	0.000	0.279	0.246	0.000	0.000	0.412	1.293	0.491	0.000	0.000	0.000	0.125	0.078	0.000	0.000
3	5	MF_DU_3P	DU	0.660	3.621	2.143	0.026	0.102	0.000	0.353	0.311	0.000	0.000	0.440	1.704	0.622	0.000	0.000	0.000	0.159	0.098	0.000	0.000
3	6	COM_SERV	KSF	0.000	0.000	14.927	0.000	0.000	11.132	31.895	31.227	0.000	0.000	0.000	0.000	4.334	0.000	0.000	10.696	14.329	9.861	0.000	0.000
3	7	ENTNMT	KSF	0.000	0.000	5.597	0.000	0.000	0.491	15.615	13.174	0.000	0.000	0.000	0.000	1.625	0.000	0.000	0.472	7.015	4.160	0.000	0.000
3	8	AUTO	KSF	0.000	0.000	0.448	0.000	0.000	0.196	7.309	5.855	0.000	0.000	0.000	0.000	0.130	0.000	0.000	0.189	3.284	1.849	0.000	0.000
3	9	RESTRNT	KSF	0.000	0.000	15.289	0.000	0.680	1.388	44.121	37.223	0.000	0.000	0.000	0.000	4.439	0.000	0.000	1.333	19.823	11.755	0.000	0.000
3	10	RETAIL	KSF	0.000	0.000	6.166	0.000	0.101	1.233	12.230	9.184	0.000	0.000	0.000	0.000	1.790	0.000	0.000	1.184	5.495	2.900	0.000	0.000
3	11	HOTEL	KSF	0.225	0.688	0.348	0.000	0.749	0.038	0.258	0.541	0.000	0.000	0.150	0.324	0.101	0.000	0.000	0.037	0.116	0.171	0.000	0.000
3	12	OFFICE	KSF	0.000	0.000	1.902	0.000	0.000	3.623	0.624	1.865	0.000	0.000	0.000	0.000	0.552	0.000	0.000	3.481	0.280	0.589	0.000	0.000
3	13	INSTNL	KSF	0.000	0.000	6.634	0.000	0.000	3.820	14.766	12.198	0.000	0.000	0.000	0.000	1.926	0.000	0.000	3.670	6.634	3.852	0.000	0.000
3	14	INDUSTRL	KSF	0.000	0.000	0.194	0.000	0.000	1.631	0.000	1.177	0.000	0.000	0.000	0.000	0.056	0.000	0.000	1.567	0.000	0.372	0.000	0.000
3	15	ELEM_STU	enroll	0.000	0.000	0.083	0.000	0.000	0.054	1.249	0.081	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.052	0.561	0.026	0.000	0.000
3	16	HOSPITAL	KSF	0.000	0.000	2.156	0.000	0.000	2.696	3.359	0.740	0.000	0.000	0.000	0.000	0.626	0.000	0.000	2.590	1.509	0.234	0.000	0.000
3	17	SAFETY	KSF	0.000	0.000	2.363	0.000	0.000	0.778	0.701	3.476	0.000	0.000	0.000	0.000	0.686	0.000	0.000	0.747	0.315	1.098	0.000	0.000
3	18	CHURCH	KSF	0.000	0.000	1.511	0.000	0.000	0.099	2.220	3.334	0.000	0.000	0.000	0.000	0.439	0.000	0.000	0.096	0.997	1.053	0.000	0.000
3	19	HS	enroll	0.000	0.000	0.028	0.000	0.000	0.055	0.371	0.027	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.053	0.167	0.009	0.000	0.000
3	20	COLLEGE	enroll	0.000	0.000	0.011	0.000	0.000	0.028	0.134	0.011	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.027	0.060	0.003	0.000	0.000
3	21	GREMPFU	emp	0.000	0.000	0.056	0.000	0.000	0.572	0.000	0.467	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.549	0.000	0.148	0.000	0.000
3	22	OMEMPFU	emp	0.000	0.000	0.295	0.000	0.000	0.388	1.377	1.228	0.000	0.000	0.000	0.000	0.086	0.000	0.000	0.372	0.619	0.388	0.000	0.000
3	23	NDEMPFUI	emp	0.000	0.000	0.153	0.000	0.000	1.329	0.000	0.870	0.000	0.000	0.000	0.000	0.044	0.000	0.000	1.277	0.000	0.275	0.000	0.000
3	24	FFEMPFU	emp	0.000	0.000	0.158	0.000	0.000	0.406	0.000	0.792	0.000	0.000	0.000	0.000	0.046	0.000	0.000	0.391	0.000	0.250	0.000	0.000
3	25	EREMPFU	emp	0.000	0.000	0.304	0.000	0.000	0.699	0.703	0.863	0.000	0.000	0.000	0.000	0.088	0.000	0.000	0.672	0.316	0.273	0.000	0.000
3	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.856	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
3	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.887	0.000
3	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	1	SF_DU	DU	1.208	4.377	2.171	0.042	0.150	0.000	0.482	0.524	0.000	0.000	0.949	1.094	0.585	0.000	0.000	0.000	0.237	0.165	0.000	0.000
4	2	MF_DU_0	DU	0.180	1.706	0.919	0.000	0.040	0.000	0.135	0.122	0.000	0.000	0.142	0.426	0.248	0.000	0.000	0.000	0.066	0.039	0.000	0.000
4	3	MF_DU_1	DU	0.511	2.375	1.315	0.015	0.062	0.000	0.207	0.188	0.000	0.000	0.401	0.594	0.355	0.000	0.000	0.000	0.102	0.059	0.000	0.000
4	4	MF_DU_2	DU	0.577	3.231	1.718	0.020	0.081	0.000	0.271	0.246	0.000	0.000	0.453	0.808	0.463	0.000	0.000	0.000	0.133	0.078	0.000	0.000
4	5	MF_DU_3P	DU	0.616	4.260	2.178	0.026	0.102	0.000	0.343	0.311	0.000	0.000	0.484	1.065	0.587	0.000	0.000	0.000	0.169	0.098	0.000	0.000
4	6	COM_SERV	KSF	0.000	0.000	15.171	0.000	0.000	11.132	27.529	35.130	0.000	0.000	0.000	0.000	4.089	0.000	0.000	10.696	13.559	11.094	0.000	0.000
4	7	ENTNMT	KSF	0.000	0.000	5.689	0.000	0.000	0.491	15.162	13.174	0.000	0.000	0.000	0.000	1.533	0.000	0.000	0.472	7.468	4.160	0.000	0.000
4	8	AUTO	KSF	0.000	0.000	0.455	0.000	0.000	0.196	7.097	5.855	0.000	0.000	0.000	0.000	0.123	0.000	0.000	0.189	3.496	1.849	0.000	0.000
4	9	RESTRNT	KSF	0.000	0.000	15.539	0.000	0.680	1.388	42.842	37.223	0.000	0.000	0.000	0.000	4.188	0.000	0.000	1.333	21.101	11.755	0.000	0.000
4	10	RETAIL	KSF	0.000	0.000	6.267	0.000	0.101	1.233	10.526	10.715	0.000	0.000	0.000	0.000	1.689	0.000	0.000	1.184	5.184	3.384	0.000	0.000
4	11	HOTEL	KSF	0.210	0.809	0.354	0.000	0.749	0.038	0.251	0.541	0.000	0.000	0.165	0.202	0.095	0.000	0.000	0.037	0.124	0.171	0.000	0.000
4	12	OFFICE	KSF	0.000	0.000	1.933	0.000	0.000	3.623	0.606	1.865	0.000	0.000	0.000	0.000	0.521	0.000	0.000	3.481	0.298	0.589	0.000	0.000
4	13	INSTNL	KSF	0.000	0.000	6.743	0.000	0.000	3.820	6.452	21.143	0.000	0.000	0.000	0.000	1.817	0.000	0.000	3.670	3.178	6.677	0.000	0.000
4	14	INDUSTRL	KSF	0.000	0.000	0.197	0.000	0.000	1.631	0.000	1.177	0.000	0.000	0.000	0.000	0.053	0.000	0.000	1.567	0.000	0.372	0.000	0.000
4	15	ELEM_STU	enroll	0.000	0.000	0.084	0.000	0.000	0.054	1.213	0.081	0.000	0.000	0.000	0.000	0.023	0.000	0.000	0.052	0.597	0.026	0.000	0.000
4	16	HOSPITAL	KSF	0.000	0.000	2.191	0.000	0.000	2.696	3.262	0.740	0.000	0.000	0.000	0.000	0.591	0.000	0.000	2.590	1.607	0.234	0.000	0.000
4	17	SAFETY	KSF	0.000	0.000	2.402	0.000	0.000	0.778	0.681	3.476	0.000	0.000	0.000	0.000	0.647	0.000	0.000	0.747	0.335	1.098	0.000	0.000
4	18	CHURCH	KSF	0.000	0.000	1.536	0.000	0.000	0.099	2.939	2.445	0.000	0.000	0.000	0.000	0.414	0.000	0.000	0.096	1.448	0.772	0.000	0.000
4	19	HS	enroll	0.000	0.000	0.028	0.000	0.000	0.055	0.360	0.027	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.053	0.177	0.009	0.000	0.000
4	20	COLLEGE	enroll	0.000	0.000	0.011	0.000	0.000	0.028	0.130	0.011	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.027	0.064	0.003	0.000	0.000
4	21	GREMPFU	emp	0.000	0.000	0.057	0.000	0.000	0.572	0.000	0.467	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.549	0.000	0.148	0.000	0.000
4	22	OMEMPFU	emp	0.000	0.000	0.299	0.000	0.000	0.388	1.337	1.228	0.000	0.000	0.000	0.000	0.081	0.000	0.000	0.372	0.658	0.388	0.000	0.000
4	23	NDEMPFUI	emp	0.000	0.000	0.156	0.000	0.000	1.329	0.000	0.870	0.000	0.000	0.000	0.000	0.042	0.000	0.000	1.277	0.000	0.275	0.000	0.000
4	24	FFEMPFU	emp	0.000	0.000	0.161	0.000	0.000	0.406	0.000	0.792	0.000	0.000	0.000	0.000	0.043	0.000	0.000	0.391	0.000	0.250	0.000	0.000
4	25	EREMPFU	emp	0.000	0.000	0.308	0.000	0.000	0.699	0.682	0.863	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.672	0.336	0.273	0.000	0.000
4	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.856	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
4	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.887	0.000
4	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

APPENDIX E:
CITY OF SANTA BARBARA TDF MODEL FRICTION FACTOR CURVES

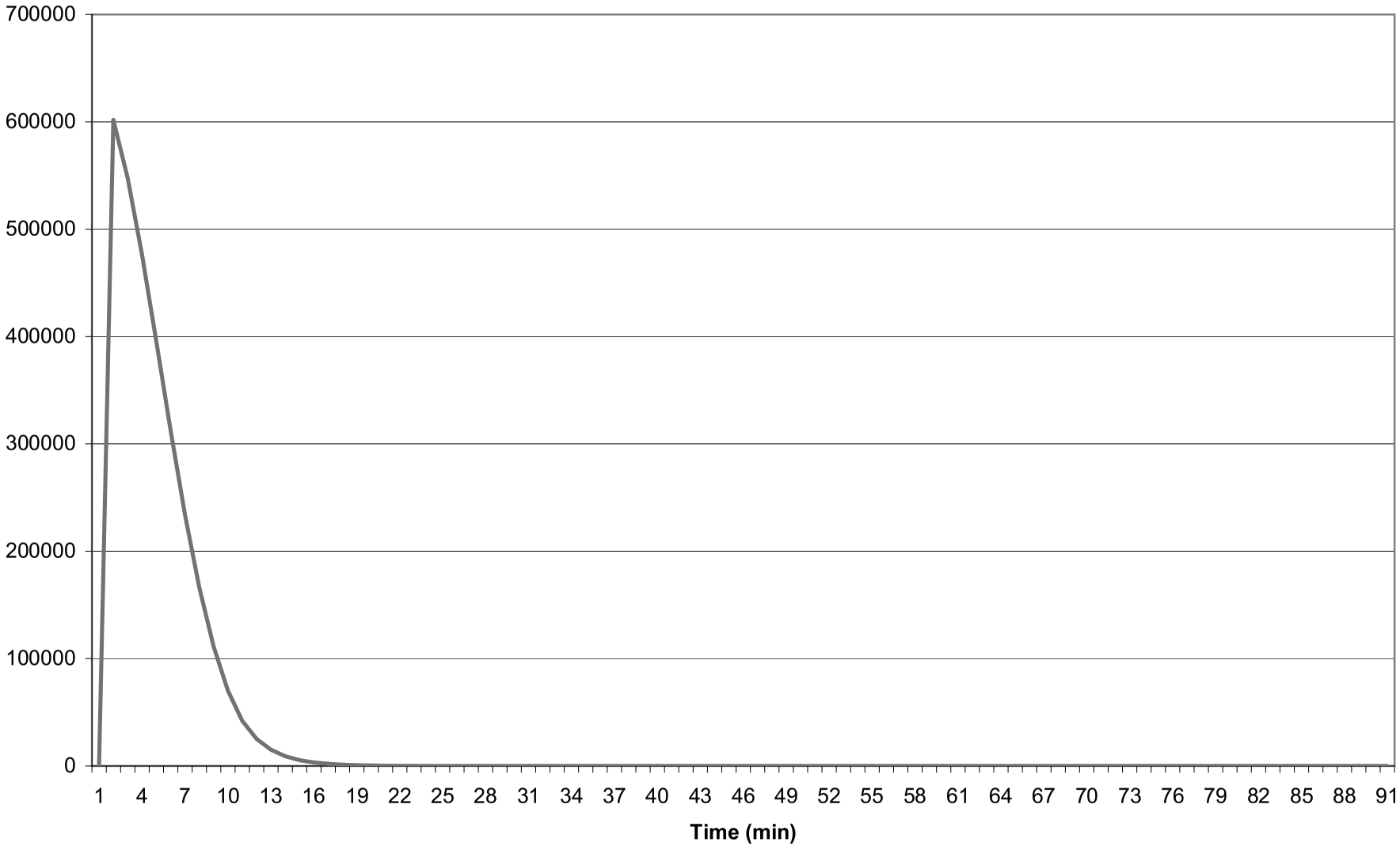
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBW



SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBO



SANTA BARBARA MODEL FRICTION FACTOR CURVES - NHB



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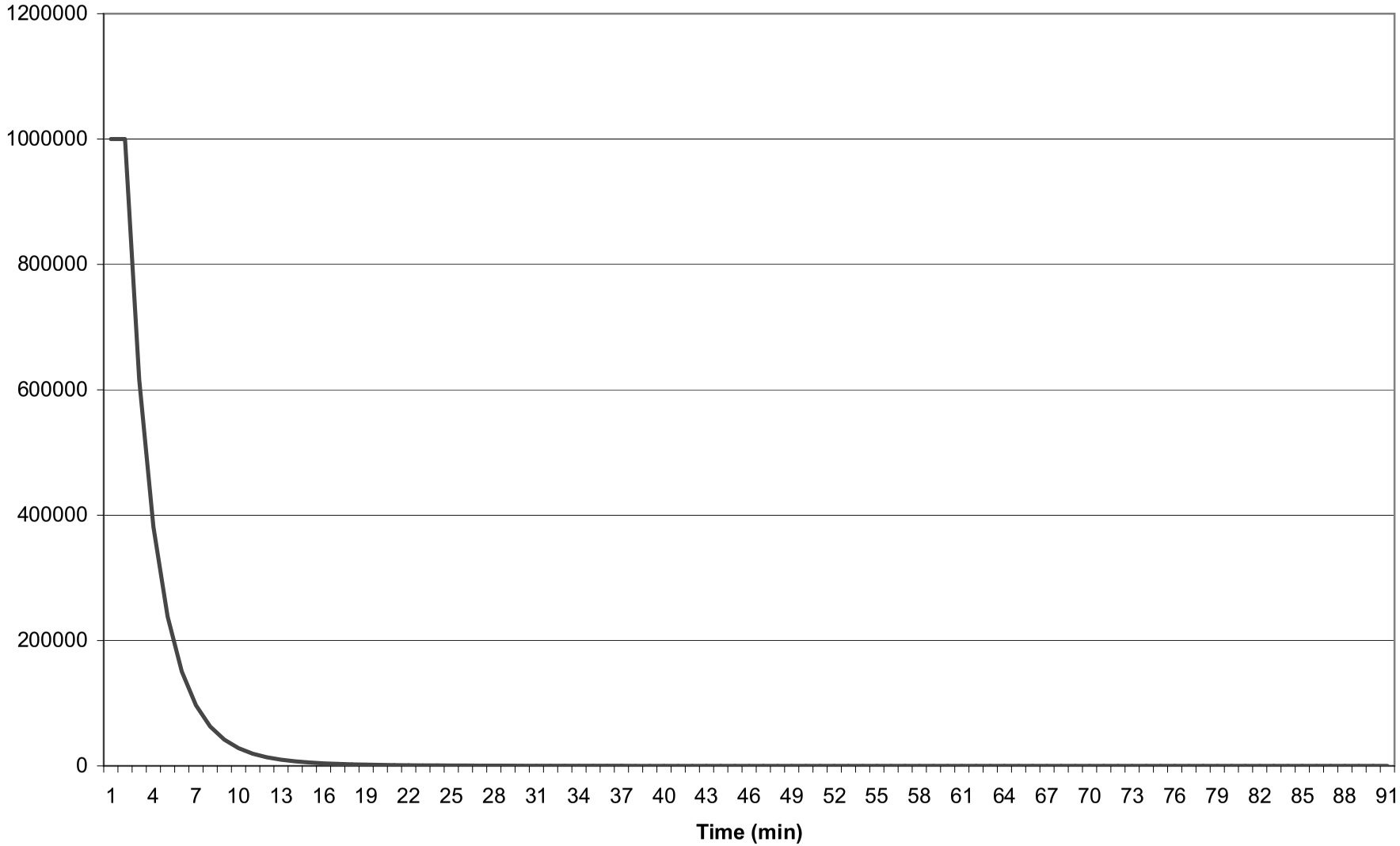

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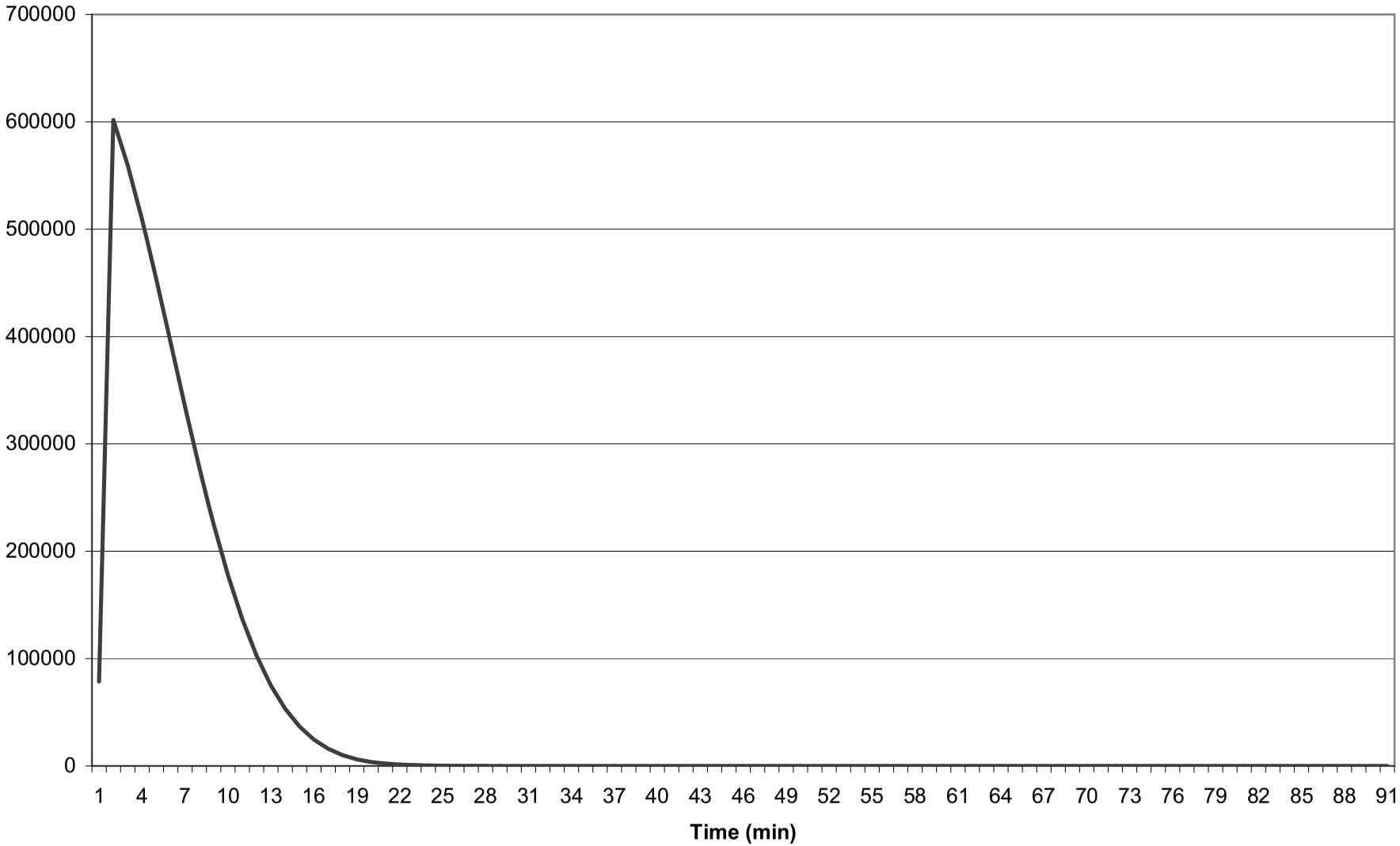
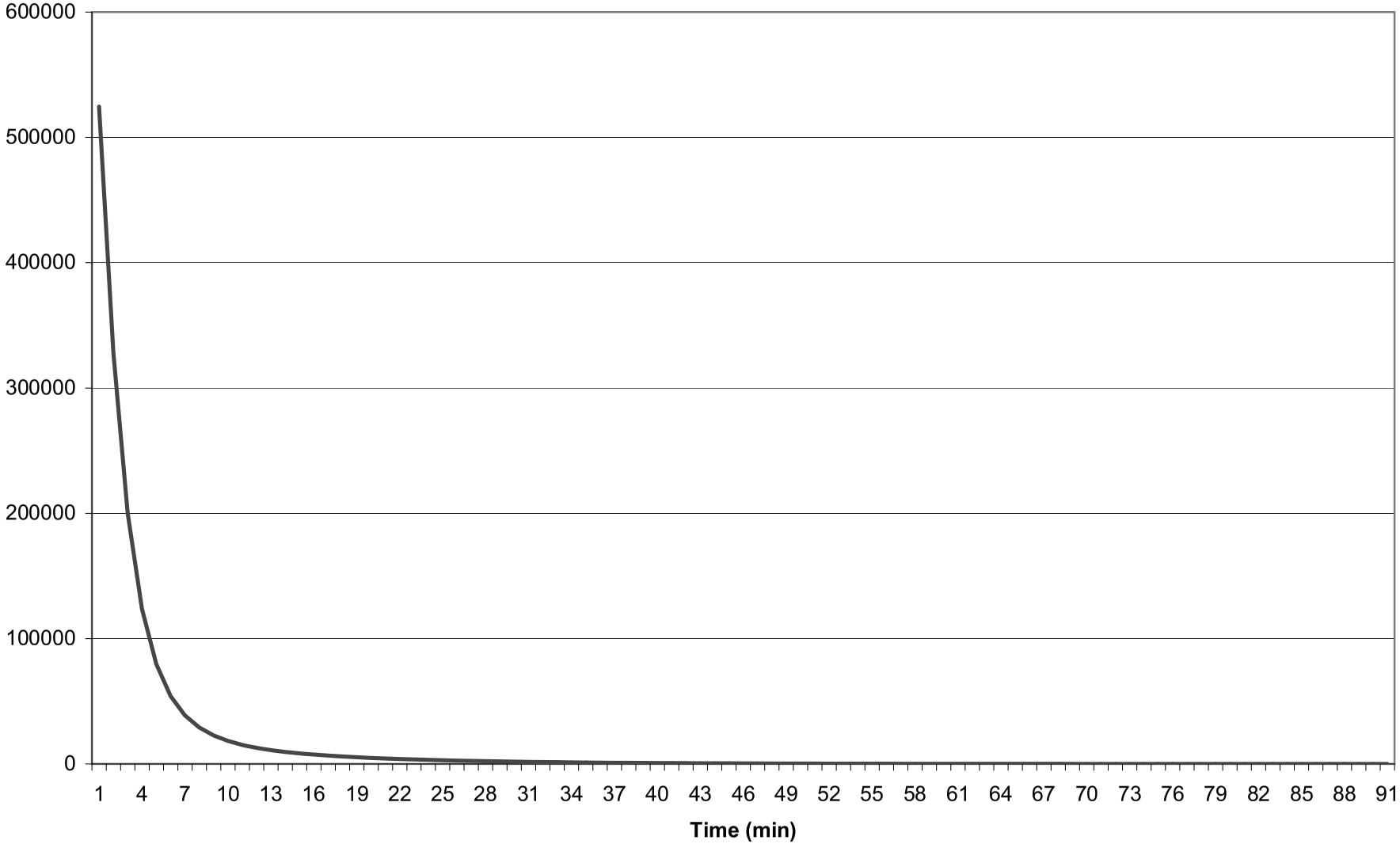


SANTA BARBARA MODEL FRICTION FACTOR CURVES - IX/XI



APPENDIX F:
VALIDATION SUMMARY REPORTS

SB GP Update Model Validation Results: Daily Two-Way Total Traffic Volumes

Roadway	Segment	Link ID	Traffic Count	Model Volume	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Foothill Rd	e/o San Marcos Pass Rd	30297	15061	19,994	1.33	1.08	0.30	**No**	4,933	24,330,035
Calle Real	e/o San Marcos Pass Rd	30298	18100	18,700	1.03	0.12	0.29	Yes	600	359,817
State St	e/o San Marcos Pass Rd	28950	13980	16,364	1.17	0.54	0.31	Yes	2,384	5,685,177
Las Palmas Dr	w/o Modoc Rd	28828	7,647	6,259	0.82	-0.44	0.41	Yes	-1,388	1,926,173
Modoc Rd	w/o Las Palmas Dr	28822	6,489	11,295	1.74	1.68	0.44	**No**	4,806	23,095,071
Las Positas Rd	s/o Hwy 101	2800	17,615	27,699	1.57	2.00	0.29	**No**	10,084	101,687,563
Las Positas Rd	s/o State St	38217	20,118	16,123	0.80	-0.72	0.28	Yes	-3,995	15,961,670
De La Vina St	w/o Alamar Ave	1631	13,463	8,009	0.59	-1.25	0.33	**No**	-5,454	29,746,669
Alamar Ave	s/o Verde Vista Dr	37037	6,628	7,703	1.16	0.37	0.44	Yes	1,075	1,155,068
State St	e/o Alamar Ave	37514	17,322	18,381	1.06	0.21	0.29	Yes	1,059	1,121,186
Mission St	n/o Hwy 101	27269	30,008	31,787	1.06	0.25	0.24	Yes	1,779	3,165,602
Laguna St	e/o Los Olivos St	37328	11,975	11,493	0.96	-0.12	0.34	Yes	-482	231,847
Micheltorena St	s/o Hwy 101	1433	9,029	9,401	1.04	0.11	0.38	Yes	372	138,210
Carrillo St	s/o San Andres St	38364	17,163	22,072	1.29	0.97	0.29	Yes	4,909	24,095,117
Carrillo St	n/o Hwy 101	1424	32,440	36,818	1.13	0.56	0.24	Yes	4,378	19,162,816
Loma Alta Dr	e/o Coronel St	1381	4,174	4,320	1.04	0.07	0.52	Yes	146	21,399
Haley St	n/o Castillo St	1498	12,250	15,333	1.25	0.74	0.34	Yes	3,083	9,505,556
Montecito St	n/o Loma Alta Dr	38438	18,676	17,258	0.92	-0.27	0.29	Yes	-1,418	2,010,175
Garden St	e/o Gutierrez St	1558	24,634	20,816	0.85	-0.60	0.26	Yes	-3,818	14,578,972
Haley St	n/o Laguna St	1486	10,943	12,751	1.17	0.46	0.36	Yes	1,808	3,268,565
Gutierrez St	n/o Laguna St	37277	10,348	14,463	1.40	1.11	0.36	**No**	4,115	16,934,188
Milpas St	e/o Quienientos St	1352	28,644	30,192	1.05	0.22	0.25	Yes	1,548	2,395,756
Alameda Padre Serra	n/o Salinas St	31682	7,467	6,896	0.92	-0.17	0.44	Yes	-571	325,958
Old Coast Hwy	e/o Salinas St	36988	5,928	5,589	0.94	-0.12	0.48	Yes	-339	114,642
Cabrillo Blvd	w/o Channel Dr	31253	9,837	13,324	1.35	0.93	0.38	Yes	3,487	12,156,020
Modoc Rd	e/o Hollister Ave	28750	7,790	8,578	1.10	0.25	0.41	Yes	788	620,390
Hollister Ave	w/o Modoc Rd	38685	17,775	23,193	1.30	1.07	0.29	**No**	5,418	29,350,315
State St	e/o Modoc Rd	38883	14,331	15,288	1.07	0.21	0.31	Yes	957	915,303
State St	w/o San Marcos Pass Rd	28859	21,161	25,406	1.20	0.73	0.28	Yes	4,245	18,023,600
Hot Springs Rd	n/o Coast Village Rd	39178	16,726	17,081	1.02	0.07	0.29	Yes	355	126,316
Olive Mill Rd	n/o Jameson Ln N	38938	7,848	4,835	0.62	-0.94	0.41	Yes	-3,013	9,078,402
San Ysidro Rd	n/o Jameson Ln N	36935	10,452	13,114	1.25	0.71	0.36	Yes	2,662	7,085,763
Foothill Rd	w/o San Roque Rd	31430	10,400	19,306	1.86	2.39	0.36	**No**	8,906	79,325,717
Mountain Dr	w/o Mission Ridge Rd	31665	3,600	2,333	0.65	-0.61	0.58	Yes	-1,267	1,605,187
San Marcos Pass Rd NB	n/o Calle Real	28896	9,000	9,427	1.05	0.12	0.38	Yes	427	182,694
San Marcos Pass Rd SB	n/o Calle Real	28897	9,000	9,762	1.08	0.22	0.38	Yes	762	580,415
Hwy 101 NB Mainline	s/o San Ysidro Rd	36702	42,500	48,239	1.14	0.63	0.21	Yes	5,739	32,930,545
Hwy 101 SB Mainline	s/o San Ysidro Rd	36774	42,500	47,999	1.13	0.60	0.21	Yes	5,499	30,234,042
Hwy 101 NB Mainline	s/o Olive Mill Rd	36704	45,000	50,101	1.11	0.54	0.21	Yes	5,101	26,018,899
Hwy 101 SB Mainline	s/o Olive Mill Rd	36772	45,000	48,800	1.08	0.40	0.21	Yes	3,800	14,437,502
Hwy 101 NB Mainline	n/o Olive Mill Rd	36704	42,500	50,101	1.18	0.84	0.21	Yes	7,601	57,773,261
Hwy 101 SB Mainline	n/o Olive Mill Rd	36772	42,500	48,800	1.15	0.69	0.21	Yes	6,300	39,685,858
Hwy 101 NB Mainline	s/o Salinas St	36708	46,000	52,405	1.14	0.67	0.21	Yes	6,405	41,020,222
Hwy 101 SB Mainline	s/o Salinas St	36769	46,000	52,813	1.15	0.71	0.21	Yes	6,813	46,412,201
Hwy 101 NB Mainline	n/o Milpas St	36712	52,000	55,736	1.07	0.36	0.20	Yes	3,736	13,956,499
Hwy 101 SB Mainline	n/o Milpas St	36766	52,000	56,648	1.09	0.45	0.20	Yes	4,648	21,600,064
Hwy 101 NB Mainline	s/o State St	36714	48,500	57,695	1.19	0.93	0.20	Yes	9,195	84,553,354
Hwy 101 SB Mainline	s/o State St	36764	48,500	56,860	1.17	0.84	0.20	Yes	8,360	69,883,781
Hwy 101 NB Mainline	s/o Carrillo St	36716	54,000	67,175	1.24	1.25	0.20	**No**	13,175	173,570,695
Hwy 101 SB Mainline	s/o Carrillo St	36762	54,000	62,501	1.16	0.81	0.20	Yes	8,501	72,260,059
Hwy 101 NB Mainline	s/o Micheltorena St	36718	60,500	73,388	1.21	1.18	0.18	**No**	12,888	166,099,211
Hwy 101 SB Mainline	s/o Micheltorena St	36760	60,500	72,398	1.20	1.09	0.18	**No**	11,898	141,567,746
Hwy 101 NB Mainline	s/o Las Positas Rd	36722	66,500	74,429	1.12	0.70	0.17	Yes	7,929	62,862,935
Hwy 101 SB Mainline	s/o Las Positas Rd	36758	66,500	79,733	1.20	1.17	0.17	**No**	13,233	175,125,010
Hwy 101 NB Mainline	n/o Las Positas Rd	36724	65,500	80,426	1.23	1.34	0.17	**No**	14,926	222,789,323
Hwy 101 SB Mainline	n/o Las Positas Rd	36756	65,500	76,914	1.17	1.03	0.17	**No**	11,414	130,271,711
Hwy 101 NB Mainline	s/o San Marcos Pass Rd	36728	64,000	67,274	1.05	0.29	0.18	Yes	3,274	10,717,187
Hwy 101 SB Mainline	s/o San Marcos Pass Rd	36753	64,000	60,211	0.94	-0.34	0.18	Yes	-3,789	14,353,559
Hwy 101 NB Mainline	n/o San Marcos Pass Rd	36728	58,000	67,274	1.16	0.86	0.19	Yes	9,274	86,001,726
Hwy 101 SB Mainline	n/o San Marcos Pass Rd	36753	58,000	60,211	1.04	0.21	0.19	Yes	2,211	4,890,250
Hwy 101 NB Mainline	s/o Turnpike Rd	36730	58,000	67,101	1.16	0.85	0.19	Yes	9,101	82,821,508
Hwy 101 SB Mainline	s/o Turnpike Rd	36752	58,000	66,426	1.15	0.79	0.19	Yes	8,426	70,992,801
Hwy 101 NB Mainline	s/o San Marcos Rd	36732	54,000	61,115	1.13	0.68	0.20	Yes	7,115	50,626,599
Hwy 101 SB Mainline	s/o San Marcos Rd	39080	54,000	61,115	1.13	0.68	0.20	Yes	7,115	50,626,599
Foothill Rd	w/o Mission Canyon Rd	1266	6,359	9,487	1.49	1.12	0.44	**No**	3,128	9,784,999
Turnpike Rd	s/o Hwy 101	38668	26,347	20,864	0.79	-0.83	0.25	Yes	-5,483	30,057,914
Turnpike Rd	s/o Hollister Ave	30782	4,407	6,013	1.36	0.70	0.52	Yes	1,606	2,580,540
Turnpike Rd	n/o Hollister Ave	28776	21,264	17,492	0.82	-0.66	0.27	Yes	-3,772	14,231,355
Turnpike Rd	s/o Calle Real	28798	18,996	19,134	1.01	0.03	0.28	Yes	138	19,091
Turnpike Rd	n/o Calle Real	28802	7,570	11,952	1.58	1.41	0.41	**No**	4,382	19,201,828
State St	e/o SR154	28950	19,890	16,364	0.82	-0.63	0.28	Yes	-3,526	12,430,132
Modoc Rd	w/o Via Senda	28822	8,240	11,295	1.37	0.90	0.41	Yes	3,055	9,331,395
Modoc Rd	s/o Hollister Ave	28750	7,790	8,578	1.10	0.25	0.41	Yes	788	620,390
Mission Canyon Rd	n/o Tunnel Rd	31448	1,565	1,879	1.20	0.32	0.63	Yes	314	98,464
Mission Canyon Rd	s/o SR192	1273	7,593	6,458	0.85	-0.36	0.41	Yes	-1,135	1,287,107
Mission Canyon Rd	n/o SR192	31447	2,989	2,022	0.68	-0.56	0.58	Yes	-967	934,141
La Cumbre	s/o SR192	30793	4,853	7,733	1.59	1.14	0.52	**No**	2,880	8,295,048

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Roadway	Segment	Link ID	Traffic Count	Model Volume	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Hollister Ave	w/o Turnpike Rd	38673	19,213	20,922	1.09	0.32	0.28	Yes	1,709	2,920,803
Hollister Ave	e/o Turnpike Rd	28775	19,344	16,795	0.87	-0.47	0.28	Yes	-2,549	6,496,841
Hollister Ave	w/o Modoc Rd	38685	17,775	23,193	1.30	1.07	0.29	**No**	5,418	29,350,315
Hollister Ave	e/o Modoc Rd	31144	14,331	15,288	1.07	0.21	0.31	Yes	957	915,303
Cathedral Oaks	w/o Turnpike Rd	28787	14,531	17,817	1.23	0.72	0.31	Yes	3,286	10,798,963
Cathedral Oaks	e/o Turnpike Rd	38736	13,220	8,730	0.66	-1.05	0.33	**No**	-4,490	20,163,861
Cathedral Oaks	w/o SR154	28760	11,957	10,719	0.90	-0.30	0.34	Yes	-1,238	1,533,141
Calle Real	e/o Turnpike Rd	28784	7,139	3,470	0.49	-1.17	0.44	**No**	-3,669	13,464,528
Calle Real	w/o Turnpike Rd	28786	4,704	5,261	1.12	0.23	0.52	Yes	557	310,202
Calle Real	w/o SR154	28858	10,055	9,389	0.93	-0.18	0.36	Yes	-666	443,955
Calle Real	w/o El Sueno Rd	28960	7,801	6,896	0.88	-0.28	0.41	Yes	-905	818,768
Alston Rd	w/o Hot Springs Rd	36976	2,943	1,735	0.59	-0.71	0.58	Yes	-1,208	1,458,065
Barker Pass Rd	s/o SR192	32774	3,607	2,010	0.56	-0.77	0.58	Yes	-1,597	2,550,724
Camino Viejo	w/o SR192	36971	2,358	2,479	1.05	0.08	0.63	Yes	121	14,620
Eucalyptus Hill Rd	s/o SR192	36974	1,011	389	0.38	-0.90	0.68	Yes	-622	386,768
Hot Springs Rd	s/o Alston Rd	31702	16,726	11,789	0.70	-1.00	0.29	**No**	-4,937	24,372,349
Hot Springs Rd	n/o Olive Mill Rd	1333	9,369	7,897	0.84	-0.41	0.38	Yes	-1,472	2,166,456
Hot Springs Rd	w/o Olive Mill Rd	27755	8,760	10,812	1.23	0.62	0.38	Yes	2,052	4,211,882
Hot Springs Rd	s/o SR192	1251	8,118	6,365	0.78	-0.53	0.41	Yes	-1,753	3,073,397
Hot Springs Rd	n/o SR192	31706	3,237	5,930	1.83	1.45	0.58	**No**	2,693	7,254,370
Jameson Ln N	e/o Olive Mill Rd	38934	3,975	2,107	0.53	-0.90	0.52	Yes	-1,868	3,489,808
Jameson Ln N	e/o San Ysidro Rd	36929	3,465	3,012	0.87	-0.23	0.58	Yes	-453	205,116
Jameson Ln N	w/o San Ysidro Rd	1315	4,041	2,014	0.50	-0.96	0.52	Yes	-2,027	4,108,672
Jameson Ln N	w/o Sheffield Dr	39092	2,636	2,177	0.83	-0.30	0.58	Yes	-459	211,138
Jameson Ln S	w/o Eucalyptus Ln	1315	1,748	2,014	1.15	0.24	0.63	Yes	266	70,763
Middle Rd	s/o Hot Springs Rd	31701	2,414	442	0.18	-1.30	0.63	**No**	-1,972	3,888,928
Olive Mill Rd	s/o Hot Springs Rd	36927	7,848	4,157	0.53	-1.15	0.41	**No**	-3,691	13,622,914
San Ysidro Rd	n/o SR192	36957	3,647	3,183	0.87	-0.22	0.58	Yes	-464	215,115
San Ysidro Rd	s/o SR192	1248	9,938	4,549	0.46	-1.43	0.38	**No**	-5,389	29,037,735
Sycamore Canyon Rd	s/o Camino Viejo	36949	7,299	5,729	0.78	-0.49	0.44	Yes	-1,570	2,464,795
Hwy 101	SHEFFIELD DR SB ON	39096	630	349	0.55	-0.65	0.68	Yes	-281	78,835
Hwy 101	SHEFFIELD DR NB OFF	39097	700	229	0.33	-0.99	0.68	Yes	-471	221,883
Hwy 101	SHEFFIELD DR SB OFF	1106	2,300	3,197	1.39	0.62	0.63	Yes	897	804,043
Hwy 101	SHEFFIELD DR NB ON	39095	2,750	3,437	1.25	0.43	0.58	Yes	687	472,125
Hwy 101	POSOLIPO LN SB ON	2866	2,100	2,455	1.17	0.27	0.63	Yes	355	125,679
Hwy 101	SAN YSIDRO NB OFF	1107	1,630	2,575	1.58	0.92	0.63	Yes	945	893,490
Hwy 101	SAN YSIDRO SB OFF	1108	3,800	4,383	1.15	0.30	0.52	Yes	583	340,085
Hwy 101	SAN YSIDRO NB ON	27214	4,500	5,030	1.12	0.23	0.52	Yes	530	280,414
Hwy 101	OLIVE MILL SB ON	33032	3,950	3,582	0.91	-0.18	0.52	Yes	-368	135,390
Hwy 101	OLIVE MILL NB OFF	1109	2,750	3,167	1.15	0.26	0.58	Yes	417	174,042
Hwy 101	OLIVE MILL SB OFF	36412	2,650	738	0.28	-1.25	0.58	**No**	-1,912	3,656,006
Hwy 101	HERMOSILLO NB OFF	1110	1,030	674	0.65	-0.51	0.68	Yes	-356	126,798
Hwy 101	RTE 101/225 NB OFF	31210	2,500	5,778	2.31	2.28	0.58	**No**	3,278	10,742,683
Hwy 101	RTE 101/225 SB ON	39228	3,200	5,800	1.81	1.41	0.58	**No**	2,600	6,758,936
Hwy 101	RTE 101/225 NB ON Q	1335	8,800	8,755	0.99	-0.01	0.38	Yes	-45	1,994
Hwy 101	RTE 101/225 SB OFF N	1117	5,650	9,075	1.61	1.28	0.48	**No**	3,425	11,729,547
Hwy 101	SALINAS NB OFF	1115	1,850	2,806	1.52	0.82	0.63	Yes	956	914,807
Hwy 101	SALINAS NB ON	1468	4,350	1,545	0.36	-1.24	0.52	**No**	-2,805	7,869,240
Hwy 101	RTE 101/144 SB ON	36607	7,350	9,542	1.30	0.68	0.44	Yes	2,192	4,803,755
Hwy 101	RTE 101/144 NB OFF	1118	5,200	7,539	1.45	0.95	0.48	Yes	2,339	5,472,928
Hwy 101	MILPAS (RTE 144) NB ON RA	1119	10,200	12,132	1.19	0.53	0.36	Yes	1,932	3,733,543
Hwy 101	101/144 SB OFF	1120	11,800	13,377	1.13	0.39	0.34	Yes	1,577	2,485,932
Hwy 101	GARDEN ST SB ON RAMP	27230	6,800	11,962	1.76	1.73	0.44	**No**	5,162	26,648,243
Hwy 101	GARDEN ST NB OFF RAMP	27226	7,750	8,730	1.13	0.31	0.41	Yes	980	961,083
Hwy 101	GARDEN ST NB ON RAMP	27237	9,750	12,998	1.33	0.88	0.38	Yes	3,248	10,546,525
Hwy 101	GARDEN ST SB OFF RAMP	37788	8,200	12,192	1.49	1.19	0.41	**No**	3,992	15,936,982
Hwy 101	BATH ST NB OFF RAMP	1168	4,700	6,135	1.31	0.59	0.52	Yes	1,435	2,058,676
Hwy 101	CASTILLO SB ON	27248	4,250	7,569	1.78	1.50	0.52	**No**	3,319	11,016,414
Hwy 101	CASTILLO NB ON	1169	12,400	15,614	1.26	0.76	0.34	Yes	3,214	10,330,709
Hwy 101	SB OFF CASTILLO/RTE 225	1173	10,440	13,210	1.27	0.74	0.36	Yes	2,770	7,673,111
Hwy 101	CARRILLO NB OFF	1175	7,000	9,191	1.31	0.71	0.44	Yes	2,191	4,800,569
Hwy 101	CARRILLO SB ON	27263	8,100	8,104	1.00	0.00	0.41	Yes	4	17
Hwy 101	CARRILLO NB ON	27253	14,750	15,404	1.04	0.14	0.31	Yes	654	428,168
Hwy 101	CARRILLO SB OFF	1205	15,400	18,002	1.17	0.56	0.30	Yes	2,602	6,769,321
Hwy 101	ARRELLAGA NB OFF	1206	4,400	2,626	0.60	-0.78	0.52	Yes	-1,774	3,145,367
Hwy 101	ARRELLAGA NB ON	1574	5,180	8,635	1.67	1.40	0.48	**No**	3,455	11,936,971
Hwy 101	MISSION SB ON	27275	7,470	7,982	1.07	0.16	0.44	Yes	512	262,599
Hwy 101	MISSION NB OFF	1209	5,000	5,163	1.03	0.07	0.48	Yes	163	26,573
Hwy 101	MISSION NB ON	27267	11,600	7,082	0.61	-1.15	0.34	**No**	-4,518	20,410,199
Hwy 101	MISSION SB OFF	1207	13,640	15,318	1.12	0.38	0.33	Yes	1,678	2,814,678
Hwy 101	PUEBLO NB OFF	1211	6,700	6,887	1.03	0.06	0.44	Yes	187	34,994
Hwy 101	LAS POSITAS AVE NB OFF	1213	7,200	3,340	0.46	-1.22	0.44	**No**	-3,860	14,901,019
Hwy 101	LAS POSITAS SB ON	1419	9,330	11,651	1.25	0.65	0.38	Yes	2,321	5,385,416
Hwy 101	LAS POSITAS NB ON	39245	10,850	9,337	0.86	-0.39	0.36	Yes	-1,513	2,288,170
Hwy 101	LAS POSITAS SB OFF	1212	8,430	8,831	1.05	0.12	0.41	Yes	401	160,667
Hwy 101	NB OFF TO HOPE AVE	28839	10,200	13,513	1.32	0.90	0.36	Yes	3,313	10,972,959
Hwy 101	NB ON FROM HOPE AVE	28842	4,530	2,109	0.47	-1.03	0.52	**No**	-2,421	5,861,458
Hwy 101	LA CUMBRE SB ON	28821	8,450	13,442	1.59	1.44	0.41	**No**	4,992	24,919,400
Hwy 101	LA CUMBRE SB OFF	28832	7,500	10,229	1.36	0.89	0.41	Yes	2,729	7,446,563
Hwy 101	101/154 NB OFF	28744	10,800	14,327	1.33	0.91	0.36	Yes	3,527	12,439,121
Hwy 101	101/154 SB ON HOLLISTER	28953	11,550	13,489	1.17	0.49	0.34	Yes	1,939	3,760,412
Hwy 101	101/154 NB ON HOLLISTER	28948	7,000	12,578	1.80	1.81	0.44	**No**	5,578	31,115,055
		Subtotal	**2,785,495**	**3,043,604**				**Model/Count Ratio =**	**1.09**	

Indicates Low Volume

Indicates High Volume

Percent Within Caltrans Maximum Deviation = 76% > 75%

Percent Root Mean Square Error = 23% < 40%

Correlation Coefficient = 0.99 > 0.88

SB GP Model Validation Results: Daily Screenline Validation

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Castillo Street									
Mission St	n/o Hwy 101	27269	31,787	30,008	1.06	0.24	Yes	-1,779	3,165,602
Micheltorena St	s/o Hwy 101	1433	9,401	9,029	1.04	0.38	Yes	372	138,210
Carrillo St	n/o Hwy 101	1424	36,818	32,440	1.13	0.24	Yes	4,378	19,162,816
Haley St	n/o Castillo St	1498	15,333	12,250	1.25	0.34	Yes	3,083	9,505,556
			93,339	83,727	**1.11**	0.26	Yes	9,612	92,383,309
			0.14	< 40%					
Screenline 2: S/O US-101 Downtown									
Las Positas Rd	s/o Hwy 101	2800	27,699	17,615	1.57	0.29	No	10,084	101,687,563
Micheltorena St	s/o Hwy 101	1433	9,401	9,029	1.04	0.38	Yes	372	138,210
Carrillo St	s/o San Andres St	38364	22,072	17,163	1.29	0.29	Yes	4,909	24,095,117
			59,171	43,807	**1.35**	0.35	Yes	15,364	236,066,911
			0.44	< 40%					
Screenline 3: S/O US-101 WCL									
Las Palmas Dr	w/o Modoc Rd	28828	6,259	7,647	0.82	0.41	Yes	-1,388	1,926,173
Modoc Rd	w/o Las Palmas Dr	28822	11,295	6,489	1.74	0.44	No	4,806	23,095,071
State St	e/o San Marcos Pass Rd	28950	16,364	13,980	1.17	0.31	Yes	2,384	5,685,177
			33,918	28,116	**1.21**	0.41	Yes	5,802	33,665,845
			0.34	< 40%					
Screenline 4: Downtown - Uptown									
Las Positas Rd	s/o State St	38217	16,123	20,118	0.80	0.28	Yes	-3,995	15,961,670
De La Vina St	w/o Alamar Ave	1631	8,009	13,463	0.59	0.33	No	-5,454	29,746,669
State St	e/o Alamar Ave	37514	18,381	17,322	1.06	0.29	Yes	1,059	1,121,186
Laguna St	e/o Los Olivos St	37328	11,493	11,975	0.96	0.34	Yes	-482	231,847
			54,006	62,878	**0.86**	0.30	Yes	-8,872	78,710,620
			0.22	< 40%					
Screenline 5: Salinas Street									
Cabrillo Blvd	w/o Channel Dr	31253	13,324	9,837	1.35	0.38	Yes	3,487	12,156,020
Old Coast Hwy	e/o Salinas St	36988	5,589	5,928	0.94	0.48	Yes	-339	114,642
Alameda Padre Serra	n/o Salinas St	31682	6,896	7,467	0.92	0.44	Yes	-571	325,958
			25,809	23,232	**1.11**	0.44	Yes	2,577	6,641,096
			0.26	< 40%					
Screenline 6: Montectio N/O US-101									
Hot Springs Rd	n/o Coast Village Rd	39178	17,081	16,726	1.02	0.29	Yes	355	126,316
Middle Rd	s/o Hot Springs Rd	31701	442	2,414	0.18	0.63	No	-1,972	3,888,928
Olive Mill Rd	n/o Jameson Ln N	38938	4,835	7,848	0.62	0.41	Yes	-3,013	9,078,402
San Ysidro Rd	n/o Jameson Ln N	36935	13,114	10,452	1.25	0.36	Yes	2,662	7,085,763
			35,472	37,440	**0.95**	0.38	Yes	-1,968	3,872,063
			0.24	< 40%					

Percent Within Caltrans Maximum Deviation = 100% = 100%

Total Count 6
Screenlines Within Deviation 6
Screenlines Outside Deviation 0

SB GP Update Model Validation Results: AM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Olive Mill Road	n/o Coast Village Road	38938	331	480	0.69	-0.60	0.52	Yes	-149	22,079
Olive Mill Road	**s/o Coast Village Road**	38601	62	427	0.14	-1.65	0.52	No	-365	133,468
Coast Village Road	**e/o Olive Mill Road**	38934	93	539	0.17	-1.74	0.48	No	-446	198,721
Coast Village Road	**w/o Olive Mill Road**	27754	187	590	0.32	-1.44	0.48	No	-403	162,012
Hot Springs Road	n/o Coast Village Road	38596	918	981	0.94	-0.17	0.38	Yes	-63	3,909
Coast Village Road	e/o Hot Springs Road	38598	569	835	0.68	-0.78	0.41	Yes	-266	70,808
Coast Village Road	w/o Hot Springs Road	36896	1,491	1,327	1.12	0.38	0.33	Yes	164	26,982
Cabrillo Boulevard	n/o US 101 SB Ramp	27222	880	914	0.96	-0.10	0.38	Yes	-34	1,181
Cabrillo Boulevard	s/o US 101 SB Ramp	2842	733	726	1.01	0.02	0.44	Yes	7	45
US 101 SB Ramp	e/o Cabrillo Boulevard	31210	500	423	1.18	0.35	0.52	Yes	77	5,942
US 101 SB Ramp	w/o Cabrillo Boulevard	1117	536	461	1.16	0.31	0.52	Yes	75	5,641
Milpas Street	n/o US 101 SB On Ramp	1349	1,061	1,014	1.05	0.13	0.36	Yes	47	2,222
Milpas Street	s/o US 101 SB On Ramp	37823	522	496	1.05	0.10	0.52	Yes	26	670
US 101 SB On Ramp	e/o Milpas Street	1470	702	582	1.21	0.44	0.48	Yes	120	14,508
Milpas Street	n/o US 101 SB Off Ramp	1351	1,633	1,655	0.99	-0.04	0.29	Yes	-22	473
Milpas Street	s/o US 101 SB Off Ramp	1350	1,202	1,206	1.00	-0.01	0.34	Yes	-4	16
US 101 SB Off Ramp	w/o Milpas Street	1120	958	949	1.01	0.02	0.38	Yes	9	79
Milpas Street	n/o Roundabout	1352	2,102	1,922	1.09	0.34	0.28	Yes	180	32,570
Milpas Street	s/o Roundabout	1351	1,633	1,584	1.03	0.10	0.30	Yes	49	2,426
Milpas Street	n/o Quinientos	31138	1,952	2,217	0.88	-0.44	0.27	Yes	-265	69,997
Milpas Street	s/o Quinientos	38950	2,038	2,297	0.89	-0.43	0.27	Yes	-259	67,047
Milpas Street	n/o Gutierrez Street	1355	1,715	1,800	0.95	-0.17	0.29	Yes	-85	7,238
Milpas Street	s/o Gutierrez Street	1354	1,847	1,791	1.03	0.11	0.29	Yes	56	3,144
Gutierrez Street	e/o Milpas Street	37169	232	390	0.60	-0.78	0.52	Yes	-158	24,807
Gutierrez Street	**w/o Milpas Street**	2665	586	359	1.63	1.10	0.58	No	227	51,624
Milpas Street	n/o Haley Street	1356	1,692	1,744	0.97	-0.10	0.29	Yes	-52	2,700
Milpas Street	s/o Haley Street	37208	1,642	1,840	0.89	-0.38	0.29	Yes	-198	39,189
Haley Street	w/o Milpas Street	1483	280	275	1.02	0.03	0.58	Yes	5	24
Cabrillo Boulevard	n/o Garden Street	2792	730	737	0.99	-0.02	0.44	Yes	-7	43
Cabrillo Boulevard	s/o Garden Street	2786	808	752	1.07	0.18	0.41	Yes	56	3,169
Garden Street	w/o Cabrillo Boulevard	37799	240	259	0.93	-0.13	0.58	Yes	-19	351
Yanonali Street	n/o Garden Street	31243	398	624	0.64	-0.76	0.48	Yes	-226	51,086
Yanonali Street	s/o Garden Street	37793	838	595	1.41	0.86	0.48	Yes	243	59,273
Garden Street	e/o Yanonali Street	1573	196	282	0.69	-0.53	0.58	Yes	-86	7,477
Garden Street	w/o Yanonali Street	27228	1,211	989	1.22	0.59	0.38	Yes	222	49,303
US 101 SB Ramps	**n/o Garden Street**	36569	655	372	1.76	1.32	0.58	No	283	79,916
US 101 SB Ramps	s/o Garden Street	36570	1,163	890	1.31	0.81	0.38	Yes	273	74,424
Garden Street	e/o US 101 SB Ramps	27228	1,211	960	1.26	0.69	0.38	Yes	251	63,023
Garden Street	w/o US 101 SB Ramps	27236	1,712	1,386	1.23	0.75	0.31	Yes	326	105,992
US 101 NB Ramps	**n/o Garden Street**	36571	859	301	2.85	3.22	0.58	No	558	311,307
US 101 NB Ramps	s/o Garden Street	36572	575	549	1.05	0.10	0.48	Yes	26	677
Garden Street	e/o US 101 NB Ramps	27243	1,712	1,359	1.26	0.80	0.33	Yes	353	124,301
Garden Street	**w/o US 101 NB Ramps**	27239	2,824	1,697	1.66	2.26	0.29	No	1,127	1,269,929
Gutierrez Street	n/o Garden Street	37394	879	878	1.00	0.00	0.38	Yes	1	0
Gutierrez Street	s/o Garden Street	2671	1,021	842	1.21	0.52	0.41	Yes	179	32,126
Garden Street	**e/o Gutierrez Street**	1570	2,787	1,609	1.73	2.42	0.30	No	1,178	1,386,599
Garden Street	w/o Gutierrez Street	1558	1,395	1,083	1.29	0.80	0.36	Yes	312	97,506
Cabrillo Boulevard	n/o State Street	38424	643	745	0.86	-0.31	0.44	Yes	-102	10,321
Cabrillo Boulevard	s/o State Street	2788	489	777	0.63	-0.91	0.41	Yes	-288	83,175
State Street	w/o Cabrillo Boulevard	1595	210	277	0.76	-0.42	0.58	Yes	-67	4,441
Gutierrez Street	n/o State Street	37601	506	372	1.36	0.63	0.58	Yes	134	17,909
Gutierrez Street	s/o State Street	2675	369	302	1.22	0.39	0.58	Yes	67	4,473
State Street	**e/o Gutierrez Street**	1621	814	439	1.85	1.64	0.52	No	375	140,668
State Street	w/o Gutierrez Street	1597	552	389	1.42	0.80	0.52	Yes	163	26,472
Cabrillo Boulevard	**n/o Castillo Street**	31784	374	793	0.47	-1.29	0.41	No	-419	175,952
Cabrillo Boulevard	**s/o Castillo Street**	1344	463	878	0.53	-1.24	0.38	No	-415	172,491
Castillo Street	**w/o Cabrillo Boulevard**	2782	123	377	0.33	-1.30	0.52	No	-254	64,460
Montecito Street	**n/o Castillo Street**	1375	933	421	2.22	2.34	0.52	No	512	262,198
Montecito Street	**s/o Castillo Street**	1368	2,019	1,364	1.48	1.48	0.33	No	655	428,776
Castillo Street	**e/o Montecito Street**	38398	231	631	0.37	-1.44	0.44	No	-400	160,311
Castillo Street	**w/o Montecito Street**	1366	2,369	1,652	1.43	1.48	0.29	No	717	514,329
Haley Street	n/o Castillo Street	1498	1,132	833	1.36	0.88	0.41	Yes	299	89,675
Castillo Street	**e/o Haley Street**	27246	1,753	1,321	1.33	1.01	0.33	No	432	186,257
Castillo Street	w/o Haley Street	38123	147	308	0.48	-0.91	0.58	Yes	-161	26,059
Haley Street	**n/o Bath Street**	1497	989	650	1.52	1.19	0.44	No	339	115,175
Haley Street	s/o Bath Street	1498	1,132	833	1.36	0.88	0.41	Yes	299	89,675
Bath Street	**e/o Haley Street**	38121	588	385	1.53	1.02	0.52	No	203	41,373
Bath Street	w/o Haley Street	38119	357	256	1.40	0.69	0.58	Yes	101	10,282
Carrillo Street	n/o Anacapa Street	1431	661	902	0.73	-0.70	0.38	Yes	-241	58,028
Carrillo Street	s/o Anacapa Street	1420	814	1,056	0.77	-0.64	0.36	Yes	-242	58,719
Anacapa Street	e/o Carrillo Street	1553	871	766	1.14	0.34	0.41	Yes	105	11,121
Anacapa Street	w/o Carrillo Street	37565	913	698	1.31	0.70	0.44	Yes	215	46,248
Carrillo Street	n/o Chapala Street	1422	931	925	1.01	0.02	0.38	Yes	6	38
Carrillo Street	s/o Chapala Street	1430	1,452	1,388	1.05	0.15	0.31	Yes	64	4,070
Chapala Street	e/o Carrillo Street	37882	626	439	1.42	0.82	0.52	Yes	187	34,792
Chapala Street	w/o Carrillo Street	1586	658	698	0.94	-0.13	0.44	Yes	-40	1,637
Carrillo Street	n/o De la Vina Street	37884	1,537	1,406	1.09	0.30	0.31	Yes	131	17,059
Carrillo Street	s/o De la Vina Street	1423	1,533	1,591	0.96	-0.12	0.30	Yes	-58	3,346
De la Vina Street	e/o Carrillo Street	1583	325	432	0.75	-0.48	0.52	Yes	-107	11,449
De la Vina Street	w/o Carrillo Street	37941	408	565	0.72	-0.58	0.48	Yes	-157	24,639
Carrillo Street	n/o Bath Street	37936	1,605	1,716	0.94	-0.22	0.29	Yes	-111	12,240
Carrillo Street	s/o Bath Street	1424	2,245	1,909	1.18	0.63	0.28	Yes	336	112,572
Bath Street	e/o Carrillo Street	2686	357	307	1.16	0.28	0.58	Yes	50	2,524
Bath Street	w/o Carrillo Street	37943	397	298	1.33	0.58	0.58	Yes	99	9,789
Carrillo Street	n/o Castillo Street	1424	2,245	1,964	1.14	0.51	0.28	Yes	281	78,690
Carrillo Street	**s/o Castillo Street**	1425	2,873	2,190	1.31	1.15	0.27	No	683	466,290
Castillo Street	e/o Carrillo Street	1540	381	260	1.46	0.81	0.58	Yes	121	14,599
Castillo Street	w/o Carrillo Street	38100	333	326	1.02	0.04	0.58	Yes	7	50
Carrillo Street	**n/o US 101 NB Ramp**	27251	2,873	2,167	1.33	1.21	0.27	No	706	498,230
Carrillo Street	s/o US 101 NB Ramp	1426	2,579	2,361	1.09	0.35	0.27	Yes	218	47,588
US 101 NB Ramp	e/o Carrillo Street	36567	495	381	1.30	0.58	0.52	Yes	114	13,097
US 101 NB Ramp	w/o Carrillo Street	36568	876	721	1.21	0.49	0.44	Yes	155	23,989

SB GP Update Model Validation Results: AM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Carrillo Street	n/o US 101 SB Ramp	27259	2,579	2,347	1.10	0.37	0.27	Yes	232	53,892
Carrillo Street	s/o US 101 SB Ramp	1427	1,718	1,923	0.89	-0.38	0.28	Yes	-205	41,874
US 101 SB Ramp	e/o Carrillo Street	36565	618	445	1.39	0.75	0.52	Yes	173	29,781
US 101 SB Ramp	**w/o Carrillo Street**	36566	1,455	855	1.70	1.71	0.41	No	600	359,501
Carrillo Street	n/o San Andres Street	31773	1,389	1,824	0.76	-0.83	0.29	Yes	-435	188,809
Carrillo Street	**s/o San Andres Street**	1428	887	1,424	0.62	-1.21	0.31	No	-537	288,613
San Andres Street	**e/o Carrillo Street**	38373	192	568	0.34	-1.39	0.48	No	-376	141,301
San Andres Street	w/o Carrillo Street	1384	505	700	0.72	-0.63	0.44	Yes	-195	37,989
Micheltorena Street	n/o San Andres Street	38360	656	726	0.90	-0.22	0.44	Yes	-70	4,840
Micheltorena Street	s/o San Andres Street	38895	504	617	0.82	-0.39	0.48	Yes	-113	12,852
San Andres Street	e/o Micheltorena Street	38362	513	610	0.84	-0.34	0.48	Yes	-97	9,427
San Andres Street	w/o Micheltorena Street	2855	431	549	0.78	-0.45	0.48	Yes	-118	13,961
Mission Street	n/o Modoc Road	38356	1,010	1,248	0.81	-0.56	0.34	Yes	-238	56,541
Mission Street	s/o Modoc Road	2867	716	1,109	0.65	-0.99	0.36	Yes	-393	154,356
Modoc Road	w/o Mission Street	38344	538	651	0.83	-0.40	0.44	Yes	-113	12,881
Mission Street	n/o US 101 SB Ramps	1444	2,200	2,082	1.06	0.21	0.28	Yes	118	13,868
Mission Street	s/o US 101 SB Ramps	27274	1,010	1,360	0.74	-0.79	0.33	Yes	-350	122,348
US 101 SB Ramps	e/o Mission Street	36563	638	600	1.06	0.13	0.48	Yes	38	1,436
US 101 SB Ramps	**w/o Mission Street**	36564	1,252	818	1.53	1.30	0.41	No	434	188,692
Mission Street	**n/o US 101 NB Ramps**	1445	2,483	1,939	1.28	1.00	0.28	No	544	296,002
Mission Street	s/o US 101 NB Ramps	27266	2,200	2,062	1.07	0.24	0.28	Yes	138	18,979
US 101 NB Ramps	e/o Mission Street	36561	331	382	0.87	-0.26	0.52	Yes	-51	2,583
US 101 NB Ramps	w/o Mission Street	36562	716	1,015	0.71	-0.82	0.36	Yes	-299	89,290
Mission Street	n/o Castillo Street	1446	1,824	1,810	1.01	0.03	0.29	Yes	14	185
Mission Street	s/o Castillo Street	38145	2,414	2,036	1.19	0.67	0.28	Yes	378	142,542
Castillo Street	e/o Mission Street	1534	243	187	1.30	0.48	0.63	Yes	56	3,141
Castillo Street	**w/o Mission Street**	38049	523	313	1.67	1.17	0.58	No	210	44,126
Mission Street	n/o Bath Street	1448	1,785	1,452	1.23	0.73	0.31	Yes	333	110,888
Mission Street	s/o Bath Street	38057	1,806	1,793	1.01	0.03	0.29	Yes	13	177
Bath Street	e/o Mission Street	2679	143	331	0.43	-0.99	0.58	Yes	-188	35,518
Bath Street	**w/o Mission Street**	38047	186	492	0.38	-1.20	0.52	No	-306	93,480
Mission Street	n/o De la Vina Street	1449	1,158	1,059	1.09	0.26	0.36	Yes	99	9,814
Mission Street	s/o De la Vina Street	37981	1,670	1,502	1.11	0.37	0.30	Yes	168	28,300
De la Vina Street	e/o Mission Street	1576	536	727	0.74	-0.60	0.44	Yes	-191	36,385
De la Vina Street	**w/o Mission Street**	37984	440	780	0.56	-1.06	0.41	No	-340	115,553
Mission Street	n/o State Street	1451	857	623	1.38	0.79	0.48	Yes	234	54,932
Mission Street	s/o State Street	37700	916	909	1.01	0.02	0.38	Yes	7	50
State Street	e/o Mission Street	37706	953	848	1.12	0.30	0.41	Yes	105	11,041
State Street	**w/o Mission Street**	1607	1,140	696	1.64	1.45	0.44	No	444	197,019
Meigs Road	**n/o Cliff Drive**	38307	609	1,016	0.60	-1.12	0.36	No	-407	165,918
Meigs Road	s/o Cliff Drive	1389	371	635	0.58	-0.95	0.44	Yes	-264	69,896
Cliff Drive	**e/o Meigs Road**	38498	736	1,182	0.62	-1.11	0.34	No	-446	199,107
Cliff Drive	w/o Meigs Road	1373	1,063	1,453	0.73	-0.86	0.31	Yes	-390	151,984
Las Positas Road	n/o Cliff Drive	38294	1,042	1,219	0.86	-0.43	0.34	Yes	-177	31,167
Cliff Drive	e/o Las Positas Road	1374	1,112	1,185	0.94	-0.18	0.34	Yes	-73	5,357
Cliff Drive	w/o Las Positas Road	2796	346	491	0.71	-0.57	0.52	Yes	-145	20,902
Las Positas Road	n/o Modoc Road	2800	1,831	1,980	0.92	-0.27	0.28	Yes	-149	22,268
Las Positas Road	s/o Modoc Road	2801	1,115	1,510	0.74	-0.86	0.30	Yes	-395	155,797
Modoc Road	e/o Las Positas Road	27786	779	614	1.27	0.56	0.48	Yes	165	27,085
Modoc Road	w/o Las Positas Road	2809	724	726	1.00	-0.01	0.44	Yes	-2	3
Las Positas Road	n/o US 101 SB Ramps	27283	1,967	2,316	0.85	-0.57	0.27	Yes	-349	121,928
Las Positas Road	s/o US 101 SB Ramps	2800	1,831	1,999	0.92	-0.30	0.28	Yes	-168	28,300
US 101 SB Ramps	e/o Las Positas Road	1419	809	739	1.09	0.21	0.44	Yes	70	4,850
US 101 SB Ramps	w/o Las Positas Road	1212	559	584	0.96	-0.09	0.48	Yes	-25	612
US 101 NB Ramp	s/o Calle Real	39245	853	1,005	0.85	-0.42	0.36	Yes	-152	23,205
Calle Real	e/o US 101 NB Ramp	1634	1,148	1,495	0.77	-0.74	0.31	Yes	-347	120,132
Calle Real	w/o US 101 NB Ramp	38587	297	499	0.60	-0.78	0.52	Yes	-202	40,604
Alamar Avenue	n/o State Street	37037	559	651	0.86	-0.32	0.44	Yes	-92	8,512
Alamar Avenue	**s/o State Street**	1279	255	557	0.46	-1.14	0.48	No	-302	91,059
State Street	e/o Alamar Avenue	37514	1,145	1,219	0.94	-0.18	0.34	Yes	-74	5,441
State Street	w/o Alamar Avenue	1610	811	1,075	0.75	-0.68	0.36	Yes	-264	69,690
De la Vina Street	s/o State Street	38203	559	659	0.85	-0.34	0.44	Yes	-100	9,970
State Street	e/o De la Vina Street	38213	1,107	1,234	0.90	-0.30	0.34	Yes	-127	16,197
State Street	w/o De la Vina Street	27775	1,646	1,857	0.89	-0.40	0.29	Yes	-211	44,509
Las Positas Road	n/o State Street	37057	831	772	1.08	0.19	0.41	Yes	59	3,444
Las Positas Road	s/o State Street	1283	1,065	1,210	0.88	-0.35	0.34	Yes	-145	20,943
State Street	e/o Las Positas Road	38219	1,839	1,882	0.98	-0.08	0.28	Yes	-43	1,810
State Street	w/o Las Positas Road	1613	2,101	1,802	1.17	0.58	0.29	Yes	299	89,687
Hitchcock Way	s/o State Street	38542	288	469	0.61	-0.74	0.52	Yes	-181	32,871
State Street	e/o Hitchcock Way	38540	1,963	1,599	1.23	0.75	0.30	Yes	364	132,339
State Street	**w/o Hitchcock Way**	31416	1,924	1,405	1.37	1.18	0.31	No	519	269,870
Hope Avenue	n/o State Street	38234	556	512	1.09	0.18	0.48	Yes	44	1,935
Hope Avenue	s/o State Street	28748	523	647	0.81	-0.44	0.44	Yes	-124	15,460
State Street	e/o Hope Avenue	38236	1,924	1,495	1.29	0.92	0.31	Yes	429	184,345
State Street	**w/o Hope Avenue**	28846	1,990	1,460	1.36	1.16	0.31	No	530	280,680
La Cumbre Road	**n/o State Street**	38244	791	1,244	0.64	-1.07	0.34	No	-453	205,613
La Cumbre Road	s/o State Street	28877	1,353	1,221	1.11	0.32	0.34	Yes	132	17,438
State Street	**e/o La Cumbre Road**	38516	2,102	1,394	1.51	1.62	0.31	No	708	501,417
State Street	**w/o La Cumbre Road**	28876	2,056	1,365	1.51	1.56	0.33	No	691	477,728
Hope Avenue	n/o US 101 NB Ramp/Calle Re	38556	578	666	0.87	-0.30	0.44	Yes	-88	7,800
US 101 NB Ramp/Calle Re	e/o Hope Avenue	31415	339	615	0.55	-0.94	0.48	Yes	-276	76,070
US 101 NB Ramp/Calle Re	w/o Hope Avenue	28823	723	1,102	0.66	-0.96	0.36	Yes	-379	143,732
La Cumbre Road	n/o US 101 SB Ramps	28934	1,972	1,714	1.15	0.51	0.29	Yes	258	66,624
La Cumbre Road	s/o US 101 SB Ramps	28831	901	1,156	0.78	-0.65	0.34	Yes	-255	64,872
US 101 SB Ramps	e/o La Cumbre Road	28821	854	693	1.23	0.53	0.44	Yes	161	25,882
US 101 SB Ramps	**w/o La Cumbre Road**	28832	890	573	1.55	1.17	0.48	No	317	100,710
La Cumbre Road	**n/o Calle Real**	28936	1,890	1,255	1.51	1.56	0.33	No	635	403,793
La Cumbre Road	s/o Calle Real	28830	1,972	1,688	1.17	0.57	0.29	Yes	284	80,722
Calle Real	e/o La Cumbre Road	28823	723	1,035	0.70	-0.84	0.36	Yes	-312	97,419
SR-154	s/o Calle Real	28860	1,220	1,266	0.96	-0.11	0.33	Yes	-46	2,143
Calle Real	e/o SR-154	30298	1,198	1,088	1.10	0.28	0.36	Yes	110	12,155
Calle Real	w/o SR-154	28858	596	752	0.79	-0.51	0.41	Yes	-156	24,244
SR-154	n/o US 101 SB On Ramp	28860	1,220	1,223	1.00	-0.01	0.34	Yes	-3	11
SR-154	**s/o US 101 SB On Ramp**	28951	584	1,045	0.56	-1.23	0.36	No	-461	212,795
US 101 SB On Ramp	**e/o SR-154**	28953	1,058	504	2.10	2.32	0.48	No	554	307,347
Indicates Low Volume		**Subtotal**	**195,929**	**189,621**				**Model/Count Ratio =**	**1.03**	
Indicates High Volume								**Percent Within Caltrans Maximum Deviation =**	**78%**	> 75%
								Percent Root Mean Square Error =	**30%**	< 40%
								Correlation Coefficient =	**0.90**	> 0.88

SB GP Model Validation Results: AM Peak Hour Screenlines

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Cabrillo Bl									
Garden Street	w/o Cabrillo Boulevard	37799	240	259	0.93	0.58	Yes	-19	351
State Street	w/o Cabrillo Boulevard	1595	210	277	0.76	0.58	Yes	-67	4,441
Castillo Street	w/o Cabrillo Boulevard	2782	123	377	0.33	0.52	No	-254	64,460
			574	913	**0.63**	0.57	Yes	-339	115,109
			0.50	< 40%					
Screenline 2: North of the Mesa									
Las Positas Road	s/o Modoc Road	2801	1,115	1,510	0.74	0.30	Yes	-395	155,797
Mission Street	n/o Modoc Road	38356	1,010	1,248	0.81	0.34	Yes	-238	56,541
Micheltorena Stree	n/o San Andres Street	38360	656	726	0.90	0.44	Yes	-70	4,840
Carrillo Street	s/o San Andres Street	1428	887	1,424	0.62	0.31	No	-537	288,613
Montecito Street	s/o Castillo Street	1368	2,019	1,364	1.48	0.33	No	655	428,776
Cabrillo Boulevard	s/o Castillo Street	1344	463	878	0.53	0.38	No	-415	172,491
			6,150	7,150	**0.86**	0.28	Yes	-1,000	999,609
			0.36	< 40%					
Screenline 3: Castillo Street									
Haley Street	n/o Castillo Street	1498	1,132	833	1.36	0.41	Yes	299	89,675
Carrillo Street	s/o Castillo Street	1425	2,873	2,190	1.31	0.27	No	683	466,290
Mission Street	s/o Castillo Street	38145	2,414	2,036	1.19	0.28	Yes	378	142,542
			6,419	5,059	**1.27**	0.32	Yes	1,360	1,849,220
			0.29	< 40%					
Screenline 4: West of Chapala									
Mission Street	s/o State Street	37700	916	909	1.01	0.38	Yes	7	50
Carrillo Street	n/o Chapala Street	1422	931	925	1.01	0.38	Yes	6	38
Gutierrez Street	s/o State Street	2675	369	302	1.22	0.58	Yes	67	4,473
			2,216	2,136	**1.04**	0.45	Yes	80	6,423
			0.05	< 40%					
Screenline 5: East of State									
Mission Street	n/o State Street	1451	857	623	1.38	0.48	Yes	234	54,932
Carrillo Street	s/o Anacapa Street	1420	814	1,056	0.77	0.36	Yes	-242	58,719
Gutierrez Street	n/o State Street	37601	506	372	1.36	0.58	Yes	134	17,909
			2,177	2,051	**1.06**	0.46	Yes	126	15,846
			0.31	< 40%					
Screenline 6: Haley Street									
Castillo Street	w/o Haley Street	38123	147	308	0.48	0.58	Yes	-161	26,059
Bath Street	w/o Haley Street	38119	357	256	1.40	0.58	Yes	101	10,282
State Street	w/o Gutierrez Street	1597	552	389	1.42	0.52	Yes	163	26,472
Garden Street	w/o Gutierrez Street	1558	1,395	1,083	1.29	0.36	Yes	312	97,506
			2,451	2,036	**1.20**	0.46	Yes	415	172,167
			0.39	< 40%					
Screenline 7: S/O Carrillo									
Castillo Street	e/o Carrillo Street	1540	381	260	1.46	0.58	Yes	121	14,599
Bath Street	e/o Carrillo Street	2686	357	307	1.16	0.58	Yes	50	2,524
Chapala Street	e/o Carrillo Street	37882	626	439	1.42	0.52	Yes	187	34,792
De la Vina Street	e/o Carrillo Street	1583	325	432	0.75	0.52	Yes	-107	11,449
Anacapa Street	e/o Carrillo Street	1553	871	766	1.14	0.41	Yes	105	11,121
			2,560	2,204	**1.16**	0.45	Yes	356	126,768
			0.18	< 40%					
Screenline 8: N/O Carrillo									
Castillo Street	w/o Carrillo Street	38100	333	326	1.02	0.58	Yes	7	50
Bath Street	w/o Carrillo Street	37943	397	298	1.33	0.58	Yes	99	9,789
Chapala Street	w/o Carrillo Street	1586	658	698	0.94	0.44	Yes	-40	1,637
De la Vina Street	w/o Carrillo Street	37941	408	565	0.72	0.48	Yes	-157	24,639
Anacapa Street	w/o Carrillo Street	37565	913	698	1.31	0.44	Yes	215	46,248
			2,709	2,585	**1.05**	0.42	Yes	124	15,290
			0.25	< 40%					
Screenline 9: S/O Mission									
Castillo Street	e/o Mission Street	1534	243	187	1.30	0.63	Yes	56	3,141
Bath Street	e/o Mission Street	2679	143	331	0.43	0.58	Yes	-188	35,518
De la Vina Street	e/o Mission Street	1576	536	727	0.74	0.44	Yes	-191	36,385
State Street	e/o Mission Street	37706	953	848	1.12	0.41	Yes	105	11,041
			1,875	2,093	**0.90**	0.46	Yes	-218	47,564
			0.28	< 40%					
Screenline 10: N/O Mission									
Castillo Street	w/o Mission Street	38049	523	313	1.67	0.58	No	210	44,126
Bath Street	w/o Mission Street	38047	186	492	0.38	0.52	No	-306	93,480
De la Vina Street	w/o Mission Street	37984	440	780	0.56	0.41	No	-340	115,553
State Street	w/o Mission Street	1607	1,140	696	1.64	0.44	No	444	197,019
			2,289	2,281	**1.00**	0.44	Yes	8	68
			0.59	< 40%					
Screenline 11: S/O Upper State									
Alamar Avenue	s/o State Street	1279	255	557	0.46	0.48	No	-302	91,059
Las Positas Road	s/o State Street	1283	1,065	1,210	0.88	0.34	Yes	-145	20,943
Hitchcock Way	s/o State Street	38542	288	469	0.61	0.52	Yes	-181	32,871
Hope Avenue	s/o State Street	28748	523	647	0.81	0.44	Yes	-124	15,460
La Cumbre Road	s/o State Street	28877	1,353	1,221	1.11	0.34	Yes	132	17,438
			3,484	4,104	**0.85**	0.36	Yes	-620	384,483
			0.23	< 40%					
Screenline 12: N/O Upper State									
Alamar Avenue	n/o State Street	37037	559	651	0.86	0.44	Yes	-92	8,512
Las Positas Road	n/o State Street	37057	831	772	1.08	0.41	Yes	59	3,444
Hope Avenue	n/o State Street	38234	556	512	1.09	0.48	Yes	44	1,935
La Cumbre Road	n/o State Street	38244	791	1,244	0.64	0.34	No	-453	205,613
			2,736	3,179	**0.86**	0.40	Yes	-443	196,277
			0.29	< 40%					

Percent Within Caltrans Maximum Deviation = 100% =100

Total Count 12
Screenlines Within Deviation 12
Screenlines Outside Deviation 0

SB GP Update Model Validation Results: PM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Olive Mill Road	n/o Coast Village Road	38938	327	550	0.59	-0.85	0.48	Yes	-223	49,803
Olive Mill Road	**s/o Coast Village Road**	38601	84	391	0.21	-1.51	0.52	No	-307	94,213
Coast Village Road	**e/o Olive Mill Road**	38934	145	598	0.24	-1.59	0.48	No	-453	205,242
Coast Village Road	**w/o Olive Mill Road**	27754	264	779	0.34	-1.61	0.41	No	-515	265,578
Hot Springs Road	n/o Coast Village Road	38596	1,099	1,026	1.07	0.20	0.36	Yes	73	5,332
Coast Village Road	e/o Hot Springs Road	38598	770	1,102	0.70	-0.84	0.36	Yes	-332	110,348
Coast Village Road	**w/o Hot Springs Road**	36896	1,807	1,356	1.33	1.02	0.33	No	451	203,554
Cabrillo Boulevard	n/o US 101 SB Ramp	27222	1,150	917	1.25	0.67	0.38	Yes	233	54,176
Cabrillo Boulevard	s/o US 101 SB Ramp	2842	1,010	917	1.10	0.27	0.38	Yes	93	8,660
US 101 SB Ramp	e/o Cabrillo Boulevard	31210	295	496	0.59	-0.78	0.52	Yes	-201	40,514
US 101 SB Ramp	**w/o Cabrillo Boulevard**	1117	698	294	2.37	2.39	0.58	No	404	163,033
Milpas Street	n/o US 101 SB On Ramp	1349	1,295	1,586	0.82	-0.61	0.30	Yes	-291	84,628
Milpas Street	s/o US 101 SB On Ramp	37823	554	847	0.65	-0.84	0.41	Yes	-293	85,888
US 101 SB On Ramp	e/o Milpas Street	1470	743	825	0.90	-0.24	0.41	Yes	-82	6,776
Milpas Street	n/o US 101 SB Off Ramp	1351	2,114	1,988	1.06	0.23	0.28	Yes	126	15,849
Milpas Street	s/o US 101 SB Off Ramp	1350	1,532	1,601	0.96	-0.14	0.30	Yes	-69	4,769
US 101 SB Off Ramp	w/o Milpas Street	1120	1,096	1,153	0.95	-0.14	0.34	Yes	-57	3,204
Milpas Street	n/o Roundabout	1352	2,460	2,024	1.22	0.78	0.28	Yes	436	190,404
Milpas Street	s/o Roundabout	1351	2,114	1,988	1.06	0.23	0.28	Yes	126	15,849
Milpas Street	n/o Quinientos	31138	2,190	2,126	1.03	0.11	0.27	Yes	64	4,048
Milpas Street	s/o Quinientos	38950	2,295	2,168	1.06	0.22	0.27	Yes	127	16,047
Milpas Street	n/o Gutierrez Street	1355	2,029	1,848	1.10	0.34	0.29	Yes	181	32,688
Milpas Street	s/o Gutierrez Street	1354	2,143	1,861	1.15	0.53	0.29	Yes	282	79,525
Gutierrez Street	e/o Milpas Street	37169	241	411	0.59	-0.79	0.52	Yes	-170	28,787
Gutierrez Street	w/o Milpas Street	2665	374	330	1.13	0.23	0.58	Yes	44	1,936
Milpas Street	n/o Haley Street	1356	1,871	1,701	1.10	0.34	0.29	Yes	170	28,802
Milpas Street	s/o Haley Street	37208	1,983	2,025	0.98	-0.08	0.28	Yes	-42	1,779
Haley Street	w/o Milpas Street	1483	540	731	0.74	-0.59	0.44	Yes	-191	36,335
Cabrillo Boulevard	n/o Garden Street	2792	1,060	1,131	0.94	-0.18	0.34	Yes	-71	4,993
Cabrillo Boulevard	s/o Garden Street	2786	1,165	1,185	0.98	-0.05	0.34	Yes	-20	405
Garden Street	w/o Cabrillo Boulevard	37799	351	348	1.01	0.02	0.58	Yes	3	11
Yanonali Street	n/o Garden Street	31243	481	719	0.67	-0.75	0.44	Yes	-238	56,491
Yanonali Street	s/o Garden Street	37793	1,025	713	1.44	0.99	0.44	Yes	312	97,156
Garden Street	e/o Yanonali Street	1573	266	397	0.67	-0.63	0.52	Yes	-131	17,074
Garden Street	w/o Yanonali Street	27228	1,455	1,151	1.26	0.78	0.34	Yes	304	92,238
US 101 SB Ramps	n/o Garden Street	36569	988	919	1.08	0.20	0.38	Yes	69	4,798
US 101 SB Ramps	s/o Garden Street	36570	824	577	1.43	0.90	0.48	Yes	247	60,984
Garden Street	e/o US 101 SB Ramps	27228	1,455	1,110	1.31	0.87	0.36	Yes	345	118,823
Garden Street	w/o US 101 SB Ramps	27236	2,345	1,964	1.19	0.69	0.28	Yes	381	145,072
US 101 NB Ramps	n/o Garden Street	36571	549	590	0.93	-0.15	0.48	Yes	-41	1,657
US 101 NB Ramps	**s/o Garden Street**	36572	1,118	734	1.52	1.19	0.44	No	384	147,570
Garden Street	e/o US 101 NB Ramps	27243	2,345	1,986	1.18	0.65	0.28	Yes	359	128,797
Garden Street	**w/o US 101 NB Ramps**	27239	3,060	2,218	1.38	1.41	0.27	No	842	708,707
Gutierrez Street	n/o Garden Street	37394	1,334	1,056	1.26	0.73	0.36	Yes	278	77,146
Gutierrez Street	s/o Garden Street	2671	957	838	1.14	0.35	0.41	Yes	119	14,189
Garden Street	**e/o Gutierrez Street**	1570	3,016	2,208	1.37	1.36	0.27	No	808	652,964
Garden Street	w/o Gutierrez Street	1558	1,670	1,536	1.09	0.29	0.30	Yes	134	18,076
Cabrillo Boulevard	n/o State Street	38424	943	1,063	0.89	-0.31	0.36	Yes	-120	14,438
Cabrillo Boulevard	**s/o State Street**	2788	631	1,051	0.60	-1.11	0.36	No	-420	176,001
State Street	w/o Cabrillo Boulevard	1595	357	538	0.66	-0.71	0.48	Yes	-181	32,799
Gutierrez Street	**n/o State Street**	37601	935	565	1.65	1.38	0.48	No	370	136,927
Gutierrez Street	s/o State Street	2675	647	426	1.52	1.00	0.52	Yes	221	48,828
State Street	**e/o Gutierrez Street**	1621	1,325	739	1.79	1.80	0.44	No	586	343,341
State Street	w/o Gutierrez Street	1597	552	634	0.87	-0.30	0.44	Yes	-82	6,773
Cabrillo Boulevard	**n/o Castillo Street**	31784	468	1,571	0.30	-2.32	0.30	No	-1,103	1,215,811
Cabrillo Boulevard	**s/o Castillo Street**	1344	611	1,652	0.37	-2.14	0.29	No	-1,041	1,083,007
Castillo Street	**w/o Cabrillo Boulevard**	2782	203	761	0.27	-1.79	0.41	No	-558	311,011
Montecito Street	**n/o Castillo Street**	1375	1,098	663	1.66	1.49	0.44	No	435	189,337
Montecito Street	**s/o Castillo Street**	1368	2,042	1,488	1.37	1.19	0.31	No	554	307,408
Castillo Street	**e/o Montecito Street**	38398	335	761	0.44	-1.36	0.41	No	-426	181,256
Castillo Street	**w/o Montecito Street**	1366	2,547	1,852	1.38	1.31	0.29	No	695	482,989
Haley Street	n/o Castillo Street	1498	1,178	1,180	1.00	0.00	0.34	Yes	-2	3
Castillo Street	e/o Haley Street	27246	2,035	1,843	1.10	0.36	0.29	Yes	192	36,880
Castillo Street	w/o Haley Street	38123	494	530	0.93	-0.14	0.48	Yes	-36	1,280
Haley Street	n/o Bath Street	1497	1,005	959	1.05	0.13	0.38	Yes	46	2,132
Haley Street	s/o Bath Street	1498	1,178	1,151	1.02	0.07	0.34	Yes	27	742
Bath Street	e/o Haley Street	38121	567	415	1.37	0.70	0.52	Yes	152	23,026
Bath Street	w/o Haley Street	38119	183	285	0.64	-0.62	0.58	Yes	-102	10,422
Carrillo Street	n/o Anacapa Street	1431	941	1,031	0.91	-0.24	0.36	Yes	-90	8,127
Carrillo Street	s/o Anacapa Street	1420	1,229	1,287	0.96	-0.14	0.33	Yes	-58	3,306
Anacapa Street	e/o Carrillo Street	1553	1,047	1,255	0.83	-0.51	0.33	Yes	-208	43,073
Anacapa Street	w/o Carrillo Street	37565	1,433	1,197	1.20	0.58	0.34	Yes	236	55,539
Carrillo Street	n/o Chapala Street	1422	1,266	1,227	1.03	0.09	0.34	Yes	39	1,491
Carrillo Street	s/o Chapala Street	1430	1,976	1,805	1.09	0.33	0.29	Yes	171	29,383
Chapala Street	e/o Carrillo Street	37882	1,311	1,009	1.30	0.83	0.36	Yes	302	90,946
Chapala Street	w/o Carrillo Street	1586	1,083	949	1.14	0.37	0.38	Yes	134	18,066
Carrillo Street	n/o De la Vina Street	37884	2,072	1,741	1.19	0.65	0.29	Yes	331	109,696
Carrillo Street	s/o De la Vina Street	1423	2,358	2,018	1.17	0.61	0.28	Yes	340	115,746
De la Vina Street	e/o Carrillo Street	1583	480	600	0.80	-0.42	0.48	Yes	-120	14,384
De la Vina Street	w/o Carrillo Street	37941	524	871	0.60	-0.97	0.41	Yes	-347	120,584
Carrillo Street	n/o Bath Street	37936	2,481	2,062	1.20	0.74	0.28	Yes	419	175,744
Carrillo Street	**s/o Bath Street**	1424	3,081	2,257	1.36	1.38	0.27	No	824	678,290
Bath Street	e/o Carrillo Street	2686	393	428	0.92	-0.16	0.52	Yes	-35	1,259
Bath Street	w/o Carrillo Street	37943	353	413	0.86	-0.28	0.52	Yes	-60	3,546
Carrillo Street	**n/o Castillo Street**	1424	3,081	2,220	1.39	1.44	0.27	No	861	740,604
Carrillo Street	**s/o Castillo Street**	1425	3,639	**2,529**	1.44	1.72	0.26	No	1,110	1,232,492
Castillo Street	e/o Carrillo Street	1540	275	407	0.67	-0.63	0.52	Yes	-132	17,524
Castillo Street	w/o Carrillo Street	38100	379	482	0.79	-0.41	0.52	Yes	-103	10,577
Carrillo Street	**n/o US 101 NB Ramp**	27251	3,639	**2,522**	1.44	1.74	0.26	No	1,117	1,248,084
Carrillo Street	s/o US 101 NB Ramp	1426	2,828	2,337	1.21	0.79	0.27	Yes	491	240,708
US 101 NB Ramp	**e/o Carrillo Street**	36567	683	444	1.54	1.03	0.52	No	239	57,034
US 101 NB Ramp	**w/o Carrillo Street**	36568	1,282	867	1.48	1.17	0.41	No	415	172,203

SB GP Update Model Validation Results: PM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Carrillo Street	n/o US 101 SB Ramp	27259	2,828	2,373	1.19	0.72	0.27	Yes	455	206,680
Carrillo Street	s/o US 101 SB Ramp	1427	1,965	1,951	1.01	0.03	0.28	Yes	14	207
US 101 SB Ramp	e/o Carrillo Street	36565	616	416	1.48	0.92	0.52	Yes	200	39,962
US 101 SB Ramp	w/o Carrillo Street	36566	1,391	1,058	1.31	0.88	0.36	Yes	333	110,635
Carrillo Street	n/o San Andres Street	31773	1,588	2,101	0.76	-0.89	0.28	Yes	-513	263,325
Carrillo Street	**s/o San Andres Street**	1428	879	1,647	0.53	-1.59	0.29	No	-768	589,287
San Andres Street	**e/o Carrillo Street**	38373	265	532	0.50	-1.06	0.48	No	-267	71,110
San Andres Street	w/o Carrillo Street	1384	745	856	0.87	-0.32	0.41	Yes	-111	12,375
Micheltorena Street	n/o San Andres Street	38360	588	732	0.80	-0.45	0.44	Yes	-144	20,866
Micheltorena Street	s/o San Andres Street	38895	527	504	1.04	0.09	0.48	Yes	23	509
San Andres Street	e/o Micheltorena Street	38362	737	705	1.05	0.10	0.44	Yes	32	1,014
San Andres Street	w/o Micheltorena Street	2855	517	747	0.69	-0.70	0.44	Yes	-230	52,865
Mission Street	n/o Modoc Road	38356	985	1,327	0.74	-0.79	0.33	Yes	-342	116,794
Mission Street	**s/o Modoc Road**	2867	681	1,229	0.55	-1.31	0.34	No	-548	300,628
Modoc Road	w/o Mission Street	38344	757	780	0.97	-0.07	0.41	Yes	-23	524
Mission Street	n/o US 101 SB Ramps	1444	2,249	2,086	1.08	0.28	0.28	Yes	163	26,484
Mission Street	s/o US 101 SB Ramps	27274	985	1,373	0.72	-0.87	0.33	Yes	-388	150,352
US 101 SB Ramps	e/o Mission Street	36563	728	517	1.41	0.86	0.48	Yes	211	44,367
US 101 SB Ramps	w/o Mission Street	36564	1,197	1,154	1.04	0.11	0.34	Yes	43	1,827
Mission Street	n/o US 101 NB Ramps	1445	2,637	2,253	1.17	0.64	0.27	Yes	384	147,744
Mission Street	s/o US 101 NB Ramps	27266	2,249	2,045	1.10	0.36	0.28	Yes	204	41,509
US 101 NB Ramps	e/o Mission Street	36561	530	417	1.27	0.52	0.52	Yes	113	12,670
US 101 NB Ramps	**w/o Mission Street**	36562	537	893	0.60	-1.05	0.38	No	-356	126,618
Mission Street	n/o Castillo Street	1446	1,998	1,855	1.08	0.27	0.29	Yes	143	20,474
Mission Street	s/o Castillo Street	38145	2,566	2,260	1.14	0.51	0.27	Yes	306	93,555
Castillo Street	e/o Mission Street	1534	273	374	0.73	-0.47	0.58	Yes	-101	10,249
Castillo Street	**w/o Mission Street**	38049	594	349	1.70	1.22	0.58	No	245	60,098
Mission Street	n/o Bath Street	1448	1,932	1,636	1.18	0.62	0.29	Yes	296	87,513
Mission Street	s/o Bath Street	38057	1,986	1,952	1.02	0.06	0.28	Yes	34	1,134
Bath Street	e/o Mission Street	2679	196	368	0.53	-0.81	0.58	Yes	-172	29,420
Bath Street	**w/o Mission Street**	38047	285	550	0.52	-1.01	0.48	No	-265	70,156
Mission Street	n/o De la Vina Street	1449	1,272	1,179	1.08	0.23	0.34	Yes	93	8,657
Mission Street	s/o De la Vina Street	37981	1,824	1,570	1.16	0.53	0.30	Yes	254	64,331
De la Vina Street	e/o Mission Street	1576	520	846	0.61	-0.94	0.41	Yes	-326	106,357
De la Vina Street	**w/o Mission Street**	37984	473	849	0.56	-1.08	0.41	No	-376	141,543
Mission Street	n/o State Street	1451	899	732	1.23	0.52	0.44	Yes	167	27,756
Mission Street	s/o State Street	37700	860	959	0.90	-0.27	0.38	Yes	-99	9,865
State Street	e/o Mission Street	37706	1,103	889	1.24	0.63	0.38	Yes	214	45,671
State Street	**w/o Mission Street**	1607	1,307	790	1.65	1.60	0.41	No	517	266,968
Meigs Road	**n/o Cliff Drive**	38307	712	1,143	0.62	-1.11	0.34	No	-431	185,919
Meigs Road	**s/o Cliff Drive**	1389	450	1,076	0.42	-1.62	0.36	No	-626	391,989
Cliff Drive	e/o Meigs Road	38498	941	1,155	0.81	-0.55	0.34	Yes	-214	45,823
Cliff Drive	w/o Meigs Road	1373	1,339	1,632	0.82	-0.61	0.29	Yes	-293	85,774
Las Positas Road	n/o Cliff Drive	38294	1,279	1,131	1.13	0.39	0.34	Yes	148	21,930
Cliff Drive	e/o Las Positas Road	1374	1,366	1,191	1.15	0.43	0.34	Yes	175	30,704
Cliff Drive	w/o Las Positas Road	2796	389	598	0.65	-0.74	0.48	Yes	-209	43,669
Las Positas Road	n/o Modoc Road	2800	2,183	2,288	0.95	-0.17	0.27	Yes	-105	11,037
Las Positas Road	s/o Modoc Road	2801	1,316	1,604	0.82	-0.59	0.30	Yes	-288	82,908
Modoc Road	e/o Las Positas Road	27786	1,141	874	1.31	0.75	0.41	Yes	267	71,278
Modoc Road	w/o Las Positas Road	2809	982	1,048	0.94	-0.18	0.36	Yes	-66	4,376
Las Positas Road	n/o US 101 SB Ramps	27283	2,362	**2,845**	0.83	-0.69	0.25	Yes	-483	233,760
Las Positas Road	s/o US 101 SB Ramps	2800	2,183	2,313	0.94	-0.21	0.27	Yes	-130	16,915
US 101 SB Ramps	e/o Las Positas Road	1419	937	725	1.29	0.66	0.44	Yes	212	44,940
US 101 SB Ramps	w/o Las Positas Road	1212	780	829	0.94	-0.14	0.41	Yes	-49	2,410
US 101 NB Ramp	s/o Calle Real	39245	722	707	1.02	0.05	0.44	Yes	15	240
Calle Real	e/o US 101 NB Ramp	1634	1,356	1,522	0.89	-0.36	0.30	Yes	-166	27,564
Calle Real	w/o US 101 NB Ramp	38587	633	818	0.77	-0.55	0.41	Yes	-185	34,046
Alamar Avenue	n/o State Street	37037	635	608	1.04	0.09	0.48	Yes	27	739
Alamar Avenue	s/o State Street	1279	576	694	0.83	-0.38	0.44	Yes	-118	13,820
State Street	e/o Alamar Avenue	37514	1,446	1,373	1.05	0.16	0.33	Yes	73	5,266
State Street	w/o Alamar Avenue	1610	1,333	1,425	0.94	-0.21	0.31	Yes	-92	8,436
De la Vina Street	s/o State Street	38203	528	823	0.64	-0.87	0.41	Yes	-295	86,857
State Street	e/o De la Vina Street	38213	1,657	1,583	1.05	0.15	0.30	Yes	74	5,438
State Street	w/o De la Vina Street	27775	2,163	2,372	0.91	-0.33	0.27	Yes	-209	43,494
Las Positas Road	n/o State Street	37057	866	841	1.03	0.07	0.41	Yes	25	633
Las Positas Road	s/o State Street	1283	1,336	1,434	0.93	-0.22	0.31	Yes	-98	9,683
State Street	e/o Las Positas Road	38219	2,372	2,411	0.98	-0.06	0.26	Yes	-39	1,513
State Street	w/o Las Positas Road	1613	2,790	2,256	1.24	0.89	0.27	Yes	534	285,188
Hitchcock Way	s/o State Street	38542	435	656	0.66	-0.76	0.44	Yes	-221	48,686
State Street	e/o Hitchcock Way	38540	2,428	2,170	1.12	0.44	0.27	Yes	258	66,503
State Street	w/o Hitchcock Way	31416	2,295	1,994	1.15	0.54	0.28	Yes	301	90,856
Hope Avenue	n/o State Street	38234	631	792	0.80	-0.49	0.41	Yes	-161	25,797
Hope Avenue	s/o State Street	28748	622	704	0.88	-0.26	0.44	Yes	-82	6,685
State Street	e/o Hope Avenue	38236	2,238	1,967	1.14	0.49	0.28	Yes	271	73,584
State Street	w/o Hope Avenue	28846	2,252	1,911	1.18	0.64	0.28	Yes	341	116,238
La Cumbre Road	n/o State Street	38244	774	1,018	0.76	-0.67	0.36	Yes	-244	59,619
La Cumbre Road	s/o State Street	28877	1,709	1,862	0.92	-0.29	0.29	Yes	-153	23,283
State Street	e/o La Cumbre Road	38516	2,407	2,212	1.09	0.33	0.27	Yes	195	38,025
State Street	w/o La Cumbre Road	28876	2,210	2,287	0.97	-0.13	0.27	Yes	-77	5,996
Hope Avenue	n/o US 101 NB Ramp/Calle Re	38556	681	926	0.73	-0.70	0.38	Yes	-245	60,268
US 101 NB Ramp/Calle Re	**e/o Hope Avenue**	31415	570	961	0.59	-1.07	0.38	No	-391	152,696
US 101 NB Ramp/Calle Re	**w/o Hope Avenue**	28823	838	1,350	0.62	-1.17	0.33	No	-512	262,409
La Cumbre Road	n/o US 101 SB Ramps	28934	2,419	1,902	1.27	0.97	0.28	Yes	517	267,796
La Cumbre Road	s/o US 101 SB Ramps	28831	1,002	918	1.09	0.24	0.38	Yes	84	7,009
US 101 SB Ramps	**e/o La Cumbre Road**	28821	1,262	744	1.70	1.58	0.44	No	518	268,838
US 101 SB Ramps	w/o La Cumbre Road	28832	816	680	1.20	0.45	0.44	Yes	136	18,405
La Cumbre Road	**n/o Calle Real**	28936	2,453	1,685	1.46	1.55	0.29	No	768	590,370
La Cumbre Road	s/o Calle Real	28830	2,419	1,920	1.26	0.93	0.28	Yes	499	249,490
Calle Real	**e/o La Cumbre Road**	28823	838	1,317	0.64	-1.12	0.33	No	-479	229,689
SR-154	s/o Calle Real	28860	1,350	1,193	1.13	0.39	0.34	Yes	157	24,757
Calle Real	e/o SR-154	30298	1,489	1,509	0.99	-0.04	0.30	Yes	-20	413
Calle Real	w/o SR-154	28858	818	882	0.93	-0.19	0.38	Yes	-64	4,159
SR-154	n/o US 101 SB On Ramp	28860	1,350	1,176	1.15	0.44	0.34	Yes	174	30,396
SR-154	s/o US 101 SB On Ramp	28951	810	1,099	0.74	-0.73	0.36	Yes	-289	83,572
US 101 SB On Ramp	**e/o SR-154**	28953	1,150	485	2.37	2.64	0.52	No	665	441,684
Indicates Low Volume		**Subtotal**	**235,162**	**227,597**				**Model/Count Ratio =**	**1.03**	
Indicates High Volume								**Percent Within Caltrans Maximum Deviation =**	**79%**	> 75%
								Percent Root Mean Square Error =	**28%**	< 40%
								Correlation Coefficient =	**0.91**	> 0.88

SB GP Model Validation Results: PM Peak Hour Screenlines

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Cabrillo Bl									
Garden Street	w/o Cabrillo Boulevard	37799	351	348	1.01	0.58	Yes	3	11
State Street	w/o Cabrillo Boulevard	1595	357	538	0.66	0.48	Yes	-181	32,799
Castillo Street	w/o Cabrillo Boulevard	2782	203	761	0.27	0.41	No	-558	311,011
			911	1,647	**0.55**	0.49	Yes	-736	540,972
			0.62	< 40%					
Screenline 2: North of the Mesa									
Las Positas Road	s/o Modoc Road	2801	1,316	1,604	0.82	0.30	Yes	-288	82,908
Mission Street	n/o Modoc Road	38356	985	1,327	0.74	0.33	Yes	-342	116,794
Micheltorena Stree	n/o San Andres Street	38360	588	732	0.80	0.44	Yes	-144	20,866
Carrillo Street	s/o San Andres Street	1428	879	1,647	0.53	0.29	No	-768	589,287
Montecito Street	s/o Castillo Street	1368	2,042	1,488	1.37	0.31	No	554	307,408
Cabrillo Boulevard	s/o Castillo Street	1344	611	1,652	0.37	0.29	No	-1,041	1,083,007
			6,422	8,450	**0.76**	0.26	Yes	-2,028	4,112,871
			0.43	< 40%					
Screenline 3: Castillo Street									
Haley Street	n/o Castillo Street	1498	1,178	1,180	1.00	0.34	Yes	-2	3
Carrillo Street	s/o Castillo Street	1425	3,639	2,529	1.44	0.26	No	1,110	1,232,492
Mission Street	s/o Castillo Street	38145	2,566	2,260	1.14	0.27	Yes	306	93,555
			7,383	5,969	**1.24**	0.31	Yes	1,414	2,000,199
			0.33	< 40%					
Screenline 4: West of Chapala									
Mission Street	s/o State Street	37700	860	959	0.90	0.38	Yes	-99	9,865
Carrillo Street	n/o Chapala Street	1422	1,266	1,227	1.03	0.34	Yes	39	1,491
Gutierrez Street	s/o State Street	2675	647	426	1.52	0.52	Yes	221	48,828
			2,772	2,612	**1.06**	0.42	Yes	160	25,685
			0.16	< 40%					
Screenline 5: East of State									
Mission Street	n/o State Street	1451	899	732	1.23	0.44	Yes	167	27,756
Carrillo Street	s/o Anacapa Street	1420	1,229	1,287	0.96	0.33	Yes	-58	3,306
Gutierrez Street	n/o State Street	37601	935	565	1.65	0.48	No	370	136,927
			3,063	2,584	**1.19**	0.42	Yes	479	229,571
			0.27	< 40%					
Screenline 6: Haley Street									
Castillo Street	w/o Haley Street	38123	494	530	0.93	0.48	Yes	-36	1,280
Bath Street	w/o Haley Street	38119	183	285	0.64	0.58	Yes	-102	10,422
State Street	w/o Gutierrez Street	1597	552	634	0.87	0.44	Yes	-82	6,773
Garden Street	w/o Gutierrez Street	1558	1,670	1,536	1.09	0.30	Yes	134	18,076
			2,899	2,985	**0.97**	0.41	Yes	-86	7,348
			0.13	< 40%					
Screenline 7: S/O Carrillo									
Castillo Street	e/o Carrillo Street	1540	275	407	0.67	0.52	Yes	-132	17,524
Bath Street	e/o Carrillo Street	2686	393	428	0.92	0.52	Yes	-35	1,259
Chapala Street	e/o Carrillo Street	37882	1,311	1,009	1.30	0.36	Yes	302	90,946
De la Vina Street	e/o Carrillo Street	1583	480	600	0.80	0.48	Yes	-120	14,384
Anacapa Street	e/o Carrillo Street	1553	1,047	1,255	0.83	0.33	Yes	-208	43,073
			3,505	3,699	**0.95**	0.38	Yes	-194	37,542
			0.25	< 40%					
Screenline 8: N/O Carrillo									
Castillo Street	w/o Carrillo Street	38100	379	482	0.79	0.52	Yes	-103	10,577
Bath Street	w/o Carrillo Street	37943	353	413	0.86	0.52	Yes	-60	3,546
Chapala Street	w/o Carrillo Street	1586	1,083	949	1.14	0.38	Yes	134	18,066
De la Vina Street	w/o Carrillo Street	37941	524	871	0.60	0.41	Yes	-347	120,584
Anacapa Street	w/o Carrillo Street	37565	1,433	1,197	1.20	0.34	Yes	236	55,539
			3,772	3,912	**0.96**	0.37	Yes	-140	19,480
			0.26	< 40%					
Screenline 9: S/O Mission									
Castillo Street	e/o Mission Street	1534	273	374	0.73	0.58	Yes	-101	10,249
Bath Street	e/o Mission Street	2679	196	368	0.53	0.58	Yes	-172	29,420
De la Vina Street	e/o Mission Street	1576	520	846	0.61	0.41	Yes	-326	106,357
State Street	e/o Mission Street	37706	1,103	889	1.24	0.38	Yes	214	45,671
Bath Street	e/o Mission Street	2679	196	368	0.53	0.58	Yes	-172	29,420
De la Vina Street	e/o Mission Street	1576	520	846	0.61	0.41	Yes	-326	106,357
			2,808	3,691	**0.76**	0.38	Yes	-883	779,376
			0.38	< 40%					
Screenline 10: N/O Mission									
Castillo Street	w/o Mission Street	38049	594	349	1.70	0.58	No	245	60,098
Bath Street	w/o Mission Street	38047	285	550	0.52	0.48	No	-265	70,156
De la Vina Street	w/o Mission Street	37984	473	849	0.56	0.41	No	-376	141,543
State Street	w/o Mission Street	1607	1,307	790	1.65	0.41	No	517	266,968
			2,659	2,538	**1.05**	0.42	Yes	121	14,580
			0.58	< 40%					
Screenline 11: S/O Upper State									
Alamar Avenue	s/o State Street	1279	576	694	0.83	0.44	Yes	-118	13,820
Las Positas Road	s/o State Street	1283	1,336	1,434	0.93	0.31	Yes	-98	9,683
Hitchcock Way	s/o State Street	38542	435	656	0.66	0.44	Yes	-221	48,686
Hope Avenue	s/o State Street	28748	622	704	0.88	0.44	Yes	-82	6,685
La Cumbre Road	s/o State Street	28877	1,709	1,862	0.92	0.29	Yes	-153	23,283
			4,679	5,350	**0.87**	0.32	Yes	-671	450,191
			0.13	< 40%					
Screenline 12: N/O Upper State									
Alamar Avenue	n/o State Street	37037	635	608	1.04	0.48	Yes	27	739
Las Positas Road	n/o State Street	37057	866	841	1.03	0.41	Yes	25	633
Hope Avenue	n/o State Street	38234	631	792	0.80	0.41	Yes	-161	25,797
La Cumbre Road	n/o State Street	38244	774	1,018	0.76	0.36	Yes	-244	59,619
			2,907	3,259	**0.89**	0.39	Yes	-352	124,215
			0.18	< 40%					

Percent Within Caltrans Maximum Deviation = 100% =100

Total Count 12
Screenlines Within Deviation 12
Screenlines Outside Deviation 0

APPENDIX G:
SANTA BARBARA MODEL RESOURCE FILE

Note: This section consists of modeling code and is available by request from the Community Development Department.

APPENDIX I-3

TRAVEL DEMAND MODEL OVERVIEW

SANTA BARBARA TRAVEL DEMAND MODEL OVERVIEW

Submitted by:

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March 2009

TABLE OF CONTENTS

INTRODUCTION 1
Background 1
General Discussion of the TDF Model 1
Study Area and Roadway Classification 2

SUMMARY OF THE INPUT DATA 3
Data Collection 3
Land Use Data 3
Traffic Analysis Zone System 3
Roadway Network 5

DESCRIPTION OF THE MODEL CALIBRATION PROCESS 9
Trip Generation Rates 9
Production/Attraction Balancing 10
Further Refinement 11
Trip Distribution (Gravity Model) 13

MODEL VALIDATION 21
Static Validation 21
Dynamic Validation 23

THE 4D PROCESS 28

LIST OF FIGURES

Figure 1 Study Area and Roadway Functional Classification 6

Figure 2 Plan Santa Barbara Model Area Types 12

Figure 3 Plan Santa Barbara External Station Weights 19

Figure 4 Plan Santa Barbara TAZs Used for Dynamic Validation 25

APPENDICES

Appendix A**:** Plan Santa Barbara Traffic Analysis Zones Key Map

Appendix B: Sample ITE Trip Generation Rates

Appendix C: Santa Barbara Model Friction Factor Curves

LIST OF TABLES

Table 1 Model Land Use Categories 4
Table 2 External Gateways 7
Table 3 Typical Roadway Speeds and Capacities 8
Table 4 Trip Production To Attraction Ratios by Purpose 11
Table 5 Daily Vehicle Trip Generation Rate Comparison 14
Table 6 Work Locations for Santa Barbara Residents 17
Table 7 Residential Locations for Santa Barbara Employees 17
Table 8 Percent of Trips by Purpose that are Internal/External for Each Area Type 18
Table 9 Matrix of Daily Through (EE) Trips 20
Table 10 Results of Daily Model Validation 22
Table 11 Results of Peak Hour Model Validation 22
Table 12 Results of Dynamic Validation Tests 26

INTRODUCTION

BACKGROUND

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The purpose of this project is to develop the City model in the TransCAD Transportation Geographic Information System (GIS) software, create the key model inputs such as land use, road network and trip generation parameters, and validate the model to current (2008) conditions. The TDF model will be used in the update of the City's General Plan and could be used to generate traffic volume forecasts and other travel demand data for various planning and engineering studies.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting data represent travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The purpose of this report is to introduce the interested citizens, elected and appointed officials of the City of Santa Barbara to their travel demand model. It describes the model development process in general, and how this process was applied to develop the City of Santa Barbara TDF model, including the sources of data used to develop key model inputs.

GENERAL DISCUSSION OF THE TDF MODEL

This section summarizes the answers to commonly asked questions related to TDF models and how the City can use a TDF model.

What is a TDF Model?

A TDF model is a computer program that simulates traffic levels and patterns for a specific geographic area. The program consists of input files that summarize the area's land uses, street network, travel characteristics, and other key factors. Using this data, the model performs a series of calculations to determine the amount of trips generated, where each trip begins and ends, and the route taken by the trip. The model's output includes projections of traffic volumes on major roads, and peak hour turning movements at certain key intersections.

How is a TDF Model Useful?

The City TDF model will be a valuable tool for the preparation of long-range transportation planning studies, such as the *Plan Santa Barbara* General Plan Update. The travel model will be used to estimate the average daily and peak hour traffic volumes on the major roads in response to future land use, transportation infrastructure, and policy assumptions, and form a consistent basis by which to analyze the different potential land use scenarios. Additionally, using these traffic projections, transportation improvements will be identified to accommodate the changing traffic patterns associated with the general plan's preferred land use alternative.

How do we know if the TDF Model is Accurate?

To be deemed accurate for projecting traffic volumes in the future, a model must first be calibrated to a year in which actual land use data and traffic volumes are available and well documented. A model is

accurately calibrated when it replicates the actual traffic counts on the major roads within certain ranges of error established in the "Travel Forecasting Guidelines," (Caltrans, 1992) and it demonstrates stable responses to varying levels of inputs. The City TDF model has been calibrated to 2008 (base year) conditions using actual traffic counts, census data, and land use data compiled by City staff.

Is the City of Santa Barbara TDF Model Consistent with Standard Practices?

The City of Santa Barbara TDF model is consistent in form and function with the standard traffic forecasting models used in the transportation planning profession. The model includes a land use/trip generation module, a gravity-based trip distribution model, and a capacity-restrained equilibrium traffic assignment process. The travel model utilizes Version 5.0 of the TransCAD Transportation GIS software, which is consistent with many of the models used by local jurisdictions in California and throughout the nation. The Santa Barbara County Association of Governments (SBCAG), the Metropolitan Planning Organization for Santa Barbara County, maintains the current regional travel demand model in TransCAD.

How Can the TDF Model be Used?

The TDF model can be used for many purposes related to planning and design of the City's transportation system. The following is a partial listing of the potential uses of the TDF model:

- To update the General Plan
- To update the Street Master Plan
- To update the city-wide traffic impact fee program
- To evaluate the traffic impacts of area-wide land use plan alternatives
- To evaluate the shift in traffic resulting from a roadway improvement
- To evaluate the traffic impacts of land development proposals
- To determine trip distribution patterns of land development proposals
- To support the development of transportation sections of Environmental Impact Reports (EIRs)
- To support the preparation of project development reports for Caltrans

STUDY AREA AND ROADWAY CLASSIFICATION

Figure 1 shows the study area for the City travel demand forecasting model. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas which are in or near the City's Sphere of Influence. The study area contains all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence.

SUMMARY OF THE INPUT DATA

DATA COLLECTION

A comprehensive data collection effort was undertaken at the outset of the *Plan Santa Barbara* process. The results of this effort are largely contained in the *Plan Santa Barbara: Transportation Existing Condition Report* (AMEC, 2008). This report served to guide the overall model development process by documenting the demographic profile, commute patterns, travel trends and traffic conditions which currently exist in Santa Barbara. In addition, certain data from this report were used directly in the model development process, such as traffic counts and household vehicle ownership data.

Other data sources include SBCAG for roadway network and regional travel data, Caltrans and the County of Santa Barbara for traffic count data, and the City of Santa Barbara for land use, and roadway network data.

LAND USE DATA

Land use data is one of the primary inputs to the travel model. These data are instrumental in estimating trip generation. This model primarily uses the City's parcel-level land use database (maintained in a GIS format) as the source for information on how much development currently exists within each traffic analysis zone (TAZ). These data were supplemented by County parcel-based data and SBCAG TAZ-based data for areas in and bordering the Sphere of Influence.

Land use in the model is divided into a variety of residential and non-residential categories. The City of Santa Barbara TDF model employs twenty-eight land use data categories to describe land use in the City, as shown in Table 1.

TRAFFIC ANALYSIS ZONE SYSTEM

Travel demand models use traffic analysis zones (TAZs) to subdivide the study area for the purpose of connecting land uses to the road network. The TAZs represent physical areas containing land uses that produce or attract vehicle-trip ends. Since the Santa Barbara County Association of Governments (SBCAG) is the Metropolitan Planning Organization (MPO) for the area, the TAZ system for the Santa Barbara model was developed to nest within the regional model TAZ system. After reviewing the TAZ layer used in the SBCAG regional model, along with the roadway network and recent aerial photographs, a set of TAZ boundaries was created for the Santa Barbara model to achieve the following local area enhancements.

- A number of large TAZs were subdivided which allows for a more detailed assignment of local traffic to the highway network. This level of detail is necessary to forecast traffic volumes at the turning movement level.

- Considerable detail was added to the TAZ system in the downtown street grid to allow for a detailed traffic assignment and a more accurate calculation of the 4D variables.

- TAZs were created to be consistent with large developments such as Paseo Nuevo and La Cumbre Plaza.

The resulting 2008 model TAZ system includes 460 zones in the model area. Detailed maps showing the TAZ numbers in all portions of the model area are included in Appendix A. Also included in the TAZ structure are the external stations or gateways at points where major roadways provide access into the model area. The external gateways represent all major routes by which traffic can enter or exit the study

TABLE 1
MODEL LAND USE CATEGORIES

Residential	
Land Use Type	**Units**
Single-Family (SF)	Dwelling Units
Multi-Family Zero Cars (MF_0)	Dwelling Units
Multi-Family One Car (MF_1)	Dwelling Units
Multi-Family Two Cars (MF_2)	Dwelling Units
Multi-Family Three or More Cars (MF_3P)	Dwelling Units
Non-Residential	
Land Use Type	**Units**
Commercial Services	Thousand Square-feet
Entertainment	Thousand Square-feet
Auto Related	Thousand Square-feet
Restaurant	Thousand Square-feet
Retail	Thousand Square-feet
Lodging	Thousand Square-feet
Office	Thousand Square-feet
Institutional	Thousand Square-feet
Industrial	Thousand Square-feet
Hospital	Thousand Square-feet
Religious Facilities	Thousand Square-feet
Police and Fire Services	Thousand Square-feet
Elementary and Middle School	Students
High Schools	Students
Colleges	Students
Recreation (Parks and Beaches)	Relative Popularity[2]
Golf	Acres
SBCAG_Agricultural[1]	Employees
SBCAG_Industrial[1]	Employees
SBCAG_Commercial[1]	Employees
SBCAG_Office[1]	Employees
SBCAG_Service[1]	Employees

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

area and capture the traffic entering, exiting, or passing through the model area. Table 2 contains a list of the eight external gateways numbered from 1001 to 1010 that were established for this model.

ROADWAY NETWORK

The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes; arterials, collectors, and a selection of local roads within the study area (see Figure 1).

The roads shown in Figure 1 are classified in four major categories and form the primary road network that is represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside of the City. The four major road categories are described below.

Freeways: Freeways are high-capacity facilities that primarily serve long-distance travel. Access is limited to interchanges that are typically spaced at least one mile apart. US-101 is the freeway which runs directly through the Santa Barbara model area. SR 217, which is west of the study area, connects UCSB and the Santa Barbara Airport to US-101.

Highways: Roadways designated as highways are typically State highways that are not limited-access freeways. These facilities serve travel between Santa Barbara and neighboring cities. The primary highway in Santa Barbara is SR 154. SR 192 runs generally parallel to US-101 along the foothills north of the City.

Arterials: Roadway segments classified as arterials are major roads that provide connections within the City, between the City and neighboring areas, or through the City (cut-through traffic). Arterials in Santa Barbara typically have two lanes in each direction, with travel speeds of 35 miles per hour (mph). Arterials are further classified as Major or Minor. Section 3 contains details on the distinction between these classes.

Collectors: Collectors are facilities that connect local streets to the arterial and highway system, and may also provide direct access to some local land uses. Collectors typically have one lane in each direction, with speeds of around 25-30 mph.

The roadway network database received from SBCAG includes street name, distance, functional class, speed, capacity, and number of lanes. These attributes were checked using maps, aerial photographs, and other data provided by the City. Table 3 shows the initial roadway speeds, lanes and capacities used for each roadway class in the model. Where necessary, these values were then modified to reflect current conditions at specific locations.

Additional Roadway Attributes

For a representative sample of network links, current daily, AM peak hour, and PM peak hour traffic counts have been coded for validating the model. The traffic count data was collected from several sources including Caltrans, the County, the City, and a comprehensive set of traffic counts conducted in March, 2008.

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STUDY AREA AND ROADWAY FUNCTIONAL CLASSIFICATION
FIGURE 1

TABLE 2
EXTERNAL GATEWAYS

Gateway Number	Gateway Description
1001	Hollister Avenue west of Turnpike Road
1002	US-101 west of Turnpike Road
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)
1004	Cathedral Oaks Road west of Turnpike Road
1005	State Route 154 north of State Route 192
1006	State Route 192 west of Sheffield Drive
1007	Sheffield Drive north of Ortega Hill Road
1008	Ortega Hill Road east of Ortega Ridge Road
1009	US-101 east of Sheffield Drive
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)

Source: Fehr & Peers, 2008.

TABLE 3
TYPICAL ROADWAY SPEEDS AND CAPACITIES

Roadway Classification [1]	Speed (MPH)	Total Through Lanes	Lane Capacity (Vehicles per hour per lane)	Total Facility Capacity (Vehicles per hour)
Freeway	65	4	2,000	8,000
Highway	50	4	1,200	4,800
Major Arterial	35	4	900	3,600
Minor Arterial	35	4	750	3,000
Collector	30	2	600	1,200
Local	25	2	600	1,200
Ramp	30	1	1,800	1,500
Centroid Connector[2]	30	2	10,000	20,000

[1] SBCAG, 2004.
[2] Centroid connectors are abstract representations of the starting and ending point of each trip, and thus should have no capacity constraints.
Source: Fehr & Peers, 2008.

DESCRIPTION OF THE MODEL CALIBRATION PROCESS

Model calibration is the process by which parameters are set based on a comparison of travel estimates computed by the model with actual data from the area being modeled. This section provides a general description of the calibration steps and the adjustments made during the process to achieve accuracy levels that are within Caltrans' guidelines.

TRIP GENERATION RATES

Trip generation rates relate the number of vehicle trips going to and from a site to some measure of the intensity of use at the site. Each trip has two ends, a "production" and an "attraction" end. By convention, trips with one end at a residence are defined as being "produced" by the residence and "attracted" to the other use (workplace, school, retail store, etc.), and are called "Home-Based" trips. Trips that do not have one end at a residence are called "Non-Home-Based" trips.

There are five trip purposes used in the Santa Barbara model:

1. Home-Based Work (HBW): trips between a residence and a workplace.
2. Home-Based Other (HBO): trips between a residence and any other destination.
3. Non-Home-Based (NHB): trips that do not begin or end at a residence, such as traveling from a workplace to a restaurant, or from a retail store to a bank.
4. Recreational (REC): trips to and from the beaches, parks and other attractions (such as the Mission) in the model area.

Trip generation rates are initially defined for total trips and later split by trip purpose, for both productions and attractions.

The most widely used source for individual project vehicle trip generation rates in the transportation planning field is the ITE *Trip Generation Manual*. This book contains national averages of trip generation rates for a variety of land uses collected by conducing driveway counts in what are generally suburban locations. The ITE land use categories tend to be very specific, while model land use categories (accounting for all land use in the City) tend to be more general. While ITE rates are appropriate for smaller site specific uses - such as traffic studies for development review - and can provide a starting point for travel models, capturing the interaction between all land uses in the City, in addition to the unique local characteristics of Santa Barbara requires the development of specific trip generation rates for the model.

A traffic impact study utilizes ITE trip generation rates because in most cases the project being examined shares characteristics with the information contained the *Trip Generation Manual*. In other words, both the traffic impact study and the ITE rates are going to rely on single-use, isolated projects that have plenty of free parking and little or no interaction with other nearby uses. When assessing the impact of an individual project, the ITE rates are typically appropriate since they can correctly mimic the site being analyzed in the traffic impact study.

The Santa Barbara TDF model, on the other hand, generates trips by purpose, and matches productions/attractions to have a balance. The model also has trip rates calibrated to local conditions and other advanced trip generation features such as cross classification that consider the effect of other variables such as vehicle availability. Traffic impact studies rely on ITE trip rates that only vary based on land use type or size. While they are a valid starting point for model calibration and validation, they have a different purpose and are not suitable for demand forecasting without customization.

Certain ITE rates will be more applicable to Santa Barbara model rates because they represent a comparable level of detail relative to what is contained in the model (e.g. "Office" = "Office"). Some ITE rates, however, cannot be used directly because the land use category is not the same as the City's land use classifications. For example, ITE's restaurant category has high turnover restaurant, fast food restaurant, fast food restaurant with drive-through with seating, fast food restaurant with drive through and no seating, etc. By necessity, Santa Barbara restaurant rates represent a compilation and average of those rates customized to the City. It is important to recognize that ITE rates are in fact averages based on driveway counts at multiple locations, so the utilization of average rates within the Santa Barbara model is entirely appropriate and accurate.

The 2008 trip generation rates were initially based on residential trip generation surveys, the SBCAG regional model, recently calibrated models in similar areas, and the ITE *Trip Generation Manual*. For example, we used as a starting point certain calibrated trip generation rates from San Luis Obispo and Lompoc. These areas were selected to the extent that they share at least partial socioeconomic and land use characteristics with the City of Santa Barbara. The rates were calibrated to account for local conditions based on counts, production-to-attraction balancing, and the difference between ITE and model land use definitions. So the final Santa Barbara trip generation rates are unique to the Santa Barbara model, and are ultimately based upon the results of successful model calibration and validation.

PRODUCTION/ATTRACTION BALANCING

Local trips (internal-to-internal, or I-I) are trips which both start and end in the study area. One of the basic assumptions of any travel model is that the total number of local trips produced is equal to the total number of local trips attracted. The logical assumption is that if someone starts on a journey from someplace they must end their journey someplace else. Otherwise, travelers would be disappearing into thin air. If the total productions and attractions are not equal, the model will typically adjust the attractions to match the productions (thus ensuring that each departing traveler finds a destination). While it is never possible to achieve a perfect match between productions and attractions prior to the automatic balancing procedure, the existence of a substantial mismatch in one or more trip purposes indicates that either land use inputs or trip generation factors may be in error.

Table 4 summarizes the local trip productions and attractions from the Santa Barbara travel model for each trip purpose, prior to the application of the automatic balancing procedure. Guidelines published by Federal Highway Administration's Transportation Model Improvement Program (TMIP) and National Highway Cooperative Research Program (NCHRP) suggest that, prior to balancing, the number of productions and attractions should match to within plus or minus 10% (i.e., the production-to-attraction ratio should be within the range of 0.90 to 1.10). The results shown in Table 4 indicate that the 2008 model meets the published guidelines for all trip purposes.

In addition to production and attraction balancing, the percent of total trips for each purpose were checked for reasonableness. Typical values are provided below:

- HBW trips 18% to 27% of all trips
- HBO trips: 47% to 54% of all trips
- NHB trips: 22% to 31% of all trips

While the Santa Barbara Model falls slightly outside of these ranges, the trip purpose percentages in the 2008 Santa Barbara model are generally reasonable and reflect a greater degree of trip chaining in Santa Barbara due to its long and narrow physical geography. This information, in conjunction with the trip generation rate comparisons and trip purpose distributions discussed later in this report, indicates that the trip generation component of the Santa Barbara model is performing reasonably.

FURTHER REFINEMENT

In addition to the standard trip generation procedures, certain enhancements were added to the Santa Barbara model to better capture local trip making characteristics and provide the ability to test certain policy options for future development scenarios. These enhancements include dividing the model area into four "area types" and cross-classifying multifamily households by auto-ownership.

Area Types

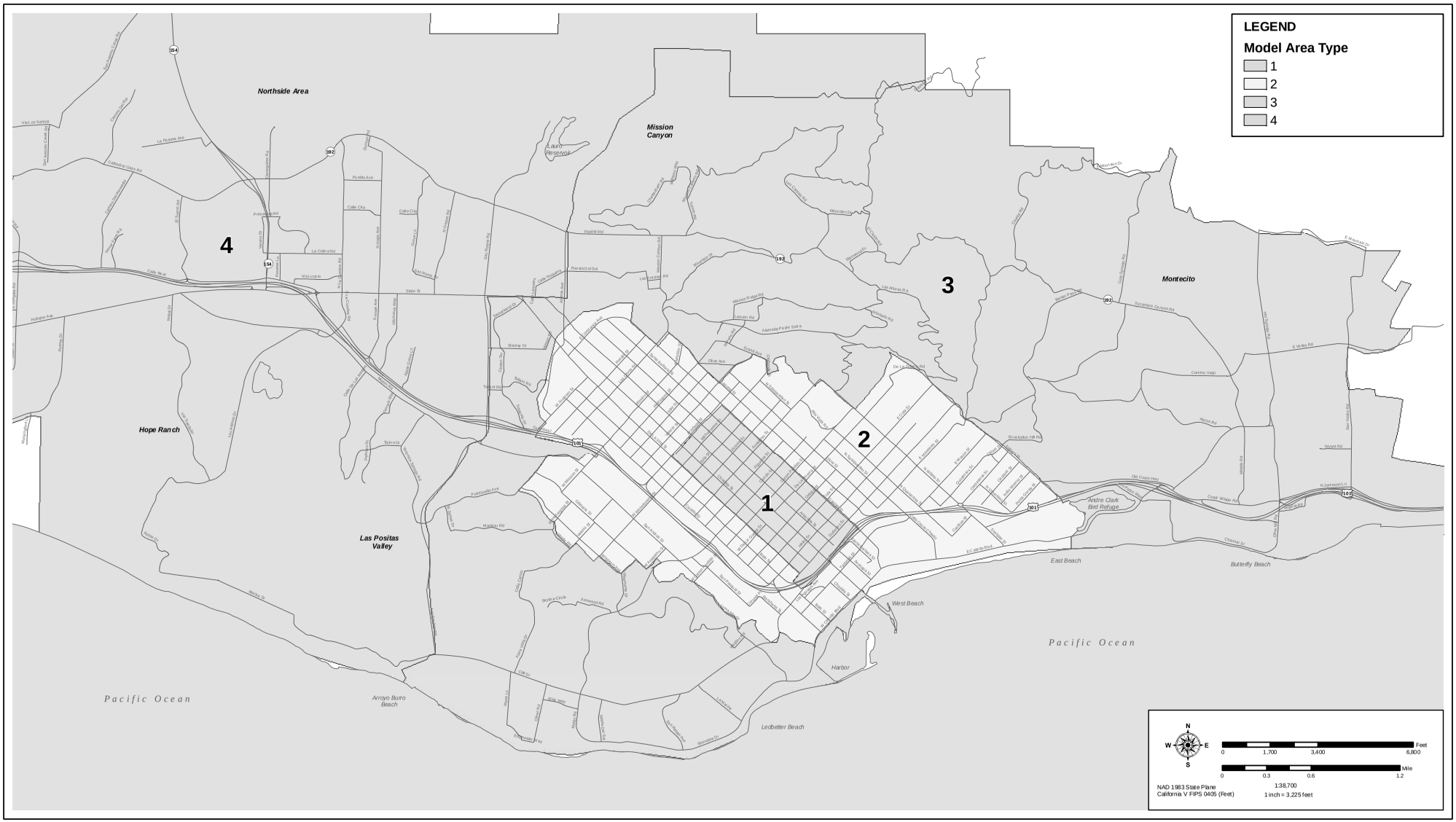
The model area contains a variety of development patterns, each with different land use characteristics and associated trip making patterns. To account for these differences, the model area was divided into four "area types". The four area types, which are shown in Figure 2, have their own associated trip generation rates and internal/external trip making characteristics.[1] Trip generation rates for each land use

TABLE 4
TRIP PRODUCTION TO ATTRACTION RATIOS BY PURPOSE

Trip Purpose	Production/ Attraction Ratio	Percent of Total Daily Vehicle Trips	
		2008 PlanSB model	California[1]
Home-Based Work (HBW)	1.00	15%	21%
Home-Based Other (HBO)	1.01	43%	48%
Non-Home-Based (NHB)	1.00	41%	31%
Recreational (REC)	N/A	2%	N/A
Total		101%	100%

[1] 2000-2001 California Statewide Household Travel Survey Final Report, June 2002.
Note: May not total 100% due to rounding
Source: Fehr & Peers, 2008.

[1] Internal/External trip making is explained in the Trip Distribution section below



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PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

in each area type are shown in Table 5. For reference, a table of ITE rates for which there are comparable land uses in the model is provided in Appendix B. Note that in some cases, Santa Barbara model rates are either higher or lower than the most applicable ITE rate. For example, the average ITE trip generation rate for single-family homes is 9.57 vehicle trips per day per unit. The Santa Barbara model single-family rates range from 8.05 to 11.98 vehicle trips per day per dwelling unit. The average ITE office rate, to provide another example, is 11.01 vehicle trips per day per thousand square feet. The Santa Barbara model rates range from 8.27 to 12.92 vehicle trips per day per thousand square feet.

As noted above, ITE trip generation rates for individual land uses can vary considerably from study to study, and ITE uses an average of these studies. For multi-family, for example, ITE does not provide stratification by auto-ownership – only a range from 4.18 to 6.72 vehicle trips per day per dwelling unit. The Santa Barbara model is based upon auto-ownership rates from the National Household Travel Survey (NHTS) specific to Santa Barbara. Both the levels of auto ownership, and the multi-family trip generation rates, are based upon the NHTS.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Area type 2 represents the remaining "grid" portion of the City. This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center which attracts trips from outside areas.

Multi-Family Unit Vehicle Ownership

In order to test certain potential policy alternatives, multi-family dwelling units were divided into four types representing varying levels of automobile ownership. Auto-ownership data for each census tract in Santa Barbara was obtained from the 2000 National Household Travel Survey, which is conducted by the United States Census Bureau. The percentage of households representing each level of automobile ownership was calculated and the total number of multifamily units in each census tract was apportioned to the relevant multi-family trip generation category based on this percentage.

TRIP DISTRIBUTION (GRAVITY MODEL)

Once the trip generation step has determined the number of trips that originate and terminate in each zone, the trip distribution process determines the specific destination of each originating trip. The destination may be within the zone itself, resulting in an intra-zonal trip. If the destination is outside of the zone of origin, it is an inter-zonal trip. Internal-internal (I-I) trips originate and terminate within the model area. Trips that originate within but terminate outside of the model area are internal-external (I-X), and trips that originate outside and terminate inside of the model area are external-internal (X-I). Trips passing completely through the model area are external-external (E-E).

The trip distribution model uses the gravity equation to distribute trips to all zones. This equation estimates an accessibility index for each zone based on the number of attractions in each zone and a friction factor, which is a function of travel time between zones. Each attraction zone is given its pro-rata

share of productions based on its share of the accessibility index. This process applies to the I-I, I-X, and X-I trips. The E-E trips are added to the trip table prior to final assignment.

Friction Factors

Friction factors, also known as travel time factors, determine the relative attractiveness of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ. These factors are used in the trip distribution stage of the model. The 2008 Santa Barbara model friction factors are based on data reported in national modeling reference documents such as National Cooperative Highway Research Program (NCHRP) 365, and modified based on local conditions and comparison with the SBCAG model. See Appendix C for friction factor curves.

TABLE 5
DAILY VEHICLE TRIP GENERATION RATE COMPARISON

Residential[1]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Single-Family (SF)	Dwelling Units	8.05	10.56	11.98	11.98
Multi-Family Zero Cars (MF_0)	Dwelling Units	3.03	3.55	4.02	4.02
Multi-Family One Car (MF_1)	Dwelling Units	4.23	5.39	6.18	6.18
Multi-Family Two Cars (MF_2)	Dwelling Units	5.96	7.04	8.08	8.08
Multi-Family Three or More Cars (MF_3P)	Dwelling Units	7.60	8.89	10.24	10.24
Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Commercial Services	Thousand Square-feet	100.10	115.20	128.40	128.40
Entertainment	Thousand Square-feet	36.40	43.20	48.15	48.15
Auto Related	Thousand Square-feet	16.38	17.28	19.26	19.26
Restaurant	Thousand Square-feet	100.10	139.20	136.05	136.05
Retail	Thousand Square-feet	32.76	45.18	40.28	40.28
Lodging	Thousand Square-feet	2.73	2.11	3.75	3.75

TABLE 5
DAILY VEHICLE TRIP GENERATION RATE COMPARISON
(CON'T)

Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Office	Thousand Square-feet	8.27	11.59	12.92	12.92
Institutional	Thousand Square-feet	45.50	48.00	53.50	53.50
Industrial	Thousand Square-feet	4.25	4.48	5.00	5.00
Hospital	Thousand Square-feet	N/A	12.48	N/A	N/A
Religious Facilities	Thousand Square-feet	8.29	8.75	9.75	9.75
Police and Fire Services	Thousand Square-feet	8.65	9.12	10.17	10.17
Elementary and Middle School	Students	1.81	1.91	2.13	2.13
High Schools	Students	N/A	0.64	N/A	0.72
Colleges	Students	N/A	0.25	0.28	N/A
Recreation (Parks and Beaches)	Relative Popularity[3]	N/A	N/A	N/A	N/A
Golf	Acres	N/A	N/A	4.75	4.75
SBCAG_Agricultural[1]	Employees	N/A	N/A	3.95	3.95
SBCAG_Industrial[1]	Employees	N/A	N/A	2.04	2.04
SBCAG_Commercial[1]	Employees	N/A	N/A	3.92	3.92
SBCAG_Office[1]	Employees	N/A	N/A	1.07	1.07
SBCAG_Service[1]	Employees	N/A	N/A	5.39	5.39

[1] The ITE manual does not stratify multifamily dwelling units by auto-ownership. ITE multifamily rates range from 4.18 to 6.72 depending on the dwelling type. Rates based on auto-ownership were developed from National Household Travel Survey (NHTS) data for the City of Santa Barbara. NHTS rates range from a minimum of 0.69 to a maximum of 11.75.

[2] Not all non-residential land use categories are present in each area type. 2008 trip generation rates were only developed for land uses present in 2008 in each area type.

[3] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

Trips between the Santa Barbara Area and External Areas

One of the important inputs to a travel model is an estimate of the amount of travel between the study area and neighboring areas outside the model. These are typically called internal-external, or I-X/X-I, trips.

The United States Census Bureau surveys residential and work locations at the place level. Table 6 illustrates the distribution of work locations for Santa Barbara residents, while Table 7 illustrates the distribution of residential locations for Santa Barbara employees.

Based on this data, the proportion of HBW trips entering and leaving the study area was estimated. For non-work trip purposes, information from the SBCAG Regional Model was used to develop and initial estimate the percent of HBO and NHB trips that travel between Santa Barbara and other areas. These estimates were then refined using the City's land use database. Table 8 summarizes the proportion of trips by purpose and area type that are assumed to have one end outside the model area.

After the number of I-X/X-I trips is estimated, those trips are distributed to the stations around the perimeter of the model area using external station weights. These external station weights are based on City, County, and Caltrans traffic count data and the SBCAG Regional Model. The resulting external station weights are presented on Figure 3.

Through Trips

Through trips (also called external-external, or EE trips) are those that pass through the study area without stopping inside the study area. The major flows of through traffic in the Santa Barbara area use US-101 and SR 154, with lower volumes of through traffic using SR 192. The majority of through trips use US-101 for at least a portion of their journey, even if they do not enter or exit the model area along this route. The size of these flows was estimated based on Caltrans traffic counts and the SBCAG Regional Model. The through trips were modified in conjunction with the external station weights so that results at the gateways accurately represented observed data. The resulting through trip matrix is summarized in Table 9.

Trip Assignment

The trip assignment process determines the route that each vehicle-trip follows to travel from origin to destination. The model selects these routes in a manner that is sensitive to congestion and the desire to minimize overall travel time. It uses an iterative, capacity-restrained assignment and equilibrium volume adjustments. This technique finds a travel path for each trip that minimizes the travel time, with recognition of the congestion caused by all other trips.

The general assignment process includes the following steps:

- Assign all trips to the links along their selected paths.
- After all assignments, examine the volume on each link and adjust its impedance based on the volume-to-capacity ratio.
- Repeat the assignment process for a set number of iterations or until specified criteria related to minimizing travel delays are satisfied.

Calibration of the roadway network included modification of the centroid connectors to more accurately represent the location at which traffic accessed the local roads, adjusting speeds from the posted speed

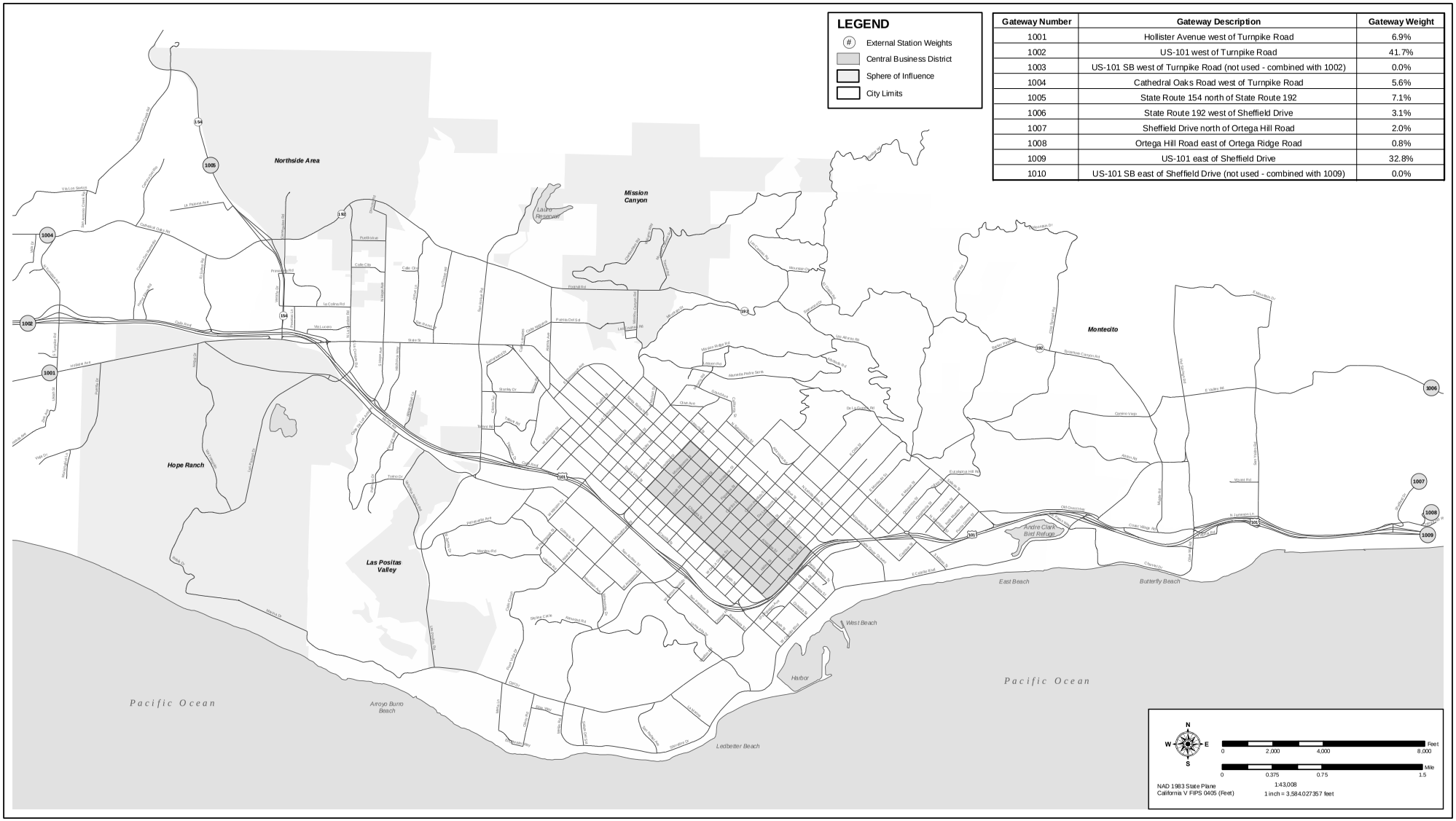
TABLE 6 WORK LOCATIONS FOR SANTA BARBARA RESIDENTS		
Year	**Percent Working Inside Santa Barbara**	**Percent Working Outside Santa Barbara**
2000	63%	37%
Source: U.S. Census Bureau.		

TABLE 7 RESIDENTIAL LOCATIONS FOR SANTA BARBARA EMPLOYEES		
Year	**Percent Living Inside Santa Barbara**	**Percent Living Outside Santa Barbara**
2000	49%	51%
Source: U.S. Census Bureau.		

TABLE 8
PERCENT OF TRIPS BY PURPOSE THAT ARE INTERNAL/EXTERNAL FOR EACH AREA TYPE

Purpose	Area Type 1		Area Type 2		Area Type 3		Area Type 4	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Home-Based Work (HBW)	20%	41%	27%	45%	40%	49%	44%	49%
Home-Based Other (HBO)	18%	38%	19%	30%	32%	31%	20%	33%
Non-Home-Based (NHB)	21%	21%	21%	20%	23%	24%	21%	24%
Golf (GOLF)	0%	40%	0%	40%	0%	35%	0%	35%
Recreational (REC)	0%	30%	0%	30%	0%	20%	0%	20%

Source: Fehr & Peers, 2008.



Gateway Number	Gateway Description	Gateway Weight
1001	Hollister Avenue west of Turnpike Road	6.9%
1002	US-101 west of Turnpike Road	41.7%
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)	0.0%
1004	Cathedral Oaks Road west of Turnpike Road	5.6%
1005	State Route 154 north of State Route 192	7.1%
1006	State Route 192 west of Sheffield Drive	3.1%
1007	Sheffield Drive north of Ortega Hill Road	2.0%
1008	Ortega Hill Road east of Ortega Ridge Road	0.8%
1009	US-101 east of Sheffield Drive	32.8%
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)	0.0%

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PLAN SANTA BARBARA EXTERNAL STATION WEIGHTS
FIGURE 3

TABLE 9
MATRIX OF DAILY THROUGH (EE) TRIPS

Destination / Origin	Hollister Ave west of Turnpike Rd	Hwy 101 west of Turnpike Rd	Cathedral Oaks Rd west of Turnpike Rd	Hwy 154 north of Hwy 192	Ortega Hill Rd north of Ortega Ridge Rd	Hwy 101 east of Sheffield Dr	**Total**
Hollister Ave west of Turnpike Rd		0	0	0	55	265	**320**
Hwy 101 west of Turnpike Rd	0		0	0	285	10120	**10405**
Cathedral Oaks Rd west of Turnpike Rd	0	0		0	30	75	**105**
Hwy 154 north of Hwy 192	0	0	0		30	830	**860**
Ortega Hill Rd east of Ortega Ridge Rd	55	285	30	30		0	**400**
Hwy 101 east of Sheffield Dr	265	10120	75	830	0		**11,290**
Total	**320**	**10405**	**105**	**860**	**400**	**11,290**	**23,380**

Note: All trips are rounded to the nearest 5 and external gateways with less than 100 trips are not shown on the above table.
Source: SBCAG

limit to adjust the attractiveness of the route and better reflect the prevailing speed of traffic, and refining the turn penalties.

Turn Penalties

Turn penalties are used to prohibit or add delay to certain turning movements. The Santa Barbara model prohibits traffic from getting off a freeway ramp and then immediately getting back on, as well as prohibits traffic from making turns across a median. In addition, all U-turns are prohibited throughout the model area in order to avoid counter-intuitive traffic routing. The PM peak hour assignment also prohibits left turns onto and off of State Street in the Central Business District.

MODEL VALIDATION

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. During the model development process, these outputs are used to further calibrate the model inputs. The extent to which the model outputs match existing travel data validates the assumptions of the inputs.

Traditionally, most model validation guidelines focus on the performance of the trip assignment function in accurately assigning trips to the roadway network. This is called static validation. This metric remains the most common and widely used means to measure model accuracy.

However, models are seldom used for static applications; by far the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Therefore, another test of a model's accuracy focuses on the model's ability to predict realistic differences in outputs as inputs are changed; or "dynamic" validation rather than static validation. In other words, it is good engineering practice take the model for a "test drive." This section describes the highest level validation checks that have been performed for the 2008 Santa Barbara TDF model.

STATIC VALIDATION

The most critical static measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. Caltrans has established certain trip assignment guidelines for models to be deemed acceptable for forecasting future year traffic in Travel Forecasting Guidelines (California Department of Transportation, November 1992). The validity of the PlanSB model was tested for daily, AM peak hour, and PM peak hour conditions. Model volumes were compared to existing traffic counts at 159 individual count sites for the daily validation, and 187 count sites for the AM and PM peak hour validation. The results are shown in Tables 10 through 11.

Link volume results from the model runs were examined and checked for reasonableness. Links were identified where model results varied substantially from the observed counts, and the characteristics of those links were reviewed to ensure that the link attributes reflected local operating conditions. In some cases, link characteristics such as speeds were modified to better reflect conditions on the ground.

Comparison Techniques

Travel model accuracy is usually tested using four comparison techniques:

- The volume-to-count ratio is computed by dividing the volume assigned by the model and the actual traffic count for individual roadways (or intersections) area-wide.
- The maximum deviation is the difference between the model volume and the actual count divided by the actual count.
- The correlation coefficient estimates the correlation between the actual traffic counts and the estimated traffic volumes from the model.
- The percent root mean square error (RMSE) is the square root of the model volume minus the actual count squared divided by the number of counts. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model.

TABLE 10 RESULTS OF DAILY MODEL VALIDATION		
Validation Item	**Criterion for Acceptance**	**Model Results**
Count Locations	N/A	159
% of Links Within Caltrans Standard Deviations	At Least 75%	77%
% of Screenlines Within Caltrans Standard Deviations	100%	100%
2-way Sum of All Links Counted	Within ± 10%	9%
Correlation Coefficient	Greater than 88%	99%
RMSE	40% or less	23%
Source: Fehr & Peers, 2008.		

TABLE 11 RESULTS OF PEAK HOUR MODEL VALIDATION			
Validation Item	**Criterion for Acceptance**	**AM Peak Hour Model Results**	**PM Peak Hour Model Results**
Count Locations	N/A	187	187
% of Links Within Caltrans Standard Deviations	At Least 75%	77%	78%
% of Screenlines Within Caltrans Standard Deviations	100%	100%	100%
2-way Sum of All Links Counted	Within ± 10%	3%	3%
Correlation Coefficient	Greater than 88%	90%	91%
RMSE	40% or less	29%	28%
Source: Fehr & Peers, 2008.			

Validation Guidelines

For a model to be considered accurate and appropriate for use in travel forecasting, it must replicate actual conditions within a certain level of accuracy. Since it would be impossible for any model to replicate all counts precisely, validation guidelines have been established by Caltrans and other agencies. Key validation standards for daily travel models based on the Caltrans guidelines are summarized below:

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).
- All of the roadway screenlines should be within the maximum desirable deviation, which ranges from approximately 15 to 64 percent depending on total volume.
- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts.
- The correlation coefficient between the actual ground counts and the estimated traffic volumes should be greater than 88 percent.

Although not stated in the Caltrans standards, an additional Fehr & Peers validation guideline was applied to the 2008 PlanSB model:

- The RMSE should not exceed 40 percent.

Tables: Results of Daily and Peak Hour Validation

DYNAMIC VALIDATION

The traditional approach to the validation of travel demand models is to compare the link volumes for the model's base year to actual traffic counts taken in the same year. This approach provides information on a model's ability to reproduce a static condition. While reproducing these conditions is very important, it is also important to know that the model will produce stable and reasonable results when various inputs such as land use are changed. The following section presents a selection of the dynamic validation results

Land Use Changes

A basic form of dynamic validation is to vary the amounts of a particular land use type and compare the magnitude and direction of change from the original forecast. Of particular interest are the resulting changes in:

- Vehicle Trips (VT)
- Change in VT per land use unit change (VT/DU or KSF)
- Vehicle Miles Traveled (VMT)
- Change in VMT per land use unit change (VMT/DU or KSF)
- Vehicle Hours Traveled (VHT)
- Change in VHT per land use unit change (VHT/DU or KSF)
- Vehicle miles traveled per vehicle trip (VMT/VT)

This form of dynamic validation was performed on the Santa Barbara model by adjusting the number of multi-family one car dwelling units and the retail development in TAZs 41, 320, 370, and 297. These zones were selected due to their geographic location, the existing land use mix within the zone, and to test one zone from each of the four area types. To isolate each of these changes, tests were done sequentially, changing one item at a time.

Figure 4 shows the location of the zones that were used for dynamic validation. Zone 41 is located downtown near Chapala Street/Ortega Street and contains a broad mix of residential and non-residential land uses. Zone 320 is located in the Westside and contains residential and retail land uses. Zone 370 is located on the Riviera and contains single family land uses and an elementary school. Zone 297 is located in the Upper State Street Area and contains a broad mix of residential and non-residential land uses. The values added to a zone were selected based on the interaction with adjacent land use, and to determine if the model is sensitive to the location and magnitude of various land use changes. The results are shown in Table 12.

- The change in VT per added DU ranges from 3.0 – 5.0. This is reasonable given the mix of land uses in the various zones and the different trip generation rates of each area type. Within each individual area type there is very little variability, showing stable trip generation across the range of land use magnitudes. The average vehicle trips per added DU are lowest for zone 41 due to the abundance of other land uses for the residents to interact with.

- Adding a single DU to the model is a test of how much noise (random error) is in the model. Total VMT changed by between 9 and 229 vehicle-miles per day per dwelling unit added, depending on the zone it was added to. Three of the four zones behaved very well with zones 41, 370 and 297 showing the appropriate increases in VMT relative to the land use mix surrounding these zones. Zone 41 has the lowest increase in VMT, while zone 370 has the highest and zone 297 falls in between. Only zone 320 returns unreasonable results. However, with only a modest increase in dwelling units in this zone, representing a realistic level of development, the model performed as expected.

- The VHT per DU change is fairly stable around -1.0 to 1.4, with the exception of adding to zone 320. However, the noise at this extremely small level of change is no longer present if increased to a normal level of development.

- As shown in Table 12, the VMT/VT is very stable and typically is around 4.2. This measure is used to reduce the influence of vehicle trip generation differences between land use types by normalizing the trip distance by total trips. As land use is added near existing compatible uses, the distance traveled decreases slightly. The opposite is also true: as land use is removed from nearby uses or added further from compatible uses, the distance traveled increases.

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PLAN SANTA BARBARA TAZs USED FOR DYNAMIC VALIDATION

FIGURE 4

TABLE 12
RESULTS OF DYNAMIC VALIDATION TESTS

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Residential Land Use Results - Multifamily Unit with 1 Car								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 DU	595,482	3.0	2,500,903	9.0	59,667	-1.0	4.20
	Added 25 DUs	595,557	3.1	2,501,338	17.8	59,690	0.9	4.20
	Added 50 DUs	595,635	3.1	2,501,440	10.9	59,698	0.6	4.20
320 - Westside	Added 1 DU	595,483	4.0	2,501,123	229.0	59,680	12.0	4.20
	Added 25 DUs	595,581	4.1	2,501,403	20.4	59,695	1.1	4.20
	Added 50 DUs	595,683	4.1	2,501,683	15.8	59,706	0.8	4.20
370 - Riveria	Added 1 DU	595,484	5.0	2,500,913	19.0	59,669	1.0	4.20
	Added 25 DUs	595,595	4.6	2,501,488	23.8	59,707	1.6	4.20
	Added 50 DUs	595,712	4.7	2,501,935	20.8	59,713	0.9	4.20
297 - Upper State Street	Added 1 DU	595,484	5.0	2,500,906	12.0	59,668	0.0	4.20
	Added 25 DUs	595,595	4.6	2,501,485	23.6	59,702	1.4	4.20
	Added 50 DUs	595,711	4.6	2,501,968	21.5	59,703	0.7	4.20
Retail Land Use Results								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 KSF	595,499	20.0	2,501,174	280.0	59,683	15.0	4.20
	Added 10 KSF	595,684	20.5	2,501,615	72.1	59,710	4.2	4.20
	Added 50 KSF	596,501	20.4	2,504,277	67.7	59,816	3.0	4.20

TABLE 12
RESULTS OF DYNAMIC VALIDATION TESTS
(CON'T)

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Retail Land Use Results								
320 - Westside	Added 1 KSF	595,502	23.0	2,501,190	296.0	59,686	18.0	4.20
	Added 10 KSF	595,707	22.8	2,501,932	103.8	59,706	3.8	4.20
	Added 50 KSF	596,618	22.8	2,505,330	88.7	59,852	3.7	4.20
370 - Riveria	Added 1 KSF	595,550	71.0	2,501,174	280.0	59,685	17.0	4.20
	Added 10 KSF	595,686	20.7	2,501,955	106.1	59,708	4.0	4.20
	Added 50 KSF	596,513	20.7	2,505,378	89.7	59,828	3.2	4.20
297 - Upper State Street	Added 1 KSF	595,501	22.0	2,501,204	310.0	59,684	16.0	4.20
	Added 10 KSF	595,702	22.3	2,504,967	407.3	59,721	5.3	4.21
	Added 50 KSF	596,594	22.3	2,505,739	96.9	59,868	4.0	4.20

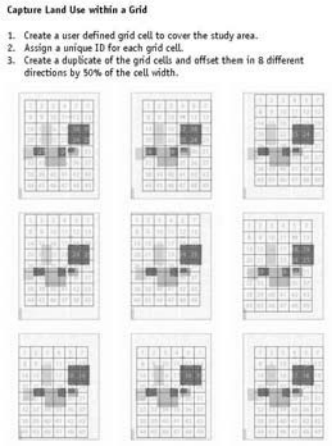
Source: Fehr & Peers, 2008.

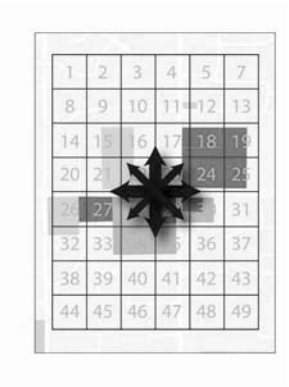
THE 4D PROCESS

The Ds method (commonly known as the 4Ds, although later expanded to include more than four built environment factors) will allow the City to evaluate the transportation effects of *Plan Santa Barbara Framework* policies, and to identify potential site-plan refinements that will further reduce its traffic impacts. The methods are based on a substantial library of research on the relationship between travel and the built environment, which has been distilled to a single set of numerical values by a panel of national experts.

The Ds will predict the degree to which each Plan Santa Barbara horizon-year land use scenario's trip generation will increase or decline with changes to the plan's:

- Density - residential and non-residential development per acre;
- Diversity - mix of residential, retail and employment land uses on the site;
- Design - connectivity and walkability of the site's transportation networks; and
- Destination Accessibility - location relative to major regional attractions, as infill sites generate fewer and shorter vehicle trips than fringe area development.

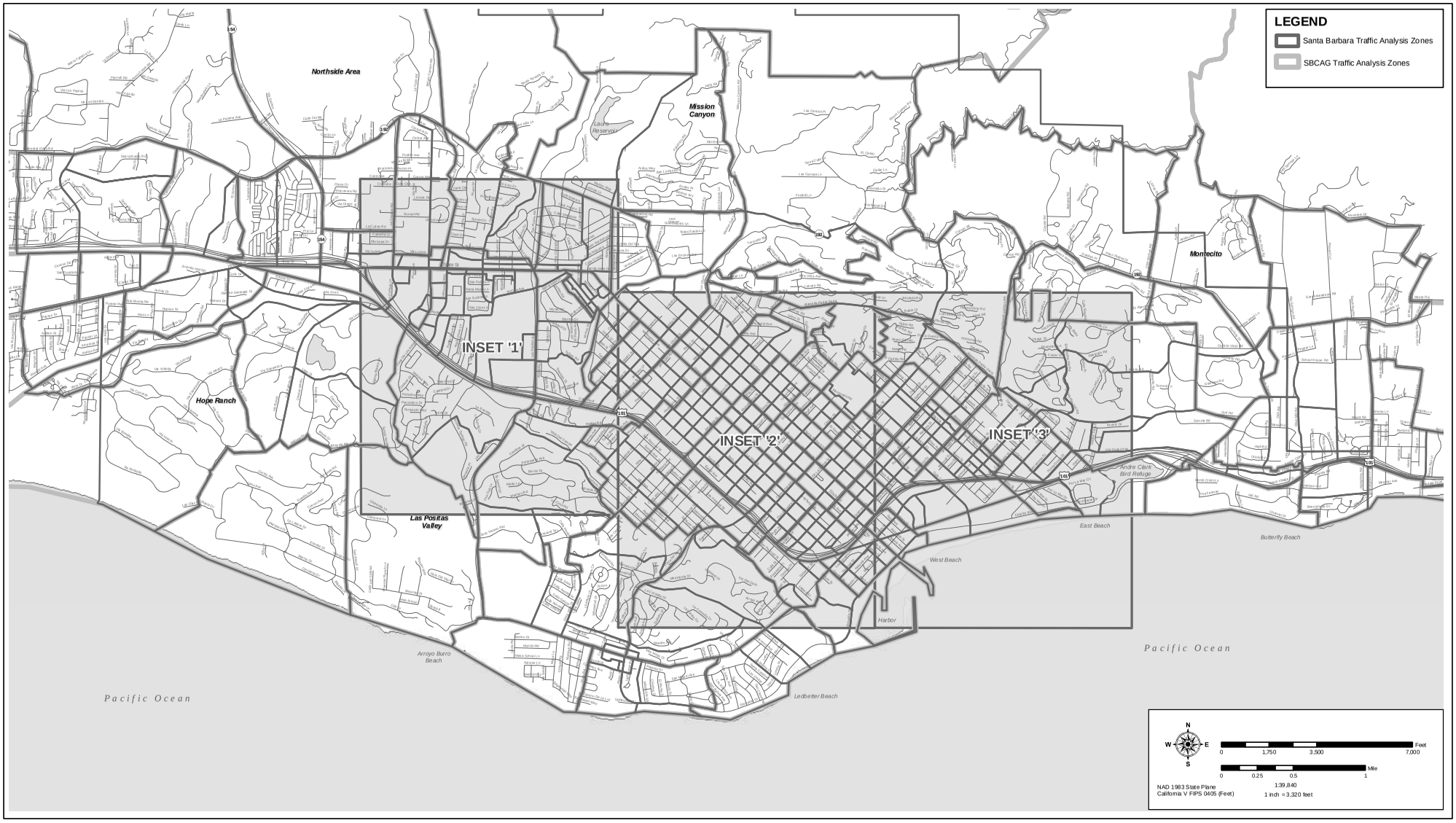




The Santa Barbara travel demand model will include advanced features that allow it to better capture the effects of *Plan Santa Barbara Framework* policy options. These features include:

- Integrated 4D refinements to enhance the sensitivity of the model to account for how travel behavior is affected by the built environment, which are necessary for evaluating the change in vehicle trips and vehicle miles of travel associated with infill development.
- GIS-based ¼ mile grid-cell analysis for calculating 4D variables for input into the traffic model. The grid-cell approach uses parcel-level land use to increase the accuracy of the variable estimates by capturing all land use intersections in ¼ grids. This method is superior to calculating variables based on traffic analysis zone geography, which can be too large to capture many nuances of the built environment.
- Refined multi-family household trip generation structure cross-classified by automobile ownership.
- Trip assignment that isolates drive alone and shared ride (2 and 3+) trips by purpose.
- District-based TDF model structure to capture different travel characteristics in different areas of the City.
- Refined TAZ system in high activity areas to allow for detailed traffic assignment.

APPENDIX A:
TRAFFIC ANALYSIS ZONES KEY MAP



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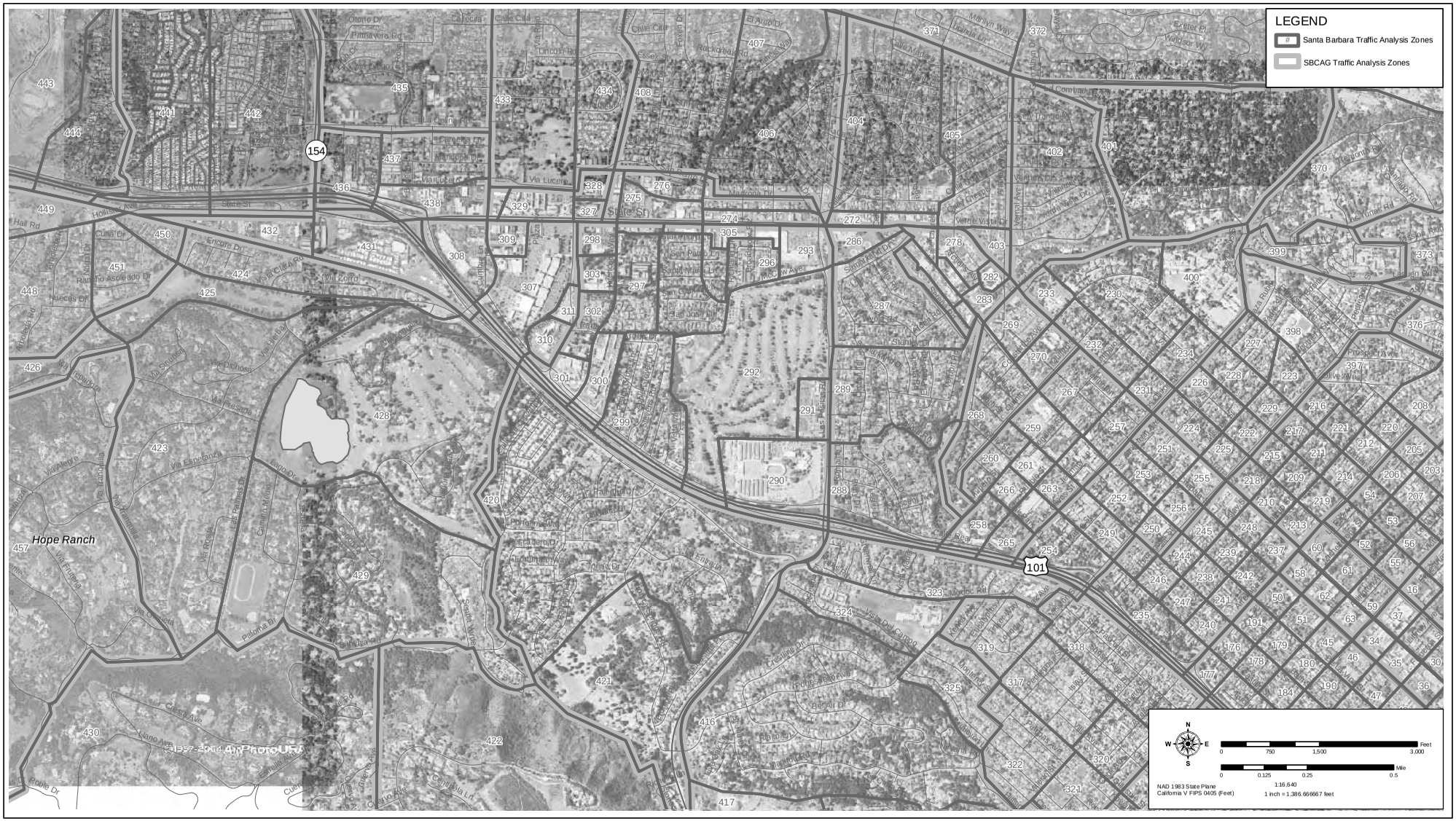
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES - KEY MAP
APPENDIX A



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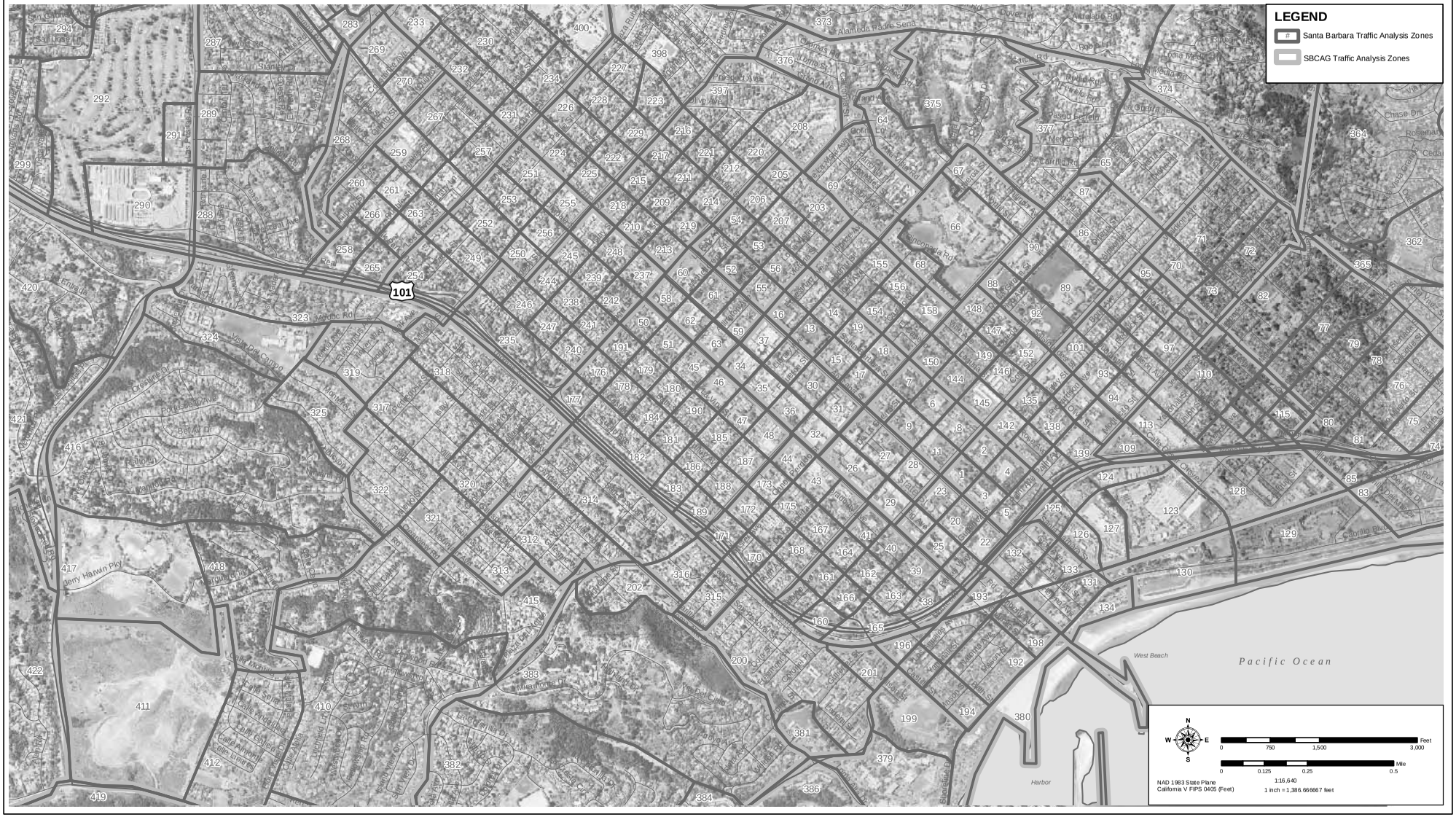
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 1



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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 2

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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 3

APPENDIX B:
SAMPLE ITE TRIP GENERATION RATES

APPENDIX B

SAMPLE ITE TRIP GENERATION RATES[1]

Residential

Land Use Type	Units	Rate
Single-Family (SF)	Dwelling Units	9.57
Apartment	Dwelling Units	6.72
Residential Condominium/Townhouse	Dwelling Units	5.86

Non-Residential

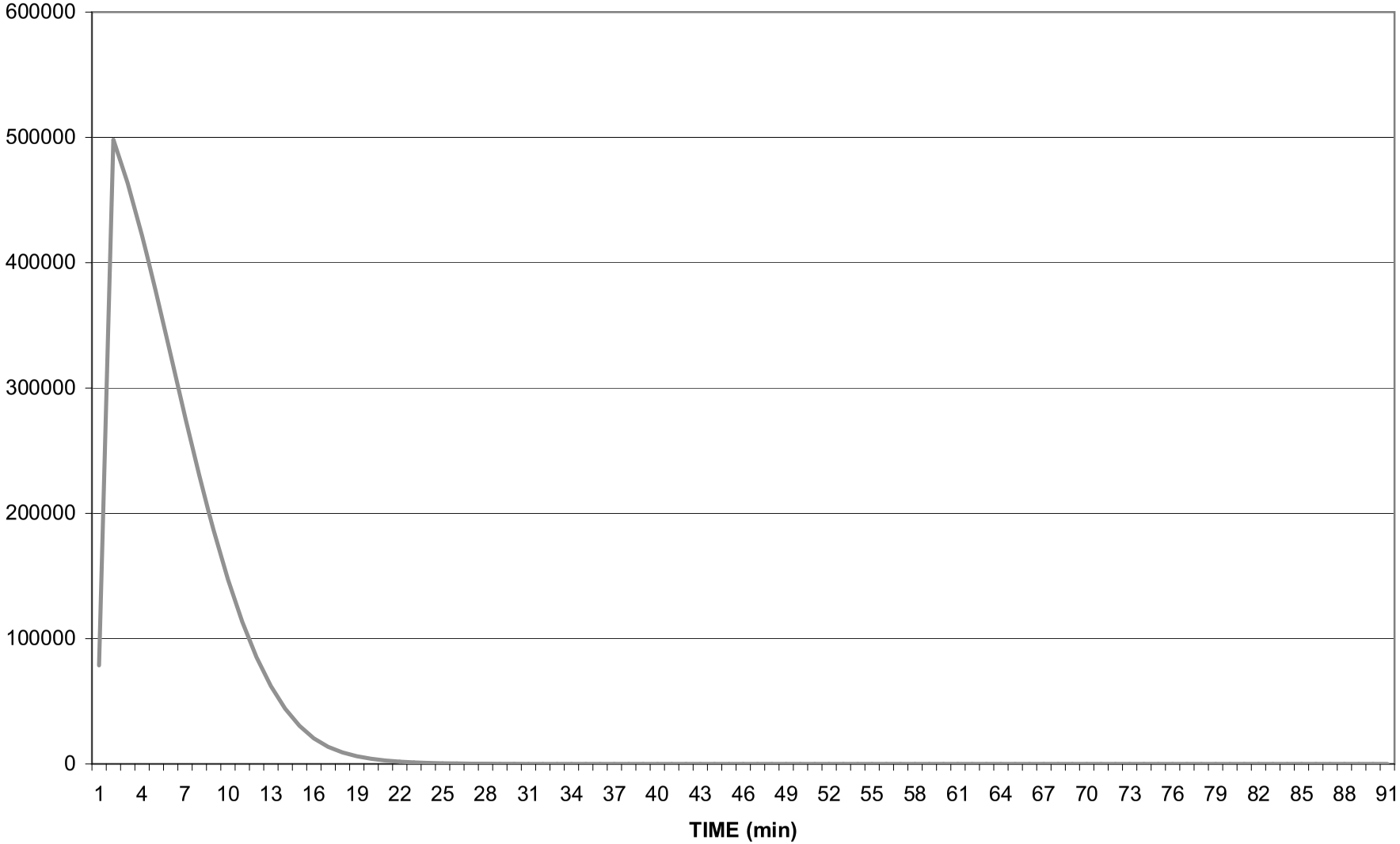
Land Use Type	Units	Rate
Office	Thousand Square-feet	11.01
General Light Industrial	Thousand Square-feet	6.97
Hospital	Thousand Square-feet	17.57
Elementary chool	Students	1.29
High Schools	Students	1.71
Junior/Community Colleges	Students	1.20
Golf	Acres	5.04

[1] ITE trip generation rates are provided for land use categories that are closely comparable between the model and ITE definitions. In general, ITE categories are more specific than the model land use categories and a direct comparison is not possible.

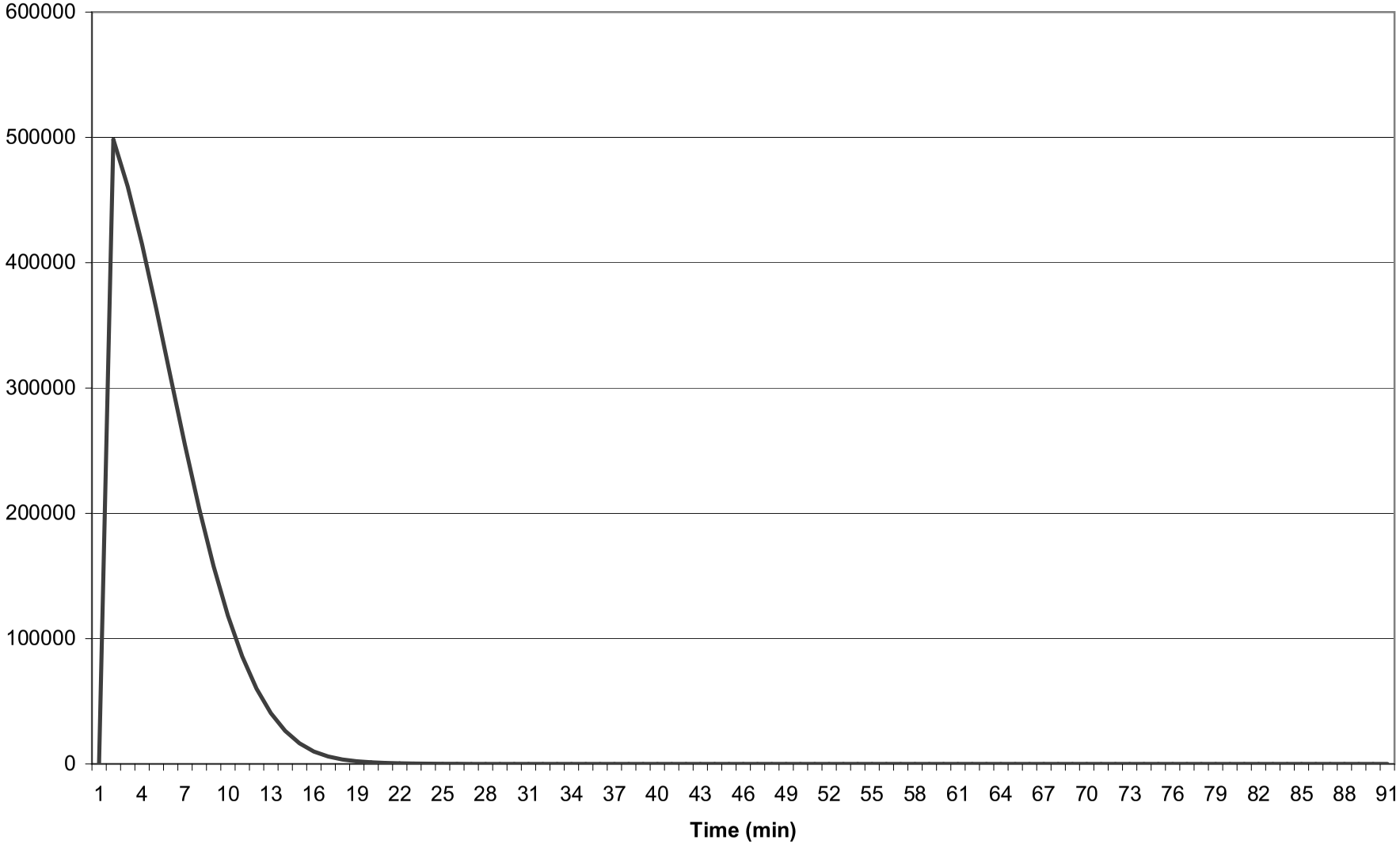
Source: Trip Generation, 7th Edition (Institute of Transportation Engineers, 2003)

APPENDIX C:
SANTA BARBARA MODEL FRICTION FACTOR CURVES-HBW

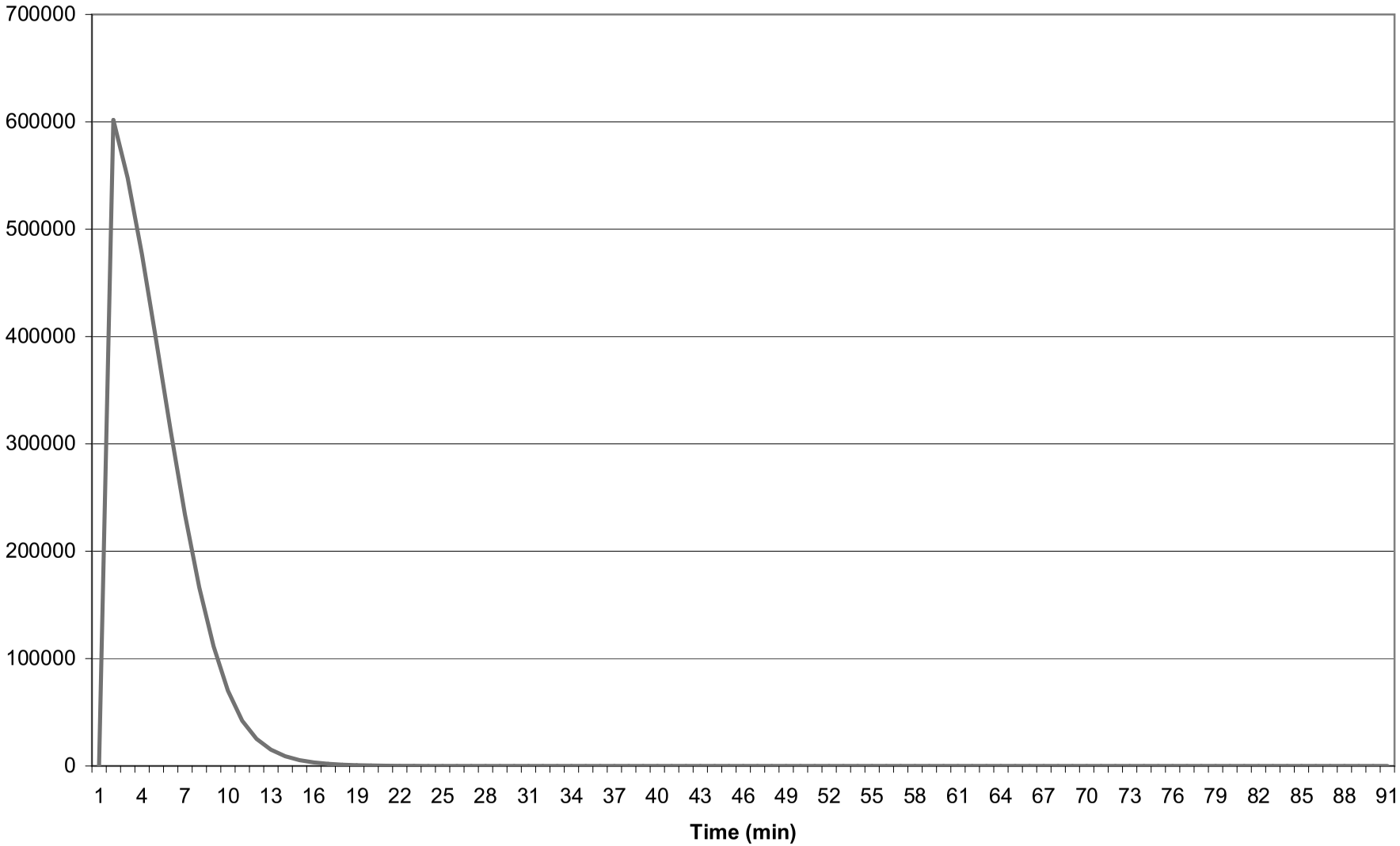
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBW



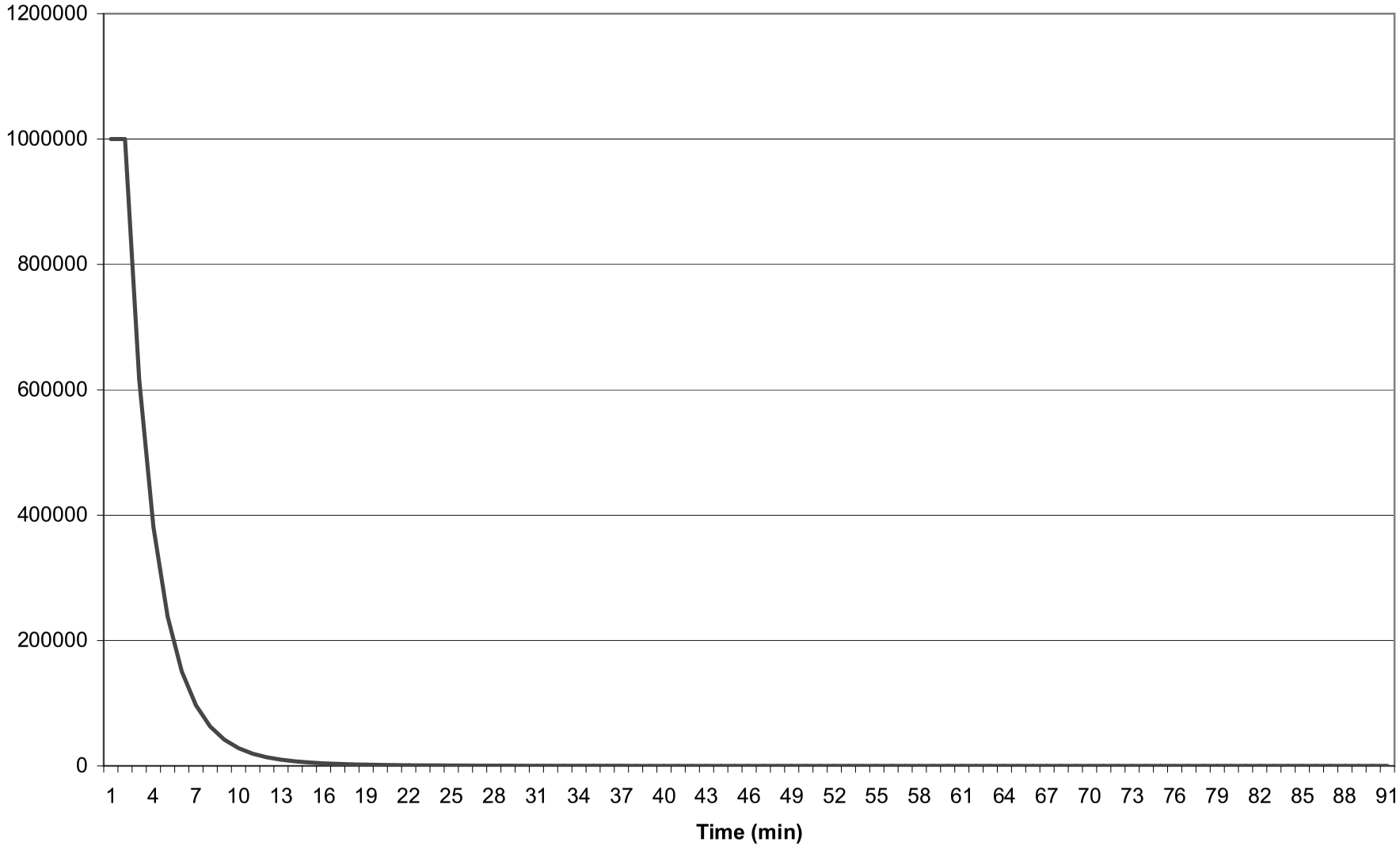
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBO



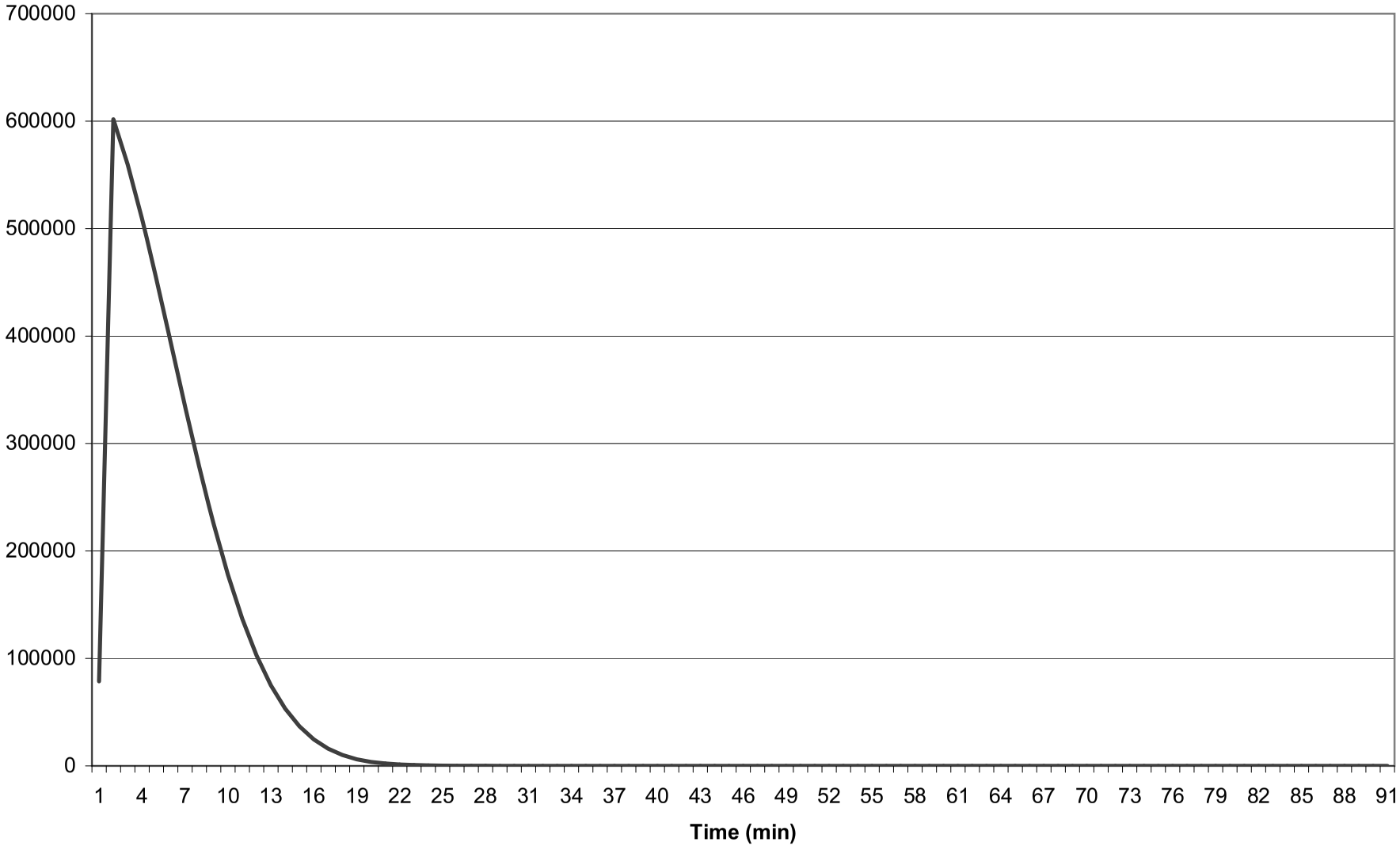
SANTA BARBARA MODEL FRICTION FACTOR CURVES - NHB



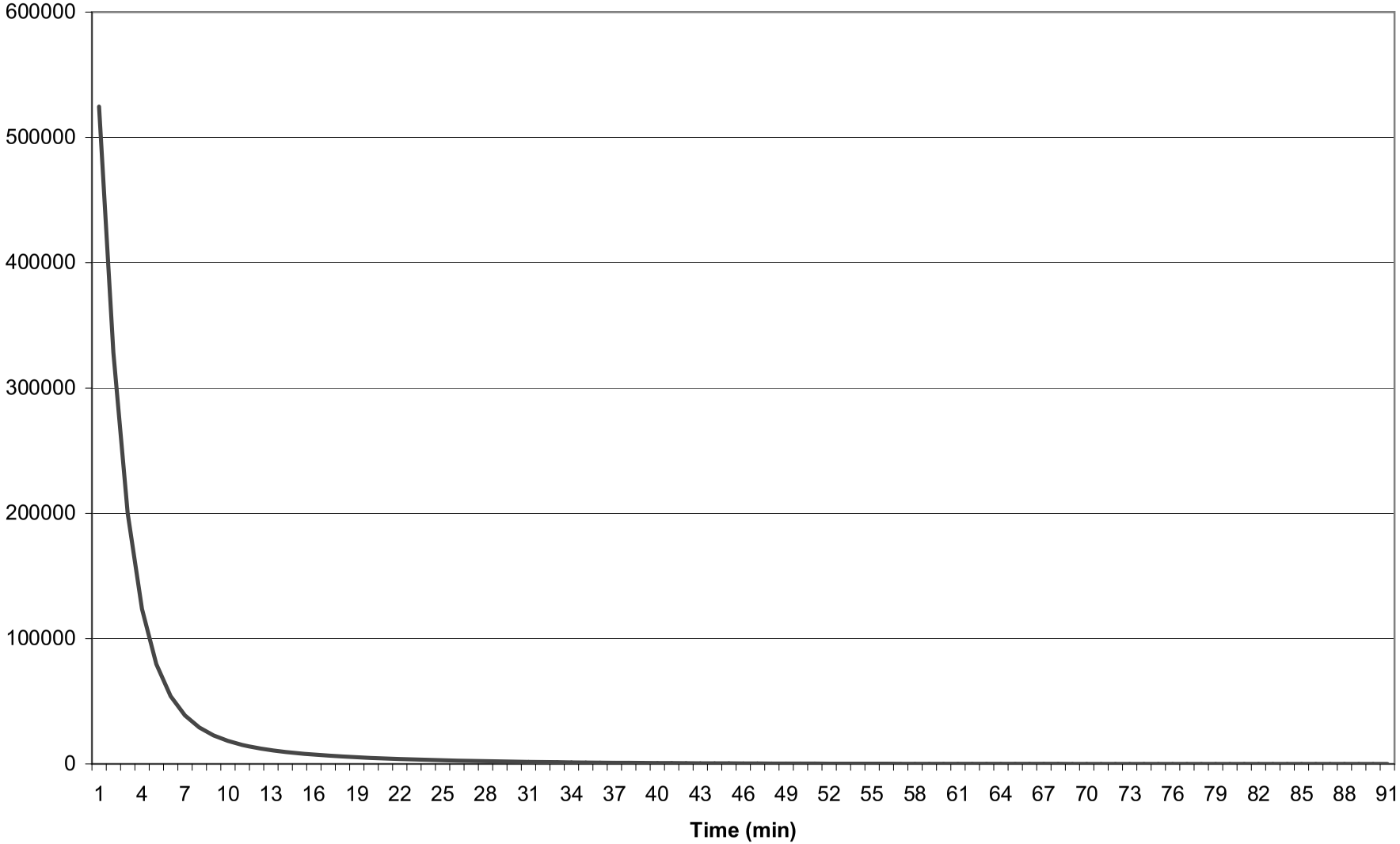
SANTA BARBARA MODEL FRICTION FACTOR CURVES - GOLF



SANTA BARBARA MODEL FRICTION FACTOR CURVES - REC



SANTA BARBARA MODEL FRICTION FACTOR CURVES - IX/XI



APPENDIX I-4

FUTURE TRAFFIC CONDITIONS FOR *PLAN SANTA BARBARA* AND THE NO PROJECT ALTERNATIVE

FEHR & PEERS
TRANSPORTATION CONSULTANTS

REVISED FINAL TECHNICAL MEMORANDUM

Date: January 27, 2010

To: Dan Gira, AMEC

From: Brian Welch and Reid Keller

Subject: ***Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario***

LA08-2253

INTRODUCTION

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The City model, developed in the TransCAD Transportation Geographic Information System (GIS) software, was successfully calibrated and validated to current conditions. [1] Although there are seasonal variations in traffic in Santa Barbara due to tourist visitation and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting model represents travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The primary purpose of the model is to test proposed *Plan Santa Barbara* policy options to see which policies are successful in meeting community objectives. The circulation goals, objectives, and policies for *Plan Santa Barbara* focus on creating a multi-modal transportation system that provides choice and decreases vehicle traffic congestion. The plan includes objectives related to mode share and traffic congestion, featuring (1) a 50/50 mode share between the single-occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions. The travel demand model provides metrics and indicators (traffic volumes, levels of service, vehicle miles traveled, etc.) that document the plan's ability to meet the *motor vehicular-related* goals, objectives, and policies. In addition, indicators and results from the model will be utilized to support forthcoming California Environmental Quality Act (CEQA) documentation

This technical memorandum summarizes traffic volume forecasts, intersection operational conditions, and a variety of other performance measures associated with implementation of the *Plan Santa Barbara* Proposed Project scenario. This scenario forms the Project scenario of the *Plan Santa Barbara* General Plan Update. These future conditions represent the change in traffic in Santa Barbara under the policy and land use changes of the *Plan Santa Barbara* Proposed Project scenario. We have also included, for ease of reference, a brief summary of existing

[1] For details regarding the model development, including calibration and validation statistics, please refer to *Plan Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

conditions as well as results for the No Project scenario. Forthcoming technical memoranda will provide similar documentation for additional horizon year plan alternatives.

As noted, the forecasts for this memo were prepared using the *Plan Santa Barbara* Travel Demand Model developed by Fehr & Peers on the TransCAD platform. The travel demand model is based around three core components:

- A **land use database** – in this case a parcel level database provided by the City with detailed information on the type and amount of development on each parcel, stratified into numerous categories. Land use databases were prepared by the City for existing conditions and projected amounts and locations of future residential and non-residential growth, based on historic growth rates and existing/proposed City growth control policies and mechanisms for the No Project (Existing Policies) Alternative and Project (*Plan Santa Barbara* policies). The type, location, and amount of growth permitted under *Plan Santa Barbara* were further modified to account for the policy framework of *Plan Santa Barbara*. These land use databases were compiled on a parcel-specific level for the entire City as well as the Sphere of Influence, and provide detailed information on the type and amount of development existing and projected for each parcel, broken down into multiple land use categories to reflect the diversity of existing and proposed land uses accurately.
- A **highway network database** – Based on the Santa Barbara County Association of Governments (SBCAG) regional travel demand model, with added detail using data provided by the City. The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes, arterials, collectors, and a selection of local roads in the study area (see Figure 1).
- The roads shown in Figure 1 are classified in four major categories and form the primary road network represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside the City.
- A **table of trip generation rates** – initial rates was researched from sources including SBCAG, the census National Household Travel Survey, the San Diego Association of Governments (SANDAG), and the Institute of Transportation Engineers (ITE). Trip generation rates were then calibrated to match the existing trip making characteristics that are unique to Santa Barbara.

The model was validated and calibrated to Caltrans, Federal Highway Administration (FHWA), and Fehr & Peers' internal standards. Once the model met the required set of criteria to be deemed adequately validated and calibrated, the land use database was modified to reflect future development growth. This growth can be attributed to two sources:

1. Currently **pending**, **approved**, and **under construction** development projects. Forecasted amounts of growth were based on the extrapolation of historic trends for residential development, and existing and proposed policy caps for non-residential development. These forecasts account for planned and pending development projects, and;

2. The City's distribution of the **future growth and development** projected to occur under both the No Project/Existing Policies Alternative and Project/*Plan Santa Barbara* scenario. Forecasted growth has been provided for the No Project/Existing Policies scenario, which includes development under the framework of the existing General Plan, as well as for the *Plan Santa Barbara* Draft Policies scenario, which accounts for the proposed policy changes set forth by the City Council for the project.

In addition to the land use database changes, currently fully funded roadway improvements were added to the highway network database. These improvements generally consisted of the Measure D funded projects along the US-101 corridor between Hot Springs Road and Milpas Street. Examples of projects include the Cacique Street freeway under-crossing, the roundabout at Old Coast Highway and Hot Springs Road and Coast Village Road and the addition of a travel lane to both directions of US-101 between Milpas Street and Hot Springs Road. US-101 improvements are currently under construction from Milpas to Hot Springs and are anticipated to be complete by 2012.

The remaining sections of this memo present relevant portions of the existing conditions analysis, the results of the future No Project analysis, and the future Proposed Project analysis for the *Plan Santa Barbara* study area, shown in Figure 1. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas in or near the City's Sphere of Influence. The study area includes all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence. The Santa Barbara Airport does not fit these criteria, and is not within the modeling framework. Airport existing and future conditions will be documented within the CEQA documentation for *Plan Santa Barbara*, based upon recently completed studies.

EXISTING CONDITIONS[2]

Average Daily Traffic Volumes

Average Daily Traffic (ADT) and AM and PM peak hour turning movement counts were collected in the *Plan Santa Barbara* study area in March 2008. Additional recent ADT counts were compiled from a variety of sources including Environmental Impact Reports (EIRs), the County of Santa Barbara count program, and Caltrans. These data were used to assess current traffic conditions in the City of Santa Barbara and inform the model development process.

Figure 2 illustrates existing ADT volumes on major thoroughfares in the study area. Certain travel patterns can be seen in the figure:

- As expected, the freeway carries the greatest daily volume of vehicles, reaching a peak of 133,000 vehicles per day (vpd) between Mission Street and Las Positas Roads.
- Arterial traffic volumes are generally greatest on segments approaching freeway ramps. This pattern is common throughout the United States, since these locations generally experience the most significant confluence of surface street traffic. The busiest locations include the following:

[2] Some relevant portions of the existing conditions data are presented here for comparative convenience. For a detailed presentation of existing transportation conditions in the City of Santa Barbara, please refer to *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008).

- Carrillo north of US-101: 32,440 vpd
- Mission north of US-101: 30,010 vpd
- Milpas north of US-101: 28,640 vpd
- Garden north of US-101: 24,630 vpd
- State west of San Marcos Pass: 21,160 vpd
- Las Positas north of US-101: 20,120 vpd

Peak Hour Freeway Volumes

Figure 3 illustrates peak hour freeway volumes for the base year. The following observations are shown in the figure:

- During the AM peak hour, traffic volumes on US-101 northbound reach their peak between Milpas Street and Garden Street. During the PM peak hour, traffic volumes peak on the US-101 northbound between Mission Street and Las Positas Road. During the AM peak hour, traffic volumes on US-101 northbound reach a peak of 6,430 vehicles per hour between Milpas and Garden Streets. These volumes do not exceed the capacity of this six-lane segment of US-101, which operates at LOS E during the AM peak.
- During the AM peak hour, traffic volumes on the two-lane segment of US-101 northbound reach a peak of 5,895 vehicles per hour south of Olive Mill Road. These volumes exceed the capacity of this two-lane segment of US-101, which operates at LOS F during the AM peak.
- During the PM peak hour, traffic volumes on US-101 northbound reach a peak of 5,895 vehicles per hour between Mission Street and Las Positas Road. These volumes do not exceed the capacity of this three-lane segment of US-101, which operates at LOS E during the PM peak.
- Traffic patterns during the AM peak hour show directional peaking, where one direction of the freeway has substantially more traffic than the other, approaching Garden Street from the south. For example, northbound AM peak hour volumes of 6,430 peak trips north of Garden Street are nearly four times as great as southbound volumes of 1,718 trips. Northbound and southbound AM peak hour volumes are more in balance in the rest of the City.
- Although the southbound direction of the freeway carries more traffic leading up to Garden Street from the north, the volumes are not substantially higher than the opposing direction. This pattern suggests that residents of Santa Barbara interact more with areas to the north of the City, but the City draws visitors (especially employees) from both the north and the south, and more traffic passes through the City from the south to the north in the morning and from the north to the south in the evening.
- The PM peak hour shows less directional peaking. Volumes on US-101 southbound south of Garden Street do exceed the opposing flow, but not to the same extent as during the morning peak hour. Traffic volumes north of Garden Street show little if any directional peaking during the PM peak hour.

- During the PM peak hour, traffic volumes on the two-lane segment of US-101 south of the City also show directional peaking. However, this is not as pronounced as in the AM. While southbound PM volumes reach a peak of 4,545 vehicles per hour south of Olive Mill Road, northbound PM peak volumes of 2,926 vehicles per hour are substantially lower. Southbound PM peak volumes do not exceed the capacity of this two-lane segment of US-101, which operates at LOS E during the PM peak period.

Relatively high peak hour peak direction freeway volumes within the study area include:

- Northbound AM peak, west of Milpas, 6,430 vehicles per hour (vph)
- Northbound AM peak, west of San Ysidro, 5,895 vph
- Northbound AM peak, west of Carrillo, 5,719 vph
- Southbound PM peak, west of San Roque, 5,806 vph
- Northbound PM peak, west of San Roque, 5,853 vph
- Northbound PM peak, west of Mission, 5,895 vph

Peak Hour Intersection Level of Service Analysis

Table 1 and Figure 4 illustrate existing intersection level of service (LOS) at the 52 *Plan Santa Barbara* study intersections during the AM and PM peak hours. Three distinct intersection control types are present in Santa Barbara and were analyzed using their respective methodologies:

- Signalized intersections, which were analyzed using the Intersection Capacity Utilization (ICU) methodology;[3]
- Unsignalized, or stop-controlled, intersections were analyzed using the Highway Capacity Manual (HCM) unsignalized intersection methodology; and
- The Milpas Roundabout was analyzed using the HCM roundabout methodology.[4]

The intersection of Hot Springs Road & Coast Village Road was stop-controlled and was analyzed using the HCM unsignalized methodology for the existing conditions. This intersection was assumed to be controlled by roundabout in future 2030 conditions and was analyzed using HCM roundabout methodology for future 2030 conditions.

The City has a target LOS of C with a volume-to-capacity (V/C) ratio of 0.77 or less for signalized intersections and a target LOS of C with less than 22 seconds of delay for unsignalized intersections. There are currently 13 intersections exceeding this threshold during one or both peak hours, as shown in Table 2.

Other Measures of Effectiveness

In addition to roadway segment volumes and intersection LOS, other measures of effectiveness (MOEs) are often analyzed when considering the effects of different general plan development scenarios. These measures are discussed at the end of this document and include:

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[3] Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity* (Transportation Research Board, 1980).

[4] Source for both unsignalized and roundabout methodologies*: Highway Capacity Manual* (Transportation Research Board, 2000).

- **Vehicle Miles Traveled** (VMT) – a measure of total vehicle travel activity for the entire study area for a given scenario.
- **Vehicle Hours Traveled** (VHT) – a measure of total time spent traveling in vehicles in the study area affected by factors including length of trip making, amount of trip making and congestion levels.
- **Vehicle Trips** (VT) – the total number of vehicle trips made in the study area (including into, out of and through the study area).
- **Average Trip Length** – calculated by dividing the total VMT by the total number of vehicle trips.

Table 6 provides 2008 results for each of these measures. It should be noted that these numbers may be held artificially low. While many trips made within the study area are relatively short, most trips leaving the study area travel considerably further than the end of the model area (i.e., Ventura or Lompoc). These numbers represent only the portion of the trip in the study area.

FUTURE YEAR (2030) TRAFFIC CONDITIONS FORECASTS

Development of the Forecast Volumes

The development of the forecast volumes for this analysis followed the approach presented in the *National Cooperative Highway Research Program (NCHRP) Report 255* (Transportation Research Board, 1982). This method is the accepted professional standard for preparing traffic forecasts for urbanized area planning applications.[5]

The NCHRP Report 255 approach involves post-processing model data and applying the growth to existing counts collected in the field. The first step in the process is to run the validated base year model and collect data for the desired segments and intersection turning movements. The model is then updated with future year land use changes and highway network improvements and run again. The data for the same study segments and turning movements is again collected from the future year model run.

The data from both model runs is then compared and applied to the existing counts using one of three methods:

- The **difference method** – directly applies the difference between the future and base year model runs to the existing count.
- The **ratio method** – factors the existing counts by the ratio of the future year data to the base year data.
- The **combined method** – takes the average of the output from both the difference method and the ratio method.

[5] While the NCHRP 255 method is the accepted professional standard, and post-processing model volumes is the typical approach to preparing traffic forecasts for sub-regional models, it is by no means required and in certain situations it may be appropriate to use raw model output as opposed to post-processed count volumes. SBCAG, in *The Travel Forecast for Santa Barbara County*, did not post-process counts and instead reported raw model volumes. The differences between freeway volumes reported here, and those reported by SBCAG, are generally attributable to this difference in methodologies. Differences between forecasts in this case are logical and both approaches are technically correct. The reasons for SBCAG's decision to report model volumes can be found on page 12 of *The Travel Forecast for Santa Barbara County* (SBCAG, 2004).

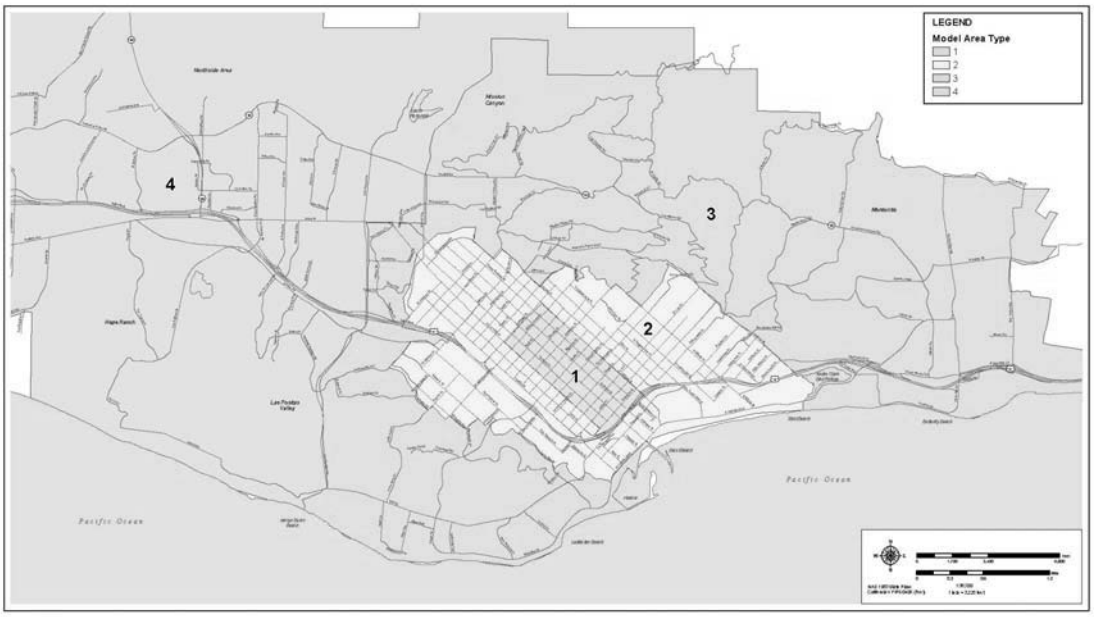
In addition to the NCHRP process described above, more sophisticated trip adjustments were implemented within the modeling framework. These are described below. For background, however, it is helpful to understand the four area types developed for the Santa Barbara model. Area types are discussed in more detail in previous reports[6], and are summarized here and shown below.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation. Area type 2 represents the remaining "grid" portion of the City, and includes most of the Mobility-Oriented Development Area (MODA). This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center that attracts trips from outside areas.

When incorporating the estimated effects of policy-based trip-reduction strategies, peak hour vehicle trips starting and ending within the model area were reduced by a greater percentage than peak-hour vehicle trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not substantially affect trip making in other jurisdictions.

[6] *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).



Travel Demand Model Area Types

Trip Adjustments for Land Use and Policy Strategies

As part of the *Plan Santa Barbara* General Plan Update, the City decided to develop a Travel Demand Forecasting model to support this and other long-range transportation planning efforts. The broadest *Plan Santa Barbara* circulation goals and policies cited in the Introduction – (1) a 50/50 mode share between the single occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions – find their manifestation in detailed implementation strategies in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09." Examining **Appendix A** reveals a very comprehensive approach to meet these goals and objectives, addressing the built environment, transportation-related policies, and transportation network assumptions.

The Santa Barbara Travel Model contains a number of enhancements that allow it to capture the effects of land use and policy initiatives contained in *Plan Santa Barbara* on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation network, parking management, and Travel Demand Management (TDM) programs. A more detailed analysis of how the fabric of urban design affects trip making and travel is also included. This is assessed using a modeling strategy known as the 4Ds, which includes an analysis of density, diversity, design, and destinations associated with the built environment.

More specifically, the Santa Barbara model features two key innovative components that are specifically intended to analyze the broadest circulation-related goals, policies, and objectives included in *Plan Santa Barbara* and articulated in **Appendix A**: the first component focuses on the built environment (the 4D process), and the second component focuses on transportation-related policies (policy-based trip reduction strategies). Each is discussed in concept below, and

their effects are described during the presentation of No Project and *Plan Santa Barbara* model results.

Built Environment 4D Factors: Density, Diversity, Design, Destination - Overview

The following narrative, prepared by Reid Ewing[7], summarizes the 4D process and is included to provide an overview of the approach:

> Some of today's most vexing problems—sprawl, congestion, oil dependence, climate change—are prompting states and localities to turn to land planning and urban design for help in reducing automobile use. Many have concluded that roads cannot be built fast enough to keep up with travel demands induced by road building itself and by the sprawling development patterns it spawns. Travel demand must somehow be moderated.
>
> The potential to moderate travel demand through changes in the built environment is the subject of more than 150 empirical studies. It has become the most heavily researched subject in urban planning.
>
> In travel research, urban development patterns have come to be characterized by "D" variables.
>
> **D**ensity is measured in terms of activity level per unit area. Density may be measured on gross or net area basis, on a population or dwelling unit basis, and on an employment or building area basis. Population and employment density are two distinct dimensions. The two are sometimes summed to compute an overall "activity density."
>
> **D**iversity is related to the number of different land uses in an area and the degree to which they are "balanced" in land area, floor area, or employment. Entropy measures of diversity are widely used in travel studies. Job-housing or job-population balance measures are less frequently used.
>
> **D**esign includes street network characteristics within a neighborhood. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming "loops and lollipops." Street accessibility usually is measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. In the occasional study, design also is measured in terms of sidewalk coverage, building setbacks, streets widths, pedestrian crossings, presence of street trees, or other physical variables that differentiate pedestrian-oriented environments from auto-oriented ones.
>
> **D**estination accessibility is synonymous with regional accessibility. In some studies, regional accessibility is simply represented by distance to the central business district. In other studies, it is represented by the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model of trip attraction measures regional accessibility.

[7] *Travel and the Built Environment*, Reid Ewing, 2009.

The 4D's compare the built environment characteristics of the future scenarios to the existing conditions on the ground as of March 2008. For each of the "D" variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each traffic analysis zone (TAZ[8]). The elasticities employed in the Santa Barbara model are as follows:

Variable[9]	**Vehicle Trip Elasticity**
Density	-0.04
Diversity	-0.06
Design	-0.02
Destination	-0.03

In practice, elasticity is a measure of the percentage change that occurs in an independent variable (vehicle trips) as a result of a percentage change in an influential variable (density, diversity, design, or destinations). For example, if vehicle trips decrease by -0.04 percent for each 1 percent increase in density, then vehicle trips are said to have an elasticity of -0.04 with respect to density. This technical memorandum documents changes between existing conditions and a future horizon-year scenario, in this case the No Project and *Plan Santa Barbara.*

Because the 4Ds are based on physical characteristics of the built environment, the calculation of these variables is an exercise in spatial modeling and the process is performed outside of the travel demand model using GIS desktop software. GIS files with land use data and the location of intersections are used as inputs. A "D" variable value for each TAZ is the output.

The density and diversity "D" variables for each TAZ take into account not only the total land use within that zone, but also the land use that is within a ¼ mile radius of that zone (¼ mile is assumed to be a reasonably conservative distance that people can easily walk). Both variables use employment and population as inputs. This process is designed to account for land uses that are "right across the street" for a person on foot or a bicycle, but would require a trip of a much longer distance if the traveler follows the model network. Thus these variables are calculated to take into account the experience of a person on foot or bike.

The design variable looks at street connectivity and sidewalk design. More connected streets (as opposed to cul-de-sacs for instance) generally allow for more direct walking and cycling, making these modes more attractive. The design variable uses the number of intersections within ¼ mile. Santa Barbara is a built-out city and there is only one notable change, the Cacique Street under-crossing, to street connectivity. Furthermore, with small block lengths, a dense grid network, and near complete sidewalk connectivity, Santa Barbara already reflects many of the ideal urban design characteristics that the design "D" looks for. This is why trip generation rates in Areas Types 1 and 2 were found to be lower than national averages. As a result, the design "D"

[8] Travel demand models use TAZs to subdivide the study area for the purpose of connecting land uses to the roadway network. For a detailed description of TAZs in the Santa Barbara Model refer to *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, 2009).

[9] Formulation of the equations uses the following data: For density, employment and population; for diversity, employment and population; for design (1) street density, (2) sidewalk completeness, and (3) route directness.

does not result in substantial vehicle trip reductions in Santa Barbara since most of the mode shift associated with it has already been achieved.

The destinations "D" is calibrated in the model structure using area types. Areas further from major regional commercial centers have higher trip rates, while areas closer to major regional commercial centers have lower trip rates. The geographic distribution of these regional commercial centers is not anticipated to change to any great extent, and so the future year scenarios carry forward the current rates for the destinations "D."

The "D" variables were calculated for both the No Project and Proposed Project (*Plan Santa Barbara*) scenarios. The No Project/Existing Policies model run assumed a continuation of the existing policy framework, including existing transportation programs, while the *Plan Santa Barbara* model run assumed a range of substantial changes in land use polices and transportation programs. A key policy issue for the City is to use the information contained in these model runs to determine the effectiveness of the proposed *Plan Santa Barbara* polices and programs on reducing trip making and congestion.

Implementation of the 4D process is not mathematically linked to the area types discussed above. Area types were developed primarily for model calibration and validation purposes, and were used in the trip reduction strategy exercise (discussed below). There is no direct causal relationship between area types and the 4Ds. However, the *effectiveness* of the 4Ds is more pronounced in areas 1 and 2, and this is discussed in more detail later in this technical memorandum.

Policy-Based Trip Reduction Strategies: Overview

In addition to a land use plan, *Plan Santa Barbara* contains a number of policy initiatives and TDM strategies aimed at strengthening Santa Barbara's alternative transportation network and encouraging travelers to shift modes. A potential range of policies was outlined by City staff and their likely effect was investigated and reported in *Plan Santa Barbara Trip Reduction Impacts Analysis* (Nelson/Nygaard, 2009). The entire report is included as **Appendix B**. (Please note that Appendix B contains within its body Nelson\Nygaard-labeled Appendices A, B, C, D, and E).

Analytical Methodology Employed

In addition to a land use plan, *Plan Santa Barbara* contains a number of transportation policies, programs and initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed to estimate the effects of these peak-hour vehicle trip reduction strategies was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall *Plan Santa Barbara* policy (please see **Appendix A**). Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as TDM requirements for new development projects), while others could also reduce existing traffic congestion (such as an expanded

subsidized transit pass program and more comprehensive parking pricing/cash-out program).

- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.
- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak hour vehicle trips in some areas and a lesser effect in others (please see discussion and figure above for location of area types).

Nelson\Nygaard estimates of the likely peak-hour vehicle trip reduction effects of *Plan Santa Barbara's* proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the *Plan Santa Barbara* context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis, we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

The analysis represents the highest and best professional standards of transportation planning. The team is confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak hour vehicle trip reduction benefits of transportation policies and programs under consideration in *Plan Santa Barbara*.

Overview of Analytical Outputs

Appendix B contains a detailed explanation of the methodology used and outputs of the analysis. Outputs of the analysis include a summary of the trip reduction strategies by area for each scenario, their effectiveness in daily versus peak hour contexts, and examples of these strategies. Highlights are provided below.

Summary of Outputs

Nelson\Nygaard's findings suggest that Santa Barbara can certainly reduce per capita vehicle trips with the implementation of trip reduction strategies. While the precise effects of specific trip reduction policies can vary depending on a number of factors, peer-reviewed empirical evidence, real-world experience of Santa Barbara[10] and other peer communities, basic economic theory,[11]

[10] The trip reduction and mode shift effects of the City of Santa Barbara's, Metropolitan Transit District, and SBCAG's programs are documented in this report and in *Plan Santa Barbara: Transportation Existing Conditions Report* (AMEC Earth & Environmental, Inc., August 2008).

[11] An oft-repeated adage of economists to guide policymakers is to "Subsidize those behaviors you want to see more of and tax those behaviors you want to see less of."

and simple common sense provide overwhelmingly support for our findings in this report that a concerted and comprehensive effort to promote mode shift and reduce vehicle trips can be effective. The order-of-magnitude estimates of likely trip reduction effects for the four different policy scenarios and each potential policy are summarized below.[12]

Aggregate Effects: Peak-Hour Trip Generation Reductions[13]

The aggregate order of magnitude reductions in peak-hour vehicle trips that result from implementation of a comprehensive package of strategies discussed in **Appendix B** are summarized below and in the table entitled "Summary of Estimated Reductions in Peak Hour Vehicle Trips," included at the end of this section.

- **No Project.** In the "No Project" scenario, there will likely be no reduction in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- ***Plan Santa Barbara*.** In the "*Plan Santa Barbara*" scenario, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 25%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 5%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 5%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 2%
- **Alternative 1.**[14] In the "Alternative 1" scenario, there will likely be no reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- **Alternative 2.** In the "Alternative 1" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 45%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 15%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

[12] The full analysis and findings, including definitions of area types and trip types, are presented in **Appendix B**.
[13] The full analysis and findings are presented in **Appendix B**.
[14] Alternatives 1 and 2 will be presented in forthcoming Technical Memoranda.

Stand-Alone Effects: Individual Strategies for Influence on Peak-Hour Trips[15]

The order-of-magnitude estimated reductions in peak-hour vehicle trips that result from implementation of individual strategies and the full findings and analysis are discussed in **Appendix B**. These estimates of the order-of-magnitude effects are based on the empirical research of each strategy's influence on peak-hour vehicle trips (as presented in Appendix B and C) and tailored to the unique conditions in Santa Barbara to influence peak-hour vehicle trips, travel behavior and mode choice.[16] Based on these considerations, Nelson\Nygaard estimates that the most effective individual trip reduction strategies in Santa Barbara will likely be a continuation and/or enhancement of the following policies and programs:

- Public parking management/pricing to discourage commuter parking.
- Parking cashout programs, including a local ordinance.[17]
- Subsidized transit pass programs.
- Safe Routes to School, with an emphasis on education and capacity building, as well as physical improvements.
- Carpooling incentives.
- Telecommuting and alternative work schedules.

As discussed below, other strategies will certainly have a substantial effect on reducing peak hour vehicle trips (e.g., enhancements to transit service), but those effects could not be quantified at this time. For more information see "Effects of Some Strategies not Quantifiable with Available Information."

Reductions in Vehicle Trip Generation Rates versus Vehicle Ownership Rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies affect each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g., lower auto ownership rates certainly correlate with lower trip generation rates), there is currently

[15] The full analysis and findings are presented in **Appendix B**.

[16] Existing conditions are discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008). As noted in **Appendix B**, there are other strategies that can affect peak-hour vehicle trips (such as enhanced transit service, expanded bicycle networks, and sidewalk and pedestrian realm improvements). Some of these strategies have been excluded from the stand-alone analysis either because there was not enough data available to reliably analyze their effects at this time (e.g., transit enhancements), their effects were accounted for in another step in the analysis (e.g., bicycle network improvements), or their impacts on *commuter* peak-hour vehicle trips was estimated to be negligible and/or within the margin of error for the purposes of this analysis (e.g., pedestrian improvements, which are important to accommodate non-commuter/non-peak trips and support peak-hour transit commuters walking to transit, but do not have a substantial impact on commuter, peak-hour vehicle trips as the vast majority of Santa Barbara residents' and employees' homes and workplaces are not located close enough to allow them to walk to work).

[17] As discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008), the State of California has adopted an existing "Parking Cashout" law that requires certain employers who offer free parking to *any* employee to offer the cash value equivalent of the free parking space to *all* employees who choose not to use the employee-provided free parking space (i.e., to "cash out" their parking space). The California Air Resource Board (CARB) is nominally responsible for enforcement of these regulations, but does not have the resources necessary to do so effectively. For this reason, many local jurisdictions (such as Santa Monica, Los Angeles, and several jurisdictions in the San Francisco Bay Area) have already adopted or are currently exploring locally- or regionally-based mechanisms to monitor compliance of employers located in their jurisdictions. For new development/employers, the City can require as a condition of approval for entitlements that any employers located in the project annually submit proof of compliance. For existing development/employers, the City can require that proof of compliance be submitted at the same time employers apply for business license renewal or pay any local business taxes.

insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those effects are already accounted for by trip reduction strategies that we were able to quantify.

Effects of Some Strategies not Quantifiable with Available Information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely effect, we indicated in our analysis in **Appendix B** that the effect was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no effect on reducing vehicle trips in reality.* Instead, these designations mean that a) the effect on peak hour trips is not significant enough to model (e.g., the effect could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g., empirical research or published case studies) to allow us to document the precise trip reduction effects for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the effects of this strategy. We have therefore excluded the effects of certain strategies from this analysis in order to avoid the risk of misstating highly localized, context-dependent benefits (e.g., enhanced transit service) or to avoid "double counting" the benefits (e.g., pedestrian improvements adequately accounted for under "street connectivity" factor of the 4D model adjustments). [18]

[18] The trip-reduction effects of bicycle network improvements and bike share programs is a good example that can be elaborated on. Naturally there will be observable before-and-after effects (e.g., mode split, percent of bicycle commuters, etc.) with the implementation of discrete bike facilities (e.g., new on-street bike lanes filling in a network gap, a new bike/ped multi-use trail, retrofitting a bridge or other "missing link" with bike/ped infrastructure). We're aware of several before-and-after studies of discrete facilities (including studies from the City of Portland and San Francisco, as well as bicycle counts included in Santa Barbara's current *Bicycle Master Plan*). One problem with some of these studies is that it is often not clear how much of the observed increase in bicycle trips is a result of mode shift (e.g., *new* bike trips coming from other modes) and how much of the observed increase is actually due to bicyclists shifting routes (e.g., choosing to travel on the enhanced route rather than their former, perhaps suboptimal, route). Another problem is that we are not aware of any studies that disaggregate the increase in bicycle trips into commuter/peak trips and non-commuter/non-peak trips (which is the purpose of this study). For example: the available research only comments on general increases in bike commuting that result from the addition of bike facilities (0.0075% increase for each additional mile per 100,000 residents) and has basically nothing to say on the effect of bike facilities on peak-hour vehicle trips. None of these potential issues means that bicycle facility improvements shouldn't be implemented, it simply means that the current state of the research doesn't allow us to disaggregate the estimated reduction in peak-hour vehicle trips because we can't reliably derive an estimate of how many of the new bicycle trips are former auto commuters. So while bike facilities and bike share programs are recommended and certainly do have impacts (especially on non-peak, non-commuter trips) and should be continued to leverage network effects and build on the success of previous investments, we don't think the research currently exists to allow us to make a reliable estimate or peak-hour vehicle trips, which is the metric deployed in the traffic model. Finally, we believe that the net effect on peak-hour commuter vehicle trips in Santa Barbara would still be relatively small (perhaps a 2-3% reduction in peak-hour vehicle trips at the most) because a) many of the gains have already been realized from previous investment in bicycle facilities, b) Santa Barbara's unique geography (e.g., hills) limits the feasible catchment area for bicycle commuting and c) Santa Barbara's jobs/housing imbalance results in long commute distances for the low-income households that are pre-disposed to commute to work by bicycle. The same is true for research on bike sharing: the current research focuses on the increase in bicycling trips rather than the decrease in peak-hour commuter vehicle trips. Even if we could reliably derive an estimate of the vehicle trip reduction effects of bikeshare programs, we believe that – even if a very robust program were to be implemented in Santa Barbara – very few existing auto commuters would be able to commute daily via a bike share program (which requires a "bikeshare pod"

Non-Additive Effects for each Policy Alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation of such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occurs concurrently. For example, a city may implement a subsidized transit pass program at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater effects when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total effects that can be achieved. For these reasons, it is not prudent to expect that the stand-alone effects of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total effects of various strategies together. Because the transportation policies and programs under consideration in the various *Plan Santa Barbara* alternatives would be implemented concurrently as a package (in fact some trip reduction strategies are already in effect), we have estimated the total effect for each alternative using a non-additive methodology. For example, when summing the effects of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated effects of other trip reduction strategies when developing our estimate of the total estimated effects for certain policy alternatives.

The No Project/Existing Policies Alternative generally assumes a continuation of successful City polices and programs that have the potential to effectuate a gradual continued shift from the automobile to other forms of transportation. However, in order to provide a conservative and reasonable worst-case analysis, this scenario assumes a continuation of the existing mode split. The Proposed Project scenario introduces an array of additional policies and programs and the vehicle trip generation rates are reduced to varying degrees based on their purpose, origin and destination.

The reductions in *Plan Santa Barbara Trip Reduction Effects Analysis* were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas (shown below) were reduced by different levels. Trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4. Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

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within walking distance of both trip ends to avoid accruing usage fees for all day). However, bike share programs can support auto commuters switching to other modes (transit, carshare, etc.) by providing them with more mobility choices at the work destination should the need arise for an unscheduled trip that is too far to walk. Since bike share programs don't have a substantial *direct* effect on peak-hour commuter trips (but instead *indirectly* leverage the effectiveness of other programs), we have excluded them from our analysis.

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

FUTURE (YEAR 2030) NO PROJECT SCENARIO MODEL DISCUSSION

4D Effects

The total amount of new growth projected in the No Project scenario is quite modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to the existing General Plan can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[19]	7.3 percent
Employment[20]	9.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated to change is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

Figure 5 illustrates the change in the density variable between existing conditions and the No Project scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. The figure illustrates that density increases are anticipated largely within the MODA boundaries, and these are modest based upon built environment assumptions. The darker green colors indicate the most pronounced change in density changes, resulting in the highest trip rate reductions. In outlying portions of Santa Barbara, large areas have minimal or no change, reflecting little change in density. Again, these density results show the extent to which the change in density is relatively higher or lower when comparing existing conditions and future conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the No Project scenario. Diversity focuses on the relative mix of jobs and population relative to regional jobs and population, and the figure shows the rate of change between the two scenarios (existing conditions and the No Project scenario). These results are a direct derivation of built environment characteristics. The diversity variable reflects the degree to which an existing area has a jobs/housing mix more or less diverse than regional averages, and Figure 6 shows the extent to which that changed (the TAZ became more diverse) and effected vehicular traffic between existing conditions and the No Project scenario.

The 4Ds are an elasticity, and just as an increase in the "D" variables between existing and future conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

[19] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[20] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

No Project Policy-Based Trip Reduction Strategy Effects

There will likely be no reduction in peak-hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Commuter Trip Reduction Effects: 0%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%

Based on this conclusion, there is no effect of policy-based trip reduction due to the policy strategies for the No Project scenario. Please see **Appendix B** for the No Project conclusion for each strategy.

No Project Model Results

Figure 7 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2 (existing conditions). The figure illustrates a variety of trends, described below:

- Traffic volumes across all study segments are projected to grow by approximately 17% with the addition of the existing general plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 14%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 23%.

While traffic volumes will increase on all facilities, the relative share of study area traffic carried by the freeway is expected to decline slightly. An expanded discussion of this topic is provided in the *Plan Santa Barbara* discussion below.

Future No Project Peak Hour Freeway Volumes

Figure 8 presents AM and PM Future (Year 2030) No Project scenario peak hour freeway forecast volumes. The figure illustrates the following trends:

- Overall, peak hour freeway volumes are projected to grow by 14% during the AM peak hour and 14% during the PM peak hour.
- As in the existing conditions, the travel patterns change slightly depending on whether one is looking at the volumes north or south of Garden Street. The additional southbound lane has the most pronounced impact south of Garden Street.
- Many of these freeway segments will be operating at or worse than LOS D, including sections operating at LOS F. Highlights include the following:
    - Freeway segments north of Carrillo will operate at LOS E or F in the PM peak hour in both directions
    - Northbound 101 north of Milpas shows volumes exceeding theoretical capacities during the AM peak hour
    - Freeway segments south of Milpas will operate at LOS E or F, southbound, in the PM peak hour

  - Freeway segments south of Hot Springs show volumes exceeding theoretical capacities, northbound in the AM peak and southbound in the PM peak

- As a result, the percentage growth in freeway volumes in the off-peak direction will likely outpace growth in the peak direction since the off-peak direction has more capacity to accommodate the growth. As mentioned, growth in traffic in the peak direction would likely take the form of peak spreading. This phenomenon is now common in the United States, where the peak period occurs for more than one hour during the evening.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 13% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 30% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 14% on US-101 northbound and while traffic volumes are projected to grow by 12% on US-101 southbound.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street. This is due to shifting travel patterns south of Garden Street and additional southbound capacity south of Garden Street.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street, growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two. This is primarily due to changes in capacity southbound south of Garden Street.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 24% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 17% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 12% on US-101 northbound and traffic volumes are also projected to grow by 12% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

Future No Project Peak Hour Intersection LOS

Table 3 and Figure 9 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, additional development under the existing general plan in the coming two decades will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the

City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represent 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. This number falls to 20 study intersections, or 38%, with further development under the existing General Plan.

While this increase in deficient intersections is substantial, it should not necessarily be extrapolated to all intersections in the City. City staff specifically selected the study intersections for this analysis in areas with higher levels of activity and in places that were likely to become congested. It is likely that many intersections in areas removed from the City's major activity centers would not be affected to the same extent.

Figures 10 and 11 chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the No Project (2030) scenario, and the Proposed Project (2030) scenario. Congestion levels are generally lower during the AM peak hour in both analysis years. The PM peak hour shows a trend towards worse LOS between 2008 and 2030 under the No Project scenario, with the most frequent LOS moving down to C from B and a greater frequency of intersections operating and LOS E or F.

A closer examination of the forecast data, shown on Figure 9, reveals some notable trends. The greatest congestion levels are currently experienced during the peak hours at or near freeway ramps. This trend will not only continue, but will escalate with the additional development under the existing general plan, as shown by the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and seven, or 44%, are deficient during both peak hours. These rates are substantially higher than for the study intersections as a whole, when 33% are deficient during one peak hour and 29% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, 10, or 63%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

FUTURE (YEAR 2030) PROPOSED PROJECT MODEL DISCUSSION

4D Effects

The total amount of new growth projected in *Plan Santa Barbara* is relatively modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to *Plan Santa Barbara* can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[21]	7.4 percent
Employment[22]	8.2 percent

[21] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[22] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

In addition, since the 4D effects measure change from a base condition, those communities with base level (1) higher density; (2) better diversity; (3) stronger design; and (4) establishment as a destination – compared to regional and national averages – will show less overall impact of the Ds when comparing base conditions with future conditions. In other words, if existing Santa Barbara transformed from low density, wholly residential, poorly connected, remote community to something just the opposite in the future, the Ds would show significant effects on trip generation between existing and future conditions. However, as the model effort shows, Santa Barbara's base condition is characterized by beneficial densities, good diversity, excellent design, and a strong role as a destination. It is therefore much more difficult to realize high trip reductions attributable to the Ds. In order to emphasize this issue further, a model run was conducted to *Plan Santa Barbara* without the Ds and with the Ds to measure the difference. The results are as follows:

Daily Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of trips reduced: 1,498
- Percent reduction: -0.22 percent
- Vehicle miles of travel reduced: 3,703
- Percent reduction: -0.13 percent

VMT is most strongly influenced by destination accessibility; effects of density, diversity, and design. Since downtown Santa Barbara is already a strong regional destination, the overall impact of this D on trip generation is somewhat muted.

Peak Hour Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of total trips reduced: 254
- Percent reduction: -0.24 percent
- Number of home-based work trips reduced: 28
- Percent reduction: -0.54 percent

While these reductions are arithmetically modest, they in no way indicate a lack of 4D effectiveness in Santa Barbara. Quite the contrary, the City is already experiencing many of the benefits attributable to the D factors, and *Plan Santa Barbara* furthers that trend.

Figure 5 illustrates the change in the density variable between the existing conditions and the Proposed Project scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. Overall, the changes are rather modest reflecting the magnitude of changes inherent in the built environment assumptions for *Plan Santa Barbara* when compared to existing conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Proposed Project scenario. The 4Ds are an elasticity, and just as an increase in the "D" variables

between future and existing conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

An overview comparison of Figures 5 and 6, focusing on the No Project scenario and *Plan Santa Barbara* reveals the following:

- Built environment assumptions reveal only modest changes in density compared to existing conditions. As discussed above, elasticities will be most noticeable in results when changes in a variable such as density have 50 percent, 100 percent, or even higher percentage changes compared to a base condition.
- Both scenarios include built environment assumptions that result in noticeable changes in diversity. The most pronounced effects are west of US-101 and south of State Street, indicating that is where the existing mix of jobs and housing was most purposefully altered.

These conclusions do not indicate that the D effects are not important. Quite the contrary, Santa Barbara happens to be characterized by effective density and diversity when compared to regional and national averages. However, the figures do show that major density and diversity changes – 50 percent, 100 percent, or more – would be necessary to alter the overall theme of Figures 5 and 6 for a city with substantial development. Such changes may be entirely inconsistent with other quality of life goals, policies, and objectives. The beneficial relationship between Santa Barbara's existing 4D qualities with policy-based trip reduction strategies, as discussed below, is significant.

Policy-Based Trip Reduction Strategy Effects

When compared to the 4D process, these trip reduction strategies have a much more pronounced impact on trip generation. To better understand the magnitude of these strategies, model runs were conducted with and without the trip reduction strategies to document the results, presented as follows:

Daily Traffic Volume Changes Attributable to trip reduction strategies, *Plan Santa Barbara*:

- Number of trips reduced: 5,183
- Percent reduction: -0.77 percent
- Vehicle miles of travel reduced: 15,227
- Percent reduction: -0.53 percent

Peak Hour Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of total trips reduced: 963
- Percent reduction: -0.92 percent
- Number of home-based work trips reduced: 239
- Percent reduction: -4.65 percent

The combined effect of the 4D process and trip reduction strategies yields the following conclusions:

- Changes in the built environment, measured by the 4D process, result in less than a one percent decrease in trips when compared to a model run without the 4D process.
- Implementation of trip reduction strategies results in over a 4.5 percent decrease in trips when compared to a model run without the trip reduction strategies.
- The combined effect of the 4D process and the trip reduction strategies results in a 5.19 percent decrease in peak hour home-based work trips, which is a measurable and significant conclusion.

On a TAZ-specific level, Cottage Hospital experienced the largest decrease in daily trips, totaling 131 trips. This is because of the change in land use in and around this zone and the raw number of trips that go there. The traffic analysis zone bounded by US-101, Calle Cesar Chavez, Montecito Street, and Quarantina experienced the greatest individual percent reduction, or 1.27 percent of all trips. This reflects the relatively low existing density and diversity and the effects that small changes in land use in and around this TAZ can have.

There are a number of reasons why the overall magnitude of trip reduction appears relatively modest. As discussed, the 4D process is most pronounced when changes occur in a relatively "poor" built environment (from the 4D perspective) to a relatively better built environment (from the 4D perspective). The trip reduction strategies, which have a more pronounced impact, must be considered within the context of trip purposes. These strategies, as extensively discussed earlier and in Appendix B, have their primary impact on home-based work trips during the peak hour. *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009), documented the fact that only 15 percent of total daily trips in Santa Barbara are home-based work trips (compared to the California average of 21 percent). The strategies, therefore, will have their most pronounced impact on 15 percent of all daily traffic. This helps explain why the percentage reduction is not significantly higher.

The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities used are conservative, so there is an absence of significant 4D-related effects when we compare existing conditions with future runs and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter and the City's development focus within the MODA has great merit. The majority of future growth through 2030 is projected to occur within the MODA.

The *Plan Santa Barbara* employment and residential density concentration, first in the Downtown core, and then in the MODA, is a sound strategy to address the City's high-level circulation goals and objectives. Since the 4Ds are an elasticity based on percentage change, and Downtown already has the highest 4D variables, it is hard to achieve a large percentage change. Having said that, the reason to focus development Downtown, especially employment, is to take advantage of centralizing activity to be serviced by various TDM programs as quantified by Nelson\Nygaard. This did take advantage of all the D variables, since Downtown has the most responsiveness to diversity, density, design, and destinations.

Note that the trip reduction strategies were numerically strongest within area type 1 (Downtown) and area type 2 (which incorporates the MODA). Centralizing residential and commercial uses in the MODA surrounding Downtown had the greatest *incremental* effect related to the 4Ds and the

most successful realization of trip reduction strategies. The impact of the 4D process and the trip reduction strategies is relatively less significant outside the MODA.

Plan Santa Barbara Model Results

Figure 12 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2. The figure illustrates a variety of trends:

- Traffic volumes across all study segments are projected to grow by approximately 16% with the addition of the Proposed Project General Plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 14%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 20%.

Traffic volumes will increase on all facilities relative to the existing conditions. Freeway volumes will see an increase similar to the No Project scenario, but surface streets will see a lesser increase than the No Project scenario. Surface street volume increases are directly attributable to land use changes inherent in the 2030 socioeconomic data set. Freeway volume changes are more complex.

The following table illustrates the percentage share of freeway volumes for both existing conditions and *Plan Santa Barbara*:

Freeway Trip Category	**Existing % of Total**	**PlanSB % of Total**
Internal trips (within model area)	24%	20%
Internal-external trips	19%	15%
External-internal trips	36%	39%
Santa Barbara subtotal	*79%*	*74%*
External-external (through)	21%	26%
Total Freeway	100%	100%

This indicates that fewer Santa Barbara internal trips will utilize the freeway in the future when compared to existing conditions. Congestion associated with increasing through trips and external-internal trips is pushing internal trips and internal-external trips off the freeway, hence the decline. The increase in freeway capacity for trips heading south toward Ventura is reflected in the external-internal increase (since those trips are generally motorists heading to jobs in Santa Barbara). There is no real gain in capacity heading north toward Goleta, which is closer and probably draws more internal-external trips compared to the southbound direction. Travel patterns change north and south of Garden in direct response to changes in freeway capacity in those locations – adding an additional freeway lane south of Garden, but not north of Garden.

Future Proposed Project Peak Hour Freeway Volumes

Figure 13 presents AM and PM Future (Year 2030) Proposed Project scenario peak hour freeway forecast volumes. The figure illustrates the same general trends as the No Project scenario, though increases are less than the No Project scenario:

- Overall, peak hour freeway volumes are projected to grow by 12% during the AM peak hour and 13% during the PM peak hour.
- In general, peak hour freeway volumes show the same pattern and trends as the No Project scenarios, with a slightly smaller increase over the existing conditions.
- Overall highlights include the following:
    - Freeway segments north of Mission will operate at LOS E or F northbound in the AM peak hour and southbound in the PM peak hour
    - The northbound 101 segment north of Milpas will operate in excess of its theoretical capacity during the AM peak hour
    - Freeway segments south of Hot Springs show volumes that exceed the freeway's theoretical capacity, northbound in the AM peak hour and southbound in the PM peak hour

As described, peak hour forecasts that indicate volumes in excess of capacity point to peak hour spreading, since these oversaturated conditions cannot be achieved during one peak hour.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 11% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 28% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 11% on US-101 northbound while traffic volumes are projected to grow by 8% on US-101 southbound.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 22% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 16% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 10% on US-101 northbound and traffic volumes are also projected to grow by 10% on US-101 southbound.

- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

In general, there are no significant differences between freeway segment peak hour forecasts when comparing No Project (Figure 8) with *Plan Santa Barbara* (Figure 13) volumes. While there are some numerical differences, they are relatively insignificant from a forecasting perspective. This conclusion is consistent with the previous analysis of freeway traffic composition, including the anticipated increase in through traffic associated with both future model runs.

Future Proposed Project Peak Hour Intersection LOS

Table 5 and Figure 14 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, development of the Proposed Project will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represents 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. Under the No Project scenario, this number falls to 20 study intersections, or 38%. Under the Proposed Project 26 study intersections, or 50%, will operate at or better than the City's LOS standard during both peak hours.

As mentioned, the study intersections were selected in the areas most likely to become congested, and so the results should not necessarily be extrapolated to the City as a whole. Notably, the peak hour conditions at the study intersections do deteriorate from the existing conditions however, they do not fall to the same level as conditions under the No Project scenario.

Figures 10 and 11, chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the No Project (2030) scenario, and the Proposed Project (2030) scenario. During the AM peak hour, considerably more intersections are maintained at LOS A than under the No Project Alternative. During the PM peak hour, considerably more intersections are maintained at LOS B than under the No Project scenario.

Plan Santa Barbara is anticipated to result in fewer LOS E and LOS F intersections when compared to the No Project alternative. These beneficial level of service results for *Plan Santa Barbara*, when compared to the No Project, are explained by two factors:

- The built environment assumptions. *Plan Santa Barbara* features more population and less employment than the No Project, resulting in fewer impacts at busy intersections. This effect, however, is minimal since the population and employment differences between the scenarios are small.
- Implementation of the Nelson\Nygaard trip reduction strategies. These strategies, which are only implemented with *Plan Santa Barbara*, have ramifications that translate into superior results at busy intersections.

Traffic forecasts for the Proposed Project scenario show the same trends as the existing conditions and the No Project scenario. Specifically, the intersections with the greatest levels of congestion are typically freeway ramps, or within ¼ mile of freeway ramps. The other continuing trend is that traffic volumes increase less than under the No Project scenario, including the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and five, or 31%, are deficient during both

peak hours. These rates are substantially higher than for the study intersections as a whole, when 32% are deficient during one peak hour and 19% are deficient during both peak hours.

- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, seven, or 44%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

Other Measures of Effectiveness

Table 6 illustrates four macro-scale MOEs used to compare general plan scenarios. The trends these measures show are consistent with the trends shown in the segment volumes and intersection levels of service. In general both future scenarios show increases in travel, and in general the Proposed Project scenario shows smaller increases in travel than the No Project scenario.

The notable exception to the latter point is with average vehicle trip length. There are two factors causing this number to rise between the existing conditions and the future conditions, and again slightly between the No Project scenario and the Proposed Project scenario. The first is that Santa Barbara will continue to attract more trips than it generates. As such, people will continue to visit Santa Barbara to work, shop, and recreate. Having more travelers entering and exiting the study area means more travelers making the longest trip measurable in the model area.

The second factor contributing to the rise in average trip length is the expected mode shift as quantified by the 4Ds and the policy based reductions. In general, these factors are more likely to reduce shorter vehicle trips than longer vehicle trips. People who are currently driving to meet their basic needs – a trip to the grocery store, drug store, or dry cleaners – may now be able to meet these needs without the use of a vehicle. Even when longer range trips see a shift to another mode (e.g., a work trip), there is often a corresponding shorter range trip that also shifts to another mode (e.g., a lunch trip). Thus, a mode shift in common shorter range trips can actually serve to increase the overall average vehicle trip length.

Overall the forecast results presented show a logical consistency with the differences in policies and land use between the two future scenarios and the existing conditions.

RECOMMENDED GUIDANCE FOR POLICY EFFECTIVENESS

Based on the results of the first two horizon year model runs, we recommend the following areas of emphasis. These recommendations are provided to (1) further reduce VMT; and (2) improve level of service at LOS E and F intersections:

1. The total amount of new growth projected in *Plan Santa Barbara* is relatively modest compared to the quantity of existing development given the 22-year time horizon. Major reductions in the sheer amount of growth are therefore not a recommended strategy.

2. The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities we use are conservative, so we are not experiencing dramatic 4D-related effects when we compare existing conditions with future runs and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter, and where there is the opportunity to guide new development between multiple locations, we recommend the following in order to ensure that all new development contributes as minimal amount of new vehicle trips as possible:

    a. Employment and residential density should be concentrated first in the Downtown core, then in the MODA. Since the 4Ds are an elasticity based on percentage change, and Downtown already has the highest 4D variables, it is hard to achieve a large percentage change. The reason to focus development Downtown, especially employment, is to take advantage of centralizing activity to be serviced by various TDM programs as quantified by Nelson\Nygaard. This will take advantage of all the D variables, since Downtown has the most responsiveness to diversity, density, design, and destinations.
    b. Centralizing residential and commercial uses in the MODA surrounding Downtown will have the greatest *incremental* effect related to the 4Ds.
    c. Employment and residential uses should be clustered whenever possible around the richest fixed-route transit (bus and rail) nodes and corridors.

3. Peak hour commute trips continue to be an issue, as evident in (1) continued intersection LOS issues at all ramp terminals; and (2) average vehicle trip length getting longer with the *Plan Santa Barbara* (compared to existing conditions). This could be addressed by adding additional housing in the Downtown core and in the MODA and implementing new or expanded commuter/peak-hour transit service and TDM programs such as subsidized transit pass programs, carpool/vanpool programs, telecommute programs, and parking pricing to discourage commuter parking downtown.[23]

    Santa Barbara is an existing and projected job-rich area. Non-residential trips are projected to grow at a greater rate than the residential trips. Which is to say, under the *Plan Santa Barbara* land use scenario, the model area is attracting more trips than it is producing. We had to make certain adjustments in the model environment, since the 2030 model "exacerbates" to some extent the existing jobs/housing balance in Santa Barbara – we had to bring in relatively more workers, compared to 2009, to balance the 2030 model. More specifically, the following changes were completed relative to current travel patterns:

[23] Nelson\Nygaard's *Trip Reduction Impact Analysis Memo* provided highly conservative estimates of the effects of all of these programs with the exception of regional transit services (there wasn't enough information was available to confidently derive a reliable estimate of the reduction in vehicle trips due to enhanced commuter/peak-hour transit service).

- For home-based work trips, we decreased internal-external/external-internal productions by 1% and increased internal-external/external-internal attractions by 2%. In other words, we exported fewer Santa Barbara residents to work outside Santa Barbara, and imported more non-Santa Barbara workers to fill Santa Barbara jobs.

- For home-based other trips, we decreased internal-external/external-internal productions by 3% and increased internal-external/external-internal attractions by 5%. In other words, for other trips between a residence and any non-workplace location, we decreased the number of Santa Barbara residents leaving the study are and increased the number of non-Santa Barbara residents entering the study area.

- For non-home-based trips, we decreased internal-external/external-internal productions by 1% and increased internal-external/external-internal attractions by 1%. In other words, for trips that do not begin or end at a residence, we increased those that would be met by Santa Barbara workers traveling outside the study area and increased trips by those by workers from outside the study area entering Santa Barbara.

The sum of these adjustments, while not excessive relative to the total number of trips in the model, is symptomatic of conditions in a job-rich, regional destination with significant shopping and service resources. As indicated above, additional housing within Downtown and the MODA will have beneficial effects on addressing these conditions. And while the travel demand model does not specifically distinguish between affordable and non-affordable housing product types, "workforce" housing in Downtown and the MODA will provide a beneficial match to nearby available job locations.

4. The trip reduction strategies articulated in Nelson\Nygaard's work are very effective at reducing vehicle trips compared to scenarios without the strategies. Trip for trip, they are going to have a more significant incremental effect than the 4Ds *because many of the trip reduction strategies are not already in place – and those that are in place could be enhanced and expanded – and therefore have a more pronounced impact on existing and future trips*. These strategies will be most effective when employed simultaneously with the areas where the 4D effects are most pronounced, so recommendations 2 and 3 work in sync with one another.

5. Many of the vehicle trip reduction effects related to bicycles and pedestrians (calculated with the 4Ds) have already been realized due to the long-standing and forward-thinking investments in pedestrian and bicycle improvements by the City of Santa Barbara and its regional partners. For this reason, while additional pedestrian and bicycle improvements are important to leverage network effects and build on the success of previous investments, the model estimates that Transportation Demand Management policies (e.g., parking management, subsidized transit passes, etc.) will have larger effects on reducing peak hour vehicle trips in the future.

It is important to recognize that without any major changes in travel behavior by Santa Barbara's residents and visitors, traffic congestion will increase with increased development. Similarly, Santa Barbara's role as regional destination will contribute to increased congestion as surrounding areas grow and more people visit Santa Barbara. Changing behavior for residents

and visitors may include shifting travel to non-drive-alone modes, such as transit and carpooling for longer distance trips, and walking, biking, and transit for shorter distance trips. City policies that encourage walkable neighborhoods to decrease the reliance on the automobile for those who wish to move to those areas, and decrease the desirability of driving alone for everyone in areas of concentrated activity, will help allow Santa Barbara to grow while minimizing adverse affects to traffic.

FIGURES:

1. PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS

2. EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES

3. EXISTING (YEAR 2008) PEAK HOUR FREEWAY FORECAST VOLUMES

4. EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE

5. PERCENT CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE NO PROJECT AND PROPOSED PROJECT SCENARIO

6. PERCENT CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE NO PROJECT AND PROPOSED PROJECT SCENARIO

7. FUTURE (YEAR 2030) NO PROJECT SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

8. FUTURE (YEAR 2030) NO PROJECT SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

9. FUTURE (YEAR 2030) NO PROJECT SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

10. AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

11. PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

12. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

13. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

14. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

TABLES:

1. YEAR 2008 WEEKDAY EXISTING CONDITIONS INTERSECTION LEVELS OF SERVICE

2. PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER

3. YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS INTERSECTION LEVELS OF SERVICE

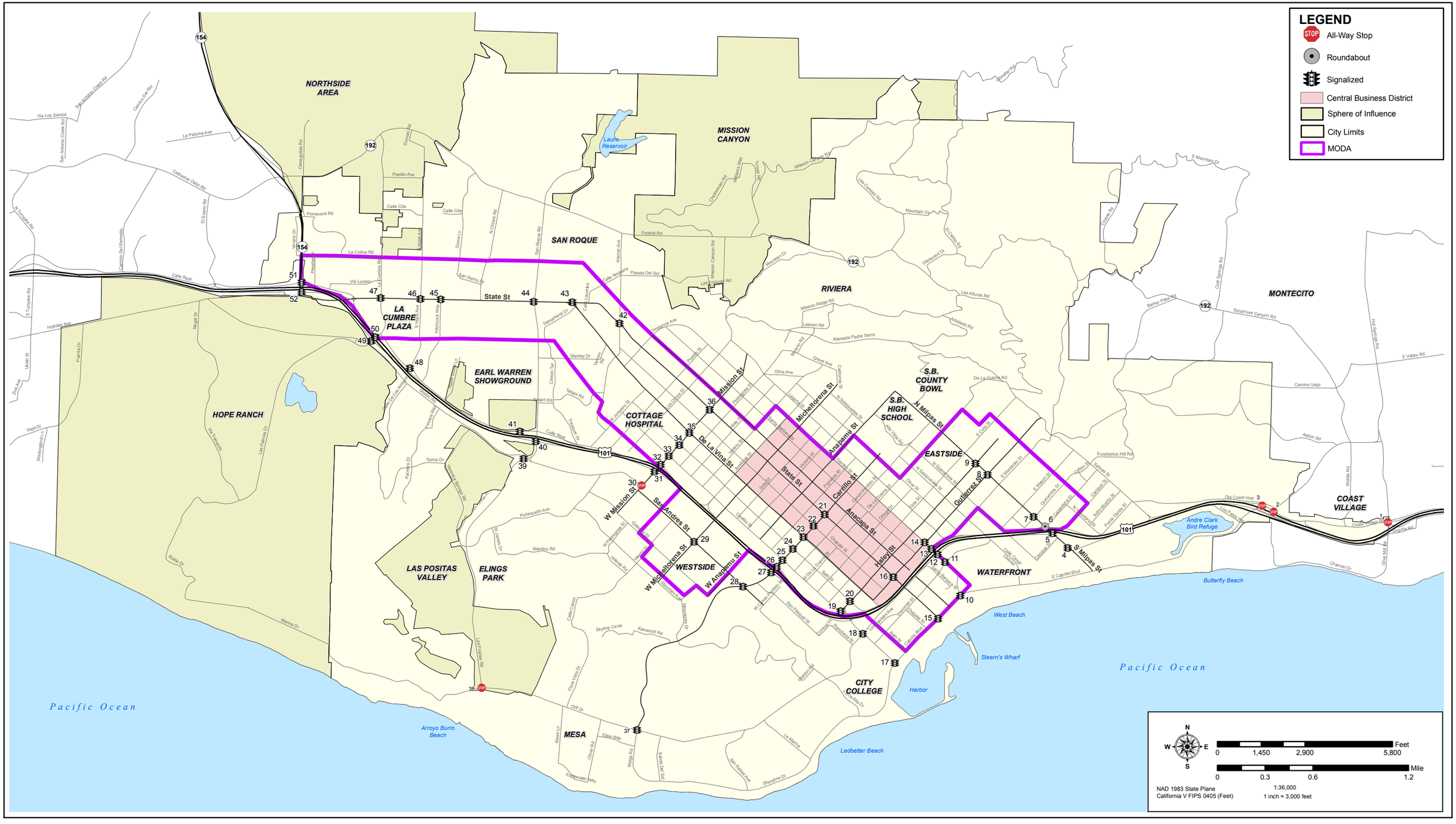
4. NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

5. YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS INTERSECTION LEVELS OF SERVICE

6. MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

APPENDIX A: *Plan Santa Barbara* EIR Assumptions 4-15-09 (City of Santa Barbara)

APPENDIX B: Nelson\Nygaard Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis 7-8-09



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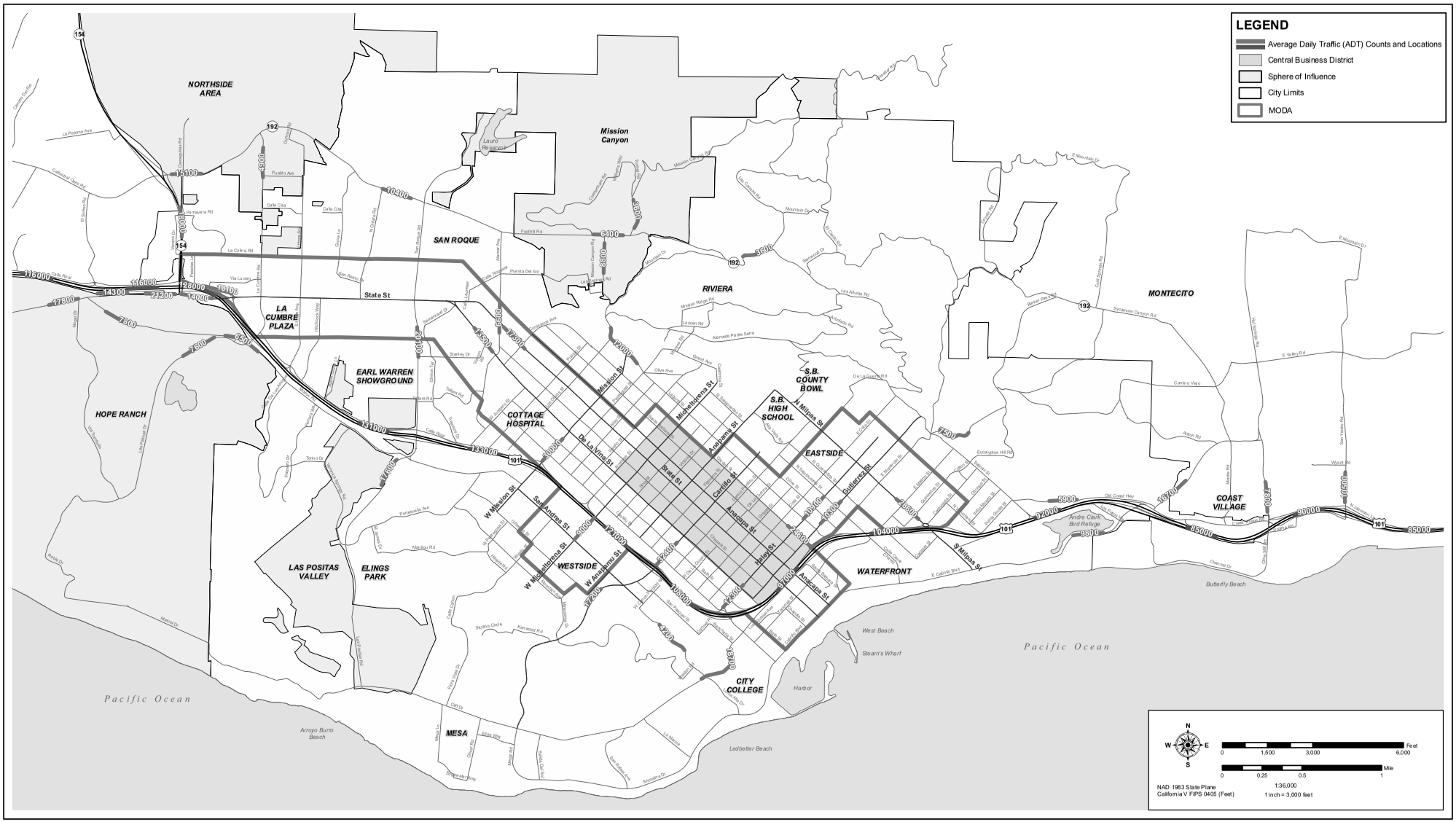
PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS
FIGURE 1



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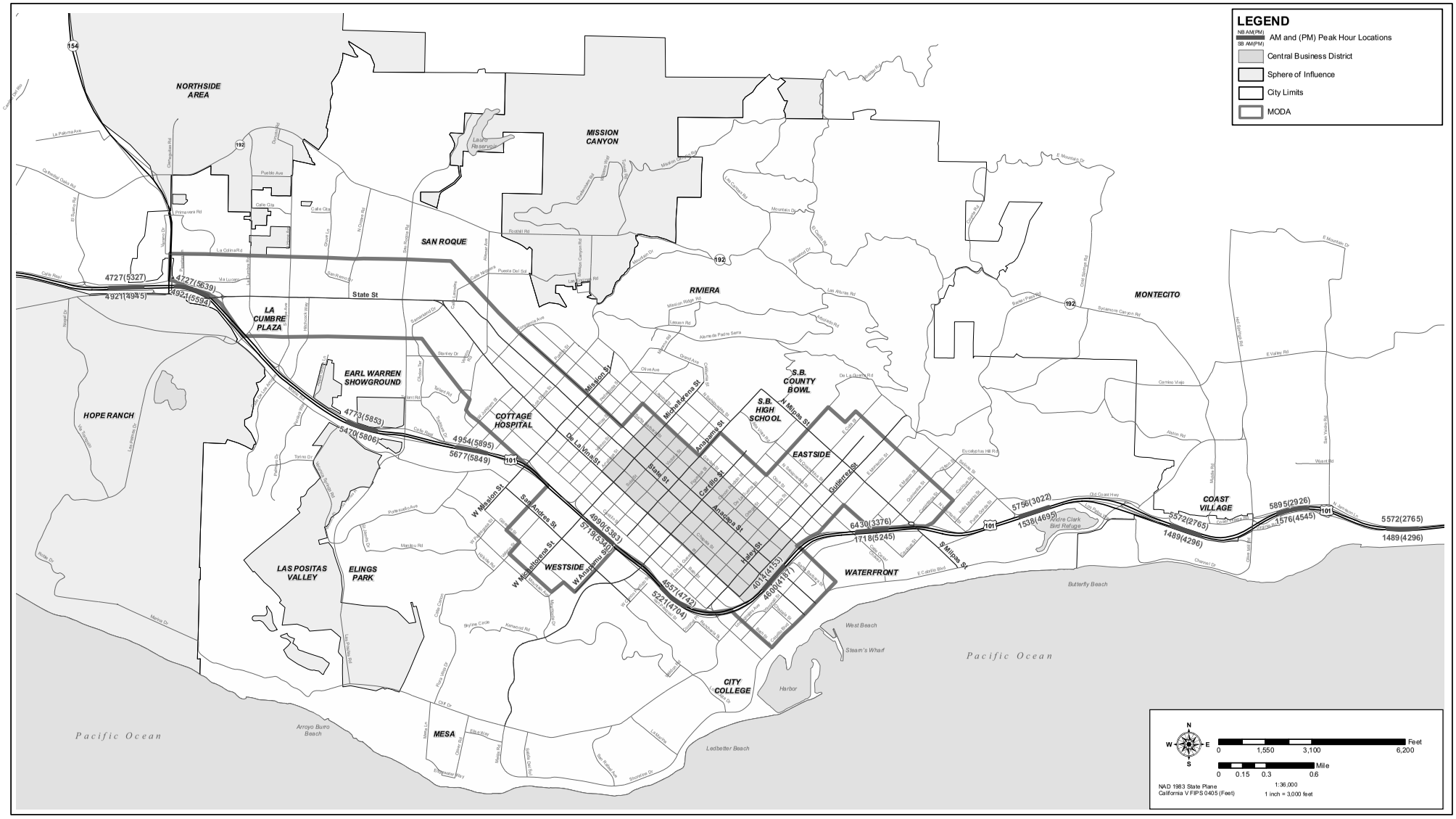
EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES
FIGURE 2



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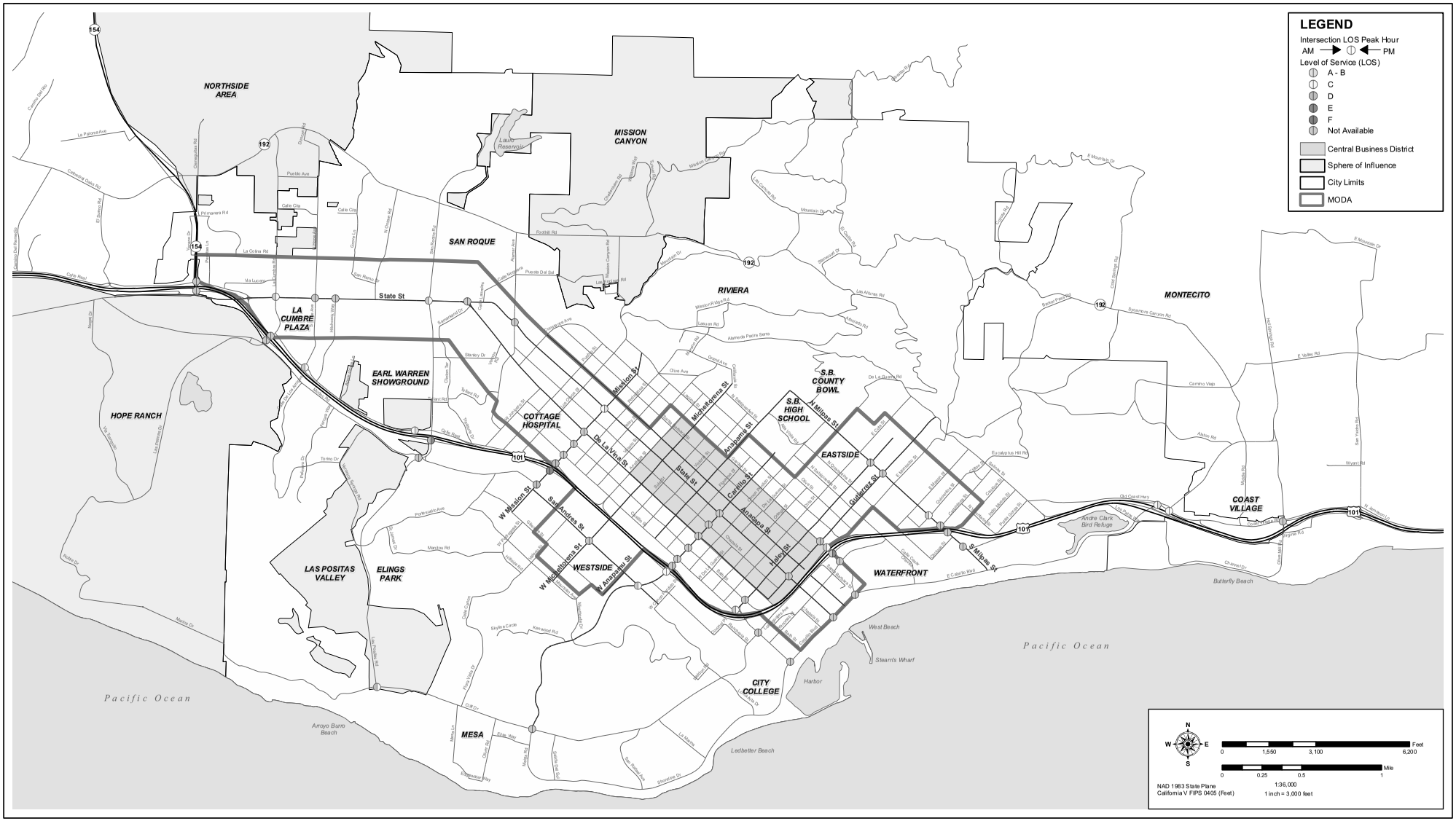
EXISTING (YEAR 2008) PEAK HOUR FREEWAY VOLUMES
FIGURE 3



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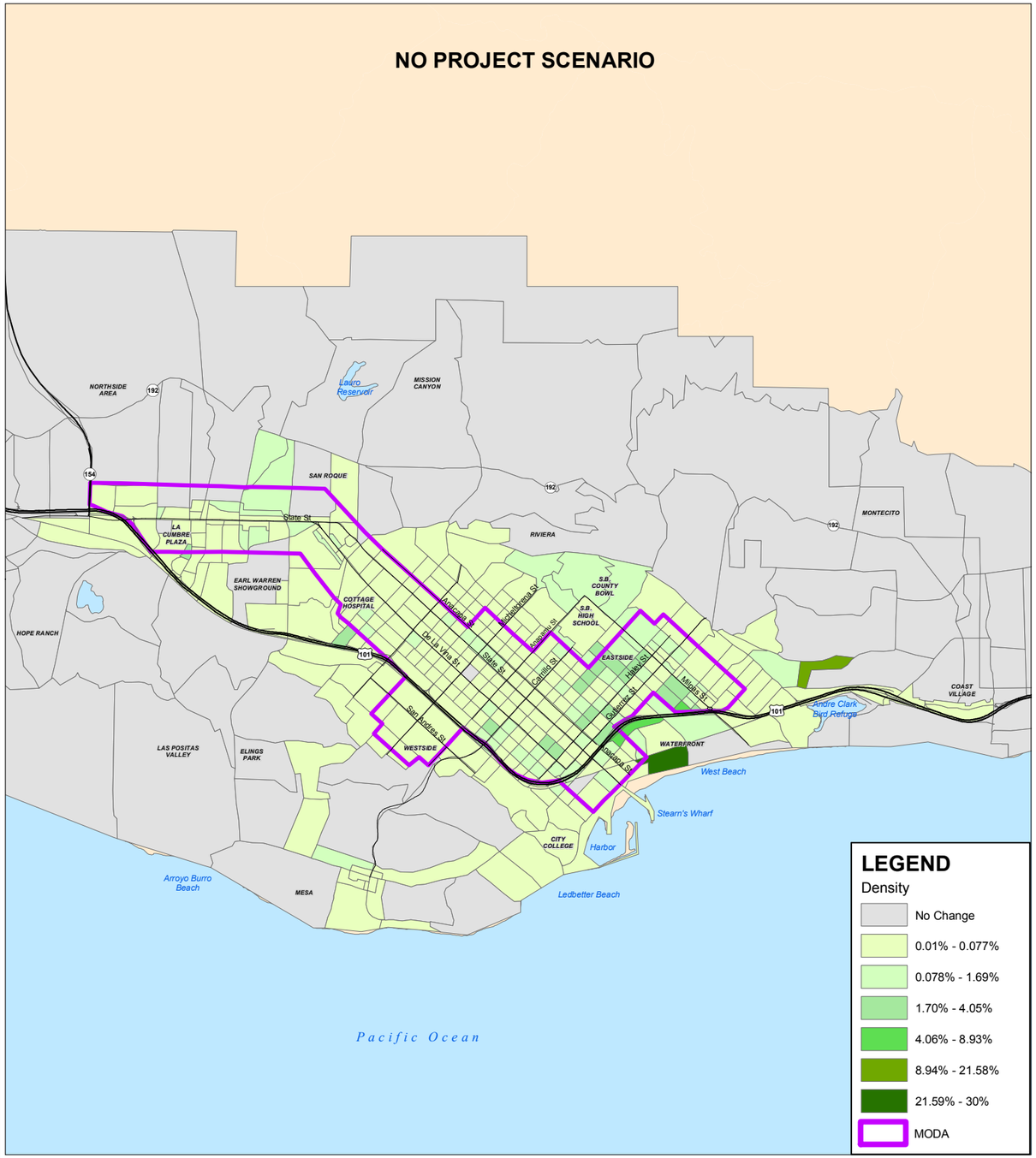
EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE
FIGURE 4

NO PROJECT SCENARIO

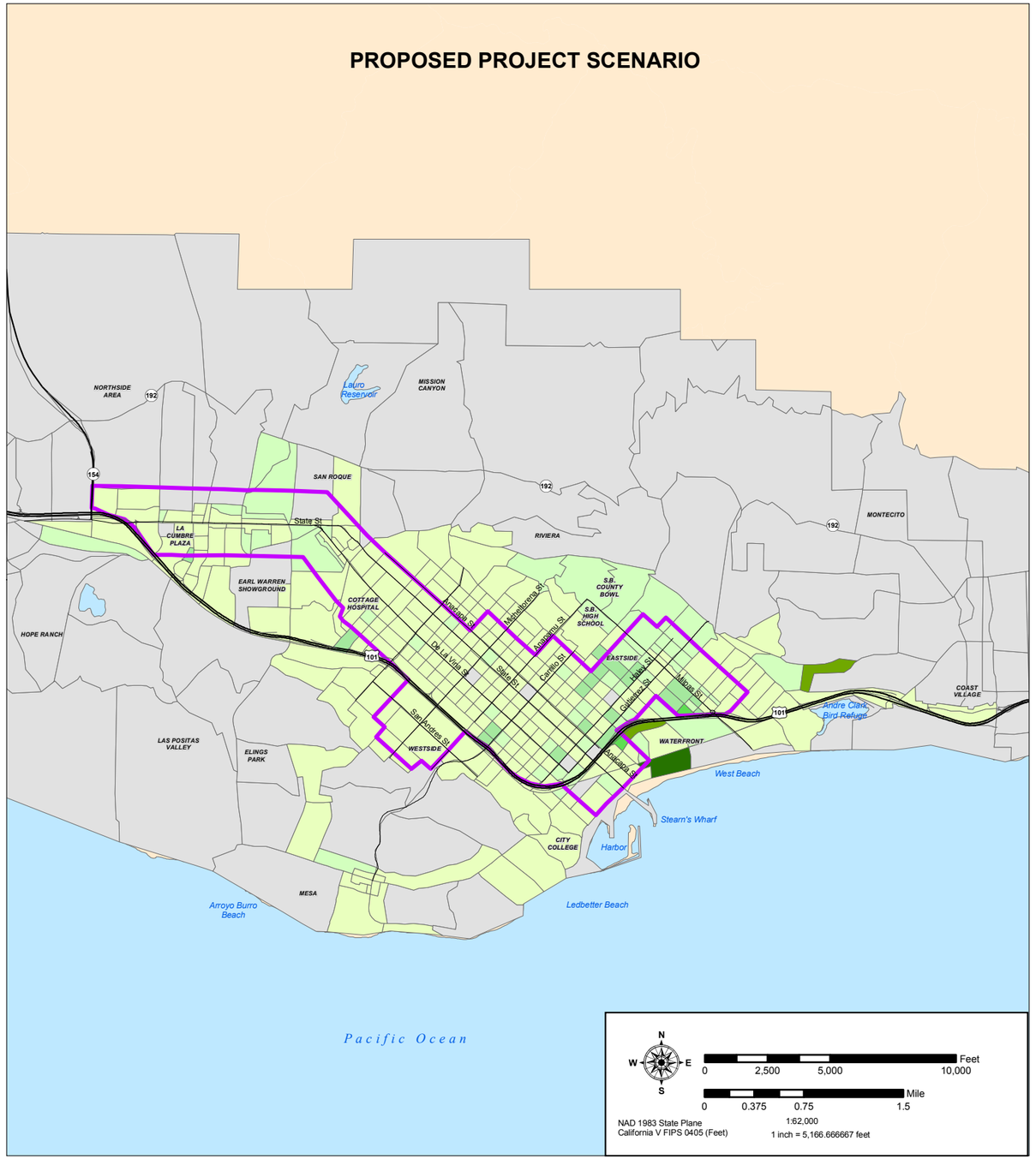


LEGEND

Density

- No Change
- 0.01% - 0.077%
- 0.078% - 1.69%
- 1.70% - 4.05%
- 4.06% - 8.93%
- 8.94% - 21.58%
- 21.59% - 30%
- MODA

PROPOSED PROJECT SCENARIO



N
W E
S

0 2,500 5,000 10,000 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane
California V FIPS 0405 (Feet)

1:62,000
1 inch = 5,166.666667 feet

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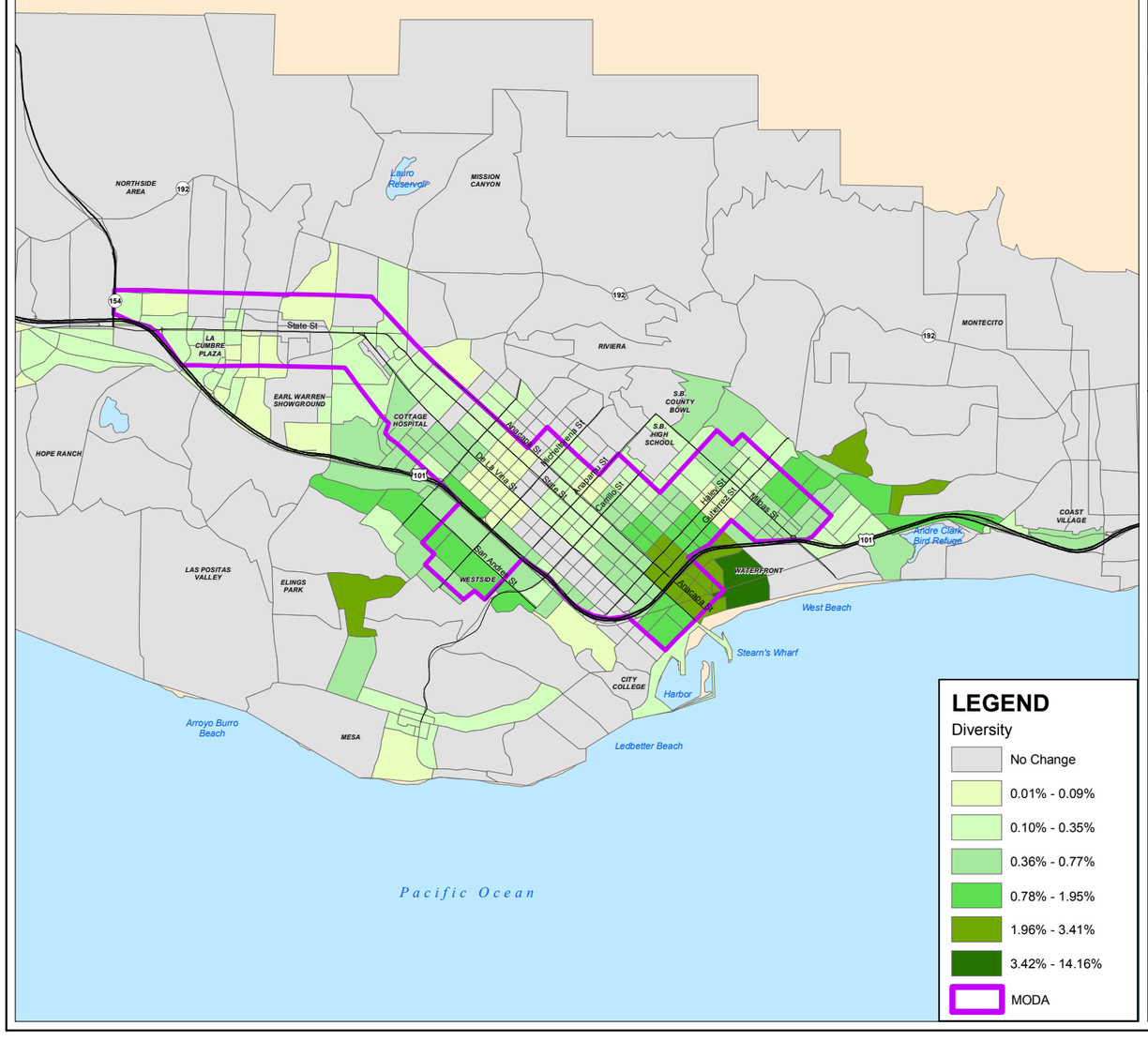
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE *NO PROJECT* AND *PROPOSED PROJECT SCENARIO*

FIGURE 5

NO PROJECT SCENARIO

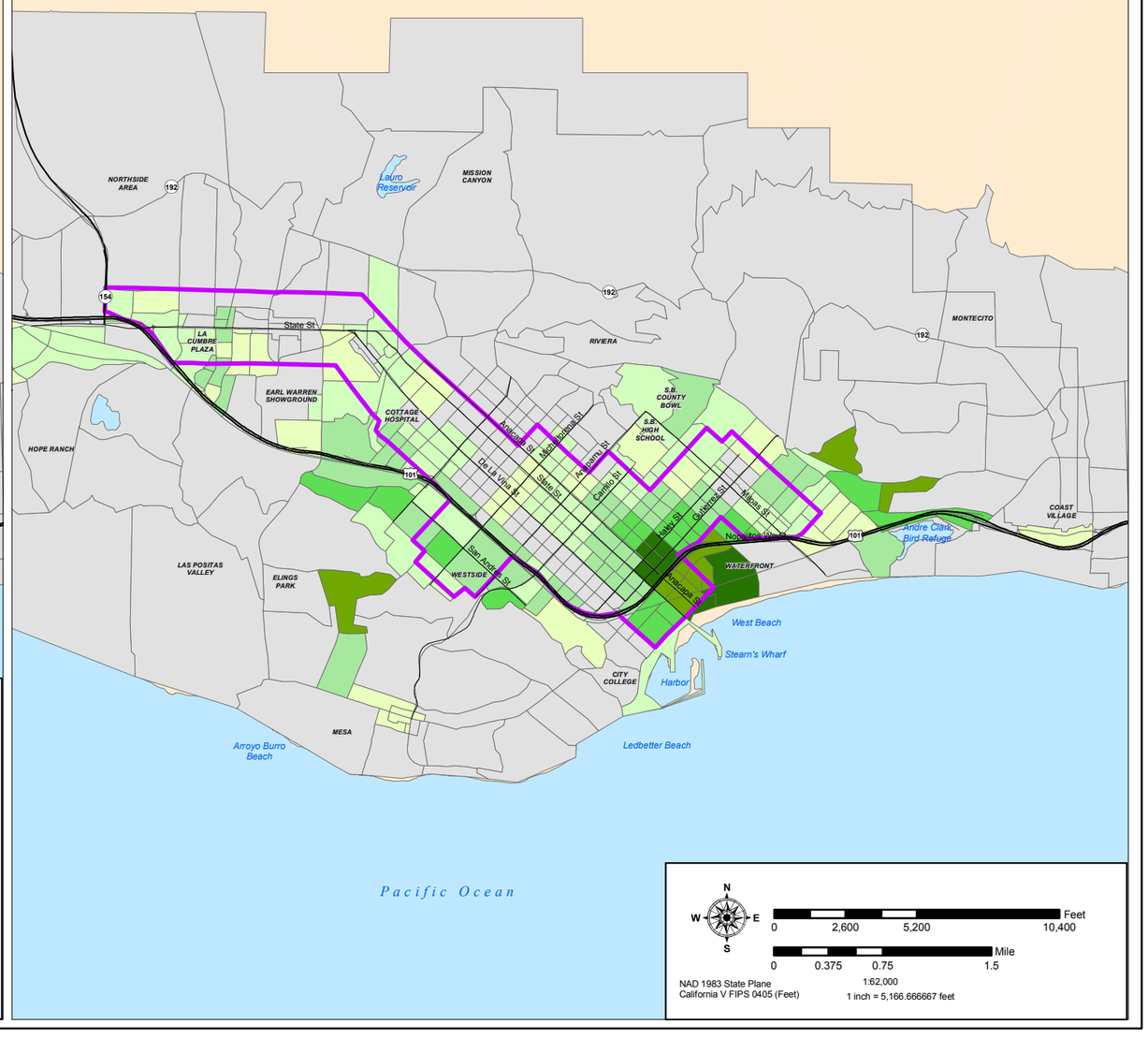


LEGEND

Diversity

- No Change
- 0.01% - 0.09%
- 0.10% - 0.35%
- 0.36% - 0.77%
- 0.78% - 1.95%
- 1.96% - 3.41%
- 3.42% - 14.16%
- MODA

PROPOSED PROJECT SCENARIO



N
W E
S

0 2,600 5,200 10,400 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000

1 inch = 5,166.666667 feet

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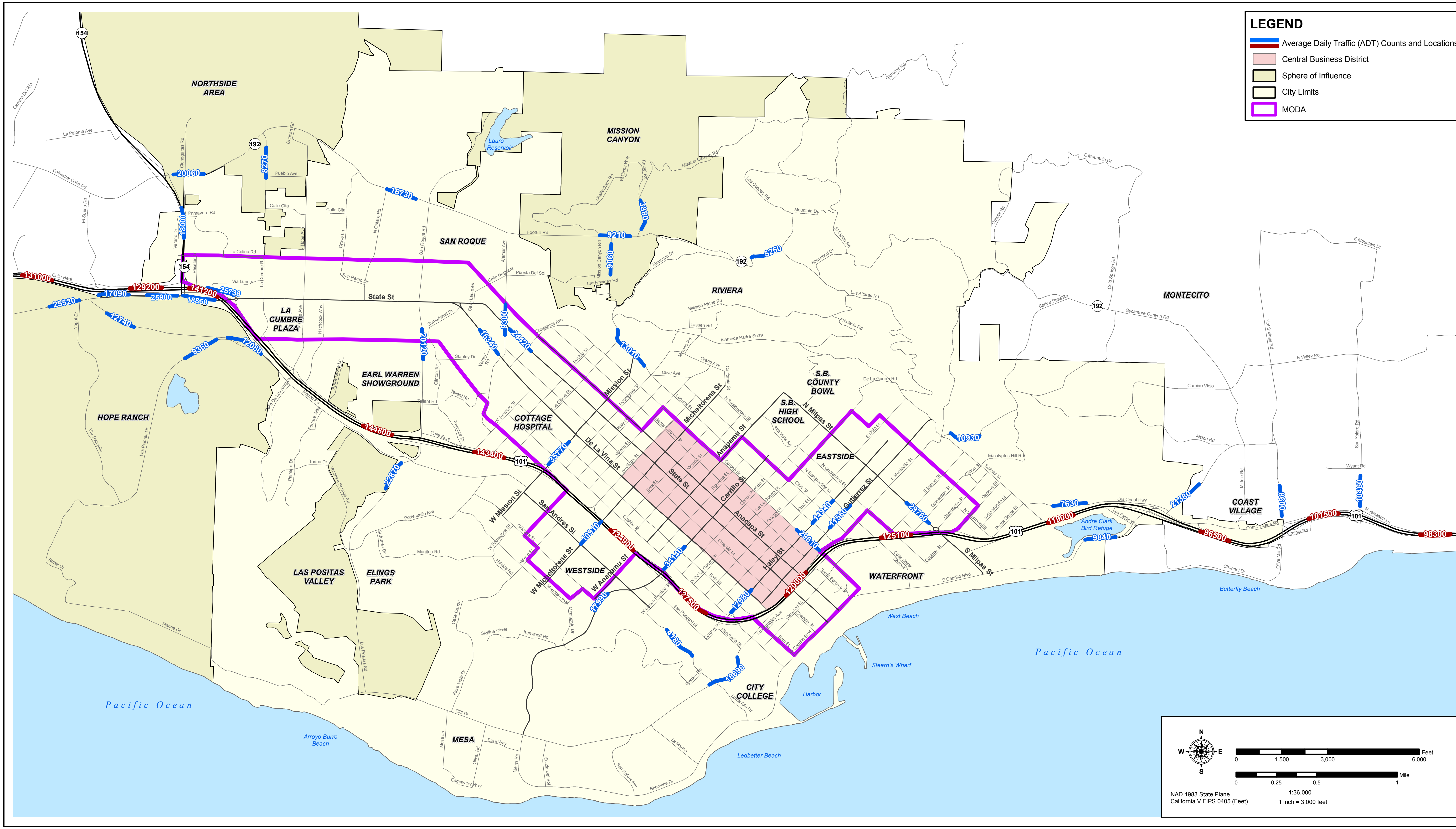
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE *NO PROJECT* AND *PROPOSED PROJECT SCENARIO*

FIGURE 6



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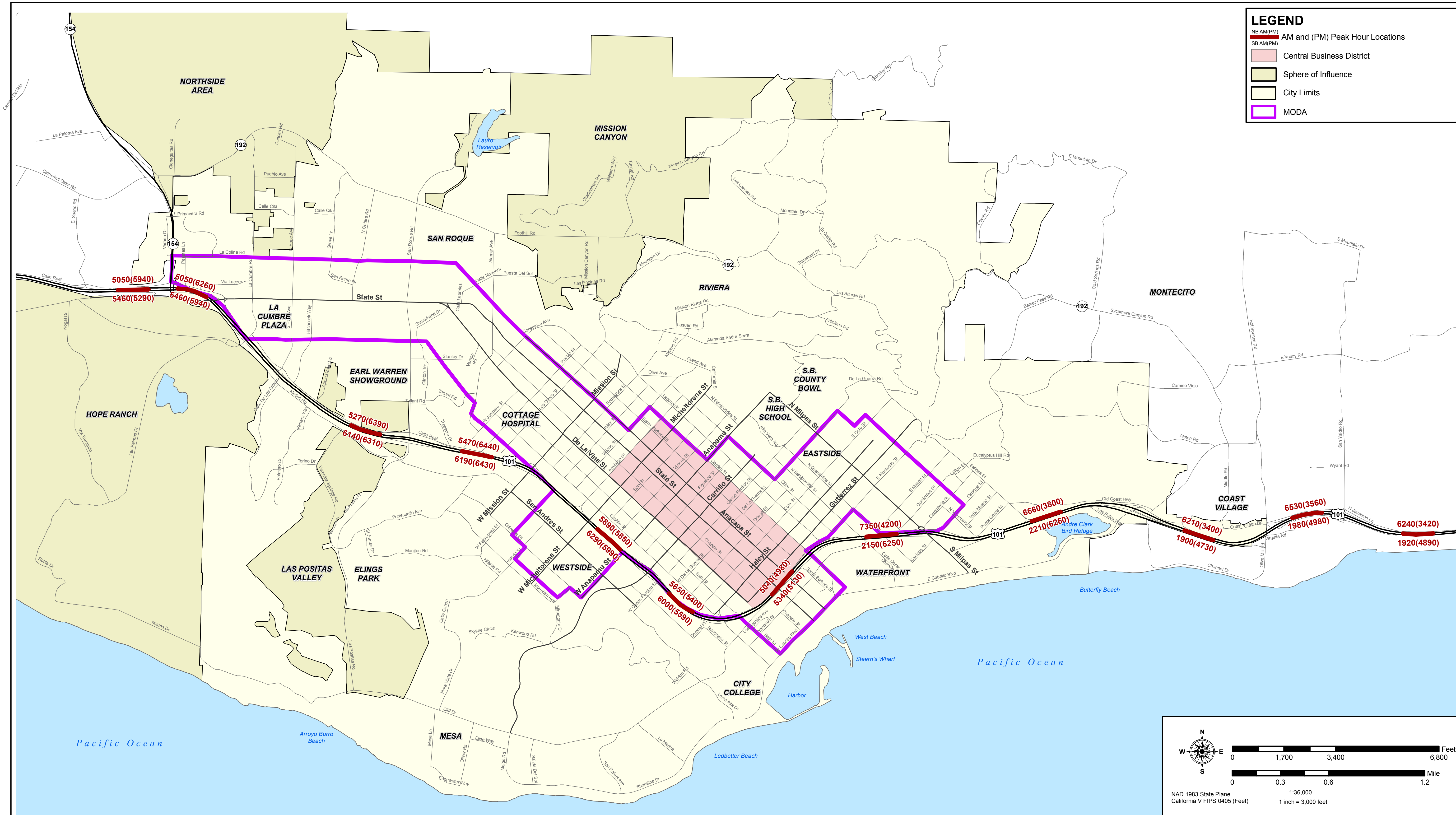
FUTURE (YEAR 2030) *NO PROJECT SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 7



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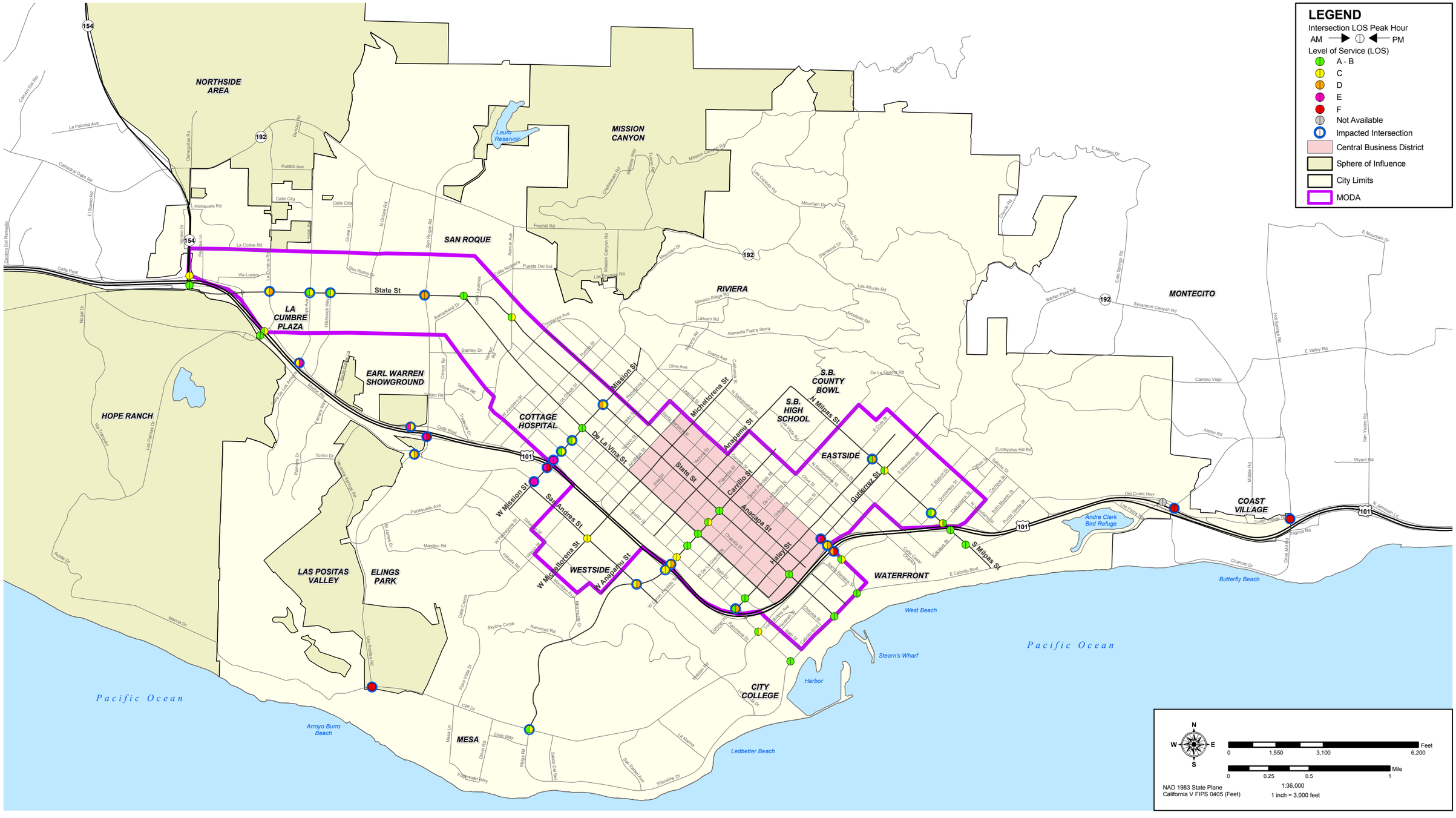
FUTURE (YEAR 2030) *NO PROJECT SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 8



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FUTURE (YEAR 2030) *NO PROJECT SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 9

FIGURE 10
AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

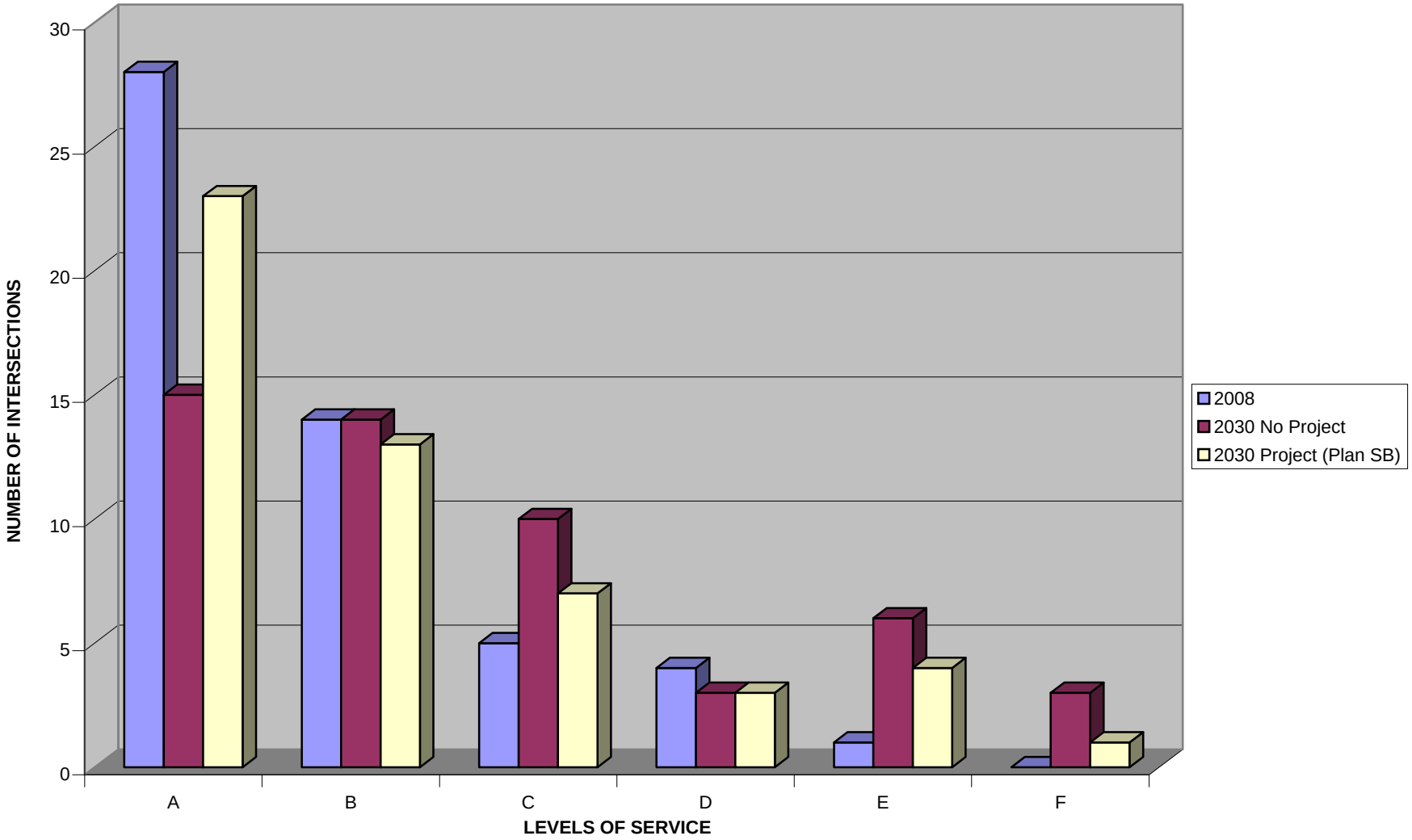
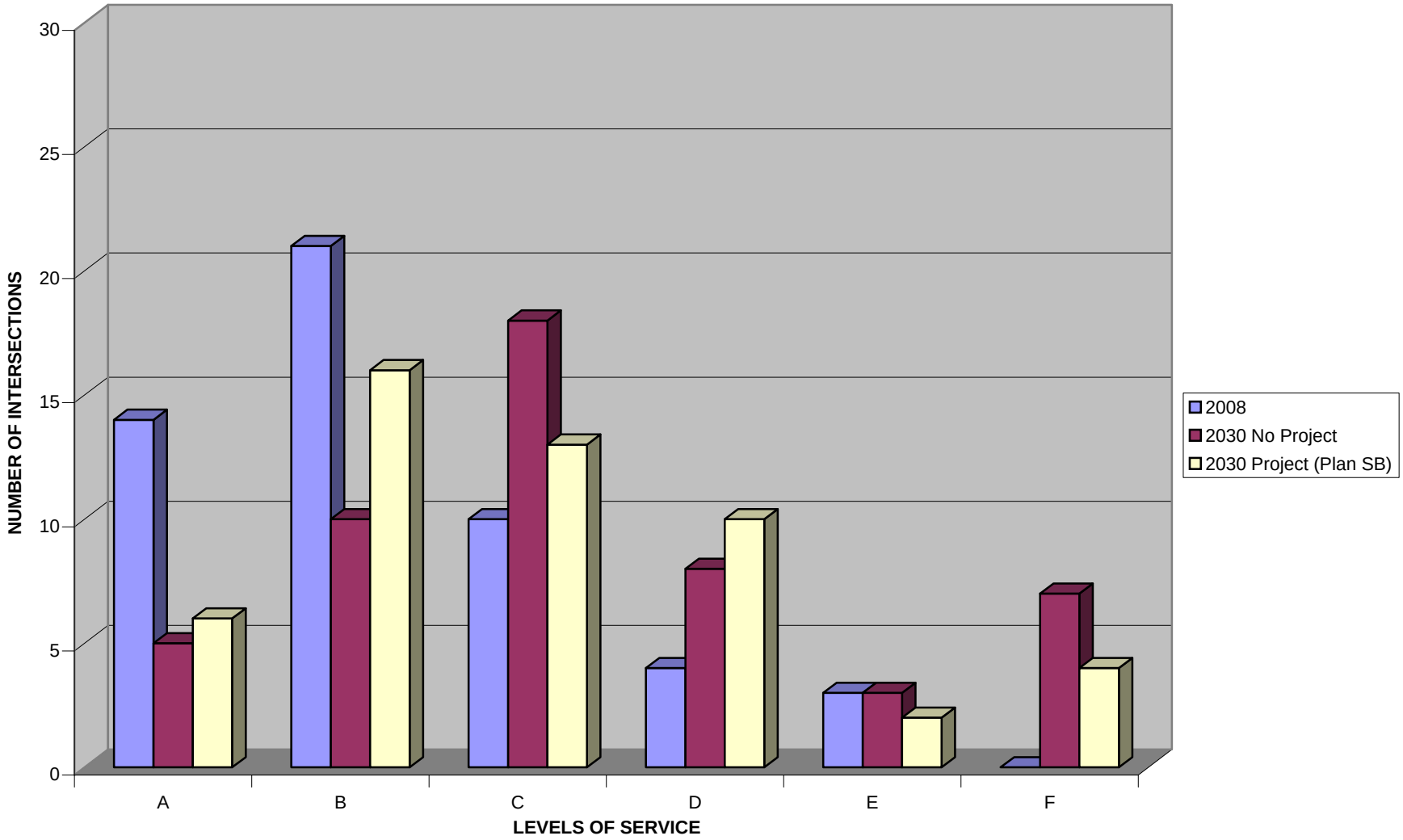
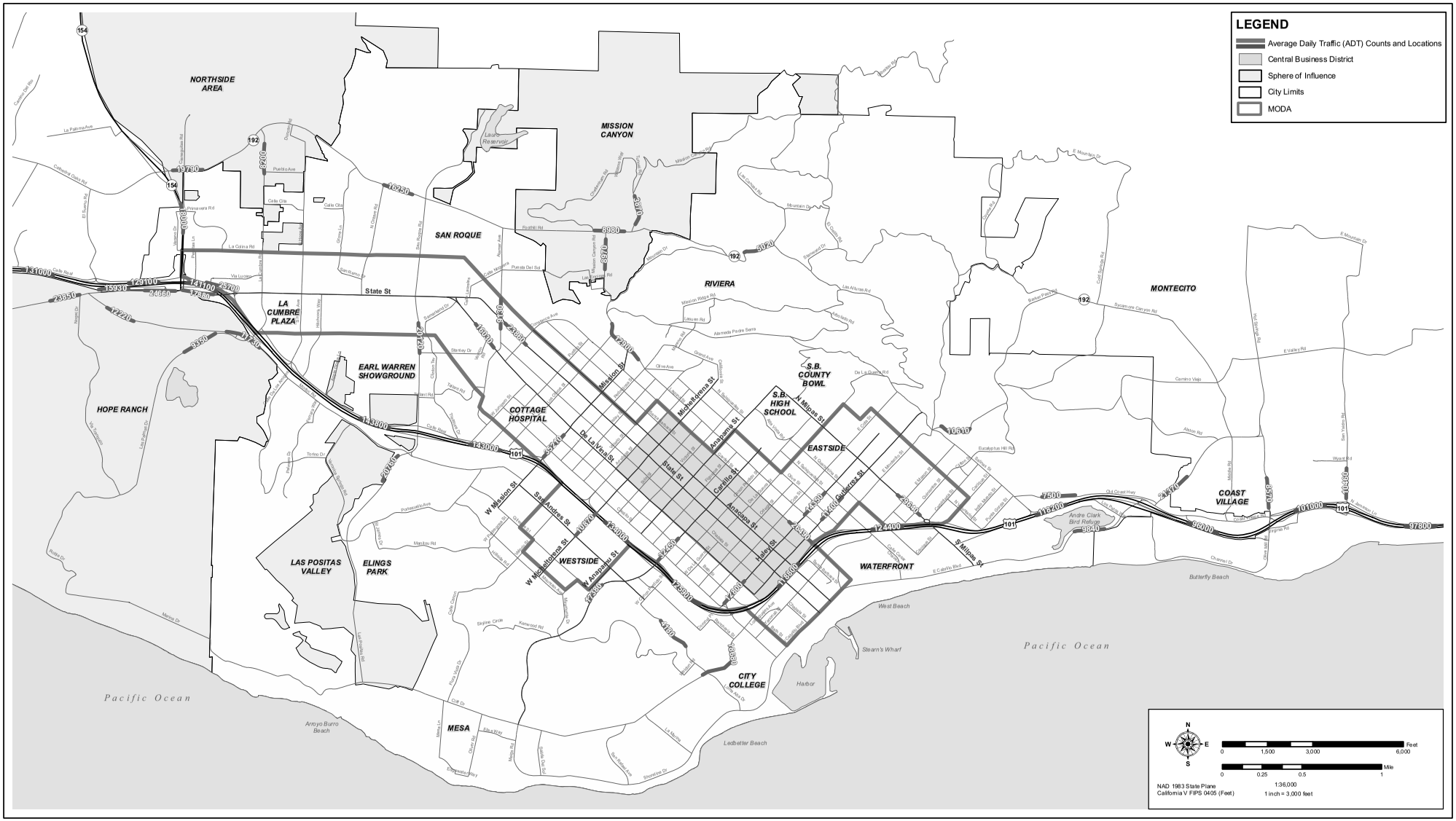


FIGURE 11
PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION





FEHR & PEERS
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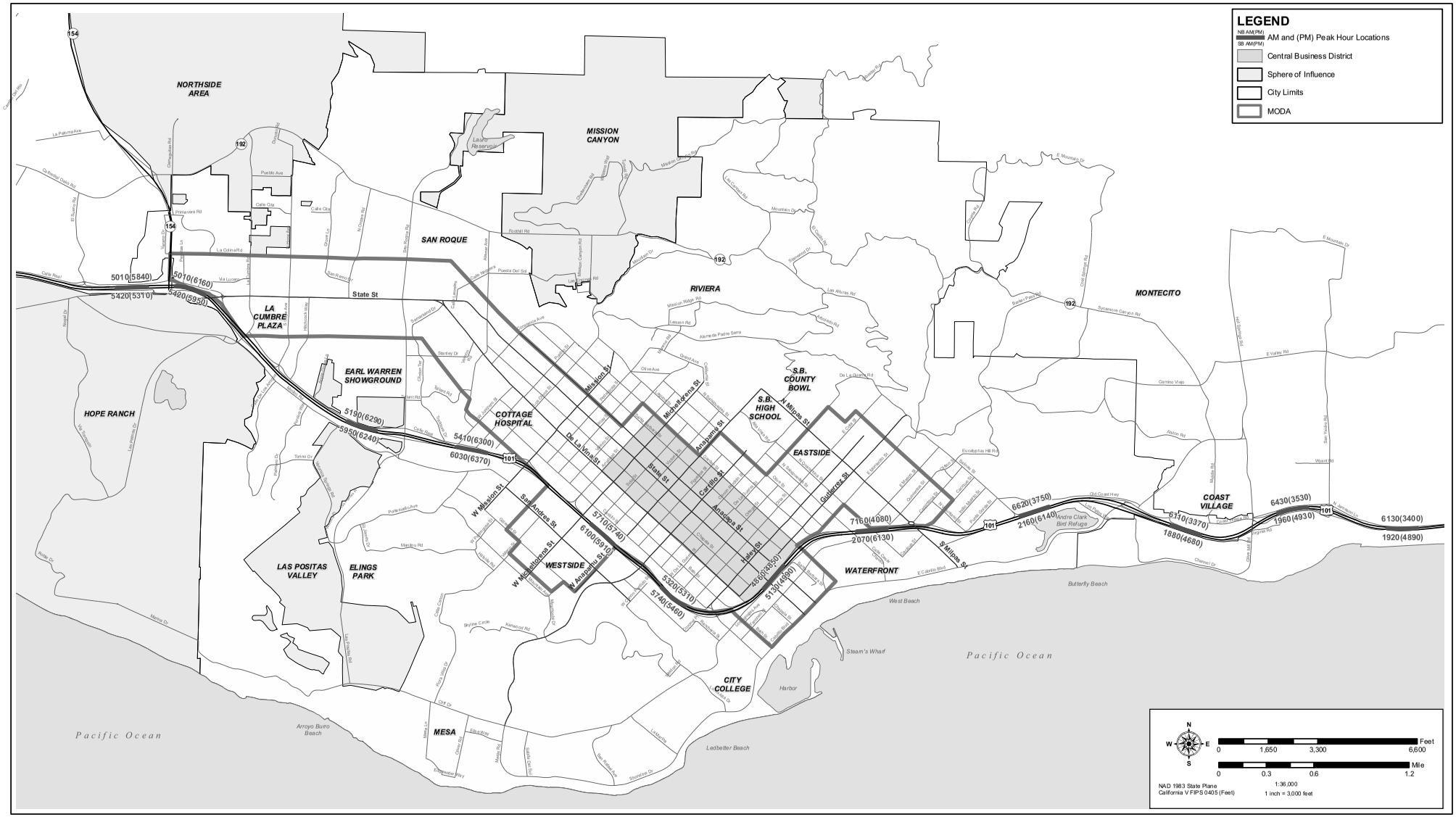
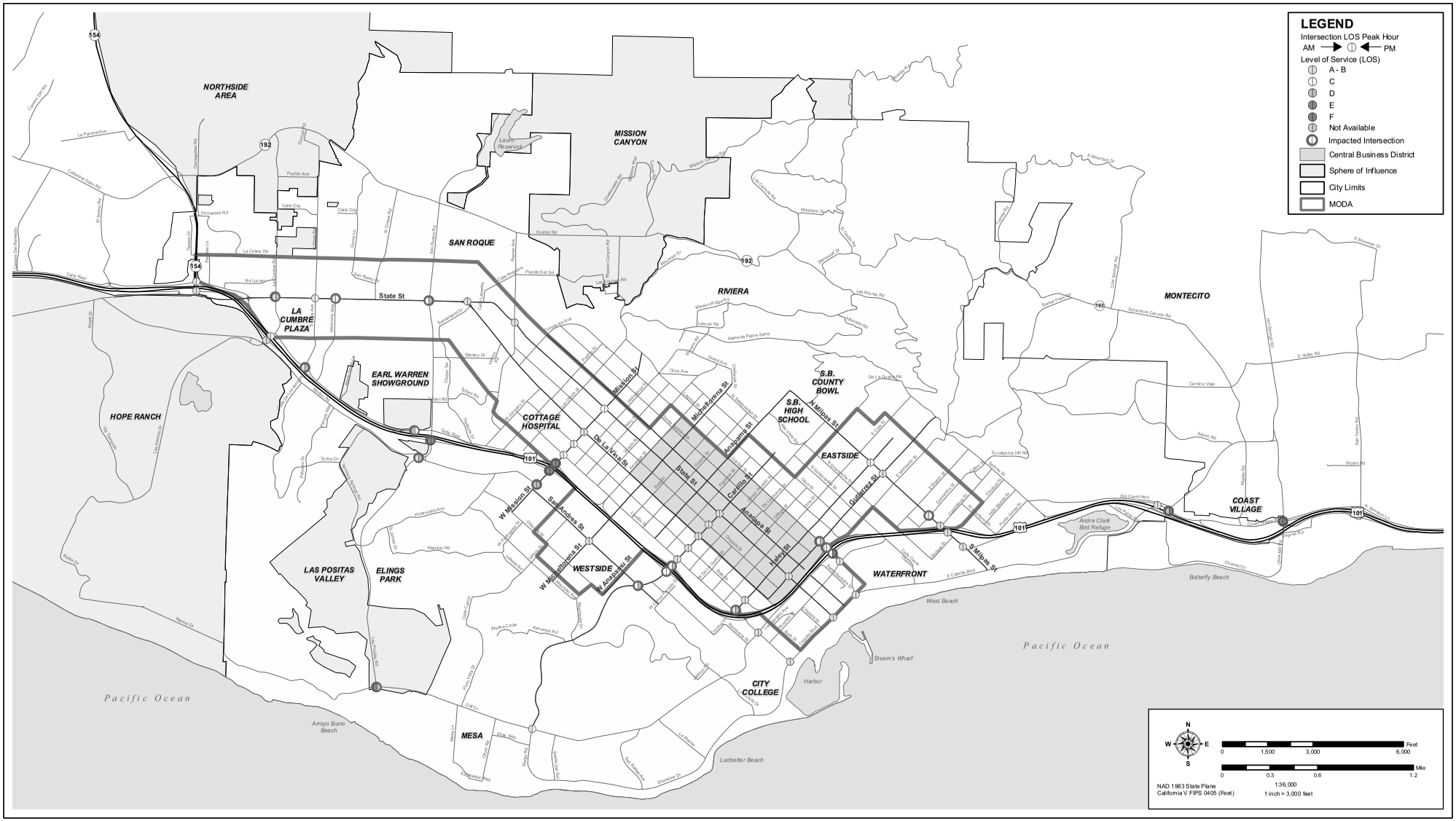
FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES
FIGURE 12



FEHR & PEERS
TRANSPORTATION CONSULTANTS

FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES
FIGURE 13



FEHR & PEERS
TRANSPORTATION CONSULTANTS

FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 14

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B
2 Hot Springs Road & Coast Village Road [b]	AM PM	20 25	C C
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM PM	20 15	C B
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B
6 Milpas Street Roundabout [c]	AM PM	15 14	B B
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B
	PM	0.61	B
30 Mission Street & Modoc Road [b]	AM	27	D
	PM	29	D
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E
	PM	0.97	E
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D
	PM	0.81	D
33 Mission Street & Castillo Street [a]	AM	0.51	A
	PM	0.55	A
34 Mission Street & Bath Street [a]	AM	0.56	A
	PM	0.61	B
35 Mission Street & De la Vina Street [a]	AM	0.52	A
	PM	0.56	A
36 Mission Street & State Street [a]	AM	0.72	C
	PM	0.70	B
37 Meigs Road & Cliff Drive [a]	AM	0.62	B
	PM	0.69	B
38 Las Positas Road & Cliff Drive [b]	AM	30	D
	PM	23	C
39 Las Positas Road & Modoc Road [a]	AM	0.61	B
	PM	0.67	B
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D
	PM	0.95	E
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C
	PM	0.68	B
42 Alamar Avenue & State Street [a]	AM	0.50	A
	PM	0.56	A
43 De la Vina Street & State Street [a]	AM	0.47	A
	PM	0.54	A
44 Las Positas Road & State Street [a]	AM	0.64	B
	PM	0.77	C
45 Hitchcock Way & State Street [a]	AM	0.48	A
	PM	0.67	B
46 Hope Avenue & State Street [a]	AM	0.51	A
	PM	0.66	B
47 La Cumbre Road & State Street [a]	AM	0.61	B
	PM	0.70	C
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A
	PM	0.77	C
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B
	PM	0.67	B
50 La Cumbre Road & Calle Real [a]	AM	0.54	A
	PM	0.66	B
51 SR-154 & Calle Real [a]	AM	0.52	A
	PM	0.55	A
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A
	PM	0.40	A

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy.

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology.

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology.

TABLE 2 PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER		
North/South Street	**East/West Street**	**Peak Hour with V/C 0.77 or Greater**
Hot Springs Road	Coast Village Road	PM [a]
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	PM
Carrillo St	U.S. Highway 101 SB Ramp	AM
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	Both [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State Street	PM

[a] For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

TABLE 3
YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) No Project Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM	13	B	275	F	**Yes**
	PM	13	B	102	F	**Yes**
2 Hot Springs Road & Coast Village Road [e]	AM	20	C	204	F	**Yes**
	PM	25	C	352	F	**Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM	20	C	N/A [f]	N/A [f]	N/A [f]
	PM	15	B	N/A [f]	N/A [f]	N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.37	A	0.50	A	No
	PM	0.53	A	0.62	B	No
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.59	A	0.47	A	No
	PM	0.62	B	0.61	B	No
6 Milpas Street Roundabout [c]	AM	15	B	21	C	No
	PM	14	B	12	B	No
7 Milpas Street & Quinientos Street [a]	AM	0.59	A	0.68	B	No
	PM	0.72	C	0.77	C	**Yes**
8 Milpas Street & Gutierrez Street [a]	AM	0.52	A	0.63	B	No
	PM	0.58	A	0.70	C	No
9 Milpas Street & Haley Street [a]	AM	0.48	A	0.62	B	No
	PM	0.64	B	0.83	D	**Yes**
10 Cabrillo Boulevard & Garden Street [a]	AM	0.30	A	0.37	A	No
	PM	0.37	A	0.42	A	No
11 Yanonali Street & Garden Street [a]	AM	0.43	A	0.58	A	No
	PM	0.49	A	0.71	C	No
12 US 101 SB Ramps & Garden Street [a]	AM	0.64	B	0.86	D	**Yes**
	PM	0.93	E	1.24	F	**Yes**
13 US 101 NB Ramps & Garden Street [a]	AM	0.58	A	0.72	C	No
	PM	0.75	C	0.84	D	**Yes**
14 Gutierrez Street & Garden Street [a]	AM	0.68	B	0.96	E	**Yes**
	PM	0.81	D	1.00	F	**Yes**
15 Cabrillo Boulevard & State Street [a]	AM	0.30	A	0.34	A	No
	PM	0.42	A	0.46	A	No
16 Gutierrez Street & State Street [a]	AM	0.29	A	0.33	A	No
	PM	0.38	A	0.51	A	No
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.36	A	0.38	A	No
	PM	0.60	A	0.62	B	No
18 Montecito Street & Castillo Street [a]	AM	0.64	B	0.65	B	No
	PM	0.67	B	0.71	C	No
19 Haley Street & Castillo Street [a]	AM	0.55	A	0.57	A	No
	PM	0.78	C	0.86	D	**Yes**
20 Haley Street & Bath Street [a]	AM	0.54	A	0.63	B	No
	PM	0.70	B	0.66	B	No
21 Carrillo Street & Anacapa Street [a]	AM	0.47	A	0.53	A	No
	PM	0.62	B	0.68	B	No
22 Carrillo Street & Chapala Street [a]	AM	0.45	A	0.46	A	No
	PM	0.64	B	0.74	C	No
23 Carrillo Street & De la Vina Street [a]	AM	0.55	A	0.59	A	No
	PM	0.64	B	0.69	B	No
24 Carrillo Street & Bath Street [a]	AM	0.55	A	0.59	A	No
	PM	0.54	A	0.57	A	No
25 Carrillo Street & Castillo Street [a]	AM	0.66	B	0.73	C	No
	PM	0.67	B	0.70	C	No
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.70	B	0.79	C	**Yes**
	PM	0.81	D	0.84	D	**Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.78	C	0.80	C	**Yes**
	PM	0.74	C	0.79	C	**Yes**
28 Carrillo Street & San Andres Street [a]	AM	0.68	B	0.74	C	No
	PM	0.76	C	0.86	D	**Yes**

TABLE 3
YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) No Project Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.73	C	No
	PM	0.61	B	0.73	C	No
30 Mission Street & Modoc Road [b]	AM	27	D	39	E	**Yes**
	PM	29	D	37	E	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	1.00	E	**Yes**
	PM	0.97	E	1.28	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.94	E	**Yes**
	PM	0.81	D	0.99	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.60	A	No
	PM	0.55	A	0.77	C	**Yes**
34 Mission Street & Bath Street [a]	AM	0.56	A	0.60	B	No
	PM	0.61	B	0.78	C	**Yes**
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.59	A	No
	PM	0.56	A	0.66	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.81	D	**Yes**
	PM	0.70	B	0.77	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.66	B	No
	PM	0.69	B	0.78	C	**Yes**
38 Las Positas Road & Cliff Drive [b]	AM	30	D	55	F	**Yes**
	PM	23	C	57	F	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.74	C	No
	PM	0.67	B	0.87	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.96	E	**Yes**
	PM	0.95	E	1.01	F	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.92	E	**Yes**
	PM	0.68	B	0.73	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.63	B	No
	PM	0.56	A	0.73	C	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.68	B	No
	PM	0.54	A	0.67	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.84	D	**Yes**
	PM	0.77	C	0.90	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.62	B	No
	PM	0.67	B	0.79	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.70	B	No
	PM	0.66	B	0.77	C	**Yes**
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.71	C	No
	PM	0.70	C	0.85	D	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.73	C	No
	PM	0.77	C	0.98	E	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.63	B	No
	PM	0.67	B	0.70	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.64	B	No
	PM	0.66	B	0.72	C	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.73	C	No
	PM	0.55	A	0.75	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.53	A	No
	PM	0.40	A	0.50	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 4
NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

Peak Hour	Number of Cases 2008	2008 Rate [a]	Number of Cases 2030 No Project	2030 No Project Rate [a]	Number of Cases 2030 Proposed Project (Plan SB)	2030 Proposed Project Rate [a]
AM Only	2	4%	2	4%	1	2%
PM Only	6	12%	13	25%	11	21%
Both AM and PM	5	10%	12	23%	9	17%
Neither Peak Deficient	39	75%	25	48%	31	60%

[a] Number may not add up to 100% due to rounding

TABLE 5
YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Proposed Project Conditions		Impact? [d]
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B	230 81	F F	**Yes** **Yes**
2 Hot Springs Road & Coast Village Road [e]	AM PM	20 25	C C	32 209	D F	**Yes** **Yes**
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM PM	20 15	C B	N/A [f] N/A [f]	N/A [f] N/A [f]	N/A [f] N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A	0.47 0.60	A B	No No
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B	0.45 0.59	A A	No No
6 Milpas Street Roundabout [c]	AM PM	15 14	B B	16 10	B A	No No
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C	0.68 0.77	B C	No **Yes**
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A	0.57 0.67	A B	No No
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B	0.55 0.76	A C	No No
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A	0.34 0.42	A A	No No
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A	0.53 0.66	A B	No No
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E	0.75 1.15	C F	No **Yes**
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C	0.66 0.78	B C	No **Yes**
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D	0.73 0.89	C D	No **Yes**
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A	0.34 0.45	A A	No No
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A	0.31 0.45	A A	No No
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A	0.37 0.61	A B	No No
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B	0.65 0.69	B B	No No
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C	0.56 0.83	A D	No **Yes**
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B	0.60 0.65	A B	No No
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B	0.50 0.65	A B	No No
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B	0.46 0.70	A B	No No
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B	0.57 0.65	A B	No No
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A	0.56 0.55	A A	No No
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B	0.67 0.68	B B	No No
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D	0.79 0.83	C D	**Yes** **Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C	0.78 0.78	C C	No **Yes**
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C	0.72 0.82	C D	No **Yes**

TABLE 5
YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Proposed Project Conditions		Impact? [d]
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.70	B	No
	PM	0.61	B	0.69	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	34	D	**Yes**
	PM	29	D	34	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	0.98	E	**Yes**
	PM	0.97	E	1.09	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.91	E	**Yes**
	PM	0.81	D	0.96	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.55	A	No
	PM	0.55	A	0.73	C	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.57	A	No
	PM	0.61	B	0.70	C	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.54	A	No
	PM	0.56	A	0.61	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.76	C	No
	PM	0.70	B	0.74	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.64	B	No
	PM	0.69	B	0.73	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	40	E	**Yes**
	PM	23	C	32	D	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.68	B	No
	PM	0.67	B	0.82	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.90	E	**Yes**
	PM	0.95	E	0.98	E	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.87	D	**Yes**
	PM	0.68	B	0.71	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.57	A	No
	PM	0.56	A	0.68	B	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.59	A	No
	PM	0.54	A	0.63	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.76	C	No
	PM	0.77	C	0.87	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.58	A	No
	PM	0.67	B	0.77	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.66	B	No
	PM	0.66	B	0.75	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.68	B	No
	PM	0.70	C	0.81	D	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.68	B	No
	PM	0.77	C	0.87	D	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.64	B	No
	PM	0.67	B	0.70	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.59	A	No
	PM	0.66	B	0.70	C	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.68	B	No
	PM	0.55	A	0.73	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.49	A	No
	PM	0.40	A	0.48	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] Based on existing CEQA and City of Santa Barbara standards, traffic impacts are identified as significant if the peak hour traffic of the proposed project would cause an intersection to exceed the V/C ratio of 0.77 or would contribute traffic to a signalized intersection already exceeding V/C ratio of 0.77 or to an unsignalized intersection already exceeding 22 seconds of delay.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 6

MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

MEASURE	2008	2030 No Project	Change Over Existing	2030 Proposed Project	Change Over Existing
Vehicle Miles Traveled (VMT)	2,500,894	2,868,962	15%	2,835,571	13%
Vehicle Hours Traveled (VHT)	59,668	74,550	25%	73,054	22%
Vehicle Trips (VT)	595,479	677,244	14%	667,784	12%
Average Vehicle Trip Length (VMT/VT)	4.20	4.24	1%	4.25	1%

Appendix A
Plan Santa Barbara EIR Assumptions 4-15-09
LAND USE POLICIES

EIR Land Use Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Amount of Growth (net increase) Non-Residential	Continue existing Measure Policies. Extrapolate historic growth rate: City 2,291,700 SF Sphere 178,202 SF Total 2,469,902 SF	Extend existing Measure E policies; and remaining net new square footage. Extrapolate historic growth rate: Project (2030): City 2,000,000 SF Sphere 178,202 SF Total 2,178,202 SF Extended Range (2050+): City 3,000,000 SF Sphere 208,100 SF Total 3,208,100 SF	Reduce Nonresidential growth cap City 1,000.000 SF Sphere 178,202 SF Total 1,178,202 SF	Reduce Nonresidential growth cap City 1,000,000 SF Sphere 178,202 SF Total 1,178,202 SF
Amount of Growth (net increase) Residential	Extrapolate historic rate City 2,795 DU Sphere 403 DU Total 3,198 DU	Extrapolate historic rate Project (2030) City 2,795 DU Sphere 403 DU Total 3,198 DU Extended Range (2050+) City 8,000 DU Sphere 620 DU Total 8,620 DU	Reduced amount of residential growth City 2,000 DU Sphere 403 DU Total 2,403 DU	Increased amount of residential growth. More affordable housing. City **4,360** DU Sphere **443** DU Total 4,403 DU
Distribution of Growth	Per future Land Use data	Per future Land Use data	Per future Land Use data	Per future Land Use data

(net increase)	base assumptions.	base assumptions.	base assumptions.	base assumptions.
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Affordable Housing% new residential growth citywide affordable to low, moderate, middle incomes	30 % of total du (838 du of total 2795 du)	35% of total du (978 du of total 2795 du)	20% of total du (400 du of total 2000 du)	40% of total du (1,768 du of total 4420 du)
New Residential Growth %/DU inside MODA	56 % residential growth in MODA (1579 DU of total 2795 DU)	66% % residential growth in MODA (1857 DU of total 2795 DU)	61 % residential growth in MODA (1217 DU of total 2000 DU)	65% residential growth in MODA (2878 DU of total 4420 DU)
New NonResidential Growth %/SF in MODA	69% non-residential growth in MODA (1,580,307 SF of total 2,291,700 SF)	65 % non-residential growth in MODA (1,309,516 SF of total 2,000,000 SF))	46 % non-residential growth in MODA (463,479 SF of total 1,000,000 SF))	47 % non-residential growth in MODA (468,161 SF of total 1,000,000 SF)
Residential Densities inside MODA (MF and Commercial Zones)	Existing Variable Density Average 20 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 25 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 15 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 50 du/ac in MODA
Residential Densities inside MODA (R2 and Single Family Zones)	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre (160 du) SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre
Residential Densities outside MODA (in MF zones)	Average 20 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 22 du/ac outside MODA in MF zones
Residential Densities outside MODA (in SF zones)	1-5 du/ac; Average 3 du/ac	Average 3 du/ac	Average 3 du/ac	Average 3 du/ac
Second Unit production (DU) inside MODA	Existing policies constrain units. 0 2nd units assumed per historic rate	Draft PlanSB policies encourage 2nd units within MODA 57 2nd units	Same as No Proj – existing policies 0 2nd units assumed	Strong encouragement of 2nd units in MODA. 173 of total 400 2nd units
Second Unit production (DU) outside MODA	Existing policies constrain units. 0 2nd units assumed	Draft PlanSB policies allow 2nd units per existing policies outside MODA, and restrict in High Fire	Same as No Proj – existing policies 0 2nd units assumed	Encouragement of 2nd units outside MODA 227 units of 400 assumed.

		Hazard areas		
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Density/Unit Size: Smaller residential unit sizes and revised variable density provisions in MODA	Existing variable density provisions based on # bedrooms & no unit size limits have resulted in many large, upper income condos. Average density 20 du/ac	Amend variable density provisions to provide range of unit sizes (rather than # bedrooms) with associated densities. Maximum unit size 1300 SF See density/unit size chart below	Include same revised smaller unit size ranges with lower densities than for project. See chart below.	Include same revised smaller unit size ranges with higher densities than for project. See chart below
Density/Unit size outside MODA	Existing variable density; SF FAR	Remove variable density; allow >1300 SF w/ new maximum unit size	Remove variable density; allow >1300 SF w/ new maximum unit size	New variable density w/ unit size ranges (similar to Project in MODA)

Density/Unit Size Chart for Inside MODA– Assumptions for EIR Analysis of Policy Changes

Unit Size	**Base Density (units/acre)**	**Density +25% Affordable Hsg** *(Inclusionary Housing Ordinance IHO or State bonus Density law)*	**Density + 100% Affordable owner or Rental Housing**
Project - PlanSB			
<400 SF	35 du/ac	44 du/ac	70 du/ac
401-700 SF	25 du/ac	31 du/ac	50 du/ac
701-1000 SF	22 du/ac	27 du/ac	44 du/ac
1001-1300 SF	19 du/ac	24 du/ac	38 du/ac
Alternative ,Lower Growth			
<400 SF	25 du/ac	31 du/ac	50 du/ac
401-700 SF	15 du/ac	19 du/ac	30 du/ac
701-1000 SF	12 du/ac	15 du/ac	24 du/ac
1001-1300 SF	9 du/ac	11 du/ac	18 du/ac
Alternative 2, More Hsg			
<400 SF	70 du/ac	88 du/ac	140 du/ac
401-700 SF	50 du/ac	62 du/ac	100 du/ac
701-1000 SF	44 du/ac	55 du/ac	88 du/ac
1001-1300 SF	38 du/ac	47 du/ac	76 du/ac

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Mixed Use & use of store of non-residential SF demolished & not replaced	Existing ordinance provisions for amount of non-residential and residential allowed on site.	Existing ordinance provisions Draft PlanSB Policy LG7 Study TEDR Ordinance	Cannot maximize both residential & commercial SF	Existing ordinance provisions
Land Use Element Map Land Use designations	Existing Land Use Element Map	The Draft PlanSB LUE Map provides largely the same LU designations and location as the existing LUE Map, but with the following amendments: -Delineate the MODA boundary -LU designation amendments to reflect changes to Variable Density inside and outside MODA -Provide LU designations and densities by acre -Establish a parcel-based map -Include some minor LU designation amendments to clarify LU designations by parcel and provide for consistency between GP LUE and Zoning designations.	Same as Existing LUE Map	Same as Project/PlanSB Draft LUE Map
Affordable Housing Policies	Existing policies per Housing Element, inclusionary, State/City bonus density provisions	Draft PlanSB policies -No more specific EIR assumption [H1-Opportunity Sites; H5-Incentives for Affordable by Design; H9-Inclusionary Amds; H10-Density Incentive for sustainable resource use; H11-Rentail incentives; H13-Residential Density Stds]	Same as Existing Policies	Increase affordable housing incentives Streamline housing permit procedures

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Building Heights	Existing building height policies per Charter, GP, and Zoning	Draft PlanSB Policy C10 – -Lower heights/step back buildings adjacent to residential zones in DT urban core, and -Lower heights in conjunction with form-based codes adjacent to historic structures. EIR Assumptions: -Lower heights to 40 ft in EPV and 45 ft in other commercial zones -Amend build height definition for commercial zones to allow for sloped sites, flood control standards, sloped roofs. -Exception to building height allowed for: >Community Priority projects (per current definition: community need, non-profit), > Residential - requirement for minimum 30% affordable up to middle income (all projects, no minimum number of units, both ownership or rental) >Substantial building area in rental units >Findings for adequate open space, quality architecture, front yard setback	Lower building height limits citywide per Save EPV initiative: -40 ft in EPV -45 feet in other commercial zones	Maintain current height limitations -Existing City height limitations

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing

Non-Development Intensification (The "Churn")

Non-Residential: Apart from net new square feet of development, background intensification of non-residential uses within existing structures, such as adding more employees within existing space.

Residential: Intensification of residential use from illegal units and overcrowding, e.g., multiple families.

Existing Condition baselines reflect current effect from these sources, such as traffic trips, air pollution, public services.

Future Conditions (No Project, Project, Alternative 1 and 2 Scenarios)

- For traffic, customized trip generation rates were calibrated with the existing conditions traffic counts and therefore incorporate/reflect traffic associated with intensification. In addition, the land use distributions for future conditions are overly conservative because they cannot reflect ongoing implementation of Charter policies for no net increase in traffic for net new non-residential square footage, which results in rejection of applications to avoid such impacts. The excess traffic effects built into the estimates based on the land use distribution therefore incorporate the background intensification effects of non-residential and residential uses.

-Similarly water use, wastewater generation, public schools, and other public facility effects are also based on average use rates derived from existing use, which incorporates intensification. Air pollution and energy impacts are also based on average existing traffic and utility assumptions that reflect intensification.

Questions

-Is there any basis for estimating non-residential intensification or illegal unit/overcrowding rates?

-Is there any basis for assuming that the non-residential and residential intensification factors and the application rejection rates are similar?

-Alternatives - Non-Residential: The No Project & Project assume 2 million SF and Alternatives 1 & 2 assume 1 million SF. Should Alternatives 1 & 2 which are limiting new development more assume more intensification occurs?

-Alternatives – Residential: The No Project & Project assume 2800 DU, while Alternative 1 assumes 2000 DU and Alternative 2 assumes 4400 DU. Should Alternative 1 assume more pressure for illegal units and overcrowding than the Project, and Alternative 2 assume less?

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses <u>Non-Residential</u>	Existing Measure E policies and process for Community Priority and Economic Development LU categories of new net Sq Ft of non-residential use.	PlanSB Policy LG10 economic development appears to allow all uses currently allowed. Implementation/incentives unclear. No policy/impact change from existing policy [LG10 – new net non-residential use to include one or more of following uses: -Community Priority (parks & recreation, community centers, educational, public cultural or arts facilities, youth development and childcare facilities, community gardens/ urban farm) -Economic Development (Enhances standard of living, strengthens economy by expanding economic diversity) -Green Economic Development (Provides green products or jobs) -Small & Local Businesses -Development for people w/disabilities]	Same as No Project – no change from existing policies? Or with less Sq Ft., shorter list of Community Necessities only?	Same – no change? Or with less Sq Ft, shorter list of Community Necessities only? Or stronger policy/incentive for community benefit uses?
Community Benefit Land Uses <u>Residential</u>	Existing HE policies	PlanSB Policy LG11 Residential: No policy/impact change from existing policy [LG11 – new residential to include one or more of following: -Affordable Housing (Low to Middle income housing; housing dedicated for critical work force; housing for local workers, rental housing, transitional housing]		

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses – Residential – Open Space provisions	Existing Ordinance requirements for open space in residential development.	LG11 – Residential – Open Space requirements Amount of open space and public spaces would increase. [LG11 – Open Space Requiremt: -Open Space (through access to adequate public open space within ½ mile radius and/ or dedication of sufficient usable open space on site and/or contribution through in-lieu fees) Note CTI projects future park demand in SB based on SBCAG pop growth projections and nat'l park demand stds. Table 3 projections for range of park categories. Fig 1 & 2 illustrate locations of deficiencies for neighborhood & community parks. For MODA, need to identify demand std for indoor recreational facilities.	Same as Project	Same as Project or less?

Adaptive Management Program

PLANSB - PROJECT OBJECTIVES *(& EXTENDED RANGE)*	PLAN SB - EIR ASSUMPTIONS *(Working Draft AMP Indicators)* FOR COMMUNITY INDICATORS TO MONITOR OBJECTIVES
LU/Growth Mgmt 1-Sufficient resource/infrastructure 2-Improvement in affordable housing supply relative to jobs 3-Majority of neighborhoods have Sustainable Neighborhood Plans 4-Increased use of alternative modes relative to single-occupancy vehicles	**LandUse/Growth Management** **1-Sufficient resources & infrastructure** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **2-Affordable Housing supply relative to Jobs** ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **3-Sustainable Neighborhood Plans** ▪ # of Sustainable Neighborhood Plans (SNPs) **4-Increased use of alternative modes relative to SOV** ▪ Transportation mode share ratio (miles, or # of people using each mode.)

Economy/Fiscal Health 1-Economic sector diversity is stable or expands; City revenues from commercial sources stable or increased. 2-Greater proportion of local jobs filled by local residents 3-Regional cooperation increased, progress made on regional blueprint for LU, housing, & transportation	**Economy/Fiscal Health** **1-Economic sector diversity; stable City revenues** ▪ Employment by economic sector ▪ % of total employment contributed by the top 10 employers ▪ Income by economic sector ▪ Taxable gross receipts **2-% local jobs filled by local employees?** **3-Regional cooperation/ progress on blueprint?** Status report
Environmental Resources 1-Citywide 50% reduction in fossil fuel use in buildings by 2020 and carbon neutrality by 2030. 2-Natural areas along creeks and elsewhere retained or expanded, and quality preserved or enhanced. 3-Opportunities for residents & students to get fresh locally-grown produce increased. 4-Reduction of greenhouse gas emissions from light vehicle & truck to 1990 levels by 2020. 5 **(New)** AQ, Water Q maintain/improved	**Environmental Resources** **1- 50% reduction bldg fossil fuel use by 2020 (neutrality 2030)** ▪ Fossil fuel consumption ▪ % renewable energy use **2-Naturals areas preserved, enhanced** ▪ New, total & per capita acres open space, by type, ownership ▪ Acres habitat area restored, enhanced, protected; bird counts **3-Increased opportunities for local produce** Informational report on ag, farmer's mkts, schools, etc. **4-Reduce GHG from vehicles to 1990 levels by 2020** Vehicle Miles Traveled (VMT) **5-(New) AQ, Water Quality maintained/improved** ▪ Ocean & creek water quality compared to standards ▪ Air quality compared to standards
Historic Resources/ Com Design 1-Distinctive character of City districts & neighborhoods retained & public places enhanced. 2-Designations of historic resources have increased. 3-Public health has improved through community design.	**Historic Resources/ Com Design** **1-Distinctive character of City districts & neighborhoods retained & public places enhanced.** New & total public open space & recreational facilities in downtown & neighborhoods ▪ # of design awards ▪ # of Sustainable Neighborhood Plans (SNPs) ▪ Review of new projects for size, bulk & scale **2-Designations of historic resources have increased.** ▪ # new historic resources evaluations, surveys, "potentials" list ▪ # new historic resource designations and/or districts **3-Public health has improved through community design**. ▪ (Obesity rates by age and gender) ▪ # beach health warnings ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas (See also air quality measure above)
Housing 1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations. 2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages. 3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes.	**Housing** **1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations**. ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages** Periodic HE review **3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes**. Densities in MODA projects reviewed for time frame

Circulation 1-Public transit service & facilities, miles of sidewalks, trails, bike paths & lanes have increased or upgraded and links between modes available. 2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020. 3-Traffic congestion has not increased or is less than the 2008 baseline study.	**Circulation** **1-Transit, sidewalks, trails, bike paths & lanes & links incr or u** ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas ▪ Transit service levels **2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020.** ▪ Transportation mode share ratio (miles, or # of people using each mode.) **3-Traffic congestion has not increased or is less than the 2008 baseline study.** ▪ Intersection level of service (LOS) and Travel Time measures ▪ Street traffic volumes ▪ Hwy 101 traffic volume
Public Services and Safety 1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program. 2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand. 3-Conservation & management practices are maintained or improved.	**Public Services and Safety** **1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program.?** Status report **2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand.** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **3-Conservation & management practices are maintained or improved**. Status report

H:\Group Folders\PLAN\Long Range Planning\PlanSB\CEQA\CEQA Document\Project Description\EIR Assumptions Chart - Land Use April 15 09.doc

APPENDIX I-5

FUTURE TRAFFIC CONDITIONS FOR THE LOWER GROWTH AND ADDITIONAL HOUSING ALTERNATIVES

FEHR & PEERS
TRANSPORTATION CONSULTANTS

FINAL TECHNICAL MEMORANDUM

Date: January 28, 2010

To: Dan Gira, AMEC

From: Brian Welch and Reid Keller

Subject: ***Future Traffic Conditions for the 2030 Alternative 1 and Alternative 2 Scenarios***

LA08-2253

INTRODUCTION

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The City model, developed in the TransCAD Transportation Geographic Information System (GIS) software, was successfully calibrated and validated to current conditions. [1] Although there are seasonal variations in traffic in Santa Barbara due to tourist visitation and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting model represents travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The primary purpose of the model is to test proposed *Plan Santa Barbara* policy options to see which policies are successful in meeting community objectives. The circulation goals, objectives, and policies for *Plan Santa Barbara* focus on creating a multi-modal transportation system that provides choice and decreases vehicle traffic congestion. The plan includes objectives related to mode share and traffic congestion, featuring (1) a 50/50 mode share between the single-occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions. The travel demand model provides metrics and indicators (traffic volumes, levels of service, vehicle miles traveled, etc.) that document the plan's ability to meet the *motor vehicular-related* goals, objectives, and policies. In addition, indicators and results from the model will be utilized to support forthcoming California Environmental Quality Act (CEQA) documentation

This technical memorandum summarizes traffic volume forecasts, intersection operational conditions, and a variety of other performance measures associated with *Plan Santa Barbara* Alternatives 1 and 2. These future conditions represent future Santa Barbara under policy and land use changes that would diverge from *Plan Santa Barbara*, and which can be summarized as follows:[2]

[1] For details regarding the model development, including calibration and validation statistics, please refer to *Plan Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

[2] Details regarding Alternatives 1 and 2 are provided in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09."

Compared to *Plan Santa Barbara*

Alternative 1 "Lower Growth"

- Reduced non-residential growth cap;
- Reduced amount of residential growth;
- Less affordable housing;
- Slightly less residential growth in the MODA; and
- Less non-residential growth in the MODA.

Alternative 2 "More Housing"

- The MODA boundary is modified to exclude areas west of US-101;
- Reduced nonresidential growth cap;
- Increased amount of residential growth;
- More affordable housing;
- Slightly less residential growth in the MODA; and
- Less non-residential growth in the MODA.

This technical memorandum also includes, for ease of reference, a brief summary of existing conditions. An additional technical memorandum (*Revised Final Technical Memorandum, Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario, January 27, 2010)* provides similar documentation for *Plan Santa Barbara* and the No Project scenario. Forthcoming environmental documentation will provide an overall summary comparison of existing conditions, *Plan Santa Barbara*; the No Project Scenario, Alternative 1, and Alternative 2 in one document.

As noted, the forecasts for this memo were prepared using the *Plan Santa Barbara* Travel Demand Model developed by Fehr & Peers on the TransCAD platform. The travel demand model is based around three core components:

- A **land use database** – in this case a parcel level database provided by the City with detailed information on the type and amount of development on each parcel, stratified into numerous categories. Land use databases were prepared by the City for existing conditions and projected amounts and locations of future residential and non-residential growth, based on historic growth rates and existing/proposed City growth control policies and mechanisms for the No Project (Existing Policies) Alternative and Project (*Plan Santa Barbara* policies). The type, location, and amount of growth permitted under *Plan Santa Barbara* were further modified to account for the policy framework of *Plan Santa Barbara*. These land use databases were compiled on a parcel-specific level for the entire City as well as the Sphere of Influence, and provide detailed information on the type and amount of development existing and projected for each parcel, broken down into multiple land use categories to reflect the diversity of existing and proposed land uses accurately.

- A **highway network database** – Based on the Santa Barbara County Association of Governments (SBCAG) regional travel demand model, with added detail using data provided by the City. The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes, arterials, collectors, and a selection of local roads in the study area (see Figure 1).
- The roads shown in Figure 1 are classified in four major categories and form the primary road network represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside the City.
- A **table of trip generation rates** – initial rates was researched from sources including SBCAG, the census National Household Travel Survey, the San Diego Association of Governments (SANDAG), and the Institute of Transportation Engineers (ITE). Trip generation rates were then calibrated to match the existing trip making characteristics that are unique to Santa Barbara.

The model was validated and calibrated to Caltrans, Federal Highway Administration (FHWA), and Fehr & Peers' internal standards. Once the model met the required set of criteria to be deemed adequately validated and calibrated, the land use database was modified to reflect future development growth. This growth can be attributed to two sources:

1. Currently **pending**, **approved**, and **under construction** development projects. Forecasted amounts of growth were based on the extrapolation of historic trends for residential development, and existing and proposed policy caps for non-residential development. These forecasts account for planned and pending development projects, and;

2. The City's distribution of the **future growth and development** projected to occur under both the Alternative 1 and Alternative 2 scenarios.

In addition to the land use database changes, currently fully funded roadway improvements were added to the highway network database. These improvements generally consisted of the Measure D funded projects along the US-101 corridor between Hot Springs Road and Milpas Street. Examples of projects include the Cacique Street freeway under-crossing, the roundabout at Old Coast Highway and Hot Springs Road and Coast Village Road and the addition of a travel lane to both directions of US-101 between Milpas Street and Hot Springs Road. US-101 improvements are currently under construction from Milpas to Hot Springs and are anticipated to be complete by 2012.

The remaining sections of this memo present relevant portions of the existing conditions analysis, the results of the future Alternative 1 analysis, and the future Alternative 2 analysis for the *Plan Santa Barbara* study area, shown in Figure 1. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas in or near the City's Sphere of Influence. The study area includes all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence. The Santa Barbara Airport does not fit these criteria, and is not within the modeling framework. Airport existing and future conditions will be documented within the CEQA documentation for *Plan Santa Barbara*, based upon recently completed studies.

EXISTING CONDITIONS[3]

Average Daily Traffic Volumes

Average Daily Traffic (ADT) and AM and PM peak hour turning movement counts were collected in the *Plan Santa Barbara* study area in March 2008. Additional recent ADT counts were compiled from a variety of sources including Environmental Impact Reports (EIRs), the County of Santa Barbara count program, and Caltrans. These data were used to assess current traffic conditions in the City of Santa Barbara and inform the model development process.

Figure 2 illustrates existing ADT volumes on major thoroughfares in the study area. Certain travel patterns can be seen in the figure:

- As expected, the freeway carries the greatest daily volume of vehicles, reaching a peak of 133,000 vehicles per day (vpd) between Mission Street and Las Positas Roads.
- Arterial traffic volumes are generally greatest on segments approaching freeway ramps. This pattern is common throughout the United States, since these locations generally experience the most significant confluence of surface street traffic. The busiest locations include the following:

  - Carrillo north of US-101: 32,440 vpd
  - Mission north of US-101: 30,010 vpd
  - Milpas north of US-101: 28,640 vpd
  - Garden north of US-101: 24,630 vpd
  - State west of San Marcos Pass: 21,160 vpd
  - Las Positas north of US-101: 20,120 vpd

Peak Hour Freeway Volumes

Figure 3 illustrates peak hour freeway volumes for the base year. The following observations are shown in the figure:

- During the AM peak hour, traffic volumes on US-101 northbound reach their peak between Milpas Street and Garden Street. During the PM peak hour, traffic volumes peak on the US-101 northbound between Mission Street and Las Positas Road. During the AM peak hour, traffic volumes on US-101 northbound reach a peak of 6,430 vehicles per hour between Milpas and Garden Streets. These volumes do not exceed the capacity of this six-lane segment of US-101, which operates at LOS E during the AM peak.
- During the AM peak hour, traffic volumes on the two-lane segment of US-101 northbound reach a peak of 5,895 vehicles per hour south of Olive Mill Road. These volumes exceed

[3] Some relevant portions of the existing conditions data are presented here for comparative convenience. For a detailed presentation of existing transportation conditions in the City of Santa Barbara, please refer to *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008).

the capacity of this two-lane segment of US-101, which operates at LOS F during the AM peak.

- During the PM peak hour, traffic volumes on US-101 northbound reach a peak of 5,895 vehicles per hour between Mission Street and Las Positas Road. These volumes do not exceed the capacity of this three-lane segment of US-101, which operates at LOS E during the PM peak.
- Traffic patterns during the AM peak hour show directional peaking, where one direction of the freeway has substantially more traffic than the other, approaching Garden Street from the south. For example, northbound AM peak hour volumes of 6,430 peak trips north of Garden Street are nearly four times as great as southbound volumes of 1,718 trips. Northbound and southbound AM peak hour volumes are more in balance in the rest of the City.
- Although the southbound direction of the freeway carries more traffic leading up to Garden Street from the north, the volumes are not substantially higher than the opposing direction. This pattern suggests that residents of Santa Barbara interact more with areas to the north of the City, but the City draws visitors (especially employees) from both the north and the south, and more traffic passes through the City from the south to the north in the morning and from the north to the south in the evening.
- The PM peak hour shows less directional peaking. Volumes on US-101 southbound south of Garden Street do exceed the opposing flow, but not to the same extent as during the morning peak hour. Traffic volumes north of Garden Street show little if any directional peaking during the PM peak hour.
- During the PM peak hour, traffic volumes on the two-lane segment of US-101 south of the City also show directional peaking. However, this is not as pronounced as in the AM. While southbound PM volumes reach a peak of 4,545 vehicles per hour south of Olive Mill Road, northbound PM peak volumes of 2,926 vehicles per hour are substantially lower. Southbound PM peak volumes do not exceed the capacity of this two-lane segment of US-101, which operates at LOS E during the PM peak period.

Relatively high peak hour peak direction freeway volumes within the study area include:

- Northbound AM peak, west of Milpas, 6,430 vehicles per hour (vph)
- Northbound AM peak, west of San Ysidro, 5,895 vph
- Northbound AM peak, west of Carrillo, 5,719 vph
- Southbound PM peak, west of San Roque, 5,806 vph
- Northbound PM peak, west of San Roque, 5,853 vph
- Northbound PM peak, west of Mission, 5,895 vph

Peak Hour Intersection Level of Service Analysis

Table 1 and Figure 4 illustrate existing intersection level of service (LOS) at the 52 *Plan Santa Barbara* study intersections during the AM and PM peak hours. Three distinct intersection control types are present in Santa Barbara and were analyzed using their respective methodologies:

- Signalized intersections, which were analyzed using the Intersection Capacity Utilization (ICU) methodology;[4]
- Unsignalized, or stop-controlled, intersections were analyzed using the Highway Capacity Manual (HCM) unsignalized intersection methodology; and
- The Milpas Roundabout was analyzed using the HCM roundabout methodology.[5]

The intersection of Hot Springs Road & Coast Village Road was stop-controlled and was analyzed using the HCM unsignalized methodology for the existing conditions. This intersection was assumed to be controlled by roundabout in future 2030 conditions and was analyzed using HCM roundabout methodology for future 2030 conditions.

The City has a target LOS of C with a volume-to-capacity (V/C) ratio of 0.77 or less for signalized intersections and a target LOS of C with less than 22 seconds of delay for unsignalized intersections. There are currently 13 intersections exceeding this threshold during one or both peak hours, as shown in Table 2.

Other Measures of Effectiveness

In addition to roadway segment volumes and intersection LOS, other measures of effectiveness (MOEs) are often analyzed when considering the effects of different general plan development scenarios. These measures are discussed at the end of this document and include:

- **Vehicle Miles Traveled** (VMT) – a measure of total vehicle travel activity for the entire study area for a given scenario.
- **Vehicle Hours Traveled** (VHT) – a measure of total time spent traveling in vehicles in the study area affected by factors including length of trip making, amount of trip making and congestion levels.
- **Vehicle Trips** (VT) – the total number of vehicle trips made in the study area (including into, out of and through the study area).
- **Average Trip Length** – calculated by dividing the total VMT by the total number of vehicle trips.

Table 6 provides 2008 results for each of these measures. It should be noted that these numbers may be held artificially low. While many trips made within the study area are relatively short, most trips leaving the study area travel considerably further than the end of the model area (i.e., Ventura or Lompoc). These numbers represent only the portion of the trip in the study area.

FUTURE YEAR (2030) TRAFFIC CONDITIONS FORECASTS

Development of the Forecast Volumes

The development of the forecast volumes for this analysis followed the approach presented in the *National Cooperative Highway Research Program (NCHRP) Report 255* (Transportation

[4] Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity* (Transportation Research Board, 1980).
[5] Source for both unsignalized and roundabout methodologies*: Highway Capacity Manual* (Transportation Research Board, 2000).

Research Board, 1982). This method is the accepted professional standard for preparing traffic forecasts for urbanized area planning applications.[6]

The NCHRP Report 255 approach involves post-processing model data and applying the growth to existing counts collected in the field. The first step in the process is to run the validated base year model and collect data for the desired segments and intersection turning movements. The model is then updated with future year land use changes and highway network improvements and run again. The data for the same study segments and turning movements is again collected from the future year model run.

The data from both model runs is then compared and applied to the existing counts using one of three methods:

- The **difference method** – directly applies the difference between the future and base year model runs to the existing count.
- The **ratio method** – factors the existing counts by the ratio of the future year data to the base year data.
- The **combined method** – takes the average of the output from both the difference method and the ratio method.

In addition to the NCHRP process described above, more sophisticated trip adjustments were implemented within the modeling framework. These are described below. For background, however, it is helpful to understand the four area types developed for the Santa Barbara model. Area types are discussed in more detail in previous reports[7], and are summarized here and shown below.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation. Area type 2 represents the remaining "grid" portion of the City, and includes most of the Mobility-Oriented Development Area (MODA). This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center that attracts trips from outside areas.

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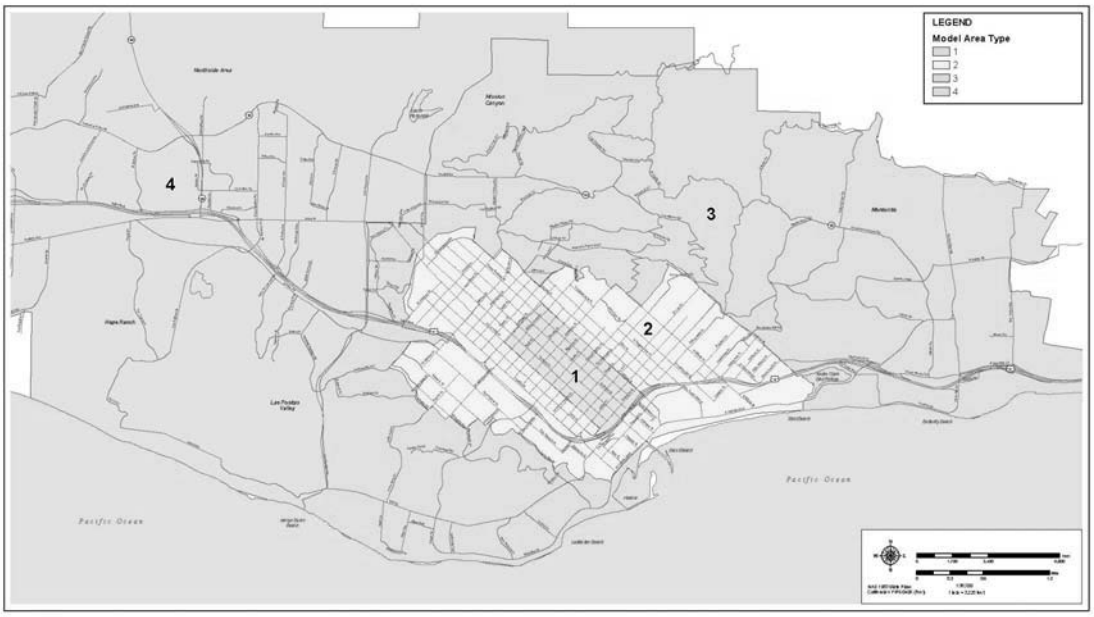
[6] While the NCHRP 255 method is the accepted professional standard, and post-processing model volumes is the typical approach to preparing traffic forecasts sub-regional models, it is by no means required and in certain situations it may be appropriate to use raw model output as opposed to post-processed count volumes. SBCAG, in *The Travel Forecast for Santa Barbara County*, did not post-process counts and instead reported raw model volumes. The differences between freeway volumes reported here, and those reported by SBCAG, are generally attributable to this difference in methodologies. Differences between forecasts in this case are logical and both approaches are technically correct. The reasons for SBCAG's decision to report model volumes can be found on page 12 of *The Travel Forecast for Santa Barbara County* (SBCAG, 2004).

[7] *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

When incorporating the estimated effects of policy-based trip-reduction strategies, peak hour vehicle trips starting and ending within the model area were reduced by a greater percentage than peak-hour vehicle trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not substantially affect trip making in other jurisdictions.



Travel Demand Model Area Types

Trip Adjustments for Land Use and Policy Strategies

As part of the *Plan Santa Barbara* General Plan Update, the City decided to develop a Travel Demand Forecasting model to support this and other long-range transportation planning efforts. The broadest *Plan Santa Barbara* circulation goals and policies cited in the Introduction – (1) a 50/50 mode share between the single occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions – find their manifestation in detailed implementation strategies in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09." Examining **Appendix A** reveals a very comprehensive approach to meet these goals and objectives, addressing the built environment, transportation-related policies, and transportation network assumptions.

The Santa Barbara Travel Model contains a number of enhancements that allow it to capture the effects of land use and policy initiatives contained in *Plan Santa Barbara* on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation network, parking management, and Travel Demand Management (TDM) programs. A more detailed analysis of how the fabric of urban design affects trip making and travel is also included. This is assessed using a modeling strategy known as the 4Ds, which includes an analysis of density, diversity, design, and destinations associated with the built environment.

More specifically, the Santa Barbara model features two key innovative components that are specifically intended to analyze the broadest circulation-related goals, policies, and objectives included in *Plan Santa Barbara* and articulated in **Appendix A**: the first component focuses on the built environment (the 4D process), and the second component focuses on transportation-related policies (policy-based trip reduction strategies). Each is discussed in concept below, and their effects are described during the presentation of No Project and *Plan Santa Barbara* model results.

Built Environment 4D Factors: Density, Diversity, Design, Destination - Overview

The following narrative, prepared by Reid Ewing[8], summarizes the 4D process and is included to provide an overview of the approach:

> Some of today's most vexing problems—sprawl, congestion, oil dependence, climate change—are prompting states and localities to turn to land planning and urban design for help in reducing automobile use. Many have concluded that roads cannot be built fast enough to keep up with travel demands induced by road building itself and by the sprawling development patterns it spawns. Travel demand must somehow be moderated.
>
> The potential to moderate travel demand through changes in the built environment is the subject of more than 150 empirical studies. It has become the most heavily researched subject in urban planning.
>
> In travel research, urban development patterns have come to be characterized by "D" variables.
>
> **D**ensity is measured in terms of activity level per unit area. Density may be measured on gross or net area basis, on a population or dwelling unit basis, and on an employment or building area basis. Population and employment density are two distinct dimensions. The two are sometimes summed to compute an overall "activity density."
>
> **D**iversity is related to the number of different land uses in an area and the degree to which they are "balanced" in land area, floor area, or employment. Entropy measures of diversity are widely used in travel studies. Job-housing or job-population balance measures are less frequently used.
>
> **D**esign includes street network characteristics within a neighborhood. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming "loops and lollipops." Street accessibility usually is measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. In the occasional study, design also is measured in terms of sidewalk coverage, building setbacks, streets widths, pedestrian crossings, presence of street trees, or other physical variables that differentiate pedestrian-oriented environments from auto-oriented ones.
>
> **D**estination accessibility is synonymous with regional accessibility. In some studies, regional accessibility is simply represented by distance to the central

[8] *Travel and the Built Environment*, Reid Ewing, 2009.

business district. In other studies, it is represented by the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model of trip attraction measures regional accessibility.

The 4D's compare the built environment characteristics of the future scenarios to the existing conditions on the ground as of March 2008. For each of the "D" variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each traffic analysis zone (TAZ[9]). The elasticities employed in the Santa Barbara model are as follows:

Variable[10]	**Vehicle Trip Elasticity**
Density	-0.04
Diversity	-0.06
Design	-0.02
Destination	-0.03

In practice, elasticity is a measure of the percentage change that occurs in an independent variable (vehicle trips) as a result of a percentage change in an influential variable (density, diversity, design, or destinations). For example, if vehicle trips decrease by -0.04 percent for each 1 percent increase in density, then vehicle trips are said to have an elasticity of -0.04 with respect to density. This technical memorandum documents changes between existing conditions and a future horizon-year scenario, in this case the No Project and *Plan Santa Barbara.*

Because the 4Ds are based on physical characteristics of the built environment, the calculation of these variables is an exercise in spatial modeling and the process is performed outside of the travel demand model using GIS desktop software. GIS files with land use data and the location of intersections are used as inputs. A "D" variable value for each TAZ is the output.

The density and diversity "D" variables for each TAZ take into account not only the total land use within that zone, but also the land use that is within a ¼ mile radius of that zone (¼ mile is assumed to be a reasonably conservative distance that people can easily walk). Both variables use employment and population as inputs. This process is designed to account for land uses that are "right across the street" for a person on foot or a bicycle, but would require a trip of a much longer distance if the traveler follows the model network. Thus these variables are calculated to take into account the experience of a person on foot or bike.

The design variable looks at street connectivity and sidewalk design. More connected streets (as opposed to cul-de-sacs for instance) generally allow for more direct walking and cycling, making these modes more attractive. The design variable uses the number of intersections within ¼ mile. Santa Barbara is a built-out city and there is only one notable change, the Cacique Street under-crossing, to street connectivity. Furthermore, with small block lengths, a dense grid network, and near complete sidewalk connectivity, Santa Barbara already reflects many of the

[9] Travel demand models use TAZs to subdivide the study area for the purpose of connecting land uses to the roadway network. For a detailed description of TAZs in the Santa Barbara Model refer to *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, 2009).

[10] Formulation of the equations uses the following data: For density, employment and population; for diversity, employment and population; for design (1) street density, (2) sidewalk completeness, and (3) route directness.

ideal urban design characteristics that the design "D" looks for. This is why trip generation rates in Areas Types 1 and 2 were found to be lower than national averages. As a result, the design "D" does not result in substantial vehicle trip reductions in Santa Barbara since most of the mode shift associated with it has already been achieved.

The destinations "D" is calibrated in the model structure using area types. Areas further from major regional commercial centers have higher trip rates, while areas closer to major regional commercial centers have lower trip rates. The geographic distribution of these regional commercial centers is not anticipated to change to any great extent, and so the future year scenarios carry forward the current rates for the destinations "D."

The "D" variables were calculated for both the Alternative 1 and Alternative 2 scenarios. Implementation of the 4D process is not mathematically linked to the area types discussed above. Area types were developed primarily for model calibration and validation purposes, and were used in the trip reduction strategy exercise (discussed below). There is no direct causal relationship between area types and the 4Ds. However, the *effectiveness* of the 4Ds is more pronounced in areas 1 and 2, and this is discussed in more detail later in this technical memorandum.

Policy-Based Trip Reduction Strategies: Overview

In addition to a land use plan, *Plan Santa Barbara* contains a number of policy initiatives and TDM strategies aimed at strengthening Santa Barbara's alternative transportation network and encouraging travelers to shift modes. A potential range of policies was outlined by City staff and their likely effect was investigated and reported in *Plan Santa Barbara Trip Reduction Impacts Analysis* (Nelson/Nygaard, 2009). The entire report is included as **Appendix B**. (Please note that Appendix B contains within its body Nelson\Nygaard-labeled Appendices A, B, C, D, and E).

Analytical Methodology Employed

In addition to a land use plan, *Plan Santa Barbara* contains a number of transportation policies, programs and initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed to estimate the effects of these peak-hour vehicle trip reduction strategies was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall *Plan Santa Barbara* policy (please see **Appendix A**). Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as TDM requirements for new development projects), while others could also reduce existing traffic congestion (such as an expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in peak-hour vehicle trips that could be anticipated with the a) continuation of existing

policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak hour vehicle trips in some areas and a lesser effect in others (please see discussion and figure above for location of area types).

Nelson\Nygaard estimates of the likely peak-hour vehicle trip reduction effects of *Plan Santa Barbara's* proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the *Plan Santa Barbara* context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis, we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

The analysis represents the highest and best professional standards of transportation planning. The team is confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak hour vehicle trip reduction benefits of transportation policies and programs under consideration in *Plan Santa Barbara*.

Overview of Analytical Outputs

Appendix B contains a detailed explanation of the methodology used and outputs of the analysis. Outputs of the analysis include a summary of the trip reduction strategies by area for each scenario, their effectiveness in daily versus peak hour contexts, and examples of these strategies. Highlights are provided below.

Summary of Outputs

Nelson\Nygaard's findings suggest that Santa Barbara can certainly reduce per capita vehicle trips with the implementation of trip reduction strategies. While the precise effects of specific trip reduction policies can vary depending on a number of factors, peer-reviewed empirical evidence, real-world experience of Santa Barbara[11] and other peer communities, basic economic theory,[12] and simple common sense provide overwhelmingly support for our findings in this report that a concerted and comprehensive effort to promote mode shift and reduce vehicle trips can be effective. The order-of-magnitude estimates of likely trip reduction effects for the four different policy scenarios and each potential policy are summarized below.[13]

[11] The trip reduction and mode shift effects of the City of Santa Barbara's, Metropolitan Transit District, and SBCAG's programs are documented in this report and in *Plan Santa Barbara: Transportation Existing Conditions Report* (AMEC Earth & Environmental, Inc., August 2008).

[12] An oft-repeated adage of economists to guide policymakers is to "Subsidize those behaviors you want to see more of and tax those behaviors you want to see less of."

[13] The full analysis and findings, including definitions of area types and trip types, are presented in **Appendix B**.

Aggregate Effects: Peak-Hour Trip Generation Reductions[14]

The aggregate order of magnitude reductions in peak-hour vehicle trips that result from implementation of a comprehensive package of strategies discussed in **Appendix B** are summarized below and in the table entitled "Summary of Estimated Reductions in Peak Hour Vehicle Trips," included at the end of this section.

- **No Project.**[15] In the "No Project" scenario, there will likely be no reduction in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- ***Plan Santa Barbara*.** In the "*Plan Santa Barbara*" scenario, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 25%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 5%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 5%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 2%
- **Alternative 1.** In the "Alternative 1" scenario, there will likely be no reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- **Alternative 2.** In the "Alternative 2" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 45%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 15%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

Stand-Alone Effects: Individual Strategies for Influence on Peak-Hour Trips[16]

The order-of-magnitude estimated reductions in peak-hour vehicle trips that result from implementation of individual strategies and the full findings and analysis are discussed in **Appendix B**. These estimates of the order-of-magnitude effects are based on the empirical

[14] The full analysis and findings are presented in **Appendix B**.
[15] No Project and *Plan Santa Barbara* were presented in *Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario, September 8, 2009*.
[16] The full analysis and findings are presented in **Appendix B**.

research of each strategy's influence on peak-hour vehicle trips (as presented in Appendix B and C) and tailored to the unique conditions in Santa Barbara to influence peak-hour vehicle trips, travel behavior and mode choice.[17] Based on these considerations, Nelson\Nygaard estimates that the most effective individual trip reduction strategies in Santa Barbara will likely be a continuation and/or enhancement of the following policies and programs:

- Public parking management/pricing to discourage commuter parking.
- Parking cashout programs, including a local ordinance.[18]
- Subsidized transit pass programs.
- Safe Routes to School, with an emphasis on education and capacity building, as well as physical improvements.
- Carpooling incentives.
- Telecommuting and alternative work schedules.

As discussed below, other strategies will certainly have a substantial effect on reducing peak hour vehicle trips (e.g., enhancements to transit service), but those effects could not be quantified at this time. For more information see "Effects of Some Strategies not Quantifiable with Available Information."

Reductions in Vehicle Trip Generation Rates versus Vehicle Ownership Rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies affect each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g., lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those effects are already accounted for by trip reduction strategies that we were able to quantify.

[17] Existing conditions are discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008). As noted in **Appendix B**, there are other strategies that can affect peak-hour vehicle trips (such as enhanced transit service, expanded bicycle networks, and sidewalk and pedestrian realm improvements). Some of these strategies have been excluded from the stand-alone analysis either because there was not enough data available to reliably analyze their effects at this time (e.g., transit enhancements), their effects were accounted for in another step in the analysis (e.g., bicycle network improvements), or their impacts on *commuter* peak-hour vehicle trips was estimated to be negligible and/or within the margin of error for the purposes of this analysis (e.g., pedestrian improvements, which are important to accommodate non-commuter/non-peak trips and support peak-hour transit commuters walking to transit, but do not have a substantial impact on commuter, peak-hour vehicle trips as the vast majority of Santa Barbara residents' and employees' homes and workplaces are not located close enough to allow them to walk to work).

[18] As discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008), the State of California has adopted an existing "Parking Cashout" law that requires certain employers who offer free parking to *any* employee to offer the cash value equivalent of the free parking space to *all* employees who choose not to use the employee-provided free parking space (i.e., to "cash out" their parking space). The California Air Resource Board (CARB) is nominally responsible for enforcement of these regulations, but does not have the resources necessary to do so effectively. For this reason, many local jurisdictions (such as Santa Monica, Los Angeles, and several jurisdictions in the San Francisco Bay Area) have already adopted or are currently exploring locally- or regionally-based mechanisms to monitor compliance of employers located in their jurisdictions. For new development/employers, the City can require as a condition of approval for entitlements that any employers located in the project annually submit proof of compliance. For existing development/employers, the City can require that proof of compliance be submitted at the same time employers apply for business license renewal or pay any local business taxes.

Effects of Some Strategies not Quantifiable with Available Information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely effect, we indicated in our analysis in **Appendix B** that the effect was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no effect on reducing vehicle trips in reality.* Instead, these designations mean that a) the effect on peak hour trips is not significant enough to model (e.g., the effect could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g., empirical research or published case studies) to allow us to document the precise trip reduction effects for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the effects of this strategy. We have therefore excluded the effects of certain strategies from this analysis in order to avoid the risk of misstating highly localized, context-dependent benefits (e.g., enhanced transit service) or to avoid "double counting" the benefits (e.g., pedestrian improvements adequately accounted for under "street connectivity" factor of the 4D model adjustments). [19]

Non-Additive Effects for each Policy Alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation of such policies and programs in order to understand the

[19] The trip-reduction effects of bicycle network improvements and bike share programs is a good example that can be elaborated on. Naturally there will be observable before-and-after effects (e.g., mode split, percent of bicycle commuters, etc.) with the implementation of discrete bike facilities (e.g., new on-street bike lanes filling in a network gap, a new bike/ped multi-use trail, retrofitting a bridge or other "missing link" with bike/ped infrastructure). We're aware of several before-and-after studies of discrete facilities (including studies from the City of Portland and San Francisco, as well as bicycle counts included in Santa Barbara's current *Bicycle Master Plan*). One problem with some of these studies is that it is often not clear how much of the observed increase in bicycle trips is a result of mode shift (e.g., *new* bike trips coming from other modes) and how much of the observed increase is actually due to bicyclists shifting routes (e.g., choosing to travel on the enhanced route rather than their former, perhaps suboptimal, route). Another problem is that we are not aware of any studies that disaggregate the increase in bicycle trips into commuter/peak trips and non-commuter/non-peak trips (which is the purpose of this study). For example: the available research only comments on general increases in bike commuting that result from the addition of bike facilities (0.0075% increase for each additional mile per 100,000 residents) and has basically nothing to say on the effect of bike facilities on peak-hour vehicle trips. None of these potential issues means that bicycle facility improvements shouldn't be implemented, it simply means that the current state of the research doesn't allow us to disaggregate the estimated reduction in peak-hour vehicle trips because we can't reliably derive an estimate of how many of the new bicycle trips are former auto commuters. So while bike facilities and bike share programs are recommended and certainly do have impacts (especially on non-peak, non-commuter trips) and should be continued to leverage network effects and build on the success of previous investments, we don't think the research currently exists to allow us to make a reliable estimate or peak-hour vehicle trips, which is the metric deployed in the traffic model. Finally, we believe that the net effect on peak-hour commuter vehicle trips in Santa Barbara would still be relatively small (perhaps a 2-3% reduction in peak-hour vehicle trips at the most) because a) many of the gains have already been realized from previous investment in bicycle facilities, b) Santa Barbara's unique geography (e.g., hills) limits the feasible catchment area for bicycle commuting and c) Santa Barbara's jobs/housing imbalance results in long commute distances for the low-income households that are pre-disposed to commute to work by bicycle. The same is true for research on bike sharing: the current research focuses on the increase in bicycling trips rather than the decrease in peak-hour commuter vehicle trips. Even if we could reliably derive an estimate of the vehicle trip reduction effects of bikeshare programs, we believe that – even if a very robust program were to be implemented in Santa Barbara – very few existing auto commuters would be able to commute daily via a bike share program (which requires a "bikeshare pod" within walking distance of both trip ends to avoid accruing usage fees for all day). However, bike share programs can support auto commuters switching to other modes (transit, carshare, etc.) by providing them with more mobility choices at the work destination should the need arise for an unscheduled trip that is too far to walk. Since bike share programs don't have a substantial *direct* effect on peak-hour commuter trips (but instead *indirectly* leverage the effectiveness of other programs), we have excluded them from our analysis.

actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occurs concurrently. For example, a city may implement a subsidized transit pass program at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater effects when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total effects that can be achieved. For these reasons, it is not prudent to expect that the stand-alone effects of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total effects of various strategies together. Because the transportation policies and programs under consideration in the various *Plan Santa Barbara* alternatives would be implemented concurrently as a package (in fact some trip reduction strategies are already in effect), we have estimated the total effect for each alternative using a non-additive methodology. For example, when summing the effects of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated effects of other trip reduction strategies when developing

The reductions in *Plan Santa Barbara Trip Reduction Effects Analysis* were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas (shown below) were reduced by different levels. Trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4. Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO MODEL DISCUSSION

4D Effects

The total amount of new growth projected in the Alternative 1 scenario is quite modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to the existing General Plan can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[20]	5.4 percent
Employment[21]	3.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated to change is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

Figure 5 illustrates the change in the density variable between existing conditions and the Alternative 1 scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. The figure illustrates that density increases are anticipated largely within the MODA boundaries, and these are modest based upon built environment assumptions. The darker green colors indicate the most pronounced change in density changes, resulting in the highest trip rate reductions. In outlying portions of Santa Barbara, large areas have minimal or no change, reflecting little change in density. Again, these density results show the extent to which the change in density is relatively higher or lower when comparing existing conditions and future conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Alternative 1 scenario. Diversity focuses on the relative mix of jobs and population relative to regional jobs and population, and the figure shows the rate of change between the two scenarios (existing conditions and the Alternative 1 scenario). These results are a direct derivation of built environment characteristics. The diversity variable reflects the degree to which an existing area has a jobs/housing mix more or less diverse than regional averages, and Figure 6 shows the extent to which that changed (the TAZ became more diverse) and effected vehicular traffic between existing conditions and the Alternative 1 scenario.

The 4Ds are an elasticity, and just as an increase in the "D" variables between existing and future conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

[20] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[21] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

Alternative 1 Policy-Based Trip Reduction Strategy Effects

There will likely be no reduction in peak-hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Commuter Trip Reduction Effects: 0%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%

Based on this conclusion, there is no effect of policy-based trip reduction due to the policy strategies for the Alternative 1 scenario. Please see **Appendix B** for the Alternative 1 conclusion for each strategy.

Alternative 1 Model Results

Figure 7 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2 (existing conditions). The figure illustrates a variety of trends, described below:

- Traffic volumes across all study segments are projected to grow by approximately 12% with the addition of the existing general plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 10%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 14%.

Future Alternative 1 Peak Hour Freeway Volumes

Figure 8 presents AM and PM Future (Year 2030) Alternative 1 scenario peak hour freeway forecast volumes. The figure illustrates the following trends:

- Overall, peak hour freeway volumes are projected to grow by 10.75% during the AM peak hour and 11.25% during the PM peak hour.
- As in the existing conditions, the travel patterns change slightly depending on whether one is looking at the volumes north or south of Garden Street. The additional southbound lane has the most pronounced impact south of Garden Street.
- Many of these freeway segments will be operating at or worse than LOS D, including sections operating at LOS F. Highlights include the following:
    - Freeway segments north of Carrillo will operate at LOS E or F during the PM peak hour in the southbound direction during both peak hours
    - Northbound 101 north of Milpas shows volumes exceeding theoretical capacities in the AM peak hour
    - Freeway segments south of Milpas will operate at LOS F, northbound in the AM peak hour
    - Freeway segments south of Hot Springs show volumes exceeding theoretical capacities, northbound in the AM peak hour and southbound in the PM peak hour

- As a result, the percentage growth in freeway volumes in the off-peak direction will likely outpace growth in the peak direction since the off-peak direction has more capacity to accommodate the growth. As mentioned, growth in traffic in the peak direction would likely take the form of peak spreading. This phenomenon is now common in the United States, where the peak period occurs for more than one hour during the evening.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 9.5% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 27% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 13.25% on US-101 northbound and while traffic volumes are projected to grow by 9.5% on US-101 southbound.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street. This is due to shifting travel patterns south of Garden Street and additional southbound capacity south of Garden Street.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street, growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two. This is primarily due to changes in capacity southbound south of Garden Street.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 20.25% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 14% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 7.75% on US-101 northbound and traffic volumes are also projected to grow by 9.5% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

Future Alternative 1 Peak Hour Intersection LOS

Table 3 and Figure 9 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, additional development under the existing general plan in the coming two decades will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represent 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. This number falls to 32 study intersections, or 62%, with further development under Alternative 1.

While this increase in deficient intersections is substantial, it should not necessarily be extrapolated to all intersections in the City. City staff specifically selected the study intersections for this analysis in areas with higher levels of activity and in places that were likely to become congested. It is likely that many intersections in areas removed from the City's major activity centers would not be affected to the same extent.

Figures 10 and 11 chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the Alternative 1 (2030) scenario, and the Alternative 2 (2030) scenario. Congestion levels are generally lower during the AM peak hour in both analysis years. When compared to existing conditions during the PM peak hour, Alternative 1 results in fewer A intersections, fewer B intersections, more C intersections, more D intersections, the same number of E intersections, and more F locations.

The greatest Alternative 1 congestion levels, as show on Figure 9, are currently experienced during the peak hours at or near freeway ramps. This trend will not only continue, but will escalate with the additional development Alternative 1, as shown by the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and four, or 25%, are deficient during both peak hours. These rates are substantially higher than for the study intersections as a whole, when 23% are deficient during one peak hour and 15% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, six, or 38%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

FUTURE (YEAR 2030) ALTERNATIVE 2 MODEL DISCUSSION

4D Effects

The total amount of new growth projected in Alternative 2 is relatively modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to Alternative 2 can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[22]	10.9 percent
Employment[23]	3.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

In addition, since the 4D effects measure change from a base condition, those communities with base level (1) higher density; (2) better diversity; (3) stronger design; and (4) establishment as a destination – compared to regional and national averages – will show less overall impact of the Ds when comparing base conditions with future conditions. In other words, if existing Santa

[22] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[23] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

Barbara transformed from low density, wholly residential, poorly connected, remote community to something just the opposite in the future, the Ds would show significant effects on trip generation between existing and future conditions. However, as the model effort shows, Santa Barbara's base condition is characterized by beneficial densities, good diversity, excellent design, and a strong role as a destination. It is therefore much more difficult to realize high trip reductions attributable to the Ds.

Figure 5 illustrates the change in the density variable between the existing conditions and the Alternative 2 scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. Overall, the changes are rather modest reflecting the magnitude of changes inherent in the built environment assumptions for Alternative 2 when compared to existing conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Alternative 2 scenario. The 4Ds are an elasticity, and just as an increase in the "D" variables between future and existing conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

An overview comparison of Figures 5 and 6, focusing on the Alternative 1 scenario and Alternative 2 reveals the following:

- Built environment assumptions reveal only modest changes in density compared to existing conditions. As discussed above, elasticities will be most noticeable in results when changes in a variable such as density have 50 percent, 100 percent, or even higher percentage changes compared to a base condition.
- Both scenarios include built environment assumptions that result in noticeable changes in diversity. The most pronounced effects are west of US-101 and south of State Street, indicating that is where the existing mix of jobs and housing was most purposefully altered.

These conclusions do not indicate that the D effects are not important. Quite the contrary, Santa Barbara happens to be characterized by effective density and diversity when compared to regional and national averages. However, the figures do show that major density and diversity changes – 50 percent, 100 percent, or more – would be necessary to alter the overall theme of Figures 5 and 6 for a city with substantial development. Such changes may be entirely inconsistent with other quality of life goals, policies, and objectives. The beneficial relationship between Santa Barbara's existing 4D qualities with policy-based trip reduction strategies, as discussed below, is significant.

Policy-Based Trip Reduction Strategy Effects

Alternative 2. In the "Alternative 2" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 45%
- Areas 3 & 4 Commuter Trip Reduction Effects: 15%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

This level of reduction is significantly higher than other studied scenarios; including *Plan Santa Barbara* and Alternative 1 (the latter has zero effects, as described previously). **Appendix B**

provides a detailed explanation for the sizable Alternative 2 reductions, which are primarily attributable to public parking pricing within the MODA and are summarized here:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour. These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail.
- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, “pay-by-cell,” etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with available spaces.

Alternative 2 Model Results

Figure 12 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2. The figure illustrates a variety of trends:

- Traffic volumes across all study segments are projected to grow by approximately 4% with the addition of the Alternative 2 development.
- Traffic volumes on freeway segments are projected to grow by approximately 5%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 2%.

Traffic volumes will increase on all facilities relative to existing conditions. Freeway volumes will see an increase roughly half of the Alternative 1 scenario, and surface streets will see a much lower increase than the Alternative 1 scenario. Surface street volume increases are directly attributable to land use changes inherent in the 2030 socioeconomic data set. For Alternative 2, increases attributable to new development are dampened by the 45 percent decrease associated with trip reduction strategies. Freeway volume changes are more complex.

The following table illustrates the percentage share of freeway volumes for both existing conditions and Alternatives 1 and 2:

Freeway Trip Category	**--------- Percentages of Total Traffic -------**		
	Existing	**Alt. 1**	**Alt. 2**
Internal trips (within model area)	24%	20%	23%
Internal-external trips	19%	16%	19%
External-internal trips	36%	36%	28%
Santa Barbara subtotal	*79%*	*73%*	*71%*
External-external (through)	21%	27%	29%
Total Freeway	100%	100%	100%

This indicates that fewer Santa Barbara internal trips will utilize the freeway in the future when compared to existing conditions. The Alternative 2 results indicate that the overall commute pattern has changed, with more Santa Barbara residents working within the City, plus more Santa Barbara residents are commuting to jobs outside Santa Barbara (both relative to existing conditions).

Future Alternative 2 Peak Hour Freeway Volumes

Figure 13 presents AM and PM Future (Year 2030) Alternative 2 scenario peak hour freeway forecast volumes. The figure illustrates the same general trends as the Alternative 1 scenario, though the increases are less than the Alternative 1 scenario:

- Overall, peak hour freeway volumes are projected to grow by 2% during the AM peak hour and 4.5% during the PM peak hour.
- In general, peak hour freeway volumes show the same pattern and trends as the Alternative 1 scenarios, with a slightly smaller increase over the existing conditions.
- Overall highlights include the following:
    - Freeway segments north of Mission and south of SR-154 will operate at LOS E northbound during the PM peak and at LOS F southbound during the PM peak
    - The northbound 101 segment north of Milpas will operate in excess of its theoretical capacity during the AM peak hour
    - Freeway segments south of Hot Springs show volumes that exceed the freeway's theoretical capacity, northbound in the AM peak hour and southbound in the PM peak hour

As described, peak hour forecasts that indicate volumes in excess of capacity point to peak hour spreading, since these oversaturated conditions cannot be achieved during one peak hour.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 0.19% (i.e. less than one percent) on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 18% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 2.25% on US-101 northbound while traffic volumes are projected to grow by 0.19% (i.e. less than one percent) on US-101 southbound.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 16.75% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 1.15% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 1.35% on US-101 northbound and traffic volumes are also projected to grow by 4.63% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

In general, there are consistent differences between freeway segment peak hour forecasts when comparing Alternative 1 (Figure 8) with Alternative 2 (Figure 13) volumes – Alternative 2 is uniformly lower. Although Alternative 1 has less additional housing growth than Alternative 2, the aggressive Alternative 2 trip reduction strategy implementation more than offsets this housing increase.

Future Alternative 2 Peak Hour Intersection LOS

Table 5 and Figure 14 illustrate AM and PM peak hour LOS at the 52 Alternative 2 study intersections. As the data show, development of Alternative 2 will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represents 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. Under the Alternative 1 scenario, this number falls to 32 study intersections, or 62%. Under Alternative 2, 37 study intersections, or 71%, will operate at or better than the City's LOS standard during both peak hours.

As mentioned, the study intersections were selected in the areas most likely to become congested, and so the results should not necessarily be extrapolated to the City as a whole. Notably, the peak hour conditions at the study intersections do deteriorate from the existing

conditions however, they do not fall to the same level as conditions under the Alternative 1 scenario.

Figures 10 and 11, chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the Alternative 1 (2030) scenario, and the Alternative 2 (2030) scenario. When compared to existing conditions, Alternative 2 results in more intersections operating at LOS C or better, more D intersections, fewer E intersections, and more LOS F intersections. At the D/E/F level, Alternative 2 is actually fairly close in performance to existing conditions. The aggressive Alternative 2 trip reduction strategy implementation is primarily responsible for this conclusion.

Traffic forecasts for the Alternative 2 scenario show fewer poorly performing intersections than the existing conditions compared to the Alternative 1 scenario. However, the intersections with the greatest levels of congestion are typically freeway ramps, or within ¼ mile of freeway ramps. The other continuing trend is that traffic volumes increase less than under the Alternative 1 scenario, including the following:

- 16 of the study intersections include freeway ramps. Seven of these intersections, or 44%, are deficient during at least one peak hour and three, or 19%, are deficient during both peak hours. These rates are higher than the study intersections as a whole, when 19% are deficient during at least one peak hour and 10% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, four, or 25%, are deficient during at least one peak hour.

Other Measures of Effectiveness

Table 6 illustrates four macro-scale MOEs used to compare general plan scenarios. The trends these measures show are consistent with the trends shown in the segment volumes and intersection levels of service. In general, both Alternatives 1 and 2 show increases in travel, and in general the Alternative 2 scenario shows noticeably smaller increases in travel than the Alternative 1 scenario. The trip reduction effect is strong enough in Alternative 2 that vehicle hours traveled (VHT) is actually lower for Alternative 2 than existing conditions.

Average vehicle trip length increases slightly for Alternative 1 and is stable for Alternative 2 when compared to existing conditions. There are two factors causing this number to rise between the existing conditions and the future conditions, and again slightly between the Alternative 1 scenario and the Alternative 2 scenario. The first is that Santa Barbara will continue to attract more trips than it generates. As such, people will continue to visit Santa Barbara to work, shop, and recreate. Having more travelers entering and exiting the study area means more travelers making the longest trip measurable in the model area.

The second factor contributing to the rise in average trip length is the expected mode shift as quantified by the 4Ds and the policy based reductions. In general, these factors are more likely to reduce shorter vehicle trips than longer vehicle trips. People who are currently driving to meet their basic needs – a trip to the grocery store, drug store, or dry cleaners – may now be able to meet these needs without the use of a vehicle. Even when longer range trips see a shift to another mode (e.g., a work trip), there is often a corresponding shorter range trip that also shifts to another mode (e.g., a lunch trip). Thus, a mode shift in common shorter range trips can actually serve to increase the overall average vehicle trip length.

Overall the forecast results presented show a logical consistency with the differences in policies and land use between the two future scenarios and the existing conditions.

CONCLUSIONS BASED ON ALTERNATIVES 1 AND 2 MODEL RUNS

Based on the results of the Alternative 1 and 2 model runs, we can discern the following:

1. Alternatives 1 and 2 perform similarly *when compared to existing conditions* at LOS F, with both Alternatives resulting in more F intersections. Alternative 2 is performing better at the intersection level during both peak hours when compared to Alternative 1.

2. Alternative 2 includes two key components that result in relatively more favorable intersection results when compared to Alternative 1: (1) additional Alternative 2 housing keeps more trips within Santa Barbara; and (2) the aggressive Alternative 2 trip reduction strategies have a significant effect on intersection LOS when compared to Alternative 1.

3. The results indicate that lower growth (Alternative 1) provides less favorable intersection LOS than more housing combined with aggressive trip reduction effects (Alternative 2). This finding is consistent with one of the conclusions stated in the review of *Plan Santa Barbara* -- the total amount of new growth projected in Alternatives 1 and 2 is relatively modest compared to the quantity of existing development given the 22-year time horizon; major reductions in the sheer amount of growth are therefore not a recommended strategy.

4. The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities we use are conservative, so we are not experiencing dramatic 4D-related effects when we compare existing conditions with Alternatives 1 and 2; and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter. Where there is the opportunity to guide new development between multiple locations, such more housing within the MODA (Alternative 2), beneficial LOS conditions are evident.

5. Peak hour commute trips continue to be an issue, as evident in (1) continued intersection LOS issues at all ramp terminals; and (2) average vehicle trip length getting slightly higher with Alternatives 1 and 2. Alternative 2 addressed these issues by (1) adding additional housing in the Downtown core and in the MODA; reducing non-residential development in the MODA; and (3) implementing an aggressive parking pricing program. The result is that with Alternative 2, most of the remaining intersection LOS failure occurs at or near freeway ramp terminals.

6. Santa Barbara is an existing and projected job-rich area. Non-residential trips are projected to grow at a greater rate than the residential trips. Alternative 2 demonstrated favorable intersection results relative to Alternative 1 in part by increasing housing and decreasing non-residential development within the MODA.

7. Santa Barbara currently exhibits strong directional peaking characteristics. Future land use scenarios that follow existing patterns will lead to further increases in peak hour, peak direction traffic. Areas within the City that have strong peak hour/peak direction flows often have underutilized capacity in the off-peak direction. Alternative 2 features a different development pattern, with resulting difference in commute patterns, which compliments this available capacity. Specifically, the additional housing in the MODA, combined with a reduction in non-residential development, means more workers seeking jobs outside Santa Barbara. These new workers will utilize the relatively less congested reverse peak direction. In other words, additional Alternative 2 scenario housing growth in the MODA would occur with less pronounced level of service degradation. The strong

Alternative 2 TDM measures would simultaneously reduce the effect of peak hour, peak direction traffic on sensitive intersections.

8. The trip reduction strategies articulated in Nelson\Nygaard's work are very effective at reducing vehicle trips compared to scenarios without the strategies. Trip for trip, they are going to have a more significant incremental effect than the 4Ds *because many of the trip reduction strategies are not already in place – and those that are in place could be enhanced and expanded – and therefore have a more pronounced impact on existing and future trips*. This was demonstrated clearly with Alternative 2.

FIGURES:

1. PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS

2. EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES

3. EXISTING (YEAR 2008) PEAK HOUR FREEWAY FORECAST VOLUMES

4. EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE

5. PERCENT CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE ALTERNATIVE 1 AND ALTERNATIVE 2 SCENARIO

6. PERCENT CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE ALTERNATIVE 1 AND ALTERNATIVE 2 SCENARIO

7. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

8. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

9. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

10. AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

11. PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

12. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

13. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

14. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

TABLES:

1. YEAR 2008 WEEKDAY EXISTING CONDITIONS INTERSECTION LEVELS OF SERVICE

2. SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER

3. YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS INTERSECTION LEVELS OF SERVICE

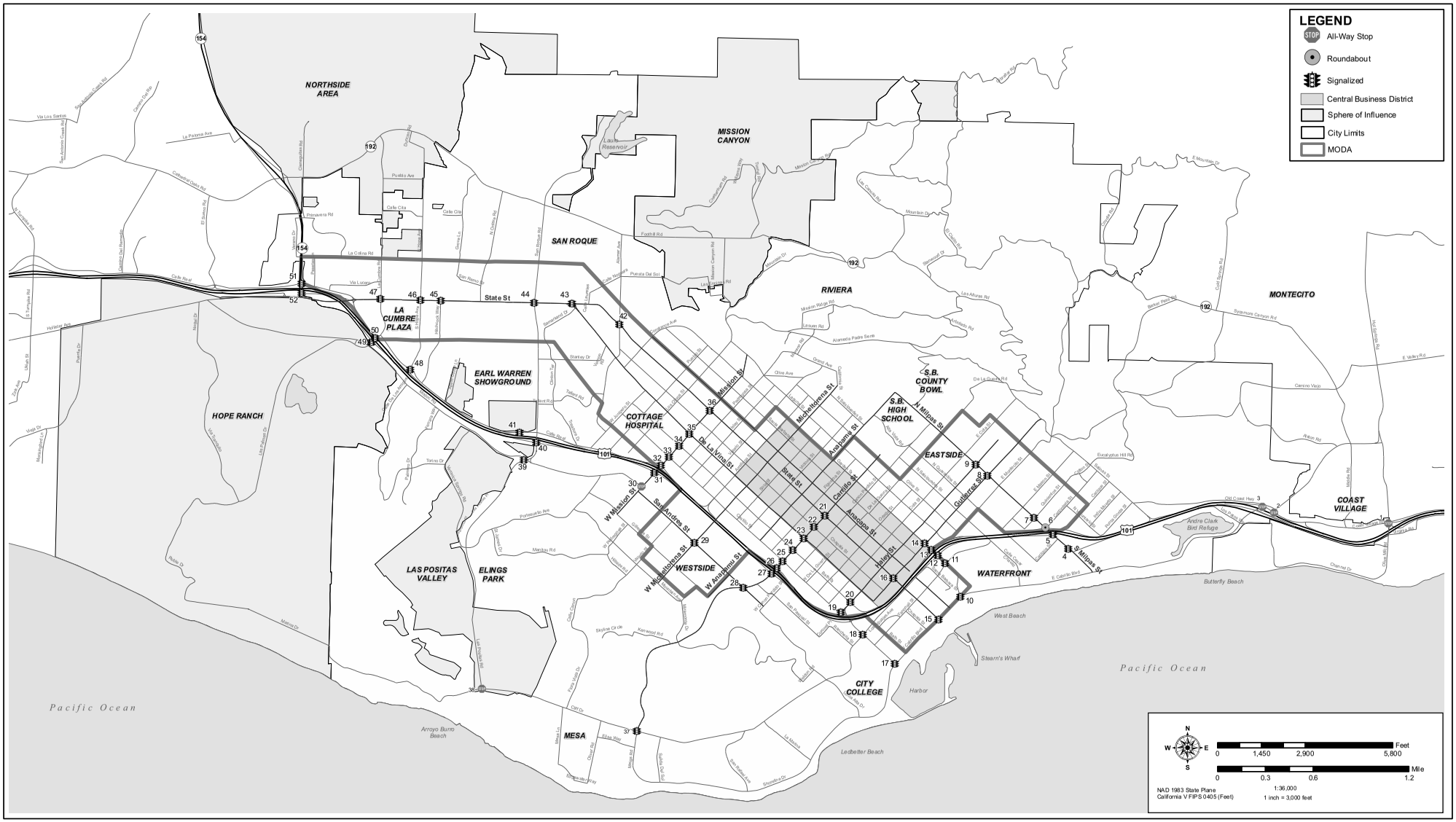
4. NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

5. YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 2 CONDITIONS INTERSECTION LEVELS OF SERVICE

6. MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

APPENDIX A: Plan Santa Barbara EIR Assumptions 4-15-09 (City of Santa Barbara)

APPENDIX B: Nelson\Nygaard Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis 7-8-09



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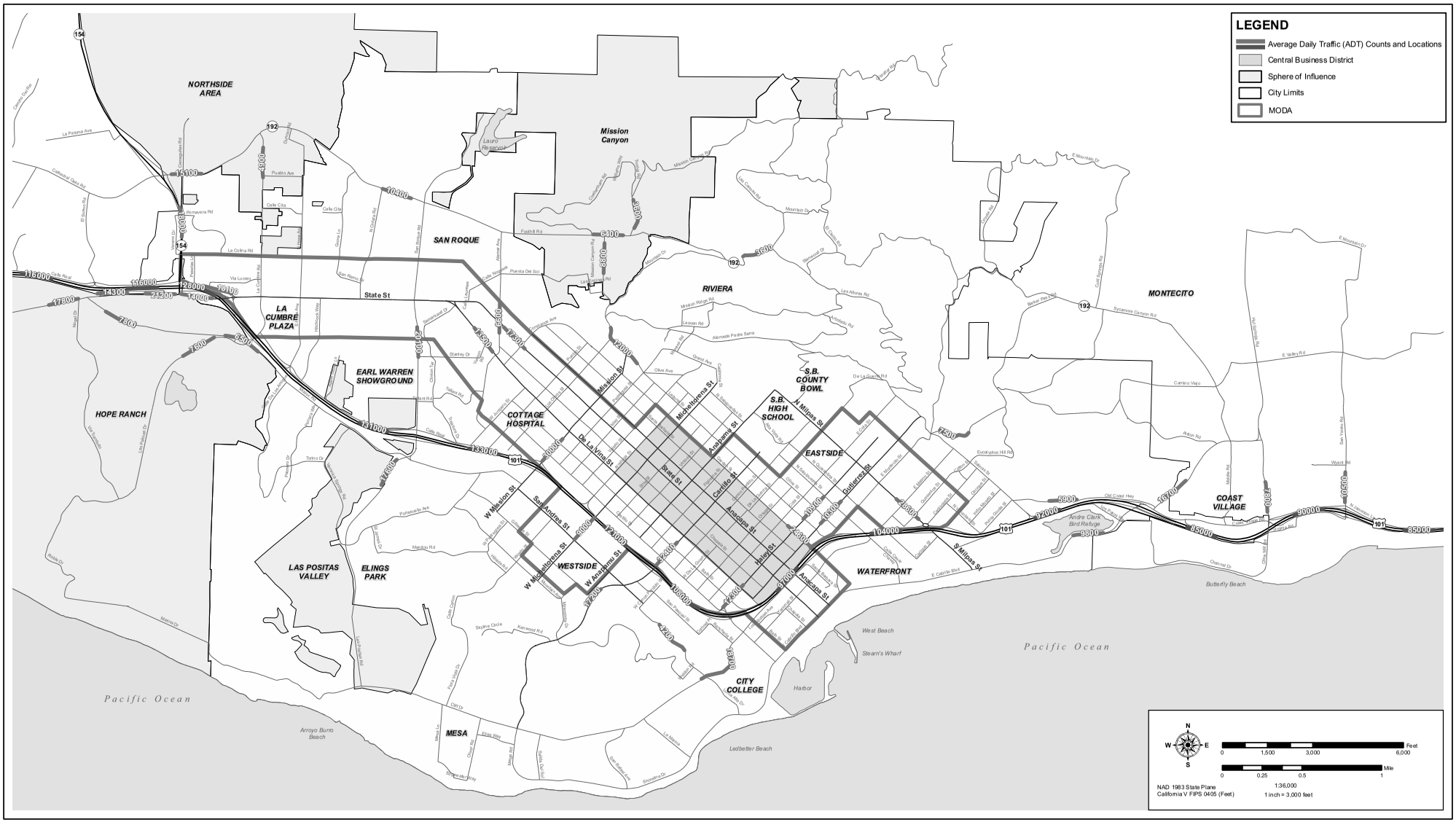
PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS
FIGURE 1



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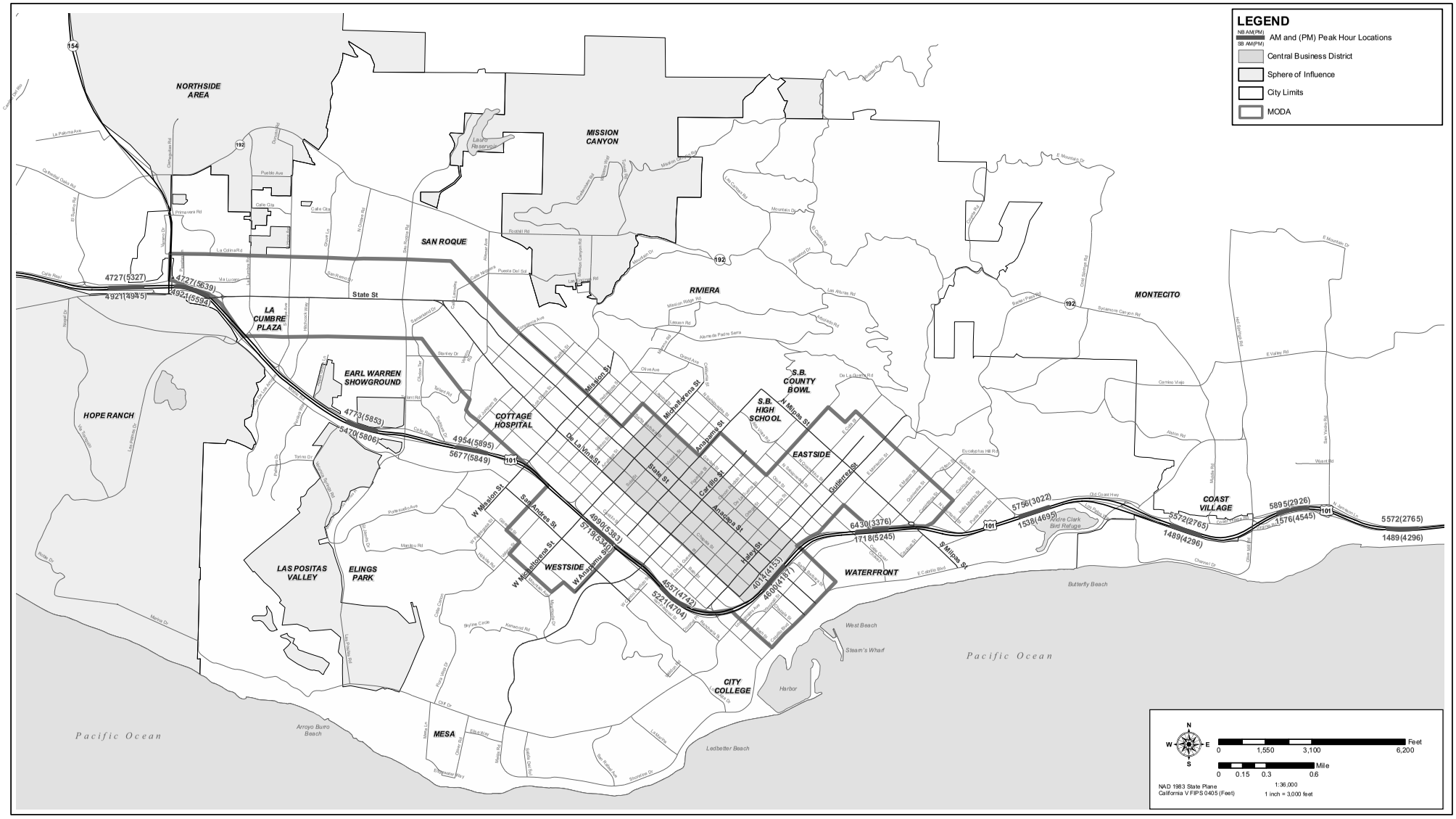
EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES
FIGURE 2



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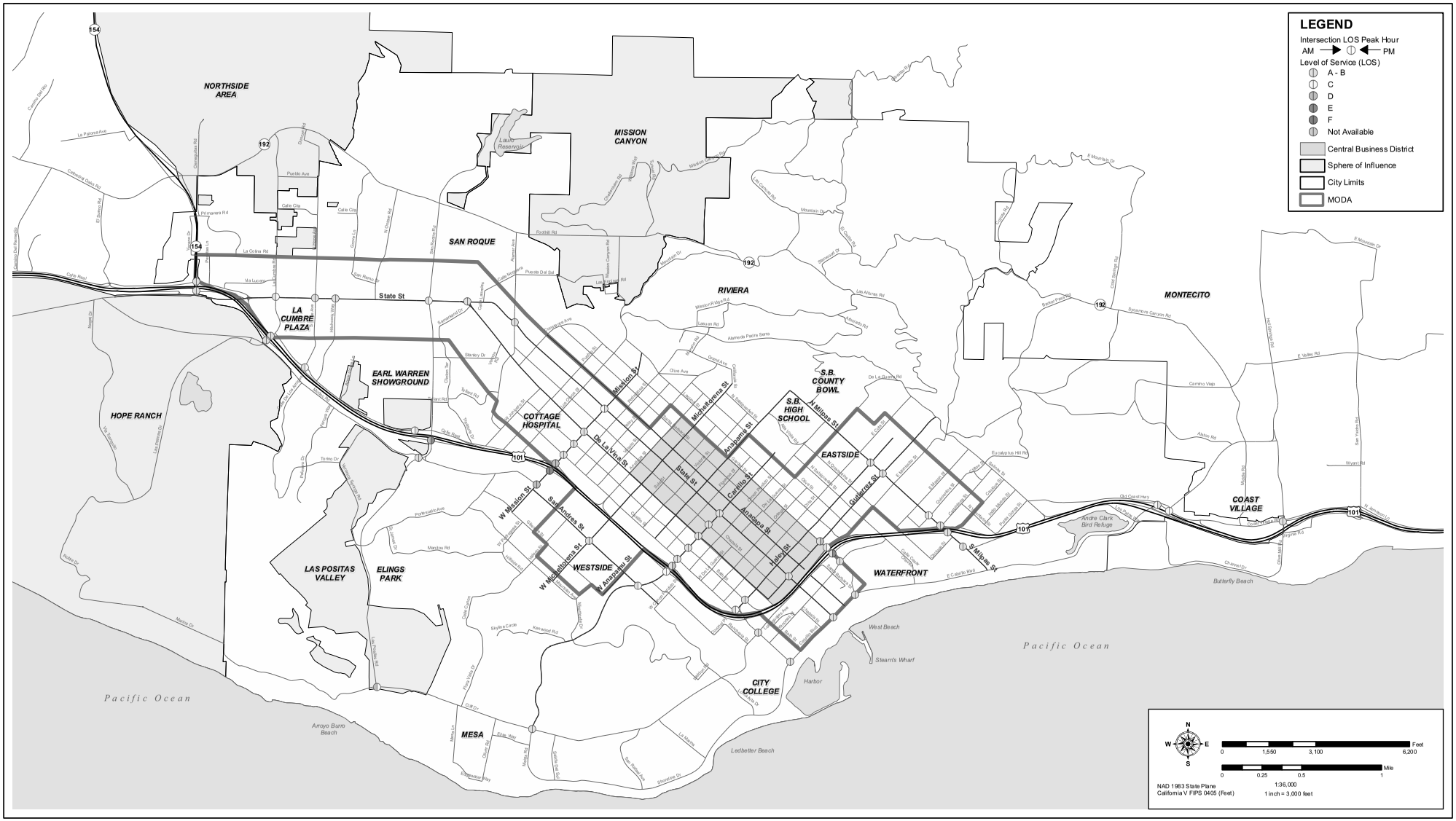
EXISTING (YEAR 2008) PEAK HOUR FREEWAY VOLUMES
FIGURE 3



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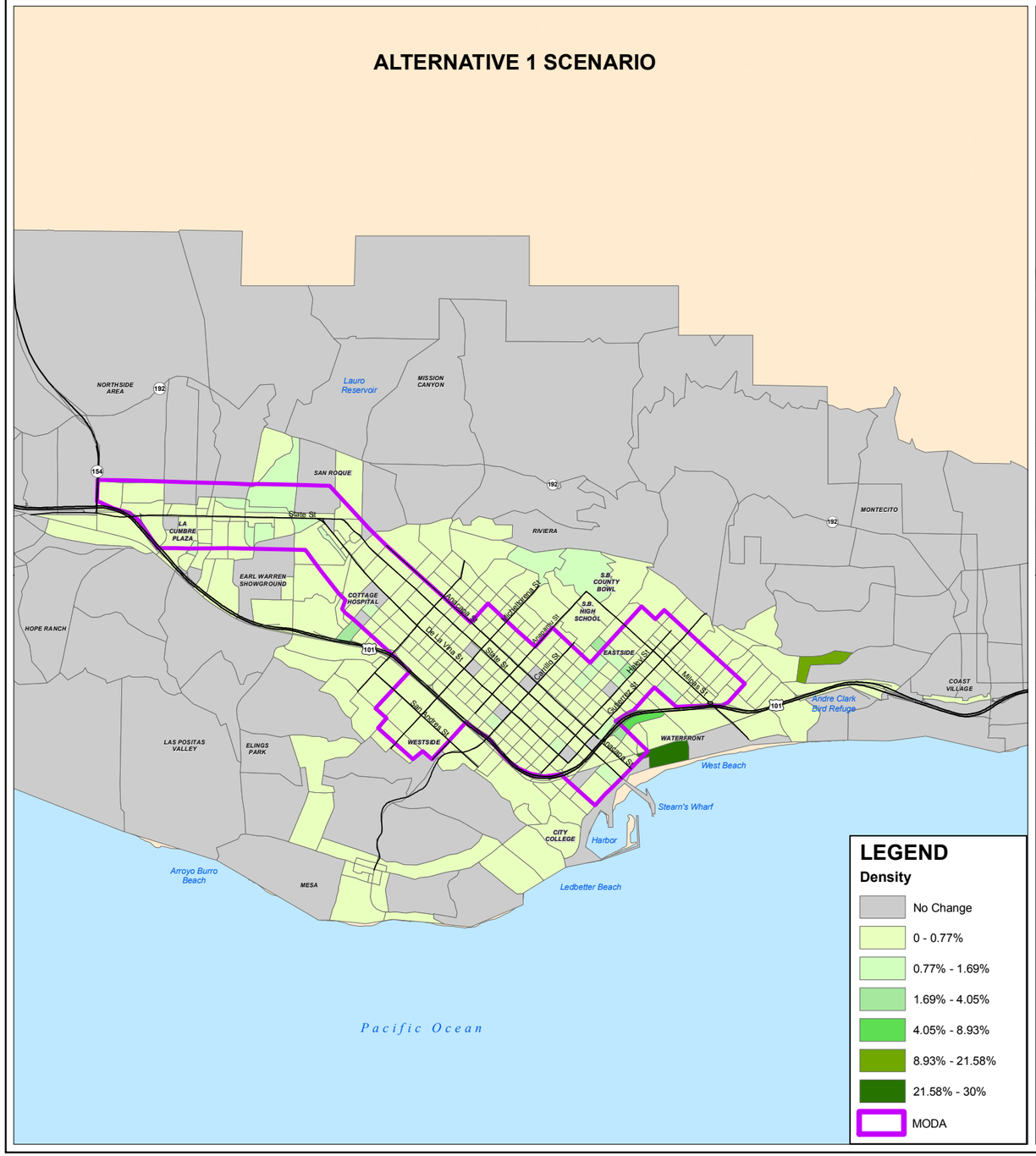
EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE
FIGURE 4

ALTERNATIVE 1 SCENARIO

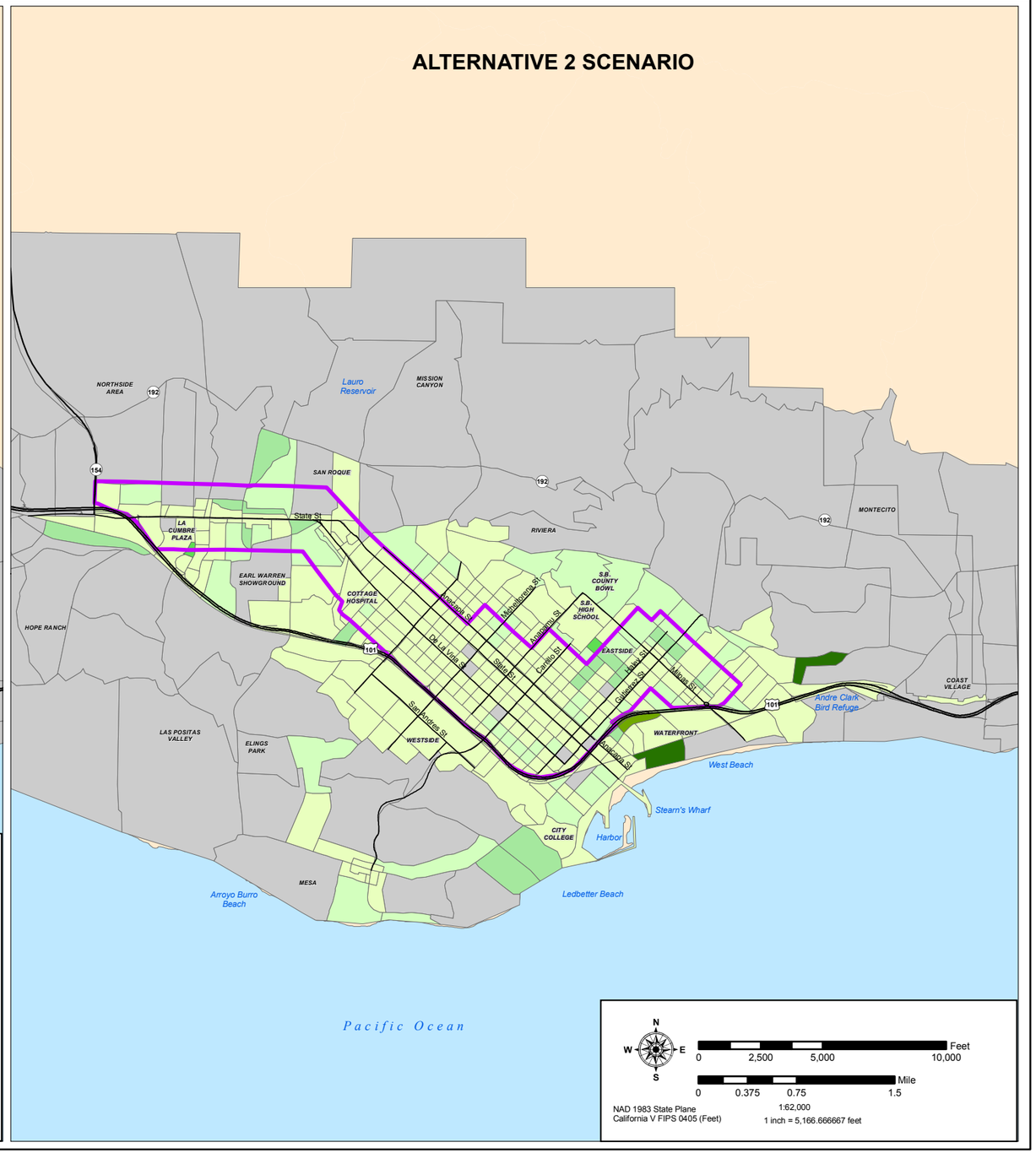


LEGEND

Density

- No Change
- 0 - 0.77%
- 0.77% - 1.69%
- 1.69% - 4.05%
- 4.05% - 8.93%
- 8.93% - 21.58%
- 21.58% - 30%
- MODA

ALTERNATIVE 2 SCENARIO



N
W E
S

Feet
0 2,500 5,000 10,000

Mile
0 0.375 0.75 1.5

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000
1 inch = 5,166.666667 feet

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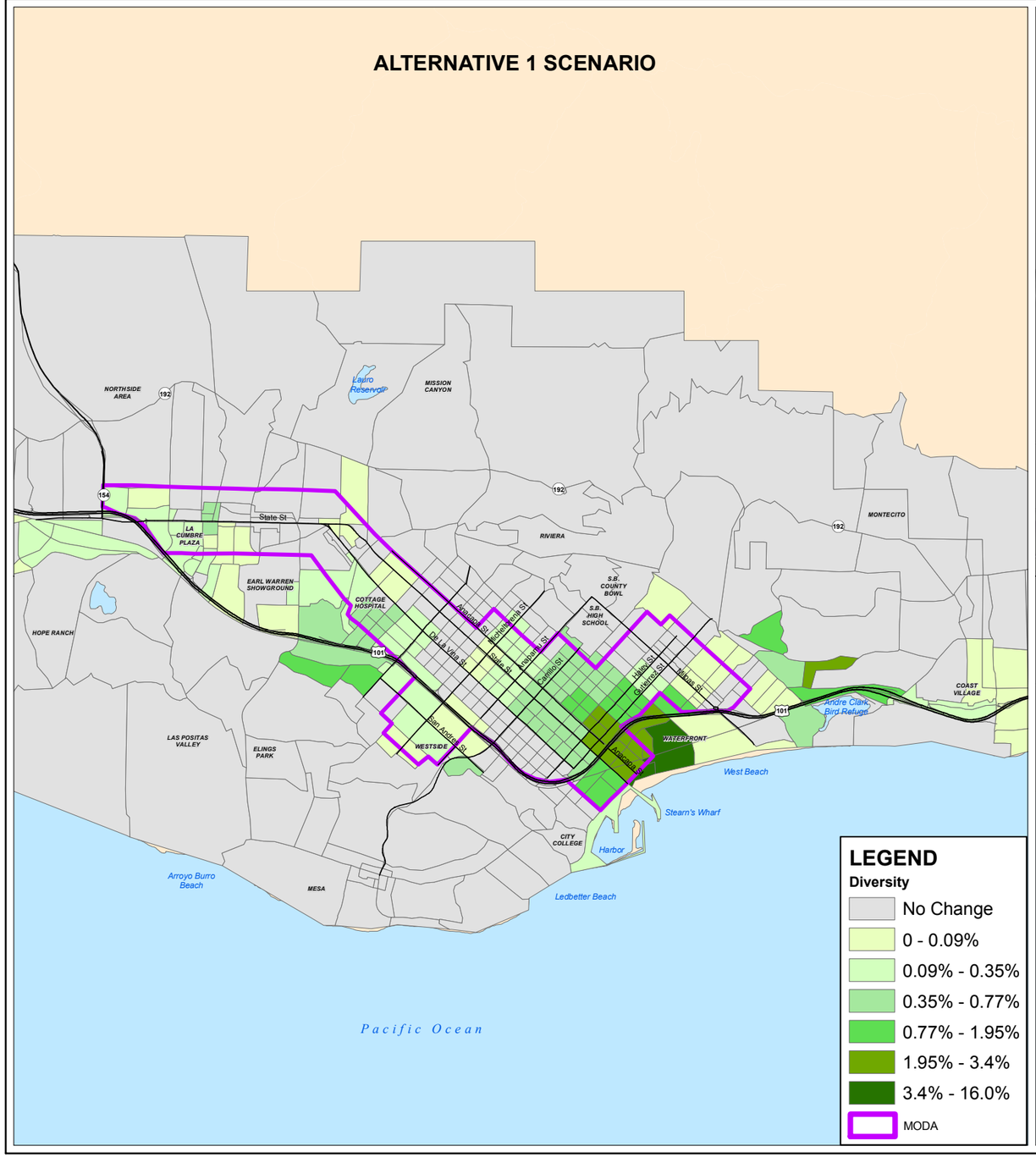
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE *ALTERNATIVE 1* AND *ALTERNATIVE 2 SCENARIO*

FIGURE 5

ALTERNATIVE 1 SCENARIO

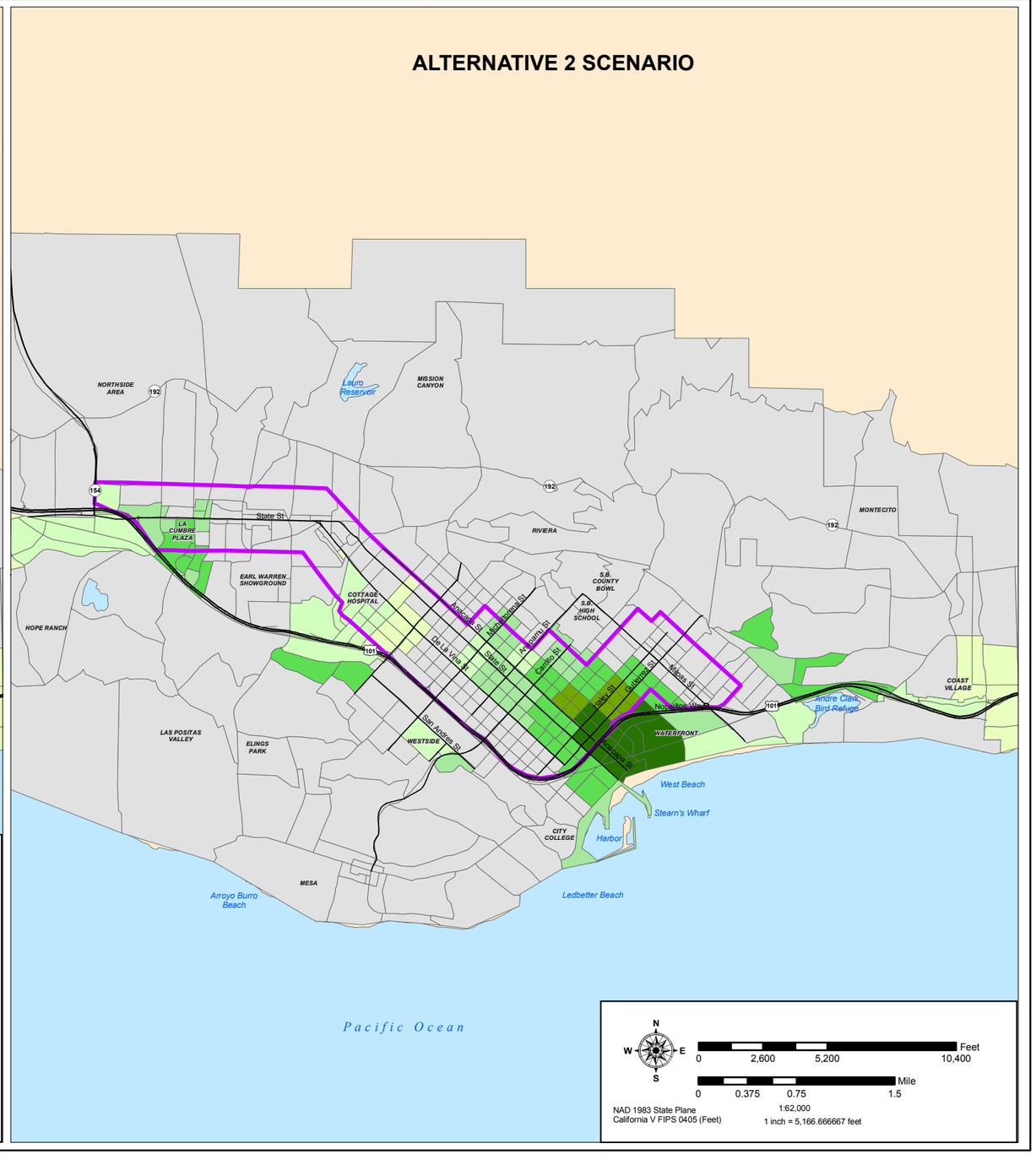


LEGEND

Diversity

- No Change
- 0 - 0.09%
- 0.09% - 0.35%
- 0.35% - 0.77%
- 0.77% - 1.95%
- 1.95% - 3.4%
- 3.4% - 16.0%
- MODA

ALTERNATIVE 2 SCENARIO



N
W E
S

0 2,600 5,200 10,400 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000

1 inch = 5,166.666667 feet

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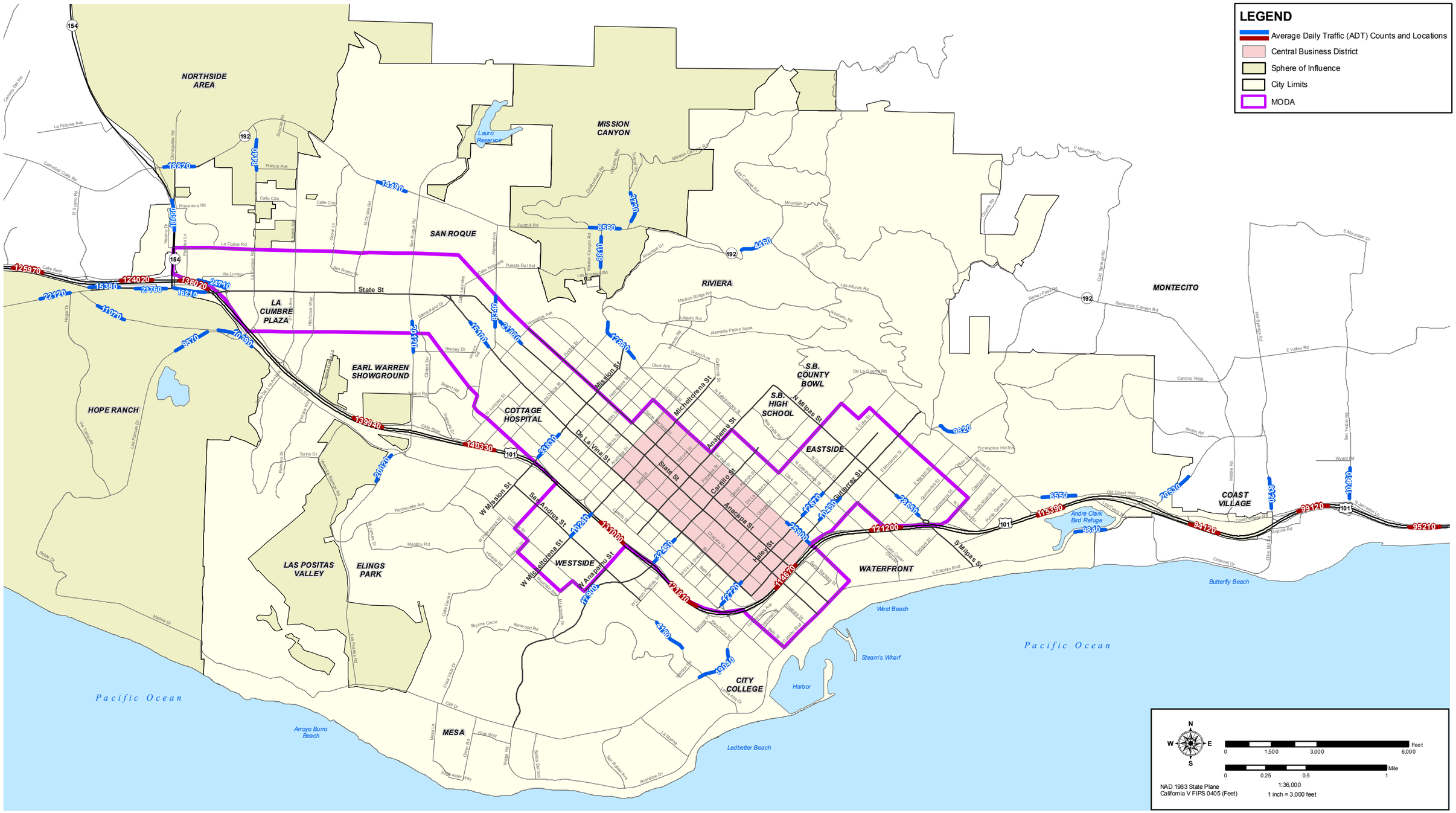
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE *ALTERNATIVE 1* AND *ALTERNATIVE 2 SCENARIO*

FIGURE 6



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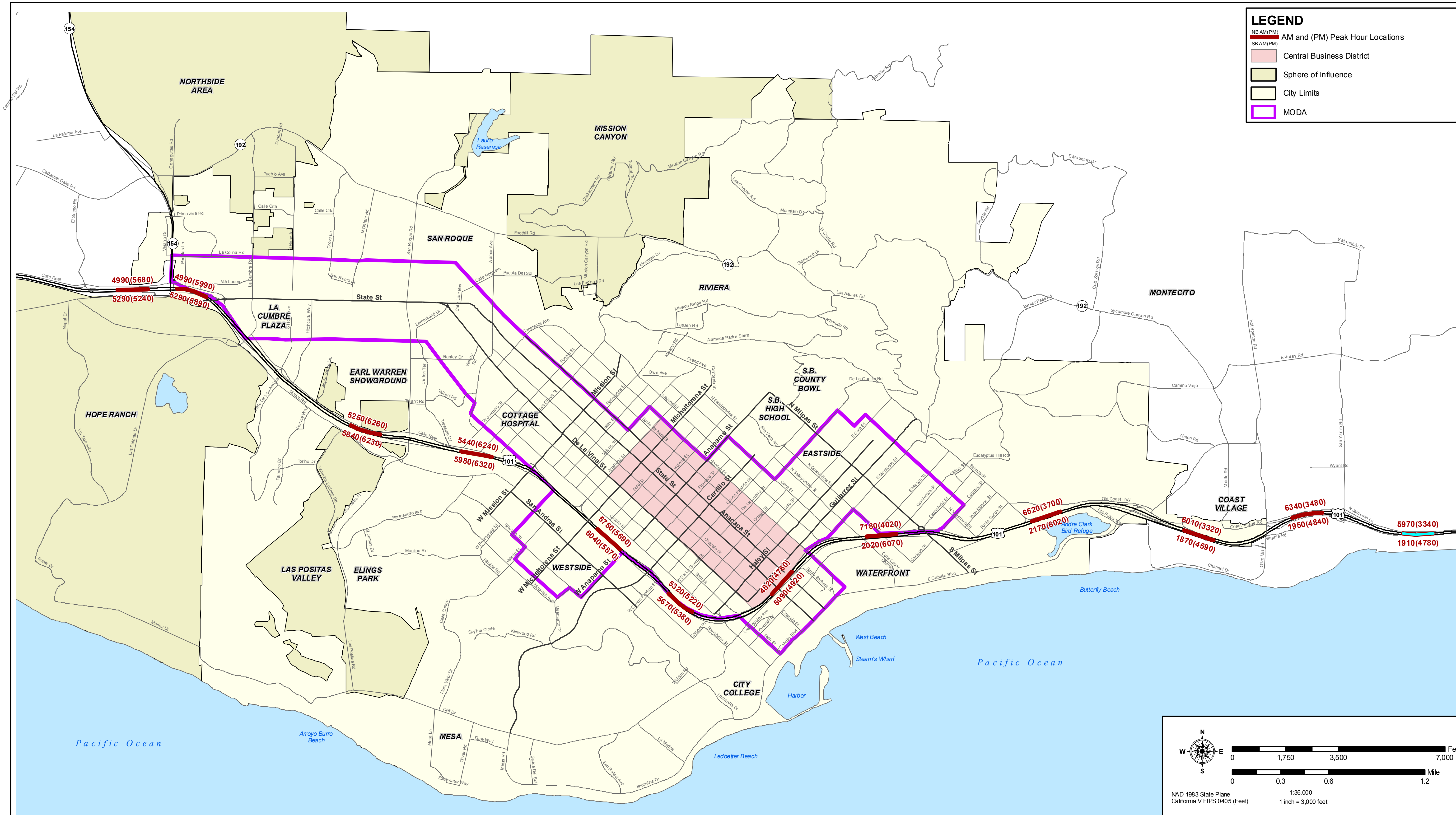
FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 7



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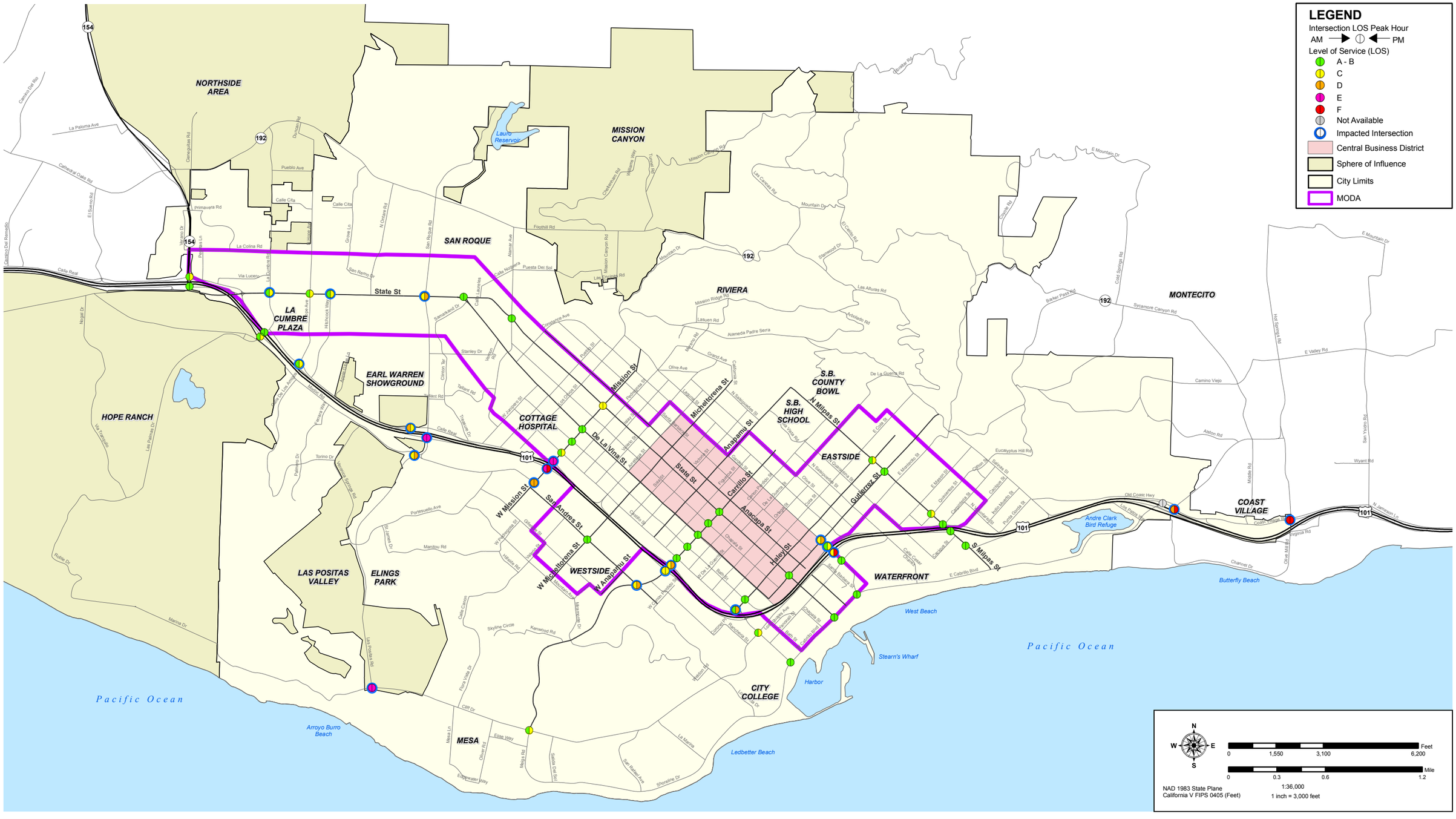
FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 8



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FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 9

FIGURE 10
AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

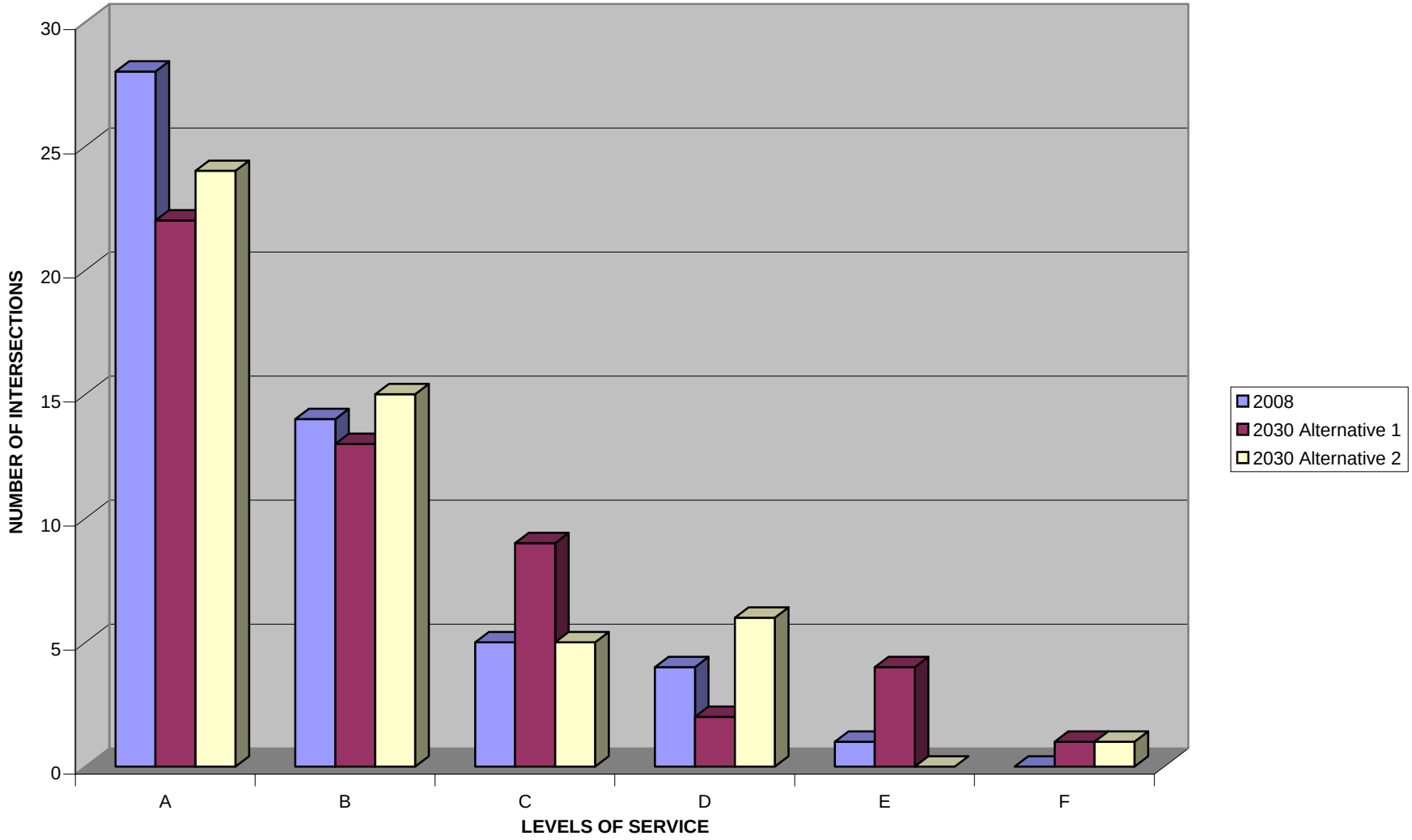
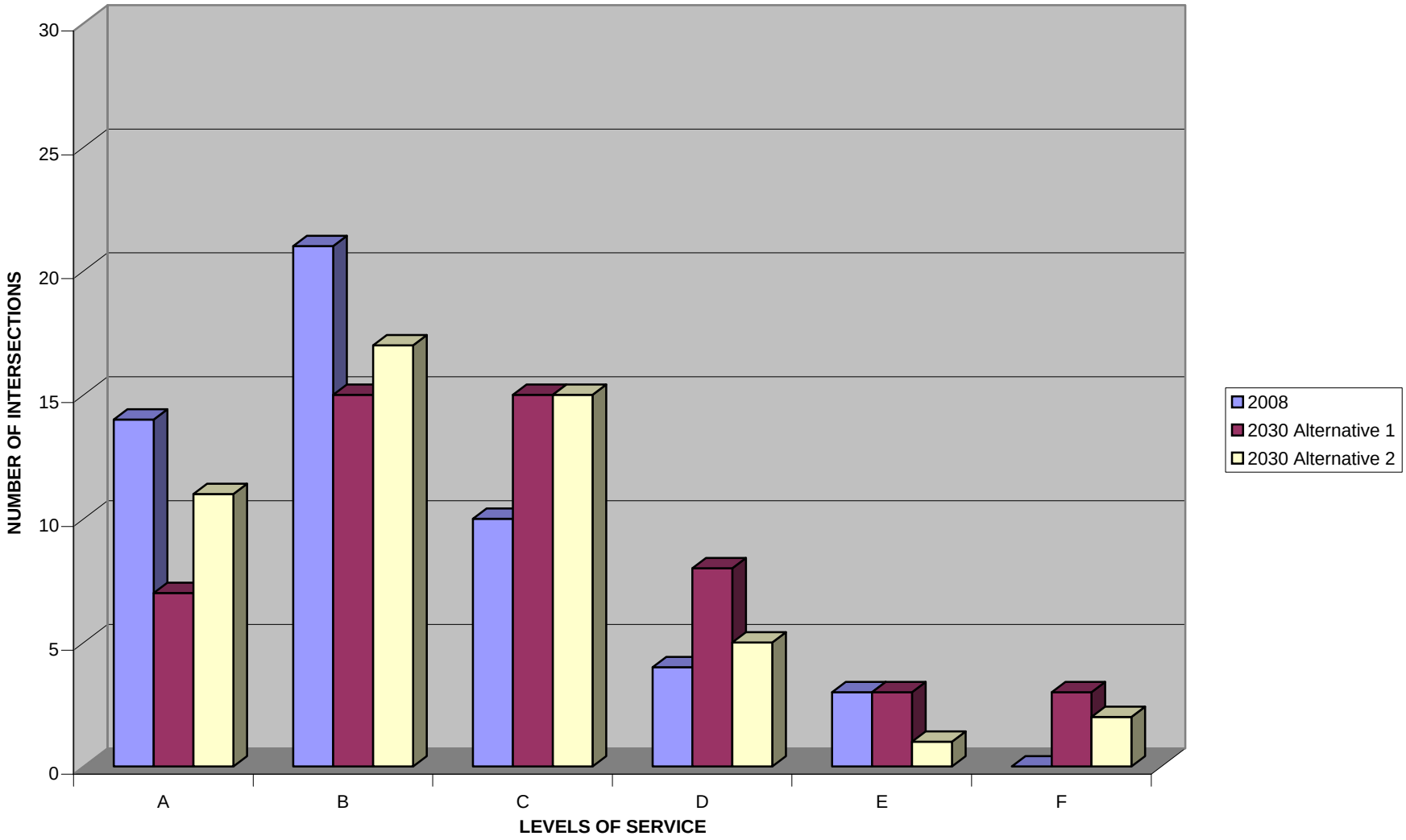
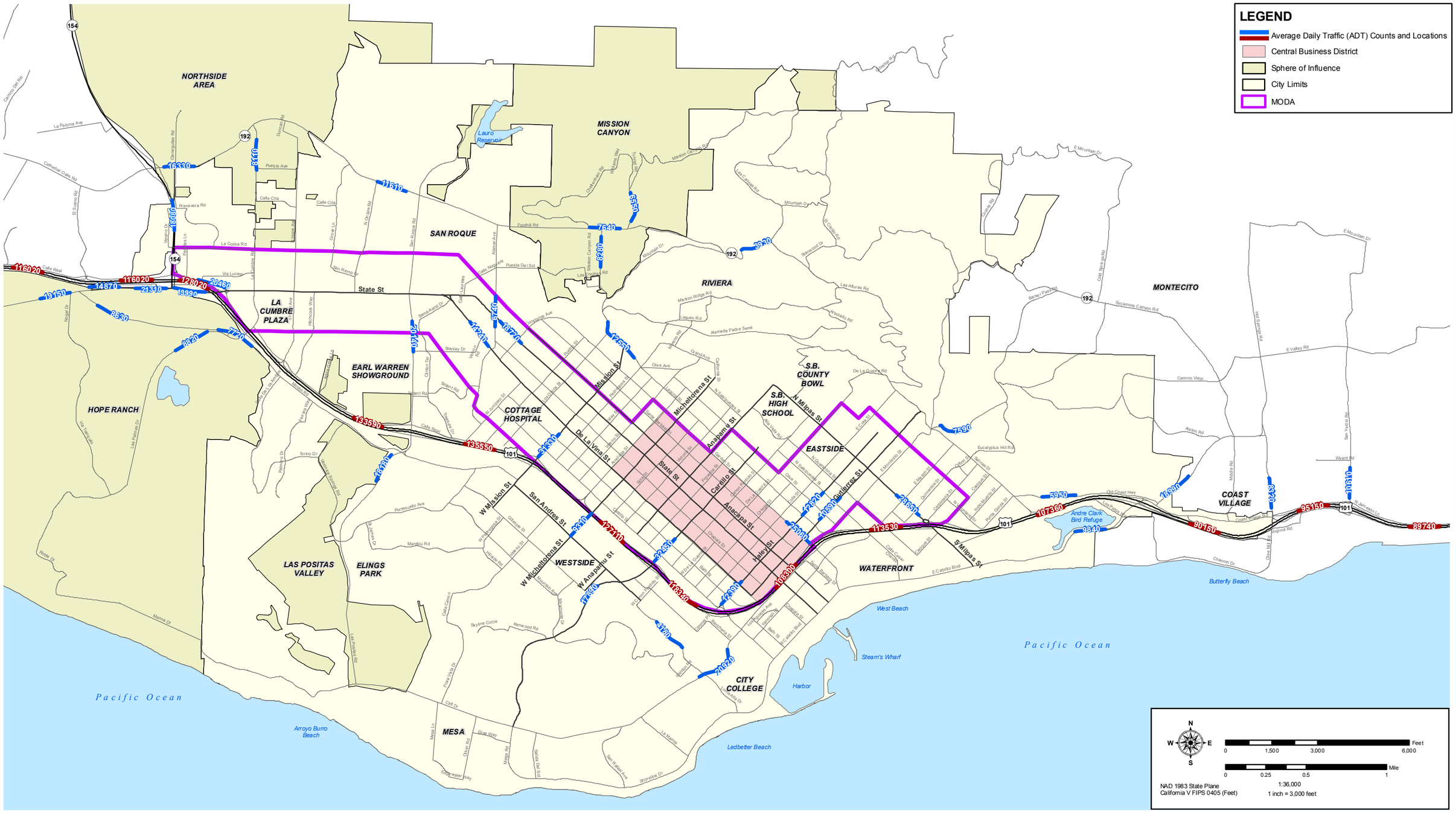


FIGURE 11
PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION





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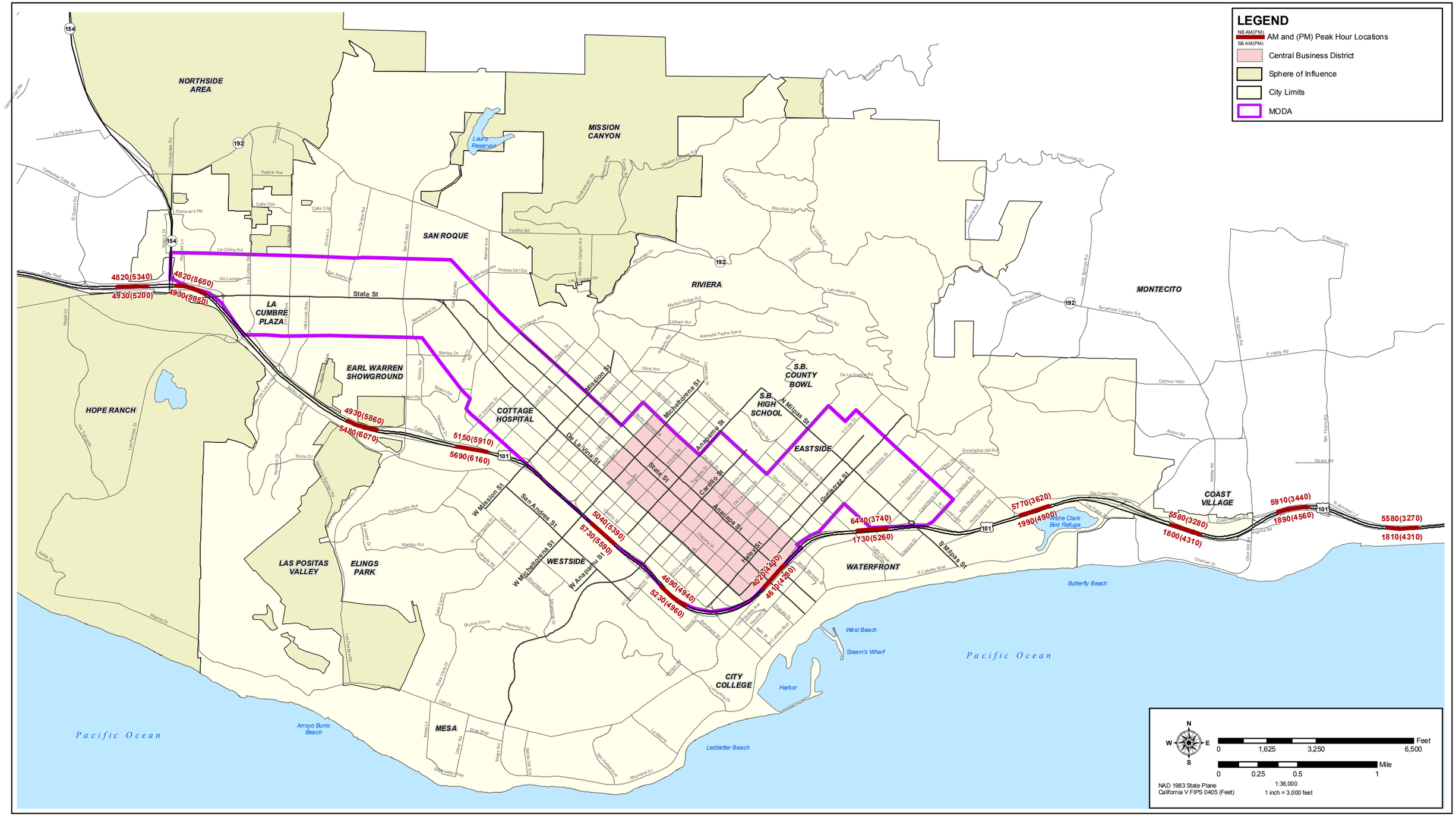
FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 12



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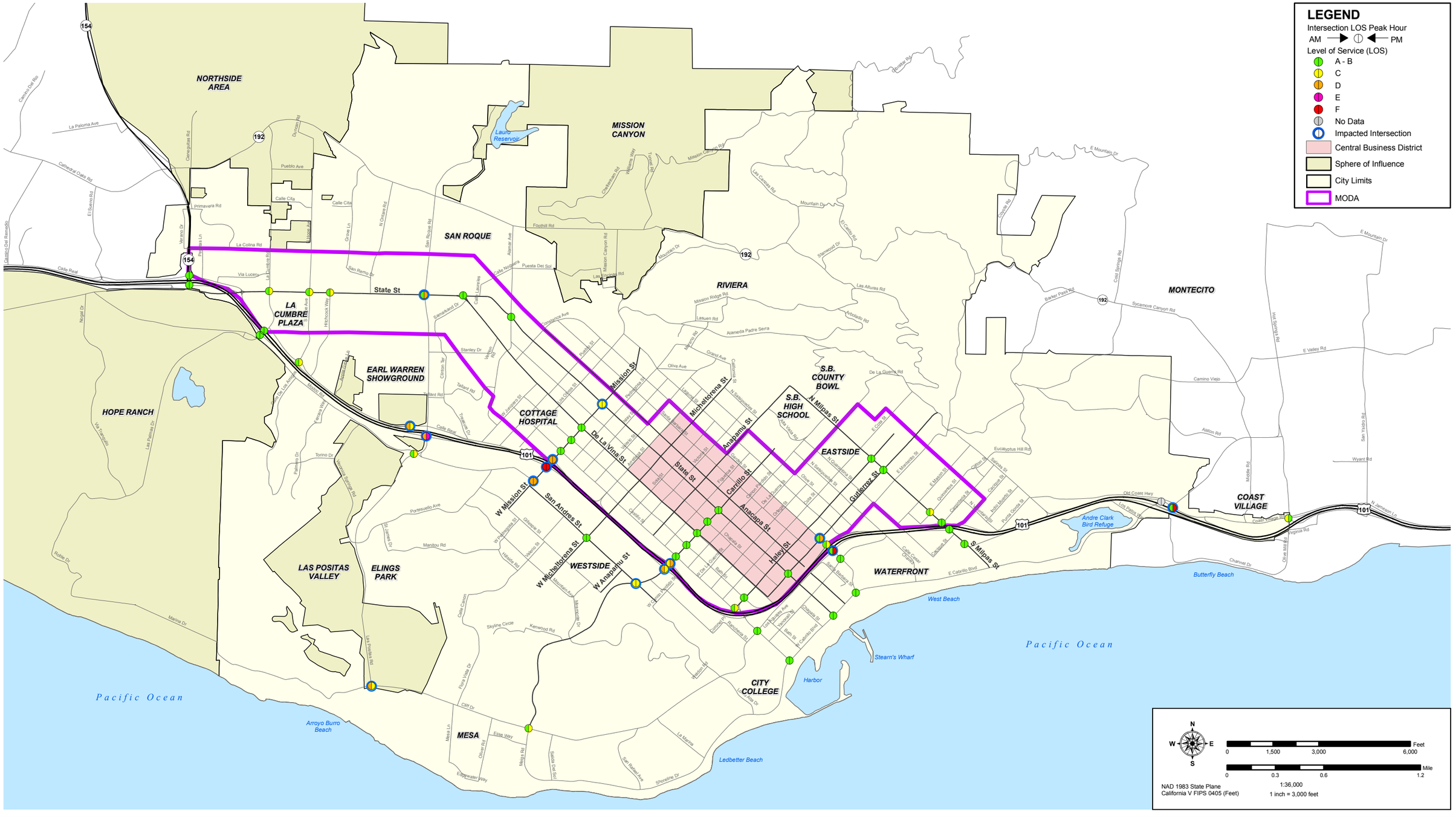
FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 13



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FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 14

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
1 Olive Mill Road & Coast Village Road [b]	AM	13	B
	PM	13	B
2 Hot Springs Road & Coast Village Road [b]	AM	20	C
	PM	25	C
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM	20	C
	PM	15	B
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.367	A
	PM	0.526	A
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.585	A
	PM	0.622	B
6 Milpas Street Roundabout [c]	AM	15	B
	PM	14	B
7 Milpas Street & Quinientos Street [a]	AM	0.592	A
	PM	0.715	C
8 Milpas Street & Gutierrez Street [a]	AM	0.520	A
	PM	0.582	A
9 Milpas Street & Haley Street [a]	AM	0.479	A
	PM	0.641	B
10 Cabrillo Boulevard & Garden Street [a]	AM	0.298	A
	PM	0.370	A
11 Yanonali Street & Garden Street [a]	AM	0.431	A
	PM	0.491	A
12 US 101 SB Ramps & Garden Street [a]	AM	0.640	B
	PM	0.929	E
13 US 101 NB Ramps & Garden Street [a]	AM	0.575	A
	PM	0.748	C
14 Gutierrez Street & Garden Street [a]	AM	0.675	B
	PM	0.808	D
15 Cabrillo Boulevard & State Street [a]	AM	0.303	A
	PM	0.420	A
16 Gutierrez Street & State Street [a]	AM	0.288	A
	PM	0.383	A
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.357	A
	PM	0.598	A
18 Montecito Street & Castillo Street [a]	AM	0.638	B
	PM	0.665	B
19 Haley Street & Castillo Street [a]	AM	0.552	A
	PM	0.784	C
20 Haley Street & Bath Street [a]	AM	0.538	A
	PM	0.697	B
21 Carrillo Street & Anacapa Street [a]	AM	0.474	A
	PM	0.618	B
22 Carrillo Street & Chapala Street [a]	AM	0.445	A
	PM	0.635	B
23 Carrillo Street & De la Vina Street [a]	AM	0.551	A
	PM	0.636	B
24 Carrillo Street & Bath Street [a]	AM	0.551	A
	PM	0.540	A
25 Carrillo Street & Castillo Street [a]	AM	0.664	B
	PM	0.666	B
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.700	B
	PM	0.814	D
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.776	C
	PM	0.744	C
28 Carrillo Street & San Andres Street [a]	AM	0.682	B
	PM	0.755	C

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
29 Micheltorena Street & San Andres Street [a]	AM	0.608	B
	PM	0.613	B
30 Mission Street & Modoc Road [b]	AM	27	D
	PM	29	D
31 Mission Street & US 101 SB Ramps [a]	AM	0.938	E
	PM	0.969	E
32 Mission Street & US 101 NB Ramps [a]	AM	0.858	D
	PM	0.812	D
33 Mission Street & Castillo Street [a]	AM	0.512	A
	PM	0.554	A
34 Mission Street & Bath Street [a]	AM	0.556	A
	PM	0.606	B
35 Mission Street & De la Vina Street [a]	AM	0.524	A
	PM	0.558	A
36 Mission Street & State Street [a]	AM	0.719	C
	PM	0.697	B
37 Meigs Road & Cliff Drive [a]	AM	0.621	B
	PM	0.688	B
38 Las Positas Road & Cliff Drive [b]	AM	30	D
	PM	23	C
39 Las Positas Road & Modoc Road [a]	AM	0.609	B
	PM	0.666	B
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.812	D
	PM	0.947	E
41 US 101 NB Ramps & Calle Real [a]	AM	0.798	C
	PM	0.683	B
42 Alamar Avenue & State Street [a]	AM	0.495	A
	PM	0.563	A
43 De la Vina Street & State Street [a]	AM	0.465	A
	PM	0.535	A
44 Las Positas Road & State Street [a]	AM	0.637	B
	PM	0.772	C
45 Hitchcock Way & State Street [a]	AM	0.477	A
	PM	0.671	B
46 Hope Avenue & State Street [a]	AM	0.511	A
	PM	0.661	B
47 La Cumbre Road & State Street [a]	AM	0.607	B
	PM	0.704	C
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.589	A
	PM	0.765	C
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.605	B
	PM	0.668	B
50 La Cumbre Road & Calle Real [a]	AM	0.539	A
	PM	0.663	B
51 SR-154 & Calle Real [a]	AM	0.517	A
	PM	0.546	A
52 SR-154 & US 101 SB On Ramp [a]	AM	0.417	A
	PM	0.400	A

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy.

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology.

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology.

TABLE 2 PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER		
North/South Street	**East/West Street**	**Peak Hour with V/C 0.77 or Greater**
Hot Springs Road	Coast Village Road	PM [a]
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	PM
Carrillo St	U.S. Highway 101 SB Ramp	AM
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	Both [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State Street	PM

[a] For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

TABLE 3
YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 1 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B	144 65	F F	**Yes** **Yes**
2 Hot Springs Road & Coast Village Road [e]	AM PM	20 25	C C	26 189	D F	**Yes** **Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM PM	20 15	C B	N/A [f] N/A [f]	N/A [f] N/A [f]	N/A [f] N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A	0.47 0.57	A A	No No
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B	0.45 0.59	A A	No No
6 Milpas Street Roundabout [c]	AM PM	15 14	B B	14 14	B B	No No
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C	0.63 0.74	B C	No No
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A	0.56 0.63	A B	No No
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B	0.54 0.72	A C	No No
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A	0.34 0.41	A A	No No
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A	0.55 0.68	A B	No No
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E	0.75 1.15	C F	No **Yes**
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C	0.65 0.78	B C	No **Yes**
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D	0.72 0.88	C D	No **Yes**
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A	0.33 0.45	A A	No No
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A	0.32 0.45	A A	No No
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A	0.37 0.61	A B	No No
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B	0.65 0.71	B C	No No
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C	0.57 0.81	A D	No **Yes**
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B	0.59 0.63	A B	No No
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B	0.50 0.65	A B	No No
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B	0.47 0.69	A B	No No
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B	0.57 0.64	A B	No No
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A	0.56 0.55	A A	No No
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B	0.67 0.68	B B	No No
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D	0.78 0.83	C D	**Yes** **Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C	0.80 0.77	C C	**Yes** No
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C	0.72 0.82	C D	No **Yes**

TABLE 3
YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 1 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.70	B	No
	PM	0.61	B	0.69	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	34	D	**Yes**
	PM	29	D	34	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	0.98	E	**Yes**
	PM	0.97	E	1.11	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.91	E	**Yes**
	PM	0.81	D	0.93	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.57	A	No
	PM	0.55	A	0.72	C	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.61	B	No
	PM	0.61	B	0.69	B	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.54	A	No
	PM	0.56	A	0.61	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.76	C	No
	PM	0.70	B	0.74	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.66	B	No
	PM	0.69	B	0.75	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	47	E	**Yes**
	PM	23	C	37	E	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.71	C	No
	PM	0.67	B	0.81	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.91	E	**Yes**
	PM	0.95	E	0.98	E	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.88	D	**Yes**
	PM	0.68	B	0.75	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.58	A	No
	PM	0.56	A	0.67	B	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.57	A	No
	PM	0.54	A	0.62	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.75	C	No
	PM	0.77	C	0.87	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.56	A	No
	PM	0.67	B	0.78	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.63	B	No
	PM	0.66	B	0.75	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.65	B	No
	PM	0.70	C	0.78	C	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.69	B	No
	PM	0.77	C	0.79	C	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.63	B	No
	PM	0.67	B	0.72	C	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.58	A	No
	PM	0.66	B	0.69	B	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.66	B	No
	PM	0.55	A	0.73	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.48	A	No
	PM	0.40	A	0.49	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 4
NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

Peak Hour	Number of Cases 2008	2008 Rate [a]	Number of Cases 2030 Alternative 1	2030 Alternative 1 Rate [a]	Number of Cases 2030 Alternative 2	2030 Alternative 2 Rate [a]
AM Only	2	4%	2	4%	3	6%
PM Only	6	12%	10	19%	7	13%
Both AM and PM	5	10%	8	15%	5	10%
Neither Peak Deficient	39	75%	32	62%	37	71%

[a] Number may not add up to 100% due to rounding

TABLE 5
YEAR 2030 FUTURE WEEKDAY ALTERNATIVE 2 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 2 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM	13	B	16	C	No
	PM	13	B	14	B	No
2 Hot Springs Road & Coast Village Road [e]	AM	20	C	14	B	No
	PM	25	C	66	F	**Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM	20	C	N/A [f]	N/A [f]	N/A [f]
	PM	15	B	N/A [f]	N/A [f]	N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.37	A	0.45	A	No
	PM	0.53	A	0.62	B	No
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.59	A	0.42	A	No
	PM	0.62	B	0.51	A	No
6 Milpas Street Roundabout [c]	AM	15	B	14	B	No
	PM	14	B	9	A	No
7 Milpas Street & Quinientos Street [a]	AM	0.59	A	0.62	B	No
	PM	0.72	C	0.74	C	No
8 Milpas Street & Gutierrez Street [a]	AM	0.52	A	0.54	A	No
	PM	0.58	A	0.63	B	No
9 Milpas Street & Haley Street [a]	AM	0.48	A	0.53	A	No
	PM	0.64	B	0.65	B	No
10 Cabrillo Boulevard & Garden Street [a]	AM	0.30	A	0.32	A	No
	PM	0.37	A	0.39	A	No
11 Yanonali Street & Garden Street [a]	AM	0.43	A	0.45	A	No
	PM	0.49	A	0.59	A	No
12 US 101 SB Ramps & Garden Street [a]	AM	0.64	B	0.68	B	No
	PM	0.93	E	1.06	F	**Yes**
13 US 101 NB Ramps & Garden Street [a]	AM	0.58	A	0.61	B	No
	PM	0.75	C	0.76	C	No
14 Gutierrez Street & Garden Street [a]	AM	0.68	B	0.68	B	No
	PM	0.81	D	0.83	D	**Yes**
15 Cabrillo Boulevard & State Street [a]	AM	0.30	A	0.32	A	No
	PM	0.42	A	0.45	A	No
16 Gutierrez Street & State Street [a]	AM	0.29	A	0.30	A	No
	PM	0.38	A	0.39	A	No
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.36	A	0.37	A	No
	PM	0.60	A	0.61	B	No
18 Montecito Street & Castillo Street [a]	AM	0.64	B	0.66	B	No
	PM	0.67	B	0.67	B	No
19 Haley Street & Castillo Street [a]	AM	0.55	A	0.57	A	No
	PM	0.78	C	0.79	C	No
20 Haley Street & Bath Street [a]	AM	0.54	A	0.60	A	No
	PM	0.70	B	0.63	B	No
21 Carrillo Street & Anacapa Street [a]	AM	0.47	A	0.49	A	No
	PM	0.62	B	0.63	B	No
22 Carrillo Street & Chapala Street [a]	AM	0.45	A	0.47	A	No
	PM	0.64	B	0.65	B	No
23 Carrillo Street & De la Vina Street [a]	AM	0.55	A	0.60	B	No
	PM	0.64	B	0.65	B	No
24 Carrillo Street & Bath Street [a]	AM	0.55	A	0.57	A	No
	PM	0.54	A	0.54	A	No
25 Carrillo Street & Castillo Street [a]	AM	0.66	B	0.67	B	No
	PM	0.67	B	0.68	B	No
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.70	B	0.75	C	No
	PM	0.81	D	0.85	D	**Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.78	C	0.80	D	**Yes**
	PM	0.74	C	0.76	C	No
28 Carrillo Street & San Andres Street [a]	AM	0.68	B	0.70	C	No
	PM	0.76	C	0.78	C	**Yes**

TABLE 5
YEAR 2030 FUTURE WEEKDAY ALTERNATIVE 2 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 2 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.65	B	No
	PM	0.61	B	0.63	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	31	D	**Yes**
	PM	29	D	32	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	1.01	F	**Yes**
	PM	0.97	E	1.01	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.90	D	**Yes**
	PM	0.81	D	0.86	D	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.53	A	No
	PM	0.55	A	0.59	A	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.57	A	No
	PM	0.61	B	0.62	B	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.53	A	No
	PM	0.56	A	0.59	A	No
36 Mission Street & State Street [a]	AM	0.72	C	0.78	C	**Yes**
	PM	0.70	B	0.75	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.63	B	No
	PM	0.69	B	0.70	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	32	D	**Yes**
	PM	23	C	24	C	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.64	B	No
	PM	0.67	B	0.70	C	No
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.84	D	**Yes**
	PM	0.95	E	0.95	E	No
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.82	D	**Yes**
	PM	0.68	B	0.74	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.51	A	No
	PM	0.56	A	0.59	A	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.47	A	No
	PM	0.54	A	0.56	A	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.65	B	No
	PM	0.77	C	0.82	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.48	A	No
	PM	0.67	B	0.74	C	No
46 Hope Avenue & State Street [a]	AM	0.51	A	0.54	A	No
	PM	0.66	B	0.73	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.68	B	No
	PM	0.70	C	0.73	C	No
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.61	B	No
	PM	0.77	C	0.77	C	No
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.67	B	No
	PM	0.67	B	0.68	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.56	A	No
	PM	0.66	B	0.68	B	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.55	A	No
	PM	0.55	A	0.63	B	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.42	A	No
	PM	0.40	A	0.46	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 6 MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS					
MEASURE	**2008**	**2030 Alternative 1**	**Change Over Existing**	**2030 Alternative 2**	**Change Over Existing**
Vehicle Miles Traveled (VMT)	2,500,894	2,721,109	9%	2,513,533	1%
Vehicle Hours Traveled (VHT)	59,668	67,528	13%	59,026	-1%
Vehicle Trips (VT)	595,479	641,233	8%	600,784	1%
Average Vehicle Trip Length (VMT/VT)	4.20	4.24	1%	4.18	0%

Appendix A
Plan Santa Barbara EIR Assumptions 4-15-09
LAND USE POLICIES

EIR Land Use Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Amount of Growth (net increase) Non-Residential	Continue existing Measure Policies. Extrapolate historic growth rate: City 2,291,700 SF Sphere 178,202 SF Total 2,469,902 SF	Extend existing Measure E policies; and remaining net new square footage. Extrapolate historic growth rate: Project (2030): City 2,000,000 SF Sphere 178,202 SF Total 2,178,202 SF Extended Range (2050+): City 3,000,000 SF Sphere 208,100 SF Total 3,208,100 SF	Reduce Nonresidential growth cap City 1,000.000 SF Sphere 178,202 SF Total 1,178,202 SF	Reduce Nonresidential growth cap City 1,000,000 SF Sphere 178,202 SF Total 1,178,202 SF
Amount of Growth (net increase) Residential	Extrapolate historic rate City 2,795 DU Sphere 403 DU Total 3,198 DU	Extrapolate historic rate Project (2030) City 2,795 DU Sphere 403 DU Total 3,198 DU Extended Range (2050+) City 8,000 DU Sphere 620 DU Total 8,620 DU	Reduced amount of residential growth City 2,000 DU Sphere 403 DU Total 2,403 DU	Increased amount of residential growth. More affordable housing. City **4,360** DU Sphere **443** DU Total 4,403 DU
Distribution of Growth	Per future Land Use data	Per future Land Use data	Per future Land Use data	Per future Land Use data

(net increase)	base assumptions.	base assumptions.	base assumptions.	base assumptions.
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Affordable Housing% new residential growth citywide affordable to low, moderate, middle incomes	30 % of total du (838 du of total 2795 du)	35% of total du (978 du of total 2795 du)	20% of total du (400 du of total 2000 du)	40% of total du (1,768 du of total 4420 du)
New Residential Growth %/DU inside MODA	56 % residential growth in MODA (1579 DU of total 2795 DU)	66% % residential growth in MODA (1857 DU of total 2795 DU)	61 % residential growth in MODA (1217 DU of total 2000 DU)	65% residential growth in MODA (2878 DU of total 4420 DU)
New NonResidential Growth %/SF in MODA	69% non-residential growth in MODA (1,580,307 SF of total 2,291,700 SF)	65 % non-residential growth in MODA (1,309,516 SF of total 2,000,000 SF))	46 % non-residential growth in MODA (463,479 SF of total 1,000,000 SF))	47 % non-residential growth in MODA (468,161 SF of total 1,000,000 SF)
Residential Densities inside MODA (MF and Commercial Zones)	Existing Variable Density Average 20 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 25 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 15 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 50 du/ac in MODA
Residential Densities inside MODA (R2 and Single Family Zones)	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre (160 du) SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre
Residential Densities outside MODA (in MF zones)	Average 20 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 22 du/ac outside MODA in MF zones
Residential Densities outside MODA (in SF zones)	1-5 du/ac; Average 3 du/ac	Average 3 du/ac	Average 3 du/ac	Average 3 du/ac
Second Unit production (DU) inside MODA	Existing policies constrain units. 0 2nd units assumed per historic rate	Draft PlanSB policies encourage 2nd units within MODA 57 2nd units	Same as No Proj – existing policies 0 2nd units assumed	Strong encouragement of 2nd units in MODA. 173 of total 400 2nd units
Second Unit production (DU) outside MODA	Existing policies constrain units. 0 2nd units assumed	Draft PlanSB policies allow 2nd units per existing policies outside MODA, and restrict in High Fire	Same as No Proj – existing policies 0 2nd units assumed	Encouragement of 2nd units outside MODA 227 units of 400 assumed.

		Hazard areas		
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Density/Unit Size: Smaller residential unit sizes and revised variable density provisions in MODA	Existing variable density provisions based on # bedrooms & no unit size limits have resulted in many large, upper income condos. Average density 20 du/ac	Amend variable density provisions to provide range of unit sizes (rather than # bedrooms) with associated densities. Maximum unit size 1300 SF See density/unit size chart below	Include same revised smaller unit size ranges with lower densities than for project. See chart below.	Include same revised smaller unit size ranges with higher densities than for project. See chart below
Density/Unit size outside MODA	Existing variable density; SF FAR	Remove variable density; allow >1300 SF w/ new maximum unit size	Remove variable density; allow >1300 SF w/ new maximum unit size	New variable density w/ unit size ranges (similar to Project in MODA)

Density/Unit Size Chart for Inside MODA– Assumptions for EIR Analysis of Policy Changes

Unit Size	**Base Density (units/acre)**	**Density +25% Affordable Hsg** *(Inclusionary Housing Ordinance IHO or State bonus Density law)*	**Density + 100% Affordable owner or Rental Housing**
Project - PlanSB			
<400 SF	35 du/ac	44 du/ac	70 du/ac
401-700 SF	25 du/ac	31 du/ac	50 du/ac
701-1000 SF	22 du/ac	27 du/ac	44 du/ac
1001-1300 SF	19 du/ac	24 du/ac	38 du/ac
Alternative ,Lower Growth			
<400 SF	25 du/ac	31 du/ac	50 du/ac
401-700 SF	15 du/ac	19 du/ac	30 du/ac
701-1000 SF	12 du/ac	15 du/ac	24 du/ac
1001-1300 SF	9 du/ac	11 du/ac	18 du/ac
Alternative 2, More Hsg			
<400 SF	70 du/ac	88 du/ac	140 du/ac
401-700 SF	50 du/ac	62 du/ac	100 du/ac
701-1000 SF	44 du/ac	55 du/ac	88 du/ac
1001-1300 SF	38 du/ac	47 du/ac	76 du/ac

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Mixed Use & use of store of non-residential SF demolished & not replaced	Existing ordinance provisions for amount of non-residential and residential allowed on site.	Existing ordinance provisions Draft PlanSB Policy LG7 Study TEDR Ordinance	Cannot maximize both residential & commercial SF	Existing ordinance provisions
Land Use Element Map Land Use designations	Existing Land Use Element Map	The Draft PlanSB LUE Map provides largely the same LU designations and location as the existing LUE Map, but with the following amendments: -Delineate the MODA boundary -LU designation amendments to reflect changes to Variable Density inside and outside MODA -Provide LU designations and densities by acre -Establish a parcel-based map -Include some minor LU designation amendments to clarify LU designations by parcel and provide for consistency between GP LUE and Zoning designations.	Same as Existing LUE Map	Same as Project/PlanSB Draft LUE Map
Affordable Housing Policies	Existing policies per Housing Element, inclusionary, State/City bonus density provisions	Draft PlanSB policies -No more specific EIR assumption [H1-Opportunity Sites; H5-Incentives for Affordable by Design; H9-Inclusionary Amds; H10-Density Incentive for sustainable resource use; H11-Rentail incentives; H13-Residential Density Stds]	Same as Existing Policies	Increase affordable housing incentives Streamline housing permit procedures

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Building Heights	Existing building height policies per Charter, GP, and Zoning	Draft PlanSB Policy C10 – -Lower heights/step back buildings adjacent to residential zones in DT urban core, and -Lower heights in conjunction with form-based codes adjacent to historic structures. EIR Assumptions: -Lower heights to 40 ft in EPV and 45 ft in other commercial zones -Amend build height definition for commercial zones to allow for sloped sites, flood control standards, sloped roofs. -Exception to building height allowed for: >Community Priority projects (per current definition: community need, non-profit), > Residential - requirement for minimum 30% affordable up to middle income (all projects, no minimum number of units, both ownership or rental) >Substantial building area in rental units >Findings for adequate open space, quality architecture, front yard setback	Lower building height limits citywide per Save EPV initiative: -40 ft in EPV -45 feet in other commercial zones	Maintain current height limitations -Existing City height limitations

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing

Non-Development Intensification (The "Churn")

Non-Residential: Apart from net new square feet of development, background intensification of non-residential uses within existing structures, such as adding more employees within existing space.

Residential: Intensification of residential use from illegal units and overcrowding, e.g., multiple families.

Existing Condition baselines reflect current effect from these sources, such as traffic trips, air pollution, public services.

Future Conditions (No Project, Project, Alternative 1 and 2 Scenarios)

- For traffic, customized trip generation rates were calibrated with the existing conditions traffic counts and therefore incorporate/reflect traffic associated with intensification. In addition, the land use distributions for future conditions are overly conservative because they cannot reflect ongoing implementation of Charter policies for no net increase in traffic for net new non-residential square footage, which results in rejection of applications to avoid such impacts. The excess traffic effects built into the estimates based on the land use distribution therefore incorporate the background intensification effects of non-residential and residential uses.

-Similarly water use, wastewater generation, public schools, and other public facility effects are also based on average use rates derived from existing use, which incorporates intensification. Air pollution and energy impacts are also based on average existing traffic and utility assumptions that reflect intensification.

Questions

-Is there any basis for estimating non-residential intensification or illegal unit/overcrowding rates?

-Is there any basis for assuming that the non-residential and residential intensification factors and the application rejection rates are similar?

-Alternatives - Non-Residential: The No Project & Project assume 2 million SF and Alternatives 1 & 2 assume 1 million SF. Should Alternatives 1 & 2 which are limiting new development more assume more intensification occurs?

-Alternatives – Residential: The No Project & Project assume 2800 DU, while Alternative 1 assumes 2000 DU and Alternative 2 assumes 4400 DU. Should Alternative 1 assume more pressure for illegal units and overcrowding than the Project, and Alternative 2 assume less?

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses <u>Non-Residential</u>	Existing Measure E policies and process for Community Priority and Economic Development LU categories of new net Sq Ft of non-residential use.	PlanSB Policy LG10 economic development appears to allow all uses currently allowed. Implementation/incentives unclear. No policy/impact change from existing policy [LG10 – new net non-residential use to include one or more of following uses: -Community Priority (parks & recreation, community centers, educational, public cultural or arts facilities, youth development and childcare facilities, community gardens/ urban farm) -Economic Development (Enhances standard of living, strengthens economy by expanding economic diversity) -Green Economic Development (Provides green products or jobs) -Small & Local Businesses -Development for people w/disabilities]	Same as No Project – no change from existing policies? Or with less Sq Ft., shorter list of Community Necessities only?	Same – no change? Or with less Sq Ft, shorter list of Community Necessities only? Or stronger policy/incentive for community benefit uses?
Community Benefit Land Uses <u>Residential</u>	Existing HE policies	PlanSB Policy LG11 Residential: No policy/impact change from existing policy [LG11 – new residential to include one or more of following: -Affordable Housing (Low to Middle income housing; housing dedicated for critical work force; housing for local workers, rental housing, transitional housing]		

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses – Residential – Open Space provisions	Existing Ordinance requirements for open space in residential development.	LG11 – Residential – Open Space requirements Amount of open space and public spaces would increase. [LG11 – Open Space Requiremt: -Open Space (through access to adequate public open space within ½ mile radius and/ or dedication of sufficient usable open space on site and/or contribution through in-lieu fees) Note CTI projects future park demand in SB based on SBCAG pop growth projections and nat'l park demand stds. Table 3 projections for range of park categories. Fig 1 & 2 illustrate locations of deficiencies for neighborhood & community parks. For MODA, need to identify demand std for indoor recreational facilities.	Same as Project	Same as Project or less?

Adaptive Management Program

PLANSB - PROJECT OBJECTIVES *(& EXTENDED RANGE)*	PLAN SB - EIR ASSUMPTIONS *(Working Draft AMP Indicators)* FOR COMMUNITY INDICATORS TO MONITOR OBJECTIVES
LU/Growth Mgmt 1-Sufficient resource/infrastructure 2-Improvement in affordable housing supply relative to jobs 3-Majority of neighborhoods have Sustainable Neighborhood Plans 4-Increased use of alternative modes relative to single-occupancy vehicles	**LandUse/Growth Management** **1-Sufficient resources & infrastructure** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **2-Affordable Housing supply relative to Jobs** ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **3-Sustainable Neighborhood Plans** ▪ # of Sustainable Neighborhood Plans (SNPs) **4-Increased use of alternative modes relative to SOV** ▪ Transportation mode share ratio (miles, or # of people using each mode.)

Economy/Fiscal Health 1-Economic sector diversity is stable or expands; City revenues from commercial sources stable or increased. 2-Greater proportion of local jobs filled by local residents 3-Regional cooperation increased, progress made on regional blueprint for LU, housing, & transportation	**Economy/Fiscal Health** **1-Economic sector diversity; stable City revenues** ▪ Employment by economic sector ▪ % of total employment contributed by the top 10 employers ▪ Income by economic sector ▪ Taxable gross receipts **2-% local jobs filled by local employees?** **3-Regional cooperation/ progress on blueprint?** Status report
Environmental Resources 1-Citywide 50% reduction in fossil fuel use in buildings by 2020 and carbon neutrality by 2030. 2-Natural areas along creeks and elsewhere retained or expanded, and quality preserved or enhanced. 3-Opportunities for residents & students to get fresh locally-grown produce increased. 4-Reduction of greenhouse gas emissions from light vehicle & truck to 1990 levels by 2020. 5 **(New)** AQ, Water Q maintain/improved	**Environmental Resources** **1- 50% reduction bldg fossil fuel use by 2020 (neutrality 2030)** ▪ Fossil fuel consumption ▪ % renewable energy use **2-Naturals areas preserved, enhanced** ▪ New, total & per capita acres open space, by type, ownership ▪ Acres habitat area restored, enhanced, protected; bird counts **3-Increased opportunities for local produce** Informational report on ag, farmer's mkts, schools, etc. **4-Reduce GHG from vehicles to 1990 levels by 2020** Vehicle Miles Traveled (VMT) **5-(New) AQ, Water Quality maintained/improved** ▪ Ocean & creek water quality compared to standards ▪ Air quality compared to standards
Historic Resources/ Com Design 1-Distinctive character of City districts & neighborhoods retained & public places enhanced. 2-Designations of historic resources have increased. 3-Public health has improved through community design.	**Historic Resources/ Com Design** **1-Distinctive character of City districts & neighborhoods retained & public places enhanced.** New & total public open space & recreational facilities in downtown & neighborhoods ▪ # of design awards ▪ # of Sustainable Neighborhood Plans (SNPs) ▪ Review of new projects for size, bulk & scale **2-Designations of historic resources have increased.** ▪ # new historic resources evaluations, surveys, "potentials" list ▪ # new historic resource designations and/or districts **3-Public health has improved through community design**. ▪ (Obesity rates by age and gender) ▪ # beach health warnings ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas (See also air quality measure above)
Housing 1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations. 2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages. 3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes.	**Housing** **1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations**. ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages** Periodic HE review **3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes**. Densities in MODA projects reviewed for time frame

Circulation 1-Public transit service & facilities, miles of sidewalks, trails, bike paths & lanes have increased or upgraded and links between modes available. 2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020. 3-Traffic congestion has not increased or is less than the 2008 baseline study.	**Circulation** **1-Transit, sidewalks, trails, bike paths & lanes & links incr or u** ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas ▪ Transit service levels **2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020.** ▪ Transportation mode share ratio (miles, or # of people using each mode.) **3-Traffic congestion has not increased or is less than the 2008 baseline study.** ▪ Intersection level of service (LOS) and Travel Time measures ▪ Street traffic volumes ▪ Hwy 101 traffic volume
Public Services and Safety 1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program. 2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand. 3-Conservation & management practices are maintained or improved.	**Public Services and Safety** **1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program.?** Status report **2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand.** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **3-Conservation & management practices are maintained or improved**. Status report

H:\Group Folders\PLAN\Long Range Planning\PlanSB\CEQA\CEQA Document\Project Description\EIR Assumptions Chart - Land Use April 15 09.doc

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MEMORANDUM

To: Plan Santa Barbara City and Consultant Team

From: Jeff Tumlin, Jeremy Nelson, Brian Canepa, Francesca Napolitan

Date: 7/8/09

Subject: Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis

What is Plan Santa Barbara?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community- based planning process called Plan Santa Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the Plan Santa Barbara process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. Specifically, the transportation consultant team will assist City staff in developing and analyzing strategies that can reasonably be expected to help reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

Purpose of this Memo

This technical memorandum was developed by Nelson\Nygaard to assist the City and consultant team in evaluating the trip reduction impacts of various transportation and parking policies and programs under consideration as part of Plan Santa Barbara. It should be noted that the purpose of this memo is to provide planning-level, order-of-magnitude estimates of the quantitative impacts of proposed/planned system changes on auto trips and mode split. Portions of this introductory text will be integrated into Fehr & Peers' report summarizing the traffic modeling analysis of each of the Plan Santa Barbara policy alternatives, and the entire memo will be attached as an Appendix to that report.

What this Memo Contains

- **Appendix A** contains maps created by Fehr & Peers and AMEC showing the areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo.[1]
- **Appendix B** contains the summary table of Plan Santa Barbara proposed policies and programs under four different policy alternatives. This table was provided to Nelson\Nygaard by the City of Santa Barbara and dated 4/2/09. The table was compiled by City staff with feedback from the consultant team. The assumptions in Appendix B are based on direction contained in the "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" and were used by Nelson\Nygaard as a guide in development of trip reduction estimates under each of the four alternatives.[2]
- **Appendix C** provides a summary of Nelson\Nygaard's order-of-magnitude, planning-level estimates of the likely anticipated reduction in peak-hour vehicle trips that could be achieved with the implementation of 13 policies under consideration in the four different Plan Santa Barbara alternatives.
- **Appendix D** provides more detailed description of each of the strategies from Appendix C and the research used to develop the trip reduction estimates in the Appendix B summary table.
- **Appendix E** provides a select list of works cited in the development of our estimates of trip reduction impacts.

Analytical Methodology Employed

In addition to a land use plan, Plan Santa Barbara contains a number of transportation policies and programs initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall Plan Santa Barbara policy framework.[3] Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation framework was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as Transportation Demand Management requirements for new development projects) while others could also reduce existing traffic congestion (such as expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in

[1] This map showing Areas 1-4 was included as Figure 2 in Fehr and Peers "Plan Santa Barbara Travel Demand Model Overview" dated 2/25/09. These four area types are listed in Appendix C. More information on the characteristics of these area types is contained in this report. The map showing the Mobility Oriented Development Areas (MODAs) was included as Figure 2.5 in AMEC's "Plan Santa Barbara Draft Environmental Impact Report" provided to Nelson\Nygaard on 4/2/09.

[2] Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

[3] The four alternatives are "No Project," "Plan Santa Barbara," "Alternative 1", and "Alternative 2" as discussed in detail in Appendix B. Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose.[4] In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in Area Types 1 and 2 were reduced by a greater percentage than trips ending in Area Types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak-hour vehicle trips in some areas and a lesser effect in others.[5] Trips starting and ending within the model area were reduced by a greater percentage than trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not significantly regulate trips to other jurisdictions.

Our estimates of the likely peak-hour vehicle trip reduction impacts of Plan Santa Barbara's proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically-derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the Plan Santa Barbara context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

We believe that our analysis represents the highest and best professional standards of transportation planning. We are confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak-hour vehicle trip reduction benefits of transportation policies and programs under consideration in Plan Santa Barbara.

Overview of Analytical Outputs

Appendices B and C contain detailed explanation of the methodology utilized and outputs of the analysis. Highlights are provided below.

Reductions in vehicle trip generation rates versus vehicle ownership rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies impact each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those impacts are already accounted for by trip reduction strategies that we were able to quantify.

[4] Commuter Trips" are Home-Based Work (HBW) trips, including school trips (within the model structure, Fehr & Peers applied strategies targeting school trips for Home-Based School trips only). All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers' "Travel Demand Model Overview" dated February 25, 2009.

[5] See Appendix A for a map of the four areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo. Fehr & Peers, June 2009.

Impacts of some strategies not quantifiable with available information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely impact, we indicated in our analysis in Appendix C and D that the impact was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality.* Instead, these designations mean that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the impacts of this strategy. We have therefore excluded the impacts of certain strategies from this analysis in order to avoid the risk of misstating highly-localized, context-dependent benefits (e.g. enhanced transit service) or to avoid "double counting" the benefits (e.g. pedestrian improvements which are adequately accounted for under "street connectivity" factor of the 4D model adjustments).

Non-additive impacts for each policy alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occur concurrently. For example, a city may implement a subsidized transit pass at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater impacts when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total impacts that can be achieved. For these reasons, it is not prudent to expect that the stand-alone impacts of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total impacts of various strategies together. Because the transportation policies and programs under consideration in the various Plan Santa Barbara alternatives would be implemented concurrently as a package (in fact some programs are already in effect), we have estimated the total impact for each alternative using a non-additive methodology. For example, when summing the impacts of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated impacts of other trip reduction strategies when developing our estimate of the total estimated impacts for certain policy alternatives.

Appendix A

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

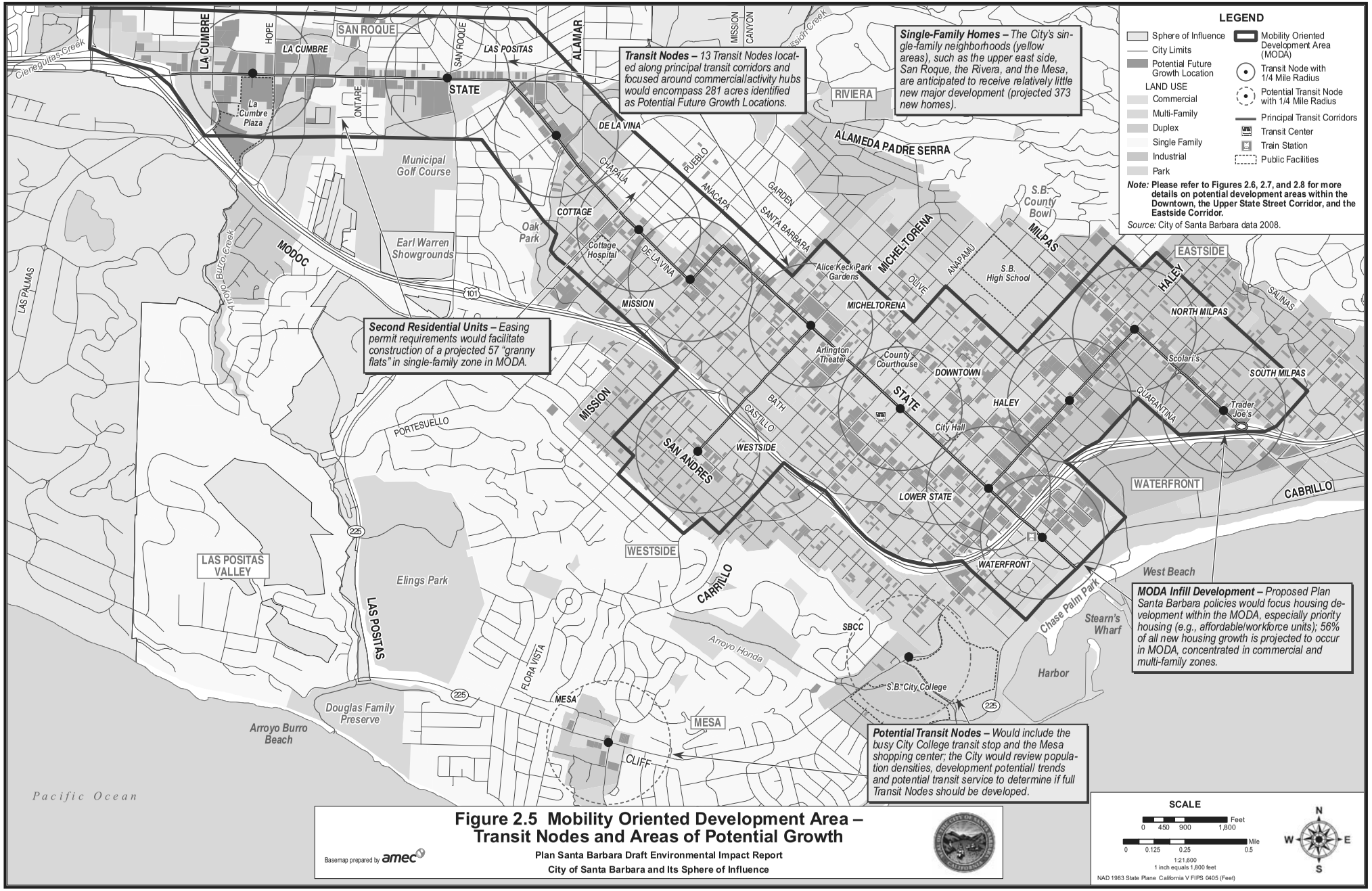


Figure 2.5 Mobility Oriented Development Area – Transit Nodes and Areas of Potential Growth

Plan Santa Barbara Draft Environmental Impact Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Appendix B

Plan Santa Barbara EIR Assumptions
Provided by the City of Santa Barbara (4/2/09)

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Transportation				
Residential parking requirements within MODA	Existing Policies: Average 2 spaces/unit + guest (per Ord 28.90) More can be provided if demand identified or if proposed. No requirement for unbundled parking	Average 1 space/unit regardless of unit size Maximum No Guest Parking Required unbundled residential parking for all unit types within MODA Exclude residential on-street parking in commercial zones, Allow required residential parking off-site in commercial zones.	Increase beyond Ordinance requirement of average 2 spaces/unit Increase beyond Ordinance requirement for Guest Parking More can be provided if demand identified or if proposed. No requirement for unbundled parking	Downtown Core – 0 spaces/unit Transit Corridors in MODA average ½ space (1 block) *(e.g., Milpas, Upper State)* Rest of MODA average 1 space/unit for all unit types. Maximums No Guest Parking Required unbundled residential parking for all unit types within MODA
Residential parking requirements outside MODA	Existing Policy Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance
Second Unit Parking inside or outside MODA	Existing : 1 space/unit	0 space/unit	1 space/unit	0 space/unit
Commercial/Retail Employee Parking inside MODA	Existing per current ordinance: DT 2/1000, Elsewhere 4/1000	Expand delineated Central Business Dist area to reduce by half parking requirements (to 2/1000)	Per current ordinance	No requirement Downtown
Commercial/Retail Employee Parking outside MODA	Existing per current ordinance	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Public Parking Pricing (on and off-street) within MODA	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Strong mgmt changes for on- and off-street: Identify aggressive price increases for off-street. Add on-street parking pricing w/mid-block kiosks, payment by cell phones, etc. (Pair w/ car share program identified under TDM)
Public Parking Pricing (on- and off-street) outside MODA	Existing management policies for on- and –off street.	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance
Bike system improvements	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report <$500K per improvement. Bike lanes priority over curbside parking in PHs plus other improvements: SB St – Haley to Micheltorena Chapala – Carrillo to Mission DelaVina–Haley to Constance Garden–Haley to Micheltorena Canon Perdido-Anacapa to Castillo	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements).	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Bike Plan to achieve low single-digit changes in mode shift. Include Peak-Hour parking restricted bike lanes on streets such as Santa Barbara, Anacapa, Anapamu, etc.

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Pedestrian system improvements	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable pedestrian improvements Existing Conditions Report (<$500,000 improvements) Complete sidewalk missing links in MODA. High quality ped crossings per vehicle yields in MODA.	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Ped Plan.
Transit system improvements	Continue existing Transit levels and locations per Existing Conditions Report.	Modest improvement in local & So. Coast transit routes/ headways. -More main lines with 10-minute peak-period headways, i.e add Crosstown Shuttle. -More lines outside of peak period. Minor reasonably foreseeable limited expense planned and funded improvements per Transit Plan	Same as "No Project" Alternative – existing conditions	Larger improvement in local & MTD regional transit routes/ headways to reflect gold-plated service, but account for diminishing returns where appropriate. -Headways from 10-5 minutes on City main lines? -Higher frequency on MTD regional express lines (i.e to Carpinteria, UCSB/Isla Vista) Reasonably foreseeable Transit Plan improvements
Regional bus service	Existing service levels per Existing Conditions Report	Modest Increase: Continued demand responsive expansion of regional bus service, e.g., Clean Air Express. Assume growth in service based on average growth rates in years prior to big spike in gas prices.	Same as PlanSB - Modest Increase	Assume aggressive expansion of regional bus service, e.g., Clean Air Express, to reflect high rates of growth during gas price run up, with corresponding reductions in regional SOV commuting. Assume some shift in funding from roads to transit to expand regional bus service. -More shoulder times for main lines and better headways 7-9. -Light rail upper State Street

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Commuter rail	Existing AMTRAK limited service per Existing Cond Report	Modest increase: Existing rail service plus limited AMTRAK Commuter Rail service improvements, i.e., re-timing of existing AMTRAK service to be commuter-oriented.	Same as PlanSB project Modest AMTRAK PH Commuter Increases	Full commuter rail service from Ventura with existing service and 2 trains each in AM and PM peak hours. Identify point where commuter rail may qualify for Federal funding according to FTA ridership criteria for New Starts.
TDM	Current levels continue per Existing Conditions Report	Modest Expansion: Subsidized Transit Pass program – modest expansion to bring in more user groups, e.g., employers Parking Cash-Out – yes, per current law - >50 employees Car Sharing – expanded - low level, City funded (i.e., can take transit to work and have a car if needed) Bike Sharing –expanded to modest program, similar to Paris Safe Routes to School – Continue, modest increase Carpooling – modest increase- Telecommuting – modest expansion (increased allowance for telecommuting)	Same as "No Project" Alternative – existing TDM programs	Aggressive increases for public and private sector: Subsidized Transit Program – strong expansion Parking Cash Out – Improved program, expand to existing employers; aggressive pricing structure Car Sharing – Strong program – commuters and neighborhoods Bike-sharing – strong program Safe Routes to School – complete program Carpooling - increased efforts to facilitate, incentivize Telecommuting – Strong expansion.

Appendix C

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

Appendix D

Category 1: Parking Policies

1.1 Reduced/Eliminated Minimum Parking Requirements

Overview

Most cities minimum parking requirements typically take into account only two variables: land use and the size of development. However, they fail to take into account a number of other factors which affect parking demand including geographic factors (e.g. pedestrian environment, proximity to transit, and availability of services), demographic factors (e.g. income, household size, and vehicle ownership rates), and other relevant factors that affect parking demand (e.g. the presence of transportation demand management programs like car-sharing).

Minimum parking requirements are intended to achieve specific goals (most commonly identified by cities as avoiding spillover parking problems and reducing congestion of on-street parking). However, these goals can also be achieved through other policies, such as pricing curb parking at market rates, residential parking permit programs, and other on-street parking management techniques.

Reduced parking requirements could be established in locations where parking demand will be lower to due to the geographic and demographic factors described above. Eliminating parking requirements would not mean that no new parking would be constructed. Rather, it would mean that market forces would determine the appropriate level of supply, based on market demands. That is to say, individual developers will construct as much parking as they deem necessary to meet consumer demand regardless in the absence of minimum requirements. Minimum parking requirements could be waived entirely anywhere in the City of Santa Barbara where there are measures in place to combat parking spillover but especially in mixed used areas like downtown and in proximity to major transit corridors.

Current Policy

For commercial and retail uses, the Santa Barbara municipal code generally requires 2 parking spaces per 1,000 sq. ft. in downtown and 4 parking spaces per 1,000 sq. ft. outside of the downtown area. For residential uses, parking requirements vary based on number of bedrooms and location.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes within the Mobility Oriented Development Area (MODA):

- Reduce commercial parking requirements by half (to 2 parking spaces per 1,000 sq. ft.).
- Average 1 space per unit for all residential units.
- No guest parking.

Assumes outside of the MODA: maintenance existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or “granny flat”) within or outside of the MODA.

Assumes that maximum parking requirements would apply to residential parking.

Alternative 1

Assumes within the MODA: an increase residential parking requirements beyond current ordinance and maintain current commercial parking requirements.

Assumes outside the MODA" maintenance of existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes 1 dedicated parking space for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Alternative 2

Assumes for residential parking within the MODA:

- No minimum or maximum commercial or retail parking requirements downtown.
- Average ½ space per unit in transit corridors (i.e. within one block) for residential parking.
- Average 1 space per unit for all unit types for residential parking outside of the transit corridors.
- No guest parking.

Assumes outside of the MODA: maintenance of existing commercial, retail, and residential parking requirements per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Summary of Literature and Study Impacts

Research shows that there is an indirect link between reduced minimum parking requirements and a decline in vehicle trips. Setting minimum parking requirements often results in lower parking prices, as the supply of parking exceeds demand, which in turn increases vehicle ownership. Studies reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[1]

Average income households spend an average of $3,800 annually per vehicle.[2] Assuming that residential parking spaces have an annualized cost of $800 per year, parking costs add 21% to vehicle costs for an average income household. If we assume a vehicle price elasticity of –0.7 (Figure 1), minimum parking requirements that exceed the actual demand for parking increase vehicle ownership about 14%. The resulting increase in vehicle ownership will likely produce more vehicle trips. Conversely, decreasing or eliminating requirements would likely result in a reduction in residential vehicle trips.

Figure 1 Vehicle Ownership Reductions from Residential Parking Pricing

Annual (Monthly) Fee	-0.4 Elasticity	-0.7 Elasticity	-1.0 Elasticity
$300 ($25)	4%	6%	8%
$600 ($50)	8%	11%	15%
$900 ($75)	11%	17%	23%
$1,200 ($100)	15%	23%	30%
$1,500 ($125)	19%	28%	38%

[1] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[2] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard has insufficient data to estimate the impacts of potential changes to minimum parking requirements on vehicle trips or vehicle ownership in Santa Barbara.[3] This does not imply that reduced/eliminated parking requirements have no impact on vehicle ownership and trips (they clearly do through Tiebout Sorting, or self-selection effects). However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[4]

[3] For example: even if minimum parking requirements are reduced or eliminated, many developers might still build projects with the same amount of parking as the old minimums in order to be competitive with older projects that were previously required to meet those minimums. Regardless of how many parking spaces were actually built, there is no way to estimate how many of those parking spaces would actually be occupied.

[4] For example, using site-level data on the number of parking spaces constructed and the amount of the constructed parking actually occupied in several "high parking" and "low parking" development projects located in similar contexts in Santa Barbra would allow us to estimate the impact of parking supply on vehicle ownership and vehicle trips generated (by multiplying the number of vehicles at the differently-parked projects by an average factor for "peak hour trips generated per vehicle" in Santa Barbara).

1.2 Unbundled Parking

Overview

Parking costs are generally subsumed into the sale or rental price of housing and commercial space. But although the cost of parking is often hidden in this way, parking is never free; instead the cost to construct and maintain the "free" parking is hidden in the cost of all other goods and services. For all commercial and residential development in Santa Barbara, the cost to lease or purchase parking could be unbundled from the cost to lease or purchase the usable space.

Such a policy would provide a financial incentive to residents and employers to lease only the amount of parking they need. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. Among households with below-average vehicle ownership rates (e.g., low-income people, singles and single parents, seniors on fixed incomes, and college students), unbundled parking can also provide a substantial financial benefit that increases housing affordability. Unbundled parking can allow employers to provide employees with an equitable transportation benefit that can reduce vehicle commuting.

Current Policy

The City of Santa Barbara does not require the unbundling of parking in residential or commercial developments.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA. No change outside MODA.[5]

Alternative 1

Assumes increased parking for commercial uses and allowable increases in residential parking.

Alternative 2

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA.

Summary of Literature and Study Impacts

Charging separately for parking is the single most effective strategy to encourage households to own fewer cars, and subsequently reduce vehicle trips. According to a study by Todd Litman, unbundling residential parking can significantly reduce household vehicle ownership.[6] Studies

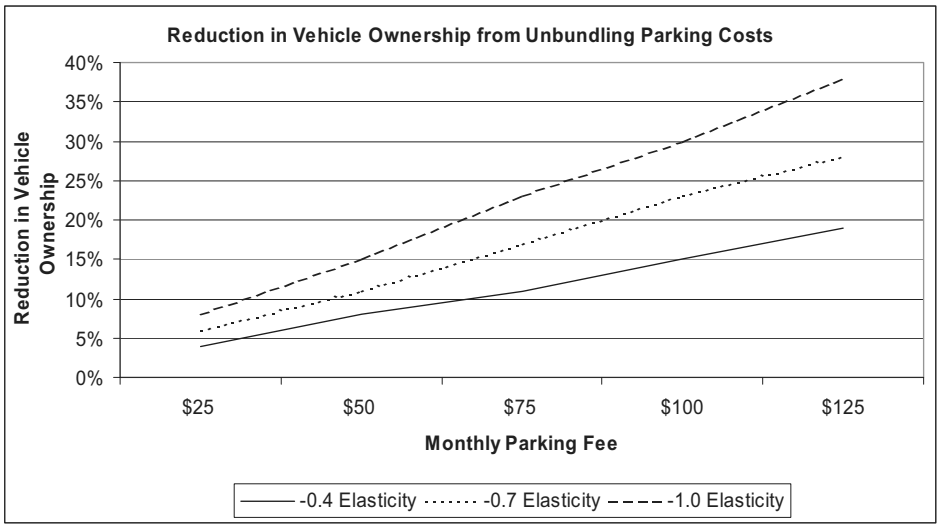
[5] Unbundled parking is recommended for multifamily attached housing including both rental apartments and for-sale condominiums and townhouses. For single-family detached housing where the parking is incorporated into the residential unit, unbundled parking is technically feasible and often occurs informally but not recommended as formal policy. For single-family detached housing where the parking is separate from the main structure (such as a carriage house garage with a residential Accessory Dwelling Unit above or where parking can be leased from a centralized "community" lot or garage serving multiple residences) then unbundled parking for single-family detached housing is feasible.

[6] Victoria Transport Policy Institute (2009), *Parking Requirement Impacts on Housing Affordability,* http://www.vtpi.org/park-hou.pdf

reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[7]

Average income households spend an average of $3,800 annually per vehicle.[8] Assuming that residential parking spaces have a monthly cost of $70, and a vehicle price elasticity of –0.7 (Figure 2), the unbundling of parking costs would decrease vehicle ownership about 15%. This decrease would result in a proportionate reduction in residential vehicle trips.

Figure 2 Reduction in Vehicle Ownership from Unbundling Parking Costs



Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

Alternative 1

This alternative assumes no unbundled parking, therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

[7] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[8] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

1.3 Public Parking Pricing

Overview

One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. In addition, studies have shown that an average of 28% of traffic congestion in urban mixed-use and commercial districts (such as downtown Santa Barbara and proposed MODA areas) is attributable to cruising for parking: motorists who have already arrived at their destination but are searching and circling to find a free or below market-rate curb parking space.[9] This phenomenon is compounded in Santa Barbara with employees engaging in the "parking shuffle" in which workers continually move their vehicles from one space to another throughout the day to avoid citations for overstay of the 75- and 90-minute time limits, thereby parking all day for free.

In these circumstances, managing on- and off-street parking prices as part of an integrated district-wide parking system is an important strategy for reducing peak-hour trip generation and localized traffic congestion, especially for trips to areas with high employment densities. Demand-responsive, market-based prices for parking pricing also have secondary benefits including:

1. Distributing highly variable parking demand to match available supply to ensure that there are available curb parking spaces at all times of day.

2. Promoting parking turnover to prevent commuters parking all-day in on-street parking spaces intended for short-term parking.

3. Reducing "ticket anxiety" of shoppers and visitors to commercial areas by allowing motorists to park for longer periods of time that with time limits so long as they pay for all the parking they use.

Based on the findings of Nelson\Nygaard's downtown on-street parking survey, both of these conditions apply in downtown Santa Barbara, and likely in other mixed-used districts in Santa Barbara such as proposed MODA areas (for more information, see the Plan Santa Barbara *DRAFT Summary of Downtown Santa Barbara On-Street Parking Survey* (dated 4/29/09).

Current Policies and Programs

Downtown parking in the non-commuter lots is free for the first 75 minutes and $1.50 per hour after. There are no time limits on the length of stay. Priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm. Monthly parking passes are available in 12 short-term lots and garages and the price varies from $100 to $150 depending on the location of the parking lot or garage. The two downtown commuter lots are reserved for commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). On-street parking is free for the first 15 to 75 minutes depending on the street.

Outside of the downtown area on-street parking is free for up to the first 90 minutes. See the Plan Santa Barbara *Transportation Existing Conditions Report* (August 2008) for more details on existing parking policies and conditions.

[9] Shoup, Donald. *The High Cost of Free Parking.* APA Planner's Press. 2005.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate program of parking management changes to on- and off-street parking within the MODA including the following:

- Relax time limits for on-street parking to allow motorists to park for longer time periods so long as they pay for the parking they use.
- Continue time limits for off-street parking.
- Eliminate parking discounts and begin charging tiered rates for off-street parking based on "length of stay" and/or "time of day."
- Begin charging for on-street parking at roughly 33 cents per hour.[10]
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Alternative 1

Assumes maintenance of existing pricing and time limit policies for on and off-street parking within and outside the MODA.

Alternative 2

Assumes implementation of a robust parking management program for both on- and off-street parking within the MODA as follows:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour.[11] These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the

[10] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

[11] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail

- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Summary of Literature and Study Impacts

The reduction in employee vehicle trips from public parking pricing varies both in the amount charged for parking and in the type of location the pricing is implemented. Parking pricing has a much more profound effect in denser areas, such as within the MODA, where more alternative mode choices are present and as a result, vehicle trips face greater reductions in those districts. Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[12] According to the information developed by Litman regarding "place types" and summarized in Figure 3, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With a citywide employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1% (and Areas 1 – 4 all showing similar figures), the travel characteristics for the entire city of Santa Barbara indicate that the city is very similar to what Litman terms an Activity Center.[13]

Figure 3 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%

[12] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

[13] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

If we assume that a public parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in commuter vehicle trips would be between 37% and 46.8%, for both current and future traffic, given that Santa Barbara is an "Activity Center."[14] Research regarding the pricing effects on short-term visitor vehicle trips is insufficient to make an estimate of impacts. No documented drop in visitor vehicle trips has been found from cities that have implemented public parking pricing. Instead, common responses by short-term parkers to changes in public parking prices are to slightly reduce the amount of time they park for or to seek out lower priced parking in facilities that may be further away from high demand areas (and are therefore underutilized) and then walk or take a transit to their final destination.

Figure 4 Vehicle Trips Reduced by Daily Parking Fees[15]

Worksite Setting	$1.49	$2.98	$4.47	$5.96
Low Density Suburb	6.5%	15.1%	25.3%	36.1%
Activity Center	12.3%	25.1%	37.0%	46.8%
Regional CBD/Corridor	17.5%	31.8%	42.6%	50.0%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a moderate increase in parking price to an average daily charge of $2.98 (approximately 33 cents per hour), research from VTPI shows the decrease in employee vehicle trips would be 25.1% in Areas 1 and 2 given that Santa Barbara is an "Activity Center." No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

This alternative assumes no change in parking policies and therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume that a parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in employee vehicle trips would be 44.2% in Areas 1 and 2 given that Santa Barbara is an "Activity Center."[16] No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[14] The $120 is based on an average of the current prices for downtown off-street monthly permits - http://www.santabarbaraca.gov/Resident/Transportation_and_Parking/Parking/PERMITS.htm.

[15] Victoria Transport Policy Institute (2008), *Land Use Impacts on Transport*, http://www.vtpi.org/landtravel.pdf

[16] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 4 (y = 0.0774x + 0.0145).

Category 2: Transportation System Improvements

2.1 Bike System Improvements

Overview

Bicycle system improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. Bike facilities can serve direct door-to-door trips, especially those trips that are "too far too walk but too far to drive" (e.g. trips of between one and two miles are too long to walk for most people, but are a short bicycle ride). In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area"[17] of the transit stop or station and increasing ridership. Bicycle access can also reduce parking pressure on heavily-used and/or heavily-subsidized feeder bus lines and auto-oriented park-and-ride facilities.

Current Policies and Programs

The city of Santa Barbara has a comprehensive bicycle network that connects nearly every part of the City, with approximately 28 miles of bike lanes and 6 miles of separated off-street bike paths. These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Santa Barbara has a high rate of biking, with Census data showing that 3.4% of residents bike to work, compared to 0.6% nationwide. For more details on existing bike facilities, see the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. On-street bicycle is available throughout downtown Santa Barbara and merchants may request to have bike parking installed near their business. On-street (sidewalk) and off-street lockers are provided for "long term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. The City of Santa Barbara also provides secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations. Off-street bicycle parking requirements are dictated by municipal code.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to bicycle network connectivity and completeness by prioritizing bike lanes over curbside parking during peak hours, including:

- Peak-hour parking restrictions would be in place to allow for curb-side bike lanes at the following locations (the curb lane would revert back to parking at all other times):
  - Santa Barbara Street - Haley to Micheltorena
  - Chapala – Haley to Constance
  - Dela Vina – Haley to Constance
  - Garden – Haley to Micheltorena
  - Canon Perdido – Anacapa to Castillo

[17] A transit catchment area is the geographic area from which a transit station draws riders.

- Improvements to bicycle travelways and parking are a priority use of rights-of-way within MODA.

Alternative 1

Assumes minor improvements to the bicycle network and facilities (a total investment of less than $500,000 each).

Alternative 2

In addition to improvements in Plan SB Alternative, assumes major improvement to the bicycle network by:

- Improvements to bicycle travelways and parking are a priority use of rights-of-way throughout the City, including implementation of all of the recommended improvements within the City of Santa Barbara's Bicycle Master Plan.
- Implement other bicycle infrastructure and programs as necessary to achieve Platinum designation as a Bicycle-Friendly Community from the League of American Cyclists.[18]
- Improve coordination between City, County, UCSB, SBCAG, and other South Coast cities and entities to improve and expand regional bike paths and routes that cross jurisdictional boundaries.

Summary of Literature and Study Impacts

One important advantage of bicycling compared to walking is that bicycling can substitute directly for automobile trips with longer distances. A before-after study of bicycle facility implementation found that each mile of bikeway per 100,000 residents increases bicycle commuting 0.075%, all else being equal.[19]

Summary of Estimated Impacts in Santa Barbara

Because the estimated impacts of bicycle system improvements are relatively small, and because Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for these impacts for purposes of the modeling effort, we have excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort.. This does not imply that bicycle system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

The introduction of bike lines on Santa Barbara St. (Haley to Micheltorena), Chapala St. (Carrillo to Mission), De la Vina St. (Haley to Constance), Garden St. (Haley to Micheltorena), and Canon Perdido (Anacapa to Castillo) would equal 5.5 miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.46% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[18] There are no definitive criteria to achieve this designation; instead a number of factors related to the 5 E's (engineering, education, encouragement, enforcement and evaluation) are considered that are tailored to the individual community seeking the designation. For more information see the League of American Bicyclists' "Bicycle Friendly Communities" website at http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities.

[19] Arthur Nelson and David Allen (1997), *If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities,* Transportation Research Record 1578, http://www.enhancements.org/download/trb/1578-10.PDF.

Alternative 1

No increase in bicycle trips is anticipated due to minor system improvements.

Alternative 2

Filling in gaps in the bicycle network and implementing additional measures will essentially have the effect of introducing 11 additional miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.92% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.2 Pedestrian System Improvements

Overview

A walkable environment gives people more transportation choices and improves quality of life. A well-designed network of streets and pedestrian ways is key to improving pedestrian accessibility, and includes streets, alleys, trails, midblock crossings and pedestrian paseos. Walking is also a free transportation option for accessing public transit, and is available to most people within a quarter to half mile of transit stations and stops. Thus creating a safe, comfortable, and convenient walking environment is key part of supporting transit. A well-designed network of streets with a high degree of pedestrian amenity is a key factor in enhancing pedestrian accessibility and connectivity to transit.

Current Policies and Programs

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service. Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. See the City of Santa Barbara's Pedestrian Master Plan for more information on current pedestrian system conditions by area.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links within the MODA as identified in the City's "Sidewalks Missing Links" program.
- Implementing enhanced pedestrian crossings at high volume intersections.

Alternative 1

Assumes minor improvements to the pedestrian network and facilities (a total investment of less than $500,000).

Alternative 2

Assumes major improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links throughout the City as identified in the City's "Sidewalks Missing Links" program.
- Constructing enhanced pedestrian crosswalk treatments at high volume intersections.
- Installing pedestrian amenities (e.g. pedestrian-scaled street lighting, benches, trees and other landscaping) along high volume pedestrian corridors, around transit stops and stations, and at other key pedestrian destinations (parks, schools, etc.).
- Continuing with the installation of corner curb ramps in compliance with Federal and State universal access requirements for public rights-of-way.
- Implementing traffic calming measures as needed.
- Implementing other improvements as identified in the City's Pedestrian Master Plan.

Summary of Literature and Study Impacts

It can be difficult to estimate precisely how much walkability investments affect travel, since it is often accompanied by investments in other alternative transportation means and changes in land use. However, studies have found that there is a direct connection between a high quality pedestrian environment and usage of travel modes other than driving:

- Walking is three times more common in a community with pedestrian friendly streets than in otherwise comparable communities that are less conducive to walking.[20]
- Residents in a pedestrian friendly community walk, bicycle, or ride transit for 49% of work trips (18 percentage points higher than in a comparable automobile community) and 15% of their non-work trips (11 percentage points higher than in a comparable automobile-oriented community).[21]
- Investments in the pedestrian environment have positive impacts on all road users. Benefits include: reduces auto-dependency and air pollution, improves livability, increases mobility for low-income households, and even increases retail sales and property values.[22]

In addition to the studies discussed above, a significant amount of research had been conducted on how urban form affects travel behavior. Urban design elements that impact pedestrian access such as street patterns (grid versus cul-de-sacs), topography, ease of street crossings, sidewalk continuity have been shown to reduce VMT and daily vehicle trips.[23] In another study which examined how urban form variables affected the number of pedestrian trips for recreation and shopping, it was shown that perceived safety, shade, and the frequency and desirability of seeing people while walking had a significant impact (for shopping trips, distance, the ease of walking and comfort were significant variables).[24]

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts, specifically in terms of street connectivity criteria in the model. We have therefore excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort. This does not imply that pedestrian system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

Major improvements to the pedestrian network will result in a 1 percentage point increase in alternative mode use for work trips and a .5 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[20] Anne Vernez Moudon, Paul Hess, Mary Catherine Snyder and Kiril Stanilov (2003), *Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments*, http://www.wsdot.wa.gov/research/reports/fullreports/432.1.pdf

[21] Robert Cervero and Carolyn Radisch (1995), *Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods*, http://www.uctc.net/papers/281.pdf.

[22] Local Government Commission (2001) *The Economic Benefits of Walkable Communities*. http://www.lgc.org/freepub/docs/community_design/focus/walk_to_money.pdf

[23] 1000 Friends of Portland (1993) *The Pedestrian Environment: LUTRAQ Report Volume 4A*, http://ntl.bts.gov/DOCS/tped.html

[24] Susan Handy, Kelly Clifton, and Janice Fisher (1998) The Effectiveness of Land Use Policies as a Strategy for Reducing Auto Dependence : A Study of Austin Neighborhoods, http://www.des.ucdavis.edu/faculty/handy/Austin_Report.pdf

Alternative 1

No increase in pedestrian trips is anticipated due to minor system improvements.

Alternative 2

Major improvements to the pedestrian network will result in a 2 percentage point increase in alternative mode use for work trips and a 1 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.3 Transit System Improvements

Overview

In most cities that have succeeded in growing while limiting the growth of vehicle trips, a fundamental component of their success has been improved transit services. Existing transit services can be improved in several ways, including:

- Increasing frequency (e.g. reduced headways).
- Increasing reliability and on-time performance.
- Reducing travel time and travel time variability.
- Increasing service span (e.g. hours of operation).
- Enhancing passenger amenities (both in-vehicle and at stations and stops).

The connectivity and convenience of the transit system can also be enhanced through the addition of new bus routes running in mixed-flow travel lanes or by adding new service running in dedicated transit rights-of-way, such as Bus Rapid Transit (BRT),[25] light rail, or heavy/commuter rail service.

Current Policies and Programs

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Santa Barbara has a typical rate of transit use, with Census data showing that 4.5% of residents bike to work, compared to 4.4% nationwide. A summary of existing services is below, and more information is presented in the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

Local MTD Transit

Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles.

Regional Bus Service

MTD operates the Valley Express which is a regional bus service. Additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal Express (the latter co-managed by the Ventura County Transportation Commission).

Commuter Rail

Amtrak serves Santa Barbara with passenger rail service along the Coast Starlight and Pacific Surfliner Routes. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara. The current schedules provide limited service during peak commute hours and existing passenger rail service is therefore not a feasible option for most commuter trips to and from Santa Barbara.

[25] A definition of BRT can be found at the Bus Rapid Transit Institute, http://www.nbrti.org/CBRT.html

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes the following service enhancements:

Local MTD Service

A modest increase in local and South Coast bus service as follows:

- Reduce peak period headways to 10 minutes on routes serving of primary transit corridors ("main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Introduce "crosstown shuttle" service.
- Implement other low-cost transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 1

Assumes the following service enhancements:

Local MTD Service

Maintenance of existing transit system and service levels as detailed in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

Regional Bus Service

As in the Plan Santa Barbara alternative, a modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 2

Assumes the following service enhancements:

Local MTD Service

In addition to the improvements in Plan Santa Barbara alternative, a robust increase in local and South Coast bus service as follows:

- Reduce peak period headways from 10 to 5 minutes on routes serving of primary transit corridors (e.g. Routes 1, 2, 6, 11 and other "main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Increase frequency of MTD regional express lines (e.g. Capinteria, UCSB/Isla Vista, etc.).
- Introduce light rail service on upper State Street.
- Implement all other transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A robust increase in regional bus service as follows:

- Shift of regional transportation funding from highway capacity projects to dramatic expansion of regional bus services (such as the Clean Air Express), including:
  - Increased frequency (reduced headways) during peak commute periods.
  - Additional services during non-peak travel times to allow peak-hour commuters to rely on the service in emergency, accommodate occasional flex-work commuters, etc.
- Service capacity and ridership to expand at the historical annual growth rate experienced during the Fall 2007 to Fall 2008 spike in gas prices.

Commuter Rail Service

A robust expansion of commuter rail service from Ventura with existing Amtrak service and two additional trains in both the AM and PM peak hours.

Summary of Literature and Study Impacts

The elasticity of transit use with respect to transit service frequency is about 0.5, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.5%.[26] The elasticity of transit use to service expansion (e.g. routes into new parts of a community already served by transit) is in the range of 0.6 to 1.0, which means that 1.0% of additional service increases ridership by 0.6-1.0%.

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would

[26] Richard Pratt (2000) *Traveler Response to Transportation System Changes*, Interim Handbook, TCRP Web Document 12. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_webdoc_12.pdf

otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%). Impacts of other expansions in transit vary depending on the conditions in which it is implemented.[27]

Local experience in Santa Barbara suggest that increasing transit service results in ridership growth: when the headways on several MTD routes (1, 2, 6, 11) were decreased from 15 minutes to 10 minutes, peak period ridership on these routes increased by 13%.[28]

Summary of Estimated Impacts in Santa Barbara

Because the extent and phasing of the transit system improvements are not known at a level of precision that would allow Nelson\Nygaard to derive a reliable estimate of peak hour vehicle trip, VMT, or vehicle ownership reductions, we have excluded these impacts from the analysis in order to maintain a conservative methodology. This does not imply that transit system improvements will have no impact on vehicle ownership and trips in Santa Barbara; quite the contrary, the available research shows that enhanced transit service will have significant impacts. However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[29]

Nelson\Nygaard also believes that some of the impacts of transit system improvements will be accounted for in the 4-D model adjustments (density, design, diversity, destinations), since areas with enhanced transit service will likely correspond to areas with increased density, mixing of uses, and reduced parking.

[27] Victoria Transport Policy Institute (2008). *Traffic Calming*. http://www.vtpi.org/tdm/tdm4.htm.
[28] Information provided by City of Santa Barbara staff.
[29] For example: service type (e.g. bus operating in mixed-flow travel lanes or BRT, light rail, heavy rail operating in a dedicated transit rights-of-way), service span and headways, and routing. Using this information, we could derive estimates of both ridership growth generated by the transit improvements (i.e. number of new transit trips net of existing transit trips in this corridor or parallel corridors) and reductions in peak-hour vehicle trips as result of the transit improvements (e.g. the number of the new transit trips occurring in peak travel periods vs. non-peak, the number of new transit trips that shifted from single-occupant vehicle trips vs. carpooling, other transit services, bicycling, etc.).

Category 3: Transportation Demand Management (TDM) Policies[30]

3.1 Subsidized Transit Passes

Overview

In recent years, growing numbers of transit agencies have teamed with universities, employers, building developers, or entire districts or neighborhoods to provide universal or subsidized transit passes to certain riders (students, employees, etc). These passes typically provide unlimited transit rides on local or regional transit providers for a low monthly fee, often absorbed entirely by the employer, school, or developers.

Current Policy and Programs

The City of Santa Barbara currently has a subsidized transit pass program as follows:

- Current City employees receive free MTD transit passes.
- All downtown employers established in the past 15 years must provide free MTD transit passes to their employees.
- Downtown employers that were established prior to 15 years ago may qualify for discounted MTD transit passes.
- Any downtown employee may request a discounted MTD transit pass.
- Non-downtown employers may voluntarily participate in the program in order to provide subsidized transit passes to their employees.
- Large development projects are sometimes required by the City (as a condition of approving entitlements) to provide subsidized transit passes to the development's employees and/or residents.

For employees eligible for discounted MTD transit passes the Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. The program is funded by revenue generated at parking lots and garages in the downtown area. For additional information on the existing program, please see the *Plan Santa Barbara Existing Conditions Report* (dated August 2008).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara Alternative

A modest expansion in the participation in the existing subsidized transit pass program as follows:

- Target expanded enrollment among these new user groups:
  - All large employers citywide.
  - All employers within MODAs.
  - All employers within a ¼ mile of high-transit corridors.
  - Schools.

[30] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Encourage these new user groups to enroll in the existing subsidized transit pass program by:
  - Promoting and marketing the program via Transportation Management Association to these new user groups.
  - Incentivizing enrollment in the program via administrative and logistical support to these new user groups.
  - Considering additional financial subsidy as necessary to enroll certain new user groups (e.g. non-profits, etc).
- Encourage expansion of participation rates by *existing* user groups through:
  - Increased promotion and marketing.
  - Lowering barriers to entry (e.g. requiring automatic opt-in).
  - Deeper financial subsidy as necessary to lower out-of-pocket costs for certain user groups (e.g. non-profits, etc.).

Alternative 1

Maintenance of existing subsidized transit pass program as described above.

Alternative 2

In addition to the policies in Plan Santa Barbara alternative, a robust expansion of the existing subsidized transit pass program as follows:

- Require passes to be provided as part of the conditions of approval for entitlements for all residents and employees of:
  - New development within downtown.
  - New development within MODAs.
  - New development within a ¼ mile of high-transit corridors.
  - New large developments citywide.
- Require subsidized transit passes be provided to the employees of:
  - All new employers citywide as part of the conditions of approval for entitlements.
  - All existing employers citywide who propose physical expansions as part of the conditions of approval for entitlements.
- Work with regional partners to ensure that:
  - The subsidized transit pass program encompasses all existing and future regional bus and/or rail transit services (in addition to MTD services).
  - The fare media used by the subsidized transit pass program is compatible for use on all services to increase user convenience and reduce barriers to entry for new participants.

Summary of Literature and Study Impacts

Current research regarding the impacts of subsidized transit passes can be generally broken into two categories.

1. The first set of research focuses on demonstrating the effects transit passes on mode splits by surveying users before and after implementation.

2. The second method bases the results of a transit pass implementation on the actual percent of vehicle trips reduced.

Both of these types of research can be useful for different purposes, as discussed below.

The first set of data is useful in illustrating the impacts of transit passes in various settings. Figure 1 shows the drive-alone and transit mode splits before and after subsidized transit pass implementation in different locations. These studies show reductions in drive-alone mode share of 4% to 42%, with an average reduction of 19%. In addition, these case studies show a wide range of increased transit mode share of between 25% and 145% with an average rise of 95%.

Figure 5 Employee Mode Splits Before & After Implementation of Subsidized Transit Pass Programs

Location	Drive Alone to work			Transit to work		
Municipalities	*Before*	*After*	*% Change*	*Before*	*After*	*% Change*
Santa Clara (County)[31]	76%	60%	27%	11%	27%	145%
Bellevue, Washington (Downtown)[32]	81%	57%	42%	13%	18%	38%
Ann Arbor, Michigan (Downtown)[33]	N/A	N/A	4%	20%	25%	25%
Universities						
UCLA (faculty and staff)[34]	46%	42%	9%	9%	20%	122%
Univ. of Washington, Seattle (faculty)[35]	60%	47%	22%	11%	27%	145%
Univ. of Washington, Seattle (staff)	44%	39%	11%	25%	36%	44%
Average Percent Change	-	-	19%	-	-	87%

Source: Table created by Nelson\Nygaard from studies cited in table footnotes.

Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[36] According to the information developed by Litman regarding "place types" and summarized in Figure 2, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With an

[31] Santa Clara Valley Transportation Authority (1997). *Eco Pass Pilot Program Survey Summary of Findings*.
[32] King County Metro (2000) *FlexPass: Excellence in Commute Reduction, Eight Years and Counting*. www.commuterchallenge.org/cc/newsmar01_flexpass.html.
[33] Christopher White, Jonathan Levine, and Moira Zellner (2002). *Impacts of an Employer-Based Transit Pass Program: The Go Pass in Ann Arbor, Michigan*. www.apta.com/research/info/briefings/documents/white.pdf
[34] Jeffrey Brown, Daniel Baldwin Hess, and Donald Shoup (2003). *Fare-Free Public Transit at Universities*. http://shoup.bol.ucla.edu/FareFreePublicTransitAtUniversities.pdf
[35] University of Washington Facilities Services, *The U-PASS Online and Telephone Survey Report (2006)*, www.washington.edu/commuterservices/programs/upass/reports.php
[36] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1%, the travel characteristics of Santa Barbara indicate that the city is very similar to an Activity Center.[37]

Figure 6 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%
Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

Furthermore, Figure 7 breaks each category into three subcategories of rideshare oriented, mode neutral, and transit oriented. Essentially, if transit or ridesharing comprises more than 50% of the alternate mode share, the site is transit oriented or rideshare oriented, respectively. If neither transit nor ridesharing dominates, then the area is considered mode neutral. In the case of Santa Barbara, carpooling is roughly equivalent to transit usage making the city mode neutral.

We have updated the daily transit subsidy information used by Litman to account for inflation since the Litman data was compiled; the source for this escalation was the U.S. Bureau of Labor Statistics Consumer Price Index.[38] Given the $52 monthly cost of an MTD pass, it can be estimated that the necessary daily transit subsidy necessary for an employee would be $2.39.[39] As shown in Figure 7, this sum falls between the $1.49 and $2.98 subsidies. By calculating the statistical relationship between transit subsidy and percent decrease in vehicle trips we find that a likely percent reduction in vehicle trips from a transit pass subsidy covering all employees in Santa Barbara would be 13.7%.[40]

Figure 7 Vehicle Trip Reduction by Workplace Setting and Daily Transit Subsidy[41]

	Daily Transit Subsidy			
Worksite Setting	**$0.75**	**$1.49**	**$2.98**	**$5.96**
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	**7.3%**	**16.4%**	38.7%
Activity center, transit oriented	5.2%	10.9%	23.5%	49.7%
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%

[37] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

[38] Bureau of Labor Statistics, *Consumer Price Index*, http://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.

[39] Based on an average 260.7 weekdays per year and 21.7 weekdays per month.

[40] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 8 (y = 0.0684x - 0.0267).

[41] Victoria Transport Policy Institute (2008), *Transportation Elasticities*, http://www.vtpi.org/elasticities.pdf

Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%	54.3%
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%	64.0%

Summary of Estimated Impacts in Santa Barbara

For this analysis, we have assumed that 20% of employees are currently participating in a transit subsidy program under Alternative 1 in Areas 1 and 2, resulting in a 2.7% reduction in auto trips (13.7% multiplied by 20%).[42] The Plan Santa Barbara alternative envisions an expansion of the program to cover 40% of employees in Areas 1 and 2 with a 5.5% reduction in trips. Alternative 2 covers 60% of employees in all areas with an 8.2% reduction in trips. These estimates are summarized in Figure 8.

Figure 8 Estimated Impacts on Auto Trips

Policy/Program	PlanSB	Alternative 1	Alternative 2
Subsidized Transit Passes	(5.5%)	(2.7%)	(8.2%)

Similarly, the impacts of a transit pass subsidy on drive-alone and transit mode shares given the ranges of 4% to 42% decreases in drive alone share and 25% to 145% increases in transit share are relative to the percentage of participating employees (20%, 40%, and 60%). For example, Alternative 1 will result in a 5% to 29% increase in transit share (25% to 145% multiplied by 20%). These estimates are summarized in Figure 9.

Figure 9 Estimated Impacts on Mode Splits

Mode	PlanSB	Alternative 1	Alternative 2
Drive Alone	(2% -16%)	(1% - 8%)	(2% - 25%)
Transit	10% - 58%	5% - 29%	15% - 87%

No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[42] Because the City already has a subsidized transit pass program and Alternative 1 assumes no expansion of that program, vehicle trip reductions from continuation of the current program under this alternative would already be accounted for in the current mode splits that are used in the traffic modeling process. For this reason, Appendix C (which is an input into the traffic model) assumes 0% reduction in peak-hour vehicle trips for the transit pass program in Alternative 1 to avoid "double counting."

3.2 Parking Cash-Out

Overview

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash-out requirement, employers are allowed to continue this practice on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work. Offering employees the option of "cashing out" their subsidized parking space can incentivize employees to ride transit, bike, walk, or carpool to work, thereby reducing vehicle commute trips and emissions.

The cash value of the parking subsidy can be offered in one of three forms:

- A transit/vanpool subsidy equal to the value of the parking subsidy (of which up to $230 per month is tax-free for both employer and employee).
- A taxable carpool/walk/bike subsidy equal to the value of the parking subsidy.
- Alternately, employees can be given a general "transportation fringe benefit" equal to the market value of an employee parking space, and all employee parking can simply be priced with a daily fee.[43]

Parking cash-out is a state law in California, but the state law only applies to employers with 50 employees or more who lease their parking and whose parking costs can be separated out as a line item on their lease. In addition, the California Air Resources Board (CARB) is nominally tasked with monitoring compliance, but CARB currently has no dedicated enforcement resources. For this reasons, some California jurisdictions such as Santa Monica and Los Angeles have implemented local parking cash-out requirements and enforcement mechanisms.[44]

Current Policies and Programs

SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace. Implementation and enforcement of a citywide or countywide parking cash-out program would therefore likely have a significant impact on travel behavior, by providing a financial incentive for some auto commuters to shift to other modes.

Some private employers in Santa Barbara already offer parking cash-out. For example, Cottage Hospital in Santa Barbara has a parking cash-out program in which all employees are paid an additional $75 per month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest increase in parking cash out programs as follows:

[43] There are a number of ways to determine the actual market value of an employee parking space that is currently provided for free in order to determine the amount of cash that should be offered in lieu of the free parking. In general these are: a) align with prices charged at comparable parking facilities in the vicinity, b) calculate the total capital and operating cost of the parking, or c) calculate the total social costs of the parking, including not only capital and operating costs but also opportunity costs and costs of mitigating externalities.

[44] Enforcement mechanisms for ensuring compliance with the existing state parking cash-out law and potential local parking cash-out requirements include measures such as requiring a signed affidavit certifying compliance when an employer's business licenses is renewed. Additional information on this topic is included in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Coordinate with local and regional partner agencies to promote the existing state parking cash-out law to subject employers (i.e. those employers with more than 50 employees who lease their parking and whose parking costs can be separated out as a line item on their lease).

- Require periodic submittal of proof of compliance with existing state parking cash-out law as a condition of approval for all new development entitlements.

Alternative 1

Assumes maintenance of existing parking cash-out programs.

Alternative 2

Assumes a robust expansion of parking cash-out program by:

- Develop a local parking cash-out ordinance that would apply to a broader number of employers than the current State law (e.g. employers with less than 50 employees, employers who own their own parking, etc). Require compliance for new employers and promote voluntary phased compliance for existing employers.

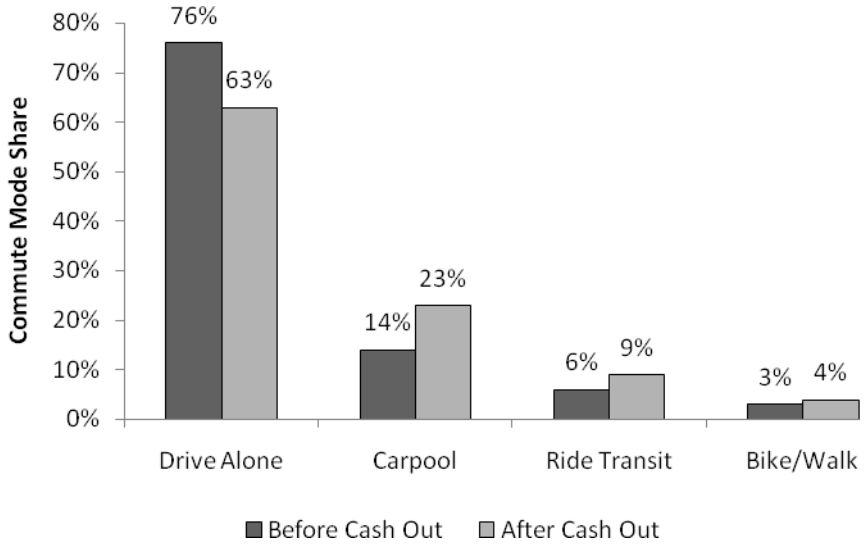
- Require periodic submittal of proof of compliance with the local and/or existing state parking cash-out requirements for all subject employers. For example, proof of compliance could be submitted as part of the application for a new or renewed business license.

Summary of Literature and Study Impacts

Research performed by Donald Shoup at the University of California-Los Angeles found that single occupancy vehicle trips declined by 17% and other modes increased significantly (carpooling by 64%, transit by 50%, and walking/biking by 33%) after a parking cash-out program was introduced at various urban and suburban worksites with varying levels of transit service. These findings are illustrated in Figure 10. These mode shifts resulted in an average 12% fewer vehicle miles traveled (VMT) per year per employee. This reduction is equivalent to removing one of every eight cars driven to work.[45] The analysis found that reductions in auto trips tend to increase over time, as more employees find opportunities to reduce their driving and take advantage of the parking cash-out "fringe benefit."

[45] Donald C. Shoup, *Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies*, http://www.arb.ca.gov/research/apr/past/93-308a.pdf.

Figure 10 Parking Cash-Out Impacts on Commute Mode



Another parking cash-out case study is that of suburban Pleasanton. The City initiated a daily form of parking cash-out in January 1994. The City offers $2 per day to employees who use a commute alternative instead of driving to work alone. All City employees are eligible to participate with no minimum days required. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 2004 doubled to 57 employees per month, which has resulted in an annualized reduction of 20,625 commuter vehicle trips.[46]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

By promoting the current parking cash-out law to subject employers and requiring new employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 3% reduction in peak-hour vehicle trips in Areas 1 and 2 and 1% reduction peak-hour vehicle trips in Areas 3 and 4. These figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

Alternative 1

This alternative assumes no expansion of parking cash-out programs, therefore no reductions in vehicle trips can be estimated.

Alternative 2

By developing a local parking cash-out ordinance that would apply to a broader number of employers and requiring all employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 12% reduction in peak-hour vehicle trips in Areas 1 and 2 and a 6% reduction in peak-hour vehicle trips in Areas 3 and 4. As noted in the Plan Santa Barbara scenario, these figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual

[46] U.S. Environmental Protection Agency (2005), *Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters,* http://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf

parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

3.3 Car Sharing

Overview

Car-sharing programs allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis. Usage charges are assessed at an hourly and/or mileage rate, in addition to a refundable deposit and/or a low annual membership fee. Car-sharing is similar to conventional car rental programs with a few key differences:

- System users must be members of a car-sharing organization.
- Fee structures typically emphasize short-term rentals rather than daily or weekly rentals.
- Vehicle reservations and access is "self-service."
- Vehicle locations are widely distributed rather than concentrated.
- Vehicles must be picked up and dropped off at the same location.

Car-sharing programs reduce the need for businesses or households to own their own vehicles, and reduce personal transportation costs and vehicle miles traveled (VMT). Through car-sharing, individuals gain access to vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations.

Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile. For example, vehicles available near a person's workplace or school can enable them to commute to work via transit or other means, knowing that they'll have a car-share vehicle available during the day only if needed for work or personal trips.

Current Policies and Programs

The City of Santa Barbara allows employees to use City fleet vehicles for work-related trips, unplanned overtime, medical appointments, approved emergency trips, occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies.

At UCSB, a car-share program with 2-3 vehicles is operated by ZipCar and is offered to all students, faculty and staff, and at discounted rate for Transportation Alternative Program (TAP) enrollees.

There are currently no car-share programs in Santa Barbara that are available to the general public.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest car-sharing program available to the public as follows:

- Limited number of vehicles at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Free on- and off-street public parking space in high-demand locations.
    - In-kind promotion and marketing support.
    - Small financial subsidy to recognized car-sharing service provider.

Alternative 1

Assumes maintenance of existing car-sharing programs (none available to the general public).

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust car-sharing program available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara and neighboring communities.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Partial conversion of city fleet to car-sharing operations
    - Larger financial subsidy to a car-sharing service provider.
- Require new development to offer "right of first refusal" parking spaces to recognized car-sharing service provider.

Summary of Literature and Study Impacts

According to the Transportation Research Board, each car-sharing vehicle takes nearly 15 private cars off the road – a net reduction of almost 14 vehicles.[47] A UC Berkeley study of San Francisco's City CarShare found that members drive nearly 50% less after joining. The study also found that when people joined the car-sharing organization, nearly 30% reduced their household vehicle ownership and two-thirds avoided purchasing another car. In addition, the study found that nearly three-quarters of the vehicle trips made by members were for running errands, visiting friends and other social activities, meaning that only roughly one-quarter of trips were for commuting to work or for recreation. The research also indicates that most trips were made outside of peak periods, thereby generating a limited impact on peak period traffic.[48]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2. (This estimate assumes that two-car households are selling one of their vehicles.)
- No measurable reduction on peak-hour vehicle trips.

Alternative 1

This alternative assumes no expansion of car-sharing programs to make these services available to the general public, therefore no reductions in vehicle trips or auto ownership can be estimated.

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[47] Transportation Research Board (2005), *Car-Sharing: Where and How it Succeeds*, Transit Cooperative Research Program Report 108. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rpt_108.pdf

[48] Robert Cervero and Yu-Hsin Tsai (2003), *San Francisco City CarShare: Travel-Demand Trends and Second-Year Impacts, Institute of Urban and Regional Development*, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1026&context=iurd

Alternative 2

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2 and a 50% reduction in 10% of households (or 5% overall reduction) in Areas 3 and 4. (This estimate assumes that two-car households are selling one of their vehicles.)

- No measurable reduction on peak-hour vehicle trips.

3.4 Bike Sharing

Overview

Bike sharing is a form of bike rental where people can have access to a shared fleet of bicycles on an as-needed basis. Bike share programs provide safe and convenient access to bicycles for short trips, such as running errands during lunch or for accessing the transit system by helping to bridge "first mile/last mile" barriers.

Bike sharing programs have been implemented in various forms for the past 40 years. Until recently, bike share programs worldwide have experienced low to moderate success. However, in the last 5 years innovations in technology have given rise to a new (third) generation of technology-driven bike share programs. These new bike share programs can dramatically lower barrier to use by allowing reservations and/or payment via smart card, credit card, or even cell phone. In addition, damage or theft of bicycles is minimized by linking accounts to a user's credit card.

The most common operational models for 3rd generation bike sharing programs are:

- The first and most common model is a privately–operated program, where contracts for exclusive rights to outdoor advertising space (bus stops, billboards, etc.) include a provision that requires the advertising company to install, operate, and maintain a bike sharing system. The Vélib system in Paris is an example of this first model.

- The second model is a publicly-operated program run by a government agency as part of a larger transit access or TDM/parking management strategy. Montreal's Bixi and Long Beach's employee-based program are examples of this second model. Some cities sell advertising rights at the bike stations and on the bikes themselves to help defray program costs, but the program is not operated by an advertising company.

Pricing of bike sharing programs is structured to encourage short trips in order to prevent users from tying up a single bicycle for long periods of time and to optimize utilization of the fleet.

The Vélib program in Paris, France is one of the most successful examples of the 3rd generation bicycle sharing programs. Vélib provides rental bikes that are available day or night throughout the city and stations are densely distributed. The system has 1,450 stations located about 900 – 1500 feet apart. Stations consist of terminals and stands for securing the bikes. Bicycles are accessed through Smart Cards that can be swiped at any station. Bicycles can also be returned at any station. Annual membership is not required, but accounts are linked to a credit card which is charged in the event of loss or damage to a bicycle. The first 30 minutes of each use are free, $1.30 for the second half hour, $2.60 for the third half hour and $5.20 for the fourth half hour and each additional half hour. The maximum ride time is three hours. Credit cards may also be used to purchase a short-term pass of one-day or seven-day subscriptions.

Current Policies and Programs

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara provides bicycle parking as well as short-term bicycle rentals as part of the "Green Bike Program."

The City of Santa Barbara has also purchased and maintains a fleet of bicycles that are located at a number of city buildings and that City employees can use during business hours.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest expansion of existing City-operated bike sharing program available to the public as follows:

- Limited number of bikes at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Providing indoor space for stations in existing City facilities (similar to existing downtown Bike Station).
    - Promotion and marketing support.
    - Small increase to existing financial subsidy.

Alternative 1

Assumes maintenance of existing bike sharing programs.

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust expansion of bike sharing programs available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Conversion of select number of on-street parking spaces to bike sharing stations.
    - Larger increase to existing financial subsidy.
- In order to realize greater expansion in a cost-effective manner, consider shifting from a City-operated program to a privately-operated program, similar to the Vélib model.

Summary of Literature and Study Impacts

Successful bike sharing programs have resulted in automobile to bike mode shifts as large as 5% to 8% in the areas they serve.[49] Impacts may be lower if conditions are not conducive to bicycling (few available bicycles, insufficient bike routes, poor weather).

In general, bike share programs are not utilized for regular commuter trips: since there is a per-use fee, regular bicycle commuters will ultimately purchase their own bicycle. Instead, bike-share programs are a “supportive” mode in that that they provide on-demand and roughly door-to-door travel for short, unscheduled trips that are too far to walk and not well-served by transit. Similar to car-sharing programs, bike sharing programs – while not used primarily for commuting – play an important role in the transportation system by allowing commuters to travel by transit knowing that they will have multiple travel options available to them during the workday.

[49] Victoria Transport Policy Institute (2008), *Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips*, http://www.vtpi.org/tdm/tdm126.htm

Summary of Estimated Impacts in Santa Barbara

The available research does not allow Nelson\Nygaard to develop a meaningful estimate of the impacts of bike sharing programs on peak hour vehicle trips, vehicle ownership, or VMT. In addition, it is our professional opinion that implementation of a bike sharing program would likely result in a relatively small reduction in peak hour vehicle trips. This does not imply that a bike sharing program would have no impact on vehicle ownership and trips in Santa Barbara, or offer secondary benefits to the residents, employees, and visitors (such as expanded mobility options, better public health outcomes through encouragement of active transportation, etc.). However, any benefits realized from a bike sharing program have been excluded from the impacts analysis in order to maintain a conservative methodology.

Category 4: Mode Shift Policies

4.1 Safe Routes to School

Overview

Safe Routes to Schools (SR2S) programs integrate health, fitness, traffic relief, environmental awareness and safety under one program. The goal is typically to increase the number of non-motorized (walk and bike) and higher occupancy (carpool and transit) trips to schools, in order to:

- Reduce traffic congestion around schools.
- Increase physical activity for children and youth.
- Foster a healthier lifestyle for the whole family.
- Create safer, calmer streets and neighborhoods.
- Improve air quality and a cleaner environment.

A SR2S program typically consists of five key components:

- *Education.* Classroom lessons teach children the skills necessary to navigate through busy streets and show them how to be active participants in the program.
- *Engineering.* A licensed traffic engineer can assist schools in developing a plan to provide a safer environment for children to walk and bike to school.
- *Encouragement.* Events, contests and promotional materials are incentives that encourage children and parents to try walking and biking.
- *Enforcement.* Police officers, crossing guards and other law enforcement officials can participate throughout the Safe Routes process to encourage safe travel through the community.
- *Evaluation.* Program participation should regularly be monitored to determine the growth in student and parent participation. Typically, “before and after” surveys are taken to ascertain any change in travel mode to school over the course of the year.

Current Policies and Programs

The City of Santa Barbara currently partners with schools and community groups to assist with the development of SR2S activities. The non-profit Coalition for Sustainable Transportation (COAST) is the lead coordinator of SR2S efforts in Santa Barbara in partnership with 20 agency and community partners, including the Santa Barbara Bicycle Coalition, the PTA Safety Committee, various government and law enforcement agencies, SBCAG’s Traffic Solutions, and the Diabetes Resource Center. The COAST SR2S program has developed a school zone safety package, a public awareness program (including two bilingual safety videos), and an education and safety-training program. The program also and distributes low-cost bicycle helmets (free to low-income children). In addition to funding from the City of Santa Barbara, SR2S activities have received funding from the Santa Barbara Foundation and from private donations. In the past, sixteen schools have participated in SR2S activities.

The City of Santa Barbara has further supported the SR2S activities by:

- Developing “Suggested Route to School Maps” for all 18 public elementary, junior high, and high schools in the City of Santa Barbara.
- Developing Concept Improvement Plans for select schools.
- Generally prioritizing pedestrian improvements in the vicinity of schools.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate expansion in the existing Safe Routes to Schools program.

Alternative 1

Assumes maintenance of the existing Safe Routes to Schools program.

Alternative 2

Assumes a robust expansion of the existing Safe Routes to Schools program.

Summary of Literature and Study Impacts

Marin County's Safe Routes to Schools program is considered very successful, particularly in reducing "chauffeured student trips." To measure the effectiveness of the program, individual classroom teachers administer "before" and "after" surveys at participating schools (both public and private) to determine how students travel to school. The "before" survey is generally taken at the beginning of the semester in which Safe Routes education is offered and the "after" survey is taken at the conclusion of the school year. A survey conducted between fall 2004 and spring 2005 shows that the annual education program reduced the chauffeured student trips by 24%, and increased walking by 43%, biking by 29% and carpooling by 29%.[50]

Figure 11 Mode Shift Impacts

	Fall 2004	Spring 2005	% Change
Single Student Car	55%	42%	-24%
Carpool	17%	22%	+29%
Bus	7%	7%	0%
Bike	7%	9%	+29%
Walk	14%	20%	+43%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a modest expansion of the existing Safe Routes to Schools program will result in a roughly 9% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 3% decrease in Areas 3 and 4. No estimates can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

Alternative 1

No increase in the existing Safe Routes to Schools program is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of the existing Safe Routes to Schools program will result in a roughly 12% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 6% decrease in Areas 3 and 4. No estimates

[50] Transportation Authority of Marin (2006), *Safe Routes to School, Evaluations and Recommendations 2005-2006*, http://www.tam.ca.gov/index.aspx?page=180.

can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

4.2 Carpooling

Overview

Carpooling is the shared use of a car by the driver—usually the owner of the vehicle—and one or more passengers. When carpooling, people either get a ride or offer a ride to others instead of each driving separately. Carpooling arrangements and schemes involve varying degrees of formality and regularity. Carpools may be formal - arranged through an employer, public website, etc. - or casual, where the driver and passenger might not know each other or have agreed upon arrangements.

Current Policies and Programs

The City of Santa Barbara provides a 75% subsidy for costs of a full vanpool. The City has established a "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rest of the vehicle costs funded by the department providing the vehicle. As of 2008 (the program's second year) there were 53 City employees in 18 registered carpools. Preferential parking is available for carpools and vanpools.

The County of Santa Barbara offers free parking passes to carpools and vanpools on a space-available basis. UC Santa Barbara offers a no charge vanpool program and parking passes for TAP registered carpools and vanpools. SBCC has a dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai) and a carpool matching program. There are also several private employers which offer subsidized carpool or vanpool programs.

Plan Santa Barbara Assumptions

Plan Santa Barbara

Assumes a moderate increase in employee participation rates in carpools and vanpools.

Alternative 1

Assumes maintenance of existing employee participation rates in carpools and vanpools.

Alternative 2

Assumes a robust increase in employee participation rates in carpools and vanpools.

Summary of Literature and Study Impacts

Experience indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies.[51]

Rideshare programs that include incentives such as HOV priority and parking cash-out often reduce affected commute trips by 10-30%.[52] If implemented without such incentives travel impacts are usually smaller. A study conducted by Reid Ewing concluded that ridesharing programs can reduce daily vehicle commute trips to specific worksites by 5-15%, and up to 20% or more if implemented with parking pricing.[53]

[51] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov.
[52] Philip Winters and Daniel Rudge (1995), *Commute Alternatives Educational Outreach*, www.cutr.eng.usf.edu.
[53] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips.*

Analysis by other researchers indicate that the elasticity of vanpool ridership with respect to fees is -2.6% using a 1997 data set and -14.8% using a less statistically robust 1999 data set, that is, a one dollar decrease in vanpool fares is associated with a 2.6% to 14.8% increase in the predicted odds of choosing vanpool with respect to drive alone. The same study found that the elasticity of vanpooling with respect to price to be -0.61 (1997) and 13.4% (1999), meaning that for each 10% increase in vanpool price, there is a 6% to 13% decrease in vanpool choice with respect to auto. Conversely, a 10% decrease in vanpool price will increase the odds of choosing vanpool (with respect to auto) by 6% to 13%. Using a nested logit model, the study found the elasticity of vanpooling with respect to fares to be -1.14.[54]

One study estimates the price elasticity of vanpooling at about 1.5, meaning that a 10% reduction in vanpool fares increases ridership by about 15%.[55] For example, if vanpool fares that are currently $50 per month are reduced to $40 (a 20% reduction), ridership is likely to increase by about 30% (20% x 1.5). Of course, exact impacts will vary depending on the specific market and whether other ridesharing incentives are also provided.

Because rideshare passengers tend to have relatively long commutes, mileage reductions can be relatively large. For example, if ridesharing reduces 5% of commute trips it may reduce 10% of vehicle miles because the trips that are reduced are twice as long as average. Rideshare programs can typically reduce up to 8.3% of commute VMT, up to 3.6% of total regional VMT, and up to 1.8% of regional vehicle trips.[56]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a moderate expansion of carpool and vanpool programs will result in an employee rideshare increase of 5%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

Alternative 1

No increase in carpool and vanpool programs is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of carpool and vanpool programs will result in an employee rideshare increase of 10%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

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[54] Francis Wambalaba, Sisinnio Concas and Marlo Chavarria (2004), *Price Elasticity of Rideshare: Commuter Fringe Benefits for Vanpools*, http://www.nctr.usf.edu/pdf/527-14.pdf
Sisinnio Concas, Philip L. Winters and Francis W. Wambalaba (2005), *Fare Pricing Elasticity, Subsidies And The Demand For Vanpool Services*

[55] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov

[56] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
TDM Resource Center (1996), *Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects*, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).

4.3 Telecommuting/Alternative Work Schedules

Overview

Telecommuting and alternative work schedules typically allow or require employees to start and/or leave work outside of peak hours. These strategies are often a part of a company's travel demand management program and include:

- *Flextime.* Employees are allowed some flexibility in their daily work schedules, e.g. starting at 7:30AM or after 9AM and leaving at 4 PM pr after 6 PM.
- *Compressed Workweek (CWW).* Employees work fewer but longer days, such as four 10-hour days each week (4/40), or 9-hour days with one day off every two weeks (9/80).
- *Staggered Shifts.* Shifts are staggered to reduce the number of employees arriving and leaving a worksite at one time, e.g. one shift works between 8:00 and 4:30, another shift 8:30 and 5:00, and a third 9:00 and 5:30.

Employer participation can be pursued through a combination of incentives for existing employers and commercial development and requirements for new employers and commercial development.[57]

Current Policies and Programs

The City of Santa Barbara currently offers a 9/80 work schedule option to all employees and 81 percent of employees participate. For private employers, SBCAG administers the Flexwork SB program. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

UC Santa Barbara offers flexible work schedules and telecommuting for certain staff.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate increase employer participation in offering telecommuting and alternative work schedule to employees.

Alternative 1

Assumes maintenance of existing telecommuting and alternative work schedule programs.

Alternative 2

Assumes a robust increase in employer participation in offering telecommuting and alternative work schedule to employees.

Summary of Literature and Study Impacts

Flextime reduces peak period congestion directly, and can make ridesharing and transit use more feasible.[58] Staggered shifts can reduce peak-period trips, particularly around large employment

[57] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

centers. Reid Ewing estimates that flextime and telecommuting together can reduce peak-hour vehicle commute trips by 20-50%.[59]

Flexible work schedules can also reduce total vehicle travel. One survey of commuters found that it could reduce vehicle trips by up to 8% if 50% of employees are participating in the program, making it among the most effective commute trip reduction strategies considered.[60]

Another analysis estimates that compressed work weeks can reduce up to 0.6% of VMT and up to 0.5% of vehicle trips in a region.[61] However, other research indicates that compressed work weeks may provide modest reductions in total vehicle travel, in part because participants make additional trips during their non-work days.[62] Compressed work weeks may also encourage some employees to move further from worksites or to drive rather than rideshare.

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, we conservatively estimate that a modest increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 10% in Areas 1 and 2, and by 5% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

No increase in telecommuting/alternative work schedules is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, we conservatively estimate that a robust increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 25% in Areas 1 and 2, and by 15% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

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[58] Alyssa Freas and Stuart Anderson (1991), *Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321*.
[59] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips*
[60] Center for Urban Transportation Research (1998), *A Market-Based Approach to Cost-Effective Trip Reduction Program Design*, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf.
[61] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
[62] Amy Ho and Jakki Stewart (1992), "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," *Transportation Research Record 1346*, TRB (www.trb.org), pp. 25-32 and Genevieve Giuliano (1995), "The Weakening Transportation-Land Use Connection, *ACCESS*, Vol. 6, University of California Transportation Center (www.uctc.net), Spring 1995, pp. 3-11.

Appendix E

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APPENDIX I-6

PLAN SANTA BARBARA TRIP REDUCTION IMPACTS ANALYSIS (NELSON/NYGAARD)

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MEMORANDUM

To: Plan Santa Barbara City and Consultant Team

From: Jeff Tumlin, Jeremy Nelson, Brian Canepa, Francesca Napolitan

Date: 7/8/09

Subject: Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis

What is Plan Santa Barbara?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community- based planning process called Plan Santa Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the Plan Santa Barbara process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. Specifically, the transportation consultant team will assist City staff in developing and analyzing strategies that can reasonably be expected to help reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

Purpose of this Memo

This technical memorandum was developed by Nelson\Nygaard to assist the City and consultant team in evaluating the trip reduction impacts of various transportation and parking policies and programs under consideration as part of Plan Santa Barbara. It should be noted that the purpose of this memo is to provide planning-level, order-of-magnitude estimates of the quantitative impacts of proposed/planned system changes on auto trips and mode split. Portions of this introductory text will be integrated into Fehr & Peers' report summarizing the traffic modeling analysis of each of the Plan Santa Barbara policy alternatives, and the entire memo will be attached as an Appendix to that report.

What this Memo Contains

- **Appendix A** contains maps created by Fehr & Peers and AMEC showing the areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo.[1]
- **Appendix B** contains the summary table of Plan Santa Barbara proposed policies and programs under four different policy alternatives. This table was provided to Nelson\Nygaard by the City of Santa Barbara and dated 4/2/09. The table was compiled by City staff with feedback from the consultant team. The assumptions in Appendix B are based on direction contained in the "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" and were used by Nelson\Nygaard as a guide in development of trip reduction estimates under each of the four alternatives.[2]
- **Appendix C** provides a summary of Nelson\Nygaard's order-of-magnitude, planning-level estimates of the likely anticipated reduction in peak-hour vehicle trips that could be achieved with the implementation of 13 policies under consideration in the four different Plan Santa Barbara alternatives.
- **Appendix D** provides more detailed description of each of the strategies from Appendix C and the research used to develop the trip reduction estimates in the Appendix B summary table.
- **Appendix E** provides a select list of works cited in the development of our estimates of trip reduction impacts.

Analytical Methodology Employed

In addition to a land use plan, Plan Santa Barbara contains a number of transportation policies and programs initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall Plan Santa Barbara policy framework.[3] Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation framework was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as Transportation Demand Management requirements for new development projects) while others could also reduce existing traffic congestion (such as expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in

[1] This map showing Areas 1-4 was included as Figure 2 in Fehr and Peers "Plan Santa Barbara Travel Demand Model Overview" dated 2/25/09. These four area types are listed in Appendix C. More information on the characteristics of these area types is contained in this report. The map showing the Mobility Oriented Development Areas (MODAs) was included as Figure 2.5 in AMEC's "Plan Santa Barbara Draft Environmental Impact Report" provided to Nelson\Nygaard on 4/2/09.

[2] Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

[3] The four alternatives are "No Project," "Plan Santa Barbara," "Alternative 1", and "Alternative 2" as discussed in detail in Appendix B. Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose.[4] In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in Area Types 1 and 2 were reduced by a greater percentage than trips ending in Area Types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak-hour vehicle trips in some areas and a lesser effect in others.[5] Trips starting and ending within the model area were reduced by a greater percentage than trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not significantly regulate trips to other jurisdictions.

Our estimates of the likely peak-hour vehicle trip reduction impacts of Plan Santa Barbara's proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically-derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the Plan Santa Barbara context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

We believe that our analysis represents the highest and best professional standards of transportation planning. We are confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak-hour vehicle trip reduction benefits of transportation policies and programs under consideration in Plan Santa Barbara.

Overview of Analytical Outputs

Appendices B and C contain detailed explanation of the methodology utilized and outputs of the analysis. Highlights are provided below.

Reductions in vehicle trip generation rates versus vehicle ownership rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies impact each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those impacts are already accounted for by trip reduction strategies that we were able to quantify.

[4] Commuter Trips" are Home-Based Work (HBW) trips, including school trips (within the model structure, Fehr & Peers applied strategies targeting school trips for Home-Based School trips only). All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers' "Travel Demand Model Overview" dated February 25, 2009.

[5] See Appendix A for a map of the four areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo. Fehr & Peers, June 2009.

Impacts of some strategies not quantifiable with available information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely impact, we indicated in our analysis in Appendix C and D that the impact was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality.* Instead, these designations mean that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the impacts of this strategy. We have therefore excluded the impacts of certain strategies from this analysis in order to avoid the risk of misstating highly-localized, context-dependent benefits (e.g. enhanced transit service) or to avoid "double counting" the benefits (e.g. pedestrian improvements which are adequately accounted for under "street connectivity" factor of the 4D model adjustments).

Non-additive impacts for each policy alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occur concurrently. For example, a city may implement a subsidized transit pass at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater impacts when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total impacts that can be achieved. For these reasons, it is not prudent to expect that the stand-alone impacts of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total impacts of various strategies together. Because the transportation policies and programs under consideration in the various Plan Santa Barbara alternatives would be implemented concurrently as a package (in fact some programs are already in effect), we have estimated the total impact for each alternative using a non-additive methodology. For example, when summing the impacts of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated impacts of other trip reduction strategies when developing our estimate of the total estimated impacts for certain policy alternatives.

Appendix A

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

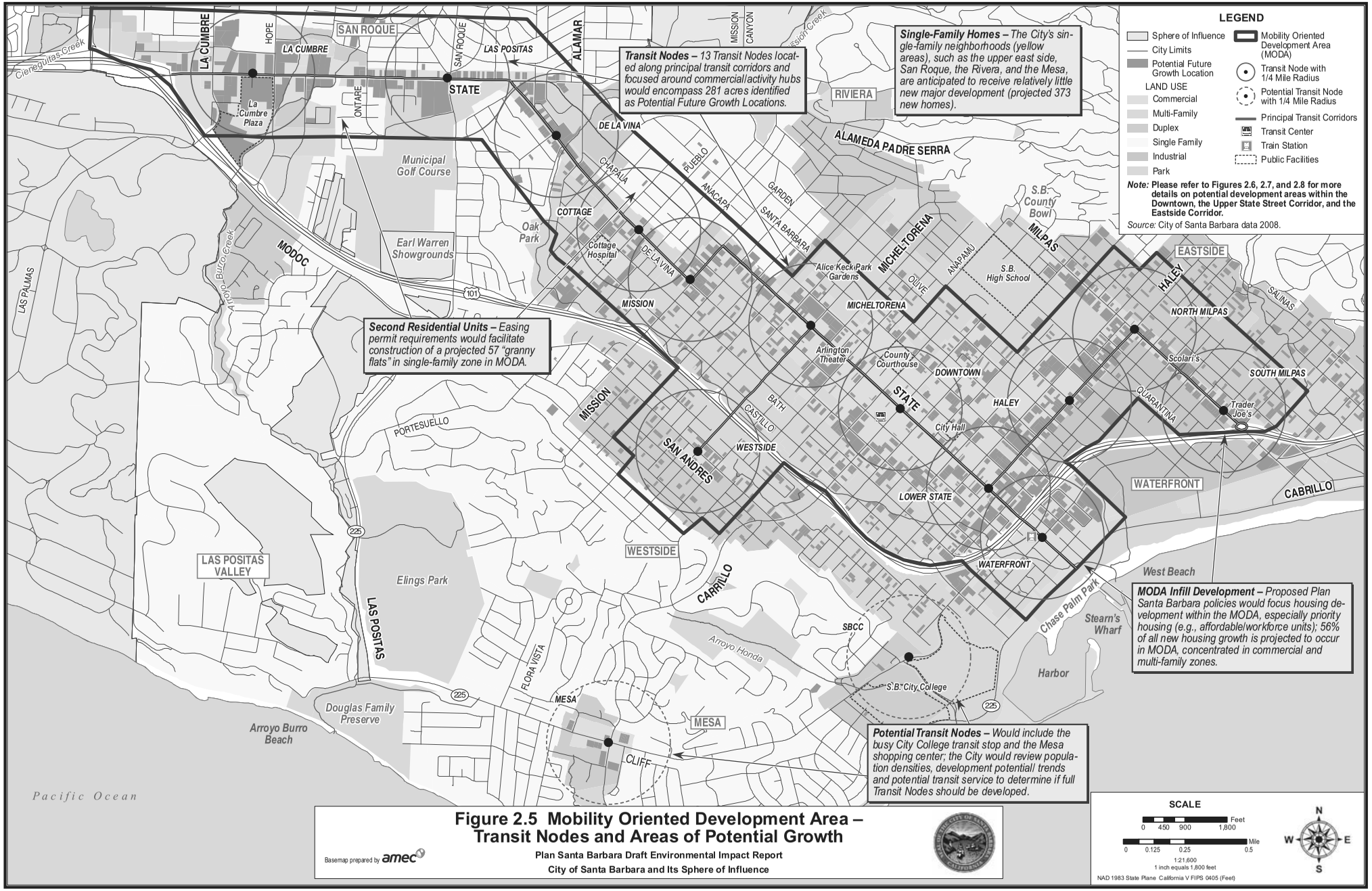


Figure 2.5 Mobility Oriented Development Area – Transit Nodes and Areas of Potential Growth

Plan Santa Barbara Draft Environmental Impact Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Appendix B

Plan Santa Barbara EIR Assumptions
Provided by the City of Santa Barbara (4/2/09)

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Transportation				
Residential parking requirements within MODA	Existing Policies: Average 2 spaces/unit + guest (per Ord 28.90) More can be provided if demand identified or if proposed. No requirement for unbundled parking	Average 1 space/unit regardless of unit size Maximum No Guest Parking Required unbundled residential parking for all unit types within MODA Exclude residential on-street parking in commercial zones, Allow required residential parking off-site in commercial zones.	Increase beyond Ordinance requirement of average 2 spaces/unit Increase beyond Ordinance requirement for Guest Parking More can be provided if demand identified or if proposed. No requirement for unbundled parking	Downtown Core – 0 spaces/unit Transit Corridors in MODA average ½ space (1 block) *(e.g., Milpas, Upper State)* Rest of MODA average 1 space/unit for all unit types. Maximums No Guest Parking Required unbundled residential parking for all unit types within MODA
Residential parking requirements outside MODA	Existing Policy Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance
Second Unit Parking inside or outside MODA	Existing : 1 space/unit	0 space/unit	1 space/unit	0 space/unit
Commercial/Retail Employee Parking inside MODA	Existing per current ordinance: DT 2/1000, Elsewhere 4/1000	Expand delineated Central Business Dist area to reduce by half parking requirements (to 2/1000)	Per current ordinance	No requirement Downtown
Commercial/Retail Employee Parking outside MODA	Existing per current ordinance	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Public Parking Pricing (on and off-street) within MODA	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Strong mgmt changes for on- and off-street: Identify aggressive price increases for off-street. Add on-street parking pricing w/mid-block kiosks, payment by cell phones, etc. (Pair w/ car share program identified under TDM)
Public Parking Pricing (on- and off-street) outside MODA	Existing management policies for on- and –off street.	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance
Bike system improvements	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report <$500K per improvement. Bike lanes priority over curbside parking in PHs plus other improvements: SB St – Haley to Micheltorena Chapala – Carrillo to Mission DelaVina–Haley to Constance Garden–Haley to Micheltorena Canon Perdido-Anacapa to Castillo	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements).	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Bike Plan to achieve low single-digit changes in mode shift. Include Peak-Hour parking restricted bike lanes on streets such as Santa Barbara, Anacapa, Anapamu, etc.

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Pedestrian system improvements	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable pedestrian improvements Existing Conditions Report (<$500,000 improvements) Complete sidewalk missing links in MODA. High quality ped crossings per vehicle yields in MODA.	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Ped Plan.
Transit system improvements	Continue existing Transit levels and locations per Existing Conditions Report.	Modest improvement in local & So. Coast transit routes/ headways. -More main lines with 10-minute peak-period headways, i.e add Crosstown Shuttle. -More lines outside of peak period. Minor reasonably foreseeable limited expense planned and funded improvements per Transit Plan	Same as "No Project" Alternative – existing conditions	Larger improvement in local & MTD regional transit routes/ headways to reflect gold-plated service, but account for diminishing returns where appropriate. -Headways from 10-5 minutes on City main lines? -Higher frequency on MTD regional express lines (i.e to Carpinteria, UCSB/Isla Vista) Reasonably foreseeable Transit Plan improvements
Regional bus service	Existing service levels per Existing Conditions Report	Modest Increase: Continued demand responsive expansion of regional bus service, e.g., Clean Air Express. Assume growth in service based on average growth rates in years prior to big spike in gas prices.	Same as PlanSB - Modest Increase	Assume aggressive expansion of regional bus service, e.g., Clean Air Express, to reflect high rates of growth during gas price run up, with corresponding reductions in regional SOV commuting. Assume some shift in funding from roads to transit to expand regional bus service. -More shoulder times for main lines and better headways 7-9. -Light rail upper State Street

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Commuter rail	Existing AMTRAK limited service per Existing Cond Report	Modest increase: Existing rail service plus limited AMTRAK Commuter Rail service improvements, i.e., re-timing of existing AMTRAK service to be commuter-oriented.	Same as PlanSB project Modest AMTRAK PH Commuter Increases	Full commuter rail service from Ventura with existing service and 2 trains each in AM and PM peak hours. Identify point where commuter rail may qualify for Federal funding according to FTA ridership criteria for New Starts.
TDM	Current levels continue per Existing Conditions Report	Modest Expansion: Subsidized Transit Pass program – modest expansion to bring in more user groups, e.g., employers Parking Cash-Out – yes, per current law - >50 employees Car Sharing – expanded - low level, City funded (i.e., can take transit to work and have a car if needed) Bike Sharing –expanded to modest program, similar to Paris Safe Routes to School – Continue, modest increase Carpooling – modest increase- Telecommuting – modest expansion (increased allowance for telecommuting)	Same as "No Project" Alternative – existing TDM programs	Aggressive increases for public and private sector: Subsidized Transit Program – strong expansion Parking Cash Out – Improved program, expand to existing employers; aggressive pricing structure Car Sharing – Strong program – commuters and neighborhoods Bike-sharing – strong program Safe Routes to School – complete program Carpooling - increased efforts to facilitate, incentivize Telecommuting – Strong expansion.

Appendix C

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

Appendix D

Category 1: Parking Policies

1.1 Reduced/Eliminated Minimum Parking Requirements

Overview

Most cities minimum parking requirements typically take into account only two variables: land use and the size of development. However, they fail to take into account a number of other factors which affect parking demand including geographic factors (e.g. pedestrian environment, proximity to transit, and availability of services), demographic factors (e.g. income, household size, and vehicle ownership rates), and other relevant factors that affect parking demand (e.g. the presence of transportation demand management programs like car-sharing).

Minimum parking requirements are intended to achieve specific goals (most commonly identified by cities as avoiding spillover parking problems and reducing congestion of on-street parking). However, these goals can also be achieved through other policies, such as pricing curb parking at market rates, residential parking permit programs, and other on-street parking management techniques.

Reduced parking requirements could be established in locations where parking demand will be lower to due to the geographic and demographic factors described above. Eliminating parking requirements would not mean that no new parking would be constructed. Rather, it would mean that market forces would determine the appropriate level of supply, based on market demands. That is to say, individual developers will construct as much parking as they deem necessary to meet consumer demand regardless in the absence of minimum requirements. Minimum parking requirements could be waived entirely anywhere in the City of Santa Barbara where there are measures in place to combat parking spillover but especially in mixed used areas like downtown and in proximity to major transit corridors.

Current Policy

For commercial and retail uses, the Santa Barbara municipal code generally requires 2 parking spaces per 1,000 sq. ft. in downtown and 4 parking spaces per 1,000 sq. ft. outside of the downtown area. For residential uses, parking requirements vary based on number of bedrooms and location.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes within the Mobility Oriented Development Area (MODA):

- Reduce commercial parking requirements by half (to 2 parking spaces per 1,000 sq. ft.).
- Average 1 space per unit for all residential units.
- No guest parking.

Assumes outside of the MODA: maintenance existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or “granny flat”) within or outside of the MODA.

Assumes that maximum parking requirements would apply to residential parking.

Alternative 1

Assumes within the MODA: an increase residential parking requirements beyond current ordinance and maintain current commercial parking requirements.

Assumes outside the MODA" maintenance of existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes 1 dedicated parking space for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Alternative 2

Assumes for residential parking within the MODA:

- No minimum or maximum commercial or retail parking requirements downtown.
- Average ½ space per unit in transit corridors (i.e. within one block) for residential parking.
- Average 1 space per unit for all unit types for residential parking outside of the transit corridors.
- No guest parking.

Assumes outside of the MODA: maintenance of existing commercial, retail, and residential parking requirements per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Summary of Literature and Study Impacts

Research shows that there is an indirect link between reduced minimum parking requirements and a decline in vehicle trips. Setting minimum parking requirements often results in lower parking prices, as the supply of parking exceeds demand, which in turn increases vehicle ownership. Studies reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[1]

Average income households spend an average of $3,800 annually per vehicle.[2] Assuming that residential parking spaces have an annualized cost of $800 per year, parking costs add 21% to vehicle costs for an average income household. If we assume a vehicle price elasticity of –0.7 (Figure 1), minimum parking requirements that exceed the actual demand for parking increase vehicle ownership about 14%. The resulting increase in vehicle ownership will likely produce more vehicle trips. Conversely, decreasing or eliminating requirements would likely result in a reduction in residential vehicle trips.

Figure 1 Vehicle Ownership Reductions from Residential Parking Pricing

Annual (Monthly) Fee	-0.4 Elasticity	-0.7 Elasticity	-1.0 Elasticity
$300 ($25)	4%	6%	8%
$600 ($50)	8%	11%	15%
$900 ($75)	11%	17%	23%
$1,200 ($100)	15%	23%	30%
$1,500 ($125)	19%	28%	38%

[1] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[2] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard has insufficient data to estimate the impacts of potential changes to minimum parking requirements on vehicle trips or vehicle ownership in Santa Barbara.[3] This does not imply that reduced/eliminated parking requirements have no impact on vehicle ownership and trips (they clearly do through Tiebout Sorting, or self-selection effects). However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[4]

[3] For example: even if minimum parking requirements are reduced or eliminated, many developers might still build projects with the same amount of parking as the old minimums in order to be competitive with older projects that were previously required to meet those minimums. Regardless of how many parking spaces were actually built, there is no way to estimate how many of those parking spaces would actually be occupied.

[4] For example, using site-level data on the number of parking spaces constructed and the amount of the constructed parking actually occupied in several "high parking" and "low parking" development projects located in similar contexts in Santa Barbra would allow us to estimate the impact of parking supply on vehicle ownership and vehicle trips generated (by multiplying the number of vehicles at the differently-parked projects by an average factor for "peak hour trips generated per vehicle" in Santa Barbara).

1.2 Unbundled Parking

Overview

Parking costs are generally subsumed into the sale or rental price of housing and commercial space. But although the cost of parking is often hidden in this way, parking is never free; instead the cost to construct and maintain the "free" parking is hidden in the cost of all other goods and services. For all commercial and residential development in Santa Barbara, the cost to lease or purchase parking could be unbundled from the cost to lease or purchase the usable space.

Such a policy would provide a financial incentive to residents and employers to lease only the amount of parking they need. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. Among households with below-average vehicle ownership rates (e.g., low-income people, singles and single parents, seniors on fixed incomes, and college students), unbundled parking can also provide a substantial financial benefit that increases housing affordability. Unbundled parking can allow employers to provide employees with an equitable transportation benefit that can reduce vehicle commuting.

Current Policy

The City of Santa Barbara does not require the unbundling of parking in residential or commercial developments.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA. No change outside MODA.[5]

Alternative 1

Assumes increased parking for commercial uses and allowable increases in residential parking.

Alternative 2

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA.

Summary of Literature and Study Impacts

Charging separately for parking is the single most effective strategy to encourage households to own fewer cars, and subsequently reduce vehicle trips. According to a study by Todd Litman, unbundling residential parking can significantly reduce household vehicle ownership.[6] Studies

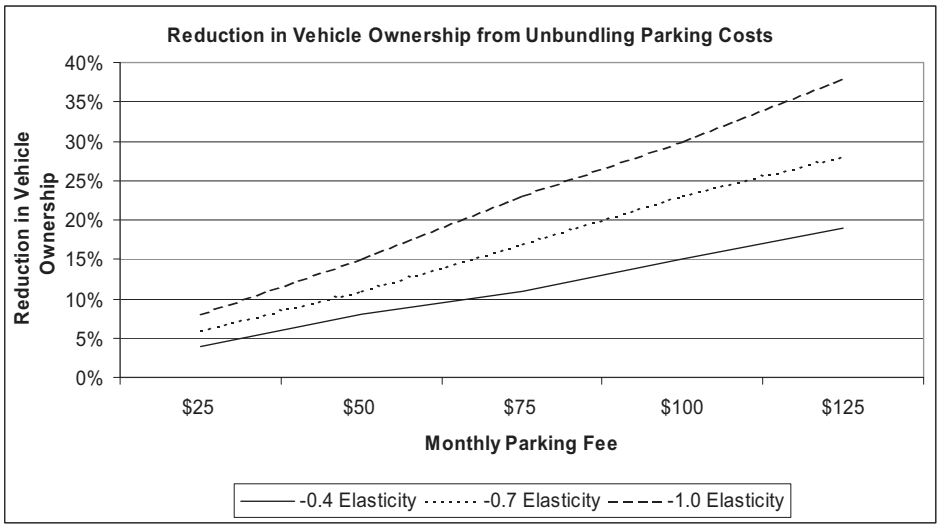
[5] Unbundled parking is recommended for multifamily attached housing including both rental apartments and for-sale condominiums and townhouses. For single-family detached housing where the parking is incorporated into the residential unit, unbundled parking is technically feasible and often occurs informally but not recommended as formal policy. For single-family detached housing where the parking is separate from the main structure (such as a carriage house garage with a residential Accessory Dwelling Unit above or where parking can be leased from a centralized "community" lot or garage serving multiple residences) then unbundled parking for single-family detached housing is feasible.

[6] Victoria Transport Policy Institute (2009), *Parking Requirement Impacts on Housing Affordability,* http://www.vtpi.org/park-hou.pdf

reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[7]

Average income households spend an average of $3,800 annually per vehicle.[8] Assuming that residential parking spaces have a monthly cost of $70, and a vehicle price elasticity of –0.7 (Figure 2), the unbundling of parking costs would decrease vehicle ownership about 15%. This decrease would result in a proportionate reduction in residential vehicle trips.

Figure 2 Reduction in Vehicle Ownership from Unbundling Parking Costs



Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

Alternative 1

This alternative assumes no unbundled parking, therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

[7] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[8] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

1.3 Public Parking Pricing

Overview

One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. In addition, studies have shown that an average of 28% of traffic congestion in urban mixed-use and commercial districts (such as downtown Santa Barbara and proposed MODA areas) is attributable to cruising for parking: motorists who have already arrived at their destination but are searching and circling to find a free or below market-rate curb parking space.[9] This phenomenon is compounded in Santa Barbara with employees engaging in the "parking shuffle" in which workers continually move their vehicles from one space to another throughout the day to avoid citations for overstay of the 75- and 90-minute time limits, thereby parking all day for free.

In these circumstances, managing on- and off-street parking prices as part of an integrated district-wide parking system is an important strategy for reducing peak-hour trip generation and localized traffic congestion, especially for trips to areas with high employment densities. Demand-responsive, market-based prices for parking pricing also have secondary benefits including:

1. Distributing highly variable parking demand to match available supply to ensure that there are available curb parking spaces at all times of day.

2. Promoting parking turnover to prevent commuters parking all-day in on-street parking spaces intended for short-term parking.

3. Reducing "ticket anxiety" of shoppers and visitors to commercial areas by allowing motorists to park for longer periods of time that with time limits so long as they pay for all the parking they use.

Based on the findings of Nelson\Nygaard's downtown on-street parking survey, both of these conditions apply in downtown Santa Barbara, and likely in other mixed-used districts in Santa Barbara such as proposed MODA areas (for more information, see the Plan Santa Barbara *DRAFT Summary of Downtown Santa Barbara On-Street Parking Survey* (dated 4/29/09).

Current Policies and Programs

Downtown parking in the non-commuter lots is free for the first 75 minutes and $1.50 per hour after. There are no time limits on the length of stay. Priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm. Monthly parking passes are available in 12 short-term lots and garages and the price varies from $100 to $150 depending on the location of the parking lot or garage. The two downtown commuter lots are reserved for commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). On-street parking is free for the first 15 to 75 minutes depending on the street.

Outside of the downtown area on-street parking is free for up to the first 90 minutes. See the Plan Santa Barbara *Transportation Existing Conditions Report* (August 2008) for more details on existing parking policies and conditions.

[9] Shoup, Donald. *The High Cost of Free Parking.* APA Planner's Press. 2005.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate program of parking management changes to on- and off-street parking within the MODA including the following:

- Relax time limits for on-street parking to allow motorists to park for longer time periods so long as they pay for the parking they use.
- Continue time limits for off-street parking.
- Eliminate parking discounts and begin charging tiered rates for off-street parking based on "length of stay" and/or "time of day."
- Begin charging for on-street parking at roughly 33 cents per hour.[10]
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Alternative 1

Assumes maintenance of existing pricing and time limit policies for on and off-street parking within and outside the MODA.

Alternative 2

Assumes implementation of a robust parking management program for both on- and off-street parking within the MODA as follows:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour.[11] These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the

[10] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

[11] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail

- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Summary of Literature and Study Impacts

The reduction in employee vehicle trips from public parking pricing varies both in the amount charged for parking and in the type of location the pricing is implemented. Parking pricing has a much more profound effect in denser areas, such as within the MODA, where more alternative mode choices are present and as a result, vehicle trips face greater reductions in those districts. Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[12] According to the information developed by Litman regarding "place types" and summarized in Figure 3, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With a citywide employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1% (and Areas 1 – 4 all showing similar figures), the travel characteristics for the entire city of Santa Barbara indicate that the city is very similar to what Litman terms an Activity Center.[13]

Figure 3 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%

[12] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

[13] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

If we assume that a public parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in commuter vehicle trips would be between 37% and 46.8%, for both current and future traffic, given that Santa Barbara is an "Activity Center."[14] Research regarding the pricing effects on short-term visitor vehicle trips is insufficient to make an estimate of impacts. No documented drop in visitor vehicle trips has been found from cities that have implemented public parking pricing. Instead, common responses by short-term parkers to changes in public parking prices are to slightly reduce the amount of time they park for or to seek out lower priced parking in facilities that may be further away from high demand areas (and are therefore underutilized) and then walk or take a transit to their final destination.

Figure 4 Vehicle Trips Reduced by Daily Parking Fees[15]

Worksite Setting	$1.49	$2.98	$4.47	$5.96
Low Density Suburb	6.5%	15.1%	25.3%	36.1%
Activity Center	12.3%	25.1%	37.0%	46.8%
Regional CBD/Corridor	17.5%	31.8%	42.6%	50.0%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a moderate increase in parking price to an average daily charge of $2.98 (approximately 33 cents per hour), research from VTPI shows the decrease in employee vehicle trips would be 25.1% in Areas 1 and 2 given that Santa Barbara is an "Activity Center." No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

This alternative assumes no change in parking policies and therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume that a parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in employee vehicle trips would be 44.2% in Areas 1 and 2 given that Santa Barbara is an "Activity Center."[16] No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[14] The $120 is based on an average of the current prices for downtown off-street monthly permits - http://www.santabarbaraca.gov/Resident/Transportation_and_Parking/Parking/PERMITS.htm.

[15] Victoria Transport Policy Institute (2008), *Land Use Impacts on Transport*, http://www.vtpi.org/landtravel.pdf

[16] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 4 (y = 0.0774x + 0.0145).

Category 2: Transportation System Improvements

2.1 Bike System Improvements

Overview

Bicycle system improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. Bike facilities can serve direct door-to-door trips, especially those trips that are "too far too walk but too far to drive" (e.g. trips of between one and two miles are too long to walk for most people, but are a short bicycle ride). In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area"[17] of the transit stop or station and increasing ridership. Bicycle access can also reduce parking pressure on heavily-used and/or heavily-subsidized feeder bus lines and auto-oriented park-and-ride facilities.

Current Policies and Programs

The city of Santa Barbara has a comprehensive bicycle network that connects nearly every part of the City, with approximately 28 miles of bike lanes and 6 miles of separated off-street bike paths. These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Santa Barbara has a high rate of biking, with Census data showing that 3.4% of residents bike to work, compared to 0.6% nationwide. For more details on existing bike facilities, see the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. On-street bicycle is available throughout downtown Santa Barbara and merchants may request to have bike parking installed near their business. On-street (sidewalk) and off-street lockers are provided for "long term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. The City of Santa Barbara also provides secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations. Off-street bicycle parking requirements are dictated by municipal code.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to bicycle network connectivity and completeness by prioritizing bike lanes over curbside parking during peak hours, including:

- Peak-hour parking restrictions would be in place to allow for curb-side bike lanes at the following locations (the curb lane would revert back to parking at all other times):
  - Santa Barbara Street - Haley to Micheltorena
  - Chapala – Haley to Constance
  - Dela Vina – Haley to Constance
  - Garden – Haley to Micheltorena
  - Canon Perdido – Anacapa to Castillo

[17] A transit catchment area is the geographic area from which a transit station draws riders.

- Improvements to bicycle travelways and parking are a priority use of rights-of-way within MODA.

Alternative 1

Assumes minor improvements to the bicycle network and facilities (a total investment of less than $500,000 each).

Alternative 2

In addition to improvements in Plan SB Alternative, assumes major improvement to the bicycle network by:

- Improvements to bicycle travelways and parking are a priority use of rights-of-way throughout the City, including implementation of all of the recommended improvements within the City of Santa Barbara's Bicycle Master Plan.
- Implement other bicycle infrastructure and programs as necessary to achieve Platinum designation as a Bicycle-Friendly Community from the League of American Cyclists.[18]
- Improve coordination between City, County, UCSB, SBCAG, and other South Coast cities and entities to improve and expand regional bike paths and routes that cross jurisdictional boundaries.

Summary of Literature and Study Impacts

One important advantage of bicycling compared to walking is that bicycling can substitute directly for automobile trips with longer distances. A before-after study of bicycle facility implementation found that each mile of bikeway per 100,000 residents increases bicycle commuting 0.075%, all else being equal.[19]

Summary of Estimated Impacts in Santa Barbara

Because the estimated impacts of bicycle system improvements are relatively small, and because Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for these impacts for purposes of the modeling effort, we have excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort.. This does not imply that bicycle system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

The introduction of bike lines on Santa Barbara St. (Haley to Micheltorena), Chapala St. (Carrillo to Mission), De la Vina St. (Haley to Constance), Garden St. (Haley to Micheltorena), and Canon Perdido (Anacapa to Castillo) would equal 5.5 miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.46% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[18] There are no definitive criteria to achieve this designation; instead a number of factors related to the 5 E's (engineering, education, encouragement, enforcement and evaluation) are considered that are tailored to the individual community seeking the designation. For more information see the League of American Bicyclists' "Bicycle Friendly Communities" website at http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities.

[19] Arthur Nelson and David Allen (1997), *If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities,* Transportation Research Record 1578, http://www.enhancements.org/download/trb/1578-10.PDF.

Alternative 1

No increase in bicycle trips is anticipated due to minor system improvements.

Alternative 2

Filling in gaps in the bicycle network and implementing additional measures will essentially have the effect of introducing 11 additional miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.92% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.2 Pedestrian System Improvements

Overview

A walkable environment gives people more transportation choices and improves quality of life. A well-designed network of streets and pedestrian ways is key to improving pedestrian accessibility, and includes streets, alleys, trails, midblock crossings and pedestrian paseos. Walking is also a free transportation option for accessing public transit, and is available to most people within a quarter to half mile of transit stations and stops. Thus creating a safe, comfortable, and convenient walking environment is key part of supporting transit. A well-designed network of streets with a high degree of pedestrian amenity is a key factor in enhancing pedestrian accessibility and connectivity to transit.

Current Policies and Programs

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service. Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. See the City of Santa Barbara's Pedestrian Master Plan for more information on current pedestrian system conditions by area.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links within the MODA as identified in the City's "Sidewalks Missing Links" program.
- Implementing enhanced pedestrian crossings at high volume intersections.

Alternative 1

Assumes minor improvements to the pedestrian network and facilities (a total investment of less than $500,000).

Alternative 2

Assumes major improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links throughout the City as identified in the City's "Sidewalks Missing Links" program.
- Constructing enhanced pedestrian crosswalk treatments at high volume intersections.
- Installing pedestrian amenities (e.g. pedestrian-scaled street lighting, benches, trees and other landscaping) along high volume pedestrian corridors, around transit stops and stations, and at other key pedestrian destinations (parks, schools, etc.).
- Continuing with the installation of corner curb ramps in compliance with Federal and State universal access requirements for public rights-of-way.
- Implementing traffic calming measures as needed.
- Implementing other improvements as identified in the City's Pedestrian Master Plan.

Summary of Literature and Study Impacts

It can be difficult to estimate precisely how much walkability investments affect travel, since it is often accompanied by investments in other alternative transportation means and changes in land use. However, studies have found that there is a direct connection between a high quality pedestrian environment and usage of travel modes other than driving:

- Walking is three times more common in a community with pedestrian friendly streets than in otherwise comparable communities that are less conducive to walking.[20]
- Residents in a pedestrian friendly community walk, bicycle, or ride transit for 49% of work trips (18 percentage points higher than in a comparable automobile community) and 15% of their non-work trips (11 percentage points higher than in a comparable automobile-oriented community).[21]
- Investments in the pedestrian environment have positive impacts on all road users. Benefits include: reduces auto-dependency and air pollution, improves livability, increases mobility for low-income households, and even increases retail sales and property values.[22]

In addition to the studies discussed above, a significant amount of research had been conducted on how urban form affects travel behavior. Urban design elements that impact pedestrian access such as street patterns (grid versus cul-de-sacs), topography, ease of street crossings, sidewalk continuity have been shown to reduce VMT and daily vehicle trips.[23] In another study which examined how urban form variables affected the number of pedestrian trips for recreation and shopping, it was shown that perceived safety, shade, and the frequency and desirability of seeing people while walking had a significant impact (for shopping trips, distance, the ease of walking and comfort were significant variables).[24]

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts, specifically in terms of street connectivity criteria in the model. We have therefore excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort. This does not imply that pedestrian system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

Major improvements to the pedestrian network will result in a 1 percentage point increase in alternative mode use for work trips and a .5 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[20] Anne Vernez Moudon, Paul Hess, Mary Catherine Snyder and Kiril Stanilov (2003), *Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments*, http://www.wsdot.wa.gov/research/reports/fullreports/432.1.pdf

[21] Robert Cervero and Carolyn Radisch (1995), *Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods*, http://www.uctc.net/papers/281.pdf.

[22] Local Government Commission (2001) *The Economic Benefits of Walkable Communities*. http://www.lgc.org/freepub/docs/community_design/focus/walk_to_money.pdf

[23] 1000 Friends of Portland (1993) *The Pedestrian Environment: LUTRAQ Report Volume 4A*, http://ntl.bts.gov/DOCS/tped.html

[24] Susan Handy, Kelly Clifton, and Janice Fisher (1998) The Effectiveness of Land Use Policies as a Strategy for Reducing Auto Dependence : A Study of Austin Neighborhoods, http://www.des.ucdavis.edu/faculty/handy/Austin_Report.pdf

Alternative 1

No increase in pedestrian trips is anticipated due to minor system improvements.

Alternative 2

Major improvements to the pedestrian network will result in a 2 percentage point increase in alternative mode use for work trips and a 1 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.3 Transit System Improvements

Overview

In most cities that have succeeded in growing while limiting the growth of vehicle trips, a fundamental component of their success has been improved transit services. Existing transit services can be improved in several ways, including:

- Increasing frequency (e.g. reduced headways).
- Increasing reliability and on-time performance.
- Reducing travel time and travel time variability.
- Increasing service span (e.g. hours of operation).
- Enhancing passenger amenities (both in-vehicle and at stations and stops).

The connectivity and convenience of the transit system can also be enhanced through the addition of new bus routes running in mixed-flow travel lanes or by adding new service running in dedicated transit rights-of-way, such as Bus Rapid Transit (BRT),[25] light rail, or heavy/commuter rail service.

Current Policies and Programs

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Santa Barbara has a typical rate of transit use, with Census data showing that 4.5% of residents bike to work, compared to 4.4% nationwide. A summary of existing services is below, and more information is presented in the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

Local MTD Transit

Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles.

Regional Bus Service

MTD operates the Valley Express which is a regional bus service. Additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal Express (the latter co-managed by the Ventura County Transportation Commission).

Commuter Rail

Amtrak serves Santa Barbara with passenger rail service along the Coast Starlight and Pacific Surfliner Routes. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara. The current schedules provide limited service during peak commute hours and existing passenger rail service is therefore not a feasible option for most commuter trips to and from Santa Barbara.

[25] A definition of BRT can be found at the Bus Rapid Transit Institute, http://www.nbrti.org/CBRT.html

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes the following service enhancements:

Local MTD Service

A modest increase in local and South Coast bus service as follows:

- Reduce peak period headways to 10 minutes on routes serving of primary transit corridors ("main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Introduce "crosstown shuttle" service.
- Implement other low-cost transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 1

Assumes the following service enhancements:

Local MTD Service

Maintenance of existing transit system and service levels as detailed in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

Regional Bus Service

As in the Plan Santa Barbara alternative, a modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 2

Assumes the following service enhancements:

Local MTD Service

In addition to the improvements in Plan Santa Barbara alternative, a robust increase in local and South Coast bus service as follows:

- Reduce peak period headways from 10 to 5 minutes on routes serving of primary transit corridors (e.g. Routes 1, 2, 6, 11 and other "main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Increase frequency of MTD regional express lines (e.g. Capinteria, UCSB/Isla Vista, etc.).
- Introduce light rail service on upper State Street.
- Implement all other transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A robust increase in regional bus service as follows:

- Shift of regional transportation funding from highway capacity projects to dramatic expansion of regional bus services (such as the Clean Air Express), including:
  - Increased frequency (reduced headways) during peak commute periods.
  - Additional services during non-peak travel times to allow peak-hour commuters to rely on the service in emergency, accommodate occasional flex-work commuters, etc.
- Service capacity and ridership to expand at the historical annual growth rate experienced during the Fall 2007 to Fall 2008 spike in gas prices.

Commuter Rail Service

A robust expansion of commuter rail service from Ventura with existing Amtrak service and two additional trains in both the AM and PM peak hours.

Summary of Literature and Study Impacts

The elasticity of transit use with respect to transit service frequency is about 0.5, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.5%.[26] The elasticity of transit use to service expansion (e.g. routes into new parts of a community already served by transit) is in the range of 0.6 to 1.0, which means that 1.0% of additional service increases ridership by 0.6-1.0%.

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would

[26] Richard Pratt (2000) *Traveler Response to Transportation System Changes*, Interim Handbook, TCRP Web Document 12. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_webdoc_12.pdf

otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%). Impacts of other expansions in transit vary depending on the conditions in which it is implemented.[27]

Local experience in Santa Barbara suggest that increasing transit service results in ridership growth: when the headways on several MTD routes (1, 2, 6, 11) were decreased from 15 minutes to 10 minutes, peak period ridership on these routes increased by 13%.[28]

Summary of Estimated Impacts in Santa Barbara

Because the extent and phasing of the transit system improvements are not known at a level of precision that would allow Nelson\Nygaard to derive a reliable estimate of peak hour vehicle trip, VMT, or vehicle ownership reductions, we have excluded these impacts from the analysis in order to maintain a conservative methodology. This does not imply that transit system improvements will have no impact on vehicle ownership and trips in Santa Barbara; quite the contrary, the available research shows that enhanced transit service will have significant impacts. However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[29]

Nelson\Nygaard also believes that some of the impacts of transit system improvements will be accounted for in the 4-D model adjustments (density, design, diversity, destinations), since areas with enhanced transit service will likely correspond to areas with increased density, mixing of uses, and reduced parking.

[27] Victoria Transport Policy Institute (2008). *Traffic Calming*. http://www.vtpi.org/tdm/tdm4.htm.
[28] Information provided by City of Santa Barbara staff.
[29] For example: service type (e.g. bus operating in mixed-flow travel lanes or BRT, light rail, heavy rail operating in a dedicated transit rights-of-way), service span and headways, and routing. Using this information, we could derive estimates of both ridership growth generated by the transit improvements (i.e. number of new transit trips net of existing transit trips in this corridor or parallel corridors) and reductions in peak-hour vehicle trips as result of the transit improvements (e.g. the number of the new transit trips occurring in peak travel periods vs. non-peak, the number of new transit trips that shifted from single-occupant vehicle trips vs. carpooling, other transit services, bicycling, etc.).

Category 3: Transportation Demand Management (TDM) Policies[30]

3.1 Subsidized Transit Passes

Overview

In recent years, growing numbers of transit agencies have teamed with universities, employers, building developers, or entire districts or neighborhoods to provide universal or subsidized transit passes to certain riders (students, employees, etc). These passes typically provide unlimited transit rides on local or regional transit providers for a low monthly fee, often absorbed entirely by the employer, school, or developers.

Current Policy and Programs

The City of Santa Barbara currently has a subsidized transit pass program as follows:

- Current City employees receive free MTD transit passes.
- All downtown employers established in the past 15 years must provide free MTD transit passes to their employees.
- Downtown employers that were established prior to 15 years ago may qualify for discounted MTD transit passes.
- Any downtown employee may request a discounted MTD transit pass.
- Non-downtown employers may voluntarily participate in the program in order to provide subsidized transit passes to their employees.
- Large development projects are sometimes required by the City (as a condition of approving entitlements) to provide subsidized transit passes to the development's employees and/or residents.

For employees eligible for discounted MTD transit passes the Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. The program is funded by revenue generated at parking lots and garages in the downtown area. For additional information on the existing program, please see the *Plan Santa Barbara Existing Conditions Report* (dated August 2008).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara Alternative

A modest expansion in the participation in the existing subsidized transit pass program as follows:

- Target expanded enrollment among these new user groups:
  - All large employers citywide.
  - All employers within MODAs.
  - All employers within a ¼ mile of high-transit corridors.
  - Schools.

[30] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Encourage these new user groups to enroll in the existing subsidized transit pass program by:
  - Promoting and marketing the program via Transportation Management Association to these new user groups.
  - Incentivizing enrollment in the program via administrative and logistical support to these new user groups.
  - Considering additional financial subsidy as necessary to enroll certain new user groups (e.g. non-profits, etc).
- Encourage expansion of participation rates by *existing* user groups through:
  - Increased promotion and marketing.
  - Lowering barriers to entry (e.g. requiring automatic opt-in).
  - Deeper financial subsidy as necessary to lower out-of-pocket costs for certain user groups (e.g. non-profits, etc.).

Alternative 1

Maintenance of existing subsidized transit pass program as described above.

Alternative 2

In addition to the policies in Plan Santa Barbara alternative, a robust expansion of the existing subsidized transit pass program as follows:

- Require passes to be provided as part of the conditions of approval for entitlements for all residents and employees of:
  - New development within downtown.
  - New development within MODAs.
  - New development within a ¼ mile of high-transit corridors.
  - New large developments citywide.
- Require subsidized transit passes be provided to the employees of:
  - All new employers citywide as part of the conditions of approval for entitlements.
  - All existing employers citywide who propose physical expansions as part of the conditions of approval for entitlements.
- Work with regional partners to ensure that:
  - The subsidized transit pass program encompasses all existing and future regional bus and/or rail transit services (in addition to MTD services).
  - The fare media used by the subsidized transit pass program is compatible for use on all services to increase user convenience and reduce barriers to entry for new participants.

Summary of Literature and Study Impacts

Current research regarding the impacts of subsidized transit passes can be generally broken into two categories.

1. The first set of research focuses on demonstrating the effects transit passes on mode splits by surveying users before and after implementation.

2. The second method bases the results of a transit pass implementation on the actual percent of vehicle trips reduced.

Both of these types of research can be useful for different purposes, as discussed below.

The first set of data is useful in illustrating the impacts of transit passes in various settings. Figure 1 shows the drive-alone and transit mode splits before and after subsidized transit pass implementation in different locations. These studies show reductions in drive-alone mode share of 4% to 42%, with an average reduction of 19%. In addition, these case studies show a wide range of increased transit mode share of between 25% and 145% with an average rise of 95%.

Figure 5 Employee Mode Splits Before & After Implementation of Subsidized Transit Pass Programs

Location	Drive Alone to work			Transit to work		
Municipalities	*Before*	*After*	*% Change*	*Before*	*After*	*% Change*
Santa Clara (County)[31]	76%	60%	27%	11%	27%	145%
Bellevue, Washington (Downtown)[32]	81%	57%	42%	13%	18%	38%
Ann Arbor, Michigan (Downtown)[33]	N/A	N/A	4%	20%	25%	25%
Universities						
UCLA (faculty and staff)[34]	46%	42%	9%	9%	20%	122%
Univ. of Washington, Seattle (faculty)[35]	60%	47%	22%	11%	27%	145%
Univ. of Washington, Seattle (staff)	44%	39%	11%	25%	36%	44%
Average Percent Change	-	-	19%	-	-	87%

Source: Table created by Nelson\Nygaard from studies cited in table footnotes.

Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[36] According to the information developed by Litman regarding "place types" and summarized in Figure 2, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With an

[31] Santa Clara Valley Transportation Authority (1997). *Eco Pass Pilot Program Survey Summary of Findings*.
[32] King County Metro (2000) *FlexPass: Excellence in Commute Reduction, Eight Years and Counting*. www.commuterchallenge.org/cc/newsmar01_flexpass.html.
[33] Christopher White, Jonathan Levine, and Moira Zellner (2002). *Impacts of an Employer-Based Transit Pass Program: The Go Pass in Ann Arbor, Michigan*. www.apta.com/research/info/briefings/documents/white.pdf
[34] Jeffrey Brown, Daniel Baldwin Hess, and Donald Shoup (2003). *Fare-Free Public Transit at Universities*. http://shoup.bol.ucla.edu/FareFreePublicTransitAtUniversities.pdf
[35] University of Washington Facilities Services, *The U-PASS Online and Telephone Survey Report (2006)*, www.washington.edu/commuterservices/programs/upass/reports.php
[36] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1%, the travel characteristics of Santa Barbara indicate that the city is very similar to an Activity Center.[37]

Figure 6 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%
Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

Furthermore, Figure 7 breaks each category into three subcategories of rideshare oriented, mode neutral, and transit oriented. Essentially, if transit or ridesharing comprises more than 50% of the alternate mode share, the site is transit oriented or rideshare oriented, respectively. If neither transit nor ridesharing dominates, then the area is considered mode neutral. In the case of Santa Barbara, carpooling is roughly equivalent to transit usage making the city mode neutral.

We have updated the daily transit subsidy information used by Litman to account for inflation since the Litman data was compiled; the source for this escalation was the U.S. Bureau of Labor Statistics Consumer Price Index.[38] Given the $52 monthly cost of an MTD pass, it can be estimated that the necessary daily transit subsidy necessary for an employee would be $2.39.[39] As shown in Figure 7, this sum falls between the $1.49 and $2.98 subsidies. By calculating the statistical relationship between transit subsidy and percent decrease in vehicle trips we find that a likely percent reduction in vehicle trips from a transit pass subsidy covering all employees in Santa Barbara would be 13.7%.[40]

Figure 7 Vehicle Trip Reduction by Workplace Setting and Daily Transit Subsidy[41]

	Daily Transit Subsidy			
Worksite Setting	**$0.75**	**$1.49**	**$2.98**	**$5.96**
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	**7.3%**	**16.4%**	38.7%
Activity center, transit oriented	5.2%	10.9%	23.5%	49.7%
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%

[37] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

[38] Bureau of Labor Statistics, *Consumer Price Index*, http://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.

[39] Based on an average 260.7 weekdays per year and 21.7 weekdays per month.

[40] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 8 (y = 0.0684x - 0.0267).

[41] Victoria Transport Policy Institute (2008), *Transportation Elasticities*, http://www.vtpi.org/elasticities.pdf

Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%	54.3%
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%	64.0%

Summary of Estimated Impacts in Santa Barbara

For this analysis, we have assumed that 20% of employees are currently participating in a transit subsidy program under Alternative 1 in Areas 1 and 2, resulting in a 2.7% reduction in auto trips (13.7% multiplied by 20%).[42] The Plan Santa Barbara alternative envisions an expansion of the program to cover 40% of employees in Areas 1 and 2 with a 5.5% reduction in trips. Alternative 2 covers 60% of employees in all areas with an 8.2% reduction in trips. These estimates are summarized in Figure 8.

Figure 8 Estimated Impacts on Auto Trips

Policy/Program	PlanSB	Alternative 1	Alternative 2
Subsidized Transit Passes	(5.5%)	(2.7%)	(8.2%)

Similarly, the impacts of a transit pass subsidy on drive-alone and transit mode shares given the ranges of 4% to 42% decreases in drive alone share and 25% to 145% increases in transit share are relative to the percentage of participating employees (20%, 40%, and 60%). For example, Alternative 1 will result in a 5% to 29% increase in transit share (25% to 145% multiplied by 20%). These estimates are summarized in Figure 9.

Figure 9 Estimated Impacts on Mode Splits

Mode	PlanSB	Alternative 1	Alternative 2
Drive Alone	(2% -16%)	(1% - 8%)	(2% - 25%)
Transit	10% - 58%	5% - 29%	15% - 87%

No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[42] Because the City already has a subsidized transit pass program and Alternative 1 assumes no expansion of that program, vehicle trip reductions from continuation of the current program under this alternative would already be accounted for in the current mode splits that are used in the traffic modeling process. For this reason, Appendix C (which is an input into the traffic model) assumes 0% reduction in peak-hour vehicle trips for the transit pass program in Alternative 1 to avoid "double counting."

3.2 Parking Cash-Out

Overview

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash-out requirement, employers are allowed to continue this practice on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work. Offering employees the option of "cashing out" their subsidized parking space can incentivize employees to ride transit, bike, walk, or carpool to work, thereby reducing vehicle commute trips and emissions.

The cash value of the parking subsidy can be offered in one of three forms:

- A transit/vanpool subsidy equal to the value of the parking subsidy (of which up to $230 per month is tax-free for both employer and employee).
- A taxable carpool/walk/bike subsidy equal to the value of the parking subsidy.
- Alternately, employees can be given a general "transportation fringe benefit" equal to the market value of an employee parking space, and all employee parking can simply be priced with a daily fee.[43]

Parking cash-out is a state law in California, but the state law only applies to employers with 50 employees or more who lease their parking and whose parking costs can be separated out as a line item on their lease. In addition, the California Air Resources Board (CARB) is nominally tasked with monitoring compliance, but CARB currently has no dedicated enforcement resources. For this reasons, some California jurisdictions such as Santa Monica and Los Angeles have implemented local parking cash-out requirements and enforcement mechanisms.[44]

Current Policies and Programs

SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace. Implementation and enforcement of a citywide or countywide parking cash-out program would therefore likely have a significant impact on travel behavior, by providing a financial incentive for some auto commuters to shift to other modes.

Some private employers in Santa Barbara already offer parking cash-out. For example, Cottage Hospital in Santa Barbara has a parking cash-out program in which all employees are paid an additional $75 per month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest increase in parking cash out programs as follows:

[43] There are a number of ways to determine the actual market value of an employee parking space that is currently provided for free in order to determine the amount of cash that should be offered in lieu of the free parking. In general these are: a) align with prices charged at comparable parking facilities in the vicinity, b) calculate the total capital and operating cost of the parking, or c) calculate the total social costs of the parking, including not only capital and operating costs but also opportunity costs and costs of mitigating externalities.

[44] Enforcement mechanisms for ensuring compliance with the existing state parking cash-out law and potential local parking cash-out requirements include measures such as requiring a signed affidavit certifying compliance when an employer's business licenses is renewed. Additional information on this topic is included in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Coordinate with local and regional partner agencies to promote the existing state parking cash-out law to subject employers (i.e. those employers with more than 50 employees who lease their parking and whose parking costs can be separated out as a line item on their lease).

- Require periodic submittal of proof of compliance with existing state parking cash-out law as a condition of approval for all new development entitlements.

Alternative 1

Assumes maintenance of existing parking cash-out programs.

Alternative 2

Assumes a robust expansion of parking cash-out program by:

- Develop a local parking cash-out ordinance that would apply to a broader number of employers than the current State law (e.g. employers with less than 50 employees, employers who own their own parking, etc). Require compliance for new employers and promote voluntary phased compliance for existing employers.

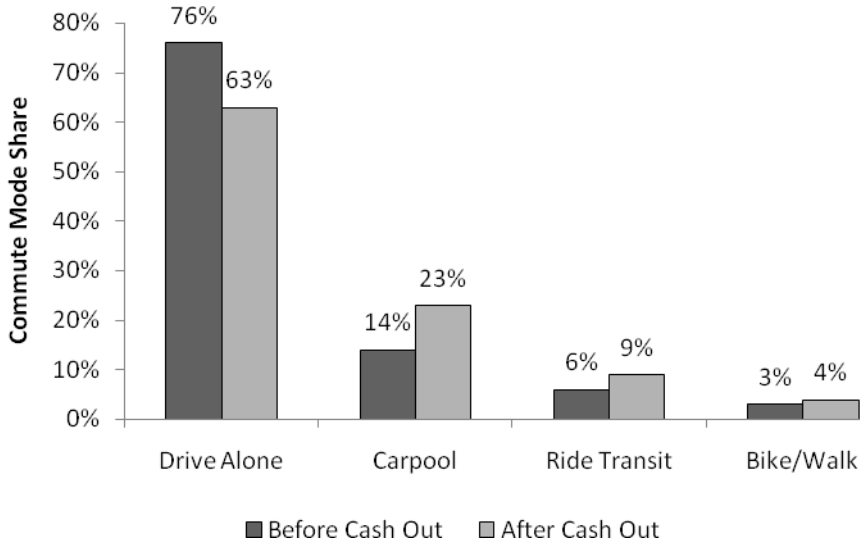
- Require periodic submittal of proof of compliance with the local and/or existing state parking cash-out requirements for all subject employers. For example, proof of compliance could be submitted as part of the application for a new or renewed business license.

Summary of Literature and Study Impacts

Research performed by Donald Shoup at the University of California-Los Angeles found that single occupancy vehicle trips declined by 17% and other modes increased significantly (carpooling by 64%, transit by 50%, and walking/biking by 33%) after a parking cash-out program was introduced at various urban and suburban worksites with varying levels of transit service. These findings are illustrated in Figure 10. These mode shifts resulted in an average 12% fewer vehicle miles traveled (VMT) per year per employee. This reduction is equivalent to removing one of every eight cars driven to work.[45] The analysis found that reductions in auto trips tend to increase over time, as more employees find opportunities to reduce their driving and take advantage of the parking cash-out "fringe benefit."

[45] Donald C. Shoup, *Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies*, http://www.arb.ca.gov/research/apr/past/93-308a.pdf.

Figure 10 Parking Cash-Out Impacts on Commute Mode



Another parking cash-out case study is that of suburban Pleasanton. The City initiated a daily form of parking cash-out in January 1994. The City offers $2 per day to employees who use a commute alternative instead of driving to work alone. All City employees are eligible to participate with no minimum days required. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 2004 doubled to 57 employees per month, which has resulted in an annualized reduction of 20,625 commuter vehicle trips.[46]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

By promoting the current parking cash-out law to subject employers and requiring new employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 3% reduction in peak-hour vehicle trips in Areas 1 and 2 and 1% reduction peak-hour vehicle trips in Areas 3 and 4. These figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

Alternative 1

This alternative assumes no expansion of parking cash-out programs, therefore no reductions in vehicle trips can be estimated.

Alternative 2

By developing a local parking cash-out ordinance that would apply to a broader number of employers and requiring all employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 12% reduction in peak-hour vehicle trips in Areas 1 and 2 and a 6% reduction in peak-hour vehicle trips in Areas 3 and 4. As noted in the Plan Santa Barbara scenario, these figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual

[46] U.S. Environmental Protection Agency (2005), *Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters,* http://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf

parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

3.3 Car Sharing

Overview

Car-sharing programs allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis. Usage charges are assessed at an hourly and/or mileage rate, in addition to a refundable deposit and/or a low annual membership fee. Car-sharing is similar to conventional car rental programs with a few key differences:

- System users must be members of a car-sharing organization.
- Fee structures typically emphasize short-term rentals rather than daily or weekly rentals.
- Vehicle reservations and access is "self-service."
- Vehicle locations are widely distributed rather than concentrated.
- Vehicles must be picked up and dropped off at the same location.

Car-sharing programs reduce the need for businesses or households to own their own vehicles, and reduce personal transportation costs and vehicle miles traveled (VMT). Through car-sharing, individuals gain access to vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations.

Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile. For example, vehicles available near a person's workplace or school can enable them to commute to work via transit or other means, knowing that they'll have a car-share vehicle available during the day only if needed for work or personal trips.

Current Policies and Programs

The City of Santa Barbara allows employees to use City fleet vehicles for work-related trips, unplanned overtime, medical appointments, approved emergency trips, occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies.

At UCSB, a car-share program with 2-3 vehicles is operated by ZipCar and is offered to all students, faculty and staff, and at discounted rate for Transportation Alternative Program (TAP) enrollees.

There are currently no car-share programs in Santa Barbara that are available to the general public.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest car-sharing program available to the public as follows:

- Limited number of vehicles at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Free on- and off-street public parking space in high-demand locations.
    - In-kind promotion and marketing support.
    - Small financial subsidy to recognized car-sharing service provider.

Alternative 1

Assumes maintenance of existing car-sharing programs (none available to the general public).

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust car-sharing program available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara and neighboring communities.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Partial conversion of city fleet to car-sharing operations
    - Larger financial subsidy to a car-sharing service provider.
- Require new development to offer "right of first refusal" parking spaces to recognized car-sharing service provider.

Summary of Literature and Study Impacts

According to the Transportation Research Board, each car-sharing vehicle takes nearly 15 private cars off the road – a net reduction of almost 14 vehicles.[47] A UC Berkeley study of San Francisco's City CarShare found that members drive nearly 50% less after joining. The study also found that when people joined the car-sharing organization, nearly 30% reduced their household vehicle ownership and two-thirds avoided purchasing another car. In addition, the study found that nearly three-quarters of the vehicle trips made by members were for running errands, visiting friends and other social activities, meaning that only roughly one-quarter of trips were for commuting to work or for recreation. The research also indicates that most trips were made outside of peak periods, thereby generating a limited impact on peak period traffic.[48]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2. (This estimate assumes that two-car households are selling one of their vehicles.)
- No measurable reduction on peak-hour vehicle trips.

Alternative 1

This alternative assumes no expansion of car-sharing programs to make these services available to the general public, therefore no reductions in vehicle trips or auto ownership can be estimated.

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[47] Transportation Research Board (2005), *Car-Sharing: Where and How it Succeeds*, Transit Cooperative Research Program Report 108. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rpt_108.pdf

[48] Robert Cervero and Yu-Hsin Tsai (2003), *San Francisco City CarShare: Travel-Demand Trends and Second-Year Impacts, Institute of Urban and Regional Development*, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1026&context=iurd

Alternative 2

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2 and a 50% reduction in 10% of households (or 5% overall reduction) in Areas 3 and 4. (This estimate assumes that two-car households are selling one of their vehicles.)

- No measurable reduction on peak-hour vehicle trips.

3.4 Bike Sharing

Overview

Bike sharing is a form of bike rental where people can have access to a shared fleet of bicycles on an as-needed basis. Bike share programs provide safe and convenient access to bicycles for short trips, such as running errands during lunch or for accessing the transit system by helping to bridge "first mile/last mile" barriers.

Bike sharing programs have been implemented in various forms for the past 40 years. Until recently, bike share programs worldwide have experienced low to moderate success. However, in the last 5 years innovations in technology have given rise to a new (third) generation of technology-driven bike share programs. These new bike share programs can dramatically lower barrier to use by allowing reservations and/or payment via smart card, credit card, or even cell phone. In addition, damage or theft of bicycles is minimized by linking accounts to a user's credit card.

The most common operational models for 3rd generation bike sharing programs are:

- The first and most common model is a privately–operated program, where contracts for exclusive rights to outdoor advertising space (bus stops, billboards, etc.) include a provision that requires the advertising company to install, operate, and maintain a bike sharing system. The Vélib system in Paris is an example of this first model.

- The second model is a publicly-operated program run by a government agency as part of a larger transit access or TDM/parking management strategy. Montreal's Bixi and Long Beach's employee-based program are examples of this second model. Some cities sell advertising rights at the bike stations and on the bikes themselves to help defray program costs, but the program is not operated by an advertising company.

Pricing of bike sharing programs is structured to encourage short trips in order to prevent users from tying up a single bicycle for long periods of time and to optimize utilization of the fleet.

The Vélib program in Paris, France is one of the most successful examples of the 3rd generation bicycle sharing programs. Vélib provides rental bikes that are available day or night throughout the city and stations are densely distributed. The system has 1,450 stations located about 900 – 1500 feet apart. Stations consist of terminals and stands for securing the bikes. Bicycles are accessed through Smart Cards that can be swiped at any station. Bicycles can also be returned at any station. Annual membership is not required, but accounts are linked to a credit card which is charged in the event of loss or damage to a bicycle. The first 30 minutes of each use are free, $1.30 for the second half hour, $2.60 for the third half hour and $5.20 for the fourth half hour and each additional half hour. The maximum ride time is three hours. Credit cards may also be used to purchase a short-term pass of one-day or seven-day subscriptions.

Current Policies and Programs

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara provides bicycle parking as well as short-term bicycle rentals as part of the "Green Bike Program."

The City of Santa Barbara has also purchased and maintains a fleet of bicycles that are located at a number of city buildings and that City employees can use during business hours.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest expansion of existing City-operated bike sharing program available to the public as follows:

- Limited number of bikes at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Providing indoor space for stations in existing City facilities (similar to existing downtown Bike Station).
    - Promotion and marketing support.
    - Small increase to existing financial subsidy.

Alternative 1

Assumes maintenance of existing bike sharing programs.

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust expansion of bike sharing programs available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Conversion of select number of on-street parking spaces to bike sharing stations.
    - Larger increase to existing financial subsidy.
- In order to realize greater expansion in a cost-effective manner, consider shifting from a City-operated program to a privately-operated program, similar to the Vélib model.

Summary of Literature and Study Impacts

Successful bike sharing programs have resulted in automobile to bike mode shifts as large as 5% to 8% in the areas they serve.[49] Impacts may be lower if conditions are not conducive to bicycling (few available bicycles, insufficient bike routes, poor weather).

In general, bike share programs are not utilized for regular commuter trips: since there is a per-use fee, regular bicycle commuters will ultimately purchase their own bicycle. Instead, bike-share programs are a “supportive” mode in that that they provide on-demand and roughly door-to-door travel for short, unscheduled trips that are too far to walk and not well-served by transit. Similar to car-sharing programs, bike sharing programs – while not used primarily for commuting – play an important role in the transportation system by allowing commuters to travel by transit knowing that they will have multiple travel options available to them during the workday.

[49] Victoria Transport Policy Institute (2008), *Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips*, http://www.vtpi.org/tdm/tdm126.htm

Summary of Estimated Impacts in Santa Barbara

The available research does not allow Nelson\Nygaard to develop a meaningful estimate of the impacts of bike sharing programs on peak hour vehicle trips, vehicle ownership, or VMT. In addition, it is our professional opinion that implementation of a bike sharing program would likely result in a relatively small reduction in peak hour vehicle trips. This does not imply that a bike sharing program would have no impact on vehicle ownership and trips in Santa Barbara, or offer secondary benefits to the residents, employees, and visitors (such as expanded mobility options, better public health outcomes through encouragement of active transportation, etc.). However, any benefits realized from a bike sharing program have been excluded from the impacts analysis in order to maintain a conservative methodology.

Category 4: Mode Shift Policies

4.1 Safe Routes to School

Overview

Safe Routes to Schools (SR2S) programs integrate health, fitness, traffic relief, environmental awareness and safety under one program. The goal is typically to increase the number of non-motorized (walk and bike) and higher occupancy (carpool and transit) trips to schools, in order to:

- Reduce traffic congestion around schools.
- Increase physical activity for children and youth.
- Foster a healthier lifestyle for the whole family.
- Create safer, calmer streets and neighborhoods.
- Improve air quality and a cleaner environment.

A SR2S program typically consists of five key components:

- *Education.* Classroom lessons teach children the skills necessary to navigate through busy streets and show them how to be active participants in the program.
- *Engineering.* A licensed traffic engineer can assist schools in developing a plan to provide a safer environment for children to walk and bike to school.
- *Encouragement.* Events, contests and promotional materials are incentives that encourage children and parents to try walking and biking.
- *Enforcement.* Police officers, crossing guards and other law enforcement officials can participate throughout the Safe Routes process to encourage safe travel through the community.
- *Evaluation.* Program participation should regularly be monitored to determine the growth in student and parent participation. Typically, “before and after” surveys are taken to ascertain any change in travel mode to school over the course of the year.

Current Policies and Programs

The City of Santa Barbara currently partners with schools and community groups to assist with the development of SR2S activities. The non-profit Coalition for Sustainable Transportation (COAST) is the lead coordinator of SR2S efforts in Santa Barbara in partnership with 20 agency and community partners, including the Santa Barbara Bicycle Coalition, the PTA Safety Committee, various government and law enforcement agencies, SBCAG’s Traffic Solutions, and the Diabetes Resource Center. The COAST SR2S program has developed a school zone safety package, a public awareness program (including two bilingual safety videos), and an education and safety-training program. The program also and distributes low-cost bicycle helmets (free to low-income children). In addition to funding from the City of Santa Barbara, SR2S activities have received funding from the Santa Barbara Foundation and from private donations. In the past, sixteen schools have participated in SR2S activities.

The City of Santa Barbara has further supported the SR2S activities by:

- Developing “Suggested Route to School Maps” for all 18 public elementary, junior high, and high schools in the City of Santa Barbara.
- Developing Concept Improvement Plans for select schools.
- Generally prioritizing pedestrian improvements in the vicinity of schools.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate expansion in the existing Safe Routes to Schools program.

Alternative 1

Assumes maintenance of the existing Safe Routes to Schools program.

Alternative 2

Assumes a robust expansion of the existing Safe Routes to Schools program.

Summary of Literature and Study Impacts

Marin County's Safe Routes to Schools program is considered very successful, particularly in reducing "chauffeured student trips." To measure the effectiveness of the program, individual classroom teachers administer "before" and "after" surveys at participating schools (both public and private) to determine how students travel to school. The "before" survey is generally taken at the beginning of the semester in which Safe Routes education is offered and the "after" survey is taken at the conclusion of the school year. A survey conducted between fall 2004 and spring 2005 shows that the annual education program reduced the chauffeured student trips by 24%, and increased walking by 43%, biking by 29% and carpooling by 29%.[50]

Figure 11 Mode Shift Impacts

	Fall 2004	Spring 2005	% Change
Single Student Car	55%	42%	-24%
Carpool	17%	22%	+29%
Bus	7%	7%	0%
Bike	7%	9%	+29%
Walk	14%	20%	+43%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a modest expansion of the existing Safe Routes to Schools program will result in a roughly 9% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 3% decrease in Areas 3 and 4. No estimates can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

Alternative 1

No increase in the existing Safe Routes to Schools program is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of the existing Safe Routes to Schools program will result in a roughly 12% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 6% decrease in Areas 3 and 4. No estimates

[50] Transportation Authority of Marin (2006), *Safe Routes to School, Evaluations and Recommendations 2005-2006*, http://www.tam.ca.gov/index.aspx?page=180.

can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

4.2 Carpooling

Overview

Carpooling is the shared use of a car by the driver—usually the owner of the vehicle—and one or more passengers. When carpooling, people either get a ride or offer a ride to others instead of each driving separately. Carpooling arrangements and schemes involve varying degrees of formality and regularity. Carpools may be formal - arranged through an employer, public website, etc. - or casual, where the driver and passenger might not know each other or have agreed upon arrangements.

Current Policies and Programs

The City of Santa Barbara provides a 75% subsidy for costs of a full vanpool. The City has established a "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rest of the vehicle costs funded by the department providing the vehicle. As of 2008 (the program's second year) there were 53 City employees in 18 registered carpools. Preferential parking is available for carpools and vanpools.

The County of Santa Barbara offers free parking passes to carpools and vanpools on a space-available basis. UC Santa Barbara offers a no charge vanpool program and parking passes for TAP registered carpools and vanpools. SBCC has a dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai) and a carpool matching program. There are also several private employers which offer subsidized carpool or vanpool programs.

Plan Santa Barbara Assumptions

Plan Santa Barbara

Assumes a moderate increase in employee participation rates in carpools and vanpools.

Alternative 1

Assumes maintenance of existing employee participation rates in carpools and vanpools.

Alternative 2

Assumes a robust increase in employee participation rates in carpools and vanpools.

Summary of Literature and Study Impacts

Experience indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies.[51]

Rideshare programs that include incentives such as HOV priority and parking cash-out often reduce affected commute trips by 10-30%.[52] If implemented without such incentives travel impacts are usually smaller. A study conducted by Reid Ewing concluded that ridesharing programs can reduce daily vehicle commute trips to specific worksites by 5-15%, and up to 20% or more if implemented with parking pricing.[53]

[51] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov.
[52] Philip Winters and Daniel Rudge (1995), *Commute Alternatives Educational Outreach*, www.cutr.eng.usf.edu.
[53] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips.*

Analysis by other researchers indicate that the elasticity of vanpool ridership with respect to fees is -2.6% using a 1997 data set and -14.8% using a less statistically robust 1999 data set, that is, a one dollar decrease in vanpool fares is associated with a 2.6% to 14.8% increase in the predicted odds of choosing vanpool with respect to drive alone. The same study found that the elasticity of vanpooling with respect to price to be -0.61 (1997) and 13.4% (1999), meaning that for each 10% increase in vanpool price, there is a 6% to 13% decrease in vanpool choice with respect to auto. Conversely, a 10% decrease in vanpool price will increase the odds of choosing vanpool (with respect to auto) by 6% to 13%. Using a nested logit model, the study found the elasticity of vanpooling with respect to fares to be -1.14.[54]

One study estimates the price elasticity of vanpooling at about 1.5, meaning that a 10% reduction in vanpool fares increases ridership by about 15%.[55] For example, if vanpool fares that are currently $50 per month are reduced to $40 (a 20% reduction), ridership is likely to increase by about 30% (20% x 1.5). Of course, exact impacts will vary depending on the specific market and whether other ridesharing incentives are also provided.

Because rideshare passengers tend to have relatively long commutes, mileage reductions can be relatively large. For example, if ridesharing reduces 5% of commute trips it may reduce 10% of vehicle miles because the trips that are reduced are twice as long as average. Rideshare programs can typically reduce up to 8.3% of commute VMT, up to 3.6% of total regional VMT, and up to 1.8% of regional vehicle trips.[56]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a moderate expansion of carpool and vanpool programs will result in an employee rideshare increase of 5%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

Alternative 1

No increase in carpool and vanpool programs is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of carpool and vanpool programs will result in an employee rideshare increase of 10%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

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[54] Francis Wambalaba, Sisinnio Concas and Marlo Chavarria (2004), *Price Elasticity of Rideshare: Commuter Fringe Benefits for Vanpools*, http://www.nctr.usf.edu/pdf/527-14.pdf
Sisinnio Concas, Philip L. Winters and Francis W. Wambalaba (2005), *Fare Pricing Elasticity, Subsidies And The Demand For Vanpool Services*

[55] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov

[56] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
TDM Resource Center (1996), *Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects*, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).

4.3 Telecommuting/Alternative Work Schedules

Overview

Telecommuting and alternative work schedules typically allow or require employees to start and/or leave work outside of peak hours. These strategies are often a part of a company's travel demand management program and include:

- *Flextime.* Employees are allowed some flexibility in their daily work schedules, e.g. starting at 7:30AM or after 9AM and leaving at 4 PM pr after 6 PM.
- *Compressed Workweek (CWW).* Employees work fewer but longer days, such as four 10-hour days each week (4/40), or 9-hour days with one day off every two weeks (9/80).
- *Staggered Shifts.* Shifts are staggered to reduce the number of employees arriving and leaving a worksite at one time, e.g. one shift works between 8:00 and 4:30, another shift 8:30 and 5:00, and a third 9:00 and 5:30.

Employer participation can be pursued through a combination of incentives for existing employers and commercial development and requirements for new employers and commercial development.[57]

Current Policies and Programs

The City of Santa Barbara currently offers a 9/80 work schedule option to all employees and 81 percent of employees participate. For private employers, SBCAG administers the Flexwork SB program. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

UC Santa Barbara offers flexible work schedules and telecommuting for certain staff.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate increase employer participation in offering telecommuting and alternative work schedule to employees.

Alternative 1

Assumes maintenance of existing telecommuting and alternative work schedule programs.

Alternative 2

Assumes a robust increase in employer participation in offering telecommuting and alternative work schedule to employees.

Summary of Literature and Study Impacts

Flextime reduces peak period congestion directly, and can make ridesharing and transit use more feasible.[58] Staggered shifts can reduce peak-period trips, particularly around large employment

[57] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

centers. Reid Ewing estimates that flextime and telecommuting together can reduce peak-hour vehicle commute trips by 20-50%.[59]

Flexible work schedules can also reduce total vehicle travel. One survey of commuters found that it could reduce vehicle trips by up to 8% if 50% of employees are participating in the program, making it among the most effective commute trip reduction strategies considered.[60]

Another analysis estimates that compressed work weeks can reduce up to 0.6% of VMT and up to 0.5% of vehicle trips in a region.[61] However, other research indicates that compressed work weeks may provide modest reductions in total vehicle travel, in part because participants make additional trips during their non-work days.[62] Compressed work weeks may also encourage some employees to move further from worksites or to drive rather than rideshare.

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, we conservatively estimate that a modest increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 10% in Areas 1 and 2, and by 5% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

No increase in telecommuting/alternative work schedules is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, we conservatively estimate that a robust increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 25% in Areas 1 and 2, and by 15% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

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[58] Alyssa Freas and Stuart Anderson (1991), *Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321*.
[59] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips*
[60] Center for Urban Transportation Research (1998), *A Market-Based Approach to Cost-Effective Trip Reduction Program Design*, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf.
[61] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
[62] Amy Ho and Jakki Stewart (1992), "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," *Transportation Research Record 1346*, TRB (www.trb.org), pp. 25-32 and Genevieve Giuliano (1995), "The Weakening Transportation-Land Use Connection, *ACCESS*, Vol. 6, University of California Transportation Center (www.uctc.net), Spring 1995, pp. 3-11.

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APPENDIX I-7

PLAN SANTA BARBARA PARKING ANALYSIS (NELSON/NYGAARD)

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M E M O R A N D U M

To: Rob Dayton

From: Jeremy Nelson and Magnus Barber

Date: June 5, 2009

Subject: Summary of Downtown Santa Barbara On-Street Parking Survey

Executive Summary

At the direction of the City of Santa Barbara, Nelson\Nygaard conducted survey of on-street parking in downtown Santa Barbara and downtown-adjacent neighborhoods.

The purpose of this survey was to gain a better understanding of on-street parking in downtown Santa Barbara- as was identified in the *Plan Santa Barbara Existing Conditions Report* the City has good data for downtown parking lots and garages (both total supply and occupancy patterns), but no recent data on on-street parking.

For this reason, the survey provided a field-based estimate of existing on-street parking spaces (supply) and surveyed both how many spaces were utilized throughout the day (occupancy) and how cars were parked in each space (length of stay). At the request of City staff, Nelson\Nygaard also collected data on residential permit utilization.

The survey was conducted Friday 3/20/09 and Saturday 3/21/09. Nelson\Nygaard staff managed the data gathering process and conducted an inventory of the parking supply. In addition, Nelson\Nygaard supervised a team of surveyors (consisting of both temporary labor and City staff) to carry out the parking survey. The weather during the survey was unusually cool and overcast, and so the levels of occupancy observed should be viewed as conservative.

Finally, Nelson\Nygaard analyzed and mapped the on-street parking data. As discussed in greater detail in this memo, key findings include:

- **Occupancy:** At the peak demand hour for the entire on-street parking system, parking demand was highly variable, with some blocks at full capacity and some blocks with excess capacity. This pattern was observed at the peak demand hour for both Friday (see Appendix A) and Saturday (see Appendix B). This finding suggests that current on-street parking management policies are not succeeding in geographically balancing supply and demand, resulting in on-street parking being difficult to find on certain blocks while readily available a few blocks away.

- **Length of Stay:** A significant portion of vehicles were found to park for considerably longer than the posted time limits. This pattern was observed on for both Friday (see Appendix C) and Saturday (see Appendix D). This finding suggests that current on-street parking management policies are not promoting the most efficient utilization of the limited on-street parking supply, resulting in the short-term curb spaces intended for downtown visitors and shoppers being used for long-term parking by commuters.

- **Permit Utilization:** Very few vehicles were observed using residential parking permits during the survey periods.

Methodology

Parking Supply Inventory

An inventory of parking spaces was conducted by examining parking regulations on all block faces in the study area. Special note was made of no parking zones, accessible parking spaces, and time limits and other restrictions.

Because most on-street parking in downtown Santa Barbara is not striped, the total number of available parking spaces was estimated by measuring the length of curb between the parcel lines at each corner of each block where parking is allowed. A geo-referenced CAD file was available for most of the downtown area, which was used to find the length on each block consisting of curb cuts or designated as no parking. Outside the downtown commercial area, several representative blocks were measured to find the typical amount of parking lost to curb cuts, fire hydrants etc. in different types of neighborhoods. From this the curb length available to parking on each block was generated. Each of these curb lengths were divided by 20 feet, a typical length for a parking space.

Each block face was then assigned a unique ID number. GIS software was used to determine the length of each block face. By dividing the total curb length available for parking by the average length of a parking space, the number of spaces on each block face could be estimated.

The actual number of parking spaces on a street face may vary somewhat, depending on how tightly cars are packed and the types of vehicles parked on that block at that time. For example, the field-estimate methodology may estimate fewer spaces than are actually available if there are a disproportionate number of small vehicles parked on a particular block or if vehicles are parked very close together. Conversely, if there is a disproportionate number of longer vehicles parked on a particular block or if vehicles are parked very far apart, then the field-estimate methodology may estimate more spaces that are actually available. This variability “averages out” across the 88-block survey area and the 2-day survey period.

Bearing the above limitations in mind, the estimated total supply in the survey area is 4,250 spaces and the supply within the 75-minute zone is 1,680 spaces.

Parking Occupancy and Length of Stay Survey

The parking survey was carried out on Friday 3/20/09 from 11 am to 7 pm, and Saturday 3/21/09 from 3 pm to 11 pm.

The survey area was bounded to the west and east by the 101 Freeway and Garden Street, and to the north and south by Sola Street and the 101 freeway, an area of approximately 88 blocks.

20 temps and 2 city staff carried out bi-hourly surveys within the survey area. The number of staff required was based on previous survey experience in dense urban environments with high utilization of on-street parking.[1] Surveyor recorded the number of vehicles parked on each block (to be used to derive occupancy) and the license plate of each vehicle (to be used to derive length of stay).

All temps currently lived in Santa Barbara and many had lived there most of their lives. Their local knowledge provided insight into traffic and parking patterns and what could be considered normal activity levels; for example, the temps provided the following anecdotal information:

- Most thought the levels of pedestrian traffic on State Street were unusually low and temps attributed this to the unseasonal cool and overcast weather during the survey.
- With regards to parking, the temps observed that most visitors either park off-street downtown or park in the public lots south of 101.
- Temps reported that motorists perceive that enforcement is only robust for a few blocks on either side of State Street and so in other areas of downtown people park for extended times at white and green curbs without being afraid of getting a ticket.

The methodology used to calculate average duration of stay might best be explained by an example:

Say a block has three parking spaces and was surveyed four times at two hourly intervals, and the 3 digits of the license plates are recorded:

	11 am	**1 pm**	**3 pm**	**5 pm**
Space 1	ABC	ABC	ABC	ABC
Space 2	DEF	<empty>	JKL	JKL
Space 3	GHI	GHI	<empty>	<empty>

Here we can see that there are a total of 9 cars parked for two hours per survey period, but there are only 4 unique license plate IDs. So the average time of stay per unique vehicle is 2 hours x 9 vehicles/4 unique vehicle IDs = 4.5 hours. The distribution is:

8 hours – 1 vehicle

[1] Future surveys could be carried out either with fewer staff, or with more frequent survey periods, as the relatively low level of occupancy and extensive no parking areas meant that surveyors could maintain higher travel speeds than anticipated.

6 hours – 0 vehicles

4 hours – 2 vehicles

2 hours – 1 vehicle

It is common practice to define the length of stay as one full survey period for each time a vehicle is observed, though this is a simplification. It is only possible to know the location of a vehicle when it is present in a space at the time a surveyor passes it. It is not possible to know if it arrived a few minutes after the previous survey registered an empty space, or a few minutes before the current survey. Likewise, it is not possible to know how long a vehicle stays after it was counted by the surveyor – did it leave a few minutes later, or only a few minutes before the following survey measurement? Hence, some uncertainty is inevitable, though it is minimized by more frequent survey intervals. The frequency of survey intervals needs to be balanced against the available budget for each survey – as shorter survey intervals require more surveyors to cover any given area.

Findings

Occupancy

The observed peak demand hour for the on-street parking system for Friday was:

- 1 pm for the entire survey area (2,230 cars, 52%)
- 11 am within the 75 minute zone (977 cars, 58%)

While the observed occupancy at both Friday 3 pm and Friday 5 pm was lower than the Friday peak demand hour, the 5 pm occupancy was higher than at 3pm and almost as high as the peak. It is possible that occupancy later on Friday (i.e. after the end of the Friday survey period at 7pm) was higher than the observed Friday peak occupancy.

The observed peak demand hour for the on-street parking system for Saturday was:

- 7 pm for the entire survey area (2,430 cars, 57%)
- 7 pm within the 75 minute zone (1,062 cars, 63%)

Table 1 summarizes the occupancy for all survey periods. Occupancy was generally higher on Saturday than on Friday.

Table 1: Level of Occupancy, Friday and Saturday

Area	Friday				Saturday			
	11:00 AM	1:00 PM	3:00 PM	5:00 PM	3:00 PM	5:00 PM	7:00 PM	9:00 PM
Survey area	52%	52%	49%	50%	49%	52%	57%	52%
75-minute zone	58%	56%	57%	54%	48%	50%	63%	58%

On both days, occupancy was higher in the streets within a few blocks of State Street throughout the length of the survey area from Gutierrez Street to Sola Street. Here there were several areas where multiple blocks were between 75 - 100% occupancy, meaning that it would be challenging for visitors to find a space. The largest of these areas was seen on Saturday around the Paseo Nuevo Shopping Center, both to the west and the east. On Saturday there was also a large group of high occupancy blocks between Sola Street and Victoria Street, from De la Vina Street to Anacapa Street. See occupancy maps in Appendices A and B, showing the parking occupancy for each block at the peak demand hour for each day of the survey. It is likely occupancy in and near these popular areas would have been even higher had the weather not been cool and cloudy during the survey.

The high variability of parking demand at the peak demand hour (with some blocks at full capacity and some blocks with excess capacity) suggests that current on-street parking management policies are not succeeding in geographically balancing supply and demand, resulting in on-street parking being difficult to find on certain blocks while readily available a few blocks away. At the most popular destinations with high on-street occupancy, visitors may need to cruise to find on-street parking. This is inconvenient for visitors, and the additional traffic causes unnecessary pollution and potentially congestion.

The *Plan Santa Barbara Existing Conditions Report* showed that the there was surplus off-street parking capacity even at peak demand hour for the off-street parking system. Changes to on-street parking management including demand-responsive pricing at the appropriate level would encourage long-term parking to move to off-street facilities or to blocks with on-street capacity, and increase turnover of curb spaces for those visitors seeking short-term parking. Best practices suggest that the price should be set so that each block always has 15% of spaces available. This ensures that on-street parking is available for short-term parkers such as visitors to restaurants or retail shopping, while long-term parkers such as employees are encouraged to park further away from the downtown core or in off-street facilities.

Average Duration of Stay

A significant portion of vehicles were found to park for considerably longer than the posted time limits.

Average duration of stay on Friday was:

- Survey area: 3 hours and 6 minutes
- 75 minute zone: 2 hours and 23 minutes
- Outside the 75 minute zone: 3 hours and 46 minutes

Average duration of stay on Saturday was:

- Survey area: 3 hours and 22 minutes
- 75 minute zone: 2 hours and 33 minutes
- Outside the 75 minute zone: 4 hours and 6 minutes

See the length of stay maps in Appendices C and D, showing the average length of stay per block for Friday and Saturday. Note that almost all blocks show an average length of stay greater than two hours.[2]

As could be reasonably expected, the longest average stays were seen in the residential neighborhoods to the west of downtown and bordering the 101 freeway, where there are no time limits. A large proportion of these blocks had an average stay of four to six hours.

Overstay of Time Limits

As can be seen from the average duration of stay, a significant portion of vehicles were found to overstay the posted time limits in the 75- and 90- minute zones. Very few vehicles were observed with residential parking permits, except as noted below.

The percentage of vehicles overstaying time limits varied between 30 - 70% of vehicles parked, depending on the block. This is relatively conservative and includes only vehicles parked for 2 hours or more[3]. That means a 30-minute overstay in the 90-minute zones and a 45-minute overstay in the 75-minute zones. If shorter overstays had been captured the number of violations would have been higher still.

This finding suggests that current on-street parking management policies are not promoting the most efficient utilization of the limited on-street parking supply, resulting in the short-term curb spaces intended for downtown visitors and shoppers being used for long-term parking by commuters.

The intention of time-limited parking is usually to preserve premium on-street parking close to popular destinations as short term parking for visitors. The long average duration of stay could either indicate that on-street parking is being used by employees at nearby businesses, in which case short term visitors will find availability of parking to be limited, or it could indicate that visitors prefer to stay for longer than the time limit. In the first case, employees should be encouraged not to park in short term parking, for example by making this parking unattractive to long term use or by implementing a transportation demand management program for downtown businesses that would help commuters transition to a different mode of transportation. In the latter case, local businesses might be losing customers if their patrons feel pressured to return to their vehicles.

The data also shows that some drivers moved their vehicles within the same block or nearby as a way of working around time restrictions. This is technically illegal and should be considered a

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[2] For this analysis, the 75-minute zone was assumed to be bordered by Victoria Street to the north, Santa Barbara Street to the east, up to but not including De la Vina to the west and Gutierrez-Motor Way-Parker Way-Chapala-Cota to the south. This is a simplification, since the area is not uniformly marked as 75 minutes, but also contains many short segments of various types of short stay parking (white, green and yellow curbs). This simplification should not distract from the central finding that the average duration of stay for all types of parking within that area was significantly in excess of posted time limits for both survey days. Most blocks in the downtown area had average stays of two to three hours.

[3] Given the 2-hour sample periods, it is not possible to say anything about events on a shorter time scale than 120 minutes. But it does mean that if a vehicle is observed for 2 consecutive periods, then it definitely parked too long. It is necessary to sample at least twice the frequency of the most frequent event, but doing surveys at 37.5 minute or 45 minute intervals would not be practical.

violation of time limits since it is effectively using the short-term parking system for long-term parking. This type of violation is difficult to enforce against, because the number of parking control officers required for robust enforcement is impractical.

Newer meter technologies or occupancy sensors can relay back to a central server whether a parking space is occupied and for how long. In addition, enforcement vehicles with automated license plate reader technology such as the City's new AutoVue system, linked to a database of parking restrictions, would potentially be able to enforce against the "time limit shuffle." These technologies are expensive, though increased citation revenue can over time make it revenue neutral. Many cities have found that a more effective way to manage on-street parking is to eliminate time limits and implement paid parking in order to encourage higher turnover and promote better utilization of public streets.

The following table summarizes the advantages and disadvantages of solving the overstay of time limits either by increased enforcement or by eliminating time limits and implementing paid parking.

Increased Enforcement		Paid Parking	
Pro	**Con**	**Pro**	**Con**
No up front capital investments necessary	Substantial cost increase out of proportion with increased revenue from citations	Low running costs	Potentially significant up front capital investment
	Time limit continues to discourage visitors from staying as long as they like	Visitors can stay as long as they wish	
	Increased enforcement does little to increase availability of parking	When priced correctly, it will ensure that there is always parking available where and when a short-term parker needs it	
	Citation revenue is unlikely to cover enforcement costs, let alone provide revenue for downtown improvements.	Parking revenue can be reinvested in the downtown area to provide improved amenities, better maintenance etc.	

Permit Utilization

Very few parked vehicles were observed with residential parking permits. In general those permits that were observed were seen in residential areas to the west of downtown, with some exceptions. The vast majority of blocks observed did not have any vehicles displaying residential permits.

For example, there was a high proportion of vehicles displaying residential parking permits in the blocks immediately to the west of the Paseo Nuevo Shopping Center, particularly along De la Guerra, Ortega and blocks branching off these, between Chapala Street and Bath Street. These vehicles also parked for considerable lengths of time, resulting in high average lengths of stay (from just less than three hours to over four hours). For more information, see the length of stay maps in Appendices C and D and the data analysis master spreadsheet tabs routes 10 and 17.

Conclusions

The central findings of the parking survey are as follows:

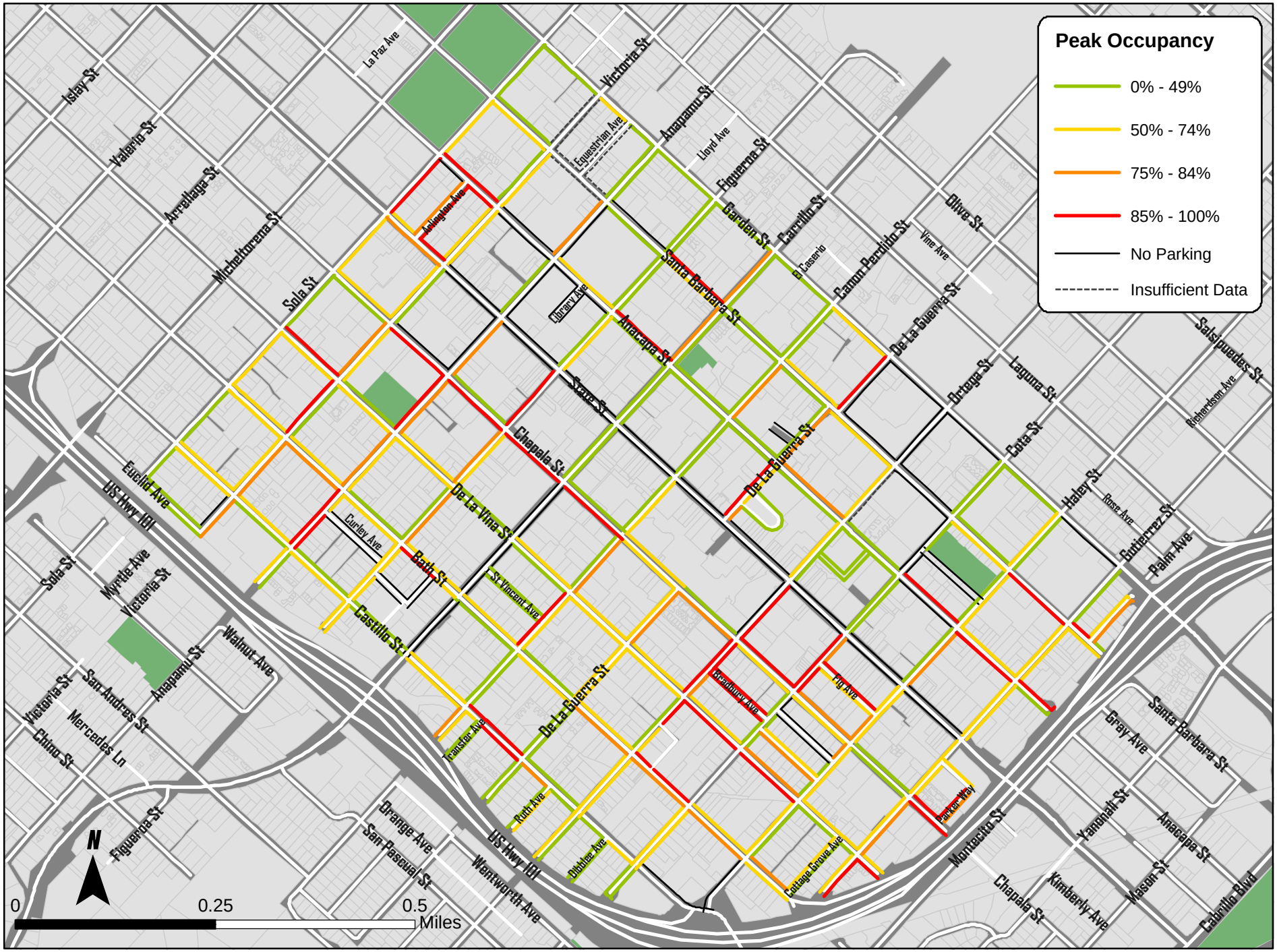
- Current parking management policies are not discouraging parkers from staying significantly longer than the posted time limits.
- As a whole there is plenty of on-street parking available in downtown Santa Barbara, even at the peak demand hour; however, usage is not uniformly distributed.
- Residential permits do not appear to be frequently used to park for extended periods in the downtown area.

Based on these findings, the City of Santa Barbara might consider the following policies to make best use of available public street space:

- Relax or eliminate time limits, which do not appear to be having the desired effect of managing occupancy or turnover.
- The relative prices of on- and off-street parking ought to give long term parkers an incentive to park off-street.
- Implement demand-responsive paid parking on streets with high parking demand to:
  - Ensure better availability of on-street parking for all visitors.
  - Minimize “cruising” for free parking.
  - Encourage a balancing of parking demand and supply and a shift to underutilized streets and off-street parking near the most popular destinations.
  - Encourage employees not to park on-street all day, taking up valuable on-street spots.

Appendix A: Peak Occupancy, Friday

Parking - Friday Peak Hour Occupancy (1PM)

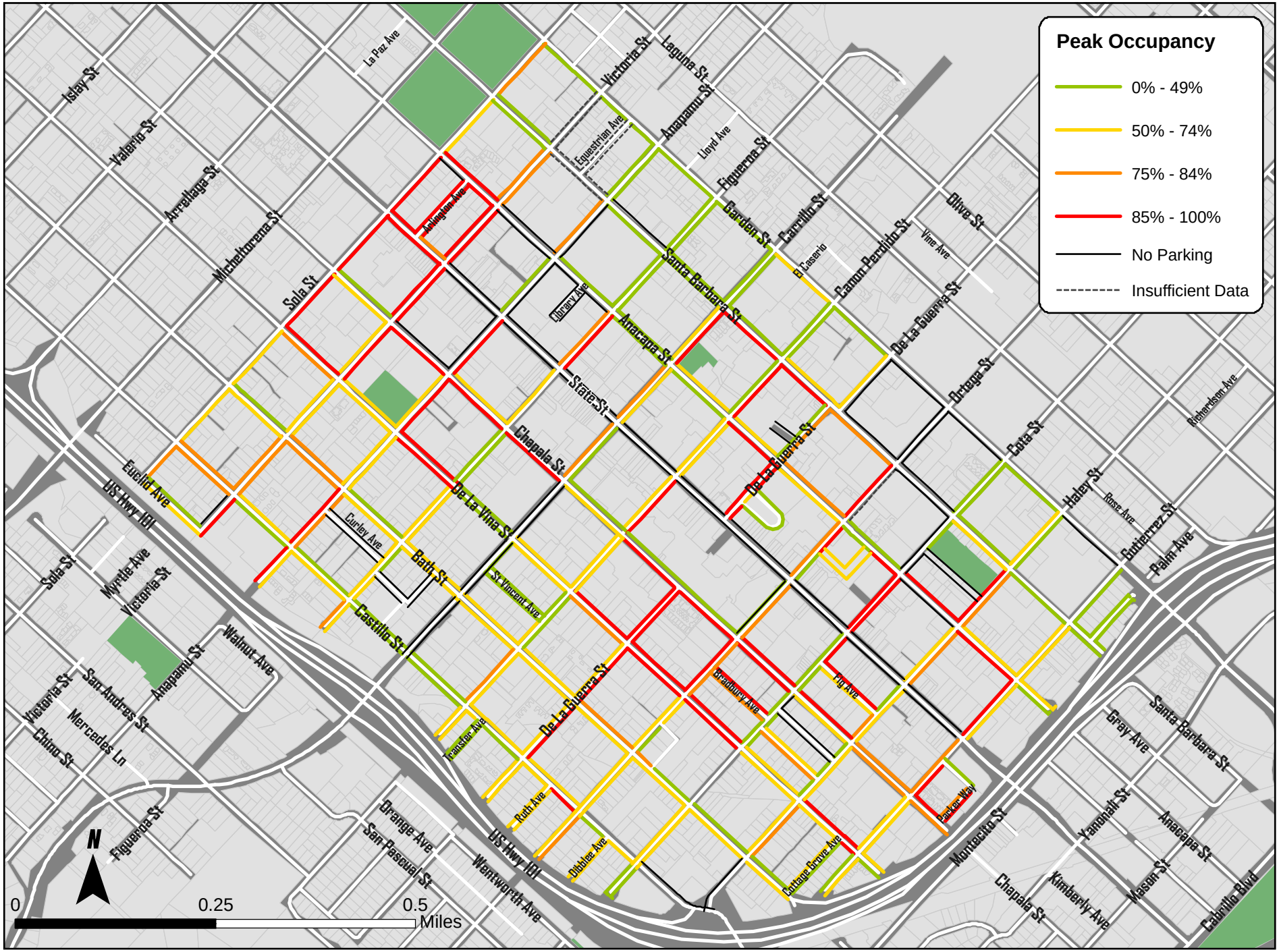


Nelson|Nygaard
consulting associates

GIS Data Source: City of Santa Barbara

Appendix B: Peak Occupancy, Saturday

Parking - Saturday Peak Hour Occupancy (7PM)

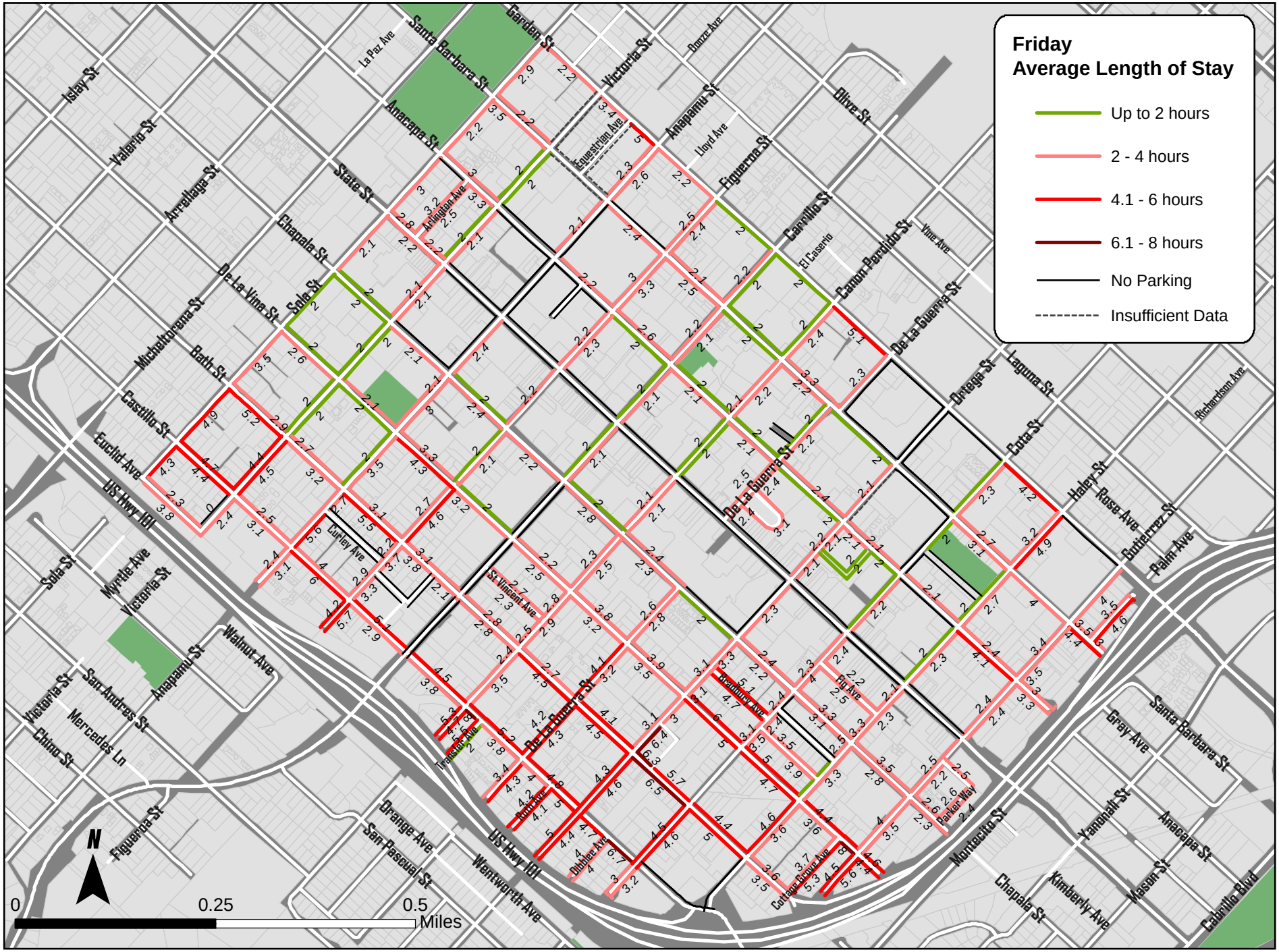


Nelson|Nygaard consulting associates

GIS Data Source: City of Santa Barbara

Appendix C: Average Length of Stay, Friday

Parking - Friday Average Length of Stay

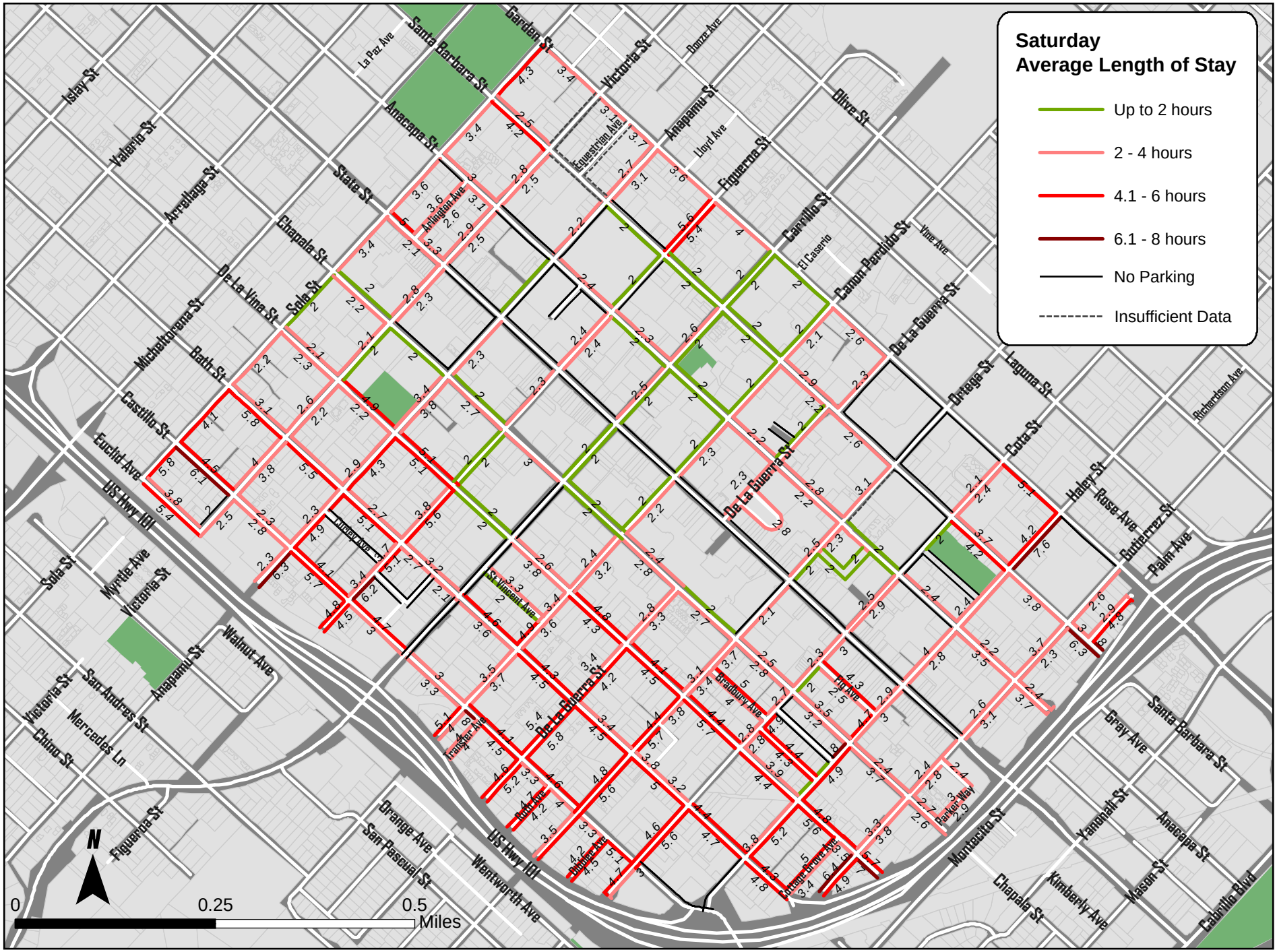


Nelson|Nygaard consulting associates

GIS Data Source: City of Santa Barbara

Appendix D: Average Length of Stay, Saturday

Parking - Saturday Average Length of Stay



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consulting associates

GIS Data Source: City of Santa Barbara

APPENDIX E: AIR QUALITY

Sources of Air Pollutants

On Shore Mobile Sources

Transit Corridors

A comparison of the 1990 and 2002 Census shows a 20% increase in the number of Santa Barbara County residents commuting 30 or more minutes to work. However, the 2007 Commuter Profile Survey conducted by the Santa Barbara County Association of Governments (SBCAG) Traffic Solutions, a Countywide rideshare organization, shows carpooling has increased in the last five years and people are driving to work alone less than the national average (SBCAG 2007a). The survey also shows that 71% of the County's residents drive alone to work and the remaining 29% use alternative transportation for commuting. According to the recent American Community Survey conducted by the U.S. Census Bureau, the national average rate for driving alone is 77% (U.S. Census Bureau 2006). The average commute for County residents is 14 miles, one-way, similar to what it was in 2002.

Commuters are also increasingly participating in alternative work schedules, as the number of people working a compressed work week (9-80 or 4-10 work schedules) or some alternative schedule has tripled over the last five years. The number of employees that telecommute as their primary commute mode has also doubled over the last five years. This survey was given in English and Spanish, and Spanish speaking respondents commute alone considerably less than English speakers, 43% vs. 78% respectively, and therefore Spanish speakers help to bring down the average rate at which the County commutes alone. This contributes to the County being below the nationwide average for alone commuting.

Recent studies show that children living near busy roads in Southern California can have substantial deficits in lung function and lung development, when compared to children living a mile away from busy roadways. Negative health effects also include an exacerbation of existing asthma conditions, increased absences at school, and potentially lung disease (Oosterlee et al. 1996, Brunekreef et al 1997, Gauderman et al. 2004). Although the exact cause of these health impacts is not known, links have been made between high levels of ozone and absentee rates at schools. In addition, diesel particulate matter, which is emitted from diesel-powered vehicles and equipment (e.g., trains, tractor-trailers), has been determined to be carcinogenic and toxic. Since diesel particulate matter is considered a "heavier" particulate, it typically is not transported as great a distance as smaller particulates, thus making people in closer proximity to these emissions more susceptible exposure (CARB 2008b).

Elevated air pollutant levels can persist near busy roadways, despite the presence and direction of wind (Baldauf et al. 2008). However, sound barriers or road-side structures, which are typically erected between a busy freeway and adjacent residences, can significantly decrease pollutant concentrations immediately behind the barrier (Baldauf et al. 2008).

In response to recent studies on children and air quality along busy transit corridors, in 2005 CARB released the Air Quality and Land Use Handbook: A Community Health Perspective, which strongly suggests siting new sensitive land uses (e.g., residences) greater than 500 feet from: freeways, urban roads (>100,000 vehicles per day), or rural roads (>50,000 vehicles per day).

Existing Ambient Air Quality

There are seven NAAQS, including carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), $PM_{2.5}$, and sulfur dioxide (SO_2). The CAAQS include these pollutants as well as sulfates, hydrogen sulfide, vinyl chloride (chloroethene), and visibility reducing particles. Although many of air toxic containments exist in the ambient air, these are the only pollutants that have standards in place.

Ozone. The majority of ground-level (or terrestrial) ozone is formed as a result of complex photochemical reactions in the atmosphere involving volatile organic compounds (VOCs), nitrogen oxides (NO_x), and oxygen. Ozone formulation is enhanced by warm temperatures and sunlight. Ozone is a highly reactive gas that damages lung tissue, reduces lung function, and sensitizes the lung to other irritants. Although stratospheric O_3 shields the earth from damaging ultraviolet radiation, terrestrial O_3 is a highly damaging air pollutant and is the primary source of smog.

Carbon Monoxide. CO is a colorless, odorless, poisonous gas produced by incomplete burning of carbon in fuel. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina and peripheral vascular disease. Other probable risk groups include fetuses, young infants, and pregnant women.

Nitrogen Dioxide. NO_2 is a brownish, highly reactive gas that can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Continued and repeated exposure to high concentrations of NO_2 may cause acute respiratory disease in children. NO_2 is an important precursor in the formation of O_3 or smog; therefore, control of NO_2 emissions is an important component of overall pollution reduction strategies. NO_2 is also a precursor in the formation of nitric acid and other aerosols which may affect aquatic and terrestrial ecosystems. The two primary sources of NO_2 in the U.S. are fuel combustion and transportation.

Sulfur Dioxide. SO_2 is emitted primarily from stationary-source coal and oil combustion, steel mills, refineries, pulp and paper mills, and from non-ferrous smelters. High concentrations of SO_2 may aggravate existing respiratory and cardiovascular disease; asthmatics and those with emphysema or bronchitis are the most sensitive to SO_2 exposure. SO_2 also contributes to acid rain, which can lead to the acidification of lakes and streams and damage trees.

Particulate Matter. PM_{10} is composed of dust, ash, soot, smoke, or liquid droplets emitted into the air by industrial sources, fires, construction activities, use of unpaved roads, and by natural sources like volcanic eruptions and wind-blown dust. Small-size particulates are most likely to cause adverse health effects because they can be inhaled into the thoracic or lower regions of the respiratory tract where they can cause aggravation of existing respiratory disease and decline in lung function.

Airborne Lead. Pb can be inhaled directly or ingested indirectly by consuming lead-contaminated food, water, or non-food materials such as dust or soil; fetuses, infants, and children are most sensitive to Pb exposure. Pb has been identified as a factor in high blood pressure and heart disease. Exposure to Pb has declined dramatically in the last 10 years as a result of the reduction in Pb in gasoline, paint, and the elimination of Pb from soldered cans.

Odors. Strong, unpleasant smelling odors are not considered unhealthful, or criteria pollutants, however they can generate public complaint. Some facilities known to cause odors include chemical manufacturing,

wastewater treatment plants, coffee roasting operations, painting operations, feed lots/dairies, composting facilities, landfills, and transfer stations. Although no regulations in federal or state air quality require odor control, any actions taken to reduce odors would derive from citizen complaints to local governments.

Toxic Air Contaminants. Toxic Air Contaminants (TACs) are also not criteria pollutants, in that federal and state ambient air quality standards have not been established. However, CARB and the USEPA regulate TACs and Hazardous Air Pollutants (HAPs), respectively, through the use of best (CARB) or maximum (USEPA) available control to limit HAP/TAC emissions. Federally, USEPA has established National Emission Standards for HAPs (NESHAPs), as required under the federal CAA Amendments. NESHAPs have resulted in federal Title V permitting, which are based on stationary source, technology specific regulations that limit allowable emissions of HAPs.

The California Air Resources Board (CARB) has the authority to regulate TACs from motor vehicles, fuels, and consumer products. TACs are primarily regulated under the Tanner Air Toxic Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), within California. The Tanner Act allows CARB to identify TACs through the use of public participation, scientific peer review, and research.

SBCAPCD works on a local level to regulate stationary source TACs, but evaluating TACs from all projects that require air quality permits. SBCAPCD assesses a TAC emitter's proximity to sensitive receptors (hospitals, schools, etc) and requires a health risk assessment for facilities that are in the "significant-risk" category, per AB 2588.

Existing sources of TACs in Santa Barbara County are primarily from off-shore oil drilling rigs and electric generating services, however the City of Santa Barbara itself does not contain any air toxic "hot spots".

Hot spots are typically industrial facilities, operating under an air quality permit through the SBCAPCD, and are required to perform health risk assessment (HRA) and report the findings to the nearby affected residents if the risk is above a certain threshold. The La Goleta facility, 0.7 miles east of the Santa Barbara Airport (SBA), at 1171 More Rd, is an industrial electrical facility which releases TACS, however HRA shows risks below SBCAPCD's notification thresholds. Approximately 2.3 miles west of SBA is the Ellwood generating station, another air toxics hot spot. Platform Holly, an off-shore oil rig, is approximately 1.5 miles southwest of the City of Goleta coastline, and its HRA also shows risks below notification thresholds (CHAPIS 2004).

Diesel-Exhaust Particulate Matter. Diesel-exhaust particulate matter (DPM) was recently added to the CARB list of TACs. DPM is the primary TAC of concern for mobile sources. Of all controlled TACs, emissions of DPM are estimated to be responsible for about 70 percent of the total ambient TAC risk. The CARB has made the reduction of the public's exposure to DPM one of its highest priorities, with an aggressive plan to require cleaner diesel fuel and cleaner diesel engines and vehicles (CARB 2008).

Ambient Air Quality

In 2005 there were 17 monitoring stations operating in Santa Barbara County, eight of which were operated by the SBCAPCD, the remaining stations were operated by CARB and the private sector.

City of Santa Barbara

The City has one ambient air quality monitoring station, which measures ozone, NO, NOx, NO2, CO, PM2.5, wind speed and direction and ambient temperature in the downtown area. Table 4.1-2 shows values for various air pollutant measured at that stations, any criteria pollutants not mentioned are not currently measured at that station (SBCAPCD 2005). There were no exceedances above standards for ozone in 2005, even though every year since 1988, the standards have been exceeded. No other criteria pollutant standards were exceeded at the Santa Barbara monitoring station in 2005. However, the City did have the highest concentrations of NO2 out of all monitoring stations in Santa Barbara County.

Clean Air Plan

The USEPA and CARB monitor the attainment classification of Santa Barbara County through the 17 air quality monitoring stations in the county. The attainment classification drives the clean air planning process, identifying which pollutants must be reduced in order to meet state and federal standards and determining deadlines for attainment.

The federal Clean Air Act Amendments of 1990 and the California Clean Air Act of 1988 mandate the preparation of Clean Air Plans (CAP) that provide an overview of air quality and sources of air pollution, and identifies pollution-control measures needed to meet federal and state air quality standards. The CAP also includes public comments, emissions forecasts, emissions inventories and an overview of planning efforts. The CAP affects the development of the SBCAPCD's rules and regulations and other programs. The Plan also influences transportation planning, allocation of funds designated for air quality projects, etc.

Since the County is classified as "moderate" nonattainment for the state 1-hour ozone standard, it must track and meet the following transportation performance standard: a substantial reduction in the rate increase of passenger vehicle trips and VMT. CARB has defined substantial reduction as holding growth in VMT and trips to the same growth rate as the population.

In August 2007 the APCD Board adopted the 2007 Clean Air Plan, an update to the 2004 CAP. The Plan was prepared to address California Clean Air Act mandates under Health and Safety Code sections 40924 and 40925 that require that every three years areas update their clean air plans to attain the state 1-hour ozone standard. The CAP also serves to help the County maintain attainment of the federal 8-hour ozone standard.

The 2007 Clean Air Plan has been adopted by the SBCAPCD and is currently under review by CARB and the USEPA. Previous plans developed to comply with the state ozone standard include the 1991 Air Quality Attainment Plan, the 1994 Clean Air Plan, and the 1998 Clean Air Plan. This 2007 Plan represents a partnership among the APCD, the SBCAG, CARB, the USEPA, local businesses, and the community to reduce pollution from all sources. The rules that are proposed in the 2007 Plan are directly included into the rulemaking priorities of the APCD. The measures that the 2007 Plan proposes on a near-, mid-, or long-term basis will be adopted by the APCD according to that schedule. The formal adoption of this 2007 Plan by the APCD Board of Directors establishes the commitments to adopt all proposed rules according to the schedule identified in the plan.

Transportation Control Measures

TCM's are listed in Table E-1 and measures proposed for adoption and further study can be found in the SBCAPCD's 2007 CAP. TCMs proposed for further study or adoption in the City include an ordinance against extended vehicle idling, residential parking programs, as well as incentives for van and carpooling, a high occupancy vehicle (HOV) lane on Highway 101, traffic flow improvements, and an extension of some existing TCMs.

Land Use

Stressing traditional neighborhood development with walkable access to public transport and a pedestrian oriented environment will help reduce single occupant vehicle trips. Obstacles to implementing Smart Growth principles include slow moving bureaucracies, lack of accountability, financial barriers, State fiscal policies with local governments, and various social obstacles. SBCAPCD suggests the reduction of VMTs, vehicle trips and peak hour travel will increase the quality of the County's air. Implementation of mixed-use development, encouraging infill and densification and increasing density near transit corridors will all help achieve these goals.

Specific land use strategies recommended for adoption by County and City planning agencies, outlined in the 2001 CAP include the following polices:

- *Cities and unincorporated communities should incorporate appropriately located compact development at densities that reduce trips and travel distances and encourage the use of alternative forms of transportation*
- *Urban growth should occur within the urban boundary lines of cities and unincorporated communities. Rural areas of the county should be maintained as open space, agricultural lands and very low-density residential development (20 acre or larger parcel size).*
- *Local planning agencies should encourage walking and transit use by planning neighborhoods and commercial centers at densities to allow for convenient access to, and use of, local and regional transit systems.*

Implementation of these policies would involve:

- *Local jurisdictions should adopt programs and standards that foster the development of vacant or underdeveloped land within existing community boundaries (infill property).*

- *Local jurisdictions should amend their land use regulations to allow higher density residential and commercial development when:*
  1. Urban services are capable of supporting higher densities.
  2. The development of higher densities is acceptable to the community and will not damage the character of historic areas in the community.
  3. The development has convenient access (within a 10 minute walk) to alternative means of transportation such as transit.

- *Local jurisdictions should strive to achieve higher densities in urban core areas in support of the regional transit system by:*
  1. Facilitating the Transfers of Development Rights to urbanized areas. Jurisdictions should use the Transfer of development Rights program to allow rural landowners to sell the development rights of their properties to land owners within community urban reserve lines or city limits.
  2. Increasing the use of incentives for projects with a residential component located in urban core areas.

- *Reducing or waiving processing fees and/or providing priority processing for urban core projects which satisfy established density criteria.*
- *Planning development and road systems to accommodate public transit.*
- *Allowing residential clustering along transit routes.*
- *In medium to higher density residential areas, jurisdictions should adjust existing standards to:*

(a) Encourage the development of apartments and condominiums within 500 feet of bus stops and transit stations.
(b) Encourage affordable housing and senior housing within 500 feet of bus stops and transit facilities.
(c) Discourage buildings less than two stories high in medium to high-density zones.
(d) Limit subdivisions of land into lots for single-household developments.
(e) Discourage projects of less than 20 housing units per gross acre within 500 feet of bus stops and transit facilities.
(f) Prepare design plans which provide for medium to high density while still maintaining a compatible, "livable" neighborhood.

- *In commercial neighborhoods, jurisdictions should adjust existing standards to:*

(a) Discourage buildings less than two stories high.
(b) Encourage developments with a floor/area ratio of 1.0 or higher.
(c) Encourage developments with 50 or more employees per gross acre.
(d) Discourage developments with less than 50 employees per gross acre within 500 feet of a transit stop.
(e) Discourage residential or mixed-use development of less than 15 housing units per gross acre within 500 feet of a bus stop or transit facility.
(f) Limit subdivisions of land into lots for single-household developments.
(g) Encourage development of residential units above ground floor commercial in the downtown core and other commercial neighborhoods.

- *Jurisdictions should adopt programs and standards that strictly limit the subdivision of land outside of community urban reserve lines.*

In previously subdivided areas beyond urban reserve lines, jurisdictions should establish Transfer of Development Rights programs to direct development to appropriate urban areas as well as programs that foster the development of clustered housing in situations where the Transfer of Development Rights is not possible.

Circulation Element

As previously discussed, air quality is linked to automobile use. The comprehensive goal and vision statement of the City's Circulation Element:

"While sustaining or increasing economic vitality and quality of life, Santa Barbara should be a city in which alternative forms of transportation and mobility are so available and so attractive that use of an automobile is a choice, not a necessity. To meet this challenge, the City is rethinking its transportation goals and land use policies, and focusing its resources on developing balanced mobility solutions. The language presented here, when taken together, will move the City in the direction of achieving the Vision."

Realization of the comprehensive goal and vision statement is furthered by the General Plan's policies and implementation strategies that seek to increase equality of convenience and choice among all modes of transportation, increase availability and use of transit, increase bicycling, and increase walking and other paths of travels. In order to assure that the community is moving towards the comprehensive goal and vision statement, every two years a monitoring report is prepared that evaluates, among other topics, "the

attainment of regional air quality standards." Finally, relative to environmental quality, the Circulation Element contains the following policy and implementation strategy:

Environmental Quality
Policy
2.3 The development and maintenance of mobility and utility systems should include consideration of the impacts and enhancements to Santa Barbara's environmental quality.
Implementation Strategy
2.3.2 Continue to review proposed mobility and utility projects for compliance with the Santa Barbara County Clean Air Plan and Air Quality Plan.

Table E-1: Existing TCM Commitments in Santa Barbara County, Which Have the Potential to Impact the City's Air Quality

TCM	Designation	CAP Year	Project Sponsor	Project/Program Description	Implementation Status
1-4	Travel Demand Management	1994/1998 /2004	Traffic Solutions	City-County TDM Program	Program On-Going
	Areawide Ridesharing		Traffic Solutions	County Rideshare Program	Program On-Going
	Work Schedule Changes		Traffic Solutions/Private Sector	Flexible Work Hours	Program On-Going
5	Public Transportation	1994	SBMTD SBMTD SBCAPCD City of Santa Maria City of Lompoc City of Solvang AMTRAK	Isla Vista-SBCC Express Service Downtown Waterfront Shuttle Clean Air Express Expansion SMAT Expansion – 1 30' Bus COLT Expansion SYVT Expansion Service Expansion	Service On-Going
		1998	County of Santa Barbara County of Santa Barbara	Goleta rail platform Surf rail platform	Service On-Going
7	Traffic Flow Improvements	1994	Caltrans County/Caltrans SBCAG/Caltrans SBCAG/Caltrans SBCAG/Caltrans County/Caltrans County of Santa Barbara City of Santa Barbara County of Santa Barbara	Crosstown Freeway Project Rte. 101/Patterson Ave. Rte. 101/La Cumbre Rte. 101/Storke Rte. 101/Betteravia interchange Rte. 101/Fairview Hollister/Fairview intersection Castillo/Montecito St interchange Signal Synchronization - Hollister	Completed
8	Parking Management	1994/1998/ 2004	City of Santa Barbara	Residential Parking Program	On-going
9	Park-n-Ride Lots	1998 50 μg/m3	County of Santa Barbara	Lompoc Park-n-Ride Lot Santa Maria Park-n-Ride Lot	Completed
10	Bicycle/Pedestrian 24-hr	1994	City of Santa Barbara City of Santa Barbara City of Santa Barbara	SBCC-East campus project Crosstown east-west bike lane Shoreline/Cabrillo bikeway	Completed
13	Old Car Buyback Program	1994/1998/ 2004	SBCAPCD	Vehicle Buyback Program (1996-1999, >2004)	Program On-Going
18	Alternative Fuel Program	1994	SBCAPCD	Innovative Technologies Group Program Clean Air Express Expansion	On-Going
19	Public Education	1994/1998/ 2004	SBCAPCD	Overall Work Program	On-going
		1998	SB Bike Coalition County of Santa Barbara	Bicycle Video Local Regulations for Electric Vehicles	On-Going

Source: SBCAPCD 2007a

Methodology and Assumptions for Air Quality Calculations

Construction Emissions

Air quality modeling of emissions growth from construction activities was performed using URBEMIS2007 (version 9.2.4) based on commercial and industrial square footage growth and the increase in single and multi-family residential units. URBEMIS defaults were used for the type and number of construction equipment and construction activity was divided into three Phases (paving, building construction, and architectural coating), and each Phase was assumed to occur over an entire year (2010) as a worst case scenario. Construction-related emissions were modeled based on the entire activity of *Plan Santa Barbara* occurring over a single year (2010) and then these total emissions were scaled over the 20 year life of the *Plan*, assuming construction would be spaced equally over the 20 year period. This represents a worst case scenario, as the construction equipment fleet mix (i.e., model year and efficiency of equipment) for the year 2010 is likely less efficient, and therefore generates pollutant emissions at a higher rate, than a fleet mix from future years. Standard URBEMIS dust mitigation was included in the model run, as the required County of Santa Barbara Dust Control Ordinance would serve to mitigate dust emissions. This mitigation reduces the amount of particulate matter (mainly PM_{10}) generated.

Vehicle (mobile source) Emissions

Air quality modeling of emissions growth from vehicles was performed using the EMFAC2007 ver. 2.3 burden scenario for summer 2010 in the South Central Coast Air Basin. The modeling was based on the projected increase in vehicle miles traveled (VMT). Projected increases in VMT was based on the traffic modeling developed for *Plan Santa Barbara* and its alternatives (provided in the *Plan Santa Barbara* traffic study, version received by AMEC on 13 Nov 09). Baseline emissions were calculated using existing VMT provided in the traffic study. Due to expectations for future technological advances and market conditions, some variation exists within projections of future emissions from vehicle sources. PM_{10} emissions for mobile sources include exhaust, brake wear, and tire wear, but do not include emissions from entrained road dust from travel on paved roads. The $PM_{2.5}$ fraction of PM_{10} is assumed to be 0.998 per the California Emission Inventory Development and Reporting System (CEIDARS) for internal combustion.

Area Source Emissions

Air quality modeling of area source emissions was performed using URBEMIS2007 (version 9.2.4) based on projections of commercial and industrial square footage growth and the increase in single and multi-family residential units. URBEMIS defaults were changed to assume no wood stoves would be included in new residential development and that 90 percent of residences would have natural gas fireplaces. Baseline area source emissions were calculated using commercial and industrial square footage and residential units obtained from the Development Trends Report provided by the City. Emissions estimates do not include stationary source emissions from potential future industrial development, as the nature of these industrial operations is currently not known.

Electrical Use (indirect) Emissions

Indirect emissions from electricity usage were calculated from energy usage data obtained from Southern California Edison (SCE) and Southern California Gas (refer to Section 7.0 *Energy*) and emissions factors from the USEPA publication: AP-42, 5th Edition. The percentage of coal and natural gas usage for electricity generation reflects data for Santa Barbara County as a whole, not specifically for the City. PG&E provides power to northern Santa Barbara County and SCE provides power to the southern part of the County. Therefore the percent of coal and natural-gas generated energy used in the calculations is the combination

of SCE and PG&E's energy portfolio. Emission factors for natural gas combustion are from AP-42 5th Ed. 1998, Table 1.4-1 and 1.4-2. Emission factors for coal combustion are from AP-42 5th Ed. 1996, Section 1.2. The $PM_{2.5}$ emission factor was assumed to be the same as the PM_{10} emission factor.

Greenhouse Gases and Commuting Table

Sources: Wong, W. and Agrawal A. 2004. Proposed Methodology to Model Carbon Dioxide Emissions and Estimate Fuel Economy - model year 2009, composite emission factor. Source for Average Commute Distance in the City of Santa Barbara: "Average Distance to Work for Workers that Work in the City of SB" Santa Barbara Traffic Solutions, Santa Barbara County Association of Governments (SBCAG) (excludes trips by bicycle). Average Commute Trip Distance for Workers in the Tri-Counties from SBCAG 2007 December – Travel Trends Report. *Notes:* Yearly emissions are based on 5 (days/week) x 52 (weeks/year) = 260 trips/year, with the average model year fleet mix for 2009, Emission Factor (gm/mile) x Mileage x 0.0022 (lb/gm) = Actual Emissions (lb/yr)/2000= Actual Emissions (tons/year).

APPENDIX F: HYDROLOGY AND WATER QUALITY

Individual Watershed Descriptions

Arroyo Burro Creek Watershed

Arroyo Burro Creek begins in the Santa Ynez Mountains and flows south until it empties into Arroyo Burro Beach (a.k.a Hendry's Beach). The watershed encompasses approximately 6,217 acres. It extends about seven miles from the ocean to the ridge of the Santa Ynez Mountains. Major tributaries to Arroyo Burro Creek include Las Positas Creek, Barger Canyon, and San Roque Creek. There are also two minor tributaries on each side of Northridge Road that empty into Arroyo Burro Creek through storm drains. A small tidal lagoon is present at the end of the creek at Arroyo Burro Beach. The upper portions of the creek traverse rural estates and orchards, while the middle portions of the creek cross dense residential and commercial development between Foothill Road and U.S. Hwy 101. Downstream of U.S. Hwy 101, the creek traverses a mixture of residential areas and open space (City of Santa Barbara 2005a). Arroyo Burro Creek has perennial flow in the upper San Roque tributary, along portions of the creek north of Highway 101, and in the Las Positas Valley.

Laguna Channel Watershed

The Laguna Creek Watershed is comprised of approximately 2,020 acres of almost entirely urban land on the southeast side of Santa Barbara. The watershed is bounded on the north by the foothills, on the east by Quarantina Street, on the west by State Street, and on the south by the Santa Barbara Channel. Near the foothills is a small upland area with oak woodland and chaparral vegetation; most of the remaining portion of the watershed is residential, with the area nearest Laguna Creek and just above and below Highway 101, commercial. Flooding is a major concern in this watershed, in part from flood flows that break out of lower Mission Creek. Laguna Creek is a remnant of a large estuarine area that was originally located on the east side of downtown. The channel contains both earthen and fully lined concrete reaches. There is a tide gate at the mouth of the channel to prevent tidal influx. The creek empties at the beach across from Chase Palm Park. Most of the runoff from the highly developed east side of the City is conveyed to Laguna Creek through underground storm drains. The channel has a very low gradient and the upstream areas are prone to flooding. The area upstream of the park, behind El Estero Wastewater Treatment Plant, is mixed-use commercial and industrial. The remainder of the creek upstream of this area (within the central portion of the City) is culverted or underground, limiting restoration values; only the lower 3,100 feet of the Laguna Creek remains open, although this channel has been substantially altered and straightened. There are also several secondary tributary channels south of Alameda Padre Serra that feed into the Laguna drainage system (City of Santa Barbara 2005b).

Mission Creek Watershed

The Mission Creek Watershed extends approximately 7.5 miles from the Santa Ynez Mountains to the ocean and covers approximately 7,400 acres. The Los Padres National Forest encompasses 47 percent of the overall watershed. Out of the forest, Mission Creek winds its way through highly urbanized areas until it reaches the ocean east of Stearns Wharf. The two main tributaries of Mission Creek are Las Canoas Creek and Rattlesnake Creek, which converge near Foothill Road. Other tributaries include West Mountain Drive

drainage in the upper watershed, Foothill Tributary, located east of middle Mission Creek, and Old Mission Creek tributary, west of U.S. Hwy 101 (City of Santa Barbara 2005b).

Sycamore Creek Watershed

The Sycamore Creek Watershed is relatively short compared to the other watersheds in the City. Originating in the chaparral of Los Padres National Forest, it contains five major tributaries in the foothills: the main stem, beginning near Sheffield Reservoir, Parma Park tributaries, Coyote Creek, Westmont Creek, and Chelham Creek, a tributary east of Westmont Drive. These tributaries all converge near the intersection of Sycamore Canyon Road and Stanwood Drive in a deep canyon with landslide-prone hills. The creek follows a narrow canyon to Alameda Padre Serra, where the grade decreases and traverses a medium-density residential and commercial area. This middle and lower reach floodplain area is approximately 90 percent developed, with areas of significant flooding problems. The creek empties into the ocean at East Beach, where a sandbar forms a small lagoon. Sycamore Creek has year-round water in the foothills and in a few locations along the lower creek reaches.

Table 3-1. Land Jurisdiction

Watershed		Jurisdiction			
		County Unincorporated	City of Santa Barbara	Los Padres National Forest	Total
Arroyo Burro	*% of Watershed*	*10*	*45*	*45*	-
	Acreage	574	2,537	2,522	5,633
Mission Creek	*% of Watershed*	*15*	*41*	*44*	-
	Acreage	1,141	3,021	3,256	7,418
Sycamore Creek	*% of Watershed*	*21*	*55*	*24*	-
	Acreage	550	1,427	613	2,590
Laguna Creek	*% of Watershed*	*2*	*98*	*0*	-
	Acreage	39	1,983	0	2,022
TOTAL ACREAGE BY JURISDICTION		2,303	8,968	6,392	17,663
TOTAL PERCENTAGE BY JURISDICTION		*13%*	*51%*	*36%*	

(Creeks Existing Conditions Study)

Additional Creeks

In addition to those described above, three other major creeks are located within Santa Barbara. These creeks include Arroyo Honda, Lighthouse Creek, and Cieneguitas Creek. Arroyo Honda is a short creek beginning at Leadbetter Beach and draining the Honda Valley to its headwaters at Carrillo Street. Lighthouse Creek is also a short creek which begins at Lighthouse Beach and extends to Cliff Drive. Laguna

Channel is a created channel that extends from the Stearns Wharf area to U.S. Hwy 101. The former intermittent creeks above the new channel are now contained in an underground storm drainage system. Cieneguitas Creek crosses U.S. Hwy 101 south of the City Limits, and drains into Atascadero Creek (and eventually, Goleta Slough), through the Hope Ranch Annex area. This creek includes portions from Foothill Road downstream through La Colina Junior High School, and La Barbara Drive east of San Marcos Pass Road, southwest to lands owned by Saint Vincent's School. Santa Barbara's creeks also include portions of Lower and Upper Tecolotito Creeks, Carneros Creek, Lower and Upper San Pedro Creeks, and Las Vegas Creek ("Airport creeks"), all part of the Goleta Slough watershed that traverse Santa Barbara Municipal Airport lands.

Creek Surface Water Quality

Lower Mission Creek has the poorest water quality of all the creeks. Bacteria are present throughout the year and there are ongoing problems with other pollutants, trash, and homeless encampments. The lack of natural stream bottom, wetlands, and riparian buffers, reduces the potential for natural filtration of pollutants.

During the rainy season as well as in the dry season, Arroyo Burro Beach is often posted with water quality warnings about bacterial pollution. Sediment, landscape debris, trash, pet waste and household products (cleaners, pesticides and fertilizers) also pollute the creek. Pollutants enter the creeks at many of 119 storm drain outlets. Water quality in Sycamore Creek is better than the other creeks, although during storms there are high levels of sediment and bacteria. Littering and illegal dumping occur in the lower watershed on a year-round basis.

Laguna Channel carries ground water, urban runoff and storm water to the ocean at East Beach. Water quality concerns include bacteria and other urban pollutants such as sediment, hydrocarbons, and pesticides (City of Santa Barbara 2007).

The following discussion provides information on the City's storm-event sampling, followed by background information and summary results for each constituent group. The information presented is not numeric, but the narrative represents information that has been collected in order to get a sense of the pollutants that the City should be most concerned about, and therefore focus its BMPs to reduce pollutants to the maximum extent practicable.

Nutrients. Nitrogen has not been found to be a consistent problem at any of the monitoring sites. Ammonia levels were lower than those known to cause toxicity. Nitrite was not detected in any samples. Nitrate levels were above EPA benchmark levels in several samples but were not high enough to cause eutrophication. Orthophosphate was below detection limits in nearly all samples. However, total phosphorus was above National Water-Quality Assessment eutrophication benchmarks in all cases.

Bacteria. Indicator bacteria have exceeded recreational contact standards in nearly all stormwater samples, often by orders of magnitude. However, current indicator-based standards are based on health studies where people were exposed to human fecal wastes. The relevance of these indicator standards where human fecal wastes have not contaminated storm water is questionable.

Metals. With the City's storm water monitoring efforts to date, several metals have never been detected, including lead, copper, arsenic, cadmium, mercury, nickel, and silver. Chromium and copper have been

detected infrequently and at levels below EPA benchmarks. Magnesium, iron, potassium and zinc have been detected in most cases but levels are not thought to be of concern.

Hydrocarbons. Although oil and grease was present in some samples, levels were well below the EPA benchmark. Similar results were found for Total Petroleum Hydrocarbons.

Pesticides. To date the City has tested for pesticides (Glysophate, Diazinon and Malthion) during one storm event. Of eleven sites, only malthion was detected, and only at a single site.

Total Suspended Solids (TSS). Sediment loads were low during the first two water years and extremely high during 2004/2005 due to large rain events.

Total Dissolved Solids (TDS). Results for TDS have been sporadic, with a few samples returning values above drinking water standards.

Individual Groundwater Basin Descriptions

Foothill Groundwater Basin. This 3,000-acre (4.5-square-mile) groundwater basin is bounded on the south by faults (Modoc, Mesa and Mission Ridge Faults) and on the north by the exposed bedrock of the Santa Ynez Mountains. The basin is situated within the northern part of the City of Santa Barbara and in the northeastern part of the Goleta area. The Santa Barbara Formation, which is the primary aquifer of the basin and estimated to be 400-feet thick, is comprised of unconsolidated marine sand, silt, and clay. Residential development dominates the groundwater basin, with some orchards present along the northern edge of the basin. The City of Santa Barbara, the La Cumbre Mutual Water Company, and private landowners are the three main users of this groundwater basin (City of Santa Barbara 2005b). Available storage of the Foothill Basin is estimated to be 5,000 AFY with a safe yield estimated to be 953 AFY (County of Santa Barbara 2005).

Santa Barbara Groundwater Basin. This 4,500-acre (7-square-mile) groundwater basin underlies nearly the entire city south of the Mission Ridge fault. The basin is bounded on the north and west by faults, and by the ocean on the south. The boundary to the east is an arbitrary line separating the Santa Barbara Groundwater Basin from the Montecito Groundwater Basin that does not reflect any known hydrologic or geologic barrier. The Santa Barbara Formation, comprised mainly of marine sands, silts and clays, is the primary aquifer for this basin. Dominant land uses include urban residential, industrial, and commercial uses. Groundwater from the basin also supplies a few private businesses and homeowners (City of Santa Barbara 2005b). According to the 2005 Santa Barbara County Groundwater Report, available storage supply within the Basin is estimated to be roughly 10,000 AFY, with a safe yield of 847 AFY (County of Santa Barbara 2005).

Montecito Groundwater Basin. This 4,300-acre (6.7 square mile) groundwater basin, comprised of unconsolidated non-marine deposits, is located along a narrow strip between the Santa Ynez Mountains and the Pacific Ocean. A small part of the Sycamore Creek Watershed is located in this basin and the Casitas formation is the primary aquifer for the basin. The Arroyo Parida and Montecito Faults separate the groundwater basin into three storage units, with the thickest sections of water-bearing sediments located north of the Arroyo Parida Fault and south of the Montecito Fault. Parcels in this area are one acre or more, with agriculture limited to scattered orchards (City of Santa Barbara 2005b). Available storage supply within the Basin is estimated to be roughly 14,400 AFY with a safe yield of 1,350 AFY (County of Santa Barbara 2005).

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APPENDIX G: NOISE

Introduction

DEFINITIONS OF COMMON NOISE TERMS

Decibel, dB: A unit of measurement describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

A-Weighted Level: The sound level in decibels as measured on a sound level meter using the A-weighting filter network.

L10: The A-weighted sound level that is exceeded ten percent of the measurement period. Similarly, L50, L90, etc.

L_{eq}: Equivalent energy level. The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given measurement period. L_{eq} is typically computed over 1-, 8-, and 24-hour sample periods.

CNEL: Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night from 10 p.m. to 7 a.m.

L_{dn}: Day-Night Average Level (Also abbreviated as DNL). The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of 10 decibels to sound levels in the night after 10 p.m. and before 7 a.m. (Note: CNEL and L_{dn} represent daily levels of noise exposure averaged on an annual or daily basis, while L_{eq} represents the equivalent energy noise exposure for a shorter time period, typically one hour.)

Noise Contours: Lines drawn about a noise source indicating equal levels of noise exposure.

Ambient Noise: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Intrusive Noise: That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence, and tonal or informational content as well as the prevailing noise level.

Noise is defined as unwanted or objectionable sound. The important physical characteristics of environmental noise include frequency (pitch), amplitude (loudness) and duration. The effects of noise on people can be grouped in three general categories: 1) subjective effects, such as annoyance and nuisance; 2) interference with activities, such as speech and sleep; and 3) physiological effects, such as startleand hearing loss. According to the Environmental Protection Agency, damage to the human ear can occur from exposure to noise levels averaging above 70 dBA for extended periods. Permanent hearing damage can occur at 80-85 dBA, if sustained over 8 hours over the course of a worker's career.

The standard unit of sound measurement, which includes both loudness and frequency, is the decibel, abbreviated "dB". Filters are used with sound level measuring equipment to emphasize various frequency or pitch ranges. The "A" filter is most commonly used since it comes closest to matching the frequency response of the human ear, and decibels are then abbreviated as "dBA".

Sound pressure levels measured in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a tenfold increase in sound pressure or acoustic energy, an increase of 20 dBA represents a hundredfold increase, and a 30 dBA increase represents a thousandfold increase. Zero dBA is the faintest sound a good human ear can hear. The upper limit is approximately 140-160 dBA. The ear begins to feel pain at about 120 dBA. The average range of sounds that we are commonly exposed to generally falls in the 30 to 100 dBA range. However, not all sound waves affect us equally. The human ear is more sensitive to high pitch sounds, such as a whistle, than it is to low pitch sounds, such as a drumbeat.

People generally have the ability to distinguish one sound from a background of sounds, such as a telephone ringing over music. However, certain noise levels can render a sound inaudible, for example, when heavy trucks interfere with a conversation. Face-to-face conversation usually can proceed where the noise level is up to 66 dBA, group conversations up to 60 dBA, and public meetings up to 55 dBA, without interruption.

Sleep interference is more difficult to quantify, although studies have shown that progressively deeper levels of sleep require louder noise levels to cause a disturbance. The California Building Code establishes 45 Ldn as the maximum interior sound level (attributable to exterior sources) in any habitable room for new hotels, motels, and residential structures. Interior noise standards of 45 Ldn should protect against sleep interference in most typical urban noise environments.

It is difficult to specify noise levels which are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. In general, a one dB change in noise level is imperceptible, a three dB change is just barely noticeable, a six dB change is clearly noticeable, and a 10 dB change is about twice (or half) as loud. Sound diminishes at the rate of 6 dB for each doubling of distance from a point source. Sound diminishes at a rate of 3 dB for each doubling of distance from a line (e. g., highway) (City of Santa Barbara 2005).

Noise Element

The following key Policies and Implementation Strategies are included in the Noise Element of the General Plan:

- Existing and potential incompatible noise levels in problem areas should be reduced through land use planning, building and subdivision code enforcement, and other administrative means.
    - Locate proposed developments in the City on the Noise Contour Map to determine if there is a potential impact on the development or, conversely, if the development will increase noise levels in a relatively quiet area. The development review and environmental review process should include a further analysis in areas of potential impact.
    - Discourage development of noise sensitive uses in incompatible noise-impacted areas, particularly adjacent to Highway 101, the Municipal Airport, and the Southern Pacific Railroad.
    - In existing or future development in noise-impacted areas, especially surrounding the Municipal Airport, encourage or require through ordinance that proper site planning and insulation measures be taken to reduce noise to established levels.
    - Require public housing constructed in noise conflict areas to incorporate noise attenuation measure in site design and construction techniques and materials such that HUD guidelines are met.
- Existing and potential incompatible noise levels in problem areas should be reduced through operational or source controls where the City has responsibility for such controls.
    - Establish routes for use by heavy trucks away from noise sensitive land uses.
- Noise control activities should be coordinated with those of other responsible jurisdictions.
    - Encourage the State Department of Transportation (CALTRANS) and the County Engineer to incorporate noise reduction methods, such as barrier walls, in new road construction and improvements to existing roadways.

Projected Noise Calculations

Projected noise level increases over baseline conditions along major transportation corridors for all scenarios were calculated based on the projected increase in average daily traffic (ADT) volumes using the following formula: dBA=10Log10(Projected ADT/2008 ADT).

The horizontal expansion of existing noise contours along selected roadway segments in the City were estimated using the following formula: L2=L1+10Log(d1/d2); where L1 is the projected noise level at the outward extent of the existing contour, L2 is the projected noise level at the outward extent of the new expanded contour, d1 is the distance from the roadway to the outward extent of the existing contour, and d2 is the distance from the roadway to the outward extent of the new expanded contour.

These calculations relied on existing noise levels and exposure as described in the City of Santa Barbara Master Environmental Assessment, Geospatial Data Update, Noise Report (2008). Existing and projected ADT volumes were taken from Fehr & Peers' technical memorandums for future traffic condition models (Fehr & Peers 2009a; 2009b).

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APPENDIX H

PUBLIC UTILITIES

WATER DEMAND FACTOR UPDATE REPORT

Prepared by Water Resources Division, City of Santa Barbara,
in conjunction with the Planning Division, City of Santa Barbara

October 2009

Background

In 1989, the City of Santa Barbara contracted with Interface Planning and Counseling Corporation to prepare the "Water Demand Factor and Conservation Study." Demand factors for various land use categories were developed for use in estimating water use of proposed development as a part of the environmental review process. In support of the ongoing *Plan Santa Barbara* process, staff of the Water Resources Division, in conjunction with the City's Planning Division, have prepared this update of the factors that are of particular interest as a part of *Plan Santa Barbara*.

Water consumption for various land use categories has been analyzed for calendar years 2006 and 2007. These years represent two different weather patterns that influence water use. Precipitation during the calendar year 2006 can be considered average, while 2007 was one of the driest years on record. The data have been reported as overall averages to provide an indication of how different weather patterns contribute to typical long term average water usage. Water use is measured in "Hundred Cubic Feet" (HCF), equal to 748 gallons, "Acre-Feet" (AF) equal to 325,850 gallons, and "Acre-Feet per Year" (AFY).

Methodology

The general methodology for calculating the demand factors involved joining land use data, generated by the Community Development Department, with consumption data from the City's Utility Billing System. The link between the two databases is the Assessor Parcel Number (APN). The land use database contains square footage (for commercial properties) and lot size values used in calculations. Water use through dedicated irrigation meters has been included to the extent the correct APN was identified. Therefore, all demand factors include both indoor and outdoor water use.

Data Sources

- A report from the City of Santa Barbara CIS Utility Billing System titled "Parcel Consumption Data" provided consumption data. The report was written to export account number, customer number, APN, consumption, and read date for 1/1/06 through 12/31/07.
- Land use data came from the Land Use Database established by the Community Development Department. This is a geodatabase that assigns a specific land use category to each parcel within the City limits (e.g., single family or multiple-family residential, service commercial, retail, office, institutional, etc.). This database was developed on a parcel-by-parcel basis and verified by field observation.

Data Analysis

- Specific lists of parcel numbers for a given land use category or lot size for a single family residence were determined using the GIS tool "Select by Attributes". The specific land uses and/or lot areas were selected and only the parcel numbers with those attributes were included in the output. A new layer was created from the output and the table exported to an Access database.
- To link the land use data with water use, the lists of parcel numbers generated in GIS were joined with the "Parcel Consumption Data" report containing water usage data from January 2006 through December 2007. The join was designed to find matching parcel numbers from both lists and exclude parcel numbers that were not common to both lists. Therefore, APN's missing from either the billing system or land use database were excluded from these analyses in order to focus on parcels known to fit the desired category.
- For non-residential uses, building square footage data was included in the water use analysis. Therefore, the joined list of water use and parcels within a certain land use category was merged with the area data from the original land use database. The parcel list was evaluated to ensure that the square footage data did not include parcels that were not joined to water use data.
- Multi-family accounts were analyzed on a bill code basis, as the use of APN can be problematic with this customer class. For example, each condominium is assigned a separate APN, so there is not a consistent one-to-one relationship between the APN for an irrigation account and the corresponding domestic accounts it serves.
- Irrigation accounts for multi-family properties were reviewed based upon service address to ensure the corresponding domestic accounts were also included in the database.

Data Quality Considerations

- Data extremes, likely representing extraordinary water use due to leaks, fire, or water wasting, have not been identified or removed. It is appropriate to include this type of usage, as it contributes to overall demand.
- There are times when meter reading is delayed and one month's reading actually reflects usage values over two months or more. However, this occurrence is not very frequent and does not affect overall annual averages.
- With regard to the land use database, if the land use had changed or the size increased or reduced since the last update, it could also introduce minor inaccuracies.

Presentation of Water Demand Factors

The demand factors presented in Table 1 are intended as indicators of typical water use by various land use categories. A breakout of values for 2006 and 2007 is included in Appendix A. Non-residential water use categories are Retail, Office, Hotel, Institutional, Service Commercial, and Industrial. Residential water use is generally divided between single family and multi-family residential users, with additional analysis of subsets as discussed below.

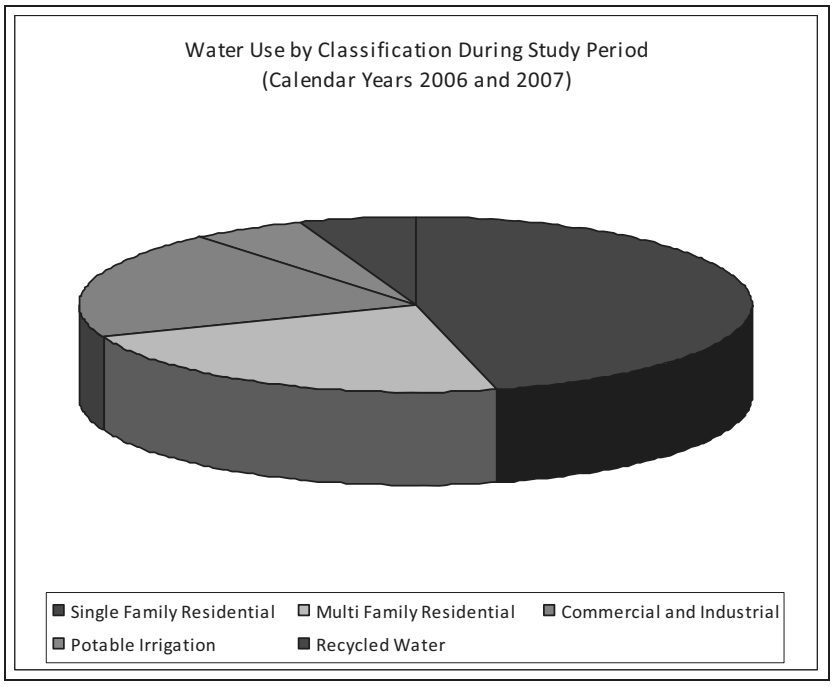

Figure 1. Water Use By Class

The non-residential user groups can be considered general headings for more specific land uses. The Service Commercial category encompasses restaurants, bars, auto service stations, banks, theatres, and

health services. The Institutional category includes educational services, hospitals, government buildings and agencies, public safety, and religious institutions. While schools are considered an Institutional use, water use from schools is not included because the data is based on the number of students and therefore not appropriate to include with data calculated on a square footage basis. Laundromats, shopping malls, grocery stores, and consumer goods fall under the Retail category. The Office category contains general office space. Hotels include hotels, motels and bed & breakfast inns. Manufacturing, warehousing, and construction related business are classified as Industrial land uses. A listing of the specific categories is included in Appendix B.

Table 1. Water Demand Factors 1989 and 2009

(All values include indoor and outdoor usage)

Land Use Category (2009 Study)	1989 Study Values	2009 Study Values	Monthly Units	1989 Study Values	2009 Study Values	Annual Units
Single Family Residential (Aggregate)	18.00	14.40	HCF/month/ dwelling unit	0.50	0.40	AFY/ year/ dwelling unit
Single Family - Small Lot size < 7000 ft^2	11.43	9.49	HCF/month/ dwelling unit	0.32	0.26	AFY/ year/ dwelling unit
Single Family - Medium Lot size 7000 ft^2 to 1 acre	18.24 – 30.42	15.09	HCF/month/ dwelling unit	0.51 – 0.85	0.42	AFY/ year/ dwelling unit
Single Family - Large Lot size > 1 acre	51.57	34.45	HCF/month/ dwelling unit	1.44	0.95	AFY/ year/ dwelling unit
Multi-Family Residential (Aggregate)	7.33	5.72	HCF/month/ dwelling unit	0.20	0.16	AFY/ year/ dwelling unit
Service Commercial	N/A	6.18	HCF/month/ 1000 ft^2	N/A	0.17	AFY/ year/1000 ft^2
Retail Large: > 20,000 ft^2 Small: < 20,000 ft^2	 2.43 3.93	(Retain 1989 values)	 HCF/month/ 1000 ft^2	 0.068 0.11	(Retain 1989 values)	 AFY/ year/1000 ft^2
Office	3.57	2.06	HCF/month/ 1000 ft^2	0.10	0.06	AFY/ year/1000 ft^2
Industrial	2.49 – 5.37	2.84	HCF/month/ 1000 ft^2	0.07 – 0.15	0.08	AFY/ year/1000 ft^2
Institutional	N/A	6.11	HCF/month/ 1000 ft^2	N/A	0.17	AFY/ year/1000 ft^2
Hotel/Motel	4.65	4.81	HCF/month/ room	0.13	0.13	AFY/ year/room
Hotel/Motel with Restaurant	5.37	7.17	HCF/month/ room	0.15	0.20	AFY/ year/room

All values in Table 1 include both indoor and outdoor water usage. Dedicated irrigation meter usage was included to the extent the data were able to be matched to the appropriate domestic service account. Lot size definitions for single family residences were slightly different for the 1989 study. Refer to Appendix B for the specific designations.

Because no aggregate single family residential value was represented in the 1989 study, the 1989 aggregate value is based on metered usage and estimated irrigation usage for calendar year 1989. The same is true for the aggregate multi-family residential value, as there were several sub-categories of multi-family use specified in both the 1989 and 2009 studies, as noted in Appendix A.

1989 values are noted as N/A (Not Applicable) for the Service Commercial and Institutional land uses, as the user group definitions and units of measuring water use were not consistent between the 1989 study and the current update. For example, Restaurant data was previously based on number of seats, Hospital data on number of beds, and School data on number of students. 2009 data for non-residential groups was consistently based on square footage, and therefore not comparable. The exception was hotel data, which was based on number of rooms, as were the 1989 values.

A value of 5.37 HCF/month/1,000 ft^2 was calculated for the 2009 Retail category as defined in the Planning Division Land Use Database. However, because this land use category now includes high usage categories such as Grocery Stores and Laundromats, use of this value is not recommended and the 1989 values of 2.43 for Large Retail (>20,000 ft2) and 3.93 for Small Retail (<20,000 ft2)are included in Table 1.

The 2009 value for Hotels/Motels with restaurants (7.17 HCF/month/room) is one of the few that is greater than the 1989 value. Investigation revealed that the highest data point in the new analysis was well above the highest value in the old database, suggesting that perhaps the old sample was not inclusive of such higher use. With the highest data point excluded, the value calculates at 5.65 HCF/month/room, which is similar to 1989 data; however the 7.17 value is considered valid and is retained.

Subset Analysis of Multi-Family Residential Water Demand

Further analysis was completed on subsets of multi-family residential water use to examine usage by neighborhood, by different types of multi-family land uses, and by age of buildings

For neighborhood analysis, the multi-family database was broken into five neighborhoods based on meter reading route books: Riviera, Downtown East, Downtown West, Mesa, and Upper State, as shown in Figure 2.

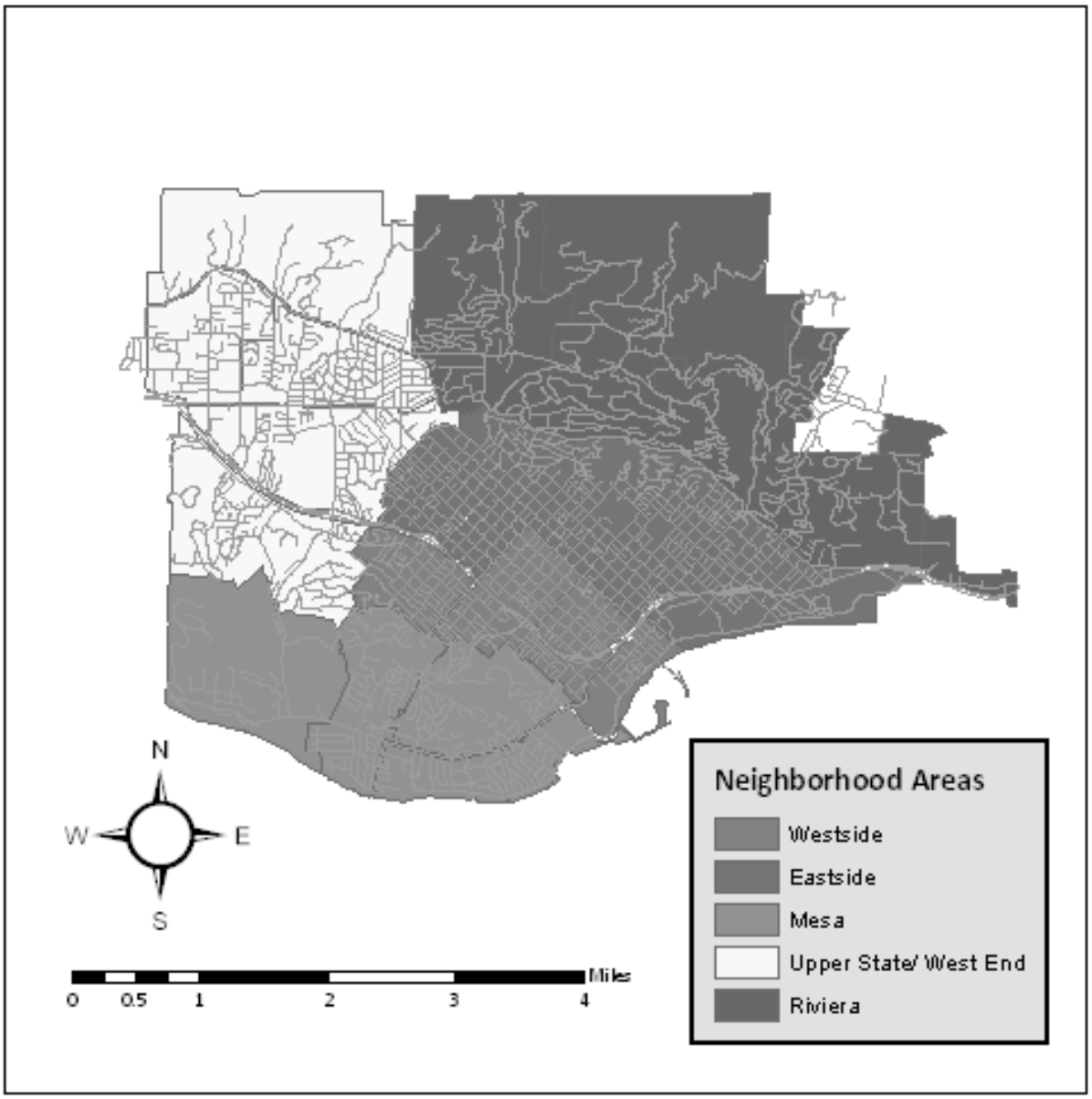

Figure 2. Neighborhood Areas

Results are summarized in Figure 3. While the overall water use patterns are similar among the groups, the Riviera neighborhood showed the greatest use compared to the other neighborhoods. All four of the other neighborhoods exhibit roughly the same range of use, varying from approximately 5 HCF per

month to 7 HCF per month throughout the year. Greater usage in the Riviera neighborhood supports the notion that there are larger lot sizes, and therefore more water used for irrigation, in this area.

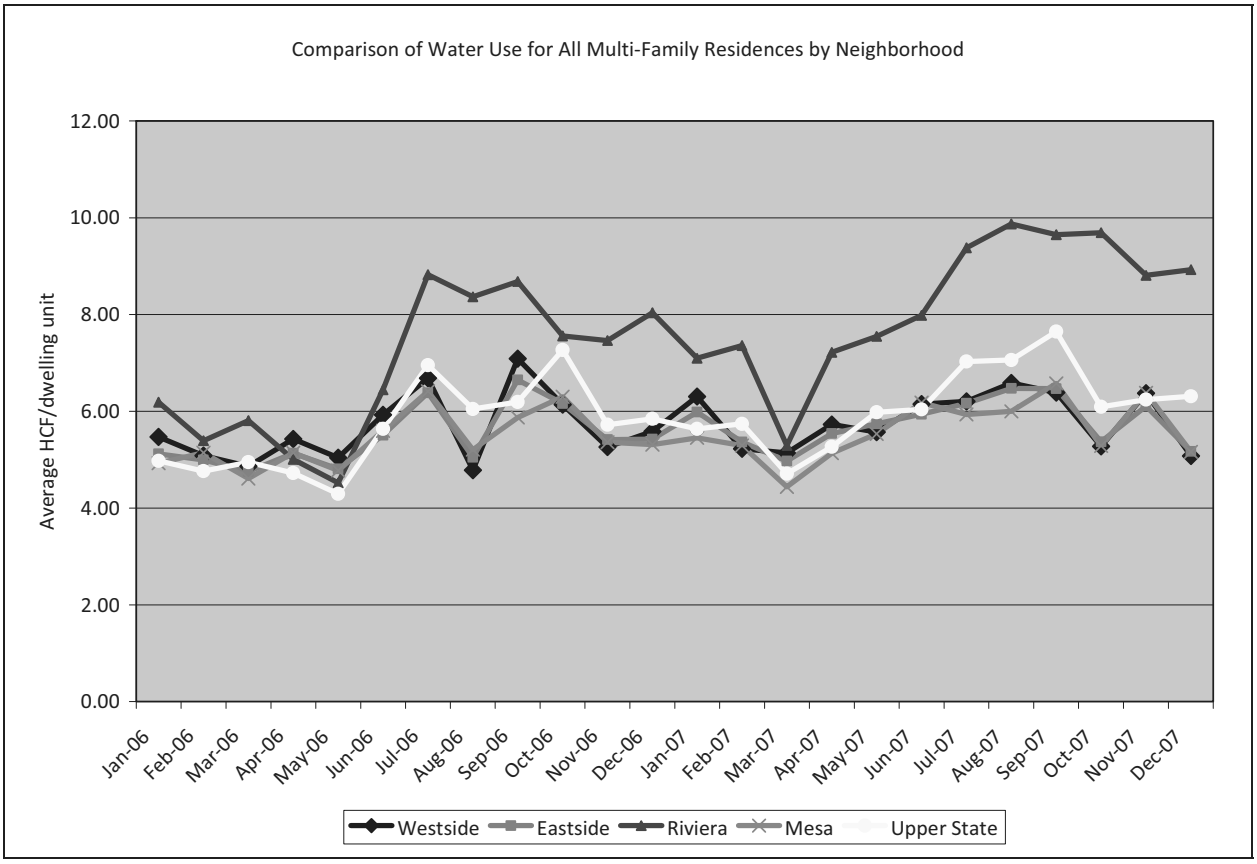

Figure 3. Multi-Family Water Use by Neighborhood

For evaluation of different types of multi-family land uses, the water use database was matched with the County of Santa Barbara Assessor land use database, which designates three different kinds of multi-family use: apartment buildings of 5 or more units, condominiums, and residential income of 2 to 4 units (more commonly referred to as duplexes, tri-plexes, and four-plexes). The County database was matched with the water use data via APN. The data are illustrated in Figure 4.

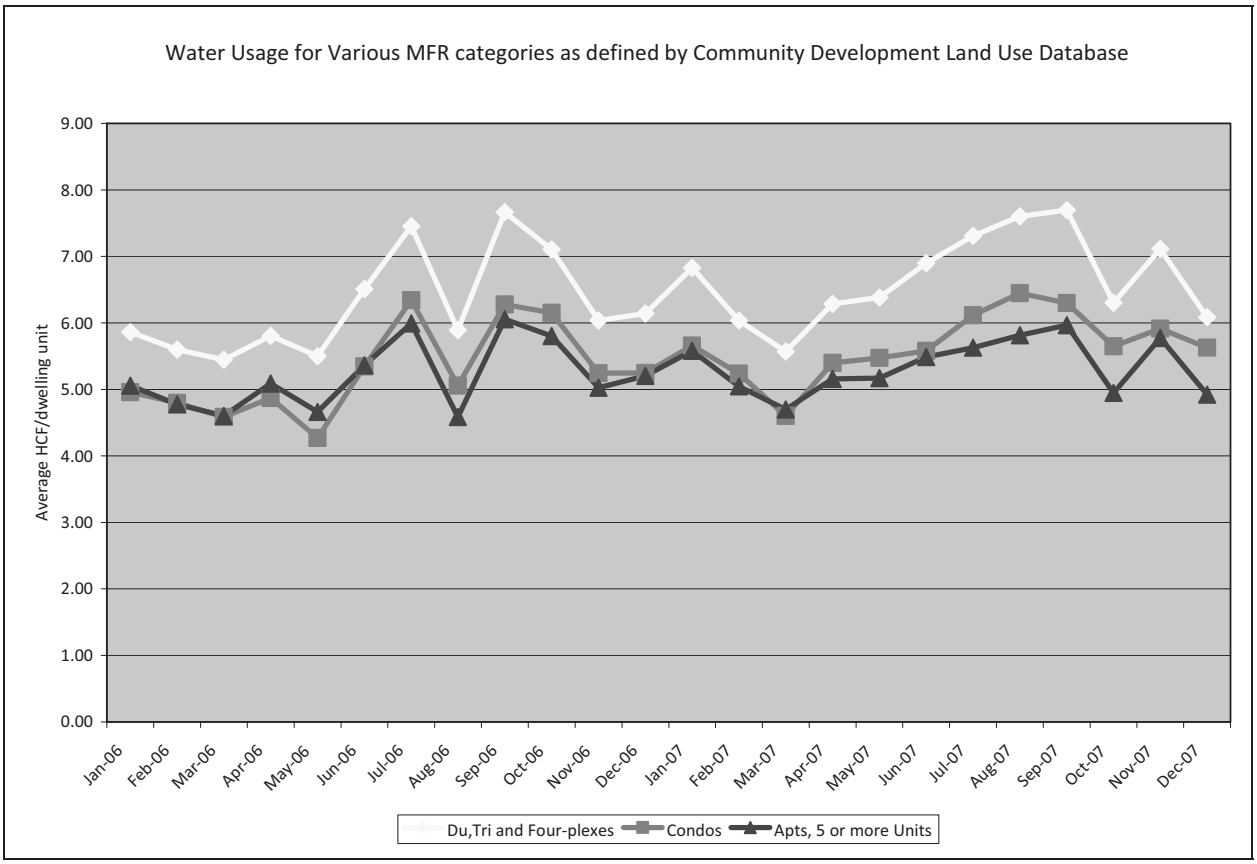

Figure 4. Water Usage by Various Multi-Family Categories

While general patterns of use are similar among the groups, use in the duplex, triplex and fourplex category data reflects consistently higher use than for condos or apartment buildings. This is consistent with the idea that lower density multi-family units have larger lot sizes with more landscaping and irrigation.

Analysis by age of structure was of interest because technology has advanced, water conservation messages have improved, block rate billing has been implemented, and stricter water use standards have been adopted. Because account numbers in the water billing system have been assigned sequentially, it was possible to designate cut-off points to distinguish between buildings built and occupied before and after 1990, the approximate effective date of current water efficiency standards. Comparing pre-1990 data to newer buildings reflects less water use overall for newer buildings, as shown in Figure 5, supporting the notion that water conservation actions have been working to reduce water use. Because the water use data analyzed was from 2006 through 2007, more recently built structures were not available for examination.

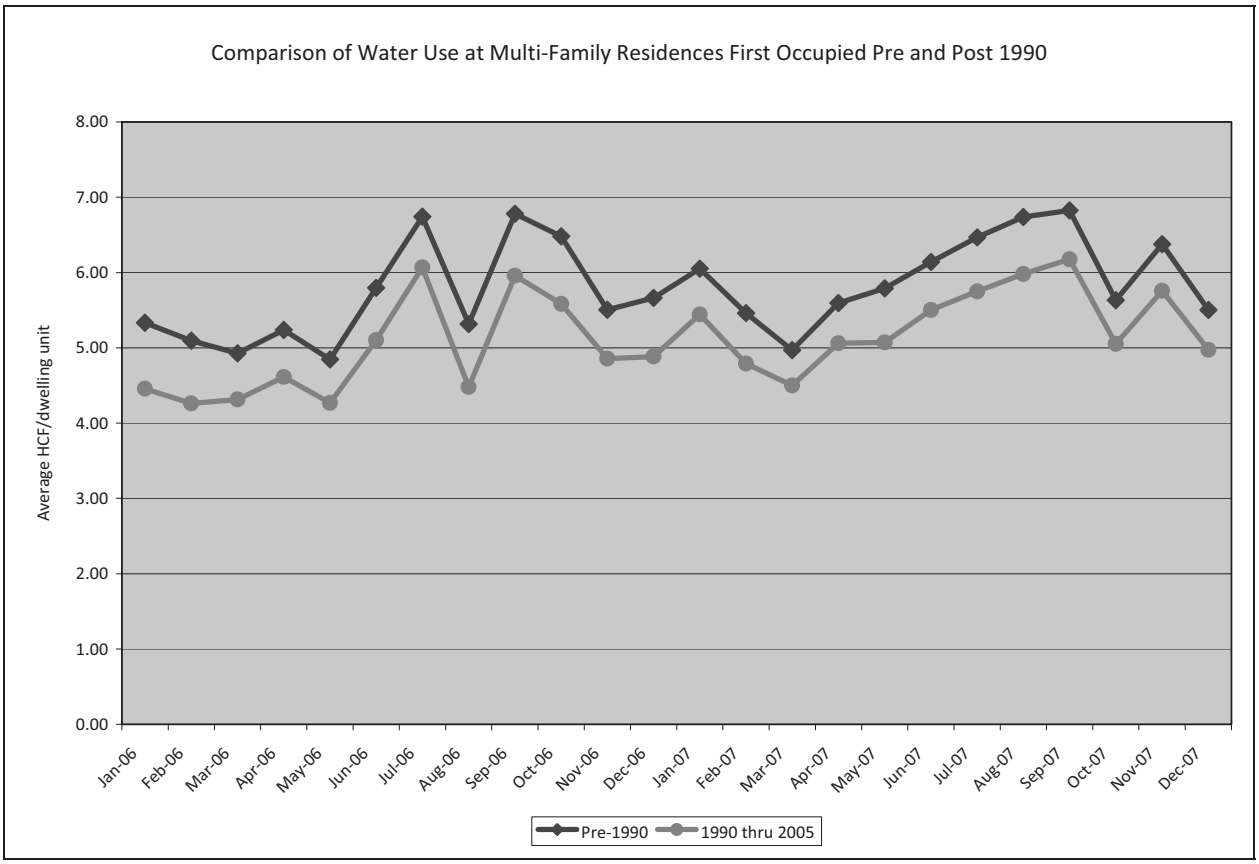

Figure 5. Multi-Family Water Usage Pre and Post 1990

Results of the subset analysis of multi-family usage as described above are summarized in Table 2.

Table 2. Subset Analysis of Multi-Family Water Usage

(All values include indoor and outdoor usage)

Multi-Family Analysis	2006 Values	2007 Values	Average	2006 Values	2007 Values	Average
	Monthly Usage (HCF/dwelling unit/month)			Annual Water Usage (AFY/dwelling unit)		
Multi-Family Residential (Aggregate)	5.56	5.88	5.72	0.15	0.16	0.16
Multi-Family – Neighborhoods (Aggregate)	5.58	5.93	5.76	0.15	0.16	0.16
Multi-Family – West Side Neighborhood	5.61	5.83	5.72	0.15	0.16	0.16
Multi-Family – East Side Neighborhood	5.45	5.77	5.61	0.15	0.16	0.15
Multi-Family – Mesa Neighborhood	5.39	5.61	5.50	0.15	0.15	0.15
Multi-Family – Upper State/West End Neighborhood	5.61	6.15	5.88	0.15	0.17	0.16
Multi-Family – Riviera Neighborhood	6.86	8.23	7.55	0.19	0.23	0.21
Multi-Family – Land use Categories (Aggregate)	5.51	5.79	5.65	0.15	0.16	0.16
Multi-Family – Du, Tri & Four-plex Category	6.25	6.68	6.46	0.17	0.18	0.18
Multi-Family – Condo Category	5.26	5.67	5.46	0.14	0.16	0.15
Multi-Family – 5+ Apt Building Category	5.18	5.35	5.27	0.14	0.15	0.15
Multi-Family – Age of Building (Aggregate)	5.59	5.92	5.75	0.15	0.16	0.16
Multi-Family – Occupied Pre-1990	5.64	5.96	5.80	0.16	0.16	0.16
Multi-Family – Occupied Between 1990 – 2005	4.90	5.34	5.12	0.13	0.15	0.14

Summary

The current water demand factor study reflects decreased water use as a whole from 1989 to the present. Figure 6 presents a summary of historical usage by customer classification. The majority of the water usage is for residential purposes, which is expected considering residential users comprise roughly 85% of the customer base. Usage rates tend to increase as the property size increases, accounting for increased landscaping area and irrigation.

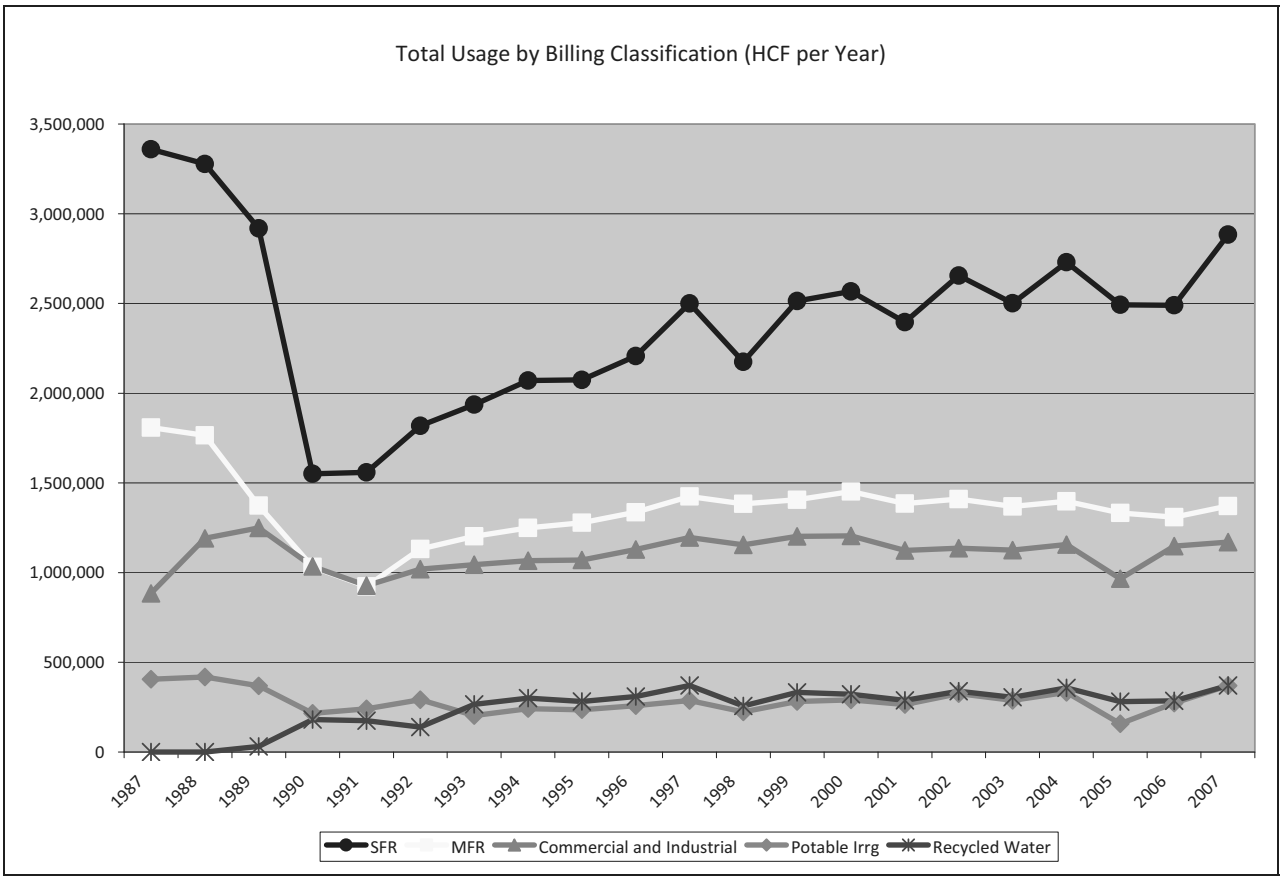

Figure 6. Historical Water Usage By Class

As a check on the updated non-residential demand factors, and as an indicator of overall water use in the non-residential sector, a comparison was made between the parcel specific data described above and aggregate water use for all non-residential accounts in the water billing system. Average 2006 & 2007 non-residential usage for all Commercial, Industrial, and non-residential Irrigation accounts was 2,752 AF. When divided by the 21.3 million square feet of currently existing non-residential floor area identified by the *Plan Santa Barbara* process, the result is .13 AFY per 1,000 sq. ft. For comparison, this same value is achieved by calculating a weighted average value (by floor area) for the data sample used in developing the demand factors in the various non-residential categories. Various analyses among multi-family users also yielded similar results on an aggregate basis, as shown in Table 2.

APPENDIX A – Factor Values: 2006, 2007, and Averages

Land Use Category (2009 Study)	2006 Values	2007 Values	Average	Monthly Units	2006 Values	2007 Values	Average	Annual Units
Single Family Residential (Aggregate)	13.43	15.37	14.40	HCF/month/ dwelling unit	0.37	0.42	0.40	AFY/ year
Single Family - Small Lot size < 7000 ft^2	9.20	9.79	9.49	HCF/month/ dwelling unit	0.25	0.27	0.26	AFY/ year
Single Family - Medium Lot size 7000 ft^2 to 1 acre	14.03	16.15	15.09	HCF/month/ dwelling unit	0.39	0.44	0.42	AFY/ year
Single Family - Large Lot size > 1 acre	33.73	38.17	34.45	HCF/month/ dwelling unit	0.93	1.05	0.95	AFY/ year
Multi-Family Residential (Aggregate)	5.56	5.88	5.72	HCF/month/ dwelling unit	0.15	0.16	0.16	AFY/ year
Multi-Family - 1-4 dwelling units	5.83	6.26	6.05	HCF/month/ dwelling unit	0.16	0.17	0.17	AFY/ year
Multi-Family - 5+ dwelling units	4.80	4.94	4.87	HCF/month/ dwelling unit	0.13	0.14	0.13	AFY/ year
Service Commercial	5.93	6.30	6.11	HCF/month/ 1000 ft^2	0.16	0.17	0.17	AFY/ year
Retail	5.35	5.38	5.37	HCF/month/ 1000 ft^2	0.15	0.15	0.15	AFY/ year
Office	1.98	2.14	2.06	HCF/month/ 1000 ft^2	0.05	0.06	0.06	AFY/ year
Industrial	2.79	2.89	2.84	HCF/month/ 1000 ft^2	0.08	0.08	0.08	AFY/ year
Institutional	5.85	6.37	6.11	HCF/month/ 1000 ft^2	0.16	0.18	0.17	AFY/ year
Hotel/Motel	4.81	4.82	4.81	HCF/month/ room	0.13	0.13	0.13	AFY/ year
Hotel/Motel with Restaurant	7.17	7.16	7.17	HCF/month/ room	0.20	0.20	0.20	AFY/ year

NOTES:

1. The 1989 Study Values are from Table 1, Water Demand Factors of the "Water Demand Factor and Conservation Study," Interface, August 1989.
2. 2009 Study values reflect the averages of usages for Calendar Years 2006 (average rainfall) and 2007 (extremely low rainfall, 43% of average), based on analysis of City Water Billing data and Planning Division Land Use Database.
3. All values represent estimated usage by category including indoor usage and outdoor usage.
4. Total SFR accounts for 2009 analysis (including 144 separately metered irrigation accounts, assumed split evenly between "medium" and "large".)
   SFR small = 5,198
   SFR medium = 9,176
   SFR large = 995
5. Number of hotels included in 2009 analysis:
   With restaurants attached = 7 hotels (20 accounts)
   Without restaurants attached = 28 hotels (36 accounts)

APPENDIX B - Land Use Category Details

2009 study categories	1989 study categories
Service Commercial	
'C - Bank, Credit Union'	Auto repair and auto body shop
'C - Bar or Drinking Place'	Bank
'C - Car Dealer'	Gas station
'C - Car Service & Repair'	Gas station/mini market
'C - Car Wash'	Health club
'C - Clubs (including gyms, health & fitness clubs, and private clubs)'	Restaurant, 24 hr
'C - Fast-Food Restaurant'	Restaurant, fast food
'C - Fast-Food Restaurant with Drive-Thru'	Restaurant, sit down
'C - Food sales (not grocery/supermarket)'	Theater
'C - Full Service Restaurant'	
'C - Gasoline Service'	
'C - Medical Related Uses'	
'C - Theater (Live or Movie)'	
'C & I - Communication & Information (TV, Newspaper, Radio, Etc.)'	
'C - Veterinary Services'	
Industrial	
'M - Manufacturing and Wholesale Trade'	Industrial assembly and manufacturing
'M - Other Industrial or Manufacturing'	Industrial R&D
'M - Warehousing and Storage'	Warehouse/industrial storage
'M - Construction Related Businesses'	
Retail	
'C - Grocery Store, Supermarket'	Grocery store
'C - Retail - Consumer Goods & Services'	Retail large
‘C - Shopping Center'	Retail small
Hotel	
'C - Lodging'	Hotel/motel
	Hotel/motel with restaurant
Institutional	
'I - Educational Services (day cares/schools)'	Church
'I - Hospital'	Church w/ school
'I - Memorial Services (funeral homes, cemeteries)'	Medical office
'I - Nursing Home/ Convalescent Hospital/ Rest Home'	Mixed medical/dental
'I - Other Government (Military, DMV, Post Office)'	School - elementary
'I - Other Institutional'	School - junior high
'I - Public Administration'	
'I - Public Safety (Police and Fire Stations)'	
'I - Religious Institutions (Churches, etc.)'	
'I - Special Purpose Institutions (Museum, Zoo, Library)'	
Office	
'C - Office (non-Institutional) - Business, Professional, Research'	General office
Multi-family	
‘R - Condo'	Condominium
'R - Mobile Home'	Multi-family apt
'R - Nursing Home/ Convalescent Hospital/ Rest Home'	Senior apt
'R - Multi-Family Residence'	
Single-family	
'R - Single Family Residence'	Single family, Small (up to 9999 sq ft lot)
	Single family, Medium (10000-22000 sq ft lot)
	Single family, Large (22001 sq ft - 1 acre lot)
	Single family, (over 1 acre lot)

Preliminary Water Demand Factor Update
City of Santa Barbara - Water Resources Division
October 2009

Land Use Category (2009 Study)	1989 Study Values	2009 Study Values	Units	Notes
Single Family Residential (Aggregate)	18.00	14.40	HCF/month/ dwelling unit	Values include SFR account usage & Irrigation usage at SFR properties; 1989 values based on average SFR accounts plus estimated Irrigation account usage by SFR's (because no aggregate SFR value was represented in 1989 study)
Single Family - Small Lot size < 7000 ft^2	11.43	9.49	HCF/month/ dwelling unit	Lot size definition was <10,000 ft^2 for 1989
Single Family - Medium Lot size 7000 ft^2 to 1 acre	18.24 – 30.42	15.09	HCF/month/ dwelling unit	18.24 – lot size 10,000 to 22,000 ft^2 for 1989 30.42 – lot size 22,000 ft^2 to 1 acre for 1989
Single Family - Large Lot size > 1 acre	51.57	34.45	HCF/month/ dwelling unit	
Multi-Family Residential (Aggregate)	7.33	5.72	HCF/month/ dwelling unit	1989 value is average MFR bill code usage plus estimated Irrigation account usage by MFR accounts. Subcategories for 1989: 4.29 – Senior Apartments 8.58 – Multi-family apartments 10.02 – Condominiums For 2009: Includes apartments, condos, & other attached dwelling units per Water Billing rate classification.
Service Commercial	N/A	6.18	HCF/month/ 1000 ft^2	Only some of the 2009 Service Commercial land use categories were represented in 1989 study. Additionally, Restaurant data was based on "seats" rather than square footage. Therefore, there is no valid 1989 value.
Retail	2.43 – 3.93	6.18	HCF/month/ 1000 ft^2	Land use categories from 1989 and 2009 are not comparable. 2009 value reflects "Retail" as defined in Planning Division Land Use Database, which includes high usage categories of Grocery Stores and Laundromats and is therefore not recommended for use in impact analysis. It is suggested that Retail be represented by 1989 values of 2.43 for Large Retail (>20,000 ft^2) and 3.93 for Small Retail (<20,000 ft^2).
Office	3.57	2.06	HCF/month/ 1000 ft^2	
Industrial	2.49 – 5.37	2.84	HCF/month/ 1000 ft^2	For 1989: 2.49 – Warehouse/ Indus. Storage, 3.03 – Indus. Assembly & Manufacturing, 5.37 – Indus. R&D
Institutional	N/A	6.11	HCF/month/ 1000 ft^2	Land use categories for 1989 and 2009 are not comparable. For example, a number of the Institutional sub-categories are not represented in the 1989 study and data for Hospitals and Schools are not based on 1000 ft^2 as for other categories.
Hotel/Motel	4.65	4.81	HCF/month/ room	
Hotel/Motel with Restaurant	5.37	7.17	HCF/month/ room	2009 value calculates at 5.65 with omission of highest data point, which is well above highest data point in 1989 study.

(See table notes on following page.)

Table Notes:

1. The 1989 Study Values are from Table 1, Water Demand Factors of the "Water Demand Factor and Conservation Study," Interface, August 1989.
2. 2009 Study values reflect the averages of usages for Calendar Years 2006 (average rainfall) and 2007 (extremely low rainfall, 43% of average), based on analysis of City Water Billing data and Planning Division Land Use Database.
3. All values represent estimated usage by category including indoor usage and potable irrigation.
4. Total SFR accounts for 2009 analysis (including 144 separately metered irrigation accounts, assumed split evenly between "medium" and "large".)
   SFR small = 5,198
   SFR medium = 9,176
   SFR large = 995
5. Number of hotels included in 2009 analysis:
   With restaurants attached = 7 hotels (20 accounts)
   Without restaurants attached = 28 hotels (36 accounts)
6. Identical 2009 values for Service Commercial and Retail have been checked to confirm that they are equal by coincidence.

APPENDIX I

TRANSPORTATION

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: August 31, 2010

To: Dan Gira, AMEC

From: Brian Welch & Reid Keller

Subject: Hot Springs Road/Coast Village Road Roundabout Future Analysis Errata

LA08-2253

The future year analysis of the Hot Springs Road/Coast Village Road roundabout contained an error that caused the delay at that intersection to be overstated for future year analysis. Due to this error the analysis originally showed a predicted level of service (LOS) of F for that location during the a.m. and p.m. peak hours, and which resulted in a significant impact. Upon correction of this error we predict LOS C during both peak hours and no significant impact. The remainder of the memorandum describes how this error occurred, and why it is limited to this location.

POST-PROCESSING MODEL DATA

Model data used to predict future traffic conditions is typically derived from three data sources:

1. Field Collected Counts
2. Base year model volumes at the same location
3. Future year model volumes at the same location.

The change in traffic found from the difference between the future year model volumes and the base year model volumes is applied to the counts to generate the future year traffic predications.[1] The Hot Springs Road/Coast Village Road roundabout had one movement (northbound through) where the base year model volume was entered incorrectly and greatly understated. The future year model volume was entered correctly. This caused the change between the base and future year to be overstated, which when applied to the counts caused the prediction of that movement to be far greater than it should have been. Correcting this issue lead to a more accurate future prediction of traffic at this location.

ISOLATED OCCURANCE

This location required specialized post–processing because of the roundabout. All other intersections, except the Milpas roundabout, use automated post-processing. The Milpas roundabout has been checked and this error was not present at the Milpas roundabout.

[1] Post-processing of model volumes is described in greater detail on pages 6-7 of the *Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario Revised Final Technical Memorandum*, (Fehr & Peers, 2010) found in the technical appendices of the EIR.

APPENDIX I-1

TRANSPORTATION EXISTING CONDITIONS REPORT

CITY OF SANTA BARBARA

Plan Santa Barbara:

Transportation Existing Conditions Report

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August 2008

Table of Contents

1.0 Introduction 1
- 1.1 What is *Plan Santa Barbara*? 1
- 1.2 What is this Transportation Existing Conditions Report About? 1
- 1.3 What's Next? 1

2 Transportation & Demographic Profile 2
- 2.1 Overview 2
- 2.2 General Demographics 2
- 2.3 Transportation Modes 2
- 2.4 Vehicle Ownership 3
- 2.5 Household Income 5
- 2.6 Key Issues and Opportunities 5

3 Automobiles 6
- 3.1 Vehicular Circulation in the Santa Barbara Area 6
  - 3.1.1 Downtown 6
  - 3.1.2 Upper State Street 11
  - 3.1.3 Eastside 11
  - 3.1.4 Other Areas 12
- 3.2 Existing Policy Framework 12
  - 3.2.1 City Circulation Element 12
  - 3.2.2 City Thresholds of Significance 13
    - 3.2.2.1 Circulation Element 13
    - 3.2.2.2 Adopted City Traffic Impact Assessment Criteria 13
  - 3.2.3 Congestion Management Plan 14
- 3.3 Existing Traffic Conditions 14
  - 3.3.1 LOS Analysis in the City of Santa Barbara 15
  - 3.3.2 Plan Santa Barbara Study Intersections 15
  - 3.3.3 Nearby Intersections 21
  - 3.3.4 Airport Area Intersections 22
- 3.4 Existing Roadway Segment Traffic Volumes 22
  - 3.4.1 Surface Streets 22
  - 3.4.2 Freeways and State Highways 22
- 3.5 Currently Programmed Roadway Improvements 24
- 3.6 Key Issues and Opportunities 24
  - 3.6.1 Regional Automobile Travel 24
  - 3.6.2 Local Automobile Travel 25
  - 3.6.3 Development Review 25
    - 3.6.3.1 Opportunities 25

4 Public Transit 26
- 4.1 Overview 26
- 4.2 Fixed-Route Transit Service 26
  - 4.2.1 MTD 26
  - 4.2.2 Regional/Commuter Transit Service 39
    - 4.2.2.1 Clean Air Express 40
    - 4.2.2.2 Coastal Express 40
    - 4.2.2.3 City of Lompoc COLT Reservation-Only Service 40
    - 4.2.2.4 Bill's Bus 40
    - 4.2.2.5 Other Regional Transit 40
- 4.3 Demand Responsive Service 41
  - 4.3.1 Easy Lift Paratransit 41
  - 4.3.2 Community Transportation Services 41
  - 4.3.3 Taxi Services 41
- 4.4 MTD Policies 42
  - 4.4.1 MTD Goals 42
  - 4.4.2 MTD Performance Standards 42
- 4.5 Key Issues and Opportunities 42

5 Bicycling Conditions 44
- 5.1 Overview 44
- 5.2 Facilities 44
  - 5.2.1 Bicycle Network 44
    - 5.2.1.1 Bicycle Routes 44
    - 5.2.1.2 Bicycle Signage 47
  - 5.2.2 Bicycle-Transit Accessibility 47
    - 5.2.2.1 Local and Regional MTD Buses 47
    - 5.2.2.2 Regional Buses 47
    - 5.2.2.3 Regional Rail 47
  - 5.2.3 Bicycle Parking 48
    - 5.2.3.1 On-Street (Sidewalk) Parking 48
    - 5.2.3.2 Off-street parking 48
  - 5.2.4 Other Bicycle-Supportive Facilities and Programs 49
- 5.3 Policies 49
- 5.4 Volumes 49
- 5.5 Safety Issues 50
- 5.6 Key Issues and Opportunities 50

6 Pedestrian Conditions 51
- 6.1 Overview 51
- 6.2 Facilities 51
- 6.3 Policies 52
- 6.4 Volumes 52
- 6.5 Safety Issues 57
- 6.6 Key Issues and Opportunities 57

7 Automobile Parking 57
- 7.1 Overview 57
- 7.2 Facilities 58

7.2.1 Downtown Parking 58
7.2.1.1 Off-Street Parking 58
7.2.1.2 On-Street Parking 58
7.2.2 Residential Parking Permit Program 60
7.2.3 Waterfront Parking 60
7.3 Policies 60
7.3.1 Minimum Parking Requirements for New Development 60
7.3.2 Parking Benefit and Improvement Assessment District 61
7.4 Key Issues and Opportunities 61

8 Transportation Demand Management 62

8.1 Overview 62
8.2 Citywide TDM Programs 63
8.3 Downtown Specific TDM Programs 65
8.3.1 Downtown Bus Pass Program 65
8.3.2 Downtown Parking Program 65
8.4 Santa Barbara County Employee Programs 65
8.5 SBCAG Traffic Solutions TDM Programs 65
8.6 Private-Sector TDM Programs 66
8.7 Other TDM Programs 66
8.7.1 UCSB TDM Programs 66
8.7.2 City College TDM Programs 67
8.7.3 APCD's "Santa Barbara Car-Free" Program 67
8.8 Policies 67
8.9 Key Issues and Opportunities 67

9 Performance Measures and Street Classification System 69

9.1 Existing Transportation Performance Measures 69
9.1.1 Existing City Transportation Performance Measures 69
9.1.2 Limitations of Existing City Performance Measures 69
9.1.3 Existing County Performance Measures 69
9.1.4 Existing Congestion Management Plan Performance Measures 70
9.2 Existing City Street Classification System 70
9.3 Key Issues and Opportunities 70

10 Pending and Planned Improvements 71

10.1 Measure D Funded Projects 71
10.2 Proposed Measure A Funding Program 71
10.3 Other Planned Improvements 73
10.3.1 Transit Improvements 73
10.3.1.1 MTD Fixed-Route Service 73
10.3.1.2 Regional Rail 73
10.3.2 Bicycle Facilities Improvements 73
10.3.3 Pedestrian Facilities Improvements 73

11 Transportation Funding Sources 74

Appendices

Appendix A: Policy Framework

List of Figures

Figure 1-1: Traffic Reduction Strategies Based on Trip Types: Within, To, From and Through Santa Barbara 2
Figure 2-1: Means of Transportation to Work for City of Santa Barbara Residents Whose Income is 150% or below of the Federal Poverty Level* 3
Figure 2-2: Median Earnings Compared to Means of Transportation to Work for City of Santa Barbara Residents 3
Figure 2-3: Transportation Mode Summary - Commuting to Work 3
Figure 2-4: Regional Commute Patterns 4
Figure 2-5: Renter Household Vehicle Ownership 5
Figure 2-6: Owner Household Vehicle Ownership 5
Figure 2-7: Average Household Vehicle Ownership 5
Figure 2-8: Santa Barbara Household Vehicle Ownership by Household Income 5
Figure 2-9: Plan Santa Barbara - Households without Vehicles (by Census Block Group) 7
Figure 2-10: Plan Santa Barbara - Households Living in Poverty (by Census Block Group) 9
Figure 3-1: CMP Designated Highways and Arterials; City of Santa Barbara 14
Figure 3-2: Level of Service Definitions for Signalized Intersections 15
Figure 3-3: Level of Service Definitions for Unsignalized Intersections (2000 Highway Capacity Manual Unsignalized Method) 15
Figure 3-4: Year 2008 Weekday Existing Conditions, Plan Santa Barbara Study Intersection Levels of Service 16
Figure 3-5. Level of Service and Average Daily Traffic Volumes 17
Figure 3-6. Intersections by Control Type 19
Figure 3-7: Plan Santa Barbara Study Intersections Currently Operating with a Peak Hour V/C of 0:77 or Greater 21
Figure 3-8: Nearby Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater 22
Figure 3-9: Airport Area Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater 22
Figure 3-10. Average Daily Traffic Volumes and Level of Service - Santa Barbara Airport Vicinity 23
Figure 4-1: Fares for Santa Barbara MTD Fixed-Route Transit Services 26
Figure 4-2: Plan Santa Barbara - Population Density (by Census Block Group) 27
Figure 4-3: Plan Santa Barbara - Employment Density 29
Figure 4-4: Local and Regional Public Transit Routes 31
Figure 4-5: Plan Santa Barbara - Regional Transit Service 33
Figure 4-6: Plan Santa Barbara - Private Carriers 35
Figure 4-7: Ridership for Local and Regional Public Transit (FY 2007) 37
Figure 4-8: MTD Operating Revenue (FY 2008) 39
Figure 4-9: Fares for Santa Barbara County Regional and Commuter Fixed-Route Services 41
Figure 5-1: Bikeways 45
Figure 6-1: Pedestrian Volumes at Surveyed Intersections (2006) 53
Figure 6-2: Locations of Collisions Involving Pedestrians (1998-2002) 55
Figure 7-1: Downtown Parking Supply and Peak-Hour Demand (Fall 2007) 59
Figure 7-2: Square Feet of Parking Area Required for Each Square Foot of Building Area for Typical Uses 60
Figure 9-1: County Criteria for Significant Changes in Auto Levels of Service – Project Impacts 69
Figure 10-1: Potential Allocation of Measure A Funds to North Coast Jurisdictions 72
Figure 10-2: Potential Allocation of Measure A Funds to South Coast Jurisdictions 72

1.0 INTRODUCTION

1.1 What is *Plan Santa Barbara*?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community-based planning process called *Plan Santa* Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the *Plan Santa Barbara* process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. This transportation planning consultant team will assist City staff in developing and analyzing cost-effective strategies that can reasonably be expected to reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

1.2 What is this Transportation Existing Conditions Report About?

In order to better understand where the opportunities exist for reducing traffic congestion, the transportation consultant team developed this "Transportation Existing Conditions" Report. This report assesses the current state of the city of Santa Barbara's multimodal transportation system by examining existing City policies, programs, and infrastructure related to automobile use, public transportation, bike and pedestrian facilities, parking, and transportation demand management.

Our evaluation of the city of Santa Barbara's current multimodal transportation system suggests that City streets currently experience limited locations and times of high traffic congestion, particularly near freeway interchanges. The City's policies are accomplishing significantly more than many other cities in California and nationwide in reducing traffic congestion and promoting more trips by carpool, transit, bicycle, and walking. Indeed, the city of Santa Barbara is seen in many areas as a national leader in multi-modal transportation, with a long history of planning for and investing in bicycle and pedestrian facilities and transit rider-ship levels comparable to cities much larger than Santa Barbara.

However, congestion on some local arterials (e.g., Upper State Street) and more significant regional congestion on U.S. Highway 101 associated with long-distance commuting continue to pose a challenge to maintaining the high quality of life and economic competitiveness of the city of Santa Barbara and the South Coast region. The automobile is currently the primary mode of travel for most trips to, through, and within the city of Santa Barbara and the surrounding region, and this is expected to continue to be true for the foreseeable future.

But this doesn't mean that the choice facing Santa Barbara is between ever-increasing traffic congestion on the one hand, and reduced quality of life, housing choice, and economic opportunity on the other. Many cities around the world have implemented a wide range of strategies to encourage "low-traffic development," resulting in a demonstrated reduction in per capita vehicle trips, a decreased rate of growth in peak-hour traffic congestion, an increased use of carpooling, transit, bicycling, and walking, and a more cost-effective use of always scarce transportation resources.

1.3 What's Next?

This next phase of this study process will help the City determine which measures will have the greatest effect on vehicle trip reduction, taking social, economic and legal implications into consideration. The City and the consultant team will begin to identify relevant traffic reduction strategies for the city of Santa Barbara. Questions to be considered include the following:

- Which traffic reduction strategies are applicable in the city of Santa Barbara and the region?
- To what extent are these strategies already being implemented – or soon will be – in Santa Barbara or the region?
- Which of these strategies have previously been attempted in Santa Barbara or the region, what impact did they have, and why did they succeed or fail?
- In which cities, considering examples from throughout the world, have these traffic reduction strategies been implemented – and which ones would be useful case studies for Santa Barbara and its region?
- What is the potential of these strategies for reducing

the growth of peak-hour traffic congestion in Santa Barbara, considered in balance with their potential effects on other community goals such as maintaining the city's economic vitality, existing social diversity and citizens' ability to travel?

One of the key issues to be addressed during the next phase of the project will be the development of both "locally-focused strategies" that can be implemented by the city of Santa Barbara as well as "regionally-focused strategies" that will need to be implemented in cooperation with the City's regional partners.[1] Local and regional trips are fundamentally different, and will therefore require different kinds of traffic reduction strategies (refer to Figure 1-1).

Figure 1-1: Traffic Reduction Strategies Based on Trip Types: Within, To, From and Through Santa Barbara

Trip Origin	Trip Destination: Within Santa Barbara	Trip Destination: Outside Santa Barbara
Within Santa Barbara	**Short trips of all types, including walking, bicycling to school, shopping, etc.** Affected by land use, transportation, and parking policies. **City-wide trips.** Affected by transit, shuttle, bicycle, and walking alternatives via land use and transportation policy.	**Primarily work trips, social, recreational and shopping trips.** The primary local strategy is to improve transit and transit-oriented land use. Affected by residential parking policy, land use policy, transit and ride-share services.
Outside Santa Barbara	**Primarily work and shopping trips.** Affected by workplace policies – TDM, parking supply and pricing, retail parking strategies, transit accessibility.	**Through trips of all types.** Most factors affecting travel mode are outside of City's influence, except through road pricing or road use restrictions.

[1] The success of traffic management strategies will in many ways depend on collaboration with the City's regional partners, such as the County of Santa Barbara, other cities in the region, Santa Barbara County Association of Governments (SBCAG), Air Pollution Control District (APCD), University of California at Santa Barbara (UCSB), and other public agency and private sector partners.

2 TRANSPORTATION & DEMOGRAPHIC PROFILE

2.1 Overview

Santa Barbara residents' demographic characteristics offer important background information concerning the baseline conditions that affect everyday travel choices. Factors such as household income distribution, commuter mode splits, and vehicle ownership patterns are important indicators of the likelihood that a person will choose to drive (thereby making a personal contribution to local and regional traffic congestion).

This section provides a "transportation and demographic profile" of city of Santa Barbara residents and employees, based on the most recent and reliable U.S. Census data available. Census data for the city of Santa Barbara is then compared to telephone survey data for the County of Santa Barbara from SBCAG's "2007 Commuter Profile" as well as to 2000 Census data for the United States as a whole and the State of California to highlight how the city of Santa Barbara compares and contrasts to the national and state averages.

2.2 General Demographics

Santa Barbara is a moderately urbanized city with a population of approximately 90,000 in 2008 (California Department of Finance). Like many jurisdictions in Southern California, the City has a large Latino population, comprising almost one-third of residents (American Community Survey 2006).

2.3 Transportation Modes

According to the 2000 Census, 66% of Santa Barbara's employed residents drive alone to work, with another 13.6% choosing to carpool. Public transportation, biking and walking account for roughly 14% of commute trips (refer to Figure 2-3). These overall resident commuting figures are very similar to the mode split of those workers employed within the city of Santa Barbara. Worker flow data from the 2000 Census reveal that nearly two-thirds of Santa Barbara residents also work in Santa Barbara, leading to similar numbers.

By comparison, the United States has a drive alone rate that is 20% (13.4 percentage points) higher than that of Santa Barbara residents. The State of California has a drive alone rate of 71.8% which is lower than the national

rate but is 5.8 percentage points higher than Santa Barbara residents.

In addition to vehicular means of travel, Santa Barbara residents walk to work at a rate of more than double the state and national average, and bike at a rate over five times as high as both the state and national average.

As shown in Figures 2-1 and 2-2, a very strong correlation exists in the city of Santa Barbara between income and means of transportation to work. While less than 5% of all commute trips are by public transit, more than 40% of those whose income is 150% or below of the Federal Poverty Level rely on transit to get to work. Likewise, a much higher percentage, 24%, of individuals with low-income walk to work. Overall, the median income of those who use public transit to get to work is only 40% of the median income of all working residents in the county, and the median income of those who walk is only 71% that of all working residents.

Figure 2-1: Means of Transportation to Work for City of Santa Barbara Residents Whose Income is 150% or below of the Federal Poverty Level*

Commute Mode	Income 150% or below	All Workers
Car, truck, or van - drove alone:	11.2%	65%
Car, truck, or van - carpooled:	9.9%	10%
Public transportation (excluding taxicab):	40.7%	4.4%
Walked:	23.8%	5.2%
Taxicab, motorcycle, bicycle, or other means:	10.4%	5.4%
Worked at home:	7.4%	9.5%

Source: U.S. Census Bureau, 2006 American Community Survey
** 12.6% of all workers fall into this category*

At the same time, there are a significant number of regional commuters driving and taking transit into Santa Barbara everyday (refer to Figure 2-4). Data from SBCAG's "2007 Commuter Profile" indicate that, although 92% of Santa Barbara County commuters both live and work in Santa Barbara County, 10% of respondents reported moving a farther distance from work in the past four years in order to obtain more affordable housing.

Figure 2-2: Median Earnings Compared to Means of Transportation to Work for City of Santa Barbara Residents

	Median Income	Percent of All Residents	Percent less than Median
Total:	$30,854		
Car, truck, or van - drove alone	$33,076	107%	-7.2%
Car, truck, or van - carpooled	$27,358	89%	11%
Public transportation (excluding taxicab)	$12,215	40%	60%
Walked	$21,823	71%	29%
Taxicab, motorcycle, bicycle, or other means	$32,393	105%	-5.0%
Worked at home	$37,990	123%	-23%

Source: U.S. Census Bureau, 2006 American Community Survey

Figure 2-3: Transportation Mode Summary - Commuting to Work

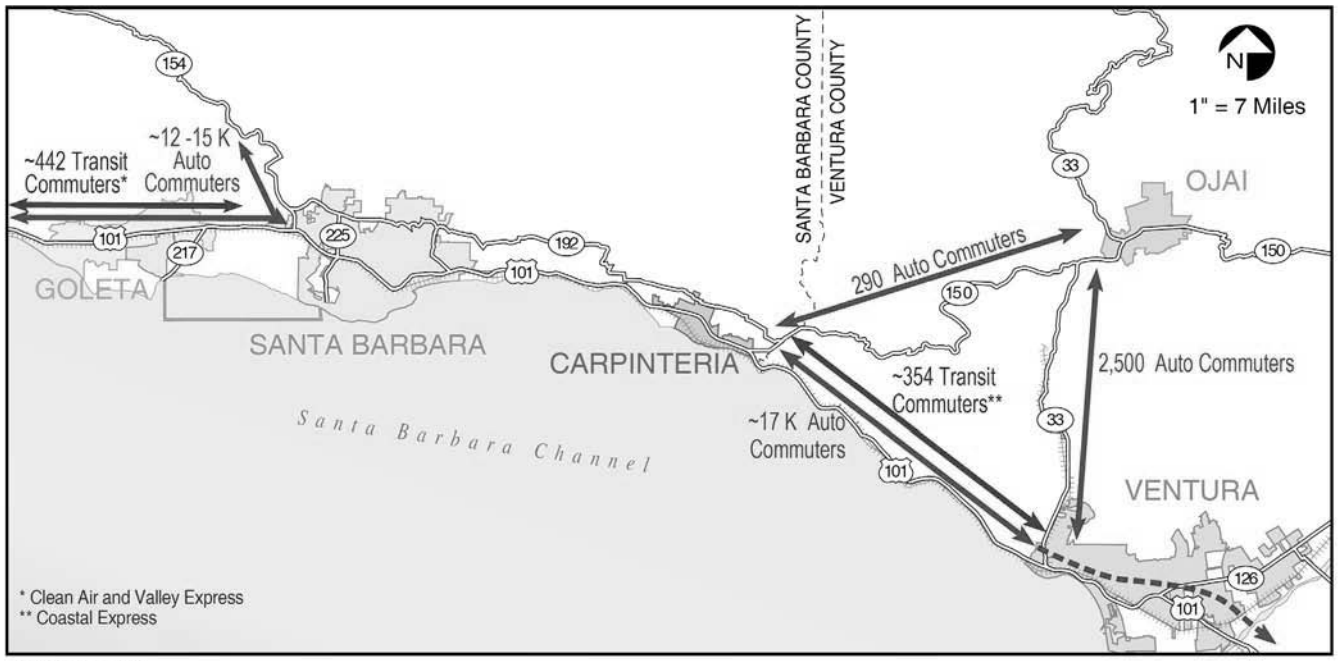
	Employees Residing in the City of Santa Barbara	Employed within the City of Santa Barbara	Employees Residing in the County of Santa Barbara	Employees Nationwide
Car, truck, or van -- drove alone	66.0%	68.8%	70.7%	79.4%
Car, truck, or vanpooled/ carpooled	13.6%	14.1%	15.4%	8.7%
Public transportation	4.5%	4.0%	3.8%	4.4%
Biked	3.4%	3.2%	2.3% (winter) 2.7% (summer)	0.6%
Walked	6.2%	4.8%	2.7%	2.7%
Other means (e.g., taxi/ motorcycle)	0.7%	0.8%	0.6%	1.0%
Worked at home	5.5%	4.3%	4.5%	3.1%

Source for Santa Barbara residents and employees and nationwide data: 2000 Census.
Source for County of Santa Barbara commuter data: SBCAG Commuter Profile, June 2007.

2.4 Vehicle Ownership

The lower reliance on the automobile in Santa Barbara is reflected in vehicle ownership rates. Citywide, over half of households either own one vehicle ("low-car households") or no vehicles ("no-car households"), 14% higher than the national average. However, there is a large discrepancy in the number of household vehicles between rental and ownership homes (refer to Figure 2-5 and Figure 2-6). Whereas

Figure 2-4: Regional Commute Patterns



Notes and Sources:
1) Auto Commuters: Interview with County transportation staff and SBCAG "Travel Trends Report" (Dec. 2007).
2) Transit Commuters: SBCAG "Travel Trends Report" (Dec. 2007); Method used to estimate transit commuters was as follows:
FY 06-07 total annual ridership numbers for commuter transit services (Coastal Express, Clean Air Express, and Valley Express) was divided by 240 weekdays per year to derive total transit ridership per weekday. Assuming each transit commuter takes 2 transit trips (AM and PM), total transit ridership per weekday on commuter services was then divided by 2 to convert total transit trips into total transit commuters. Because the Coastal Express offers non-commuter service as well (mid-days, weekends, etc), this methodology likely understates total transit commuters on the 101 corridor between Ventura and Santa Barbara, but is an order of magnitude estimate based on the best available data.

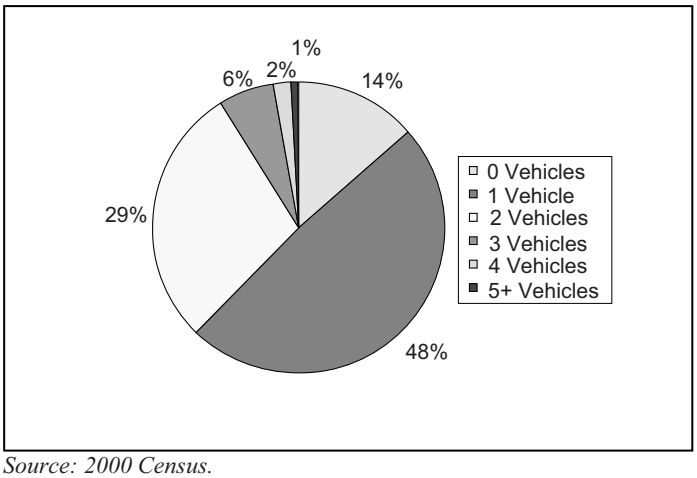
over 60% of renter-occupied households own zero or one vehicle, this number drops to just 34% for owner-occupied homes.

These varying rates of vehicle ownership are reflected in the separate *average vehicle ownership* for renter households and owner households, compared to average city-wide vehicle ownership (refer to Figure 2-7). It is important to note that those households owning the most number of vehicles (owner-occupied) still have on average fewer than the commonly-reported "two cars per household" rule of thumb for Southern California communities. While this is a generalized rule of thumb that does not take into account differences in "average household size" in different communities, it does support other evidence that suggests that Santa Barbara households *on average* already own fewer cars and drive them less than typical Southern California communities. The nearby cities of Ventura and Oxnard support this idea: in Oxnard and Ventura the average vehicle ownership for owner-occupied units is 2.18 and 1.99, respectively.

For comparison, the SBCAG's 2007 Commuter Profile telephone survey found that 85% of Santa Barbara County commuters "always" have a vehicle available to get to work, 6% "sometimes" do, and 9% "never" do. This is a noticeable drop from the 2002 SBCAG's Commuter Profile Survey, which reported that 91% of Santa Barbara residents "always" have access to a vehicle, 5% "sometimes" do and 4% "never" have access to a vehicle.

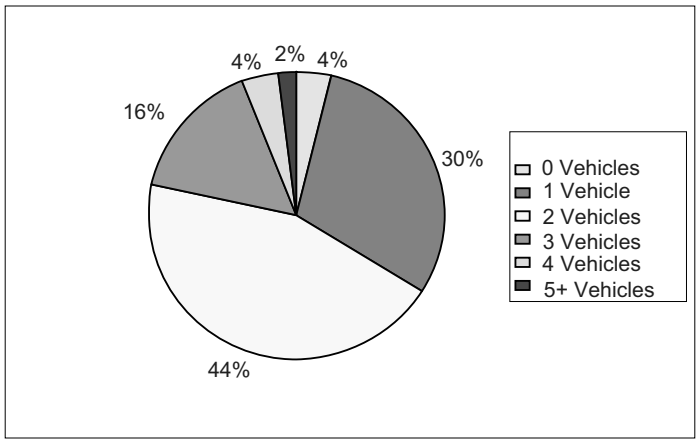
The nearby counties of Ventura and San Luis Obispo experienced similar trends with the percentage of commuters "always" having a vehicle dropping between 2002 and 2007. In 2002 the percentage of commuters "always" having a vehicle in Ventura County was 93% and in 2007 the rate dropped to 88%. For San Luis Obispo County the percentage of commuters "always" having a vehicle in 2002 was 95%, dropping to 93% in 2007.

Figure 2-5: Renter Household Vehicle Ownership



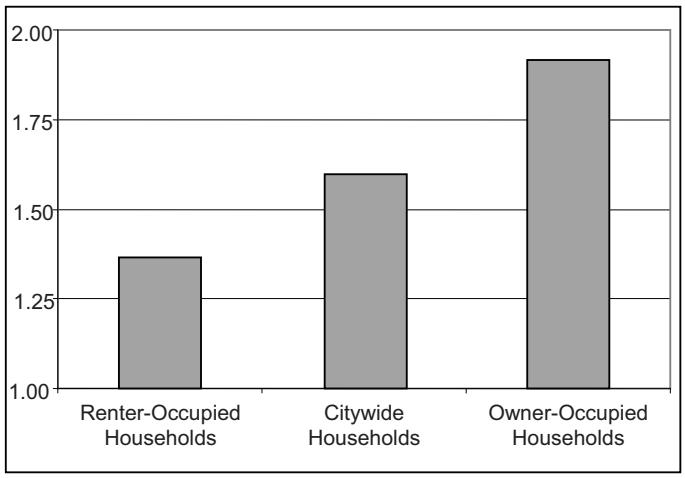
Source: 2000 Census.

Figure 2-6: Owner Household Vehicle Ownership



Source: 2000 Census.

Figure 2-7: Average Household Vehicle Ownership



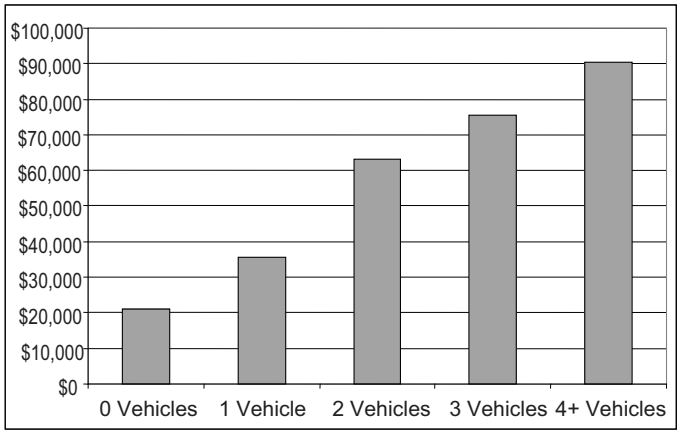
Source: 2000 Census.

Figure 2-9 illustrates the spatial distribution of "no car households" in Santa Barbara and the region.

2.5 Household Income

While 2000 Census data show that Santa Barbara resident's per capita income is 40% above the national average, there are wide variations in income with over 13% of the population living below the Federal poverty level. National data consistently show a direct relationship between income and vehicle ownership. Figure 2-8 illustrates the connection between household income and vehicle ownership in Santa Barbara: while the median annual income of a household with no vehicles is roughly $20,000, the median income of a household with two vehicles is over three times that figure ($63,150)[2].

Figure 2-8: Santa Barbara Household Vehicle Ownership by Household Income



Source: 2000 Census.

For comparison, 2000 Census data indicates that 34% of Santa Barbara County households have annual incomes of $25,000 or less. Figure 2-10 illustrates the spatial distribution of low-income households in Santa Barbara and the region.

2.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the aim of reducing the rate of growth of peak-hour vehicle trips:

- Compared to national averages, Santa Barbara residents and workers already have a relatively lower rate of drive-alone commuting and relatively higher rates of commuting by alternative modes.
- Santa Barbara residents also have lower-than-average rates of vehicle ownership with over one-third of owner households and nearly two-thirds of renter households owning either one or no cars.

[2] The 2000 US Census defines a household as all the people who occupy a housing unit as their usual place of residence.

- The demographics of Santa Barbara and its surrounding region (with concentrations of both high-income households and low-income households) suggest that programs to encourage use of alternative modes may need to be tailored to special markets rather than "one-size-fits-all." For example:
    - Programs to reduce traffic congestion may need to emphasize financial incentives to attract low-income auto commuters to alternate modes, while emphasizing time-savings and amenities to attract higher-income auto commuters.
    - In addition, transit services themselves may need to be tailored to serve both "transit-dependent" riders (who are more likely to be low-income, travel during "off-peak" non-commute hours, and make shorter/local trips) and "choice" riders (who are more likely to be higher income, travel during "peak" commute hours, and make longer/regional trips).
- In addition to the demographic issues discussed in this section, Santa Barbara has other attributes that make alternative transportation more feasible than in other areas. For example:
    - The geography of the City (with mountain ranges and a narrow coastal plain creating a limited number of regional travel corridors and a land use pattern which concentrates origin and destinations) can contribute to higher usage of alternate modes (versus a land use pattern that resembles a "spider web" or "hub and spoke", with multiple regional travel corridors and an infinite number of origins and destinations scattered throughout the region).
    - In addition, the political and cultural environment in Santa Barbara is strongly supportive of environmentally-friendly policies and programs.
    - A large student population (a segment that is more likely to utilize alternative modes) lives in Santa Barbara and the surrounding areas, creating a baseline demand for transit, bicycling, and walking.
- Finally, similar to many communities, the number of motorcycle/scooter commuters in Santa Barbara is currently quite small according to Census data. However, with the increasing price of gas, evidence suggests that there has been an increase in motorcycle/scooter usage nationwide because these vehicles are more fuel efficient than other motorized vehicles. Motorcycles/scooters also make more efficient use of roadway and parking capacity, so while there is likely no need to develop a specific marketing or incentive program to encourage motorcycle/scooter use, the city of Santa Barbara should ensure that adequate on- and off-street parking exists to meet the demand for two-wheeled vehicles. Unfortunately, the "per-person-mile" emissions of motorcycles/scooters is typically higher than other modes (depending on the motorcycle/scooter trip length, age, engine size, pollution control equipment, maintenance record, and aftermarket modifications), so their positive impacts on reducing traffic and parking congestion can be offset by their negative impacts on air pollution.

3 AUTOMOBILES

3.1 Vehicular Circulation in the Santa Barbara Area

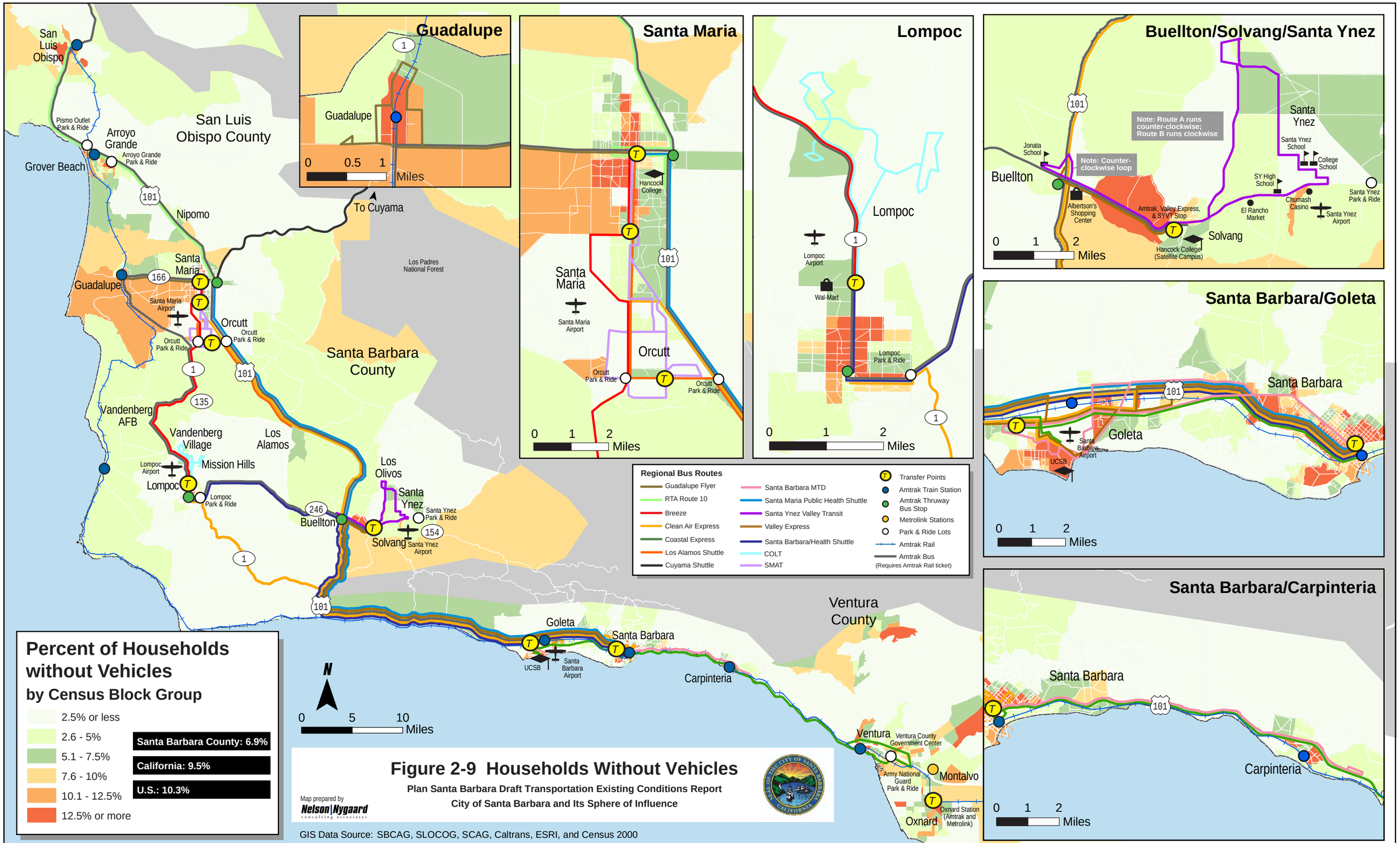
The Santa Barbara area is a long and narrow coastal plain, constrained by the Santa Ynez Mountains to the north and the Pacific Ocean to the south. The City is roughly bisected by U.S. Highway 101, which serves as the primary link for automobile travel between Santa Barbara and adjacent jurisdictions. Because of these geographic constraints, few other options exist for automobile traffic into and out of the area, and as such, most inter-regional automobile commuters into and out of the area must use U.S. Highway 101.

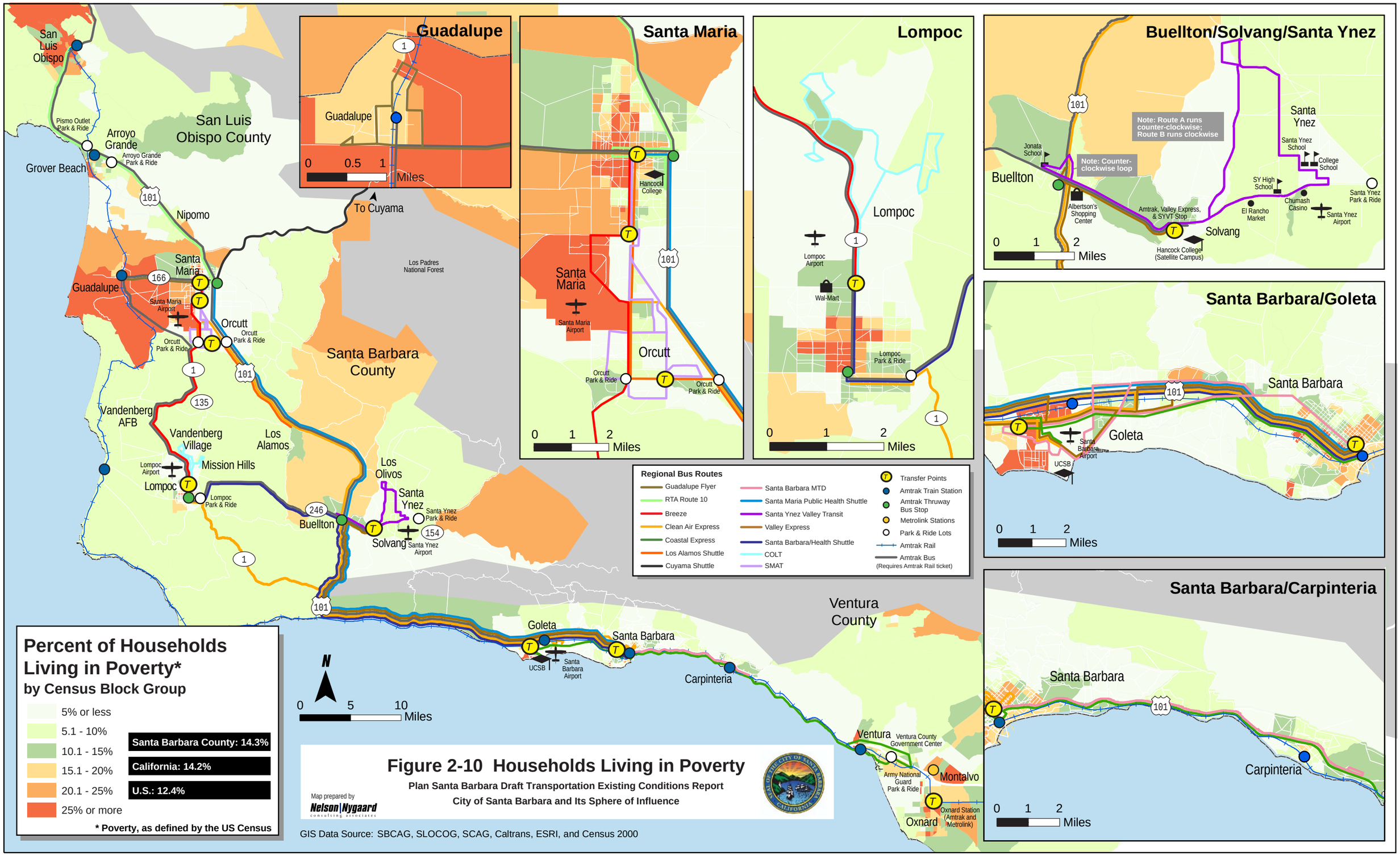
The city of Santa Barbara is mostly built-out, and is anticipated to experience predominately infill development along existing corridors in the future. The following section describes sub-areas of the City and the transportation corridors that serve them, highlighting the existing land use and street and automobile network. The City has identified a number of possible locations for future development, which are also described in greater detail in this section.

3.1.1 Downtown

The streets in the central area of the City form a grid where the streets run northeast/southwest and northwest/southeast. Block faces are short, and one-way couplets such as Chapala and De La Vina streets are used to eliminate left-turn conflicts and boost traffic capacity on streets that are fairly narrow, typically two lanes.

State Street acts as the spine of Santa Barbara, traveling


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc
Lompoc Airport
Wal-Mart
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Santa Ynez
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Santa Ynez School
College School
SY High School
Chumash Casino
El Rancho Market
Santa Ynez Park & Ride
Santa Ynez Airport
Solvang
Hancock College (Satellite Campus)
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Los Padres National Forest
Santa Barbara County
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
101
166
135
246
154
1
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Percent of Households without Vehicles
by Census Block Group
2.5% or less
2.6 - 5%
5.1 - 7.5%
7.6 - 10%
10.1 - 12.5%
12.5% or more
Santa Barbara County: 6.9%
California: 9.5%
U.S.: 10.3%
N
0 5 10 Miles
Figure 2-9 Households Without Vehicles
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000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0 1 2 Miles
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Lompoc Airport
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Lompoc Park & Ride
1
0 1 2 Miles
Buellton/Solvang/Santa Ynez
101
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Solvang
Hancock College (Satellite Campus)
Santa Ynez
Santa Ynez School
College School
SY High School
Chumash Casino
El Rancho Market
Santa Ynez Airport
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0 1 2 Miles
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1
101
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Carpinteria
Ventura County
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Ventura County Government Center
Army National Guard Park & Ride
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Regional Bus Routes
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Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Santa Barbara/Carpinteria
Santa Barbara
101
Carpinteria
0 1 2 Miles
Percent of Households Living in Poverty*
by Census Block Group
5% or less
5.1 - 10%
10.1 - 15%
15.1 - 20%
20.1 - 25%
25% or more
Santa Barbara County: 14.3%
California: 14.2%
U.S.: 12.4%
* Poverty, as defined by the US Census
Figure 2-10 Households Living in Poverty
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000

from the Pacific Ocean northwest to East San Roque, where it turns west along Upper State Street, eventually extending beyond the western City limit, becoming Hollister Avenue on its way into the eastern Goleta Valley. Through downtown Santa Barbara, State Street is generally two lanes, lined with a mixture of retail and commercial land uses in the core with some residential uses at the northwestern fringe. While much of the retail land use in downtown Santa Barbara is focused on State Street, parking is provided in a series of surface lots and structures accessed via parallel Chapala Street and Anacapa Street, allowing State Street's buildings to directly face the street with minimal setbacks from the curb. This situation provides a pleasing atmosphere for pedestrians while minimizing their conflicts with vehicles needing to turn to access parking.

Carrillo Street links the Mesa, the Westside, U.S. Highway 101 and Downtown Santa Barbara, running perpendicular to State Street. It is generally four lanes through downtown, except for a brief stretch between De la Vina Street and U.S. Highway 101 where it expands to five lanes, providing three lanes of travel for motorists heading from downtown to the highway. Carrillo Street is lined with predominantly retail land uses between U.S. Highway 101 and Anacapa Street, where it transitions to primarily office and service commercial land uses as it heads northeast. Carrillo Street acts as a major transit corridor, with multiple buses traversing this corridor on an hourly basis to access the Downtown Transit Center from U.S. Highway 101, the Westside, and the Mesa. The City has identified this corridor as one that may accommodate future growth.

Outside the principal corridors and the one-way streets, most corridors in the downtown grid have similar characteristics for the motorist. These corridors are generally two lanes and lined by either residential or commercial land uses. Vehicular traffic is able to filter through the existing grid network in a direct and efficient manner.

3.1.2 Upper State Street

Outside of the downtown towards the northwest, the roads become wider and the block faces longer. The Upper State Street area stretches from roughly Alamar Avenue on the east to the western City limit and beyond to the eastern Goleta Valley, and from U.S. Highway 101 on the south to northern City limits. The area is characterized by a street network where traffic must make its way to the larger arterials from disconnected local streets and cul-de-sacs before proceeding to its ultimate destination.

Upper State Street serves as the primary east-west corridor for vehicular travel in this area, being generally four lanes with intermittent landscaped medians. This corridor is lined by most of the area's retail and commercial buildings, many of which are set back from the street behind their parking. This parking is often accessed by driveways directly linked to State Street, which creates frequent conflict points between vehicles attempting to use the street as a throughway and vehicles attempting to access and exit the buildings. With vehicles regularly driving across the sidewalk, the pedestrian's experience is greatly diminished. Traffic flow is reduced while turning vehicles block through traffic as they wait in the roadway for pedestrians to clear driveways, and through traffic slows behind drivers who must reduce their speed to successfully execute the turn maneuver into driveways that are often narrow.

The *Upper State Street Study* (City of Santa Barbara, March 2007) identified the key issues leading to traffic congestion in this corridor and recommended a set of potential solutions to improve traffic flow, including gradually decreasing the number of driveway access points through incremental redevelopment and, where possible without obstructing mountain views, requiring new development to place parking and access behind the building. These solutions would help the Upper State Street corridor accommodate the potential future growth that may occur here.

Los Positas Road, which is four lanes south of State Street and becomes San Roque Road with two lanes north of State Street, Hope Avenue, which is two lanes, and La Cumbre Road, which is four lanes south of State Street and two lanes north of State Street, provide the primary north-south vehicle corridors in this area and access to Highway 101.

3.1.3 Eastside

Traveling northeast from downtown Santa Barbara on Anapamu Street, motorists who follow the gentle bend in the road will find themselves driving down the Eastside's principal thoroughfare, Milpas Street, which passes under the highway and ends at the beach. On this route, Milpas Street is two lanes and lined with residential land uses until it reaches Canon Perdido Street. From Canon Perdido Street to Calle Puerto Vallarta, it opens to four lanes and is lined primarily with neighborhood-serving commercial and retail land uses. Like downtown, blocks are short and, with the exception of larger neighborhood shopping cen-

ters, most of the buildings are pulled up to the curb.

However, unlike downtown, these buildings are often served by their own parking lots accessed from Milpas Street or the side streets connecting to Milpas Street. A few larger supermarkets are set back from the street with their parking in front. The parking access here creates the same type of conflicts seen along Upper State Street, though the shorter block lengths are more amenable to pedestrians. This corridor has also been identified by the City as one that may accommodate future growth.

The one-way couplet of Gutierrez and Haley Streets also connects the Eastside to downtown Santa Barbara.

3.1.4 Other Areas

Outside of the areas mentioned, the route, directness, and connectivity of the roadway network typically follow the physical geographic setting. These other areas are largely residential, and commercial activity, if any, is centralized along the primary corridors, or at the intersection of primary corridors.

Areas in the foothills to the north are generally served by narrow and winding roads, which are usually two lanes. Foothill Avenue (Highway 192) and Alameda Padre Serra, both with two lanes, provide the primary access to residential streets in these neighborhoods.

The Westside, situated in a basin between the hillsides of the Mesa and the freeway, has a grid system of roads similar to the downtown area. Two-lane San Andres Street is the primary corridor and is lined with commercial and retail land uses in the blocks approaching the intersection with Micheltorena Street, which in turn connects this area to downtown across U.S. Highway 101. Mission Street also acts as a primary route for traffic between the western edge of the Westside and Highway 101.

Traffic on the Mesa uses a small number of larger arterial roadways to access smaller winding local streets that traverse the level mesa-top and hillsides. Four-lane Cliff Drive (formerly SR 225), Shoreline Drive, (recently narrowed from four to two lanes between Loma Alta and La Marina) and becoming two-lane Meigs Road provide access to the residential streets in this area. Retail and commercial centers are located around the intersection of Cliff Drive with Meigs Road/Shoreline Drive.

Traffic in Montecito uses a series of smaller roads to access two-lane arterials connecting it to the freeway and the City. Retail and commercial land uses are generally confined to Coast Village Road, which is part of the city of Santa Barbara, while Hot Springs, Olive Mill, and San Ysidro Roads provide access to unincorporated County residential streets in this area. All of these streets are two lanes.

3.2 Existing Policy Framework

The following section highlights aspects of the existing governmental policy framework that are pertinent to automobile travel within the city of Santa Barbara. A discussion of the overall transportation policy framework in the area can be found in Appendix A of this report.

3.2.1 City Circulation Element

The city of Santa Barbara's General Plan Circulation Element was adopted in 1998 and sets forth a comprehensive vision of Santa Barbara's desired transportation system. The Circulation Element addresses all modes of transportation, including the automobile, transit, pedestrians, and bicycles. In addition, the 1998 Circulation Element addresses issues such as economic vitality, equality of modes of transportation, parking, and the relationship of land use and new development to transportation.

In regards to roadways and automobile use, the Circulation Element retains the roadway classification system from the original older element that it replaces, although this system does not contain policy direction or standards associated with these classifications. This system utilizes five categories of streets: freeway, primary arterial, minor arterial, collector street, and local street. These classifications were based on traffic volumes in vehicles per day, right-of-way width, and design features such as the number of travel lanes, presence of driveway access and on-street parking. Historically, the volume of vehicular traffic was the primary basis by which a City qualified for funding from the federal or state governments. However, the 1998 Circulation Element focuses upon broadening mobility options available to residents.

A discussion of a possible alternative classification system that takes into account other considerations outside of vehicular traffic was discussed in the 1998 Circulation Element (refer to Section 9.2). However, this alternative functional classification system has not yet been implemented, and the City does not specifically designate a vehicular functional classification system beyond the regional Congestion Management Plan system in its Circulation Element.

3.2.2 City Thresholds of Significance

3.2.2.1 Circulation Element

The 1998 Circulation Element discusses traffic impact analysis for development projects in the city of Santa Barbara and identifies significance criteria for intersections based on two primary variables; Level of Service (LOS) and Volume of vehicles/Capacity of road (V/C). LOS is measured on a scale from LOS A to LOS F, where LOS A represents free flow activity and LOS F represents overcapacity operation (see section 3.3.1 for further explanation of LOS). According to the General Plan, an intersection must have a LOS "C" or better, which is equivalent to a V/C of 0.8 or 80% or less, to be considered acceptable.

The Circulation Element also highlights the applicable effect of Measure E (Charter non-residential growth limit amendment) on traffic impact analysis, and notes that the restrictive criteria that must be met could prevent compact development that may actually reduce vehicle trips as follows:

- *Land use patterns directly affect the transportation choices that people make. A compact, pedestrian oriented development pattern will provide a greater variety of transportation choices by facilitating modes of transportation other than the automobile. This happens because people can live and work in close proximity to transportation centers and facilities. Conversely, a low-density, sprawling development pattern that segregates residential and non-residential uses limits transportation options and increases dependence on the automobile for mobility. This land use pattern, commonly known as Urban Sprawl, can be seen in many post World War II communities such as Los Angeles and San Jose.*
- *Currently, the amount and density of development that can occur in the City is governed by different sets of regulations. Passed by the voters in 1989, Measure E was incorporated into the City Charter as Charter Section 1508. This Charter Section not only places a ceiling on the total amount of non-residential square footage developed in the City until the year 2010, it also states that new non-residential construction can only occur where it will not cause a significant and unmitigated adverse impact on the City's water resources and traffic within the City, or the supply of affordable housing on the South Coast. However, because Measure E has not been incorporated into the City's Local Coastal Program it cannot be used for the purpose of making findings regarding the consistency of any project with the certified Local Coastal Program. Such a use would require the provisions of Measure E to be certified through the Coastal Commission through an amendment to the City's Local Coastal Program.*
- *Traffic impacts are currently determined in two different ways. The first way that traffic impacts are determined is by adopted Level of Service (LOS) standards for signalized City intersections. Currently, signalized intersections are considered impacted if they exceed the City's LOS goal of C, which carries a V/C of 0.80. However, for the purposes of environmental assessment in the city of Santa Barbara under the California Environmental Quality Act (CEQA), a signalized intersection is considered impacted if a project causes the V/C to exceed 0.77. By state law, in any case where a project results in a significant traffic impact, an environmental impact report must be prepared.*[3]

3.2.2.2 Adopted City Traffic Impact Assessment Criteria

Traffic impacts are determined for any development project in the City using the following impact significance criteria. A project that is estimated to result in a net traffic increase that exceeds these thresholds would typically be required to prepare an Environmental Impact Report (EIR) under CEQA (unless it was exempted statutorily, via a "statement of overriding considerations," or another mechanism). The stringent nature of these impact criteria, which are more rigorous than the Circulation Element criteria, has greatly influenced development in the City over the last two decades. The criteria are:

- Project-Specific Significant Impact: A project-specific significant impact occurs when:
  (a) Project peak-hour traffic would cause an intersection to exceed 0.77 V/C (per the General Plan language above), or
  (b) The V/C of an intersection would be increased by 0.01 (1%) or more as a result of project peak-hour traffic.
- Significant Cumulative Contribution: A project would result in a significant contribution to cumulative traffic when:
  (a) Project peak-hour traffic together with other cumulative traffic from existing and reasonably foreseeable pending projects would cause

[3] Excerpted from Chapter 11: Traffic Standards from the city of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.

an intersection to exceed 0.77 V/C, or

(b) Project would contribute traffic to an intersection already exceeding 0.77 V/C.

Given the more stringent nature of impact criteria and levels of significance under CEQA, projects which are likely to require an EIR, such as the Santa Barbara Cottage Hospital expansion project, will use CEQA guidelines when conducting their traffic impact analysis.

3.2.3 Congestion Management Plan

The Congestion Management Plan (CMP) is required by law (California State Government Code Section 65089), for all urban counties in the State. The CMP for Santa Barbara County is administered by the Santa Barbara County Association of Government. The goal of the CMP is to reduce or maintain current congestion levels through supply side measures, such as capital improvements, and demand side measures, such as travel demand management (TDM) programs and coordinated local jurisdiction land use planning. To measure the effectiveness of the CMP, certain key roadways are selected for regular monitoring. This designated roadway system includes all State Highways and principal arterials within the city of Santa Barbara (refer to Figure 3-1).[4]

The city of Santa Barbara must maintain a certain level of service, or congestion level, on streets designated in the CMP in order to receive funding from various Federal and State transportation and air quality funding programs (Government Code Section 65089.2). In general, LOS D or better is the CMP standard for roadways and intersections, but the CMP recognizes that some facilities are currently operating at LOS E or below. Where facility traffic levels exceed this standard, the CMP requires that agencies adopt a Deficiency Plan to improve operation of the facility. Agencies that fail to do so are out of conformity. As of the most recent CMP, the city of Santa Barbara was in conformity because all of its facilities which exceed CMP standards had adopted Deficiency Plans.[5]

At the project level, if a proposed development is located adjacent to or near one of the CMP designated highways and arterials, then the proposed development must also meet the CMP specified thresholds of significance.

Figure 3-1: CMP Designated Highways and Arterials; City of Santa Barbara

Street	Segment
State Highways:[a]	
Highway 101	(within City limits)
State Route 144	(portions of Milpas St., Mason St., Salinas St., and Sycamore Cyn. Rd.)
State Route 192	(portions of Sycamore Cyn. Rd., Stanwood Dr., Mission Ridge Rd., Mountain Dr., and Foothill Rd.)
State Route 225	(portions of Las Positas Rd., Cliff Dr., and Castillo St.)
Principal Arterials:[a]	
State Street	De la Vina St. to Hollister Ave.
Las Positas Road	Highway 101 to State St.
Chapala Street	Gutierrez St. to Mission St.
De La Vina Street	Mission St. to State St
Mission Street	Highway 101 to Anacapa St.
Anacapa Street	Cliff Drive to Anacapa St.
Carrillo Street/ Meigs Road	Highway 101 to Milpas St.
Haley Street	Bath St. to Milpas St
Gutierrez Street	Cabrillo Blvd. to Haley St
Milpas Street	Haley St. to Cabrillo Blvd
Garden Street	Haley St. to Cabrillo Blvd
Hollister Avenue	San Pedro Creek to Los Carneros Rd
Fairview Avenue	Placencia St. to Olney St.

[a] *Chapter 10: Mobility from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.*

In addition, the CMP provides its own classification system used when determining eligibility for funding rather than the classification system contained within the City's Circulation Element. However, the Inter-modal Surface Transportation Efficiency Act (ISTEA), passed in 1991, established new policies that fund a variety of modes of transportation, including cars, trucks, buses, trains, bicycles, and walking. ISTEA requires the comprehensive planning of appropriate modes of transportation for natural and built environments and air quality standards.

3.3 Existing Traffic Conditions

Because traffic flow on urban arterials is most constrained at intersections, detailed traffic flow analyses typically focus on the operating conditions of critical intersections during peak travel periods. Thus the bulk of the following analysis focuses on intersection operations. However, in some instances, congestion along major road corridors can be related to the interaction between closely spaced signals and other factors such as a large number of driveways, pedestrian activity, transit operations, etc. Several such corridors exist in the City, including Upper State

[4] Excerpted from Chapter 10: Mobility from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara 1998.

[5] Congestion Management Plan. SBCAG, 2003

Street and Carrillo Street between U.S. Highway 101 and Milpas Street.

This section describes the methodology used to assess the traffic conditions for each of the intersections analyzed in the study, and reports the operating conditions at each, indicating V/C in the case of signalized intersections, average delay in the case of stop-controlled intersections, and LOS for all intersections. This study analyzes and reports the following types of intersections:

- *Plan Santa Barbara* study intersections within the City, and
- Intersections in the adjacent unincorporated communities of Goleta and Montecito which may be affected by traffic generated by future growth within the city of Santa Barbara; and
- Intersections within the boundaries of the City Municipal Airport as well as those within the adjacent city of Goleta that may be affected by future growth within Santa Barbara jurisdiction.

Although there are many signalized intersections within and adjacent to the City, this study focuses on those along major transportation corridors likely to be affected by traffic generated by future growth and development permitted under *Plan Santa Barbara*, particularly those that are currently congested or have the potential to become congested in the future.

3.3.1 LOS Analysis in the City of Santa Barbara

Level of Service is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at LOS A to overloaded conditions at LOS F. LOS C with a V/C ratio of 0.77 or less is the acceptable level of service in the city of Santa Barbara. For unsignalized intersections, LOS C is used as the minimum acceptable LOS.

The city of Santa Barbara uses the "Intersection Capacity Utilization" (ICU) method (Transportation Research Board 1980) of intersection capacity analysis to determine the intersection V/C ratio and corresponding LOS for the given turning movements and intersection characteristics at signalized intersections. Figure 3-2 defines the ranges of V/C ratios and their corresponding LOS using the ICU method.

For unsignalized intersections, the city of Santa Barbara uses the Highway Capacity Manual (HCM) unsignalized intersection methodology (Transportation Research Board 2000) to determine average approach delay and corresponding LOS for the given turning movements and intersection characteristics. Figure 3-3 defines the ranges of average delay and their corresponding LOS using the HCM method.

Figure 3-2: Level of Service Definitions for Signalized Intersections

LOS	V/C	Definition
A	0.000-0.600	EXCELLENT. No Vehicle waits longer than one red light and no approach phase is fully used.
B	0.601-0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701-0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801-0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901-1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Source: Transportation Research Circular No. 212, Interim Materials on Highway Capacity, Transportation Research Board 1980.

Figure 3-3: Level of Service Definitions for Unsignalized Intersections (2000 Highway Capacity Manual Unsignalized Method)

Level of Service	Average Control Delay per Vehicle (seconds)
A	$\leq$ 10.0
B	> 10.0 and $\leq$ 15.0
C	> 15.0 and $\leq$ 25.0
D	> 25.0 and $\leq$ 35.0
E	> 35.0 and $\leq$ 50.0
F	> 50.0

Source: Highway Capacity Manual, Transportation Research Board, 2000.

3.3.2 Plan Santa Barbara Study Intersections

The City Transportation Planning staff, in consultation with Fehr & Peers, selected 52 key intersections in the City for detailed study (refer to Figures 3-4 and 3-5).

Figure 3-4: Year 2008 Weekday Existing Conditions, Plan Santa Barbara Study Intersection Levels of Service

	Intersection	Peak Hour	Existing Conditions Delay or V/C	LOS
1	Olive Mill Road &	AM	13	B
	Coast Village Road [b]	PM	18	C
2	Hot Springs Road &	AM	20	C
	Coast Village Road [b]	PM	25	C
3	Cabrillo Boulevard &	AM	20	C
	U.S. Highway 101 SB Ramp [b]	PM	15	B
4	Milpas Street &	AM	0.367	A
	U.S. Highway 101 SB On Ramp [a]	PM	0.526	A
5	Milpas Street &	AM	0.683	B
	U.S. Highway 101 SB Off Ramp [a]	PM	0.771	C
6	Milpas Street Roundabout [c]	AM	15	B
		PM	14	B
7	Milpas Street &	AM	0.592	A
	Quinientos Street [a]	PM	0.715	C
8	Milpas Street &	AM	0.520	A
	Gutierrez Street [a]	PM	0.582	A
9	Milpas Street &	AM	0.479	A
	Haley Street [a]	PM	0.641	B
10	Cabrillo Boulevard &	AM	0.298	A
	Garden Street [a]	PM	0.370	A
11	Yanonali Street &	AM	0.431	A
	Garden Street [a]	PM	0.491	A
12	U.S. Highway 101 SB Ramps &	AM	0.640	B
	Garden Street [a]	PM	0.929	E
13	U.S. Highway 101 NB Ramps &	AM	0.575	A
	Garden Street [a]	PM	0.748	C
14	Gutierrez Street &	AM	0.675	B
	Garden Street [a]	PM	0.808	D
15	Cabrillo Boulevard &	AM	0.303	A
	State Street [a]	PM	0.420	A
16	Gutierrez Street &	AM	0.288	A
	State Street [a]	PM	0.383	A
17	Cabrillo Boulevard &	AM	0.357	A
	Castillo Street [a]	PM	0.598	A
18	Montecito Street &	AM	0.691	B
	Castillo Street [a]	PM	0.763	C
19	Haley Street &	AM	0.552	A
	Castillo Street [a]	PM	0.784	C
20	Haley Street &	AM	0.538	A
	Bath Street [a]	PM	0.697	B
21	Carrillo Street &	AM	0.474	A
	Anacapa Street [a]	PM	0.618	B
22	Carrillo Street &	AM	0.445	A
	Chapala Street [a]	PM	0.635	B
23	Carrillo Street &	AM	0.551	A
	De la Vina Street [a]	PM	0.636	B
24	Carrillo Street &	AM	0.551	A
	Bath Street [a]	PM	0.540	A
25	Carrillo Street &	AM	0.664	B
	Castillo Street [a]	PM	0.666	B
26	Carrillo Street &	AM	0.773	C
	U.S. Highway 101 NB Ramp [a]	PM	0.842	D
27	Carrillo Street &	AM	1.023	F
	U.S. Highway 101 SB Ramp [a]	PM	0.962	E
28	Carrillo Street &	AM	0.682	B
	San Andres Street [a]	PM	0.755	C
29	Micheltorena Street &	AM	0.608	B
	San Andres Street [a]	PM	0.613	B
30	Mission Street &	AM	27	D
	Modoc Road [b]	PM	29	D
31	Mission Street &	AM	0.938	E
	U.S. Highway 101 SB Ramps [a]	PM	0.969	E
32	Mission Street &	AM	0.858	D
	U.S. Highway 101 NB Ramps [a]	PM	0.812	D
33	Mission Street &	AM	0.512	A
	Castillo Street [a]	PM	0.554	A
34	Mission Street &	AM	0.556	A
	Bath Street [a]	PM	0.606	B
35	Mission Street &	AM	0.524	A
	De la Vina Street [a]	PM	0.558	A
36	Mission Street &	AM	0.719	C
	State Street [a]	PM	0.697	B
37	Meigs Road &	AM	0.621	B
	Cliff Drive [a]	PM	0.688	B
38	Las Positas Road &	AM	30	D
	Cliff Drive [b]	PM	23	C
39	Las Positas Road &	AM	0.671	B
	Modoc Road [a]	PM	0.730	C
40	Las Positas Road &	AM	0.812	D
	U.S. Highway 101 SB Ramps [a]	PM	0.947	E
41	U.S. Highway 101 NB Ramp &	AM	0.798	C
	Calle Real [a]	PM	0.683	B
42	Alamar Avenue &	AM	0.495	A
	State Street [a]	PM	0.563	A
43	De la Vina Street &	AM	0.465	A
	State Street [a]	PM	0.535	A
44	Las Positas Road &	AM	0.637	B
	State Street [a]	PM	0.772	C
45	Hitchcock Way &	AM	0.477	A
	State Street [a]	PM	0.671	B
46	Hope Avenue &	AM	0.511	A
	State Street [a]	PM	0.661	B
47	La Cumbre Road &	AM	0.600	A
	State Street [a]	PM	0.853	D
48	Hope Avenue &	AM	0.589	A
	U.S. Highway 101 NB Ramp/Calle Real [a]	PM	0.765	C
49	La Cumbre Road &	AM	0.605	B
	U.S. Highway 101 SB Ramps [a]	PM	0.668	B
50	La Cumbre Road &	AM	0.539	A
	Calle Real [a]	PM	0.663	B
51	SR 154 &	AM	0.531	A
	Calle Real [a]	PM	0.730	C
52	SR 154 &	AM	0.417	A
	U.S. Highway 101 SB On Ramp [a]	PM	0.400	A

[a] Intersection is controlled by signal and uses ICU methodology
[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology
[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- 34000 Average Daily Traffic (ADT) Count and Location

Level of Service (LOS)
- A – B
- C
- D
- E
- F
- No Data

Intersection LOS Peak Hour
AM → ◐ ← PM

Sources: Fehr & Peers 2008; Envicon Corp. 2007, *Santa Barbara Botanic Garden Vital Mission Plan DEIR*; SAIC 2006, *Saint Athanasius Antiochian Orthodox Church Complex FEIR*; SBCAG 2007, *Santa Barbara County Congestion Management Program*; Caltrans 2007, *2006 Traffic Volumes on California State Highways*; County of Santa Barbara 2007, *County of Santa Barbara 2006 Roadway Traffic Volumes*; County of Santa Barbara 2006, *Westmont College Master Plan FSEIR*; Crawford Multari & Clark Associates 2008, *UCSB Long Range Development Plan DEIR*.

Figure 3-5 Level of Service and Average Daily Traffic Volumes

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Fehr and Peers

SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

Scale: 1" = 1,800'

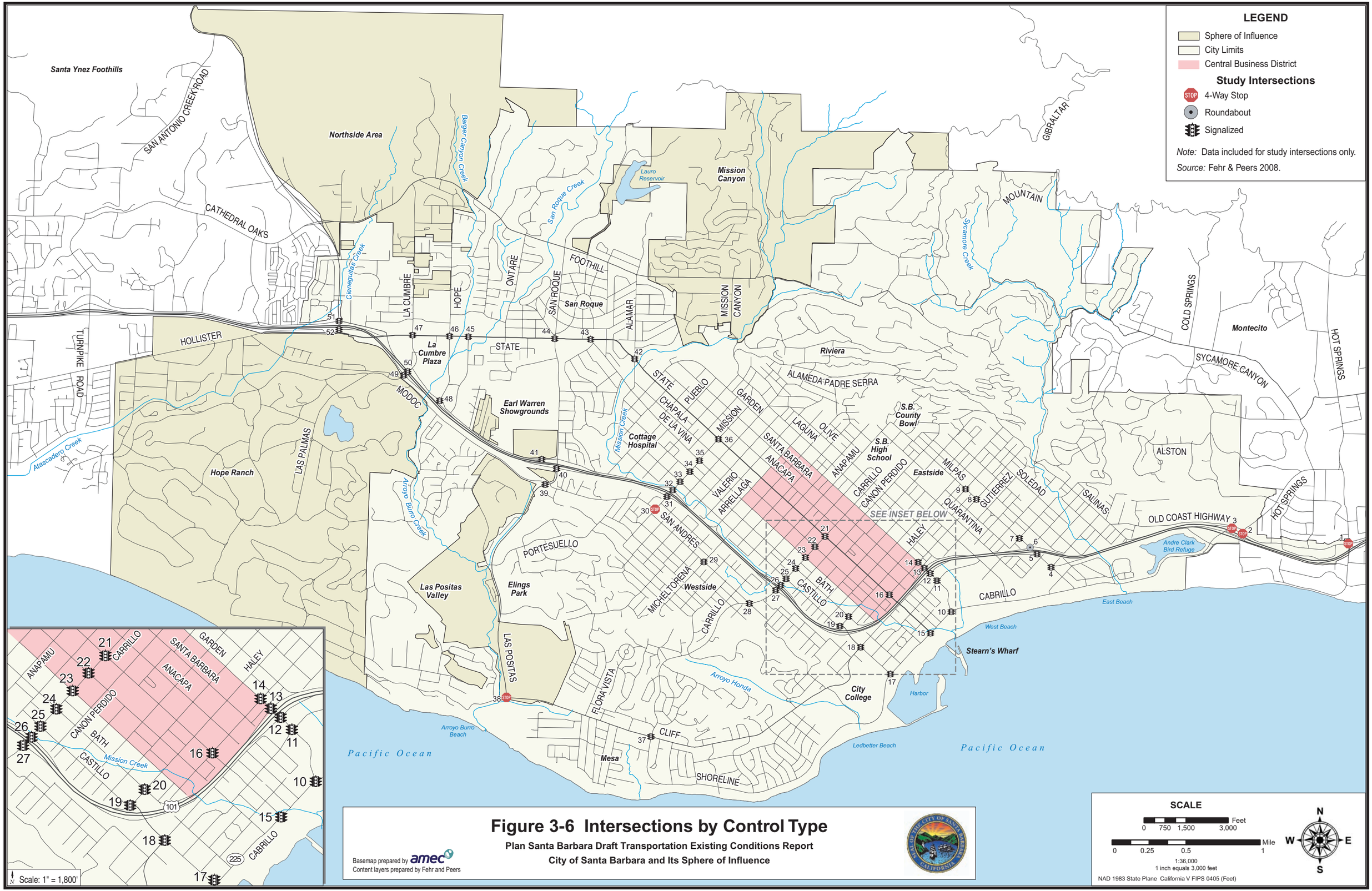


Figure 3-6 Intersections by Control Type

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Fehr and Peers

These intersections were selected based on existing congestion as identified in previous studies or by City staff, location along key arterials or corridors and/or potential to be affected by future growth and development associated with Plan Santa Barbara. Weekday morning and evening peak period traffic counts (7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.) were conducted at each of the study intersections between Tuesday, March 11 and Thursday, March 13, 2008. Peak periods coincide with heaviest commute hours, and the peak one hour within the peak period is used to define maximum congestion levels at intersections. These counts were used to analyze operating conditions at the Plan Santa Barbara study intersections. A list of the Plan Santa Barbara study intersections with the results of the LOS analysis is provided in Figure 3-4, and LOS is graphically represented in Figure 3-5.

Traffic data collection is an exercise in sampling. Significant singular events, such as a traffic collision or Santa Barbara's annual Fiesta, or common broader events, such as holidays and school vacations, will have a noticeable impact on traffic flow. Collective minor variations in the everyday routines of the City's populace should not be overlooked, however, as they can cause traffic volumes to vary considerably from their daily and weekly historic averages, often as much as 10-15%. Such variations may affect intersections such as those near City College (e.g., Castillo/Montecito streets) where congestion may vary depending upon the time of year, with higher congestion levels associated with the start of the semester or finals and lower levels at other times.

The *Plan Santa Barbara* count program was conducted to minimize the effects that major foreseeable events, such as school spring breaks, would have on the results. However, certain intersections may appear to have a better or worse LOS than previous analysis because of daily fluctuation in traffic.

As shown in Figure 3-7, the following intersections are currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours. The greatest levels of congestion are generally found at freeway interchanges or intersections approaching freeway interchanges.

Figure 3-7: Plan Santa Barbara Study Intersections Currently Operating with a Peak Hour V/C of 0:77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Milpas St	U.S. Highway 101 SB Off Ramp	PM
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	Both
Carrillo St	U.S. Highway 101 SB Ramp	Both
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	AM [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State St	PM
La Cumbre Rd	State St	PM

Note: [a] For unsignalized intersections, LOS C was taken as the minimum acceptable LOS.

3.3.3 Nearby Intersections

Santa Barbara is generally bordered by unincorporated County communities; to the east is the semi-rural community of Montecito and to the west are the more urban neighborhoods of the eastern Goleta Valley and the city of Goleta. Traffic generated within the City uses a number of the arterials and key intersections in these boundary areas, and growth permitted under *Plan Santa Barbara* could add to congestion at these facilities. As a result, the consultant team conferred with County and City staff and identified those boundary area intersections with the highest potential to be affected by traffic generated by growth and development permitted under *Plan Santa Barbara*.

Intersections in the boundary and airport area were not subject to new traffic counts by the project team. Rather, this study primarily relies on data obtained from existing sources, including recent traffic counts and LOS analysis performed by SBCAG for CMP monitoring, and traffic counts and LOS analysis from a number of recent EIRs prepared for development projects in these areas. The majority of these intersections generally operate at acceptable levels of service, a V/C ratio of 0.77 or less, during the P.M. peak hour (refer to Figures 3-6 and 3-10).

As shown in Figure 3-8, one nearby intersection is currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours.

Figure 3-8: Nearby Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Mission Canyon Rd	Foothill Road	PM [a]

Note: [a] For unsignalized intersections, LOS C was taken as the minimum acceptable LOS.

3.3.4 Airport Area Intersections

The City's municipal airport is surrounded by the incorporated city of Goleta. Future growth and development at the airport and adjacent Commercial/Industrial Specific Plan, although not a primary focus of *Plan Santa Barbara*, has the potential to affect both airport and city of Goleta intersections. As a result, the consultant team conferred with staff from Santa Barbara County, the city of Goleta, and the city of Santa Barbara to identify those airport area intersections with the highest potential to be affected by traffic generated by growth and development permitted at the airport.

Intersections in the area were not subject to new traffic counts by the project team. Rather, this study relies on data obtained from the recent *University of California Santa Barbara (UCSB) Long Range Development Plan DEIR* (March, 2008), which studied surface street intersection operating conditions during the p.m. peak period and freeway ramp operating conditions during both the a.m. and p.m. peak periods. Arterial roadways and intersections surrounding the airport experience relatively high traffic volumes and associated congestion, with seven intersections that exceed the City's standard of V/C ratio 0.77/ LOS C (refer to Figure 3-10).

As shown in Figure 3-9, several airport area intersections are currently operating with a V/C ratio of 0.77 or greater during one or both of the peak hours.

Figure 3-9: Airport Area Intersections Currently Operating with a Peak Hour V/C of 0.77 or Greater

North/South Street	East/West Street	Peak Hour with V/C 0.77 or Greater
Storke Rd	Hollister Av	PM
Storke Rd	U.S. Highway 101 NB Ramps	Both
Storke Rd	U.S. Highway 101 SB Ramps	Both
Los Carneros Rd	U.S. Highway 101 NB Ramps	PM
Los Carneros Rd	U.S. Highway 101 SB Ramps	PM
Fairview Av	U.S. Highway 101 NB Ramps	Both
Fairview Av	U.S. Highway 101 SB Ramps	PM

3.4 Existing Roadway Segment Traffic Volumes

Daily traffic counts for 25 roadway segments were conducted as part of this study of existing conditions. In addition, daily traffic counts outside the City in or near the City's sphere of influence were collected from a variety of sources, including the Santa Barbara County Count Program and various EIRs. Daily traffic volumes for the U.S. Highway 101, State Route (SR) 154, and sections of SR 192 were collected from Caltrans. Daily traffic volumes are illustrated in Figures 3-4 and 3-5.

The volume maps illustrate the large number of regional trips entering and leaving Santa Barbara. The greatest volumes on the freeway occur between downtown and the medical district, the area with the largest concentration of employment in the City. Surface streets also illustrate this pattern, with the volumes increasing as the observed route approaches the freeway.

3.4.1 Surface Streets

Within the city of Santa Barbara, daily traffic volumes range from a high of 32,440 vehicles on Carrillo Street northeast of U.S. Highway 101 to a low of 4,170 vehicles on Loma Alta Drive north of Colonel Street. The street segments with the greatest traffic volumes are typically those approaching U.S. Highway 101 interchanges, with Mission Street and Carrillo Street carrying more than 30,000 vehicles per day, and Las Positas Road, Garden Street, and Milpas Street carrying more than 20,000 vehicles per day.

Just outside the City limits, Hollister Avenue west of Modoc Road carries 17,780 vehicles per day, while La Cumbre Road south of SR 192 carries 4,850 vehicles per day.

3.4.2 Freeways and State Highways

U.S. Highway 101 is the only freeway within the Santa Barbara City limits. In Santa Barbara the volumes range from a high of 133,000 vehicles per day between Mission Street and Las Positas Road (which is also the highest volume in the greater Santa Barbara area), to a low of 85,000 vehicles per day between Olive Mill Road and Coast Village Road/Cabrillo Boulevard.

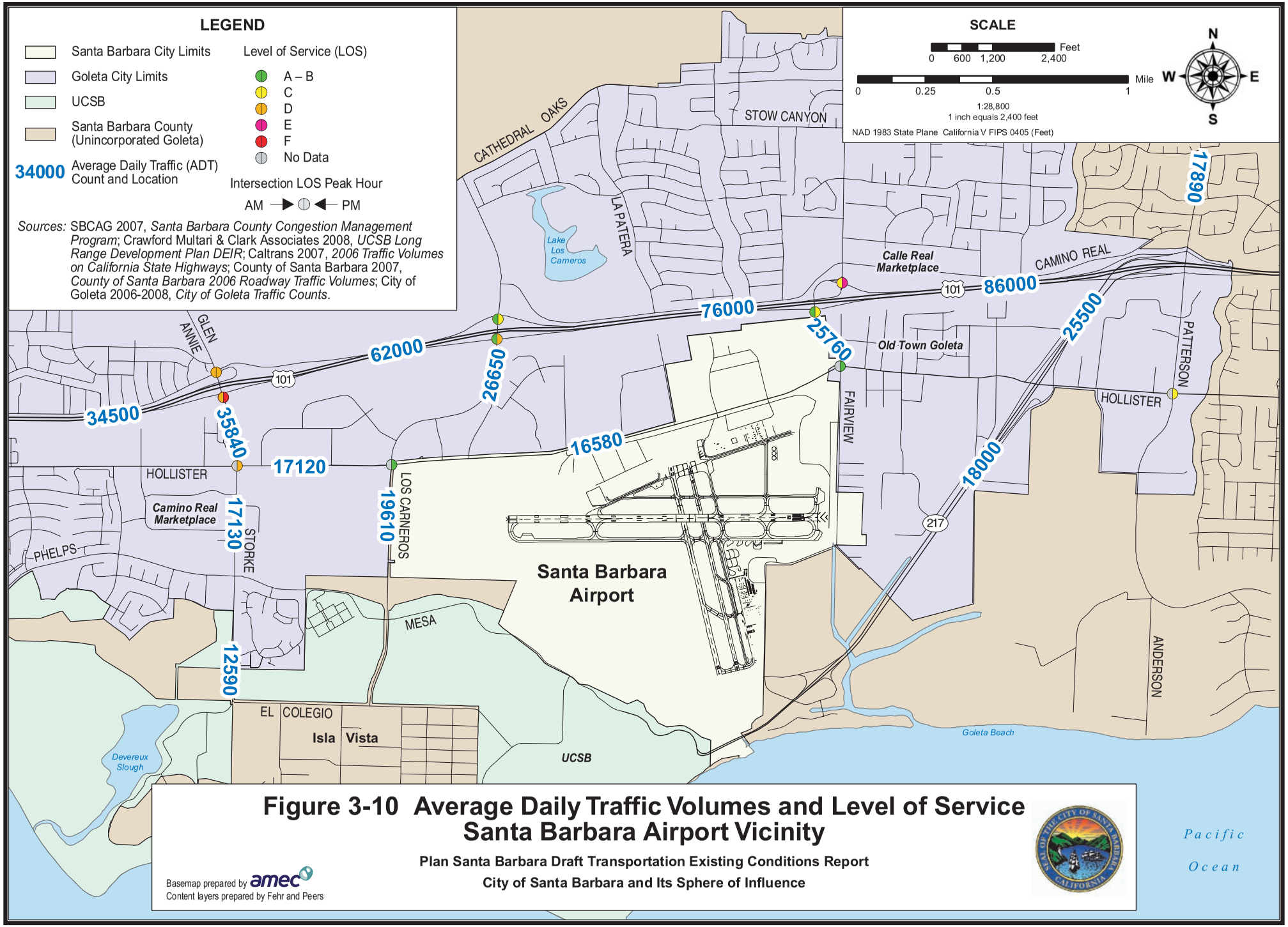


Figure 3-10 Average Daily Traffic Volumes and Level of Service Santa Barbara Airport Vicinity

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Content layers prepared by Fehr and Peers

When approaching Santa Barbara from the north, volumes on U.S. Highway 101 increase continuously as they approach Las Positas Road to Mission Street segment. Coming from the south, volumes generally increase as they approach downtown, decrease briefly after the Garden Street interchange and increase again leading into the Mission Street to Las Positas Road segment.

Just inside the City limits, SR 154 carries 18,000 vehicles per day south of the junction with SR 192, and SR 192 carries 15,060 vehicles per day just east of the junction with SR 154 (refer to Figure 3-5).

3.5 Currently Programmed Roadway Improvements

Currently funded major roadway improvements in the City are centered on and around U.S. Highway 101 between Milpas Street and Hot Springs Road. This project will construct an additional lane of travel on the freeway in each direction and reconfigure certain freeway ramps and nearby intersections to improve traffic flow through the area. Construction began in June 2008 and will be completed in 2012. The project will proceed in four stages, detailed below[6]:

Stage 1 (2008-2009)
1. Replace Milpas bridges
2. Milpas off-ramp improvements
3. Southbound Milpas hook off-ramp
4. Replace Sycamore creek bridge
5. Cabrillo to Salinas merge lane
6. Tennis stadium sound wall
7. Third southbound lane
8. Old Coast Highway sidewalk
9. Montecito Roundabout (Old Coast Hwy/Hot Springs Road/Coast Village Road)
10. Multipurpose path

Stage 2 (2009-2010)
11. Third southbound lane over Milpas
12. Cacique under crossing
13. Close southbound on-ramp

Stage 3 (2010-2011)
14. Salinas to Alisos sound wall
15. Third northbound lane from Salinas to Milpas

Stage 4 (2011-2012)
16. Third northbound lane over Milpas
17. Connect Cacique Street
18. Multipurpose path

This project will help relieve a notable choke point for traffic entering and exiting Santa Barbara from the south by increasing capacity on the freeway and improving flow on roadways leading to freeway ramps. This project will be built with funds from Measure D. For a detailed discussion of Measure D see section 10.1 of this report.

In addition to this major freeway widening project, additional funded projects currently under construction include the addition of a new lane to the northbound onramp onto US Highway 101 at Carrillo Street and safety improvements to the Mission Street US Highway 101 underpass which include sidewalk and bike path improvements. Frontage improvements to the entire length of Cliff Drive (SR 225) are also planned and designed to bring this four lane road up to current standards prior to the State relinquishing ownership to the city of Santa Barbara.

3.6 Key Issues and Opportunities

3.6.1 Regional Automobile Travel

The high demand for regional travel, and its associated strain on the local and regional road network, is the most significant transportation challenge facing the city of Santa Barbara in developing future land uses, goals and policies for *Plan Santa Barbara*. The greatest demand for roadway facilities in the city of Santa Barbara is generally approaching freeway interchanges, and traveling on the freeway itself. This pattern of traffic suggests that a great deal of the travel in the city of Santa Barbara is regional in nature.

This regional travel demand is related to both commuting within the South Coast, and between the South Coast and outlying housing market areas (e.g., Ventura County). Within the South Coast, regional travel involves commutes between the City and employment opportunities at UCSB and Goleta industrial parks, inbound commutes from other South Coast communities to employment in the City, particularly within downtown, and more specialized trips such as travel from student housing in Isla Vista to City College. Although precise data for the City is unavailable, regional commuting into the South Coast from Ventura, Santa Ynez, Lompoc and Santa Maria is estimated to involve approximately 25,000 daily trips by automobile (refer to Figure 2-4). Both travel within the South Coast and regional commuting are related to the high cost of housing in the City combined with the large number of jobs.

[6] Detailed construction project staging information taken from SBroads.com, June, 2008.

3.6.2 Local Automobile Travel

Within the City, traffic congestion on surface streets arises from two principal sources. While the experience for the motorist is largely the same – delay, and in some cases stop-and-go traffic – the source of the problem and potential solutions are quite different.

First, demand for regional travel leads to high volumes on roadways approaching the freeway, mainly during peak commuting periods. The congestion experienced on these roadways results primarily from demand that exceeds the available capacity. This sort of congestion is seen on roadway segments such as Carrillo Street between Chapala Street and the freeway, and Milpas Street as it approaches the freeway.

The second source of congestion on surface streets in the City results from design issues. Disconnected local streets such as cul-de-sacs force more local traffic onto larger through-streets, while frequent driveways and traffic signals, and conflicts between pedestrians and automobiles can all create friction and slow traffic flow, effectively lowering the carrying capacity of the roadway. In this case, excess demand is not the problem, but drivers with different purposes interacting on the same roadway facility that is well equipped to handle one purpose or another, but not all simultaneously. This sort of problem is seen most clearly on Upper State Street and is well documented in the *Upper State Street Study* (City of Santa Barbara 2007).

3.6.3 Development Review

The current development review process, as it relates to automobile traffic, creates a substantial barrier to new development in areas with existing traffic congestion. The unintended and potentially counter-productive consequences that this sort of impact criteria can have are highlighted in the Constraints section of Chapter 11 of the 1998 Circulation Element, and are quoted below:

- *The current method for determining traffic impacts acts as a constraint to development in areas where intersections are at or near the maximum allowable capacity. Impacted intersections are typically located near freeway on/off-ramps, Downtown, or near commercial centers. Ironically, it is these compact and higher density areas that will most easily facilitate transit and alternate modes of transportation. In addition, the inability of small businesses to expand in locations at or near impacted intersections may result in the relocation of those businesses to lower density or outlying areas that may not be as suitable for alternative modes of transportation. This will, in turn, increase the reliance on the automobile in these areas and possibly contribute to a sprawling development pattern. In addition, the charter section requirement that new development occur only where it does not cause a significant and unmitigated adverse impact on traffic also acts as a constraint. Traditionally, the methods to mitigate traffic impacts involved improvements to streets, such as street widening, turn lanes, or striping. In a city such as Santa Barbara that is mostly developed, many of these mitigation methods may no longer be feasible or desirable.*[7]

3.6.3.1 Opportunities

Demand for transportation is rooted in land use patterns. Certain patterns will result in a higher demand for longer distance automobile transportation. Congestion from this type of travel pattern may be relieved by increasing roadway supply, such as expanding roadway facilities. However, this approach may not solve the problem entirely and the steps necessary to do so may not be desirable or economically feasible. It may also be necessary to manage the demand for automobile use with a variety of land use changes and Transportation Demand Management (TDM) programs, which encourage alternative modes of transportation. Protecting and enhancing the quality of life in Santa Barbara is related to maintaining mobility and mobility options. A combination of local efforts and regional initiatives will be necessary to maintain and improve Santa Barbara's mobility, including:

- Consideration of new land use patterns and development trends to provide appropriate housing in close proximity to traffic generators or attractors such as employment, shopping, education and entertainment. This may require changes in both historic and recent development trends, including development of mixed use projects geared towards Santa Barbara's workforce, development of more rental and affordable housing (e.g., smaller units) within walking distance of downtown, and provision of employee or student housing near employment or educational centers.
- Consideration of other urban design variables that promote walking and bicycling while reducing vehicular traffic friction. Where possible, such measures may include; parking accessed from alleys as opposed to frequent sidewalk curb cuts,

[7] Excerpted from Chapter 11: Traffic Standards from the City of Santa Barbara General Plan Circulation Element. City of Santa Barbara, 1998.

connecting residential streets and decreasing the number of cul-de-sacs.

- Continued improvements in both local and regional transit to increase service frequency and convenience to attract more non-transit dependent riders.
- Consideration of improvements or adjustments to existing TDM and parking programs to encourage and foster transportation choices that relieve roadway congestion.
- Completion of key regional transportation improvements, such as those planned for the U.S. Highway 101 corridor or companion rail and regional bus service improvements.

4 PUBLIC TRANSIT

4.1 Overview

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Key aspects of Santa Barbara's transit service relevant to this project are summarized below. Background information for reference is illustrated in the following maps:

- Population densities for Santa Barbara and the region are shown in Figure 4-2.
- Employment densities for Santa Barbara and the region are shown in Figure 4-3.
- Local MTD transit routes and regional routes serving Santa Barbara are shown in Figure 4-4.
- Regional public transit routes are shown in Figure 4-5.
- Private transit carriers are shown in Figure 4-6.
- Ridership for the top 5 local transit routes and regional routes serving Santa Barbara are shown in Figure 4-7.

4.2 Fixed-Route Transit Service

4.2.1 MTD

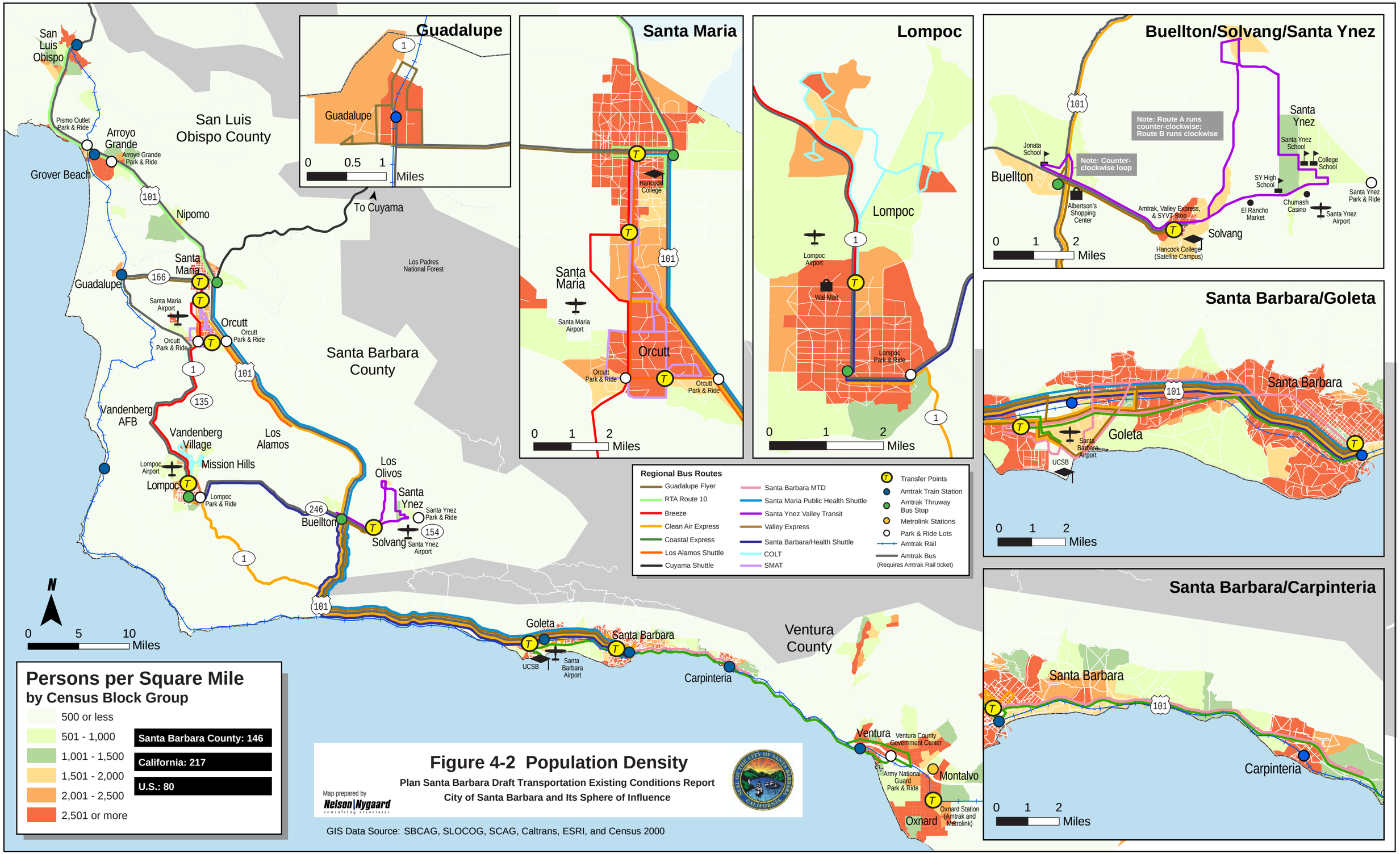
Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles. MTD operates weekdays from 5:25 am to midnight, 6:00 am to 11:20 pm Saturdays, and 6:20 am to 10:00 pm on Sunday. The Federal Transit Administration recognizes Santa Barbara as a small Transit-intensive Community, with an especially high level of transit service and ridership for a small city. As of FY 2007, MTD provided about 7.5 million rides annually. This level of ridership is very strong for a community of this size, which normally represents the ridership of a region with ten times the population of MTD's service area.

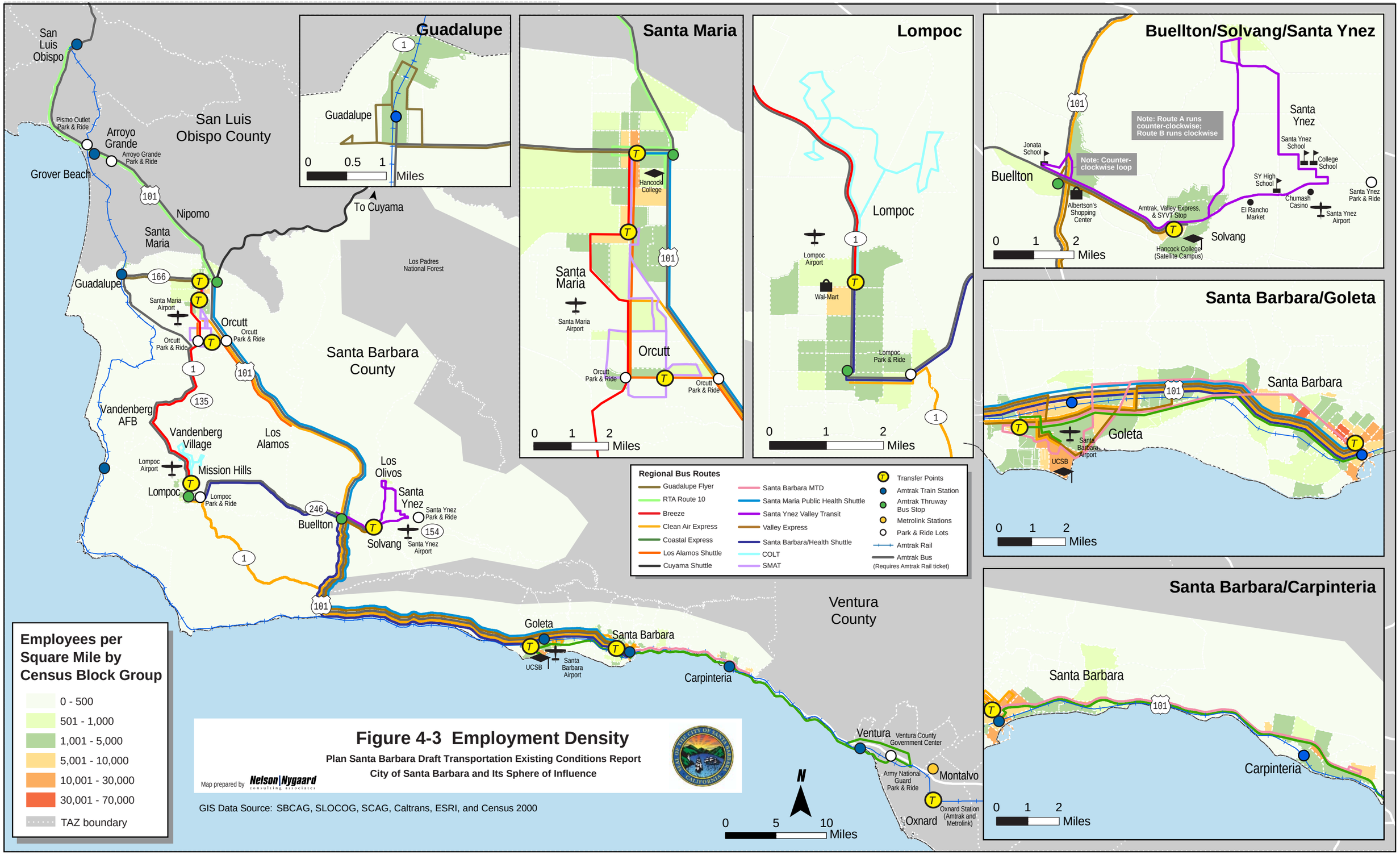
MTD on-time performance (as measured at the Downtown Transit Center) is approximately 95%, which is considered to be a very successful performance level. A GPS system coming online in the next few months will allow MTD to track on-time performance system-wide.[8] Within the MTD system, routes 1, 2, 6, 11, and the 24 Express have the highest ridership (refer to Figure 4-1).

Figure 4-1: Fares for Santa Barbara MTD Fixed-Route Transit Services

Fare Type	Price
Cash Fares	
Regular One-Way Fare	$1.25
Seaside Shuttle	$0.25
Downtown-Waterfront	$0.25
Valley Express	$4.00
Seniors (age 62 and over)	$0.60
ADA and Persons with Disabilities	$0.60
Persons who are blind	Free
Children (45 inches or less)	Free
UCSB/SBCC Students	Free
10-Ride Pass	
Adult	$10.00
Youth (K-12)	$7.50 (valid Monday - Friday)
Seniors and Persons with Disabilities	$5.00
Medicare Cardholders	$5.00
Santa Ynez Valley Express	$35.00
ADA Complementary Paratransit	$20.00 (service operated by Easy Lift)
Unlimited 30-Day Pass	
Adult	$41.00
Youth (K-12)	$32.00
Seniors and Persons with Disabilities	$18.00
Medicare Cardholders	$18.00
Santa Ynez Valley Express	$120.00 (includes regular local services)
ADA Complementary Paratransit	Not Available

[8] Santa Barbara Metropolitan Transit District website (http://www.sbmtd.gov), MTD Short Range Transit Plan: FY 2006 to FY 2010, and interviews with MTD staff.


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc Airport
Wal-Mart
Lompoc
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Solvang
Hancock College (Satellite Campus)
El Rancho Market
Chumash Casino
Santa Ynez
Santa Ynez School
College School
SY High School
Santa Ynez Park & Ride
Santa Ynez Airport
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Los Padres National Forest
Santa Barbara County
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
N
0 5 10 Miles
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Persons per Square Mile
by Census Block Group
500 or less
501 - 1,000
1,001 - 1,500
1,501 - 2,000
2,001 - 2,500
2,501 or more
Santa Barbara County: 146
California: 217
U.S.: 80
Figure 4-2 Population Density
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard
consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000


Guadalupe
Guadalupe
0 0.5 1 Miles
To Cuyama
Santa Maria
Hancock College
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Orcutt Park & Ride
0 1 2 Miles
Lompoc
Lompoc Airport
Wal-Mart
Lompoc Park & Ride
0 1 2 Miles
Buellton/Solvang/Santa Ynez
Note: Route A runs counter-clockwise; Route B runs clockwise
Note: Counter-clockwise loop
Jonata School
Buellton
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Hancock College (Satellite Campus)
Solvang
El Rancho Market
Chumash Casino
SY High School
Santa Ynez School
College School
Santa Ynez
Santa Ynez Airport
Santa Ynez Park & Ride
0 1 2 Miles
Santa Barbara/Goleta
Santa Barbara
Goleta
Santa Barbara Airport
UCSB
0 1 2 Miles
Santa Barbara/Carpinteria
Santa Barbara
Carpinteria
0 1 2 Miles
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Santa Maria
Guadalupe
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Orcutt Park & Ride
Los Padres National Forest
Santa Barbara County
Vandenberg AFB
Vandenberg Village
Los Alamos
Lompoc Airport
Mission Hills
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Goleta
Santa Barbara
UCSB
Santa Barbara Airport
Carpinteria
Ventura
Ventura County Government Center
Army National Guard Park & Ride
Montalvo
Oxnard
Oxnard Station (Amtrak and Metrolink)
Ventura County
Regional Bus Routes
Guadalupe Flyer
RTA Route 10
Breeze
Clean Air Express
Coastal Express
Los Alamos Shuttle
Cuyama Shuttle
Santa Barbara MTD
Santa Maria Public Health Shuttle
Santa Ynez Valley Transit
Valley Express
Santa Barbara/Health Shuttle
COLT
SMAT
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Park & Ride Lots
Amtrak Rail
Amtrak Bus
(Requires Amtrak Rail ticket)
Employees per Square Mile by Census Block Group
0 - 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 30,000
30,001 - 70,000
TAZ boundary
Figure 4-3 Employment Density
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by Nelson|Nygaard consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000
N
0 5 10 Miles

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- T Downtown Transit Center
- A Amtrak Station

MTD Bus Routes

1	West – San Andres	25	Ellwood
2	East – Milpas/Salinas	27	UCSB Shuttle
3	Oak Park Shuttle	32	Harbor Waterfront Shuttle
4	Mesa Loop	36	Seaside Winter Shuttle
5	Mesa/La Cumbre Connection	37	Crosstown Shuttle
6	State/Hollister	50	Carrillo Lot Shuttle
8	Health Care Link	81	SYVE CoHealth/SBCH/ SBCC
9	Old Town Goleta Shuttle	82	SYVE Hollister Avenue
10	Cathedral Oaks	83	SYVE UCSB
11	Downtown/UCSB	84	SYVE Downtown SB
16	City College Shuttle	12X	Goleta Express
17	SBCC/Mesa to Downtown	15X	SBCC/UCSB Express
20	Carpinteria	21X	Carpinteria Express
22	Old Mission	24X	UCSB Express
23	Winchester Canyon		

Sources: Santa Barbara MTD; SBCAG; VISTA; Pacific Surfliner, *Bus Route Maps.*

To Goleta, Santa Maria, and Solvang

Northside Area
Bargar Canyon Creek
Cieneguitas Creek
San Roque Creek
Lauro Reservoir
Mission Canyon
La Cumbre Plaza
Earl Warren Showgrounds
Cottage Hospital
Sansum
Hope Ranch
Las Positas Valley
Elings Park
Westside
Eastside
Riviera
Montecito
Alston
Mesa
Arroyo Burro Beach
Atascadero Creek
Arroyo Burro Creek
Arroyo Honda
Andre Clark Bird Refuge
East Beach
West Beach
Stearn's Wharf
Harbor
Ledbetter Beach
City College
S.B. County Bowl
S.B. County Admin.
S.B. High School
City Hall
Paseo Nuevo
Pacific Ocean

101 192 225 217

HOLLISTER TURNPIKE ROAD MODOC LA CUMBRE HOPE ONTARE SAN ROQUE FOOTHILL ALAMAR MISSION CANYON STATE PUEBLO CHAPALA DE LA VINA GARDEN LAGUNA MISSION ANACAPA SANTA BARBARA ALAMEDA PADRE SERRA ANAPAMU CARRILLO CANON PERDIDO OLIVE MILPAS GUTIERREZ SOLEDAD SALINAS QUARANTINA HALEY COTA DE LA GUERRA FIGUEROA ARRELLAGA MICHELTORENA BATH CASTILLO SAN ANDRES LAS PALMAS PORTESUELLO LAS POSITAS FLORA VISTA CLIFF SHORELINE SYCAMORE CANYON HOT SPRINGS OLD COAST HIGHWAY To Ventura CABRILLO

SEE INSET ABOVE

Inset: City of Goleta

City of Goleta
HOLLISTER
FAIRVIEW
LOS CARNEROS
MESA
Santa Barbara Airport
UCSB
Inset map same scale as main map

Inset: S.B. High School / S.B. County Admin. / Paseo Nuevo / City Hall

Scale: 1" = 1,800'

REGIONAL SERVICE:

Valley Express
Santa Barbara Transit Center to/from Solvang, via 101

Clean Air Express
Santa Barbara Transit Center to/from Santa Maria, via 101

Coastal Express
Goleta – Santa Barbara Transit Center – Ventura, via 101

SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

Figure 4-4 Local and Regional Public Transit Routes

Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

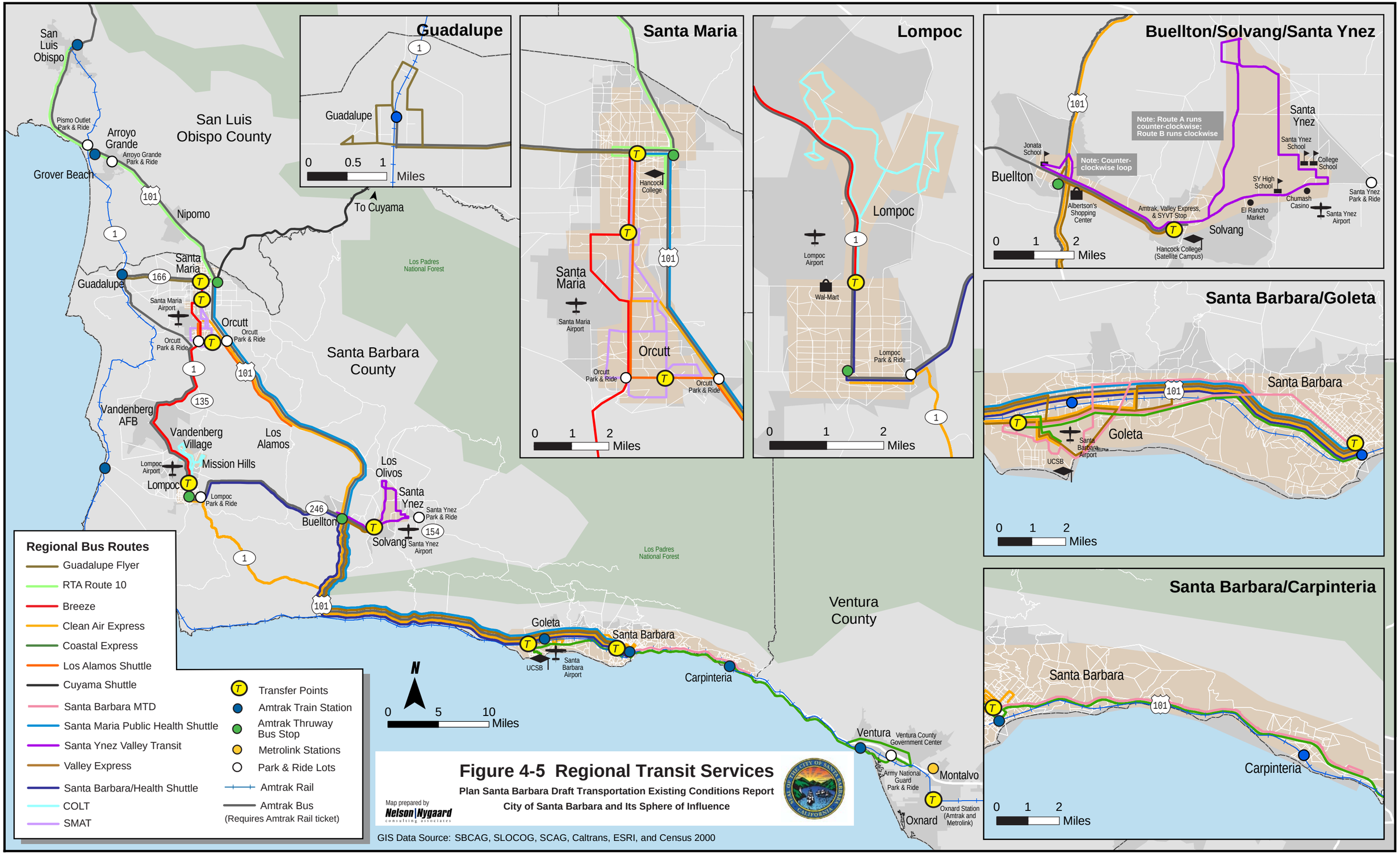


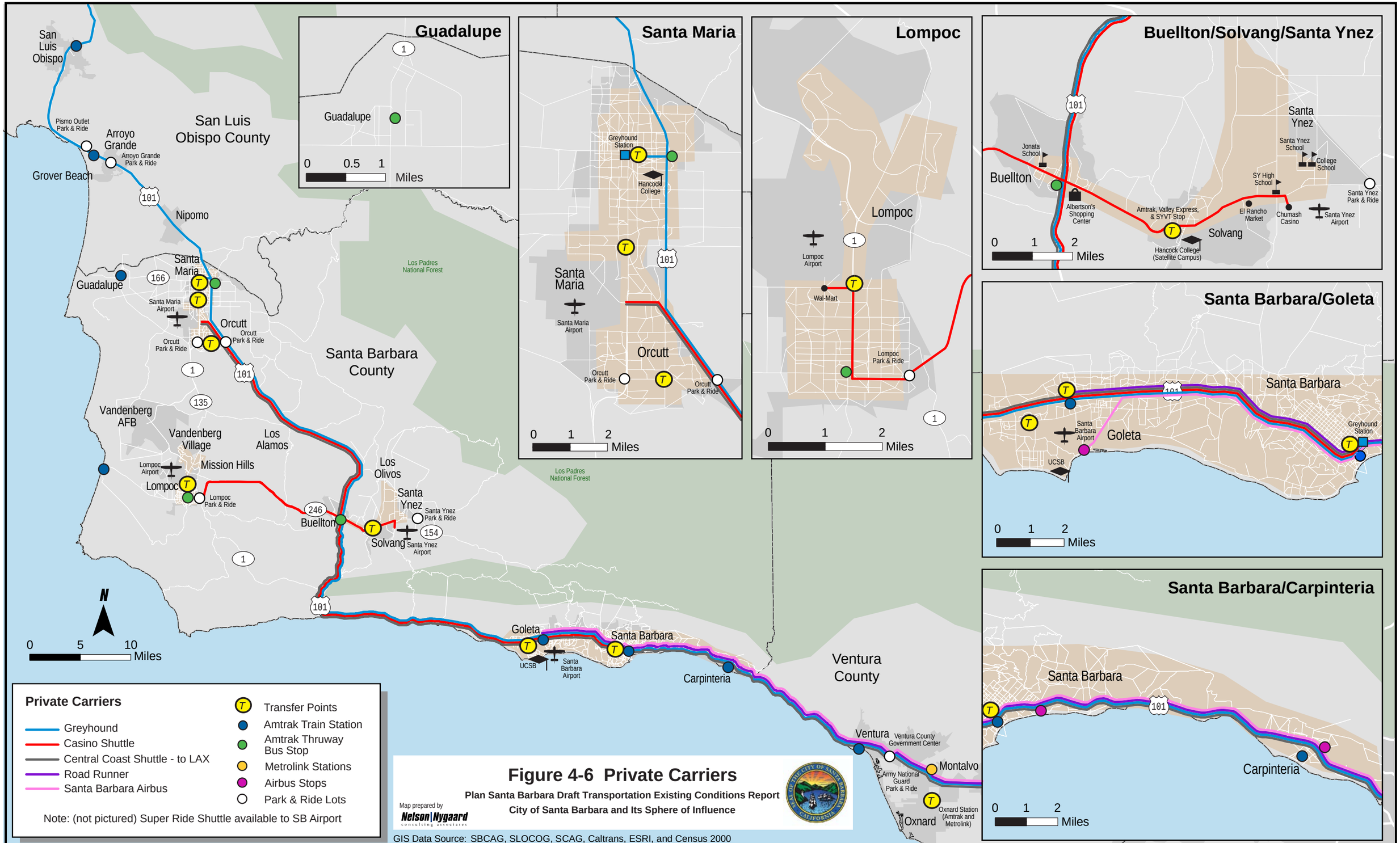
Figure 4-5 Regional Transit Services

Plan Santa Barbara Draft Transportation Existing Conditions Report

City of Santa Barbara and Its Sphere of Influence

Map prepared by Nelson\Nygaard consulting associates

GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000


Guadalupe
Santa Maria
Lompoc
Buellton/Solvang/Santa Ynez
Santa Barbara/Goleta
Santa Barbara/Carpinteria
San Luis Obispo
Pismo Outlet Park & Ride
Arroyo Grande
Arroyo Grande Park & Ride
Grover Beach
San Luis Obispo County
Nipomo
Guadalupe
Santa Maria
Santa Maria Airport
Orcutt
Orcutt Park & Ride
Santa Barbara County
Vandenberg AFB
Vandenberg Village
Los Alamos
Mission Hills
Lompoc Airport
Lompoc
Lompoc Park & Ride
Los Olivos
Santa Ynez
Santa Ynez Park & Ride
Buellton
Solvang
Santa Ynez Airport
Los Padres National Forest
Greyhound Station
Hancock College
Wal-Mart
Lompoc Park & Ride
Jonata School
Albertson's Shopping Center
Amtrak, Valley Express, & SYVT Stop
Hancock College (Satellite Campus)
El Rancho Market
Chumash Casino
SY High School
Santa Ynez School
College School
Goleta
Santa Barbara
Santa Barbara Airport
UCSB
Carpinteria
Ventura County
Ventura
Ventura County Government Center
Montalvo
Army National Guard Park & Ride
Oxnard
Oxnard Station (Amtrak and Metrolink)
0 5 10 Miles
0 0.5 1 Miles
0 1 2 Miles
N
Private Carriers
Greyhound
Casino Shuttle
Central Coast Shuttle - to LAX
Road Runner
Santa Barbara Airbus
Transfer Points
Amtrak Train Station
Amtrak Thruway Bus Stop
Metrolink Stations
Airbus Stops
Park & Ride Lots
Note: (not pictured) Super Ride Shuttle available to SB Airport
Figure 4-6 Private Carriers
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by
Nelson|Nygaard consulting associates
GIS Data Source: SBCAG, SLOCOG, SCAG, Caltrans, ESRI, and Census 2000

Route 11 – State/Hollister/UCSB/Airport
Total Passengers - 978,724
Main Streets of Route – Hollister & State
Annual Trips – 26,963

Route 6 – State/Hollister/Goleta
Total Passengers - 794,481
Main Streets of Route – Hollister & State
Annual Trips – 20,234

Route 2 – Eastside
Total Passengers - 712,794
Main Streets of Route – Anapamu & Milpas
Annual Trips – 41,007

Route 24X – UCSB Express
Total Passengers - 484,521
Main Streets of Route – Hollister & El Colegio
Annual Trips – 18,154

Route 1 – Westside
Total Passengers - 500,638
Main Streets of Route – San Andres & Carrillo
Annual Trips – 38,814

LEGEND

- Sphere of Influence
- City Limits
- Central Business District
- (T) Downtown Transit Center
- (A) Amtrak Station

Sources: Santa Barbara MTD 2007; SBCAG Traffic Solutions 2007.

Figure 4-7 Ridership for Local and Regional Public Transit (FY 2007)

Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

SCALE

0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)

N W E S

MTD operates several specialized services, in addition to its standard fixed-route service, including the Seaside Shuttle and the Downtown-Waterfront shuttle, and the Santa Ynez Valley Express as shown in Figures 4-4 and 4-5. The MTD operates two shuttles to provide connections to two Amtrak Stations in Santa Barbara County. The Santa Barbara station is served by the Downtown-Waterfront Shuttle and the Carpinteria Station is served by the Seaside Shuttle. The shuttles run seven days a week, with varying schedules in the winter and summer. The Valley Express is a peak-hour commuter transit service, with four trips daily between the Santa Ynez Valley and the South Coast, with stops in Solvang and Buellton.

The regular one-way fare on MTD is $1.25, and is $0.60 for seniors (age 62 and over) and people with disabilities. Persons who are blind, young children (45 inches or less in height), and students at UCSB and SBCC ride free. UCSB and SBCC student bus passes are paid for through mandatory fees imposed through their schools. A 10-ride pass is available for $10, or $7.50 for youth (K-12) and $5.00 for seniors, Medicare cardholders, and persons with disabilities. A 30-day pass allowing for unlimited rides is available for $41, or $32 for youth (K-12) and $18 for seniors, persons with disabilities, and Medicare cardholders.

Certain routes/services provided by MTD have their own fares (refer to Figure 4-1). The one-way cash fare on the Seaside Shuttle and Downtown-Waterfront route cost $0.25, with no discount available for any passenger type. The one-way cash fare for the Santa Ynez Valley Express is $4, with a 10-ride pass available for $35 and an unlimited 30-day rolling pass available for $120. The 30-day pass includes unlimited rides on other MTD routes. In Fiscal Year 2008, MTD anticipates $18,419,500 in total revenue for operations. As shown in Figure 4-8, the most significant proportion (more than one-third) comes from passenger fares. A nearly equal proportion (about one-third) comes from the Transportation Development Act – Local Transportation Fund (TDA-LTF).

Between Fiscal Years 1995 and 2004, the annual number of passengers on MTD increased gradually from 6 million to 7 million and annual revenue hours[9] increased from 160,000 to 180,000. Ridership on an hourly basis remained fairly consistent, with between 35 and 40 passengers per revenue hour.[10] While no hard data exists, it is suspected that in addition to ongoing service enhancements, the recent increases in transit ridership are primarily due to the recent increase in gas prices during the same time period. In theory, the rise in gas prices increases the "marginal" per-trip costs of an auto trip enough to outweigh the "time penalty" associated with travel on alternative modes, causing price-sensitive auto commuters to take transit, walk, or bike (or forgo the trip altogether) more often. Operating expenses for MTD have been rising however, with a nine percent increase between 2003 and 2004 due primarily to higher fuel costs. The farebox recovery ratio for MTD was 39.6% in FY 2004, just below the MTD standard of 40%. The increase in farebox recovery, despite increasing operating costs, was due to a fare increase in 2004: one-way cash fares were increased from $1.00 to $1.25, though discounted 10-ride and 30-day passes were also introduced at that time.

Figure 4-8: MTD Operating Revenue (FY 2008)

Source of Revenue	Revenue	Percentage of Total
Passenger Fares		
Core Service	$6,461,300	35.0%
Valley Express and SCTP	$301,700	1.6%
Non-Transportation Income	$594,800	3.2%
Local Operating Assistance	$338,400	1.8%
Property Tax Revenue	$725,900	3.9%
TDA - Local Transportation Fund	$6,325,300	34.0%
FTA 5307 Operating Assistance	$3,038,200	16.0%
FTA CMAQ Operating Assistance	$633,800	3.4%
Total Operating Revenue	*$18,419,500*	*100.0%*

As of FY 2007, MTD provided about 7.5 million rides annually, with ridership expected to increase to 7.6 million in FY 2008, and increase to 7.7 million by FY 2010. Increasing gas prices are expected to further induce ridership growth; though the increase in fuel costs will also impact operating costs for MTD. Pending and planned improvements are discussed in Section 10.3.1.1.

4.2.2 Regional/Commuter Transit Service

In addition to the MTD's Valley Express discussed above, additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal

[9] Annual Revenue Hours refers to the total number of hours buses are in operation and carrying passengers during the Fiscal Year (e.g., it does not include time spent driving—or idle—but not carrying passengers.

[10] Sources: Santa Barbara Metropolitan Transit District website (accessed at http://www.sbmtd.gov in June 2008) and MTD's *Short Range Transit Plan: FY 2006 to FY 2010*.

Express (the latter co-managed by the Ventura County Transportation Commission). These and other commuter bus services are described below.

4.2.2.1 Clean Air Express

The Clean Air Express operates commuter bus service from Santa Maria to Goleta and Santa Barbara, and from Lompoc to Goleta and Santa Barbara, generally employing 40-passenger capacity buses. Eleven total bus trips connect these destinations each morning and afternoon/evening: six trips to/from Lompoc, and five trips to/from Santa Maria. The Clean Air Express operates Monday through Friday, excluding approximately ten holidays per year. The one-way cash fare on the Clean Air Express is $7, with a 10-ride ticket book available for $50 and a monthly pass available for $140, providing unlimited rides. No discounts are offered to seniors, youth, or persons with disabilities. Ridership in FY 2006-07 was around 185,642 boardings (up 13% from the previous year; again while no hard data exists, it is suspected that in addition to ongoing service enhancements the recent increases in transit ridership are primarily due to the recent increase in gas prices during the same time period). Although there is 25% capacity remaining with current service levels, approximately 15 passengers daily are denied boarding daily due to already full buses on the more popular routes. The market for the Clean Air Express is estimated by SBCAG staff to be about 95% "choice" riders (versus "transit dependent" riders) with about 97% or more of these choice riders using the service for commuter trips.

4.2.2.2 Coastal Express

The Coastal Express was initiated in 1991, operating under a joint agreement between SBCAG and the Ventura County Transportation Commission (VCTC). The Coastal Express operates between Ventura and the South Coast, with 38 daily trips, including timed transfers at the Santa Barbara Transit Center to the MTD route 24X serving UCSB (express bus). Nine trips in each direction operate on Saturdays and Sundays. The one-way cash fare on the Coastal Express is $2, with a discount offered to seniors, persons with disabilities, and users with a "Go Ventura" monthly pass. An increase in fares will occur in August 2008.

The Coastal Express had a farebox recovery ratio of 65% in 2007. The Coastal Express has experienced consistent and strong ridership growth since initiation. Ridership in Fiscal Year 2006-07 was 179,300 trips (up 13% from the previous year), and is expected to rise to almost 200,000 trips in FY 2007-08.

According to a passenger survey conducted in 2007, rider satisfaction is high, with 98% or higher satisfied with overall service. Work trips account for 83% of all trips on the Coastal Express and almost three-quarters of weekday riders use the bus four or more days per week. Fifty-nine percent of passengers live in Ventura, with the next most common city being Oxnard (18%). Santa Barbara is the most common destination for commuters (56.7%), with Goleta second (22.6%). The most common request for improved service was for the buses to be more frequent. The operation improvements underway for Highway 101, between Milpas Street and Hot Springs Road/Cabrillo Boulevard will improve transit speeds and reduce transit travel times along this important commute corridor.

4.2.2.3 City of Lompoc COLT Reservation-Only Service

The City of Lompoc provides reservation-only bus service from Mission Plaza in Lompoc to the Santa Barbara Transit Center, with one round-trip on Tuesdays and Thursdays. The one-way cash fare is $4, with no discounts or multi-ride passes available. No data was available on ridership or trip purpose, but the current scheduling of this service means that it is likely not highly utilized by commuters.

4.2.2.4 Bill's Bus

Bill's Bus is a private operator providing late-night transportation between Isla Vista and downtown Santa Barbara. Three buses depart Isla Vista hourly in the evening and two return later in the evening. An additional route is in operation between Isla Vista and Goleta on Wednesdays. It is provided as a transportation alternative to help reduce drinking and driving by students at UCSB and has been in operation since 1991. Fares are $6 one-way and $10 round-trip.

Fares for Santa Barbara County regional/commuter transit service are summarized in Figure 4-9.

4.2.2.5 Other Regional Transit

There are other regional transportation options in Santa Barbara as well, although many of these services are not feasible for most commuter trips due to infrequent schedules, relatively high fares, and/or limited destinations served.

Amtrak serves Santa Barbara with passenger rail service

Figure 4-9: Fares for Santa Barbara County Regional and Commuter Fixed-Route Services

Fare Type	Price	Description of Service
Clean Air Express		Weekday commuter service from Lompoc to Goleta (4 buses) and Santa Barbara (2 buses), and from Santa Maria to Goleta (3 buses) and Santa Barbara (2 buses). No reverse commute service offered.
Regular One-Way Fare	$7.00	
10-ride ticket book	$50.00	
VISTA Coastal Express		Bi-directional service (commute and reverse commute), with 38 daily trips Monday-Friday and nine trips in each direction on both Saturday and Sunday.
Regular One-Way Fare	$2.00	
Senior/Disabled	$1.00	
City of Lompoc (COLT)		One trip to Santa Barbara each Tuesday and Thursday morning, with return trip that afternoon.
All passengers	$4.00	
Bill's Bus		Late-night private bus between Isla Vista and Santa Barbara, to reduce driving and driving, Tuesday-Saturday evenings. Additional bus to Goleta Wednesdays.
One-way cash fare	$6.00	
Round-trip ticket	$10.00 ($6.00 to Goleta)	

along the Coast Starlight and Pacific Surfliner Routes. The Amtrak station is located in downtown Santa Barbara at 209 State Street. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips, and carries 2.65 million passengers annually (data on what proportion of those trips were commuter trips to and from Santa Barbara is not available). The Pacific Surfliner is an "Amtrak California" service and is subsidized and administered by the Caltrans Division of Rail. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara.

Greyhound provides intercity bus transportation with destinations throughout the County. There are four daily northbound and southbound trips. Buses stop at the Greyhound Bus Station adjacent to the MTD Transit Center in downtown Santa Barbara.

Santa Barbara Airbus[11] is a private motorcoach operator, providing transportation between Santa Barbara and Los Angeles International Airport. Travel time is less than 3 hours. Seven trips are made in each direction, seven days a week. Buses stop at the Bistro 1111 Restaurant on E. Cabrillo Blvd in Santa Barbara. Fares are $44-48 one-way and $84-90 round-trip per person, with discounts available for larger parties.

Santa Barbara Airport[12] provides domestic flights through six airlines, including non-stop services to twelve cities. The airport is located to the west of the city of Santa Barbara, surrounded by the city of Goleta.

4.3 Demand Responsive Service

4.3.1 Easy Lift Paratransit

Easy Lift[13] is a private non-profit corporation providing curb-to-curb ADA paratransit service for older adults and persons with disabilities. Its service area is within ¾ mile of all MTD fixed-route bus stops. The one way fare is $2. Easy Lift operates under a memorandum of understanding with MTD. Its hours are Monday through Friday from 5:25 am to midnight, Saturdays from 6:00 am to 11:20 pm and Sundays from 6:20 am to 10:45 pm.

4.3.2 Community Transportation Services

The County of Santa Barbara Health Bus provides transportation for medical-related trips between several North County communities and medical facilities in the Santa Barbara and Goleta area. Reservations are required, preferably two days in advance. The service is available every Tuesday and Friday, as well as two Mondays and two Thursdays per month. Prices vary from $2 to $6, depending on distance traveled.

4.3.3 Taxi Services

Five private taxi companies are located in the city of Santa Barbara, including:

- Blue Dolphin Cab
- Crown Cab Company
- Fly by Night Taxi Company
- Beachside Taxi
- Rockstar Taxi and Limousine

[11] Source: Santa Barbara Airbus website (accessed at www.santabarbaraairbus.com in May 2008).
[12] Source: Santa Barbara Municipal Airport website (accessed at www.flysba.com in May 2008).
[13] Source: Easy Lift website (accessed at www.easylift.org in May 2008).

Several other taxi companies are located in nearby communities and provide service to Santa Barbara. No information was available on taxi usage or travel patterns.

4.4 MTD Policies[14]

MTD carries the overwhelming majority of transit trips for Santa Barbara residents and commuters, and worker flow data from the 2000 census reveal that nearly two-thirds of Santa Barbara residents also work in Santa Barbara.

Therefore, MTD policies play a critical role in reducing congestion on local streets and to a lesser extent regional highway congestion (whereas the regional commuter services will have a larger impact on congestion on 101 and other regional highways).

For this reason, the relevant MTD goals and performance measures are highlighted below. Other policies relevant to transit service (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

4.4.1 MTD Goals

The following goals, adopted by the MTD Board of Directors, provide the direction to fulfill the mission statement and meet the needs of the public:

- MTD shall provide a reliable, safe, comfortable and attractive means of transportation to those who lack other options, including elderly persons, persons with disabilities, students, and economically disadvantaged persons; and to those who use mass transit by choice.
- MTD shall maintain fares at the lowest feasible level that enables the recovery of operating expenses consistent with the financial plan contained in the adopted Short Range Transit Plan.
- MTD shall ensure the responsible expenditure of public funds, and shall continually seek improvements in its operating efficiency.
- MTD shall treat all individuals with fairness and respect, including passengers, employees, and all others involved in MTD activities.
- MTD shall work cooperatively with businesses, individuals, community organizations, and government agencies in planning and developing the best transit service possible within the limits of available funding.
- MTD shall comply with regional, state and federal goals of reducing traffic emissions and congestion through provision of an attractive alternative to the personal automobile.
- MTD shall continue to acquire feasible alternatively-fueled buses.
- MTD shall seek all reasonable means to satisfy public transportation needs.

4.4.2 MTD Performance Standards

The following performance standards provide a means to measure the success of MTD in meeting the goals:

- At least 95% of all MTD revenue trips shall depart no more than 5 minutes late.
- At least 98% of all MTD scheduled revenue trips shall be completed.
- The MTD system shall carry an average of not less than 36 passengers per revenue hour for any 3-year period.
- The MTD system shall carry an average of not less than 2.5 passengers per revenue mile for any 3-year period.
- MTD shall maintain at least a 40% farebox recovery ratio over any 3-year period.
- The MTD systemwide spare ratio shall not exceed 20%.
- MTD revenue vehicles shall travel a minimum of 8,000 miles between breakdowns. (A breakdown requires a vehicle exchange.)
- The MTD shall limit annual passenger transfers to 20% of total annual ridership.
- Passenger complaints shall average no more than 1 complaint per 10,000 MTD passenger boardings.

4.5 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips:

- Per capita ridership on current MTD service is quite high, and ridership has grown as new service is added. This suggests that any future potential increases in MTD ridership will occur most cost-effectively during off-peak periods when surplus capacity (i.e. empty seats) currently exists (similar to the tourist industry strategy of increasing demand during the non-peak travel months, or "growing the shoulders"). If MTD peak-period ridership continues to increase, it will require the addition of more peak-period service on some

[14] Source: MTD's *Short Range Transit Plan: FY06 to FY10*.

routes to accommodate the demand, which is more expensive.

- MTD operating costs are anticipated to increase largely as a result of increasing fuel costs, as well as costs associated with adding new peak period service, as discussed above.
- MTD transit ridership is higher than for cities of similar size (as mentioned above, MTD has ridership comparable to a city with a population of 1 million residents). In addition to the high-quality service that MTD provides, factors that contribute to this higher-than-average ridership likely include Santa Barbara's unique geography, a political and cultural environment that is strongly supportive of environmentally-friendly policies and programs, and a large student population. Combined, these factors suggest that while it is still best practice to allow for appropriate increases in densities along major transit corridors and around major transit hubs, overall density in Santa Barbara may not need to be as high as the rule of thumb for "transit-supportive" densities that is often applicable to other cities.
- Like many transit operators, MTD policy goals are largely focused on meeting the needs of "transit-dependent" market segment. Considering the demographics of Santa Barbara (with a large proportion of high-income households), one potential opportunity to help achieve the *Plan Santa Barbara* goal of reducing traffic congestion is to consider options for increasing MTD ridership among the "choice" riders, through targeted marketing/branding, upgraded passenger amenities, and more commuter-focused and/or special event services.
- While some capacity exists on current regional bus transit services, ongoing increases in ridership (including strong ridership gains over the past several year period coinciding with rising gas costs) is already resulting in certain routes being oversubscribed and potential riders denied boarding. This trend suggests that the frequency and/or service span of regional transit services will need to increase to meet current and future expected demand.
- One niche transit market that could be better exploited is business and leisure travelers to and from the airport; more frequent and potentially express service to and from the airport and major regional destinations would need to be created and well-marketed to grow the ridership.
- Existing rail service to and from Santa Barbara is not a feasible option for most commuter trips; short-term solutions to adjust existing Pacific Surfliner peak period schedules to be more "commuter friendly" should be pursued, in addition to long-term efforts to initiate dedicated commuter rail service in the Santa Barbara County region.
- Transit service frequency (headways), hours of operation (span), and on-time performance (schedule reliability) are generally cited as the main determinants as to whether people will choose to commute by transit. For example, running more frequent buses reduces crowding both at the transit stops and on-board the transit vehicles, which helps ensure that fewer potential passengers get left behind at stops ("pass-bys"), more passengers are able to find a seat once on-board, and passengers can enter and exit the vehicle safely and comfortably. While available data suggest that existing transit serving Santa Barbara has a good on-time performance record, many existing transit services have limited frequency (e.g., buses that have 30 minute headways) and limited operating hours that may not serve commuters as well as they could.
- While existing regional commuter transit focuses on capturing so-called "choice" riders (e.g., those who have the choice to drive a car for their trip), existing local transit service in Santa Barbara appears to target so-called "transit dependent" riders. In addition, existing routing focuses on geographic coverage (e.g., spreading out service to all parts of Santa Barbara) and is downtown-focused, with nearly all routes terminating at the downtown Transit Center. Additional analysis of the potential impact of transit service changes to reduce peak-hour vehicle trips will be explored in greater detail in the next phase of the project.
- Securing operating funds for existing and potential expansions of service continues to be a significant challenge for transit operators serving Santa Barbara. Transit fares cover a portion of costs, and the most recent increase in MTD fares

did not impact ridership. However, other funding sources are also crucial, including federal transit operating assistance (Section 5307) and State Transportation Development Act funds. Congestion Management Air Quality (CMAQ) funds can also be used to support increased transit service, though most often on short-term basis. If they renewed in the November elections, local measure A and D funds will also help support transit enhancements.

5 BICYCLING CONDITIONS[15]

5.1 Overview

Bicycling has been a part of Santa Barbara's transportation system since 1869, when a local resident and businessperson rode a high-wheel "velocipede" bicycle down State Street. Today, the city of Santa Barbara is known as a national leader in promoting bicycling as a form of recreation for residents and visitors, and as a viable choice for everyday transportation to work, school, shopping, and other trips. This leadership position is the result of the City's long history of planning for bicyclists and investing in bicycling infrastructure, beginning in 1974 with the adoption of the City's first official "Proposed Bikeway Master Plan". In addition to the City's efforts to improve bicycling conditions within city boundaries through the 1998 Bicycle Master Plan and 2003 update, several other regional partners—including SBCAG, MTD, UCSB, and the County—have played an important role in making it more feasible to bicycle to and from Santa Barbara. These efforts have resulted in the city of Santa Barbara receiving a "Bicycle-Friendly Cities" Silver designation. The region's mild climate, beautiful natural scenery, and demographic profile also help make bicycling a feasible and attractive transportation option.

[15] Sources consulted for the bicycling section include: Interviews with transportation staff at the City of Santa Barbara, Santa Barbara County, and SBCAG; "City of Santa Barbara Bicycle Master Plan" (October 1998) and "2003 Supplement to the 1998 Bicycle Master Plan" (December 2003); SBCAG Traffic Solutions' "Santa Barbara County Bike Map" (2006); City of Santa Barbara Municipal Code, Title 10: Transportation and Parking and Title 28: Zoning Ordinance; SBCAG Metro Transportation Plan (January 2005); Santa Barbara Bicycle Coalition website (accessed at www.sbbike.org in May 2008); Santa Barbara Bikestation website (accessed at www.bikestation.org/santabarbara/index.asp in May 2008; Bici Centro (Bicycle Center) website (accessed at www.bicicentro.org in May 2008); Amtrak's Pacific Surfliner website (accessed http://www.amtrak.com/servlet/ContentServer?pagename=Amtrak/am2Route/Vertical_Route_Page&c=am2Route&cid=1081256322013&ssid=132 in May2008); and Santa Barbara Car Free's bicycling website (accessed at www.santabarbaracarfree.org/bike.htm in May 2008).

5.2 Facilities

One of the most important incentives to more people to choose bicycling for more of their trips is to provide safe and convenient facilities for bicyclists, including:

- A comprehensive network of bicycle paths, lanes, and routes that connects the places that people want and need to get to.
- Reasonable accommodation of bicycles on transit, to help fill in actual or perceived gaps in the bicycle network (due to lack of dedicated bicyclist facilities, difficult terrain, or high auto volumes). Transit accommodation of bikes is also important to provide bicyclists with a "Plan B" option for getting both themselves and their vehicle around if unanticipated circumstances prevent them from riding their bike (such as mechanical failure or inclement weather).
- Secure, well-located, and adequate bicycle parking so bicyclists can feel confident that there will be a place at or near their final destination to leave their bike (and that their bike will still be there when they return).
- Other bicycle-supportive facilities and programs, such as 'bike stations' (with showers and lockers) and bicycle safety and repair classes.

Santa Barbara's existing bicycle facilities are described below.

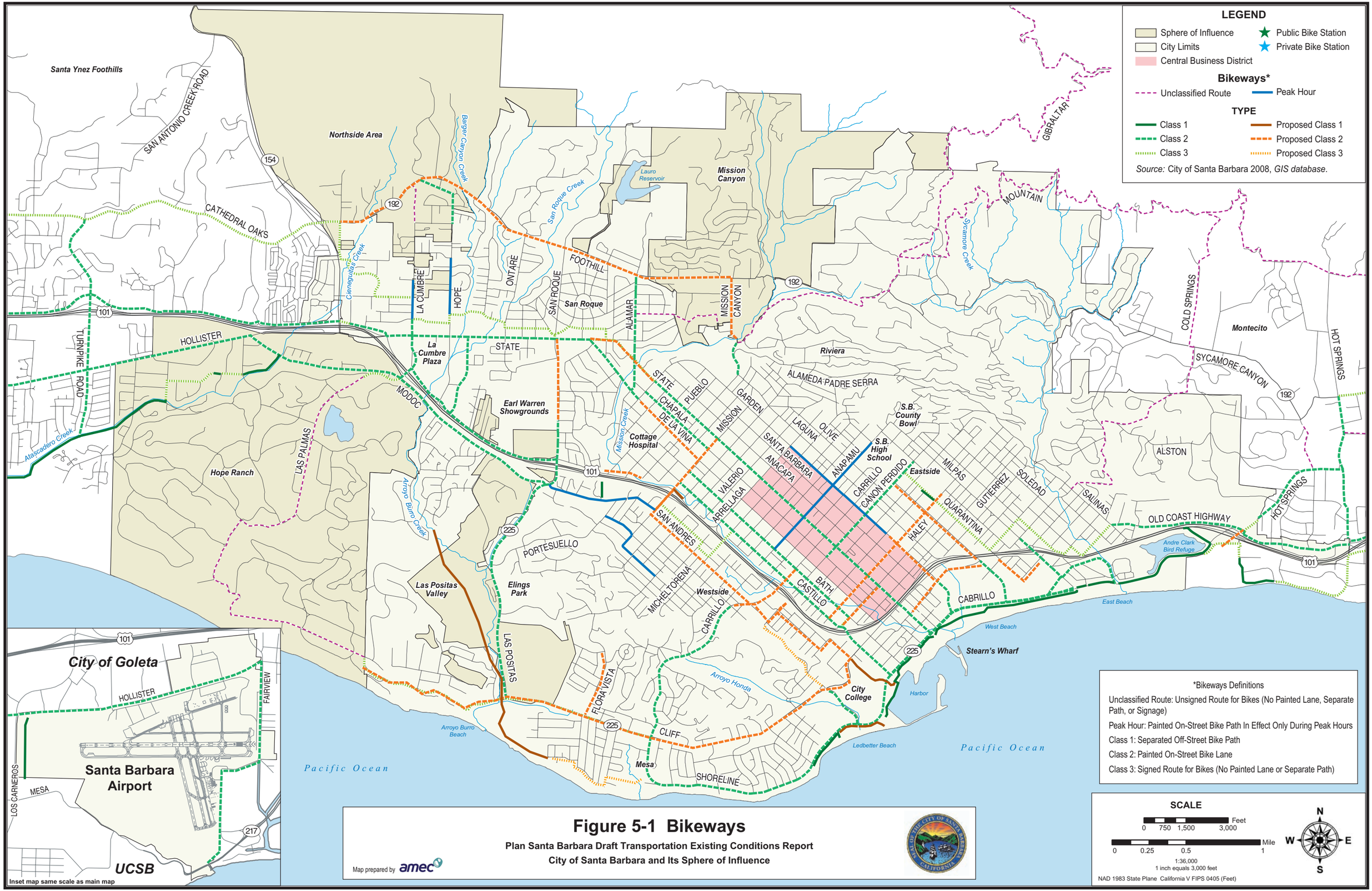
5.2.1 Bicycle Network

5.2.1.1 Bicycle Routes

The city of Santa Barbara has a comprehensive bicycle network (refer to Figure 5-1) that connects nearly every part of the City, with approximately 28 miles of Class II bikeways (painted on-street bike lanes)[16] and 6 miles of Class I bikeways (separated off-street bike paths). These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Major regional bicycle routes in the South Coast urban area include:

- Foothill Route
- Cross Town Route
- State Street Route
- North Goleta Route
- Maria Ignacio Route
- Coast Route

[16] It is worth noting that as recently as 15 years ago, the number of miles of Class II bikeways in Santa Barbara was just half the current lane-miles.


LEGEND
Sphere of Influence
City Limits
Central Business District
Public Bike Station
Private Bike Station
Bikeways*
Unclassified Route
Peak Hour
TYPE
Class 1
Class 2
Class 3
Proposed Class 1
Proposed Class 2
Proposed Class 3
Source: City of Santa Barbara 2008, GIS database.
Santa Ynez Foothills
SAN ANTONIO CREEK ROAD
Northside Area
Barger Canyon Creek
Lauro Reservoir
Mission Canyon
GIBRALTAR
MOUNTAIN
Sycamore Creek
CATHEDRAL OAKS
154
192
Cieneguitas Creek
LA CUMBRE
HOPE
ONTARE
San Roque Creek
FOOTHILL
San Roque
ALAMAR
MISSION CANYON
COLD SPRINGS
Montecito
HOT SPRINGS
SYCAMORE CANYON
101
TURNPIKE ROAD
HOLLISTER
La Cumbre Plaza
STATE
Riviera
ALAMEDA PADRE SERRA
MODOC
Earl Warren Showgrounds
PUEBLO
GARDEN
CHAPALA
DE LA VINA
MISSION
LAGUNA
OLIVE
S.B. County Bowl
S.B. High School
ANAPAMU
SANTA BARBARA
ANACAPA
CARRILLO
CANON PERDIDO
Eastside
MILPAS
GUTIERREZ
SOLEDAD
SALINAS
ALSTON
Alsacadero Creek
Hope Ranch
LAS PALMAS
Cottage Hospital
Mission Creek
Arroyo Burro Creek
VALERIO
ARRELLAGA
QUARANTINA
HALEY
OLD COAST HIGHWAY
Andre Clark Bird Refuge
225
PORTESUELLO
SAN ANDRES
MICHELTORENA
Las Positas Valley
Elings Park
Westside
BATH
CASTILLO
CABRILLO
East Beach
West Beach
Stearn's Wharf
LAS POSITAS
FLORA VISTA
Arroyo Honda
City College
Harbor
CLIFF
Arroyo Burro Beach
Ledbetter Beach
Pacific Ocean
Mesa
SHORELINE
City of Goleta
FAIRVIEW
Santa Barbara Airport
LOS CARNEROS
MESA
217
UCSB
Inset map same scale as main map
*Bikeways Definitions
Unclassified Route: Unsigned Route for Bikes (No Painted Lane, Separate Path, or Signage)
Peak Hour: Painted On-Street Bike Path In Effect Only During Peak Hours
Class 1: Separated Off-Street Bike Path
Class 2: Painted On-Street Bike Lane
Class 3: Signed Route for Bikes (No Painted Lane or Separate Path)
SCALE
0 750 1,500 3,000 Feet
0 0.25 0.5 1 Mile
1:36,000
1 inch equals 3,000 feet
NAD 1983 State Plane California V FIPS 0405 (Feet)
N
W
E
S
Figure 5-1 Bikeways
Plan Santa Barbara Draft Transportation Existing Conditions Report
City of Santa Barbara and Its Sphere of Influence
Map prepared by amec

Currently, gaps in the bicycle network exist where there are no dedicated bike facilities (such as on-street painted bike lanes or off-street separated bike paths). Most of the segments in the bike network that do not have dedicated bike facilities are located on streets that generally have low auto volumes where most committed cyclists will be comfortable sharing the same lane as automobile traffic. However, new or potential bicycle commuters can have safety concerns on sharing road with automobiles, particularly on higher speed routes. These concerns may represent an incremental barrier to broadening bicycle commuting. Major gaps in the bike network dedicated bicycle facilities include:

- Downtown, east of State Street lacks dedicated bike lanes. Cyclists must compete with high speed automobiles and parking on Anacapa/Santa Barbara streets or parked cars of Garden, Laguna or Olive streets.
- The State Street route downtown can be frequently interrupted by pedestrian signals, causing delays to bike commuters
- The underpasses at Castillo, Carrillo and Mission present challenges to cyclists due to congestion, narrow or non-existent bike lanes and drivers turning across the path of bike travel to enter the freeway
- A gap exists on middle State Street between De La Vina and Alamar where cyclists compete with parked cars and relatively high speed traffic
- East-west connections downtown parallel to State Street (the one way couplets of Bath/ Castillo and Chapala/De La Vina are good bike routes but do not have dedicated bike facilities over significant portions)
- Portions of the Coast Route (the ½ mile Canyon section through Hope Ranch is especially narrow)[17]
- Portions of the Foothill Route in the San Roque area from La Cumbre Road to Mission Canyon

In addition, bicycle facilities within Santa Barbara are part of the regional bicycle network as well as the Pacific Coast Bike Route (which runs along the entire west coast). As of 2005, Santa Barbara County had 123 miles of bicycle routes, including Class I (separated bike path or trail), Class II (painted on-street bike lane), Class III (signed on-street route with no painted lane or separate path), and Class IV (which are County designated and maintained off-road, unpaved facilities). Most of the bicycle facilities in the region are Class II on-street painted bike lanes.

5.2.1.2 Bicycle Signage

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. All free-standing signage includes the name of the route and a recognizable logo; some signs also include directional and distance information. Routes through residential neighborhoods where freestanding signage might not be desired are marked with graphic pavement markings to guide bicyclists along the designated route.

5.2.2 Bicycle-Transit Accessibility

5.2.2.1 Local and Regional MTD Buses

With MTD's "Bike and Bus" program, all of the agency's local and regional buses (with the exception of electric shuttles) have bike racks installed on the front of the vehicle that can accommodate up to two bicycles. Instructions for using the racks are posted directly on the racks and a full explanation is included in MTD's schedule book (although no information was found on the MTD website). Barriers to usage that exist with some bike-on-bus programs (such as a registration fee or training session) are not part of the MTD's program.

5.2.2.2 Regional Buses

As discussed in the transit section, SBCAG and VCTC operate regional commuter buses to and from Santa Barbara. Both of these services allow bicycles to be stowed in the exterior luggage holds of the charter-style commuter buses, although very little information about this option was available on the buses' respective websites. The City's Bicycle Master Plan indicates that these racks were oversubscribed.

5.2.2.3 Regional Rail

As discussed in the transit section, the schedule for the regional Pacific Surfliner (operated by Amtrak) provides the best rail option for regional commuters. According to Amtrak, most Pacific Surfliner cars are equipped with bicycle racks accommodating up to three bicycles per car. While not required, a space can be reserved in advance for a fee ranging from $5 to $10 fee depending on length of trip.

[17] This section is located in the County.

5.2.3 Bicycle Parking

5.2.3.1 On-Street (Sidewalk) Parking

The vast majority on on-street sidewalk bike parking in Santa Barbara, particularly downtown, is provided via the "Hitching Post Program." Under this program, businesses or institutions can request bicycle parking, and the City will supply and install one or more "hitching post" style racks at cost along the curb edge of the sidewalk. The rack must be installed according to the City's bicycle parking standards in Title 28 of the Municipal Code (discussed in detail below). Once installed, the racks are considered public property and may be removed or relocated at the City's discretion. Hitching posts are intended for "short-term" bicycle parking and are found throughout town, largely concentrated in downtown and the waterfront areas according to the city's Bicycle Master Plan.

The Bicycle Master Plan also indicates that on-street (sidewalk) and off-street lockers are provided for "long-term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. Some of the lockers are available for rent on a monthly basis while some are for short-term use accessed with a small deposit.

5.2.3.2 Off-street parking

Bicycle parking requirements for development projects

Chapter 28.90 (Automobile Parking Requirements) of the City's Municipal Zoning Code contain the following bicycle parking requirements for non-residential development projects:

- Requires that bicycle parking be provided for all commercial and industrial uses identified in the zoning code (Sec. 28.90.001.16)
- Specifies siting and design standards for bike parking which conform to best practices, including requiring that racks have two points of contact (for locking both the frame and wheel) and are located in an area that is conveniently-accessible, paved (to accommodate all weather conditions), and lighted at night (Sec. 28.90.045.5)
- Indicates the land use types where bicycle parking is (and is not) required (Section 28.90.100.J).
- Specifies that bicycle parking be provided at the ratio of one (1) bicycle parking space for each seven (7) vehicle parking spaces, as required by the Zoning Code (Section 28.90.100.L).
- An exception to the above bicycle parking requirement (one bike parking space for every seven automobile parking spaces) is made for schools and child care centers, where bicycle parking is required, but "at a rate determined by the school"; or in the case of institutions of higher education "at a rate determined by the governing body of the educational institution" (Section 28.90.100.J).
- No bicycle parking is required for single family or multi-family residential projects.

Enhanced bicycle parking provided by employers

Some Santa Barbara employers exceed the Municipal Code's minimum parking requirements by offering enhanced bicycle parking and other supportive facilities to their employees. Our research suggests that enhanced bicycle parking is provided in order to meet existing bicycling parking demand from current bicycle commuters, but also to encourage more employees to commute by bike. For example, the County of Santa Barbara provides a secure "bicycle cage" parking facility at its Anapamu Street facility. Raytheon, Santa Barbara's largest private employer, provides employees with a covered "bike cage" facility that has both a locked door (with a combination given only to employees) and visibility from a nearby security guard.

Other important off-street parking facilities

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara (part of the National Bikestation Network) is located in the Granada Garage and provides secure indoor parking for 78 bicycles. The Bikestation is more than just a bicycle parking garage; it also offers a private shower, changing room/bathroom, lockers for storing clothes or bags, and repair equipment (including tools, a work stand, and air compressor). Bicycles can be rented as part of the "Green Bike Program" and bicycle accessories can be purchased. In addition, transit and bicycling information and maps are available. Access is restricted solely to members, but members have access 24 hours a day, 7 days a week. Membership rates range from $1/day (purchased in $10 increments), $12/month, or $96/year (all users pay a $20 annual administrative fee). The Bikestation's operations are partially funded by the City's Downtown Parking Program.

The City's Bicycle Master Plan indicates that other types of bicycle parking are installed at public facilities such as parks, schools, and public buildings. As mentioned above,

the Bicycle Master Plan also indicates that on-street (sidewalk) and off-street lockers are provided for "long-term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. Some of the lockers are available for rent on a monthly basis while some are for short-term use accessed with a small deposit.

Bicycle parking is provided at both of the multimodal transit centers downtown, the Santa Barbara Amtrak Station and the MTD Transit Center.

5.2.4 Other Bicycle-Supportive Facilities and Programs

Other public, non-profit, and private-sector bicycle programs, facilities and infrastructure include:

- The city of Santa Barbara employs a full-time bicycle coordinator, maintains a bicycle pool that employees can use, and offers Bikestation memberships to full-time employees.
- The City's Bicycle Master Plan indicates that there are seven "end-of-trip" facilities that provide showers and/or lockers for bicycle commuters. These are located in and around the commercially-zoned areas of downtown. All require users to be either an employee or registered member.
- Bici Centro (Spanish for Bike Center), a community-based multilingual bike repair shop that provides low to no-cost education and training programs related to bicycle repair and safety.
- Santa Barbara Bicycle Coalition's CycleSmart program offering safety training for youth and adult cyclists.
- Santa Barbara Car Free "bicycle tourism" promotional activities.
- Numerous private-sector bicycle rental companies, guided bicycle tour companies, and bicycle sales/repair shops.

5.3 Policies

The most important policy document governing bicycling in Santa Barbara is the City's Bicycle Master Plan. This Council-adopted policy document provides clear direction for encouraging increase bicycling within, to, and from Santa Barbara. Policies relevant to *Plan Santa Barbara* are listed below:

Policy 1.1 The City shall educate bicyclists and motorists about the appropriate use of the bicycle on City streets.

Policy 1.2 The City shall promote the bicycle as an important alternative form of transportation for all, and promote Santa Barbara's image as being among the most livable cities for bicycling.

Policy 1.3 The City shall create incentives for all employees to commute to work by bicycle and encourage local businesses to do the same.

Policy 2.1 The City shall expand the bikeway network to increase ridership for bicycle transportation and recreation.

Policy 2.2 The City shall maintain the bikeway network.

Policy 2.3 The City shall enhance the bikeway network.

Policy 2.4 The City shall collect data to assist in bicycle planning and evaluation of existing projects.

Policy 3.1 Parking for bicycles shall be required in private development, construction, or reconstruction projects.

Policy 3.2 The City shall increase the number of secure, convenient, and attractive bicycle parking and storage facilities on public property.

Policy 3.3 The City shall require all development projects to be designed to meet the needs of people who ride bicycles, as appropriate.

Policy 3.4 The City shall encourage transit providers to increase the use of bicycles in conjunction with transit.

Other policies relevant to bicycling (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

5.4 Volumes

Bicycling is a small but important part of Santa Barbara's transportation system. As discussed above, the region's mild climate, beautiful natural scenery, and demographic profile help make cycling a feasible and attractive transportation option. The demographic profile at the beginning of this report noted that 2000 Census data suggests that 3.4% of the city of Santa Barbara residents commute to work by bicycle. SBCAG's 2007 Commuter Profile Report suggests that 2.7% of County residents commute by bicycle.

The most recent data on bicycle volumes at specific inter-

sections are the bicycle trip counts that were conducted in 1973 for the City's 1974 Bikeway Master Plan and in 1996-97 for the 1998 Bicycle Master Plan. The 1998 Bicycle Master Plan found that:

- The peak hours of bicycle travel are from 4 p.m. to 6 p.m.
- In the peak hours of travel, the City saw an overall increase (19%) in bicycle volumes from the year 1973 to 1997, after adjusting for population increase.
- In the peak hours of travel, streets with bike lanes had 47% overall increase in cyclists from 1973 to 1997, after adjusting for population increase.
- In the peak hours of travel, cycling on all other streets (those without bike lanes) declined overall by 1% from 1973 to 1997, after adjusting for population increase.

In general, the bicycle trip counts that were conducted in 1973 and in 1996-97 suggest that historically, bicycle volumes were highest downtown (especially along the State Street corridor) and along the waterfront. No additional or more recent data on bicycle volumes is available to our knowledge.

Surveys undertaken as part of the City's 1998 Bicycle Master Plan indicated that the top two obstacles preventing more people from commuting by bicycle were "Dangerous traffic conditions" and "Not enough bike lanes on street."

5.5 Safety Issues

The City's 1998 Bike Master Plan identifies "trouble spots" for bicyclists based on reported collision and public accident records from the Santa Barbara Police Department. In general, this data suggest that historically, bicycle collisions were highest downtown (especially along the State Street corridor) and along the waterfront. It is not clear from the plan if these data was adjusted to account for higher bicycle volumes in these areas (i.e., relative number of bicycle collisions per bicycle trip, rather than absolute numbers of collisions).

In addition to traffic collisions, one of the other safety hazards for bicyclists is poor pavement conditions, including both degraded pavement conditions and debris. The City's 1998 Bicycle Master Plan identifies then current road maintenance and street sweeping cycles as not being specifically tailored to maintaining the bicycle network. The report identified a need to establish a reporting mechanism for road conditions affecting cyclists and increase funding for street sweeping in order to keep existing and new bike lanes clear of debris.

5.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- Santa Barbara already has a fairly comprehensive bike network, with the exception of the major gaps noted in Section 5.2.1.1. In addition, there are many regional bicycle routes that allow people to travel by bicycle to and from destinations outside of Santa Barbara. Filling in the remaining gaps in the bike network will involve difficult trade-offs of how right-of-way is allocated to different modes.
- It is unclear if the current "1:7" requirement for off-street bicycle parking (1 bicycle parking space for every 7 auto parking spaces) is meeting the needs in all areas; applying this single ratio citywide could be resulting in oversupply in some areas and undersupply in areas with a higher than average rates of bicycle commuting.
- Santa Barbara already has a number of public- and private-sector programs to encourage bicycling as a viable mode of everyday transportation; additional opportunities to expand bicycling in order to reduce peak-hour vehicle trips may include:
  - Many communities find that a significant amount of their peak-hour traffic is due to parents driving their children to school. Expansion of the existing Safe Routes to School program could ensure that more school-aged youth that live within near the school could safely walk or bike to school. Adjusting school opening and closing hours to hours outside the peak congestion times could help reduce cyclists' exposure to vehicle traffic.
  - Expand membership in the existing Bikestation through increased marketing, incentives, high quality equipment and maintenance, and implement a network of Bikestations located at key activity centers and destinations.
  - Create a "bike share" program similar to those developed in a numbers of communities of all sizes around the world (ranging from Paris to Tulsa). Such a program would require a network of on-street bike rental stands throughout the City and allow for short-term bicycle rental for casual trips. It will be important to partner

with existing bicycle rental companies to involve them in the creation of such a program.

- Create a "bike-and-fly" program at the airport, starting with installing bicycle parking and marketing, with consideration of an end-of-trip facility to allow bicyclists to box their bike, shower, and/or change clothes at the airport.
- More coordination between City, County, UCSB, SBCAG, other South Coast cities and entities to improve and expand bike paths and routes that cross jurisdictions.

6 PEDESTRIAN CONDITIONS[18]

6.1 Overview

Santa Barbara is in many ways a pedestrian friendly city, with a fairly continuous pedestrian network, pedestrian connectivity in almost all areas of the city, high-quality pedestrian amenities in many areas, and low per-capita rates of pedestrian collisions with vehicles. The city of Santa Barbara has invested heavily in the pedestrian realm, going beyond the provision of pedestrian pathways to fund pedestrian lighting, street furniture, and other projects to improve pedestrian comfort, convenience, and safety, particularly within the Central Business District and along the waterfront. As described above for bicycling, the City's many mixed-use areas, proximity of residential neighborhoods to the downtown, mild climate and demographic profile also help make walking a feasible and attractive transportation option. Like many cities, the city of Santa Barbara is engaged in ongoing efforts to ensure that the pedestrian network is fully accessible to all Santa Barbara residents and visitors through installation of missing sidewalk segments, curb ramps, and other pedestrian infrastructure.

6.2 Facilities

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service.

Deficiencies in the City's pedestrian facilities were identified in a community survey undertaken as part of the Pedestrian Master Plan. The results of the survey identified the following pedestrian facility improvement issues:

- Sidewalk continuity and connectivity
- Safety in crossing intersections
- Lighting at night
- General aesthetics for a pleasant walking environment

In addition, the Pedestrian Master Plan identifies the ongoing need to make the pedestrian network fully accessible, including accessibility improvements such as better maintained pavement surfaces, installation of additional curb ramps, removal of sidewalk obstructions, audible pedestrian signals, and accessible transit stops.

The City has several programs to address deficiencies in pedestrian facilities, including:

- City Mobility Coordinator (receives safety complaints, coordinates response)
- Safe Routes to Schools Program
- Curb Ramp Installation Program
- Development of design guidelines, engineering standards, and pedestrian-supportive zoning

The City has also developed a Neighborhood Traffic Management Program to implement traffic calming, improve programs to reduce cut-through traffic and improve pedestrian safety. The Oak Park neighborhood is the first area to be addressed under this program. Despite significant public outreach and discussions, a ballot measure in 2005 was not able to achieve sufficient support for continuation of the program, although some improvements that were supported by the community were made. The St. Francis neighborhood went through a similar community-based planning process, including a design charrette and adoption of a neighborhood mobility plan. A construction contract was awarded in September 2007, and some traffic calming devices have been installed between St. Francis and Santa Barbara High.[19]

The city of Santa Barbara's "Sidewalk Missing Links" program has identified missing sidewalks throughout the city and uses funds from Measure D (sales tax) as well as State and Federal grants to fund improvements to the pedestrian network. The Sidewalk Missing Links program undertakes about $1 million in sidewalk improvements annually. In addition, the Redevelopment Agency has a

[18] Sources for this section include: Interviews with City transportation staff; City of Santa Barbara Pedestrian Master Plan (July 2006); City of Santa Barbara Conditions, Trends, and Issues (CTI) Report (2005); City of Santa Barbara Redevelopment Agency's Public Infrastructure and Amenities website (accessed at www.santabarbaraca.gov/Resident/Home/Redevelopment/success_infrastructure.htm?js=false in May 2008).

[19] Sources: Interviews with City transportation staff and the City's Neighborhood Traffic Management Program website (accessed at www.santabarbaraca.gov/Resident/Transportation_and_Parking/OPNTM/how.htm in May 2008).

long history of investing in pedestrian facilities. Major projects funded in the past 15 years include:

- State Street Sidewalk Improvements
- State Street Pedestrian Crosswalks
- Downtown Pedestrian Street Lighting
- Lower State Street Revitalization
- Cabrillo Boulevard Pedestrian Lighting
- Improvements to the Cul de Sacs at 300 Block of Santa Barbara, Anacapa and Chapala Streets
- Sidewalk along West Carrillo to link Alta Mesa to the Westside

6.3 Policies

The most important policy document governing pedestrian conditions in Santa Barbara is the City's Pedestrian Master Plan. The most relevant policies from this plan are listed below:

Policy 1.1 The City shall expand the sidewalk network to increase walking for transportation and recreation.

Policy 1.2 The City shall improve pedestrian safety and comfort at intersections.

Policy 1.3 The City shall enhance pedestrian corridors.

Policy 1.4 The City shall work to eliminate U.S. Highway 101 as a barrier to pedestrian travel.

Policy 1.5 The City shall assist neighborhoods that desire to improve pedestrian access to, from, and within their neighborhood.

Policy 1.6 The City shall support the establishment and construction of urban trails to enhance circulation and provide recreational opportunities through parks and open spaces.

Policy 1.7 The City shall maintain, protect, and improve sidewalk facilities on an on-going basis and during public and private construction projects.

Policy 1.8 The City shall work with transit providers to develop high quality and pedestrian accessible transit stops.

Policy 1.9 The City shall work to make the pedestrian environment accessible to those with disabilities, children, and the elderly.

Policy 2.1 The City shall assist in the development of a Safe Routes to School program.

Policy 2.2 The City shall develop and maintain maps that identify the most appropriate routes for children to walk to school.

Policy 2.3 The City shall identify and fund programs and improvements that will make it safer and more attractive for students to walk to school.

Policy 3.1 The City shall protect, preserve, and enhance the paseo network.

Policy 3.2 The City shall expand the network of paseos.

Policy 4.1 The City shall establish and maintain pedestrian design guidelines.

Policy 5.1 The City shall encourage people to walk through education and awareness efforts.

Policy 5.2 The City shall work to enforce laws that protect pedestrians.

Policy 6.1 The City shall incorporate the Pedestrian Master Plan into the land development process.

Policy 6.2 The City shall pursue revisions to the Zoning Ordinance that will help implement the Plan.

Policy 6.3 The City shall incorporate pedestrian projects into its Capital Improvement Program (CIP).

Policy 6.4 The City shall maximize the amount of financial resources available for pedestrian projects.

Other policies relevant to pedestrian conditions (from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan) are summarized in Appendix A.

6.4 Volumes

Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. As part of the 2006 Pedestrian Master Plan, pedestrian counts at particular intersections were taken between July and September 2003 in order to understand the highest volume pedestrian flows. The spatial distribution of pedestrian volumes (refer to Figure 6-1) identifies Downtown as having the highest pedestrian volumes and the Eastside the next highest.

The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. Respondents to a

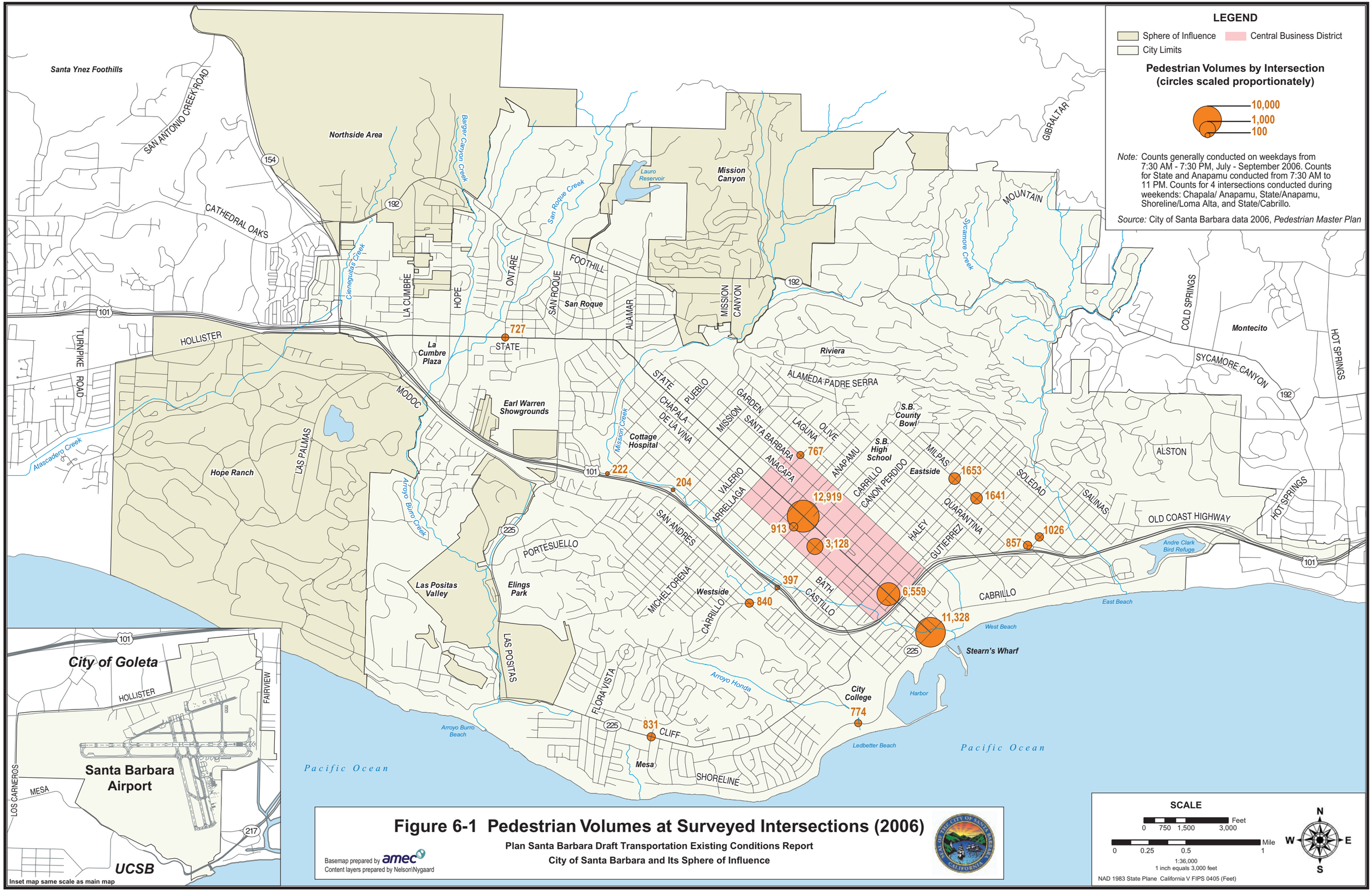


Figure 6-1 Pedestrian Volumes at Surveyed Intersections (2006)

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City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

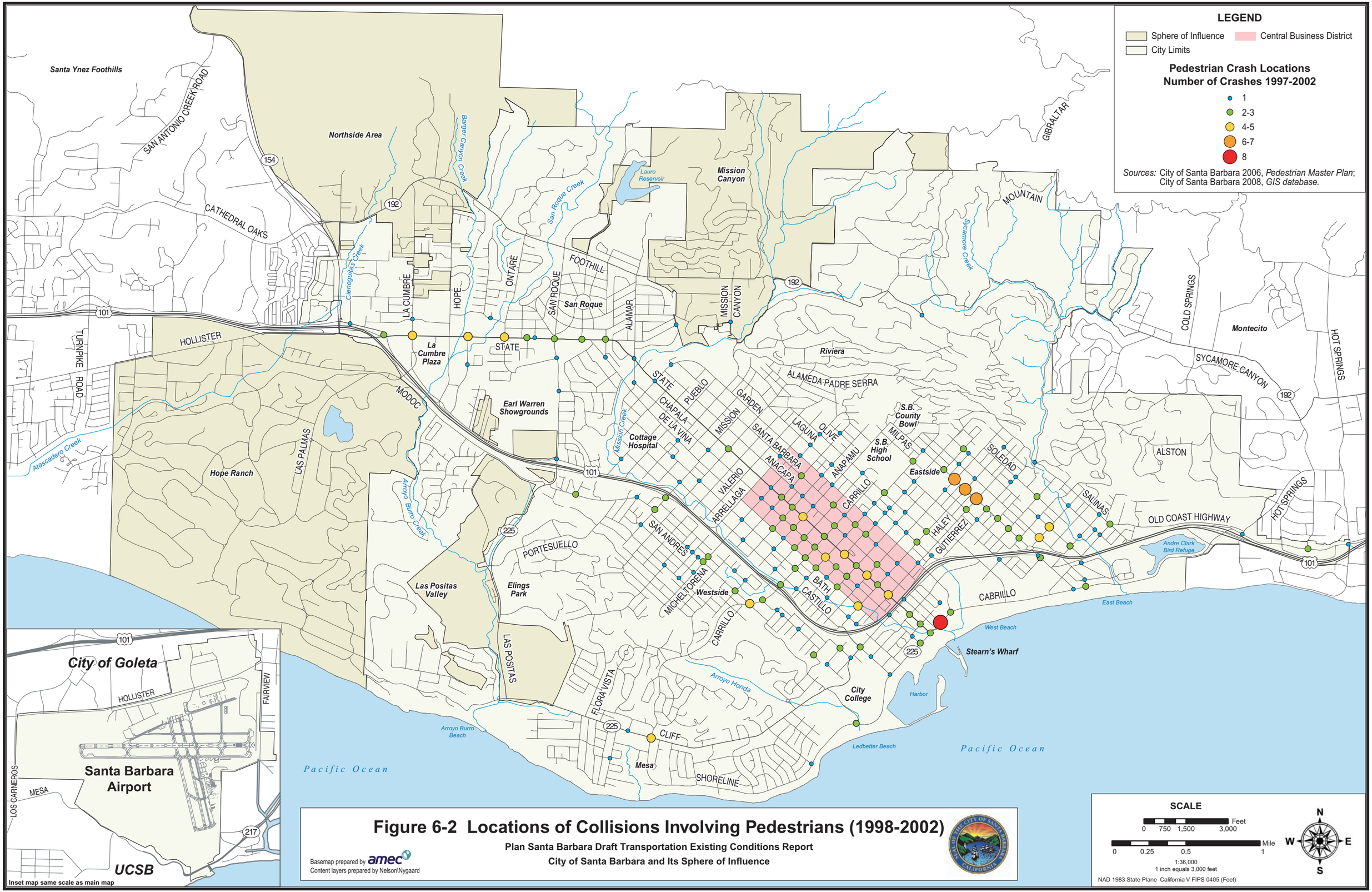

Figure 6-2 Locations of Collisions Involving Pedestrians (1998-2002)

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Basemap prepared by amec
Content layers prepared by Nelson\Nygaard

survey undertaken as part of the 2006 Pedestrian Master Plan were asked to name the top reasons they don't walk more often; the top responses relevant to this report were:

- Destination too far
- High traffic volumes or speeds
- Inadequate separation from traffic
- Autos do not yield to pedestrians
- No sidewalk

6.5 Safety Issues

Overall, Santa Barbara offers a safe environment for people to walk, with a per capita pedestrian collision rate nearly 50% lower than the average for other California cities. Nonetheless, a total of 428 pedestrian-involved collisions were reported to police between 1998 and 2002. Figure 6-2 shows the spatial distribution of pedestrian collisions for these years.

By time of day, collisions involving pedestrians peaked during the evening commute. Additionally, over a quarter (28%) of collisions involving pedestrians occurred before sunrise or after sunset. As an indicator of fault, 64% of post-collision citations were given to drivers, and 36% to pedestrians. The most common violation leading to a pedestrian-vehicle crash was "Vehicle failed to yield to pedestrian in crosswalk." suggesting that increased education and enforcement of crosswalk yield violations could reduce this type of pedestrian-involved collision.

6.6 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- Overall, Santa Barbara already has a relatively well-developed pedestrian realm characterized by a fairly continuous pedestrian network, pedestrian connectivity in almost all areas of the city, high-quality pedestrian amenities in many areas, and low per-capita pedestrian collision rates.
- Significant areas with high pedestrian volumes where pedestrian connectivity or amenity is less than ideal include: crossings of U.S. Highway 101, Upper State Street, the waterfront area, Cabrillo (where tourists scramble across the street), Anacapa, Milpas (open campus lunch trips from Santa Barbara High), and Cliff Drive. Pedestrian linkages between Alta Mesa and the Westside to Downtown are also intermittent, with the heavily used unpaved path along Loma Alta targeted for improvement. Pedestrian linkages between Veronica Springs and other Las Positas Valley neighborhoods and Arroyo Burro Beach Park, Elings Park and the Douglas Family Preserve are also intermittent. Remediating these and other "missing links" in the pedestrian network—with prioritization of improvements for intersections and corridors with higher-than-average rates of pedestrian volumes, collisions, or both—is an ongoing process that will require sustained funding.
- The City's pedestrian mode share for commuting to work is already higher than the national and state averages (refer to Figure 2-1). Walking is usually a viable mode for short-distance ("micro-level") trips (refer to Figure 1-1). For this reason, the most effective way for walking to help the City achieve its policy goal of reduced peak-hour vehicle trips is to facilitate more mixed-use, moderate-density development in existing urbanized areas, in order to put more origins and destinations within short walking distance of each other.
- Many communities find that a significant amount of their peak-hour traffic is due to parents driving their children to school. Expansion of the existing Safe Routes to School program could ensure that more school-aged youth that live within near the school could safely walk or bike to school.
- Based on pedestrian surveys and collision data, increased enforcement and education regarding moving violations that endanger pedestrian safety would complement Santa Barbara's investments in pedestrian infrastructure and amenities.

7 AUTOMOBILE PARKING[20]

7.1 Overview

Research has shown that the availability and price of parking is one of the single largest determinants of the decision to drive or travel by some other mode. Beginning with its

[20] Sources: Interviews with city transportation and parking program staff; City of Santa Barbara Municipal Code, Title 10: Transportation and Parking and Title 28: Zoning Ordinance; City of Santa Barbara "Lot Information Sheet" (undated); City of Santa Barbara "Bi-Annual Occupancy Graphs" (September 2007); City of Santa Barbara Waterfront Area Transportation Study (May 2001); SBCAG 2007 Commuter Profile Report (June 2007).

1979 Transportation Management Plan — which recognized the fact that the City can't feasibly accommodate all commuters who might choose to drive downtown—the city of Santa Barbara has been active in promoting parking management strategies to balance the needs of all motorists. The public parking system (including on-street parking and off-street lots and garages downtown and in the Waterfront area) is designed so that visitors' and shoppers' short-term parking needs are prioritized, while long-term commuter parking is deemphasized.

In addition, the City has established numerous residential parking permit districts to protect residents from spillover parking problems caused by non-residents parking in neighborhood areas. Santa Barbara has fairly conventional off-street parking requirements for new development, while many other communities have found that such requirements do not reflect actual demand and often act as a barrier to high-quality, "low-traffic" development.

7.2 Facilities

7.2.1 Downtown Parking

7.2.1.1 Off-Street Parking

There are fourteen off-street lots and garages in the downtown area (two of which are devoted solely to commuters) comprising over 3,300 off-street parking spaces. Parking in the non-commuter lots is free for the first 75 minutes (150 minutes for motorists displaying a disability placard) and $1.50 per hour thereafter. There are no time limits on the length of stay. Parking facilities are open 24 hours a day, 7 days per week, but priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm.

The City sells commuter/monthly parking passes in 12 short-term lots and garages, but to maintain parking availability for short-term parking needs closest to the downtown area, monthly passes for commuters are progressively less expensive the further the parking lot is from downtown. Passes range from $100-150 monthly and include free travel on downtown and waterfront shuttles. To ensure that there will always be short term parking available in short-term lots, the city stops selling monthly passes when a lot reaches 85% occupancy.

The two downtown commuter lots are dedicated exclusively to commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). Purchase of a monthly pass at either lot also includes free travel on downtown and waterfront shuttles.

Parking facilities and the "75 minutes free" are funded via the Downtown Parking Benefit and Improvement Assessment District, in which property owners pay an annual assessment derived by formula based on their proximity to (e.g., their "benefit" from) off-street public lots and facilities.

During the peak demand hour for the downtown parking system, average occupancy for the 3,200 short-term parking spaces is 69%, with occupancy for individual facilities ranging from 36% to 93% (refer to Figure 7-1). In other words, while individual parking facilities may have high occupancy rates at particular peak periods, there are over 1,000 off-street short-term parking spaces available at the peak demand hour for the entire downtown parking system as a whole.

This situation described above suggests that parking deficits in downtown Santa Barbara are not the result of a supply problem, but rather a distribution problem. Many communities have found that parking distribution problems can be solved without adding new supply, through such strategies as demand-responsive rather than flat-rate pricing (e.g., prices are higher at times and locations where demand is high, and lower or free at times and locations when demand is low). Santa Barbara's existing transit shuttles/circulators are also a partial solution to address the distribution problem in that they provide another option for people who don't want to walk from peripheral parking locations to their ultimate destination. However, the frequency of this service varies and delays may contribute to resistance to parking in outlying locations.

7.2.1.2 On-Street Parking

On-street parking is free downtown for limited durations, ranging from 15-75 minutes depending on the street. Generally speaking, 75-minute time limits are in effect in the first two blocks off of the State Street corridor and in close proximity to the off-street public lots and garages in order to match the "75-minutes" free time limit for these off-street facilities. Outside of downtown parking is free up to 90 minutes.

No data was available on the total supply or recent demand of downtown on-street parking. However, anecdotal observations indicate that major downtown employers such as the County, City and retail businesses along State Street with limited or no employee parking are major users of downtown and nearby residential neighborhood on-street parking.

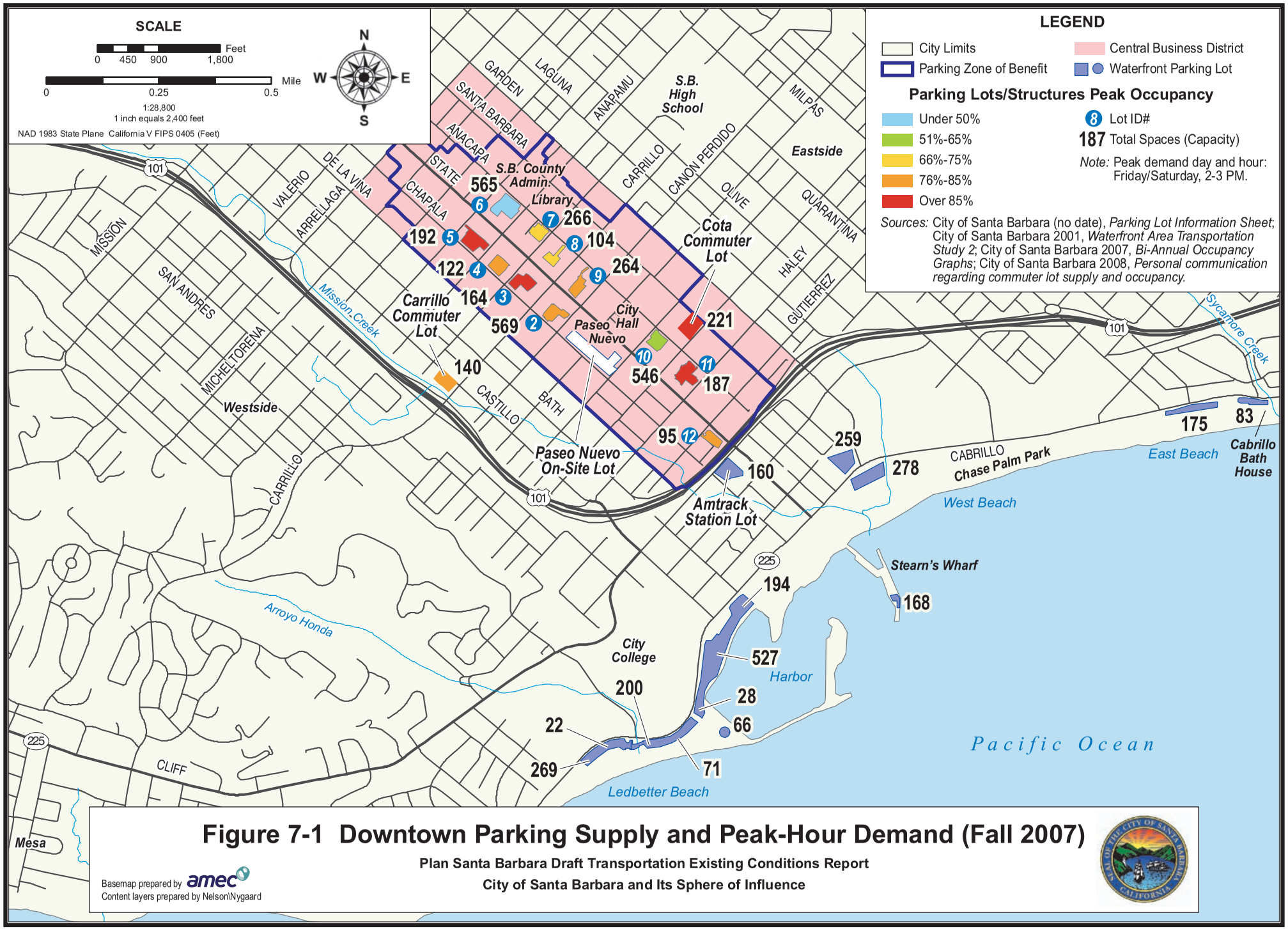

Figure 7-1 Downtown Parking Supply and Peak-Hour Demand (Fall 2007)

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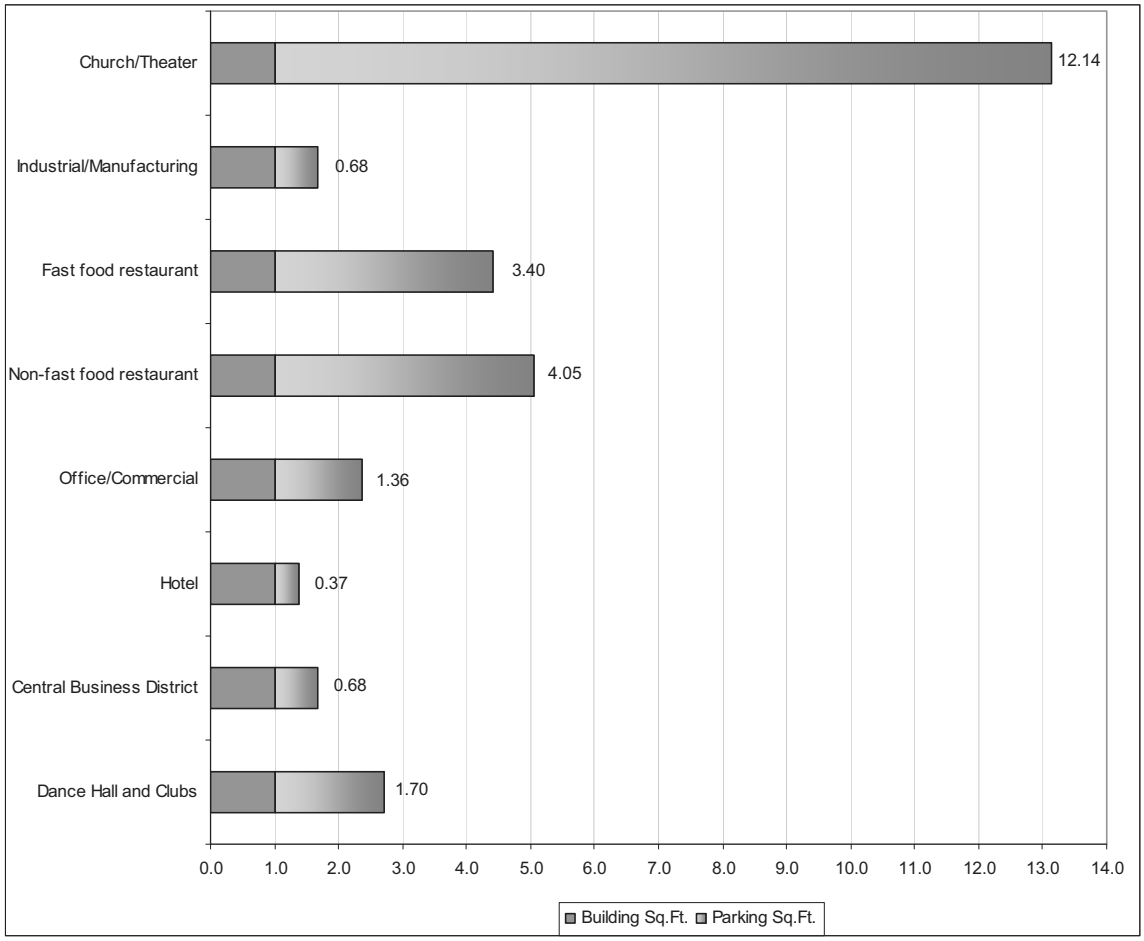
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Content layers prepared by Nelson\Nygaard

Figure 7-2: Square Feet of Parking Area Required for Each Square Foot of Building Area for Typical Uses



Source: City of Santa Barbara Municipal Code, Title 28.

7.2.2 Residential Parking Permit Program

The city of Santa Barbara has a fairly typical residential permit parking program to prevent non-resident parking spillover problems in residential areas. The program was created following the 1980 decision to reduce parking requirements for the Downtown core in anticipation that some downtown employees might park in the downtown-adjacent residential neighborhoods. There are currently 9 residential permit parking areas. Residential parking permits are available for $15/month, up to three resident permits and one guest permit per household. The City finds that this ratio leaves a reasonable ratio of free to occupied on-street parking in residential neighborhoods.

7.2.3 Waterfront Parking

Waterfront parking lots also charge more for proximity to popular destinations. The beach lots closest to downtown, the main harbor and the beach charge $1.50/hour, while the lots further away charge $2 for 3 hours ($0.66/hour). There is a maximum daily charge of $7 or $9. Annual passes are also available for $95, and are prorated depending on the time of year they are purchased. Waterfront parking is managed by the Waterfront Department.

7.3 Policies

7.3.1 Minimum Parking Requirements for New Development

The city of Santa Barbara's existing minimum parking requirements are fairly typical for Southern California cities. Santa Barbara's minimum parking requirements often require more than one square foot of parking area for every square foot of building (refer to Figure 7-2). While the City has reduced requirements for new development in the Central Business District (as described below), many cities have found that excessive minimum parking requirements (which essentially function as a development impact fee) are a barrier to high-quality development (af-

fecting the density, mix of uses, and design of new development), that can undermine their policies goals of creating "low-traffic" development.

In general, the code-required parking is interpreted to be the same as the actual parking demand. The City's current identified parking requirements for new development are generally not tailored to various uses in different parts of the City.

7.3.2 Parking Benefit and Improvement Assessment District

Reduced parking requirements are permitted for new development in the "delineated zone" of the Central Business District. This is in recognition of the mixed-use, compact, walkable, and transit-intensive character of downtown as well as the revenues derived from the Downtown Parking Benefit and Improvement Assessment District (PBIAD) for downtown parking facilities. Within the PBIAD, property owners pay an annual assessment based on their proximity to (e.g., their "benefit" from) off-street public lots and facilities. Revenues are used to construct, operate, and maintain downtown public parking facilities.

This arrangement resembles a parking in-lieu fee, where developers pay a fee at the time of project entitlement in exchange for reductions in the project's parking requirements, and revenues are used to construct and maintain parking or, increasingly, fund multimodal improvements. The key differences are that Santa Barbara's assessment is 1) paid annually, 2) paid by all property owners and not just new development projects, and 3) assessed on new development projects even if they are required to fully meet their on-site parking requirements (which the City requires when adjacent off-street public parking facilities consistently experience 85% occupancy or above).

7.4 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips:

- The city of Santa Barbara is a recognized leader in the management of off-street parking for downtown, in two areas especially:
    - Prioritizing the provision of short-term parking for visitors and shoppers over long-term commuter parking.
    - Using any surplus parking revenues (net of parking facility operations and maintenance costs) to fund transit service enhancements and free transit passes for downtown employees and City employees working downtown.
- The pricing of off-street parking facilities downtown could be evaluated for its impact on inducing additional peak-hour vehicle trips. For example, the low prices of monthly commuter passes ($30-$40) at commuter lots equate to $1.50 to $2 per day, much lower than the cost of a regional transit trip and likely much lower than the financial value of the land considering downtown Santa Barbara's high land values. In addition, the flat-rate pricing and lack of time limits at short-term (combined with the first 75 minutes free) at downtown off-street lots and garages may not provide a great enough incentive to deter commuter parking. Alternatives include progressive tiered-rate pricing (e.g., the 3rd hour is priced higher that the 2nd, the 4th hour is priced higher than the 3rd, and so on) and/or demand-responsive pricing in which prices are set for each facility based on average historical demand patterns at that facility.
- One area in which Santa Barbara differs from other communities is in the management of on-street parking, relying on time limits rather than demand-responsive pricing (e.g., pricing parking based on demand patterns) to promote turnover. While the reduction of on-street time limits from 90 minutes to 75 minutes reduced employees shuffling cars from space to space, this phenomenon is still prevalent. With off-street parking priced after the first 75 minutes and on-street parking free, motorists may have a financial incentive to cruise for free on-street parking. Other communities have found metering a more cost-effective (and visitor-friendly) strategy for managing on-street parking. Some portion of any net revenue generated by pricing on-street parking could be invested in pedestrian improvements or multi-modal programs (e.g., increased marketing of off-street parking options and increased frequency of transit service).
- Santa Barbara's current residential permit parking program relies on time limits to reduce non-resident parking spillover problems in residential neighborhoods; some communities have found that in neighborhoods where on-street parking ca-

pacity exists during the day, it is more cost-effective option to sell on-street parking to non-residents at market rate prices while continuing to allow residents with permits to park exempt from time limits or pricing.

- SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace; one opportunity for the city of Santa Barbara to reduce peak-hour vehicle trips would be to develop enforcement mechanisms with the State's existing parking cash-out law, which requires certain employers to offer their employees the option to either a) "cash out" the financial value of any employer-provided parking that they don't use or b) price employer-provided parking and give all employees a monthly transportation allowance that they can spend on employee parking or other modes commuting (similar to the existing Cottage Hospital program in which parking is priced, all employees receive a transportation subsidy, and employees who don't use the parking can use the cash to offset their transit commuting costs). Alternatively, the city of Santa Barbara could develop a local parking cash-out ordinance that would apply to more types of employers than does the State law.
- Currently, the city of Santa Barbara requires parking demand studies for larger developments. MEA traffic analysis procedures also provide for traffic impact analysis based on demand. In addition, modifications to the existing minimum parking requirements can be requested by project sponsors and are sometimes approved. Further analysis could be undertaken to evaluate how existing parking requirements compare to actual demand patterns in Santa Barbara, peer communities, and/or national averages. This analysis will be an important component in support of the Plan Santa Barbara goal of reducing peak-hour vehicle trips.
- Currently only the Granada Garage is able to monitor real-time occupancy data, and that data is displayed at the garage entrance. City parking staff are currently pursuing implementation real-time occupancy monitoring equipment at all downtown off-street parking facilities; some communities have found that providing information on parking availability to motorists on-site via facility signage can help reduce traffic congestion caused by cruising for parking. In addition, providing this information before motorists begin their trip via website or phone can help motorists decide whether to drive or take some other mode if parking isn't available.

8 TRANSPORTATION DEMAND MANAGEMENT

8.1 Overview

"Transportation Demand Management" (or TDM) is a somewhat arcane term that simply means investing in cost-effective programs that will create incentives and encourage more people to either:

- Shift more of their *auto* trips to times of day that have less congestion (or avoid the auto trip altogether through strategies such as telecommuting).
- Shift more of their *overall* travel to modes that create less congestion (carpool, transit, bicycle, or on foot).

TDM programs recognize that transportation resources are always scarce and that construction or technology projects to widen roadways or improve traffic flow are typically quite expensive on a "per trip accommodated" basis. For this reason, the most effective TDM programs are based on the principle that it is often cheaper to pay people not to drive (or give them some other incentive that they value such as priority parking for carpools, additional vacation time, etc.) than it is to accommodate their vehicle trip.

Some TDM programs include marketing and education programs to ensure that commuters are aware of the alternatives to driving. These have proven effective, although the most significant impacts are seen when general marketing is supplemented with personalized outreach (such as telephone or even door-to-door contact providing "Transit Starter Kits" and individualized transit commute plans).

The city of Santa Barbara, the County of Santa Barbara, and SBCAG all have active TDM programs as described below. (Note that while parking management programs are an important part of most TDM programs, parking management policies are described in the parking section above).

8.2 Citywide TDM Programs[21]

The city of Santa Barbara has several TDM requirements for new businesses and new development projects, including:

- TDM plans may be applied by the City as a condition of approval for development projects that: a) request an adjustment (or "modification") from the City's existing minimum parking requirements, b) need to mitigate significant traffic effects associated with the project; or c) propose TDM measures as project benefits. For those projects that establish TDM plans, there is no post-occupancy monitoring or enforcement mechanism to ensure compliance with or evaluate the effectiveness of the TDM plans.
- Transportation demand management has been required for new business licenses for the past 15 years. To receive their business permit, new businesses must offer free transit passes to their employees, and provide reserved parking spaces for carpools and vanpools. Downtown businesses that predate the transportation demand features of the business permit approvals process can qualify for 90-day transit passes at a steeply discounted rate of $45 per employee as part of the Downtown Bus Pas Program described below. There is no monitoring for compliance with the program.
- As discussed in the transit and parking sections of this report, the City also funds a "Bus Pass Program" which provides steeply discounted MTD bus passes for any downtown employee that requests them. The program is funded from net revenues from downtown parking facilities.

Though the City's Work Trip Reduction Incentive program (or "WorkTRIP"), the City has a number of TDM measures in place for specifically geared towards City employees:

- The "My Ride" program provides free MTD transit passes for City employees (regardless of the employees' work location) for use on any transit trip (i.e. not just for commute trips). In the period from July 1 to December 31, 2007, 165 City employees used their MyRide passes for a total of 9,098 MTD transit trips. This program is funded by net revenues from downtown parking facilities and non-capital transportation funds.
- In addition to receiving free MTD transit passes through the My Ride program, City employees can select from one more of the following commuter benefits:
  - 75% subsidy for costs of a full vanpool or 75% subsidy of monthly or ten-ride passes for long-distance transit services (such as the Coastal Express and Clean Air Express). Approximately 60 City employees participate in this program.
  - "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rests of the vehicle costs funded by the department providing the vehicle. This program is currently paid for with non-capital transportation funds, but over time it is envisioned that the funding responsibility will be shared by all departments on a pro rata basis according to the total number of employees in each department. This program is in its second year and currently has 53 City employees in 18 registered carpools.
  - City employees who commute by bicycle are offered steeply discounted annual or per use memberships in the downtown Bikestation, which offers secure bicycle parking and other amenities for bike commuters (as described in detail on the bicycle section of this report). Currently 17 City employees are Bikestation members.
- The City offers a 9/80 work schedule to all employees. Eighty-one percent of City employees participate, resulting in a significant reduction in commute trips made by City employees due to the elimination of many commute trips on alternating Fridays. In addition, City employees participating in the 9/80 schedule have a reduced impact on peak hour traffic congestion, because the program results in their commute trips occurring outside of conventional peak commuting hours.
- Through SBCAG Traffic Solutions' FlexWork program, the City offers flexible work schedules and telecommuting options to any employee whose supervisor approves.
- The City has recently explored the feasibility of partnering with a carsharing organization that would potentially replace some portion of the City's fleet vehicles and make these vehicles available to the general public when not needed by City employees. While those negotiations did not result in the establishment of a carsharing program, the City did recently change its "vehicle use policy" – which formerly permitted use of City

[21] Sources: Interviews with City TDM and parking program staff.

fleet vehicles only for work-related trips, unplanned overtime, medical appointments, and approved emergency trips – to also allow for occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies. This revised policy allows employees to feel more confident that they can regularly commute to work by transit, on bicycle, or by walking, because they know that a car will be available to them during the work day if needed.

- In addition, the City has a number of other TDM programs, including:
  - Preferential parking for carpools and vanpools.
  - A City purchased and maintained fleet of bicycles located at many work sites for use during business hours.
  - Secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations.
  - "Urban cycling training" to build confidence in novice bike commuters, teach safe riding skills, assist with route planning, and provide related support and encouragement.

Some evaluation of the impacts of the City's TDM programs has been done, including:

- SBCAG Traffic Solutions' "TS Online" (www.trafficsolutionsonline.info) is used by City employees to register their participation in the various TDM programs and to log how many days they traveled to work each week by alternative modes (i.e. not in a single-occupant vehicle). This self-reporting is required in order for employees to continue receiving WorkTRIP benefits. City employees are additionally encouraged to be consistent in logging the days they commute by alternative modes through the "Green Commute Challenge" weekly raffle, in which two randomly selected employees who have logged one or more commute trips by alternative modes in the previous week are given $50 gift cards to local businesses.
- There are currently 310 registered City employees on TS Online, meaning that 310 out of a total of 1,727 City employees (about 1,200 full-time equivalents) are participating in some aspect of the City's WorkTRIP TDM program.
- The TDM impacts of the City's WorkTRIP program for the 14-week period of 4/15/08 through 7/27/08 (as estimated by TS Online calculations) include the following:[22]
  - Total vehicle trips eliminated: 5,418
  - Total vehicle miles eliminated: 164,939
  - Total pounds of vehicle emissions reduced: 152,558
- In addition, the City conducts an annual survey of City employees' commute patterns. While participation is voluntary, the survey has an extraordinarily high response rate of 30%. A significant shortcoming of these kinds of surveys is due to "self-selection bias," as those who respond are disproportionately more likely to be using alternative modes because they are motivated to report what is working (and not working) with the City's transportation benefit programs. For this reason, the overall mode split of the City workforce is not reported here, and is assumed to be comparable to mode splits reported for all residents and workers in the city of Santa Barbara, as described in the demographics section of this report.

One City practice that potentially undermines the effectiveness of its WorkTRIP program is the provision of free parking to City employees in the two downtown commuter parking lots as well as at certain city building (such as the parking lots at the Public Works Building, Water Treatment Facility, and City Hall). In addition, those employees who don't have access to free *off*-street parking can usually find free all-day parking *on*-street (with the exceptions of the Library and the Carrillo Recreation Center which are the only City facilities without free parking available nearby). Even when on-street parking has 2-hour time limits, employees can still park all day for free on the street by simply leaving work every 2 hours and moving their cars to a different on-street space (i.e. the "2-hour shuffle").

[22] It is worth noting that City transportation staff believe there is significant under-reporting of alternative commuting due to the fact that the calculations are based on employee self-reporting. Source: "Work Trip Reduction Incentive Program Update," City of Santa Barbara Council Agenda Report, 3/25/08.

8.3 Downtown Specific TDM Programs[23]

8.3.1 Downtown Bus Pass Program

The Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. To be eligible, an employee must work within the area circumscribed by De La Vina Street, Garden Street, Mason Street, and Sola Street. Certain private employers and employees from other public agencies are excluded from this program if they provide their own bus pass program. City employees receive their bus-pass for free. Currently, 264 workers are actively enrolled in the bus pass program, including 92 City employees and 178 Downtown employees. The program is funded by revenue generated at parking lots and garages in the downtown area.

8.3.2 Downtown Parking Program

The Downtown Parking Program manages 12 short-term public parking lots and garages and two commuter lots. In the short-term lots and garages, parking is free for the first 75 minutes, but $1.50 per hour thereafter. A portion of the parking revenue goes to support additional peak-hour transit service as well as the Downtown Bus Pass Program, installation of bike lockers, and other multimodal amenities in the downtown area.

8.4 Santa Barbara County Employee Programs[24]

Onsite parking for County employees working downtown has an estimated *ten-year* waiting list for a permit. Employees who still drive and do not wish to pay for parking in public lots either park on-street in surrounding residential neighborhoods, park on-street in commercial areas and move their car every 75 minutes, or park in commuter satellite lots and take an MTD shuttle into downtown.

While the County has not yet explored the option of charging employees for parking or offering parking-cash out as a strategy to reduce demand, the County has developed several TDM strategies as part of its "Commuter Benefits/Alternative Work Schedules" program in order to both reduce parking demand and to provide a fringe benefit for employees. This program is geared toward promoting a) commuting by transit bus or vanpool, b) working at an alternative site part or full-time or, c) changing work hours to avoid peak-period commuting. While the program is focused on employees who commute into Santa Barbara from North County or from Ventura County, any employee can participate in any of the program incentives, which include the following:

- County employees can receive an additional two days of vacation per year if they use alternative transportation for 80% of their commute trips in a pay period.
- The County will provide a $10 subsidy each month to help offset the cost of a transit pass. Pre-tax commuter checks are also available for employees, for a total combined pre-tax benefit of up to $115.

Though the supply of individual parking permits is highly constrained, carpool/vanpool passes can be obtained for day-to-day use of the County Administration Building lot (220 spaces) or the Garden Street lot (177 spaces), on a space-available basis. The driver must be a regular employee with at least one year of service with the County, and must have the other passengers in the vehicle when they park. A commuter permit must be obtained in advance from the County General Services department.

With department and supervisor approval, County employees can arrange for an "alternative work schedule" in which employees work either a flexible schedule or a compressed work week and/or "telecommute" by gaining access to the County's Virtual Private Network (VPN) in order to have access to the County computer network at home.

8.5 SBCAG Traffic Solutions TDM Programs[25]

SBCAG Traffic Solutions has developed several programs to support reduction in regional vehicle commuter trips, including bicycle programs, commuter buses (described in the transit section) emergency ride home programs, vanpool formation, carpool matching, and an employer consulting program. Altogether, SBCAG estimates that its Traffic Solutions programs had the following impact in FY 2006-07:

[23] Sources: Interviews with City TDM and parking program staff and the City's Downtown Bus Pass Program website (accessed at www.santabarbaraca.gov/Business/Transportation_and_Parking/Downtown_Parking/BUS_PASS.htm in May 2008).

[24] Sources: Interviews with County TDM Benefits staff and County TDM Benefits website (accessed at www.sbcountyhr.org/benefits/commuterbenefits.html in May 2008).

[25] Sources: SBCAG program materials, interviews with SBCAG staff, SBCAG FY 2006-07 Annual Report (October 2007), and SBCAG website (accessed at www.trafficsolutions.info/default.htm in May 2008).

- 489,536 fewer automobile trips
- 19.7 million fewer vehicle miles traveled
- 887,382 fewer gallons of gasoline consumed
- $8.8 million in commuter cost savings
- 7,570 metric tons of pollutants removed

The Flexwork SB program appears to have achieved an especially noticeable reduction in peak-hour vehicle trips. The Flexwork SB Program, administered by SBCAG, was developed with the overall goal to stimulate more telecommuting and flexible work schedules countywide, to reduce peak period traffic congestion, improve air quality, and assist employers in addressing high staff turnover that results from long distance commutes. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

Phase 1 of the program was funded by Federal Congestion Mitigation and Air Quality (CMAQ) funds, and completed implementation in 2006. It is estimated to result in 109,000 fewer peak hour trips each year (73,000 from U.S. Highway 101 south to Ventura) and approximately 1.5 million fewer vehicle miles traveled (VMT). At the completion of Phase 1 in 2006, the FlexWork program had 363 participants each month.

Approximately 8,700 employees are impacted by the FlexWork Santa Barbara Phase 1 program. Phase 2 of the program seeks to expand the level of participation by these employers, focusing on recruiting employers who meet the following criteria:

- Private sector employers located near the project corridor in the Downtown area and on both sides of U.S. Highway 101 in Santa Barbara.
- Private sector employers with large numbers of employees traveling through the project corridor, located in Goleta, Summerland and Carpinteria.
- Employers that participated in FlexWork Phase I that have the potential to further expand their Flexwork programs, such as Cottage Health System, the county of Santa Barbara and the city of Santa Barbara.
- Commitment from participating employers: Employers that are selected to participate in Phase II will be required to commit to implementing a pilot flexwork program consisting of a minimum number of employee participants.[26]

In addition, to its role as a consultant to employers, SBCAG Traffic Solutions staff also provides ad hoc technical assistance to cities that wish to include TDM strategies in policy and regulatory documents. In a similar fashion, developers often contact Traffic Solutions staff (usually at the recommendation of entitling agencies or local business organizations such as the Chamber of Commerce) to get assistance with crafting appropriate TDM strategies to reduce peak-hour vehicle trips associated with their development.

8.6 Private-Sector TDM Programs

Interviews with public agency staff revealed that several private-sector employers implement TDM programs, including:

- Cottage Hospital in Santa Barbara has a "parking cash-out" program in which all employees are paid an additional $75/month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75). Employees who don't drive to work or who drive less frequently receive additional take-home pay, while employees who must drive everyday are no worse off then if parking was free.
- Raytheon, the largest employer in Santa Barbara, provides heavily subsidized carpool/vanpools for employees, as well as bicycle parking, showers, and change rooms to encourage bicycle commuting.

8.7 Other TDM Programs

8.7.1 UCSB TDM Programs[27]

UCSB offers a wide range of TDM programs to encourage students, faculty, and staff to use alternative modes through its Transportation Alternatives Program (or TAP program), including:

- Free MTD rides for UCSB students from 7 days before the first day of classes until the last day of final examinations, funded by a mandatory student fee
- 50% discounted monthly MTD pass for faculty/staff

[26] Source: SBCAG website (accessed at www.sbcag.org/Newswire/2006/08-06.htm in June 2008) and FlexWork Phase I Final Report (July 20, 2006).
[27] Sources: UCSB Transportation Alternatives Program (TAP) website (accessed at www.tap.ucsb.edu in May 2008) and interviews with SBCAG staff.

- Carshare program operated by ZipCar (2 or 3 vehicles) offered to all students, faculty and staff, and at discounted rate for TAP enrollees
- Flex schedules and telecommuting for certain staff
- No charge vanpool program
- Bicycling promotion programs
- Free parking pass for TAP registered carpools and vanpools
- 57 hours of complimentary campus parking per quarter for TAP registered students (to allow individuals who have given up their parking pass as part of the TAP program to drive on those occasions when they need to)
- Emergency Ride Home program

The program is funded through fines and forfeitures revenue collected by Transportation and Parking Services.

8.7.2 City College TDM Programs[28]

Anecdotal information suggests that Santa Barbara City College (SBCC) students are a major source of traffic congestion on City streets and on U.S. Highway 101, with as many as 3,000 students, faculty and staff living within 10 miles of campus. SBCC offers a wide range of TDM programs to encourage students, faculty, and staff to use alternative modes through its Alternative Transportation Program, including:

- Free MTD rides for SBCC students from 7 days before the first day of classes until the last day of final examinations.
- SBCC dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai).
- Carpool matching program (called GreenRide) to find other interested carpoolers who live nearby and have similar schedules and preferences.
- Priority parking spaces closer to classrooms and administrative offices for carpools.

8.7.3 APCD's "Santa Barbara Car-Free" Program[29]

The Santa Barbara County Air Pollution Control District (APCD) leads a cooperative TDM program called "Santa Barbara Car Free" which promotes sustainable "car-free" or "car-light" tourism in the Santa Barbara region. Program materials, including a visitors map and guide, highlight "How to travel *to* Santa Barbara car free" and "How to travel *around* Santa Barbara car free." The program is considered a model program and has won state and national awards, including an Environmental Award from the U.S. Environmental Protection Agency Region 9 and a Marketing Excellence Award for "Best Niche Marketing: Eco-Tourism" from the California Travel and Tourism Commission (CTTC).

8.8 Policies[30]

The most important TDM policies are from the city of Santa Barbara's current General Plan Circulation Element and SBCAG's Regional Transportation Plan, and these are summarized in Appendix A. SBCAG has additional TDM policies relevant for the *Plan Santa Barbara* project, which are listed below:

SBCAG Traffic Solutions – Program Objectives

- To provide a countywide TDM program, regional commuter bus service and ridesharing information.
- To develop programs benefiting the public and to provide information about transportation choices through education, outreach and public participation.
- To promote cooperative relationships with local businesses, government agencies, and community groups and individuals to expand participation in commuter programs.

8.9 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal of reducing the rate of growth of peak-hour vehicle trips. Specific opportunities will then be described and analyzed in greater detail in the next stage of development of the Plan.

- The city of Santa Barbara, the county of Santa Barbara, and SBCAG all have active TDM programs that operate at the local and regional levels to reduce peak-hour commuting by public-sector employees.
- While some programs develop comprehensive performance measures of their TDM program, it was not possible to get performance measures for many programs. At a minimum, TDM programs

[28] Source: SBCC Alternative Transportation website (accessed at: www.sbcc.edu/commute/index.php?sec=2434 in May 2008) and interviews with SBCAG staff.

[29] Source: Santa Barbara Car-Free brochure and website (Accessed at www.SantaBarbaraCarFree.org in May 2008).

[30] Source: Source: SBCAG Traffic Solutions website (www.trafficsolutions.info), accessed on June 18, 2008.

should be organized to monitor and report participation rates, estimates of peak-hour vehicle trips reduced, and net cost-per-peak-hour-trip-avoided figures (potentially including estimates of the financial value of reduced social and environmental externalities).

- As discussed in the parking section, a more robust parking management program for on-street public parking, public- and private-sector employers, and at educational institutions could be an important part of reducing peak-hour vehicle trips. The cost for parking and the ability of the City to minimize long-term use of short-term parking spaces will be key factors impacting the level of auto use downtown and elsewhere.
- One opportunity for the City and/or County to consider pursuing is partnering with a carshare provider (such as ZipCar that has a car share "pod" at UCSB) to convert some or all of their motor pools to shared use vehicles that would be available to employees when needed and available to members of the public at other times. For example, the City has a total motor vehicle pool of 529 vehicles at a cost of over $4 million annually.[31] Several communities including Berkeley, California and Philadelphia, Pennsylvania, have seen savings from such a program, with no decrease in vehicle availability for employees. Several carsharing pods scattered downtown could allow more households to live without a car knowing that a car is available when needed.
- TDM requirements for new development and employers: As part of a jurisdictions' quasi-judicial "police powers" authority to maintain and enhance the public interest, it can require new development to: a) create transportation demand management plans, b) implement a full range of TDM programs and policies (such as free transit passes, unbundling of parking prices, carsharing, etc.), c) establish and achieve performance measures (participation rates, levels of investment, mode split targets, etc.), d) conduct regular monitoring and reporting on the effectiveness of the TDM plan in meeting the performance measures. The mechanism for implementing these requirements includes "conditions of approval" or a stand-alone development agreement, and jurisdictions are able to assess penalties for non-compliance or non-attainment of the performance measures, just as with any other condition of approval or provision in a stand-alone development agreement. Consideration of a more comprehensive package of TDM requirements as part of the development approval process in Santa Barbara could be initiated to support *Plan Santa Barbara*'s policy goal of reducing the future rate of growth in traffic congestion.
- TDM requirements for existing development and employers: Senate Bill 437 (Lewis) was adopted by the California State Legislature in October, 1995 (Health and Safety Code Section 40717.9). SB 437 declares that public agencies "shall not require an employer to implement an employee trip reduction program unless the program is expressly required by federal law and the elimination of the program will result in federal sanctions or the loss of federal transportation funds." SB 437 was enacted specifically in response to the repeal of the 1990 Amendments to the federal Clean Air Act "employee trip reduction programs", and does not mention the much broader term "transportation demand management." It applies only to this one specific technique of "trip reduction programs", not to all types of TDM policies, programs and requirements. To emphasize this point, SB 437 includes this statement: "*Nothing in this section shall preclude a public agency from regulating indirect sources in any manner that is not specifically prohibited by this section, where otherwise authorized by law.*" The term "indirect source" is not defined in state law but is broadly defined in federal law to mean "a facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution…" Some jurisdictions in California have interpreted SB 437 to mean that only new employers and development, and not existing ones, can be required to implement TDM programs. To the consultant's knowledge, there is no case law or published legal opinion supporting this interpretation. Consideration of incentives for large employers and developments to encourage voluntary participation in the TDM programs of a citywide Transportation Management Association could be initiated as an important first step to support *Plan Santa Barbara*'s policy goal of reducing the future rate of growth in traffic congestion. Consideration of citywide Transportation Management Ordinance that would require large developers and large employers to gradually come into compliance with the TDM requirements of

[31] Source: City of Santa Barbara Department of Public Works Annual Report FY 2006-07.

the ordinance would also be an effective tool for reducing the future rate of growth in traffic congestion in Santa Barbara.

- Currently the city of Santa Barbara doesn't have a transportation impact fee of any kind; such a fee could be imposed to support the policy goals of this project if a) the fee assessment was based on number of auto trips generated and b) the fee revenue was dedicated to multimodal programs and projects that reduce peak hour vehicle trips.
- SBCAG Traffic Solutions' currently ad hoc assistance to cities and developers with TDM planning and implementation could be formalized and made part of its official mission (similar to its "clearinghouse" role in providing TDM assistance to employers in Santa Barbara County).
- School-age children (K-12) ride free on MTD buses and MTD provides supplemental "boost" shuttle circulators directly serving some primary and secondary schools, but opportunities may exist to increase the ability of MTD to provide transportation services to and from school. Many parents instead drive their children, or older students may drive their own cars, causing traffic congestion near schools at the beginning and end of the school day. Another potential strategy with a lower cost would be to focus on increasing the walking and bicycling rates of students who live close enough to school to walk or bike.

9 PERFORMANCE MEASURES AND STREET CLASSIFICATION SYSTEM

9.1 Existing Transportation Performance Measures

9.1.1 Existing City Transportation Performance Measures

According to the city of Santa Barbara's 1998 Circulation Element, traffic impacts for new development and infrastructure projects can be calculated in two different ways. The first method examines traffic impacts by adopted automobile Level of Service (LOS) standards at signalized intersections. Currently, a signalized intersection is considered impacted if it exceeds the City's goal of LOS C, equivalent to a traffic volume to capacity ratio (V/C) of 0.70 to 0.80. The second approach examines signalized intersections for the purposes of environmental assessment under the California Environmental Quality Act (CEQA), which states that a project will impact an intersection if the V/C ratio exceeds 0.77, at which point an environmental impact report must be prepared.

9.1.2 Limitations of Existing City Performance Measures

In addition to defining current performance standards for traffic, the City's Circulation Element simultaneously realizes its shortcomings and questions the sole reliance on automobile LOS as a measure of success of the transportation system. In its "Constraints" section, the Element states that current standards restrict development near intersections that are at or near maximum capacity. These intersections are often near commercial centers or downtowns, which most easily facilitate transit and alternative modes of transportation. By effectively prohibiting moderate or higher-density residential and commercial development in these areas, current performance measures may inadvertently push development to outlying areas where development is not as well-served by transit and walking and bicycling trips are less feasible. The "Constraints" section concludes by stating that sole reliance on automobile LOS standards and mitigating traffic impacts through wider streets or new turn lanes simply isn't feasible or desirable in Santa Barbara. These widening projects compound problems by making roadways less attractive and safe for pedestrians and bicyclists.

9.1.3 Existing County Performance Measures

The county of Santa Barbara standards for determining significant traffic project-level impacts are very similar to those of the City. The County declares that a project will have a substantial impact if an intersection's automobile LOS falls below C. In addition, a project can also have a significant impact if the following criteria (refer to Figure 9-1) are met:

Figure 9-1: County Criteria for Significant Changes in Auto Levels of Service – Project Impacts

Intersection Level of Service (Including Project)	Increase in V/C or Trips Greater Than
LOS A	0.20
LOS B	0.15
LOS C	0.10
LOS D	15 Trips
LOS E	10 Trips
LOS F	5 Trips

9.1.4 Existing Congestion Management Plan Performance Measures

SBCAG's 2003 Congestion Management Plan (CMP) states that per Section 65089(b) (1) (B) of the California statute, the CMA is bound to establish a traffic LOS standard no lower than LOS E. If a segment or intersection has been deemed not in compliance, a deficiency plan must be created to bring the area back up to standard. As such, SBCAG labels intersections and segments falling below LOS C to have significant impacts.

However, the CMP has also included a chapter highlighting its "Transportation System Performance Element." This section does not trigger deficiency plans in the same way as the standard model, but it does prescribe five measures that should be used as guidelines in gauging transportation performance. The CMP readily admits that, "no single performance measure currently in use adequately addresses all aspects of system performance" and in order to address this shortcoming the following measures were included:

- Weighted Arterial Intersection LOS
- Weighted Freeway Interchange LOS
- Weighted Uninterrupted Segment LOS
- Transit Boarding Opportunity
- Regional Bikeway Completion Ratio

No data was available to assess whether these or other performance measures have been implemented.

9.2 Existing City Street Classification System

Chapter 10 of the city of Santa Barbara's 1998 General Plan Circulation Element seeks to create a street classification system that integrates all modes of transportation. The City's previous 1988 Interim Circulation Element used the standard street classification system from the Institute of Transportation Engineers (ITE) that prioritized automobile movement above all other modes. The new Element seeks to remedy this imbalance by creating a system that emphasizes intermodal connections resulting in a City in which, "automobile use is a choice, not a necessity."

In order to address this deficit in the City's existing street classification system, the 1998 Circulation Element proposed a street classification system which deviates from the ITE street categorization (freeway, primary arterial, minor arterial, collector street, local street) and instead focuses on creating streets that are designed to conform to their surrounding land uses. Or, as the Element states, streets will be classified, "based on their purpose and function." The Element outlines four different types of "corridors" distinguished by their functionality. Each of these corridors possesses design features that correspond to the predominant land use present to ensure efficient and equal mobility access:

- Residential
- Commercial
- Multiple/mixed purpose
- Gateway

9.3 Key Issues and Opportunities

The preceding summary suggests the following issues and opportunities relevant to the goal reducing the rate of growth of peak-hour vehicle trips:

- The primary transportation performance measure in use by the City, the County, and SBCAG for regional facilities is automobile LOS, which focuses on only one mode (the automobile) and only one dimension of the motorists' travel experience (seconds of delay at intersections).
- These performance measures provide no basis for evaluating the performance of other modes, nor do they assess other factors that are an important part of the travel experience (such as safety). In other words, automobile LOS measures one dimension of system "failure" but provides no guidance as to what constitutes success in conformance with the City's multimodal policy goals.
- City and SBCAG policy documents recognize the limitations of automobile LOS, but no data is available to know if any reforms have been implemented; many other US communities (e.g., Gainesville, FL, Baltimore, MD) of all sizes have pursued the implementation of performance measures for multiple modes and multiple dimensions of travel. These performance measures range from converting from LOS measures of "total vehicle throughput" to "total person throughput" measures, or something as simple as setting safety goals on key bicycle and pedestrian corridors (such as a 5% reduction in bicycle collisions per year on the City's core bicycle network).
- The City's current street classification system is

based on traditional functional classification which primarily accounts for daily auto volumes that the street is expected to handle (Average Daily Traffic, or ADT). Other cities, such as Seattle and Denver, have found the reclassification of streets based on the principle that different types of streets have different purposes (and not all streets can serve all modes equally well) to be an effective way to enhance mobility. Such street classification systems are typically informed by both the adjacent land use pattern of each street and its relative importance as part of the primary auto, transit, bike, and pedestrian network. A similar street classification system could be an opportunity for Santa Barbara to help achieve their stated goals of promoting the use of non-drive-alone modes to reduce peak-hour vehicle congestion.

10 PENDING AND PLANNED IMPROVEMENTS

10.1 Measure D Funded Projects[32]

Measure D was passed by the voters of Santa Barbara County in November of 1989 to improve transportation infrastructure in the county. Measure D provides for a one-half cent sales tax increase over a period of twenty years and dedicates these revenues solely to fund transportation projects and programs. Under Measure D, $270 million in sales tax revenues have been collected since April 1990. Sales tax revenues will continue to be collected until the program sunset date in April 2010.

Passage of Measure D by the voters was preceded by approval of the Measure D Expenditure Plan by SBCAG, the county of Santa Barbara and each of the cities. The Measure D Expenditure Plan defined how the sales tax revenues would be distributed. Local agencies receive 70% of the revenues for local street repair funding, 29.5% funds regional highway and transit projects, and the remaining 0.5% is used for specialized transit services.

The funds for regional highway and transit projects to date total $169.9 million. Of this amount, just $1.8 million – or 1% of the total – is devoted to transit, the rest is largely spent on freeway realignments and road widenings. Measure D devotes $4.68 million, or 0.8% of its funding to transit services. These services include on-going inter-regional transit service between Ventura and Santa Barbara counties and intercity service from Lompoc and Santa Maria to Goleta and Santa Barbara. Non-Measure D funds also contribute a substantial amount to various projects.[33]

10.2 Proposed Measure A Funding Program[34]

Measure A (the extension of Measure D which sunsets in April 2010) is a proposed one-half cent sale tax which would provide more than $1 billion in revenues for transportation projects in Santa Barbara County over 30 years. If approved by a two-thirds majority of voters in November 2008, Measure A would relieve traffic congestion and improve safety on U.S. Highway 101 by providing $140 million in matching funds to widen the freeway from two to three lanes south of Santa Barbara.

The Measure A Investment Plan would also provide $455 million each for the North County and South Coast for high priority transportation projects and programs to address the current and future needs of local communities. In both regions, the plan provides funding for:

- Local street improvements such as pothole repairs and synchronized traffic signals.
- Increasing senior and disabled accessibility to public transit.
- Building safer walking and bike routes to schools.
- Providing increased opportunities for carpool and vanpool programs.

The local sales tax revenues would be matched by an estimated $522 million in federal and state gas taxes, developer fees, and other sources. Of the total $1.05 billion, 28.19% is designated to be spent on alternative modes of transportation—a significant increase from multimodal funding under Measure D. It should be noted that there is a wide discrepancy in the amount of alternative transportation funding between North and South Counties, 17.15% and 47.92% respectively, of the $455 million allotted for each.

Programs and projects contained in the Measure D In-

[32] Source: SBCAG Measure D website (Accessed at www.sbcag.org/PDFs/measureD/Measure_D_Overview.pdf in May 2008).

[33] Source: SBCAG Transportation Funding Guide for Santa Barbara County (Accessed at: http://www.sbcag.org/PDFs/measuredrenewal/Handouts/August/Transportation%20Funding%20Guide.pdf in June 2008)

[34] Source: SBCAG Measure A website (Accessed at www.measurea2008.org/PDFs/Measure%20A%20Investment%20Plan.pdf in May 2008).

vestment Plan that are relevant to this report are summarized below:

- North Coast Programs:
- Specialized Transit for Elderly and Disabled: $4,500,000
- Safe Routes to School, Bicycle & Pedestrian Program: $3,000,000
- Carpool and Vanpool Program: $2,000,000
- Interregional Transit Program: $22,500,000
- Local Street and Transportation Improvements: $341,000,000

Revenues would be allocated to cities and the County based on their proportionate share of the North County population after each jurisdiction has received a $100,000 annual base allocation. Figure 10-1 is an estimate of how much each jurisdiction can expect to receive for local street and transportation improvements.

Figure 10-1: Potential Allocation of Measure A Funds to North Coast Jurisdictions

North Coast Jurisdictions	Net 30 Year Allocation	Alternative Transportation
Buellton	$9,928,000	5%
Guadalupe	$12,504,000	5%
Lompoc	$65,421,000	15%
Santa Maria	$137,205,000	15%
Solvang	$11,164,000	15%
County of Santa Barbara (unincorporated North County)	$104,778,000	10%
North Coast Total	**$341,000,000**	**12.81%**

Each jurisdiction must spend a minimum percentage of their funds on eligible alternative transportation projects according to the percentages identified in the table above. This requirement must be met by the fifth year of the program, and every fifth year thereafter.

- South Coast Programs:
- Safe Routes to School Program: $13,000,000
- Specialized Transit for Elderly and Disabled: $6,000,000
- Carpool and Vanpool Program: $7,000,000
- South Coast Transit Operations Program: $58,000,000 for costs related to operating general public bus services, planning, marketing and promotions directly allocated to Santa Barbara MTD.
- South Coast Transit Capital Program: $27,000,000 transit capital projects directly allocated to Santa Barbara MTD for general public bus services
- Interregional Transit Program: $25,350,000
- Regional Bicycle and Pedestrian Program: $13,000,000
- Commuter & Passenger Rail Planning & Service Improvements: $25,000,000
- Local Street & Transportation Improvements $273,150,000

Revenues would be allocated to cities and the County based on their proportionate share of the South Coast population after each jurisdiction has received a $100,000 annual base allocation. Figure 10-2 shows the net allocation that each jurisdiction would receive for local street and transportation improvements.

Figure 10-2: Potential Allocation of Measure A Funds to South Coast Jurisdictions

South Coast Jurisdictions	Net 30 Year Allocation	Percent of Gross Allocation to MTD
Carpinteria	$22,777,000	7.96%
Goleta	$42,913,000	13.18%
Santa Barbara	$104,054,000	26.05%
County of Santa Barbara (unincorporated South Coast)	$102,906,000	11.12%
South Coast Total	**$272,650,000**	**16.88%**

Each jurisdiction must contribute a percentage of their gross allocation, specified in the table above, to the South Coast Transit Operations Program which would directly allocate funds to the Santa Barbara MTD. Each South Coast city and the county of Santa Barbara must expend a minimum of 10% of their Net 30 Year Allocation on eligible alternative transportation projects. This requirement must be met by the fifth year of the program, and every fifth year thereafter.

For both the North County and the South Coast, use of potential Measure A Local Street and Transportation Improvement program funds for multimodal transportation projects would be governed by the following guidelines:

- Local Street and Transportation Improvement funding may be expended by city councils and the board of supervisors on the following uses to meet the prescribed alternative modes percentage.
- Maintenance, repair, construction and improvement of bicycle and pedestrian facilities, excluding maintenance of Class 2 bikeway facilities.
- Safe Routes to School improvements.
- Reduced transit fares for seniors and the disabled.
- Bus and rail transit services and facilities.
- Education and incentives designed to reduce single occupant auto trips.

- The County of Santa Barbara may count expenditures on Class 2 bikeway maintenance toward its alternative transportation percentage but these expenditures may not exceed 50% of the County's prescribed percentage.

10.3 Other Planned Improvements[35]

10.3.1 Transit Improvements

10.3.1.1 MTD Fixed-Route Service

MTD has experienced strong ridership growth recently, to the extent that passengers must sometimes wait for a subsequent bus during times of peak demand. In 2007, MTD introduced additional buses on several high-demand routes and a new route called the Mesa Loop (refer to Figure 4-4). Ridership is expected to remain strong and continue to grow over time, and MTD intends to pursue additional strategies to increase transit service to meet this demand. The following services were programmed in the MTD's most recent Short Range Transit Policies (SRTP) for implementation between FY 2006 and FY 2010:

- Calle Real/Old Town Shuttle (in Goleta) – in service as of June 2008
- Isla Vista/UCSB Shuttle (in unincorporated county) – not yet in service

The SRTP also includes a list of potential additional enhancements to service if additional funding were secured.[36]

10.3.1.2 Regional Rail

Travel demand is high along the 101 corridor in Santa Barbara and is expected to grow in the future. Demand is especially strong for peak hour commute trips from Ventura to the city of Santa Barbara, due to the concentration of employment in the city of Santa Barbara and relatively lower cost of living in Ventura County. Travel demand between Santa Barbara and Los Angeles is also strong, and expected to grow over time.

In addition to the commuter bus services provided by Coastal Express, several planning processes have explored opportunities to improve rail service along this corridor, including the 2005 Metropolitan Transportation Plan and the LOSSAN North Corridor Strategic Plan. Increased service during peak hour commute times is an especially important goal.

10.3.2 Bicycle Facilities Improvements

The city of Santa Barbara's 2005 Conditions, Trends, and Issues (CTI) Report identified the following planned and proposed improvements:

- *Gutierrez/Haley Streets Bike Lanes:* Add bicycle lanes to each street on this one way couplet.
- *Bicycle Improvement Program:* Ongoing improvements including bicycle parking, signage, and a maintenance hotline; additionally will fund the Garden Street bicycle lanes through the U.S. Highway 101 interchange (underway).
- *Mission Interchange Bicycle Improvements:* Bicycle lanes from Modoc Road to Castillo Street through the Mission Interchange (portions currently under construction).
- Capital Improvements List*:*

  Multi-Purpose Path Next to Rails Plan: Investigate use of Union Pacific right-of-way for a multi-purpose pathway/bike route connecting Atascadero Bike Path to downtown.

  Citywide Corridor Improvement Plan: A citywide inventory and review of corridors requiring improvements.

  Westside Bikeway Plan: Develop a plan to improve bike connections to, from, and within the Westside.

10.3.3 Pedestrian Facilities Improvements

The city of Santa Barbara's "Sidewalk Missing Links" program has identified missing sidewalks throughout the city and uses funds from Measure D (sales tax) as well as state and Federal grants to fund improvements to the pedestrian network. The Sidewalk Missing Links program undertakes about $1 million in sidewalk improvements annually. The city of Santa Barbara's 2005 CTI Report identified the following planned and proposed improvements:

- *Citywide Corridor Improvement Plan:* A citywide inventory and review of corridors requiring improvements.
- *Mission Interchange Pedestrian Improvements:* Improve pedestrian conditions on Mission Street between Modoc Road and Castillo Street (portions currently under construction).

[35] Sources for this section include: MTD Short-Range Transit Plan FY 2006-10 (May 2005); SBCAG Metropolitan Transportation Plan (2005); Caltrans/LOSAAN Rail Corridor Agency's North Corridor Strategic Plan (October 2007); and City of Santa Barbara's Transportation Conditions, Trends, and Issues (CTI) Report (2005).

[36] Source: Table 18 on page 57 of MTD Short-Range Transit Plan FY 2006-10 (May 2005).

- *Carrillo Street Pedestrian Walkway:* Construct all missing sidewalk links on Carrillo Street between San Andres and Cliff Drive (portions currently under construction).
- *Cabrillo Boulevard Sidewalk Improvements:* Repair sidewalks and make pedestrian improvements along Cabrillo Boulevard from State Street to Milpas Street and in front of the Cabrillo Arts Center.
- *Loma Alta Drive Sidewalk:* Construct sidewalk on Loma Alta Drive from Canon Perdido Street to Cornel Road on the downhill side of the road, Including street lights and retaining walls (under environmental review).
- *Ortega Corridor Improvements:* Construct enhanced street crossings, landscape, street furniture and lighting between Chapala Street and the Ortega Pedestrian Overcrossing.
- *Anapamu Corridor Improvements:* Construct enhanced street crossings, landscape, street furniture and lighting between Chapala Street and the Anapamu Pedestrian Overcrossing.
- *Alameda Padre Serra Sidewalk Feasibility Plan:* Conduct a pedestrian study and prepare a cost estimate to construct a sidewalk on Alameda Padre Serra between Los Olivos Street and Salinas Street.

11 TRANSPORTATION FUNDING SOURCES

In addition to Measure D regional sales tax revenues distributed by SBCAG, Federal transit funds allocated directly to transit operators, and ad hoc grant awards, the transportation improvements in Santa Barbara are generally funded via the following sources:

- Local funding sources:
  - Utility Users' Tax. A specific portion of the utility users' tax is dedicated to transportation.
  - General Fund. The Streets and Transportation Department is funded from the General Fund, and the Streets Capital Program receives a pre-determined portion of General Fund revenues. The largest revenue sources for the General Fund are Sales Tax, Transient Occupancy Tax, Utility Users' Tax, and Property Tax.
  - Downtown Parking Fund. This enterprise fund collects revenues and manages parking in the Downtown area. It is administered by a division of the Public Works Department, manages downtown parking supply and "looks for innovative and practical ways to clear congestion, air pollution and a better quality of life in the downtown district." In addition to constructing and maintaining parking facilities, the Fund also supports efforts to encourage commuters to choose alternative transportation. It funds a Crosstown Shuttle and free bus passes for qualifying downtown workers.
  - Downtown Parking & Business Improvement Area District. An annual assessment on downtown properties (based on proximity to public parking lots and garages) is used to subsidize 75-minutes of free parking in downtown parking facilities.
- State funding sources:
  - Gas Tax revenues from the State, which are distributed on a per capita basis, are accounted for in the Gas Tax Fund and then transferred to the General Fund for use in funding street operations and maintenance. These are legally restricted to use in the City's streets program.
  - Traffic Safety Fund. Pursuant to State law, all fines and forfeitures received from citations issued by City officers for vehicle code violations must be deposited into a special Traffic Safety Fund and must be used for traffic control, law enforcement, accident prevention, etc. Once recorded in this Fund, they are transferred to the General fund and expended by Public Works for Traffic Signals.
  - Bicycle Transportation Account. Caltrans awards about five million dollars in grants annually to eligible bicycle facility projects that are supported by a Bikeway Master Plan.
- Federal funding sources:
  - Transportation Development Act (TDA) Funds. The City receives TDA (Article 3) funds annually for restricted use in support of alternative transportation, including sidewalks and bikeways.

APPENDIX A: POLICY FRAMEWORK

This section summarizes the two key policy documents affecting transportation and parking conditions in the City of Santa Barbara and surrounding region that were not specifically summarized elsewhere in this report. These two key policy documents are the City's General Plan Circulation Element and SBCAG's Metropolitan Transportation Plan.

A.1 City of Santa Barbara General Plan Circulation Element

In California, every City and County is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community. Implicit in their name, General Plans are usually more general in nature, articulating a broad vision of the future while leaving specific implementation details to be developed in later planning processes and documents (e.g. zoning codes, municipal codes, neighborhood plans, corridors plans, and the like).

General Plans consist of a number of chapters called "Elements" that cover a variety of issues such as land use, housing, noise pollution, air quality, etc. Transportation and parking is addressed in the Circulation Element. The City of Santa Barbara's last General Plan was adopted in 1998 and the Circulation Element lays out a comprehensive vision of Santa Barbara's desired transportation system. The City's goals and policies that are particularly relevant to this report are listed below.

A.1.1 Goals & Policies

- Goal 1: Provide a Transportation System that Supports Economic Vitality
  - Policy 1.1.1: Optimize access and parking for customers in business areas by implementing policies of the Circulation Element aimed at reducing dependence upon the automobile, and improving and increasing pedestrian, bicycle use, and transit use.
  - Policy 1.1.3: Enhance alternative transportation services and infrastructure access between residential, recreational, educational, institutional and commercial areas.
- Goal 2: Strive to Achieve Equality of Choice Among Modes
  - Policy 2.1.4: Work with outside agencies, employees, and employers to optimize the use of alternative travel modes to reduce the use of the automobile, especially during peak periods of congestion.
  - Policy 2.1.6: Manage the parking supply and work to increase the use of alternative forms of travel to increase the availability of parking and access to the Downtown area.
  - Policy 2.1.10: Develop urban design standards that will facilitate the use of alternative means of travel and reduce dependency upon the automobile. The standards shall address linkages throughout the City, such as walkways, bikepaths, and transit.
- Goal 3: Increase the Availability and Use of Transit
  - Policy 3.1: The City shall promote the development, improvement, expansion, and increased ridership of transit within the City, including the development of new forms of transit as they become available.
  - Policy 3.3: The City shall support increases in regional transit services.
  - Policy 3.4: The City shall work to improve and expand intermodal connections.
- Goal 4: Increase Bicycling as a Transportation Mode
  - Policy 4.2: The City shall work to expand, enhance, and maintain the system of bikeways to serve current community needs and to develop increased ridership for bicycle transportation and recreation.
  - Policy 4.4: The City shall continue to use parking restrictions to create peak commute hour capacity for bicycle traffic. Public hearings shall be held prior to the creation of new parking restrictions.
  - Policy 4.5: The City shall actively promote the safe use of bicycles as an efficient and affordable mode of transportation.
- Goal 5: Increase Walking and Other Paths of Travel
  - Policy 5.1: The City shall create an integrated pedestrian system within and between City neighborhoods, schools, recreational areas, commercial areas and places of interest.
  - Policy 5.2: The City shall link pedestrian paths with other alternative modes of transportation.
  - Policy 5.5: The City shall create and foster a pedestrian friendly environment through

physical and cultural improvements and amenities.

- Goal 6: Reduce the Use of the Automobile for Drive-Alone Trips
  - Policy 6.1: The City shall continue to support efforts to expand Transportation Demand Management Programs.
  - Policy 6.2: The City shall set an example as a model employer to reduce the use of the single occupancy vehicle.
  - Policy 6.3: The City shall support and promote regional programs that reduce the use of the single occupancy vehicle.
- Goal 7: Increase Access by Optimizing Parking Citywide
  - Policy 7.2: The City shall improve ways to utilize existing parking and create new parking opportunities through partnerships and cooperation.
  - Policy 7.3: The City shall continue to operate a Residential Parking Permit Program.
  - Policy 7.4: The City shall update its Parking Requirements and Design Standards to optimize its parking resources and to encourage increased use of alternative transportation.
- Goal 8: Increase Parking Availability and Access for Downtown Customers
  - Policy 8.2: The City shall manage the Downtown parking supply to reduce the need for employee parking while increasing the availability of customer parking and working with the County of Santa Barbara to address parking needs.
  - Policy 8.5: The City shall promote/facilitate the development of housing to decrease the need for parking through an increased walking/biking population that lives, works, and shops in the Downtown.
- Goal 9: Develop Special Policies Related to Transportation and Parking in the Coastal Zone
  - Policy 9.1: The City shall encourage use of alternative modes of transportation, especially non-motorized options, in and around the Coastal Zone.
  - Policy 9.3: The City shall coordinate parking lot access and alternative modes of transportation.

A.2 SBCAG Metropolitan Transportation Plan

Many of the issues that face local governments and the people they serve, such as traffic, housing, air quality, and growth, extend beyond jurisdictional boundaries. The Santa Barbara County Association of Governments (SBCAG) is an association of city and county governments in Santa Barbara County that provides a forum for regional collaboration and cooperation on problems that impact multiple communities and jurisdictions in Santa Barbara County. A particular focus of SBCAG's work is transportation; as such SBCAG plays several regional roles relevant to this report:

- Metropolitan Planning Organization (MPO): MPOs are responsible for regional transportation planning and programming activities required under federal law. This includes development of long range transportation plans and multi-year funding programs, and the selection and approval of transportation projects using federal funds.
- Regional Transportation Planning Agency (RTPA): RTPAs are the multi-modal transportation planning, programming, and funding agency required by state statutes. This includes the annual allocation of state Transportation Development Act (TDA) funds.
- Congestion Management Agency (CMA): CMAs develop and implement the county-wide Congestion Management Program (CMP). A CMP is required of all urban counties in California to evaluate the transportation impacts of local land use decisions and coordinate regional solutions.
- Local Transportation Authority (LTA): SBCAG is the administrator of a ½ cent county-wide sales tax authorized by voter approval in 1989 (Proposition D) and up for reauthorization in November of 2008 (Proposition A).
- Traffic Solutions Program: SBCAG manages and funds Traffic Solutions, a county-wide Transportation Demand Management (TDM) program.

In its role as the RTPA for Santa Barbara County region, SBCAG is tasked with developing a Regional Transportation Plan, or RTP, laying out regional transportation goals and priorities. SBCAG's most recent RTP, the 2005 Metropolitan Transportation Plan, lists the following goals, policies, and objectives relevant to this report.

A.2.1 Goals

- Provide a comprehensive multimodal transportation system of facilities and services that is balanced, coordinated, safe, cost effective, and environmentally sound and that meets the public's need for the movement of people, information,

goods, and services that is consistent with the social, economic, and environmental goals and policies of the region.

- Preserve and maintain the existing transportation system, emphasizing safety and efficiency.
- Promote alternative forms of transportation to reduce traffic congestion and air pollution.
- Make the most efficient use of limited transportation funds.
- Enhance the movement of goods and services within the region.
- Encourage land use and growth patterns that enhance the livability of our communities for current and future generations.

A.2.2 Policies and Objectives

A.2.2.1 Regional Policies for System Integration

- Policy 1. The RTP shall provide for a coordinated multimodal system designed to serve the travel requirements of the region and should, where feasible, provide the citizens of individual communities with a realistic choice of travel modes.
- Policy 2. The planning, construction, and operation of transportation facilities and of the system as a whole shall:
  - Be coordinated with land use planning
  - Be consistent with other regional policies
  - Enhance access, circulation, and safety (including seismic considerations)
  - Minimize social, economic, and environmental impacts
  - Be consistent with applicable federal, state and local energy conservation programs, goals and objectives
  - Preserve existing investments in the system by emphasizing life cycle cost principles in investment decisions in order to reduce annualized capital and maintenance costs of transportation facilities
  - Be consistent with the approved California Transportation Plan
  - Give special attention to the needs of elderly and disabled individuals for improved transportation accessibility and removal of physical barriers, including provisions required under the 1990 Americans with Disabilities Act (ADA)
  - Facilitate freight and goods movement
  - Provide for improved ground access to the airports and rail terminals in the region
  - Be compatible with the surrounding area
  - Encourage private sector participation where feasible
- Policy 3. The RTP shall encourage the completion of emergency preparedness plans that address the transportation needs of the elderly and/or disabled members of the population.
- Objective 4.1 Encourage jurisdictions and transit agencies to secure private funding to subsidize transportation improvements in exchange for advertising on transit vehicles, bus shelters and benches, and bicycle maps.
- Objective 4.2 Encourage the coordination of transportation services provided by various community and human service agencies to maximize vehicle use, improve efficiency, and increase the level of service provided where needed, when resources are available.
- Policy 5. Air Quality**.** The RTP shall be consistent with the air quality goals of the region.
  - *Objective 5.2* The RTP shall promote the use of alternative fuels and vehicle fleet modifications to zero/low emission alternative fuel vehicles; improved vehicle efficiency; and, the application of advanced transportation and energy technologies to reduce vehicular emissions and energy consumption.
- Policy 6. Land Use. The RTP shall emphasize the importance of land use decisions on the transportation system and include recommendations that local agencies:
  - Objective 6.1 Make land use decisions that adequately address necessary regional transportation issues and adopt improvement proposals that are consistent with the RTP and local land use policies.
  - Objective 6.2 Require mitigation of the traffic impacts of new land development through on-site improvements for all modes of transportation, contribution to or construction of offsite improvements, provision of facilities for all modes of transportation, and incentives to encourage the use of alternative transportation modes.
  - Objective 6.3 Implement the Jobs/Housing Policy recommendations in the region's Congestion Management Program and Jobs Housing Study.
- Policy 7. Transportation System Management (TSM) / Transportation Demand Management (TDM). Increase transportation system efficiency, improve mobility, reduce travel demand and provide for improved air quality through the imple-

mentation of system management and demand management strategies and Intelligent Transportation System (ITS) applications.

- Policy 7.1. The RTP shall encourage alternatives to the automobile and increase the efficiency of automobile usage through inclusion of operational improvements (e.g., fuel-efficient signal timing, left turn lane channelization, ramp metering for Route 101, etc.); and the Transportation Demand Management (TDM) requirements of the region's CMP and the 1994 and 1998 Clean Air Plans.
- Policy 7.2. The RTP will support the maintenance and expansion of the Traffic Solutions TDM programs budget.
- Objective 7.2 SBCAG's Traffic Solutions staff shall work with employers to encourage commuting during off-peak hours or by a travel mode other than the single occupant auto, increase educational marketing efforts, including TV and radio public service announcements concerning bicycling safety, commuting tips and Traffic Solutions services, expand outreach and contacts with companies in Santa Barbara County, and expand public outreach on alternative forms of transportation (e.g., APCD's [Air Pollution Control District] "Take a vacation from your car" program). Traffic Solutions shall also identify/implement new and innovative TDM programs, such as start-up subsidies for vanpools, elementary school education programs and regional bus pass programs.

- Policy 8. Intelligent Transportation Systems. SBCAG shall promote transportation strategies that encourage the application of telecommunications technologies to improve transportation.
  - *Objective 8.1* Participate in implementing the Central Coast Intelligent Transportation Systems Strategic Deployment Plan.
  - *Objective 8.2* Encourage acceptance of the regional architecture developed in the ITS Deployment Plan as the common structure for development of ITS throughout our region.
  - Objective 8.3 Work with Caltrans, CHP, local agencies and transit providers to maintain and enhance the regional ITS architecture.
  - Objective 8.4 The RTP shall contain an Intelligent Transportation System (ITS) component that includes telecommuting, Smart Call boxes, changeable message signs, and other applications of information technology.
- Policy 10. Environmental Justice. Ensure compliance with the DOT and FTA/FHWA environmental justice policy.
  - Objective 10.3 Analyze the impacts of the RTP on accessibility and mobility of minority and low-income populations.
  - Objective 10.4 Identify the distribution of RTP environmental impacts (noise, traffic congestion, air quality) in relation to the location of minority and low-income populations.
  - Objective 10.5 Take steps to propose mitigation measures or consider alternative approaches when disproportionately high and adverse impacts on minority or low-income populations are identified.
  - Objective 10.6 Continue to evaluate and respond as necessary to environmental justice issues that arise during the implementation of regional plans.

A.2.2.2 Multi Modal Policies and Objectives

Bicycling

- Policy 11. The RTP shall promote bicycling as a means to decrease auto-use, air pollution, and traffic congestion.
  - Objective 11.1 Promote the development of the regional bikeway system adopted in SBCAG's Regional Bikeway Study, with emphasis on linking gaps in the bikeway system to provide for regional connectivity.
  - Objective 11.2 Update and upgrade SBCAG's Regional Bikeway Study to a full plan status, including a chapter for each jurisdiction consistent with the state Bicycle Lane Account requirements to ensure their eligibility for Bicycle Lane Account funding;
  - Objective 11.3 Encourage local jurisdictions to adopt a capital improvement program for bikeways with a funding commitment policy to support the program.
  - Objective 11.4 Encourage the jurisdictions to include in their capital programs projects to construct commuter bikeways (i.e., between residential areas and schools, and residential areas and business areas).
  - Objective 11.5 Encourage local agencies to use the policies and standards adopted in the Regional Bikeway Study in completing future bikeways (use of a consistent set of policies and standards regionwide will reduce inter-jurisdictional issues in developing bicycle facilities and increase the safety of the facilities).

- Objective 11.6 Encourage the implementation of signal-actuating mechanisms for bicycles at all major signalized intersections.
- Objective 11.7 Encourage the implementation of bicycle safety and bicycle education programs.
- Objective 11.8 Encourage local jurisdictions to provide for Class II bike lanes as part of roadway improvement projects where feasible.

- Policy 12. The RTP shall encourage the jurisdictions to program funds to improve the safety of bikeways, including projects to mitigate identified bicycle/vehicle conflict problem areas.
- Policy 13. The following SBCAG Bicycle Funding Policies (approved 8/20/98) shall guide SBCAG programming decisions for bicycle facilities:
  - Policy 13.1. Determine that projects supportive of the SBCAG Regional Bikeway Study will be given priority for the use of bikeway funds.
  - Policy 13.2. Establish goal to program at least 10% of TEA 21 flexible funds from the Regional STP, CMAQ and TEA funds for these bikeway projects.

Transit

- Policy 14. The RTP shall promote the expansion of public transit services within the county to meet the mobility needs of the residents for access to essential services, educational, recreational and employment opportunities as a means to reduce air pollution, traffic congestion, and parking problems.
  - Objective 14.1 Include in the RTP Action Element projects to implement improvements identified in the transit agencies' Short Range Transit Plans and Transit Development Plans to meet existing and forecast ridership needs over the short term planning period, as well as those identified to meet forecast ridership needs consistent with projected population increases over the twenty year RTP planning period.
  - Objective 14.2 Incorporate projects in the RTP Action Element that foster the use of alternative fuels and advanced technologies to reduce vehicle emissions.
  - Objective 14.3 Include projects in the RTP Action Element to implement improvements identified through the annual Unmet Transit Needs public hearings.
  - Objective 14.4 Encourage the adoption of transit oriented standards and criteria to be used by local jurisdictions in their land use approval process.
  - Objective 14.5 Ensure that transit projects included in the Action Element are consistent with the provisions of the ADA of 1990.
  - Objective 14.6 Encourage intermodality by including projects in the Action Element such as bike lockers at park and ride lots and transit facilities and bike racks on buses.
  - Objective 14.7 Support federal and state transportation legislation that continues funding support for transit, particularly for operating expenses commensurate with transit's expanded role in addressing congestion and improving air quality.

Pedestrian Facilities

- Policy 15. The RTP shall promote the provision of pedestrian facilities to meet the mobility needs of the residents for access, and recommend the design/safety objectives below be followed in planning and implementing new pedestrian facilities.
  - Objective 15.1 New pedestrian accessways and revisions to existing accessways over or under Route 101 where possible should include provisions for bicycles.
  - Objective 15.2 Pedestrian accessways over or under Route 101, whether new or revised, should be designed to provide accessible use by the disabled, consistent with the Americans with Disabilities Act (ADA) requirements.
  - Objective 15.3 Pedestrian accessways must include lighting to encourage use; existing underpasses are dark, and should be modified.
  - Objective 15.4 Design of pedestrian facilities should include separation of pedestrians from traffic through elevated walkways or other means of separation; where a devil strip does not separate sidewalks, sidewalks should be wide enough to provide reasonable separation from traffic.

Street and Road System

- Policy 16. For highways, streets and roads, the RTP shall give the highest priority to upgrading existing facilities to eliminate or mitigate high accident situations or congestion, based on the Level

of Service standards of the Congestion Management Program (CMP).

- Policy 16.1 Due consideration should be given to examining alternative forms of transportation in addressing congestion problems.
- Policy 16.3 Due to overriding cost and environmental considerations, Route l54 shall not be expanded to provide more than two through lanes, except that passing lanes should be added where appropriate.

Rail

- Policy 17. The RTP shall provide for increased availability of intercity passenger rail service as a mode of public transportation to serve the region.
  - Policy 17.1 SBCAG shall support federal and state policies and programs that maintain or expand the level of passenger rail service, the acquisition of rolling stock, and the rehabilitation/upgrade of railways.
  - Policy 17.2 SBCAG shall support AMTRAK in the process of increasing rail passenger train service to and within Santa Barbara.
  - Policy 17.3 SBCAG shall monitor the need for passenger rail commute service.

Airports

- Objective 16.2 The RTP shall provide for improved multimodal ground access to the airports in the county where appropriate.

Performance Measures/Monitoring

- Policy 19. Performance Measures. To ensure the RTP achieves the goals and policies SBCAG shall implement a transportation system performance monitoring program (TSPM) that assesses by mode and as appropriate, the nine desired outcomes of system performance, namely, mobility, sustainability, safety, reliability, economic well-being, equity, cost-effectiveness and environmental quality. The RTP's TSPM program is described in Chapter 7.

APPENDIX I-2

MODEL DEVELOPMENT REPORT

Model Development Report

City of Santa Barbara Travel Demand Forecasting Model

Submitted by:

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February 25, 2009

FEHR & PEERS
TRANSPORTATION CONSULTANTS

CITY OF SANTA BARBARA TRAVEL DEMAND FORECASTING MODEL
MODEL DEVELOPMENT REPORT

February 25, 2009

Submitted to:

AMEC

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TABLE OF CONTENTS

1. INTRODUCTION 1

Background 1

Study Area and Roadway Classification 1

General Discussion of the TDF Model 3

Organization of this Report 4

2. COMPONENTS OF THE MODEL 6

File and Folder Structure 6

Overall Model Components 9

3. SUMMARY OF THE INPUT DATA 14

Data Collection 14

Traffic Analysis Zone (TAZ) System 14

Land Use Data 15

Special Generators 16

Roadway Network 17

4. DESCRIPTION OF THE MODEL CALIBRATION PROCESS 18

Trip Generation rates 18

Trip Distribution (Gravity Model) 32

Trip Assignment 36

5. MODEL RESULTS AND DAILY VALIDATION 39

Land Use 39

Trip Generation 39

Trip Assignment 40

Dynamic Validation 48

6. PEAK HOUR MODEL SPECIFICATIONS 56

7. PEAK HOUR MODEL VALIDATION RESULTS 57

APPENDICES

Appendix A: Traffic Analysis Zone (TAZ) Boundary Map

Appendix B: Base Year Land Use Data by TAZ

Appendix C: Roadway Network Information

Appendix D: City of Santa Barbara TDF Model Trip Generation Summary

Appendix E: City of Santa Barbara TDF Model Friction Factor Curves

Appendix F: Validation Summary Reports

Appendix G: Santa Barbara Model Resource File

LIST OF FIGURES

Figure 1 Model Area 2
Figure 2 Model User Interface 6
Figure 3 File and Folder Structure 7
Figure 4 Components of Santa Barbara Travel Demand Model 10
Figure 5 Area Types 20
Figure 6 External Station Weights 35
Figure 7 Base Year (2008) Roadway Functional Class 37
Figure 8 Base Year (2008) Roadway Total Through Lanes 38
Figure 9 Daily Validation Locations 41
Figure 10 Daily Screenline Locations 42
Figure 11 2008 Model Average Daily Traffic Volumes 43
Figure 12 Daily Model Validation by Location 45
Figure 13 Daily Model Validation Scatter Plot 46
Figure 14 TAZs Used for Dynamic Validation 49
Figure 15 Peak Hour Validation Locations 59
Figure 16 Peak Hour Screenline Locations 60
Figure 17 AM Model Volumes 61
Figure 18 PM Model Volumes 62
Figure 19 AM Peak Hour Model Validation by Location 63
Figure 20 AM Peak Hour Model Validation Scatter Plot 64
Figure 21 PM Peak Hour Model Validation by Location 65
Figure 22 PM Peak Hour Model Validation Scatter Plot 66

LIST OF TABLES

Table 1 External Gateways 15
Table 2 Model Land Use Categories 15
Table 3 Typical Roadway Speeds and Capacities 17
Table 4 Daily Vehicle Trip Generation Rate Comparison 21
Table 5-1 Percent of Vehicle Trips by Trip Purpose – Area Type 1 24
Table 5-2 Percent of Vehicle Trips by Trip Purpose – Area Type 2 26
Table 5-3 Percent of Vehicle Trips by Trip Purpose – Area Type 3 28
Table 5-4 Percent of Vehicle Trips by Trip Purpose – Area Type 4 30
Table 6 Trip Generation Production and Attraction Summary 32
Table 7 Work Locations for Santa Barbara Residents 33
Table 8 Residential Locations for Santa Barbara Employees 33
Table 9 Percent of Trips by Purpose that are Internal/External 33
Table 10 Matrix of Daily Through (EE) Trips 34
Table 11 Trip Production To Attraction Ratios by Purpose 39
Table 12 Results of Daily Model Validation 44
Table 13 Results of Daily Model Validation by Volume Range 47
Table 14 Results of Dynamic Validation Tests 51
Table 15 Dynamic Validation Network Test-Remove US 101 53
Table 16 Dynamic Validation Network Test Add One Lane 54
Table 17 Dynamic Validation Network Test Remove One Lane 55
Table 18 Peak Hour Factor Comparison-NCHRP 365 56
Table 19 Results of Peak Hour Model Validation 57
Table 20 Results of Peak Hour Model Validation by Volume Range 58

1. INTRODUCTION

BACKGROUND

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The purpose of this project is to develop the City model in the TransCAD Transportation Geographic Information System (GIS) software, create the key model inputs such as land use, road network and trip generation parameters, and validate the model to current (2008) conditions. The TDF model will be used in the update of the City's General Plan and could be used to generate traffic volume forecasts and other travel demand data for various planning and engineering studies.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting data represent travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

This report describes the model development process, including the sources of data used to develop key model inputs, and presents model validation results, which measure the model's accuracy. The purpose of this report is to provide a comprehensive source of data about the model to technical professionals, such as City Staff, and other interested parties.

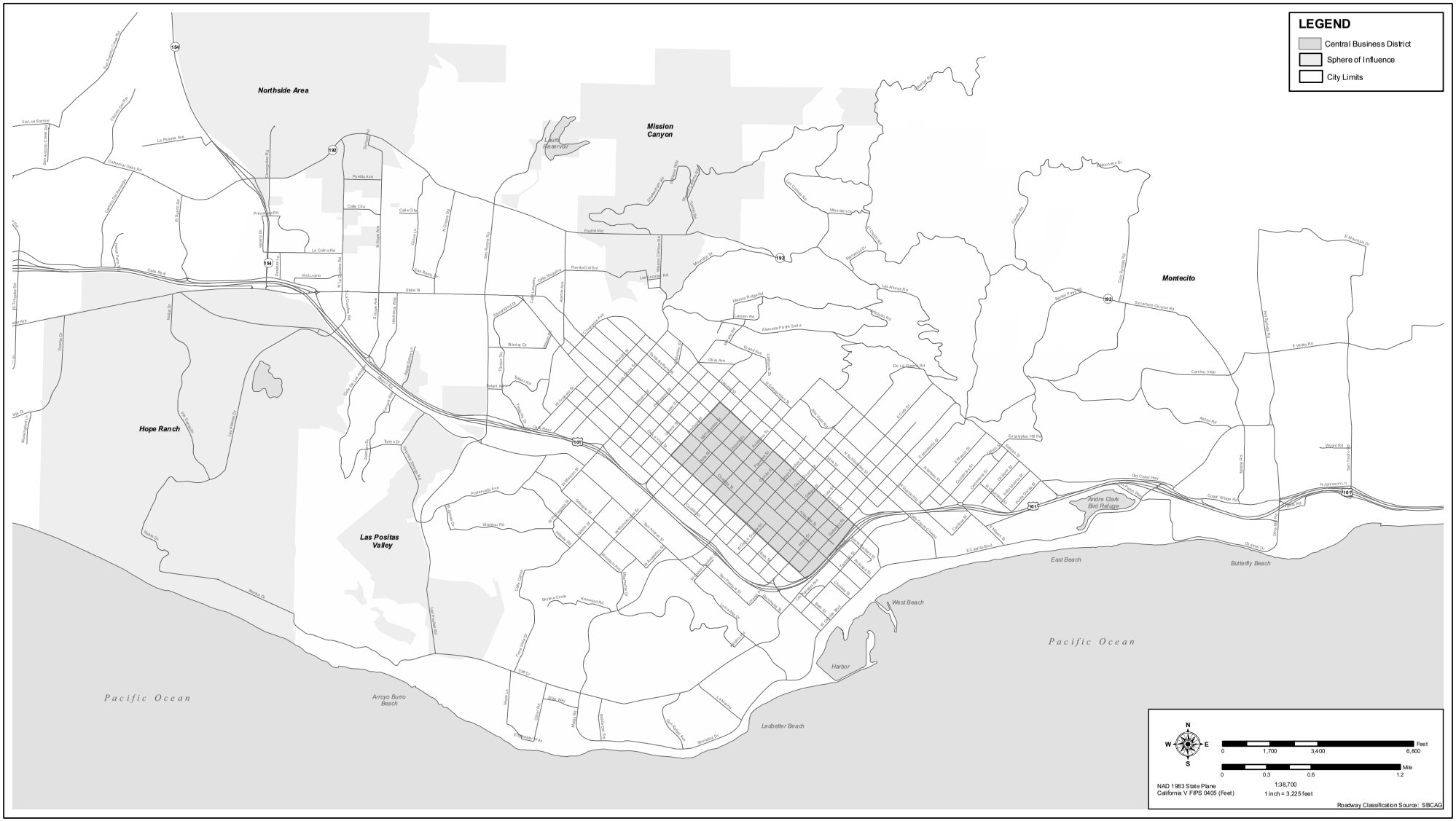
STUDY AREA AND ROADWAY CLASSIFICATION

Figure 1 shows the study area for the City travel demand forecasting model, which includes all freeways, State Routes (SRs), arterials, collector roadways, and certain key local roads. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas which are in or near the City's Sphere of Influence. The study area contains all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent which interact frequently with the City and its Sphere of Influence.

The roads shown in Figure 1 are classified in four major categories and form the primary road network that is represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside of the City. The four major road categories are described below.

<u>*Freeways*</u>: Freeways are high-capacity facilities that primarily serve long-distance travel. Access is limited to interchanges that are typically spaced at least one mile apart. US-101 is the freeway which runs directly through the Santa Barbara model area. SR 217, which is west of the study area, connects UCSB and the Santa Barbara Airport to US-101.

<u>*Highways*</u>: Roadways designated as highways are typically State highways that are not limited-access freeways. These facilities serve travel between Santa Barbara and neighboring cities. The primary highway in Santa Barbara is SR 154. SR 192 runs generally parallel to US-101 along the foothills north of the City.



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA STUDY AREA
FIGURE 1

Arterials: Roadway segments classified as arterials are major roads that provide connections within the City, between the City and neighboring areas, or through the City (cut-through traffic). Arterials in Santa Barbara typically have two lanes in each direction, with travel speeds of 35 miles per hour (mph). Arterials are further classified as Major or Minor. Section 3 contains details on the distinction between these classes.

Collectors: Collectors are facilities that connect local streets to the arterial and highway system, and may also provide direct access to some local land uses. Collectors typically have one lane in each direction, with speeds of around 25-30 mph.

GENERAL DISCUSSION OF THE TDF MODEL

This section summarizes the answers to commonly asked questions related to TDF models and how the City can use a TDF model.

What is a TDF Model?

A TDF model is a computer program that simulates traffic levels and patterns for a specific geographic area. The program consists of input files that summarize the area's land uses, street network, travel characteristics, and other key factors. Using this data, the model performs a series of calculations to determine the amount of trips generated, where each trip begins and ends, and the route taken by the trip. The model's output includes projections of traffic volumes on major roads, and peak hour turning movements at certain key intersections.

How is a TDF Model Useful?

The City TDF model will be a valuable tool for the preparation of long-range transportation planning studies, such as the *Plan Santa Barbara* General Plan Update. The travel model will be used to estimate the average daily and peak hour traffic volumes on the major roads in response to future growth assumptions, and form a consistent basis by which to analyze the different potential land use scenarios. Additionally, using these traffic projections, transportation improvements will be identified to accommodate the changing traffic patterns associated with the general plan's preferred land use alternative.

How do we know if the TDF Model is Accurate?

To be deemed accurate for projecting traffic volumes in the future, a model must first be calibrated to a year in which actual land use data and traffic volumes are available and well documented. A model is accurately calibrated when it replicates the actual traffic counts on the major roads within certain ranges of error established in the "Travel Forecasting Guidelines," (Caltrans, 1992) and it demonstrates stable responses to varying levels of inputs. The City TDF model has been calibrated to 2008 (base year) conditions using actual traffic counts, census data, and land use data compiled by City staff.

The ability of a travel model to replicate traffic counts is known as model validation. For the daily model validation, six screenlines and 159 roadway segments within the study area were included as validation locations. For the peak hour model validation, 12 screenlines and 187 roadway segments within the study area were included. Traffic counts at these locations were compared with the base year daily, AM peak hour, and PM peak hour model projections to determine the model's accuracy.

Is the City of Santa Barbara TDF Model Consistent with Standard Practices?

The City of Santa Barbara TDF model is consistent in form and function with the standard traffic forecasting models used in the transportation planning profession. The model includes a land use/trip generation module, a gravity-based trip distribution model, and a capacity-restrained equilibrium traffic assignment process. The travel model utilizes Version 5.0 of the TransCAD Transportation GIS software, which is consistent with many of the models used by local jurisdictions in California and throughout the nation. The Santa Barbara County Association of Governments (SBCAG), the Metropolitan Planning Organization for Santa Barbara County, maintains the current regional travel demand model in TransCAD.

How Can the TDF Model be Used?

The TDF model can be used for many purposes related to planning and design of the City's transportation system. The following is a partial listing of the potential uses of the TDF model.

- To update the General Plan
- To update the Street Master Plan
- To update the city-wide traffic impact fee program
- To evaluate the traffic impacts of area-wide land use plan alternatives
- To evaluate the shift in traffic resulting from a roadway improvement
- To evaluate the traffic impacts of land development proposals
- To determine trip distribution patterns of land development proposals
- To support the development of transportation sections of Environmental Impact Reports (EIRs)
- To support the preparation of project development reports for Caltrans

ORGANIZATION OF THIS REPORT

This report is organized into the following seven sections:

- Section 1 – Introduction
- Section 2 – Components of the Model
- Section 3 – Summary of the Input Data
- Section 4 – Description of the Model Calibration Process
- Section 5 – Model Results and Daily Validation
- Section 6 – Peak Hour Model Specifications
- Section 7 – Peak Hour Model Validation

A technical appendix is also attached, which contains model development information that is referenced in the report.

2. COMPONENTS OF THE MODEL

The Santa Barbara travel demand model utilizes the TransCAD 5.0 modeling software. Following is a description of the file and folder structure, followed by a detailed description of the model components.

FILE AND FOLDER STRUCTURE

Figure 2 shows the model user interface (UI). The buttons on the user interface activate the various steps in the model. By default, users can run all model steps in a single operation by pressing the "Trip Generation" button. Users can complete these steps one at a time by checking the "Stop after stage" box and pushing the various buttons in sequence.

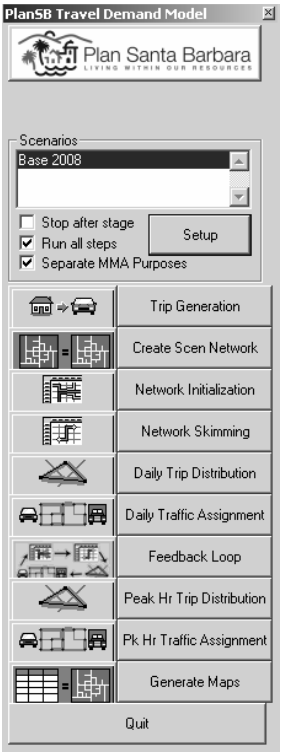


Figure 2 – Model User Interface

The model requires that some UI setup files (shown in the upper portion of Figure 3) be stored in the TransCAD software folder along with the TransCAD program. The model input files and output files can be stored either on the user's hard drive or in a local area network (shown in the lower portion of Figure 3). The model setup files are described in detail below.

1. **Add-ins.TXT**: This setup file stores the information about where the script is stored and the name of the model scenario. The contents should look like this:

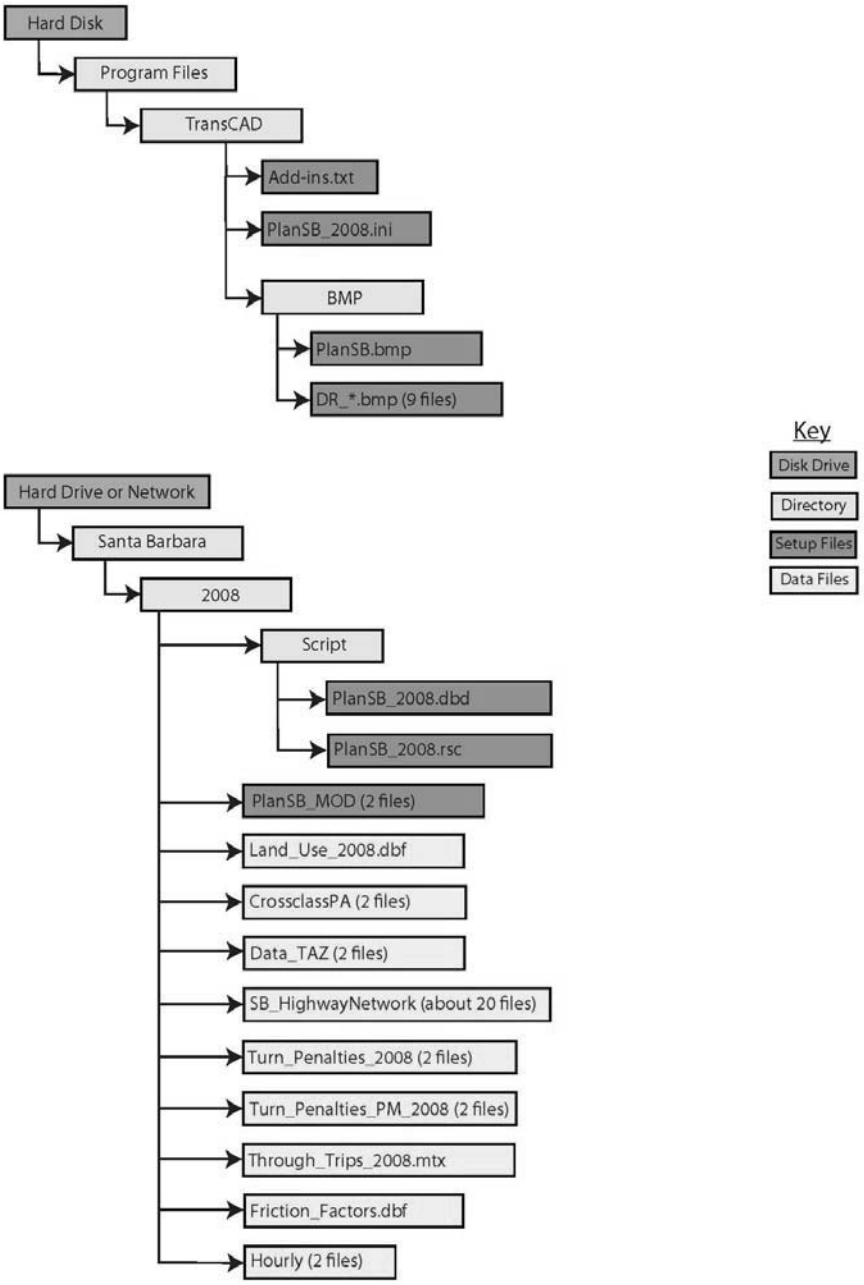
M, gisdk\\toolbox\\gisdk, GISDK Start Toolbox, GIS Developer's Kit
D, plansb_2008_ui, PlanSB Model, PlanSB - 2008

2. **SB_2008.INI**: This setup file stores the paths for some setup files and the model folder. The contents should look like this:

[Model Table]
C:\SBModel\2008\MOD_2008.bin
[UI File]
C:\Program Files\TransCAD\plansb_2008_ui.dbd
[Scenario File]
C:\SBModel\2008\Scenario_SB.arr
[Data Directory]
C:\SBModel\2008\

3. **Model Batch Script**: The model script, which is also known as the "resource" file (SB_2008.rsc), controls the overall model flow and also produces a user interface similar to the one shown in Figure 2. The model script is written in a scripting language called GISDK, which is used to set up and run TransCAD models. Because TransCAD script is a compiled language, the model script has been compiled and saved as plansb_2008_ui.* (seven files).

Figure 3 File and Folder Structure



4. **BMP Files:** The Plan Santa Barbara logo (PlanSB.BMP) and icons (DR_*.BMP) for the buttons should be stored in the BMP folder under TransCAD program folder**.**

5. **MOD_2008.BIN**: This setup file stores the names of the model input and output files, the model parameters, and other setup information.

OVERALL MODEL COMPONENTS

The model consists of three kinds of components:

Input Data – Input Data are files that represent different aspects of the City's road system, land use, and travel characteristics.

Model Steps – The model steps are the mathematical calculations the model completes in determining traffic flows. These steps are performed by model batch script.

Model Outputs – Model Outputs are data files produced by the model, and some are inputs to other steps in the model.

Figure 4 shows the relationship between input files and output files. The individual components are described below for each step of the TDF model (Trip Generation, Daily Trip Distribution, and Trip Assignment).

Trip Generation

1. **Land Use Table (Land_Use_2008.DBF)**: This input file stores the land use characteristics of the traffic analysis zones (TAZs) and the external station weights.

   The land use data includes such items as the number of single-family and multi-family dwelling units (DUs), and the square footage of commercial, office, industrial, and other non-residential land uses.

   External station weights (or factors) show the relative amount of traffic to and from each external station. These factors are used to distribute the internal-external and external-internal trip productions and attractions to the areas external to the travel model.

2. **Trip Generation Rates (CrossClassPA.BIN)**: This input file stores the trip generation rates by trip purpose. For example, home-based work and home-based other trips generated per single-family dwelling unit have separate trip generation rates.

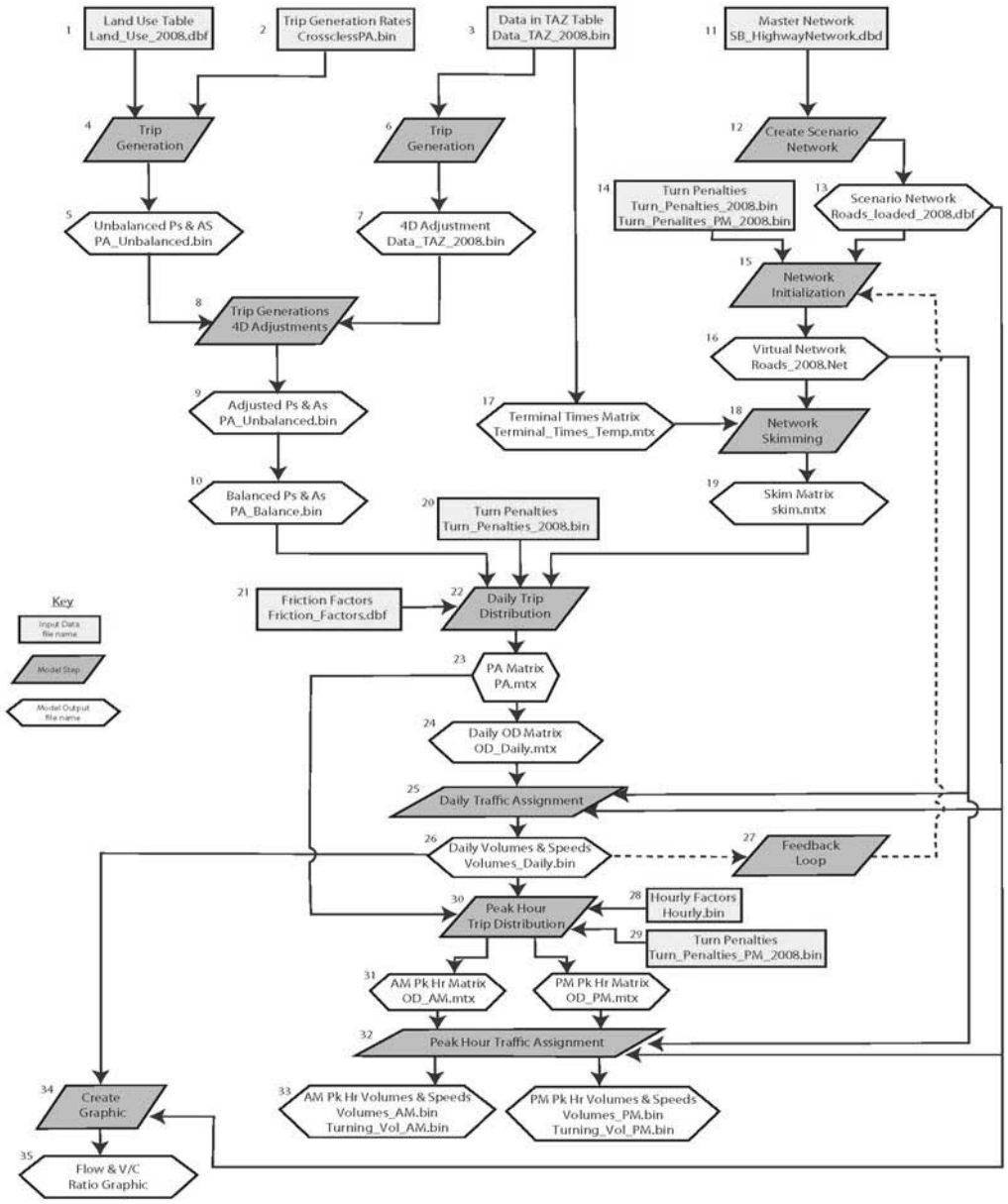
3. **Data in TAZ (Data_TAZ_2008.BIN)**: This input file stores the model input data in TAZ format other than land use. This data includes terminal times and 4D inputs.

   The terminal times represent the time needed at the start and end of each trip to accomplish tasks such as looking for a parking place and walking from the car to the destination. These values are added to the travel time value in the skim matrix for each TAZ.

   This data also stores information about the elasticities of trip-generation to the Density, Diversity, and Design characteristics of each TAZ. It also stores data on a Base Case and a Scenario for comparative purposes.

4. **Trip Generation**: This step multiplies the land use table by the trip generation rates to produce an initial estimate of trip ends. The model then balances the trip production and attraction estimates based on the script file. The model will hold to either productions or attractions, and then factor the other estimate up or down until it equals the selected control. For most trip purposes, the model's default is to adjust attractions to balance to productions. See Section 4 for details about trip balancing.

Figure 4 Components of Santa Barbara Travel Demand Model



5. **Unbalanced Trip Ends (PA_Unbalanced.BIN)**: This output file stores the vehicle trip productions and attractions by trip purpose before the trip-end balancing procedure.

6. **Compare 4D Characteristics**: This step is a part of trip generation that calculates the 4D adjustment factors.

7. **4D Adjustment (Data_TAZ_2008.BIN)**: This file stores the updated 4D adjustment factors.

8. **4D Adjustment Step**: This step is a part of trip generation that applies the 4D adjustment factors to the unbalanced trip ends.

9. **Adjusted Trip Ends (PA_Unbalanced.BIN)**: This file stores the adjusted trip ends by the 4D factors before the trip-end balancing procedure.

10. **Balanced Trip Ends (PA_Balanced.BIN)**: This output file stores the model estimate of vehicle trips for each trip purpose that begin or end in each TAZ.

Create Scenario Network

11. **Master Network (SB_HighwayNetwork.DBD)**: This input file is a master highway network that contains highway networks for all scenarios (existing roadways and future roadway improvements). This is a family of files showing the length, location, free-flow speed, capacity, and other characteristics of the roadways in the study area.

12. **Create Scenario Network Step**: This step creates a scenario-specific highway network file from the master highway network file.

13. **Scenario Network (Roads_Loaded_2008.DBD)**: This output file is a scenario-specific network generated in the Master Network step. This is a family of files showing the length, location, free-flow speed, capacity, and other characteristics for the specific model year. The volume flow attributes are added, but not populated with values until step 31 has completed.

Network Initialization

14. **Turn Penalty Table (Turn Penalties_2008.BIN)**: This input file stores the turning prohibition or delay for specific turning movements in the model network. A second turn penalties file **(Turn Penalties_PM_2008)** is used to store turning prohibitions that are in place only during the PM peak hour assignment.

15. **Network Initialization Step**: In this step, the model takes the highway network data and converts it into a format used by TransCAD. Some basic characteristics of the input data are also checked (e.g., no two links can have the same ID number), and an error message may occur if the model detects problems.

16. **Virtual Network (Roads_2008.NET)**: This output file is a special TransCAD data structure that stores the important highway network data and the turn penalty information.

Network Skimming

17. **Terminal Times Matrix (Terminal Times_Temp.MTX)**: This is a temporary output file that stores the terminal times values in a matrix format.

18. **Network Skimming Step**: This step measures travel times for all possible routes between each pair of TAZs, based on the information contained in the highway network, and determines the shortest route. Then it adds the terminal times.

19. **Skim Matrix (SKIM.MTX)**: This output file stores the shortest travel time path between each pair of TAZs, including the terminal times. The data is stored in the form of a TAZ-to-TAZ matrix, with each cell showing the shortest travel time in minutes between each pair of zones.

Daily Trip Distribution

20. **Friction Factors (Friction_Factors.DBF)**: This input file contains factors determining the relative attractiveness (by trip purpose) of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ.

21. **Through Trips (Through_Trips_2008.MTX)**: This input file contains the number of through trips, in the form of an origin-destination (OD) matrix for external TAZs.

22. **Daily Trip Distribution Step**: This step uses four input files from Steps 10, 19, 20, and 21 to determine how trips are distributed among productions and attractions. It then converts them to the origin-destination pairs for the 24-hour period.

23. **Production-Attraction Matrix (PA.MTX)**: This output file contains the trips from the trip generation plus the through trips. This is an intermediate product before determining the directionality of trips.

24. **Daily OD Matrix (OD_DAILY.MTX)**: This output file stores the daily OD trips.

Daily Traffic Assignment

25. **Daily Traffic Assignment Step**: The model uses an iterative assignment process whereby the quickest route is determined for each of the trips in the daily OD matrix, taking into account congestion caused by other trips.

26. **Daily Volumes (Volumes_Daily.BIN)**: This output file stores the daily model volumes and speed on each link.

Feedback Loop

27. **Feedback Loop**: In this step, the model feeds the congested travel time back into the network initialization step and repeats steps 15 through 26.

Peak Hour Trip Distribution

28. **Hourly Factors (Hourly.BIN)**: This input file factors the daily OD matrix into the AM and PM Peak Hour OD matrices.

29. **Peak Hour Trip Distribution Step**: The model uses an iterative assignment process that determines the quickest route for each trip in the AM and PM peak hour OD matrices, taking into account congestion caused by other trips.

30. **AM and PM Peak Hour OD Matrices (OD_AM.MTX, OD_PM.MTX)**: These output files store the number of trips between each OD pair for the AM and PM peak hours.

Peak Hour Traffic Assignment

31. **Peak Hour Traffic Assignment Step**: The model uses an iterative assignment process that determines the quickest route for each trip in the AM and PM peak hour OD matrices, taking into account congestion caused by other trips.

32. **AM and PM Peak Hour Volumes (Volumes_AM.BIN, Volumes_PM.BIN, Turning_Vol_AM.BIN, Turning_Vol_PM.BIN):** Volumes_AM.BIN and Volumes_PM.BIN store the AM and PM peak hour model volumes and speed on each link. Turning_Vol_AM.BIN and Turning_Vol_PM.BIN store the turning movement volumes at the study intersections for the AM and PM peak hours. The link volumes are copied into the Roads_Loaded_2008.DBD file.

Create Graphic

33. **Create Graphic Step**: This step automatically produces a network map showing the traffic volume as a bandwidth and congestion as a color code.

34. **Flow and V/C Ratio Graphic**: Most users will find it useful to produce this graphic, which shows daily traffic volumes as a bandwidth and the volume/capacity ratio as a color code. Users can save this graphic as an image file such as JPEG or BMP for use with other software package, such as embedding it in a report done in Microsoft Word.

3. SUMMARY OF THE INPUT DATA

DATA COLLECTION

A comprehensive data collection effort was undertaken at the outset of the *Plan Santa Barbara* process. The results of this effort are largely contained in the *Plan Santa Barbara: Transportation Existing Condition Report* (AMEC, 2008). This report served to guide the overall model development process by documenting the demographic profile, commute patterns, travel trends and traffic conditions which currently exist in Santa Barbara. In addition, certain data from this report were used directly in the model development process, such as traffic counts and household vehicle ownership data.

Other data sources include SBCAG for roadway network and regional travel data, Caltrans and the County of Santa Barbara for traffic count data, and the City of Santa Barbara for land use, and roadway network data.

TRAFFIC ANALYSIS ZONE (TAZ) SYSTEM

Travel demand models use traffic analysis zones (TAZs) to subdivide the study area for the purpose of connecting land uses to the road network. The TAZs represent physical areas containing land uses that produce or attract vehicle-trip ends. Since the Santa Barbara County Association of Governments (SBCAG) is the Metropolitan Planning Organization (MPO) for the area, the TAZ system for the Santa Barbara model was developed to nest within the regional model TAZ system. After reviewing the TAZ layer used in the SBCAG regional model, along with the roadway network and recent aerial photographs, a set of TAZ boundaries was created for the Santa Barbara model to achieve the following local area enhancements.

- A number of large TAZs were subdivided which allows for a more detailed assignment of local traffic to the highway network. This level of detail is necessary to forecast traffic volumes at the turning movement level.
- Considerable detail was added to the TAZ system in the downtown street grid to allow for a detailed traffic assignment and a more accurate calculation of the 4D variables.
- TAZs were created to be consistent with large developments such as Paseo Nuevo and La Cumbre Plaza.

The resulting 2008 model TAZ system includes 460 zones in the model area. Detailed maps showing the TAZ numbers in all portions of the model area are included in Appendix A. Also included in the TAZ structure are the external stations or gateways at points where major roadways provide access into the model area. These stations capture the traffic entering, exiting, or passing through the model area. Table 1 contains a list of the eight external gateways numbered from 1001 to 1010 that were established for this model (see map in Appendix A).

To provide flexibility in future model applications, the City of Santa Barbara model will include 51 unused TAZs. These TAZs (numbered 750 to 800) can be used to provide greater detail in the model for future specific applications.

TABLE 1 EXTERNAL GATEWAYS	
Gateway Number	**Gateway Description**
1001	Hollister Avenue west of Turnpike Road
1002	US-101 west of Turnpike Road
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)
1004	Cathedral Oaks Road west of Turnpike Road
1005	State Route 154 north of State Route 192
1006	State Route 192 west of Sheffield Drive
1007	Sheffield Drive north of Ortega Hill Road
1008	Ortega Hill Road east of Ortega Ridge Road
1009	US-101 east of Sheffield Drive
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)
Source: Fehr & Peers, 2008.	

LAND USE DATA

One of the primary inputs to the travel model is the land use data. This data is instrumental in estimating trip generation. This model primarily uses the City's parcel-level land use database (maintained in a GIS format) as the source for information on how much development currently exists within each TAZ. These data were supplemented by County parcel-based data and SBCAG TAZ-based data for areas in and bordering the Sphere of Influence.

The City of Santa Barbara TDF model employs twenty-eight land use data categories for each traffic zone, as shown in Table 2. A complete list of the land uses by TAZ and information relating to the land use codes that were aggregated to each of the model land use categories is included in Appendix B.

TABLE 2 MODEL LAND USE CATEGORIES	
Residential	
Land Use Type	**Units**
Single-Family (SF)	Dwelling Units
Multi-Family Zero Cars (MF_0)	Dwelling Units
Multi-Family One Car (MF_1)	Dwelling Units
Multi-Family Two Cars (MF_2)	Dwelling Units
Multi-Family Three or More Cars (MF_3P)	Dwelling Units

TABLE 2 MODEL LAND USE CATEGORIES (CONT)	
Non-Residential	
Land Use Type	**Units**
Commercial Services	Thousand Square-feet
Entertainment	Thousand Square-feet
Auto Related	Thousand Square-feet
Restaurant	Thousand Square-feet
Retail	Thousand Square-feet
Lodging	Thousand Square-feet
Office	Thousand Square-feet
Institutional	Thousand Square-feet
Industrial	Thousand Square-feet
Hospital	Thousand Square-feet
Religious Facilities	Thousand Square-feet
Police and Fire Services	Thousand Square-feet
Elementary and Middle School	Students
High Schools	Students
Colleges	Students
Recreation (Parks and Beaches)	Relative Popularity[2]
Golf	Acres
SBCAG_Agricultural[1]	Employees
SBCAG_Industrial[1]	Employees
SBCAG_Commercial[1]	Employees
SBCAG_Office[1]	Employees
SBCAG_Service[1]	Employees

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

SPECIAL GENERATORS

Special generators are used for unique land uses that cannot be adequately represented by one of the standard land use categories. The trip ends for special generators are determined outside

the model process for each specific use and added to the results of the standard trip generation procedure. There are no special generators currently used in the 2008 Santa Barbara model.

ROADWAY NETWORK

The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes; arterials, collectors, and a selection of local roads within the study area (see Figure 1).

The roadway network database received from SBCAG includes street name, distance, functional class, speed, capacity, and number of lanes. These attributes were checked using maps, aerial photographs, and other data provided by the City. Table 3 shows the initial roadway speeds, lanes and capacities used for each roadway class in the model.

TABLE 3
TYPICAL ROADWAY SPEEDS AND CAPACITIES

Roadway Classification[1]	Speed (MPH)	Total Through Lanes	Lane Capacity (Vehicles per hour per lane)	Total Facility Capacity (Vehicles per hour)
Freeway	65	4	2,000	8,000
Highway	50	4	1,200	4,800
Major Arterial	35	4	900	3,600
Minor Arterial	35	4	750	3,000
Collector	30	2	600	1,200
Local	25	2	600	1,200
Ramp	30	1	1,800	1,500
Centroid Connector[2]	30	2	10,000	20,000

[1] SBCAG, 2004.

[2] Centroid connectors are abstract representations of the starting and ending point of each trip, and thus should have no capacity constraints.

Source: Fehr & Peers, 2008.

Additional Roadway Attributes

For a representative sample of network links, current daily, AM peak hour, and PM peak hour traffic counts have been coded for validating the model. The traffic count data was collected from several sources including Caltrans, the County, the City, and a comprehensive set of traffic counts conducted in March, 2008. Count location tables and maps are provided in Appendix C.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions.

4. DESCRIPTION OF THE MODEL CALIBRATION PROCESS

Model calibration is the process by which parameters are set based on a comparison of travel estimates computed by the model with actual data from the area being modeled. This section provides a general description of the calibration steps and the adjustments made during the process to achieve accuracy levels that are within Caltrans' guidelines. For detailed information regarding the specified modeling steps, refer to the TransCAD model control file that is included in Appendix G.

TRIP GENERATION RATES

Trip generation rates relate the number of vehicle trips going to and from a site to some measure of the intensity of use at the site. Each trip has two ends, a "production" and an "attraction" end. By convention, all trips with one end at a residence are defined as being "produced" by the residence and "attracted" to the other use (workplace, school, retail store, etc.), and are called "Home-Based" trips. Trips that do not have one end at a residence are called "Non-Home-Based" trips.

There are five trip purposes used in the Santa Barbara model:

1. Home-Based Work (HBW): trips between a residence and a workplace.
2. Home-Based Other (HBO): trips between a residence and any other destination.
3. Non-Home-Based (NHB): trips that do not begin or end at a residence, such as traveling from a workplace to a restaurant, or from retail store to a bank.
4. Golf (GOLF): trips to and from golf courses.[1]
5. Recreational (REC): trips to and from the beaches, parks and other attractions (such as the Mission) in the model area.

Trip generation rates are initially defined for total trips and later split by trip purpose, for both productions and attractions.

The most widely used source for vehicle trip generation rates in the transportation planning field is the ITE *Trip Generation Manual*. The 2008 trip generation rates were initially based on residential trip generation surveys, the SBCAG regional model, recently calibrated models in similar areas, and the ITE *Trip Generation Manual*. The rates were calibrated to account for local conditions based on counts, production-to-attraction balancing, and to account for the difference between ITE and model land use definitions.

[1] Although GOLF trips account for only a negligible percentage of the total daily trips in Santa Barbara, the unique peaking characteristics and large land coverage of these areas require that these trips be handled specially to ensure an accurate assignment in the immediately surrounding areas during the peak hours.

Further Refinement

In addition to the standard trip generation procedures, certain enhancements were added to the Santa Barbara model to better capture local trip making characteristics and provide the ability to test certain policy options for future development scenarios. These enhancements include dividing the model area into four "area types" and cross-classifying multifamily households by auto-ownership.

Area Types

The model area contains a variety of development patterns, each with different land use characteristics and associated trip making patterns. To account for these differences, the model area was divided into four "area types". The four area types, which are shown in Figure 5, have their own associated trip generation rates and internal/external trip making characteristics. Trip generation rates for each land use in each area type are shown in Table 4.

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PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 5

TABLE 4 DAILY VEHICLE TRIP GENERATION RATE COMPARISON					
Residential[1]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Single-Family (SF)	Dwelling Units	8.05	10.56	11.98	11.98
Multi-Family Zero Cars (MF_0)	Dwelling Units	3.03	3.55	4.02	4.02
Multi-Family One Car (MF_1)	Dwelling Units	4.23	5.39	6.18	6.18
Multi-Family Two Cars (MF_2)	Dwelling Units	5.96	7.04	8.08	8.08
Multi-Family Three or More Cars (MF_3P)	Dwelling Units	7.60	8.89	10.24	10.24
Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Commercial Services	Thousand Square-feet	100.10	115.20	128.40	128.40
Entertainment	Thousand Square-feet	36.40	43.20	48.15	48.15
Auto Related	Thousand Square-feet	16.38	17.28	19.26	19.26
Restaurant	Thousand Square-feet	100.10	139.20	136.05	136.05
Retail	Thousand Square-feet	32.76	45.18	40.28	40.28
Lodging	Thousand Square-feet	2.73	2.11	3.75	3.75
Office	Thousand Square-feet	8.27	11.59	12.92	12.92
Institutional	Thousand Square-feet	45.50	48.00	53.50	53.50
Industrial	Thousand Square-feet	4.25	4.48	5.00	5.00

TABLE 4
DAILY VEHICLE TRIP GENERATION RATE COMPARISON
(CONT)

Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Hospital	Thousand Square-feet	N/A	12.48	N/A	N/A
Religious Facilities	Thousand Square-feet	8.29	8.75	9.75	9.75
Police and Fire Services	Thousand Square-feet	8.65	9.12	10.17	10.17
Elementary and Middle School	Students	1.81	1.91	2.13	2.13
High Schools	Students	N/A	0.64	N/A	0.72
Colleges	Students	N/A	0.25	0.28	N/A
Recreation (Parks and Beaches)	Relative Popularity[3]	N/A	N/A	N/A	N/A
Golf	Acres	N/A	N/A	4.75	4.75
SBCAG_Agricultural[1]	Employees	N/A	N/A	3.95	3.95
SBCAG_Industrial[1]	Employees	N/A	N/A	2.04	2.04
SBCAG_Commercial[1]	Employees	N/A	N/A	3.92	3.92
SBCAG_Office[1]	Employees	N/A	N/A	1.07	1.07
SBCAG_Service[1]	Employees	N/A	N/A	5.39	5.39

[1] The ITE manual does not stratify multifamily dwelling units by auto-ownership. ITE multifamily rates range from 4.18 to 6.72 depending on the dwelling type. Rates based on auto-ownership were developed from 2000 National Household Travel Survey (NHTS) data for the City of Santa Barbara. NHTS rates range from a minimum of 0.69 to a maximum of 11.75.

[2] Not all non-residential land use categories are present in each area type. 2008 trip generation rates were only developed for land uses present in 2008 in each area type.

[3] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Area type 2 represents the remaining "grid" portion of the City. This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center which attracts trips from outside areas.

Multi-Family Unit Vehicle Ownership

In order to test certain potential policy alternatives, multi-family dwelling units were divided into four types representing varying levels of automobile ownership. Auto-ownership data for each census tract in Santa Barbara was obtained from the 2000 National Household Travel Survey, which is conducted by the United States Census Bureau. The percentage of households representing each level of automobile ownership was calculated and the total number of multifamily units in each census tract was apportioned to the relevant multi-family trip generation category based on this percentage.

After the total vehicle trips are calculated for each land use type, they are split into the five trip purposes described above. The distribution of trips by purpose was based on the SBCAG model and recent data from the 2000 National Household Travel Survey and was compared to similar regions. The results by land use category for the 2008 model are presented in Tables 5-I through 5-4.

For example, based on Table 4 a neighborhood in area type 4 consisting of 10 single-family dwelling units would generate 120 daily vehicle trips. Splitting these trips into the various purposes based on Tables 5-I through 5-4 would result in 22 trips traveling between home and work, 62 trips between home and anything other than work (e.g., shopping, bank, visiting friends), 35 trips between two non-home locations (e.g., going from work to a restaurant), half a trip between home and a golf course, and remaining one and a half trips between home and a recreational area.

Table 6 compares preliminary travel model productions and attractions by trip purpose to the final productions and attractions after trip balancing. The HBW, HBO, GOLF, and REC purposes are balanced to productions while the NHB purposes are balanced to attractions. The AM and PM peak hour trip tables are created by factoring the daily production-attraction trip table as described in Section 6.

TABLE 5-1
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 1

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	15.65%	N/A	45.00%	7.00%	25.00%	5.00%	0.35%	N/A	2.00%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.00%		47.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family Two Cars (MF_2)	12.25%		47.50%	5.00%	30.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		50.00%	5.00%	29.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	18.00%	N/A	32.00%	15.00%	35.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		31.75%	18.00%	44.00%	0.00%		0.25%	
Lodging	9.00%	2.00%	27.00%	10.00%	20.00%	11.00%	0.25%		20.75%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		20.00%		18.00%	16.00%	46.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-1
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 1
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	33.00%	20.00%	45.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		17.00%		10.00%	30.00%	43.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools[3]										
Colleges[3]										
Recreation (Parks and Beaches)[3]										
Golf3										
SBCAG_Agricultural[1,3]								N/A		
SBCAG_Industrial[1,3]										
SBCAG_Commercial[1,3]										
SBCAG_Office[1,3]										
SBCAG_Service[1,3]										

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-2
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 2

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	16.00%	N/A	46.65%	6.00%	24.00%	5.00%	0.35%	N/A	2.00%	N/A
Multi-Family Zero Cars (MF_0)	9.00%		53.00%	5.00%	28.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	18.00%		48.00%	3.00%	28.00%	2.00%	0.00%		1.00%	
Multi-Family Two Cars (MF_2)	13.50%		48.50%	5.00%	28.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	11.75%		50.00%	5.00%	28.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	19.00%	N/A	35.00%	15.00%	31.00%	0.00%	N/A	0.00%	N/A
Entertainment		3.00%		46.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		46.00%	3.00%	49.00%	0.00%		0.00%	
Restaurant		2.00%		45.50%	16.00%	36.00%	0.00%		0.50%	
Retail		6.00%		44.00%	19.75%	30.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		18.00%	16.00%	52.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital		38.00%		35.00%	20.00%	7.00%	0.00%		0.00%	

TABLE 5-2
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 2
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	45.00%	20.00%	33.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges		20.00%		70.00%	5.00%	5.00%	0.00%		0.00%	
Recreation (Parks and Beaches)[3]										
Golf[3]										
SBCAG_Agricultural[1,3]								N/A		
SBCAG_Industrial[1,3]										
SBCAG_Commercial[1,3]										
SBCAG_Office[1,3]										
SBCAG_Service[1,3]										

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-3
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 3

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	18.00%	N/A	46.65%	6.00%	23.00%	5.75%	0.35%	N/A	1.25%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	39.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.75%		48.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Two Cars (MF_2)	12.75%		50.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		52.00%	5.00%	27.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	17.00%	N/A	36.00%	15.00%	32.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		44.00%	19.75%	30.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		40.00%	16.00%	30.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-3
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 3
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%		33.00%	20.00%	45.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges		20.00%		70.00%	5.00%	5.00%	0.00%		0.00%	
Recreation (Parks and Beaches)[3]										
Golf		0.00%		0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
SBCAG_Agricultural[1]		62.00%		0.00%	4.00%	34.00%	0.00%	N/A	0.00%	
SBCAG_Industrial[1]		66.00%		0.00%	5.00%	29.00%	0.00%		0.00%	
SBCAG_Commercial[1]		16.00%		42.00%	8.00%	34.00%	0.00%		0.00%	
SBCAG_Office[1]		39.00%		0.00%	10.00%	51.00%	0.00%		0.00%	
SBCAG_Service[1]		35.00%		26.00%	10.00%	29.00%	0.00%		0.00%	

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational.

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 5-4
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 4

Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Single-Family (SF)	18.00%	N/A	45.65%	6.00%	23.00%	5.75%	0.35%	N/A	1.25%	N/A
Multi-Family Zero Cars (MF_0)	8.00%		53.00%	5.00%	29.00%	4.00%	0.00%		1.00%	
Multi-Family One Car (MF_1)	14.75%		48.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Two Cars (MF_2)	12.75%		50.00%	5.00%	27.00%	4.00%	0.25%		1.00%	
Multi-Family Three or More Cars (MF_3P)	10.75%		52.00%	5.00%	27.00%	4.00%	0.25%		1.00%	

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Commercial Services	N/A	17.00%	N/A	32.00%	15.00%	36.00%	0.00%	N/A	0.00%	N/A
Entertainment		2.00%		47.00%	15.00%	36.00%	0.00%		0.00%	
Auto Related		2.00%		55.00%	3.00%	40.00%	0.00%		0.00%	
Restaurant		2.00%		47.00%	14.50%	36.00%	0.00%		0.50%	
Retail		6.00%		39.00%	19.75%	35.00%	0.00%		0.25%	
Lodging	10.00%	2.00%	26.75%	10.00%	12.00%	19.00%	0.25%		20.00%	
Office	N/A	55.00%	N/A	7.00%	19.00%	19.00%	0.00%		0.00%	
Institutional		14.00%		18.00%	16.00%	52.00%	0.00%		0.00%	
Industrial		64.00%		0.00%	5.00%	31.00%	0.00%		0.00%	
Hospital[3]										

TABLE 5-4
PERCENT OF VEHICLE TRIPS BY TRIP PURPOSE - AREA TYPE 4
(CONT)

Non-Residential

Land Use Type	Home-Based Work		Home-Based Other		Non-Home-Based		Golf		Recreational	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Religious Facilities	N/A	2.00%	N/A	45.00%	20.00%	33.00%	0.00%	N/A	0.00%	N/A
Police and Fire Services		15.00%		10.00%	30.00%	45.00%	0.00%		0.00%	
Elementary and Middle School		5.00%		85.00%	5.00%	5.00%	0.00%		0.00%	
High Schools		15.00%		75.00%	5.00%	5.00%	0.00%		0.00%	
Colleges[3]										
Recreation (Parks and Beaches)										
Golf		0.00%		0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
SBCAG_Agricultural[1]		62.00%		0.00%	4.00%	34.00%	0.00%	N/A	0.00%	
SBCAG_Industrial[1]		66.00%		0.00%	5.00%	29.00%	0.00%		0.00%	
SBCAG_Commercial[1]		16.00%		42.00%	8.00%	34.00%	0.00%		0.00%	
SBCAG_Office[1]		39.00%		0.00%	10.00%	51.00%	0.00%		0.00%	
SBCAG_Service[1]		35.00%		26.00%	10.00%	29.00%	0.00%		0.00%	

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational

[3] Not all non-residential land use categories are present in each area type. 2008 splits by purpose were only developed for land uses present in 2008 in each area type.

Source: Fehr & Peers, 2008.

TABLE 6
TRIP GENERATION PRODUCTION AND ATTRACTION SUMMARY

Purpose	Estimated Productions	Estimated Attractions	Final Productions	Final Attractions
Home-Based Work (HBW)	40,329	40,199	40,329	40,329
Home-Based Other (HBO)	140,512	136,160	140,512	140,512
Non-Home-Based (NHB)	137,806	137,185	137,185	137,185
Golf (GOLF)	1,105	1,135	1,105	1,105
Recreational (REC)	6,625	6,625	6,625	6,625
IX	106,682	N/A	103,865	103,865
XI	N/A	140,197	136,165	136,165
		Total	565,786	565,786

Source: Fehr & Peers, 2008.

TRIP DISTRIBUTION (GRAVITY MODEL)

Once the trip generation step has determined the number of trips that originate and terminate in each zone, the trip distribution process determines the specific destination of each originating trip. The destination may be within the zone itself, resulting in an intra-zonal trip. If the destination is outside of the zone of origin, it is an inter-zonal trip. Internal-internal (I-I) trips originate and terminate within the model area. Trips that originate within but terminate outside of the model area are internal-external (I-X), and trips that originate outside and terminate inside of the model area are external-internal (X-I). Trips passing completely through the model area are external-external (E-E).

The trip distribution model uses the gravity equation to distribute trips to all zones. This equation estimates an accessibility index for each zone based on the number of attractions in each zone and a friction factor, which is a function of travel time between zones. Each attraction zone is given its pro-rata share of productions based on its share of the accessibility index. This process applies to the I-I, I-X, and X-I trips. The E-E trips are added to the trip table prior to final assignment.

Friction Factors

Friction factors, also known as travel time factors, determine the relative attractiveness of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ. These factors are used in the trip distribution stage of the model. Friction factors reported in national modeling reference documents such as National Cooperative Highway Research Program (NCHRP) 365, and modified based on local conditions and comparison with the SBCAG model, were used in the 2008 Santa Barbara model. See Appendix E for friction factor curves.

Trips between the Santa Barbara Area and External Areas

One of the important inputs to a travel model is an estimate of the amount of travel between the study area and neighboring areas outside the model. These are typically called internal-external, or I-X/X-I, trips.

The United States Census Bureau surveys residential and work locations at the place level. Table 7 illustrates the distribution of work locations for Santa Barbara residents, while Table 8 illustrates the distribution of residential locations for Santa Barbara employees.

TABLE 7
WORK LOCATIONS FOR SANTA BARBARA RESIDENTS

Year	Percent Working Inside Santa Barbara	Percent Working Outside Santa Barbara
2000	63%	37%

Source: U.S. Census Bureau.

TABLE 8
RESIDENTIAL LOCATIONS FOR SANTA BARBARA EMPLOYEES

Year	Percent Living Inside Santa Barbara	Percent Living Outside Santa Barbara
2000	49%	51%

Source: U.S. Census Bureau.

Based on this data, the proportion of HBW trips entering and leaving the study area was estimated. For non-work trip purposes, information from the SBCAG Regional Model was used to develop an initial estimate the percent of HBO and NHB trips that travel between Santa Barbara and other areas. These estimates were then refined using the City's land use database. Table 9 summarizes the proportion of trips by purpose and area type that are assumed to have one end outside the model area.

TABLE 9
PERCENT OF TRIPS BY PURPOSE THAT ARE INTERNAL/EXTERNAL FOR EACH AREA TYPE

Purpose	Area Type 1		Area Type 2		Area Type 3		Area Type 4	
	[1]P	[2]A	P	A	P	A	P	A
Home-Based Work (HBW)	20%	41%	27%	45%	40%	49%	44%	49%
Home-Based Other (HBO)	18%	38%	19%	30%	32%	31%	20%	33%
Non-Home-Based (NHB)	21%	21%	21%	20%	23%	24%	21%	24%
Golf (GOLF)	0%	40%	0%	40%	0%	35%	0%	35%
Recreational (REC)	0%	30%	0%	30%	0%	20%	0%	20%

Notes:
[1]P=Production
[2]A=Attraction

Source: Fehr & Peers, 2008.

After the number of I-X/X-I trips is estimated, those trips are distributed to the stations around the perimeter of the model area using external station weights. These external station weights are based on City, County, and Caltrans traffic count data and the SBCAG Regional Model. The resulting external station weights are presented on Figure 6.

Through Trips

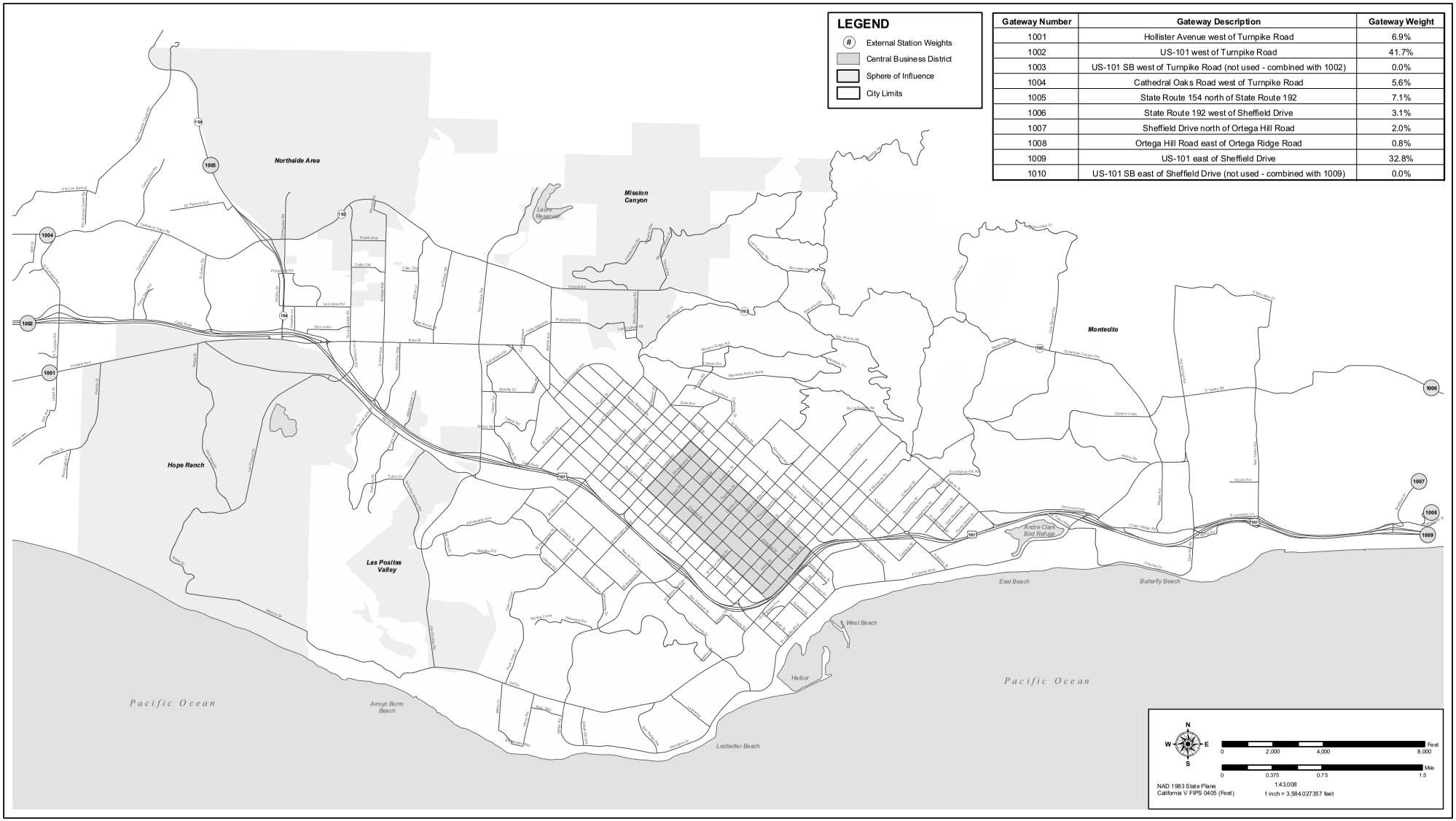
Through trips (also called external-external, or EE trips) are those that pass through the study area without stopping inside the study area. The major flows of through traffic in the Santa Barbara area use US-101 and SR 154, with lower volumes of through traffic using SR 192. The majority of through trips use US-101 for at least a portion of their journey, even if they do not enter or exit the model area along this route. The size of these flows was estimated based on Caltrans traffic counts and the SBCAG Regional Model. The through trips were modified in conjunction with the external station weights so that results at the gateways accurately represented observed data. The resulting through trip matrix is summarized in Table 10.

TABLE 10
MATRIX OF DAILY THROUGH (EE) TRIPS

Destination / **Origin**	Hollister Ave west of Turnpike Rd	Hwy 101 west of Turnpike Rd	Cathedral Oaks Rd west of Turnpike Rd	Hwy 154 north of Hwy 192	Ortega Hill Rd north of Ortega Ridge Rd	Hwy 101 east of Sheffield Dr	**Total**
Hollister Ave west of Turnpike Rd		0	0	0	55	265	**320**
Hwy 101 west of Turnpike Rd	0		0	0	285	10120	**10405**
Cathedral Oaks Rd west of Turnpike Rd	0	0		0	30	75	**105**
Hwy 154 north of Hwy 192	0	0	0		30	830	**860**
Ortega Hill Rd east of Ortega Ridge Rd	55	285	30	30		0	**400**
Hwy 101 east of Sheffield Dr	265	10120	75	830	0		**11,290**
Total	**320**	**10405**	**105**	**860**	**400**	**11,290**	**23,380**

Note: All trips are rounded to the nearest 5 and external gateways with less than 100 trips are not shown on the above table.

Source: SBCAG



Gateway Number	Gateway Description	Gateway Weight
1001	Hollister Avenue west of Turnpike Road	6.9%
1002	US-101 west of Turnpike Road	41.7%
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)	0.0%
1004	Cathedral Oaks Road west of Turnpike Road	5.6%
1005	State Route 154 north of State Route 192	7.1%
1006	State Route 192 west of Sheffield Drive	3.1%
1007	Sheffield Drive north of Ortega Hill Road	2.0%
1008	Ortega Hill Road east of Ortega Ridge Road	0.8%
1009	US-101 east of Sheffield Drive	32.8%
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)	0.0%

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PLAN SANTA BARBARA EXTERNAL STATION WEIGHTS
FIGURE 6

TRIP ASSIGNMENT

The trip assignment process determines the route that each vehicle-trip follows to travel from origin to destination. The model selects these routes in a manner that is sensitive to congestion and the desire to minimize overall travel time. It uses an iterative, capacity-restrained assignment and equilibrium volume adjustments. This technique finds a travel path for each trip that minimizes the travel time, with recognition of the congestion caused by all other trips.

The general assignment process includes the following steps.

- Assign all trips to the links along their selected paths.
- After all assignments, examine the volume on each link and adjust its impedance based on the volume-to-capacity ratio.
- Repeat the assignment process for a set number of iterations or until specified criteria related to minimizing travel delays are satisfied.

Calibration of the roadway network included modification of the centroid connectors to more accurately represent the location at which traffic accessed the local roads, adjusting speeds from the posted speed limit to adjust the attractiveness of the route and better reflect the prevailing speed of traffic, and refining the turn penalties. Figure 7 and Figure 8 show the calibrated functional class and lanes.

Turn Penalties

Turn penalties are used to prohibit or add delay to certain turning movements. The Santa Barbara model prohibits traffic from getting off a freeway ramp and then immediately getting back on, as well as prohibits traffic from making turns across a median. In addition, all U-turns are prohibited throughout the model area in order to avoid counter-intuitive traffic routing. The PM peak hour assignment also prohibits left turns onto and off of State Street in the Central Business District.

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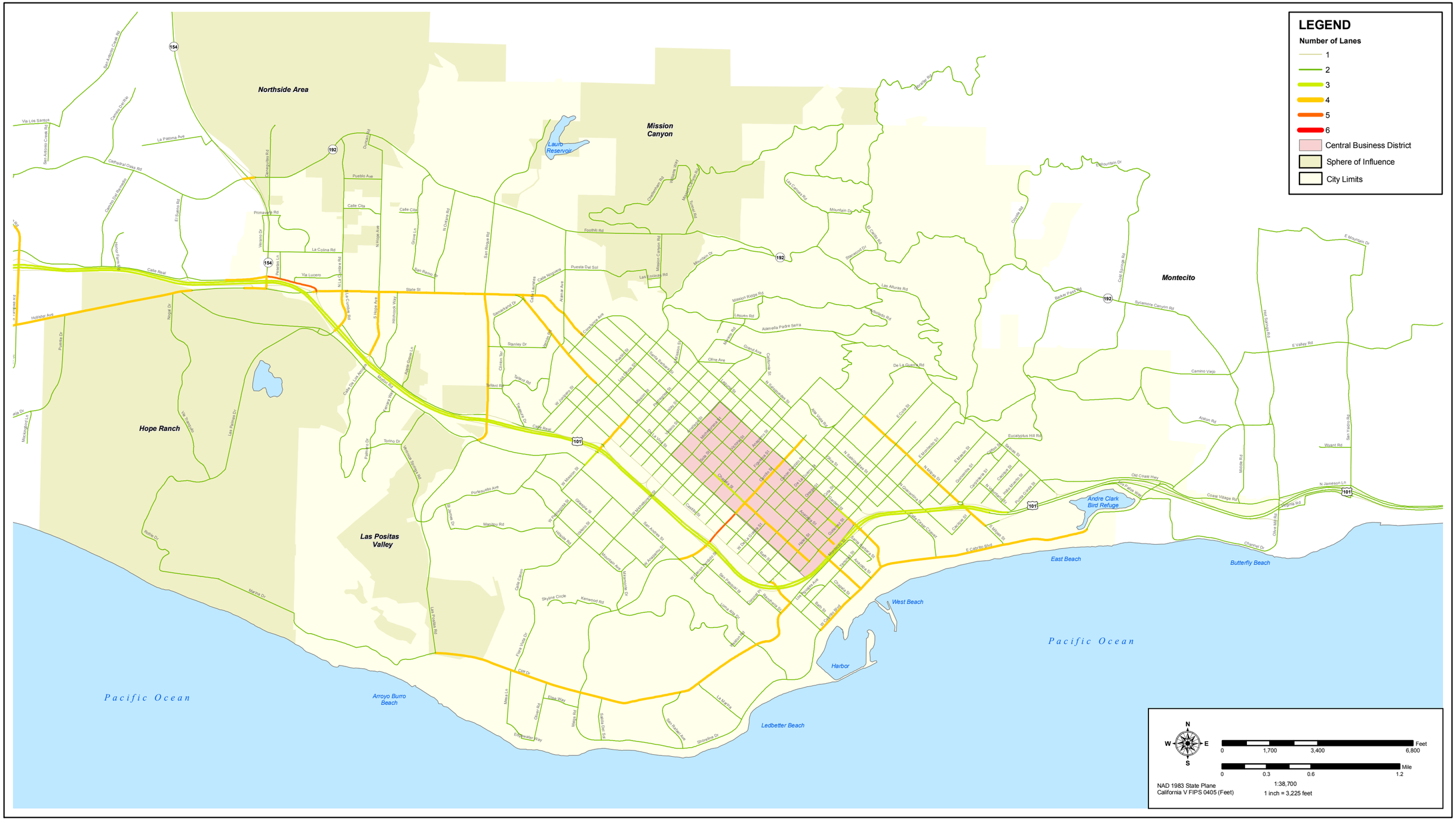
PLAN SANTA BARBARA BASE YEAR (2008) ROADWAY FUNCTIONAL CLASSIFICATION
FIGURE 7



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PLAN SANTA BARBARA BASE YEAR (2008) ROADWAY TOTAL THRU LANES

FIGURE 8

5. MODEL RESULTS AND DAILY VALIDATION

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. While most model validation guidelines focus on the performance of the trip assignment function in accurately assigning trips to the roadway network, it is good modeling practice to examine the outputs from each step of the modeling process for reasonableness, and to compare them against existing data if available. This section describes the reasonableness and validation checks that have been performed for the 2008 Santa Barbara TDF model.

LAND USE

Detailed parcel level land use data for the Santa Barbara model was researched and compiled by City staff. The land use database was created to represent March 2008 conditions.

TRIP GENERATION

One of the basic assumptions of any travel model is that the total number of local trips (internal-to-internal, or I-I) produced is equal to the total number of local trips attracted. If the totals are not equal, the model will typically adjust the attractions to match the productions. While it is never possible to achieve a perfect match between productions and attractions prior to the automatic balancing procedure, the existence of a substantial mismatch in one or more trip purposes indicates that either land use inputs or trip generation factors may be in error.

Table 11 summarizes the local trip productions and attractions from the Santa Barbara travel model for each trip purpose, prior to the application of the automatic balancing procedure. Guidelines published by Federal Highway Administration's Transportation Model Improvement Program (TMIP) and NCHRP suggest that, prior to balancing, the number of productions and attractions should match to within plus or minus 10% (i.e., the production-to-attraction ratio should be within the range of 0.90 to 1.10). The results shown in Table 11 indicate that the 2008 model meets the published guidelines for all trip purposes.

TABLE 11
TRIP PRODUCTION TO ATTRACTION RATIOS BY PURPOSE

Trip Purpose	Production/Attraction Ratio	Percent of Total Daily Vehicle Trips	
		2008 PlanSB Model	California[1]
Home-Based Work (HBW)	1.00	15%	21%
Home-Based Other (HBO)	1.01	43%	48%
Non-Home-Based (NHB)	1.00	41%	31%
Golf (GOLF)	0.97	Negligible[2]	N/A
Recreational (REC)	N/A	2%	N/A
Total		101%	100%

[1] *2000-2001 California Statewide Household Travel Survey Final Report*, June 2002.
[2] Although GOLF trips account for only a negligible percentage of the total daily trips in Santa Barbara, the unique peaking characteristics and large land coverage of these areas require that these trips be handled specially to ensure an accurate assignment in the immediately surrounding areas during the peak hours.
Note: May not total 100% due to rounding.
Source: Fehr & Peers, 2008

In addition to production and attraction balancing, the percent of total trips for each purpose were checked for reasonableness. Typical values are provided below:

- HBW trips 18% to 27% of all trips
- HBO trips: 47% to 54% of all trips
- NHB trips: 22% to 31% of all trips

While the Santa Barbara Model falls slightly outside of these ranges, the trip purpose percentages in the 2008 Santa Barbara model are generally reasonable and reflect a greater degree of trip chaining in Santa Barbara due to its long and narrow physical geography. This information, in conjunction with the trip generation rate comparisons and trip purpose distributions discussed in Section 4, indicates that the trip generation component of the Santa Barbara model is performing reasonably.

TRIP ASSIGNMENT

The most critical static measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. Caltrans has established certain trip assignment guidelines for models to be deemed acceptable for forecasting future year traffic. This section describes the model performance in comparison to the standards discussed in Travel Forecasting Guidelines (California Department of Transportation, November 1992).

The validity of the Santa Barbara travel model was tested for daily, AM and PM peak hour conditions. Model volumes were compared to existing traffic counts at 159 individual count sites shown on Figure 9, and at 6 screenlines shown on Figure 10. Daily screenlines were selected to correspond with the major flows into and out of the City at available data points. The remainder of this section contains a summary of the validation results, while Appendix F contains a detailed report of all validation comparisons.

Link volume results from the model runs were examined and checked for reasonableness. Links were identified where model results varied substantially from the observed counts, and the characteristics of those links were reviewed with City staff to ensure that the link attributes accurately reflected local operating conditions. In some cases, link characteristics such as speeds were modified based on local input. Figure 11 shows the daily link volumes resulting from the 2008 Santa Barbara travel demand model.

Comparison Techniques

Travel model accuracy is usually tested using four comparison techniques.

- The volume-to-count ratio is computed by dividing the volume assigned by the model and the actual traffic count for individual roadways (or intersections) area-wide.
- The maximum deviation is the difference between the model volume and the actual count divided by the actual count.
- The correlation coefficient estimates the correlation between the actual traffic counts and the estimated traffic volumes from the model.
- The percent root mean square error (RMSE) is the square root of the model volume minus the actual count squared divided by the number of counts. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model.

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PLAN SANTA BARBARA DAILY VALIDATION COUNT LOCATIONS
FIGURE 9

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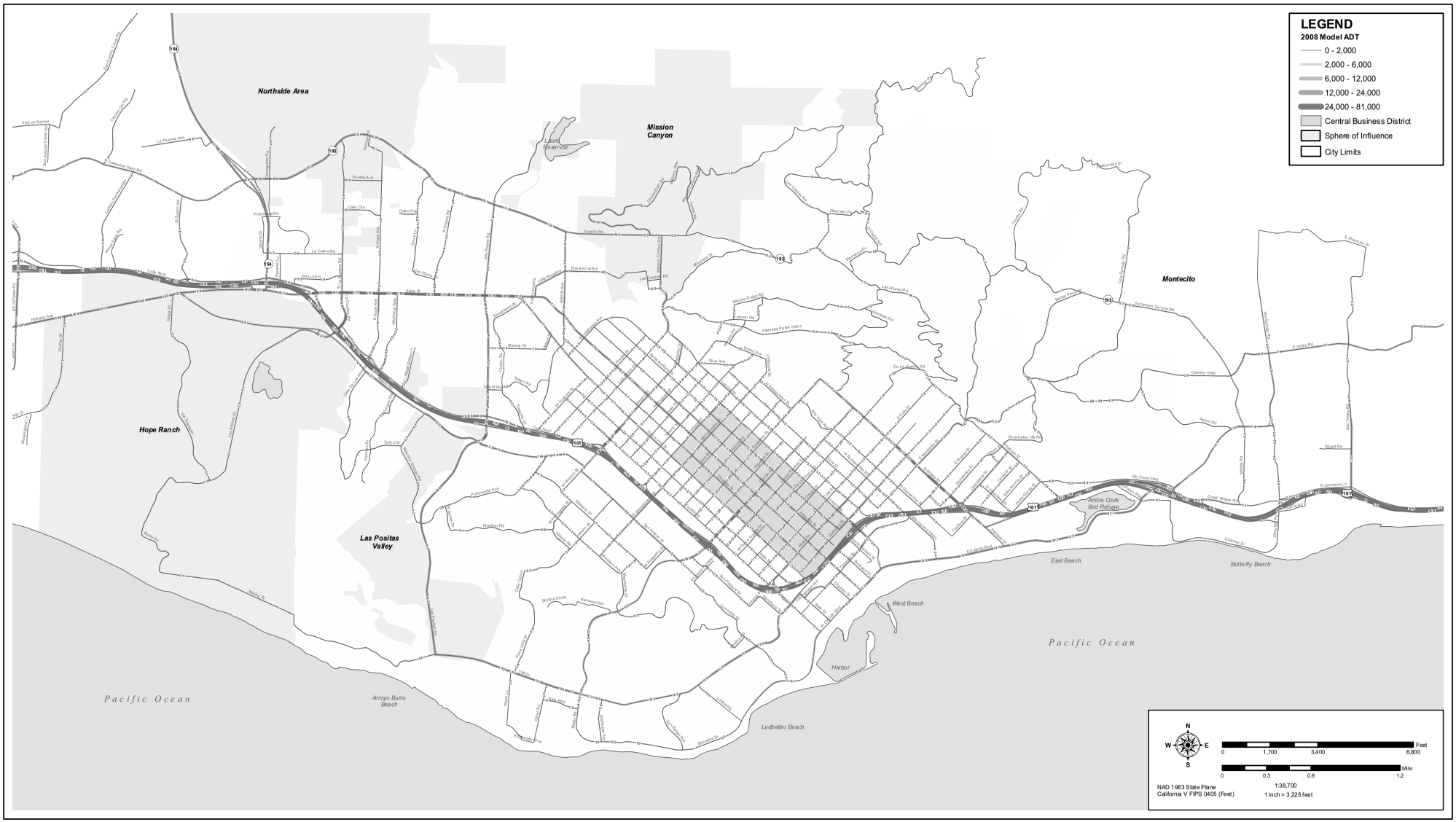
PLAN SANTA BARBARA DAILY SCREENLINE LOCATIONS
FIGURE 10



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PLAN SANTA BARBARA 2008 AVERAGE DAILY TRAFFIC VOLUMES

FIGURE 11

In addition to these tests, the model's stability was tested to verify that reasonable output responses occurred based on varying input variables.

Validation Guidelines

For a model to be considered accurate and appropriate for use in traffic forecasting, it must replicate actual conditions to within a certain level of accuracy. Since it would be impossible for any model to precisely replicate all counts, validation guidelines have been established by Caltrans and other agencies. Key validation standards for daily travel models based on the Caltrans guidelines are summarized below.

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).
- All of the roadway screenlines should be within the maximum desirable deviation, which ranges from approximately 15 to 64 percent depending on total volume.
- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts.
- The correlation coefficient between the actual ground counts and the estimated traffic volumes should be greater than 88 percent.

Although not stated in the Caltrans standards, an additional Fehr & Peers validation guideline was applied to the 2008 Santa Barbara travel model.

- The RMSE should not exceed 40 percent.

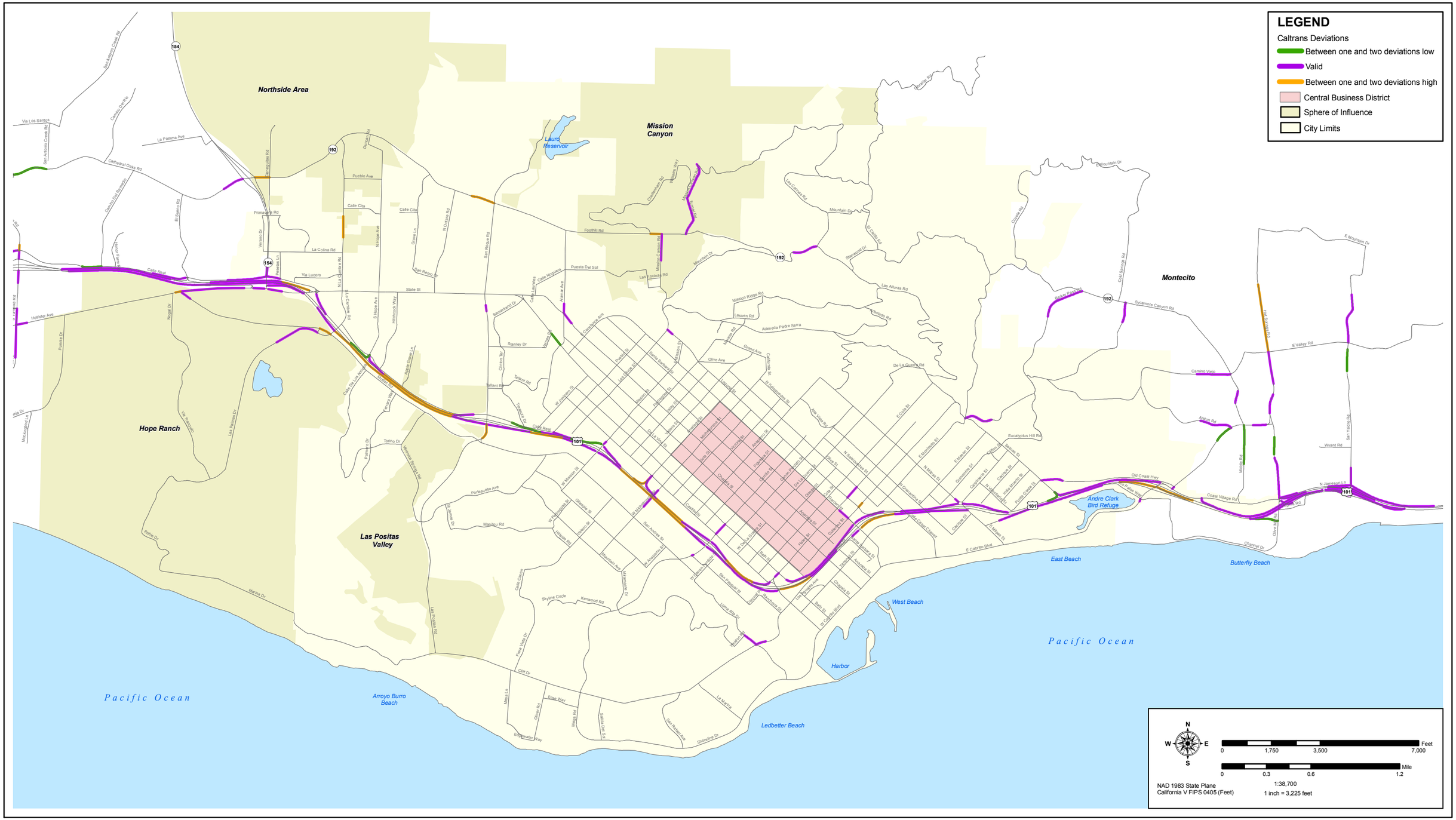
Static Validation Results

Scripts and spreadsheets were created to compute the validation results for roadway links in the Santa Barbara travel model. The results for daily conditions are summarized in Table 12 below, while the detailed spreadsheets are presented in Appendix F. The model deviation by geographic location is shown on Figure 12. Figure 13 shows a scatter plot of count and model volumes compared to Caltrans' allowable error. The model performs well, exceeding all guidelines for overall model accuracy.

TABLE 12
RESULTS OF DAILY MODEL VALIDATION

Validation Item	Criterion for Acceptance	Model Results
Count Locations	N/A	159
% of Links Within Caltrans Standard Deviations	At Least 75%	77%
% of Screenlines Within Caltrans Standard Deviations	100%	100%
2-way Sum of All Links Counted	Within ± 10%	9%
Correlation Coefficient	Greater than 88%	99%
RMSE	40% or less	23%

Source: Fehr & Peers, 2008.



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PLAN SANTA BARBARA MODEL VALIDATION BY LOCATION
FIGURE 12

FIGURE 13
DAILY MODEL VALIDATION SCATTERPLOT

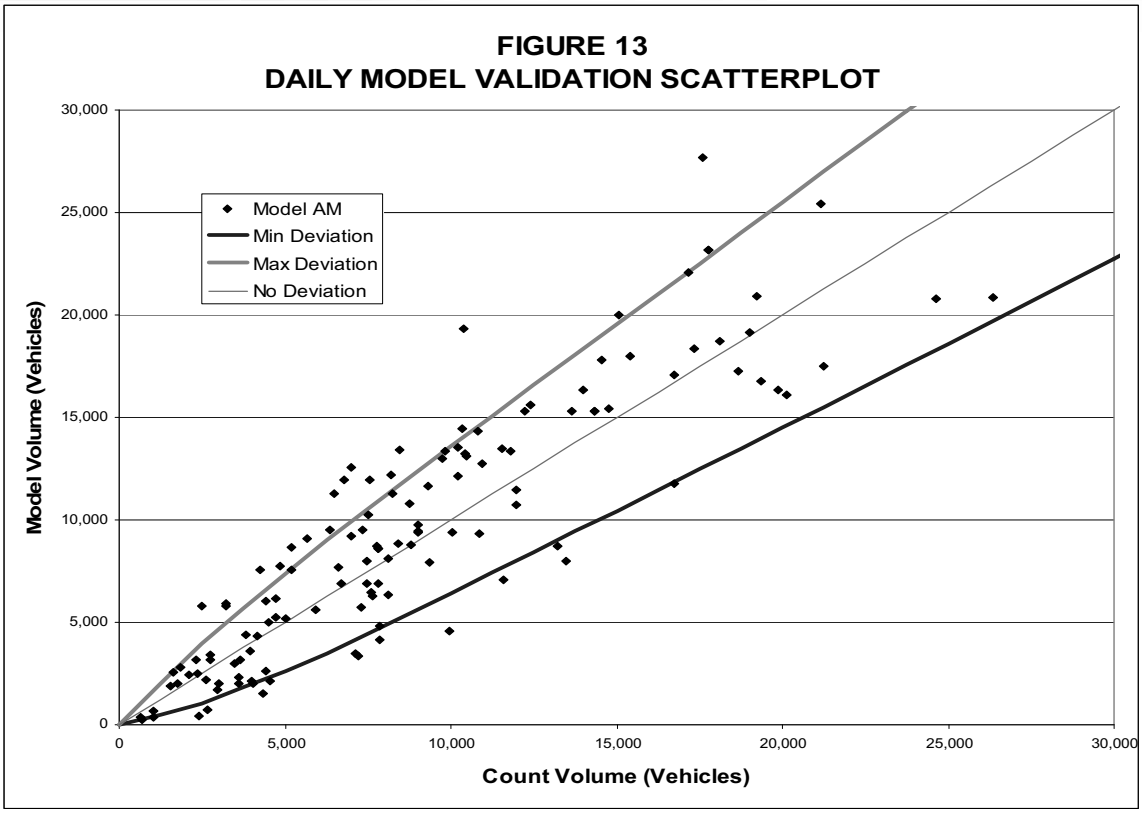
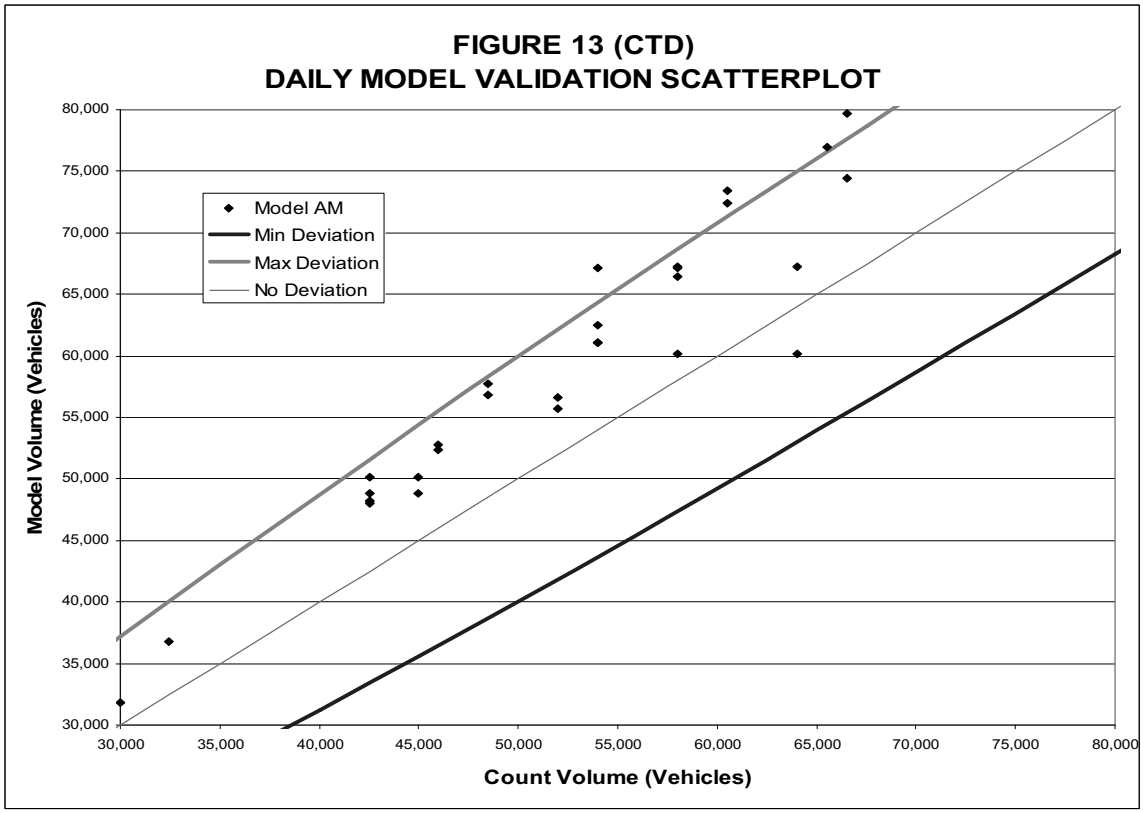


FIGURE 13 (CTD)
DAILY MODEL VALIDATION SCATTERPLOT



In addition to model-wide statistics, the results are aggregated by count volume range, as shown below.

Because the traffic volumes carried by facilities with the same functional class can vary substantially, it is our standard practice to calculate model validation statistics by traffic volume range. This ensures that the model performs well on mid- and high-volume facilities, which are the primary focus of most travel forecasting efforts. These results are shown in Table 13.

TABLE 13
RESULTS OF DAILY MODEL VALIDATION BY VOLUME RANGE

Count Volume Range	Count Locations	Volume-to-Count		RMSE	
		Criteria[1]	Model	Criteria[2]	Model
Less than 1,000	1	± 200%	**-206%**	116%	67%
1,000 to 2,499	10	± 100%	5%	116%	48%
2,500 to 4,999	27	± 50%	1%	116%	48%
5,000 to 9,999	44	± 25%	11%	43%	35%
10,000 to 19,999	41	± 20%	9%	28%	26%
20,000 to 24,999	8	± 20%	-4%	25%	16%
25,000 to 39,999	0	± 15%	N/A	25%	N/A
40,000 to 49,999	10	± 15%	13%	30%	15%
50,000 to 59,999	10	± 10%	**12%**	30%	14%
60,000 to 89,999	8	± 10%	**12%**	19%	17%

[1] Travel Model Improvement Program, Federal Highway Administration.

[2] A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for the National Association of Regional Councils, Harvey, G. et al., Washington, D.C. July 1993.

Note: Bold indicates where criteria are not met.

The model performs quite well on those validation criteria. This is a result of the validation and checking of the inputs at each step of the model development process, including a complete database of 2008 land use, 2000 US Census data, 2000 National Household Travel Survey data, the use of the SBCAG Regional Model, and locally adjusted trip generation rates.

DYNAMIC VALIDATION

The traditional approach to the validation of travel demand models is to compare the link volumes for the model's base year to actual traffic counts taken in the same year. This approach provides information on a model's ability to reproduce a static condition. However, models are seldom used for static applications; by far the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Therefore, another test of a model's accuracy would focus on the model's ability to predict realistic differences in outputs as inputs are changed; in other words, "dynamic" validation rather than static validation.

Land Use Changes

A basic form of dynamic validation is to vary the amounts of a particular land use type and compare the magnitude and direction of change from the original forecast. Of particular interest are the resulting changes in:

- Vehicle Trips (VT)
- Change in VT per land use unit change (VT/DU or KSF)
- Vehicle Miles Traveled (VMT)
- Change in VMT per land use unit change (VMT/DU or KSF)
- Vehicle Hours Traveled (VHT)
- Change in VHT per land use unit change (VHT/DU or KSF)
- Vehicle miles traveled per vehicle trip (VMT/VT)

This form of dynamic validation was performed on the Santa Barbara model by adjusting the number of multi-family one car dwelling units and the retail development in TAZs 41, 320, 370, and 297. These zones were selected due to their geographic location, the existing land use mix within the zone, and to test one zone from each of the four area types. To isolate each of these changes, tests were done sequentially, changing one item at a time.

Figure 14 shows the location of the zones that were used for dynamic validation. Zone 41 is located downtown near Chapala Street/Ortega Street and contains a broad mix of residential and non-residential land uses. Zone 320 is located in the Westside and contains residential and retail land uses. Zone 370 is located on the Riviera and contains single family land uses and an elementary school. Zone 297 is located in the Upper State Street Area and contains a broad mix of residential and non-residential land uses. The values added to a zone were selected based on the interaction with adjacent land use, and to determine if the model is sensitive to the location and magnitude of various land use changes. The results are shown in Table 14.

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PLAN SANTA BARBARA TAZs USED FOR DYNAMIC VALIDATION

FIGURE 14

TABLE 14
RESULTS OF DYNAMIC VALIDATION TESTS

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Residential Land Use Results – Multifamily Unit with 1 Car								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 DU	595,482	3.0	2,500,903	9.0	59,667	-1.0	4.20
	Added 25 DUs	595,557	3.1	2,501,338	17.8	59,690	0.9	4.20
	Added 50 DUs	595,635	3.1	2,501,440	10.9	59,698	0.6	4.20
320 - Westside	Added 1 DU	595,483	4.0	2,501,123	229.0	59,680	12.0	4.20
	Added 25 DUs	595,581	4.1	2,501,403	20.4	59,695	1.1	4.20
	Added 50 DUs	595,683	4.1	2,501,683	15.8	59,706	0.8	4.20
370 - Riveria	Added 1 DU	595,484	5.0	2,500,913	19.0	59,669	1.0	4.20
	Added 25 DUs	595,595	4.6	2,501,488	23.8	59,707	1.6	4.20
	Added 50 DUs	595,712	4.7	2,501,935	20.8	59,713	0.9	4.20
297 - Upper State Street	Added 1 DU	595,484	5.0	2,500,906	12.0	59,668	0.0	4.20
	Added 25 DUs	595,595	4.6	2,501,485	23.6	59,702	1.4	4.20
	Added 50 DUs	595,711	4.6	2,501,968	21.5	59,703	0.7	4.20
Retail Land Use Results								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 KSF	595,499	20.0	2,501,174	280.0	59,683	15.0	4.20
	Added 10 KSF	595,684	20.5	2,501,615	72.1	59,710	4.2	4.20
	Added 50 KSF	596,501	20.4	2,504,277	67.7	59,816	3.0	4.20

TABLE 14 RESULTS OF DYNAMIC VALIDATION TESTS (CONT)								
TAZ	**Scenario**	**Vehicle Trips (VT)**	**Change in VT/DU or KSF Change**	**Vehicle Miles Traveled (VMT)**	**Change in VMT/DU or KSF Change**	**Vehicle Hours Traveled (VHT)**	**Change in VHT/DU or KSF Change**	**VMT/VT**
Retail Land Use Results								
320 - Westside								
	Added 1 KSF	595,502	23.0	2,501,190	296.0	59,686	18.0	4.20
	Added 10 KSF	595,707	22.8	2,501,932	103.8	59,706	3.8	4.20
	Added 50 KSF	596,618	22.8	2,505,330	88.7	59,852	3.7	4.20
370 - Riveria	Added 1 KSF	595,550	71.0	2,501,174	280.0	59,685	17.0	4.20
	Added 10 KSF	595,686	20.7	2,501,955	106.1	59,708	4.0	4.20
	Added 50 KSF	596,513	20.7	2,505,378	89.7	59,828	3.2	4.20
297 - Upper State Street	Added 1 KSF	595,501	22.0	2,501,204	310.0	59,684	16.0	4.20
	Added 10 KSF	595,702	22.3	2,504,967	407.3	59,721	5.3	4.21
	Added 50 KSF	596,594	22.3	2,505,739	96.9	59,868	4.0	4.20

Source: Fehr & Peers, 2008.

- The change in VT per added DU ranges from 3.0 – 5.0. This is reasonable given the mix of land uses in the various zones and the different trip generation rates of each area type. Within each individual area type there is very little variability, showing stable trip generation across the range of land use magnitudes. The average vehicle trips per added DU are lowest for zone 41 due to the abundance of other land uses for the residents to interact with.

- Adding a single DU to the model is a test of how much noise (random error) is in the model. Total VMT changed by between 9 and 229 vehicle-miles per day per dwelling unit added, depending on the zone it was added to. Three of the four zones behaved very well with zones 41, 370 and 297 showing the appropriate increases in VMT relative to the land use mix surrounding these zones. Zone 41 has the lowest increase in VMT, while zone 370 has the highest and zone 297 falls in between. Only zone 320 returns

unreasonable results. However, with only a modest increase in dwelling units in this zone, representing a realistic level of development, the model performed as expected.

- The VHT per DU change is fairly stable around -1.0 to 1.4, with the exception of adding to zone 320. However, the noise at this extremely small level of change is no longer present if increased to a normal level of development

- As shown in Table 14, the VMT/VT is very stable and typically is around 4.2. This measure is used to reduce the influence of vehicle trip generation differences between land use types by normalizing the trip distance by total trips. As land use is added near existing compatible uses, the distance traveled decreases slightly. The opposite is also true: as land use is removed from nearby uses or added further from compatible uses, the distance traveled increases.

Roadway Network Changes

The final dynamic validation test was to see how the model would respond to changes in the road network. For these tests, we removed a key segment of the freeway and added/removed lanes on a Carrillo Street segment with particularly high demand. To isolate each of these changes, only one of the tests was done at a time. The description and results of each test are below and are shown on Tables 15 through 17.

- Remove Freeway Segment – Remove the segment of US-101 between Garden Street and Bath Street: Traffic that used this segment shifts to alternate routes. Routes parallel to the freeway, as well as routes approaching and departing from the freeway are impacted by this shift in traffic. The impact of this change is isolated to an appropriate area given the number and location of alternate freeway ramps on either side of the removed segment.

- Add Lanes to Key Segment – Carrillo Street was increased by one lane in each direction between US-101 Lane and Santa Barbara Street: The change in volume is isolated to a small area and the magnitude of increase in volume on Carrillo Street is roughly the same as the reduction on the adjacent segment of Bath Street which connects to the adjacent southbound freeway ramp. This is reasonable given the increase in primarily local traffic routes, and the prevailing congestion on Carrillo Street.

- Remove Lanes on Key Segment – Carrillo Street was reduced by one lane in each direction between US-101 and Santa Barbara Street: By reducing the capacity of the primary link between the Central Business District and the, traffic shifts on major roadways throughout the City. Due to the importance of Carrillo Street to the transportation system of the City, local trips divert to other internal routes, and regional trips exit the freeway at the neighboring freeway ramps.

TABLE 15
DYNAMIC VALIDATION NETWORK TEST - REMOVE US-101 SOUTHBOUND SEGMENT BETWEEN US-101 GARDEN STREET AND BATH STREET

Roadway	Segment	Volume with Existing US-101 Segment	Volume Without US-101 Segment	Ratio
US 101 southbound (36714)	Garden Street to Bath Street	58,507	-	-
Salinas St	w/o Carpinteria St	7,705	6,845	0.89
Milpas St	n/o Roundabout	30,852	30,656	0.99
Garden St	n/o Gutierrez St	20,817	23,638	1.14
Santa Barbara St	n/o Gutierrez St	8,584	8,180	0.95
Anacapa St	n/o Gutierrez St	4,183	3,811	0.91
Chapala St	n/o Gutierrez St	4,874	16,824	3.45
De La Vina St	n/o Gutierrez St	3,970	6,274	1.58
Bath St	n/o Haley St	3,462	1,530	0.44
Castillo St	n/o Haley St	2,276	8,165	3.59
Carrillo St	n/o Castillo St	40,133	45,915	1.14
Mission St	n/o Castillo St	23,695	21,400	0.90
Arellega St	n/o Castillo St	10,478	8,758	0.84
Total		161,029	181,996	1.13

Note: total for volume with US-101 segment does not include freeway segment volume
Source: Fehr & Peers, 2008

TABLE 16
DYNAMIC VALIDATION NETWORK TEST - ADD ONE LANE IN EACH DIRECTION ON CARRILLO STREET BETWEEN US-101 AND SANTA BARBARA STREET

Roadway	Segment	Volume with Existing Carrillo Street Lane Geometry	Volume After Adding One Lane	Ratio
Carrillo St	s/o Castillo St	44,281	46,693	1.05
Salinas St	w/o Carpinteria St	7,705	7,699	1.00
Milpas St	n/o Roundabout	30,852	30,907	1.00
Garden St	n/o Gutierrez St	20,817	20,486	0.98
Santa Barbara St	n/o Gutierrez St	8,584	8,593	1.00
Anacapa St	n/o Gutierrez St	4,183	4,186	1.00
Chapala St	n/o Gutierrez St	4,874	4,770	0.98
De La Vina St	n/o Gutierrez St	3,970	3,824	0.96
Bath St	n/o Haley St	3,462	3,101	0.90
Castillo St	n/o Haley St	2,276	2,268	1.00
Carrillo St	n/o Castillo St	40,133	44,526	1.11
Mission St	n/o Castillo St	23,695	23,331	0.98
Arellega St	n/o Castillo St	10,478	10,136	0.97
Mitcheltorena St	n/o Castillo St	8,419	8,103	0.96
Total		213,729	218,623	1.02

Source: Fehr & Peers, 2008

TABLE 17
DYNAMIC VALIDATION NETWORK TEST - REMOVE ONE LANE IN EACH DIRECTION ON CARRILLO STREET BETWEEN US-101 AND SANTA BARBARA STREET

Roadway	Segment	Volume with Existing Carrillo Street Lane Geometry	Volume After Removing One Lane	Ratio
Carrillo St	s/o Castillo St	44,281	33,853	0.76
Salinas St	w/o Carpinteria St	7,705	7,699	1.00
Milpas St	n/o Roundabout	30,852	30,970	1.00
Garden St	n/o Gutierrez St	20,817	21,564	1.04
Santa Barbara St	n/o Gutierrez St	8,584	8,605	1.00
Anacapa St	n/o Gutierrez St	4,183	4,184	1.00
Chapala St	n/o Gutierrez St	4,874	4,968	1.02
De La Vina St	n/o Gutierrez St	3,970	3,678	0.93
Bath St	n/o Haley St	3,462	5,902	1.70
Castillo St	n/o Haley St	2,276	2,844	1.25
Carrillo St	n/o Castillo St	40,133	26,711	0.67
Mission St	n/o Castillo St	23,695	25,770	1.09
Arellega St	n/o Castillo St	10,478	11,331	1.08
Mitcheltorena St	n/o Castillo St	8,419	9,317	1.11
Total		213,729	197,396	0.92

Source: Fehr & Peers, 2008

6. PEAK HOUR MODEL SPECIFICATIONS

In addition to the daily model described in the earlier sections of this report, it was necessary to develop model components to address the morning (AM) and evening (PM) peak hours. (For purposes of model development and testing, the average peak hours were calculated based on traffic count data). Estimates of peak hour trips were obtained by applying a percentage factor to the daily productions and attractions for each trip purpose. The peak hour factors were calibrated to reflect trip-making relationships between the AM and PM peak hours to the daily model. In addition, recent national data from the reference document National Cooperative Highway Research Program Report 365 (NCHRP 365) was consulted to ensure that the peak hour factors used in the Santa Barbara model were within reasonable ranges.

Table 18 presents the AM and PM peak hour factors from the NCHRP 365 and the Santa Barbara model. The differences in peak hour factors between the two models are primarily due to travel characteristics in the Santa Barbara area compared to other parts of the country. The largest difference is the non-home based trip in the PM peak hour for the Santa Barbara model is higher than NCHRP 365. This is likely due to the fact that many Santa Barbara residents work within the city and the city is relatively small, allowing for a higher number of short trips to occur within a single hour.

TABLE 18
PEAK HOUR FACTOR COMPARISON - NCHRP 365 AND 2008 SANTA BARBARA MODEL

Purpose		AM Peak Hour Factors[1]		PM Peak Hour Factors[1]	
		NCHRP 365[2]	2008 Santa Barbara Model	NCHRP 365[2]	2008 Santa Barbara Model
Home-Based Work (HBW)	Production	13.8	15	0.9	0.9
	Attraction	0.6	1.25	11.4	10
Home-Based Other (HBO)	Production	5	5.5	4.2	4.25
	Attraction	0.4	1.75	3.2	3.75
Non-Home Based (NHB)	Production	1.5	1.5	9.1	3.75
	Attraction		1.5		4
Golf (GOLF)	Production	N/A	1	N/A	3
	Attraction		3		2
Recreational (REC)	Production		4		6
	Attraction		1.5		6.5
Internal-External (IX)	Production		5.75		3
	Attraction		2		5
External-Internal (XI)	Production		5.75		2
	Attraction		1		5
External-External(E-E)	Production		3		4
	Attraction		3		4

[1]. Factors represent the percent of daily traffic occurring in the peak hour.

[2]. Travel Estimation Techniques, National Cooperative Highway Research Program Report 365, 1998. Reported for 7-8 am and 5-6 pm.
Source: Fehr & Peers, 2008

7. PEAK HOUR MODEL VALIDATION RESULTS

The peak hour model volumes were compared against individual peak hour traffic counts collected specifically for this project, and other counts provided by City staff, the County, and Caltrans. Spreadsheets were created to compute the validation results for roadway links in the Santa Barbara travel model. In addition to the daily counts by hour that were used for the daily validation, intersection peak hour turning movements were collected and added to the count database for a count set of 187 locations. Because the peak hour counts were not in all the same places as the daily counts, a new set of screenlines was created to work with the peak hour count set. Figure 15 shows the peak hour validation locations and Figure 16 shows the peak hour screenline locations, while Figure 17 and Figure 18 show the link volumes resulting from the 2008 Santa Barbara model for the AM and PM peak hours, respectively. The analysis of the complete set of counts is included in Appendix F.

The final results for peak hour conditions are summarized in Table 19 below, while the detailed spreadsheets are presented in Appendix F.

TABLE 19
RESULTS OF PEAK HOUR MODEL VALIDATION

Validation Item	Criterion for Acceptance	AM Peak Hour Model Results	PM Peak Hour Model Results
Count Locations	N/A	187	187
% of Links Within Caltrans Standard Deviations	At Least 75%	77%	78%
% of Screenlines Within Caltrans Standard Deviations	100%	100%	100%
2-way Sum of All Links Counted	Within ± 10%	3%	3%
Correlation Coefficient	Greater than 88%	90%	91%
RMSE	40% or less	29%	28%

Source: Fehr & Peers, 2008.

As shown in Table 19, the 2008 Santa Barbara AM and PM peak hour models meet or exceed the guidelines for model accuracy. In addition to model-wide statistics, the results are aggregated by volume range, as shown in Table 20. The model performs quite well on those validation criteria except for the highest volume range in the PM; however, there are only three count locations within this range, so having a single location where the model volume is substantially higher than the count skews the results.

The results of the validation are due to the checking of the inputs at each step of the model development process, including a very well calibrated and validated daily model, and complete set of count data.

The AM peak hour model deviation by geographic location is shown on Figure 19, while Figure 20 shows a scatter plot of count and model volumes compared to Caltrans' allowable error. Figure 21 and Figure 22 show similar comparisons for the PM peak hour model. As these Figures show,

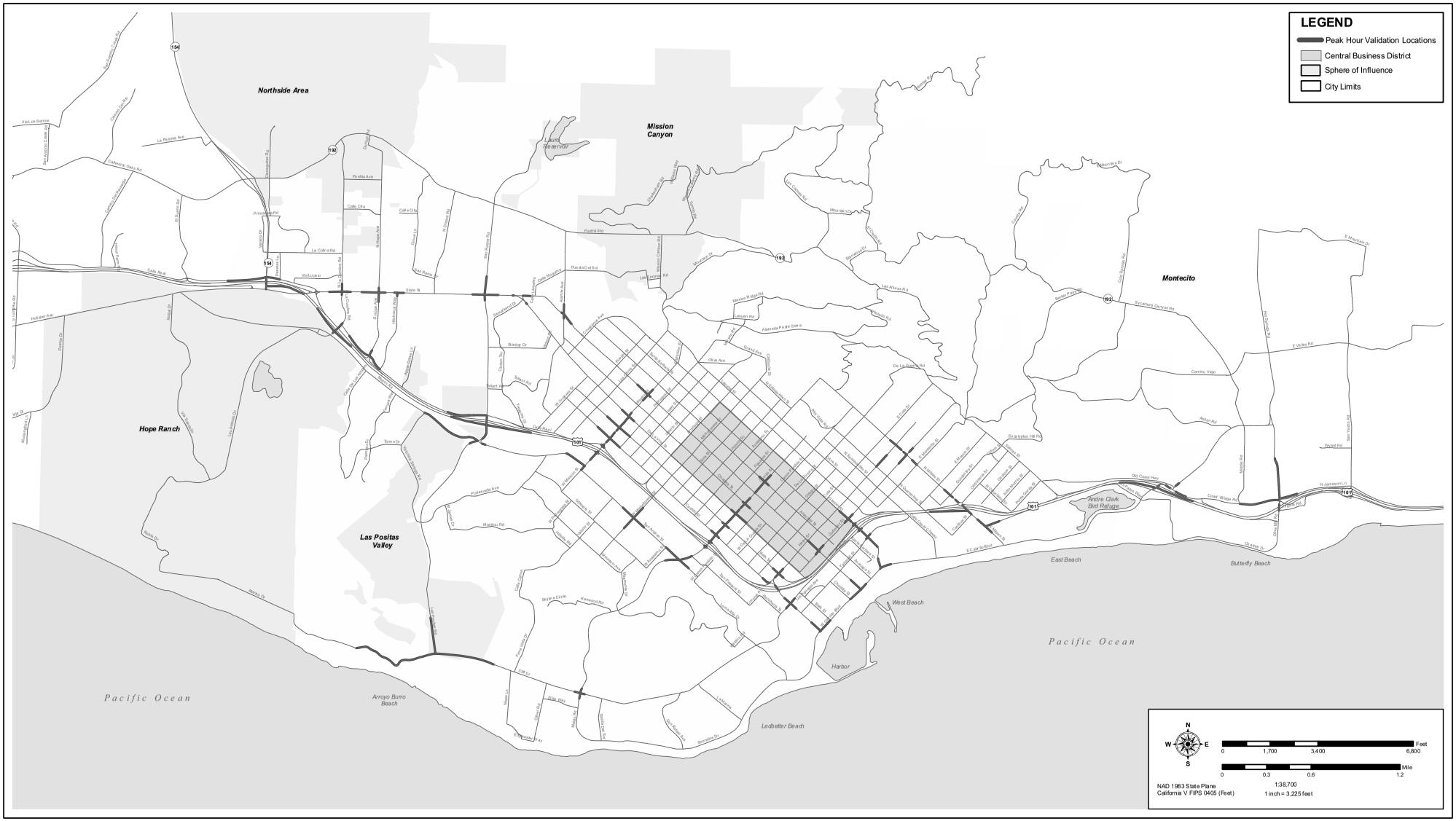
the error is distributed geographically and by count volume in a way that demonstrates the model is performing well overall.

TABLE 20
RESULTS OF PEAK HOUR MODEL VALIDATION BY VOLUME RANGE

Count Volume Range	Volume-to-Count Criteria[1]	RMSE Criteria[2]	AM Peak Hour			PM Peak Hour		
			Counts	Volume-to-Count	RMSE[2]	Counts	Volume-to-Count	RMSE[2]
100 to 250	± 100%	116%	1	32%	32%	0	N/A	N/A
250 to 499	± 50%	116%	37	9%	57%	21	9%	57%
500 to 999	± 25%	43%	66	-1%	33%	63	-5%	36%
1,000 to 1,999	± 20%	28%	73	3%	25%	75	0%	24%
2,000 to 2,499	± 20%	25%	10	8%	17%	25	12%	19%
2,500 to 3,999	± 15%	25%	0	N/A	N/A	3	**22%**	**36%**

Note: Bold indicates where criteria are not met.
[1] Travel Model Improvement Program, Federal Highway Administration.
[2] A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for the Natural Association of Regional Councils, Harvey, G. et al., Washington, D.C. July 1993.

Source: Fehr & Peers, 2008.



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PLAN SANTA BARBARA PEAK HOUR VALIDATION LOCATIONS
FIGURE 15

FEHR & PEERS
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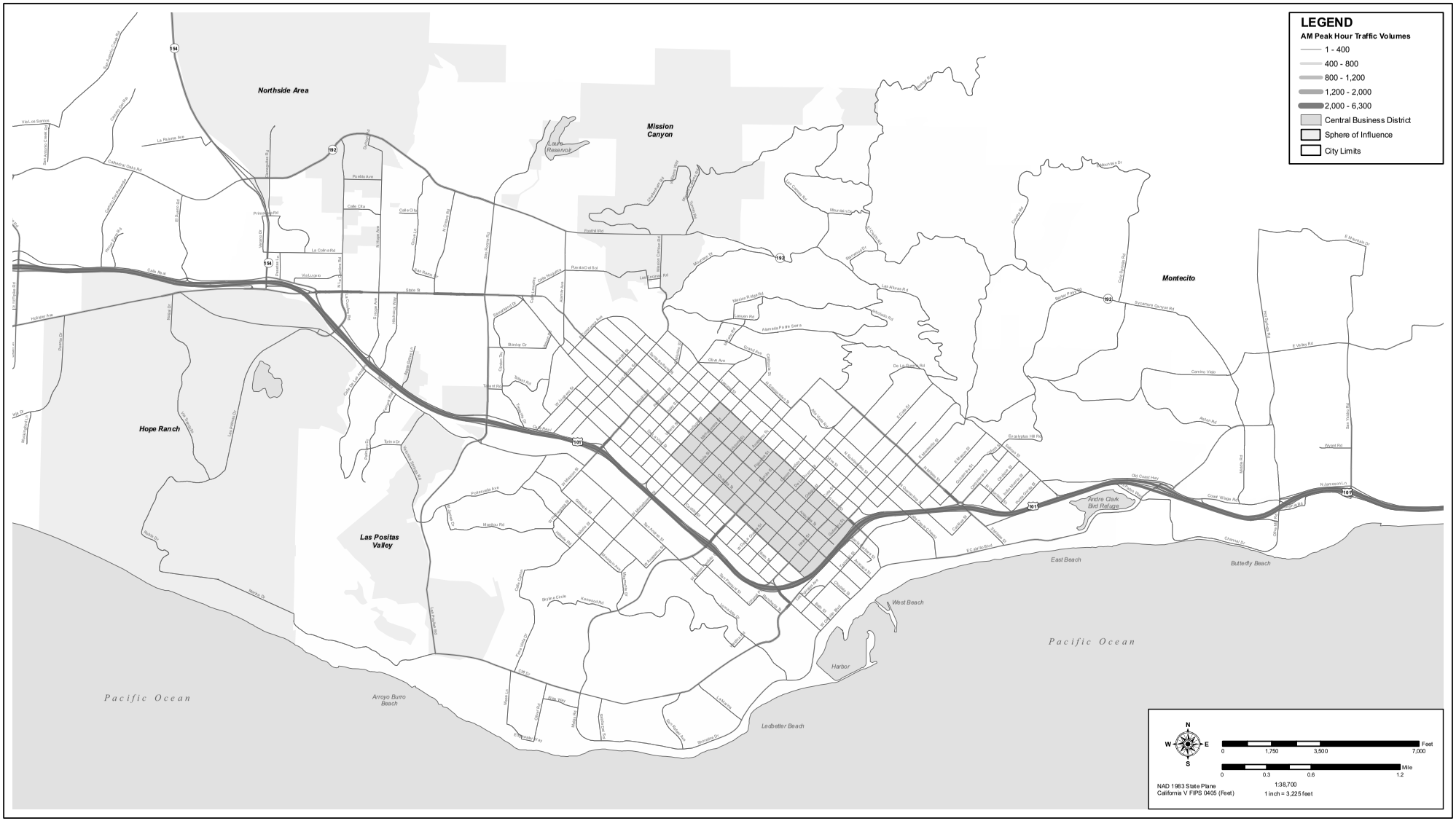
PLAN SANTA BARBARA PEAK HOUR SCREENLINE LOCATIONS
FIGURE 16



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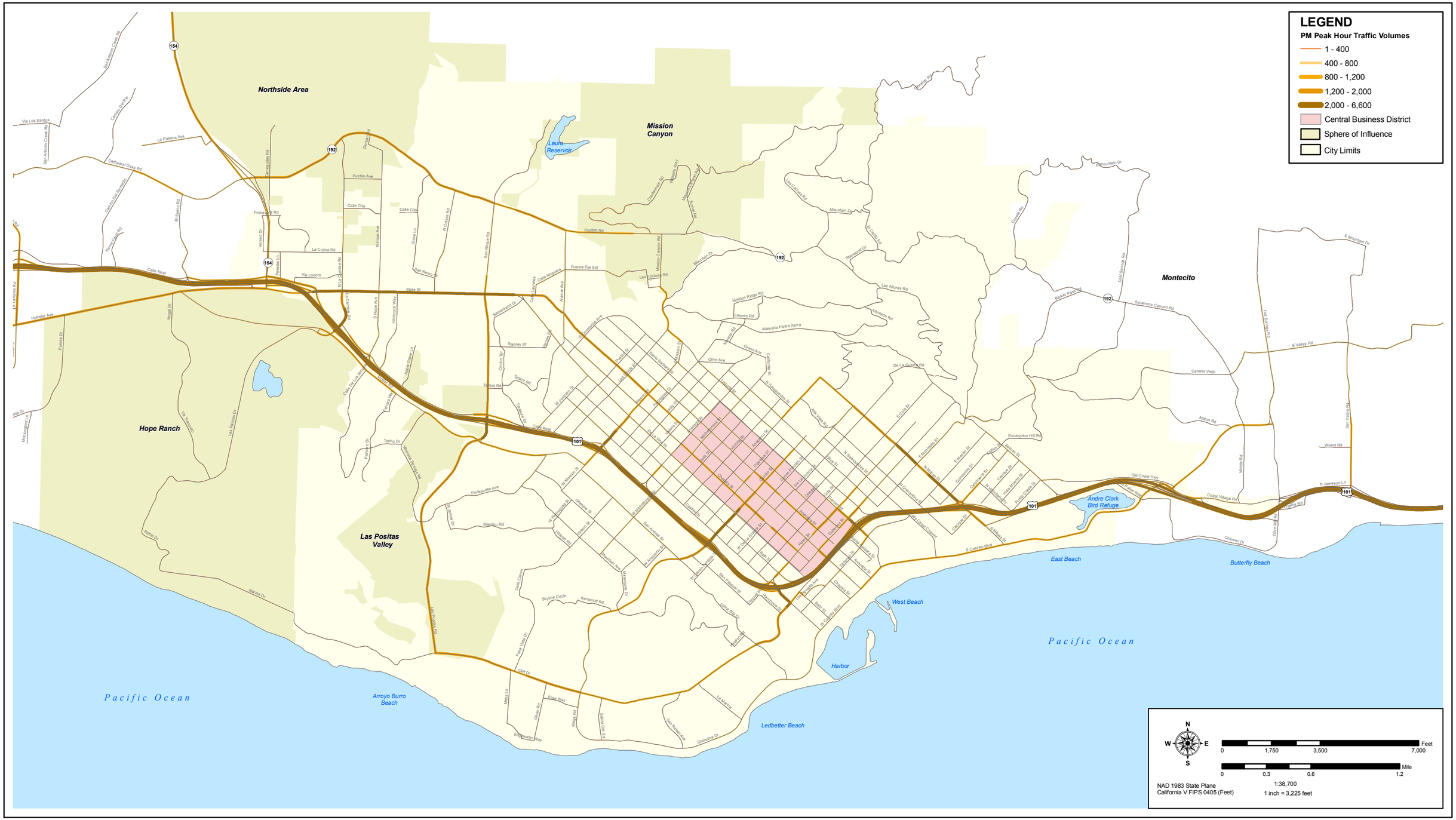
PLAN SANTA BARBARA AM MODEL VOLUMES
FIGURE 17



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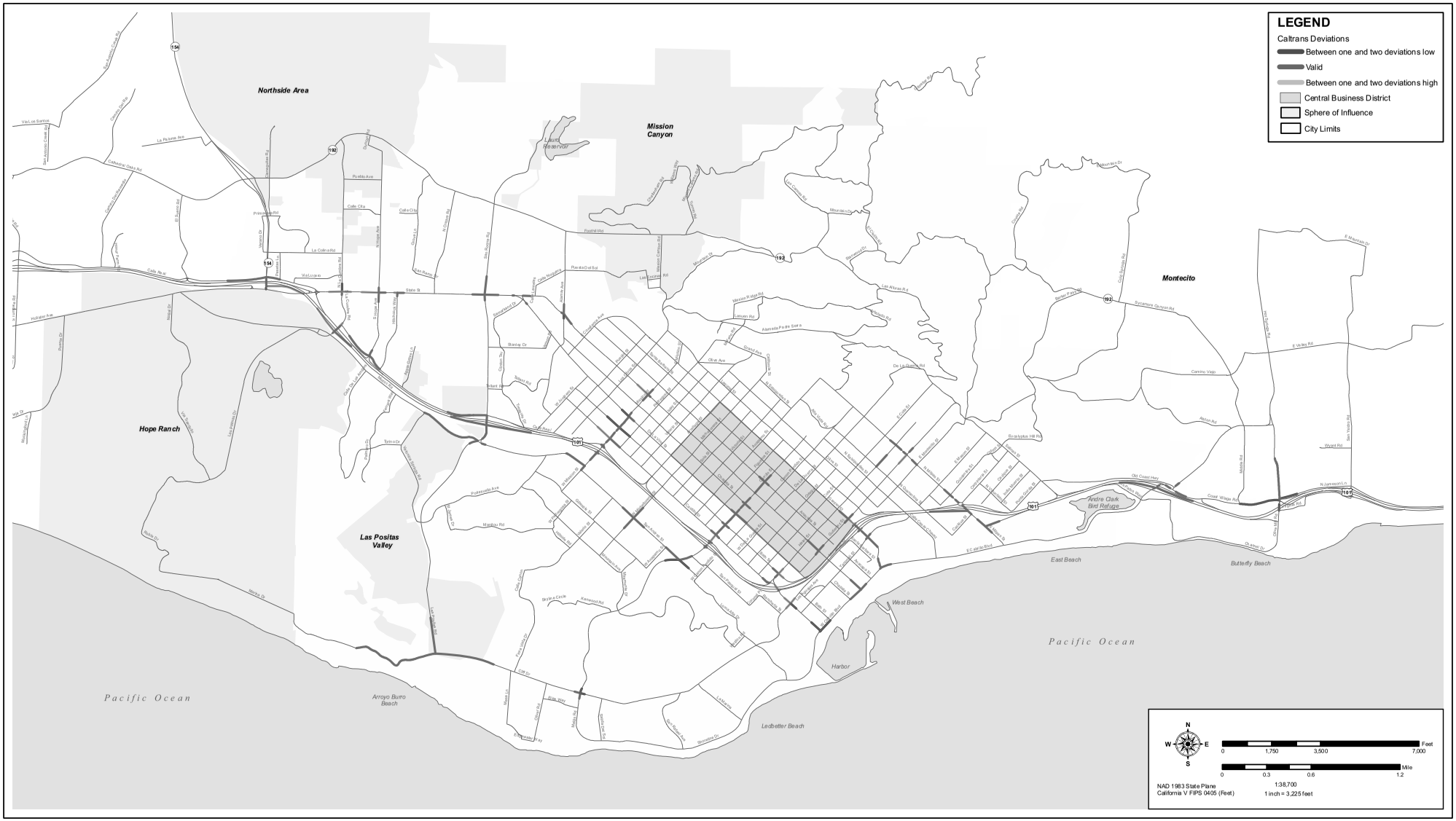
PLAN SANTA BARBARA PM MODEL VOLUMES
FIGURE 18



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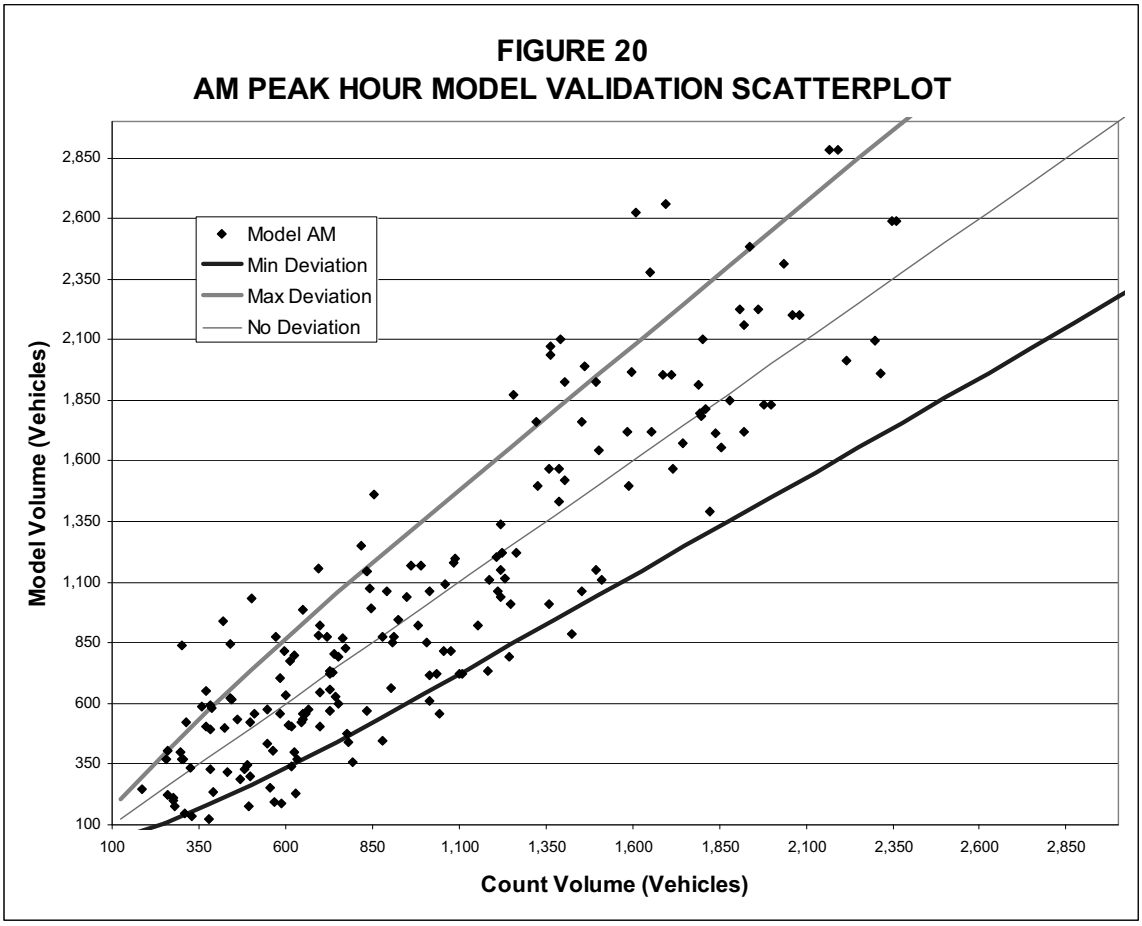
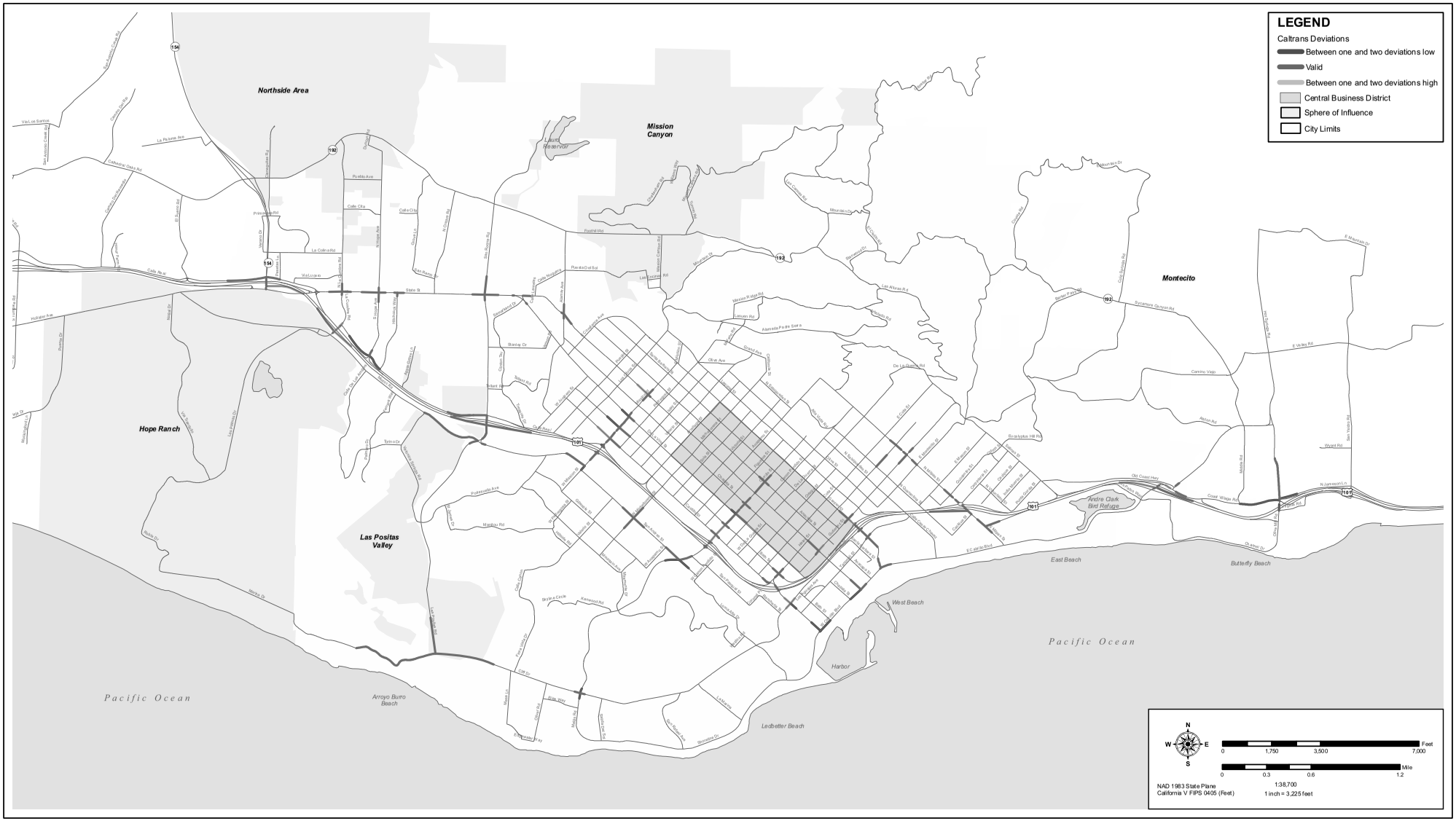
PLAN SANTA BARBARA AM PEAK HOUR MODEL DEVIATION
FIGURE 19

FIGURE 20
AM PEAK HOUR MODEL VALIDATION SCATTERPLOT





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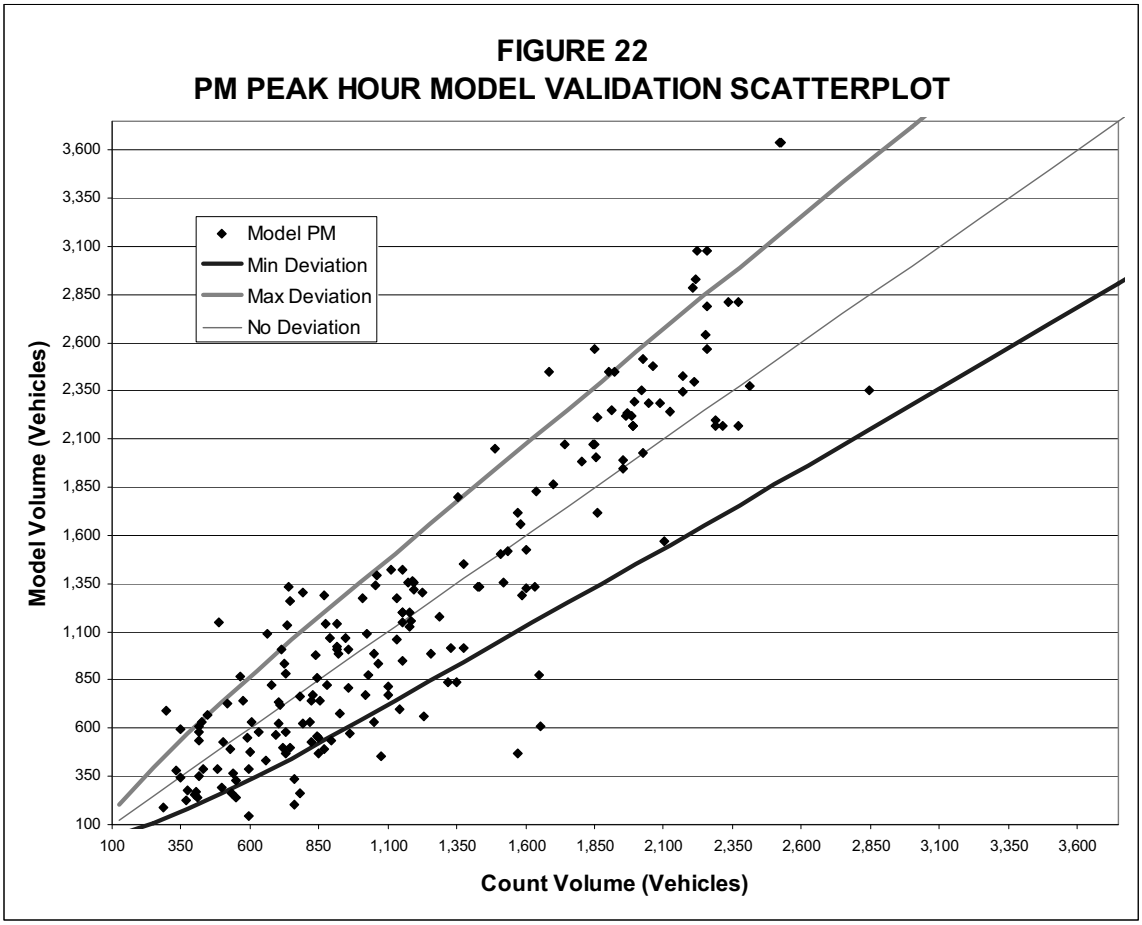
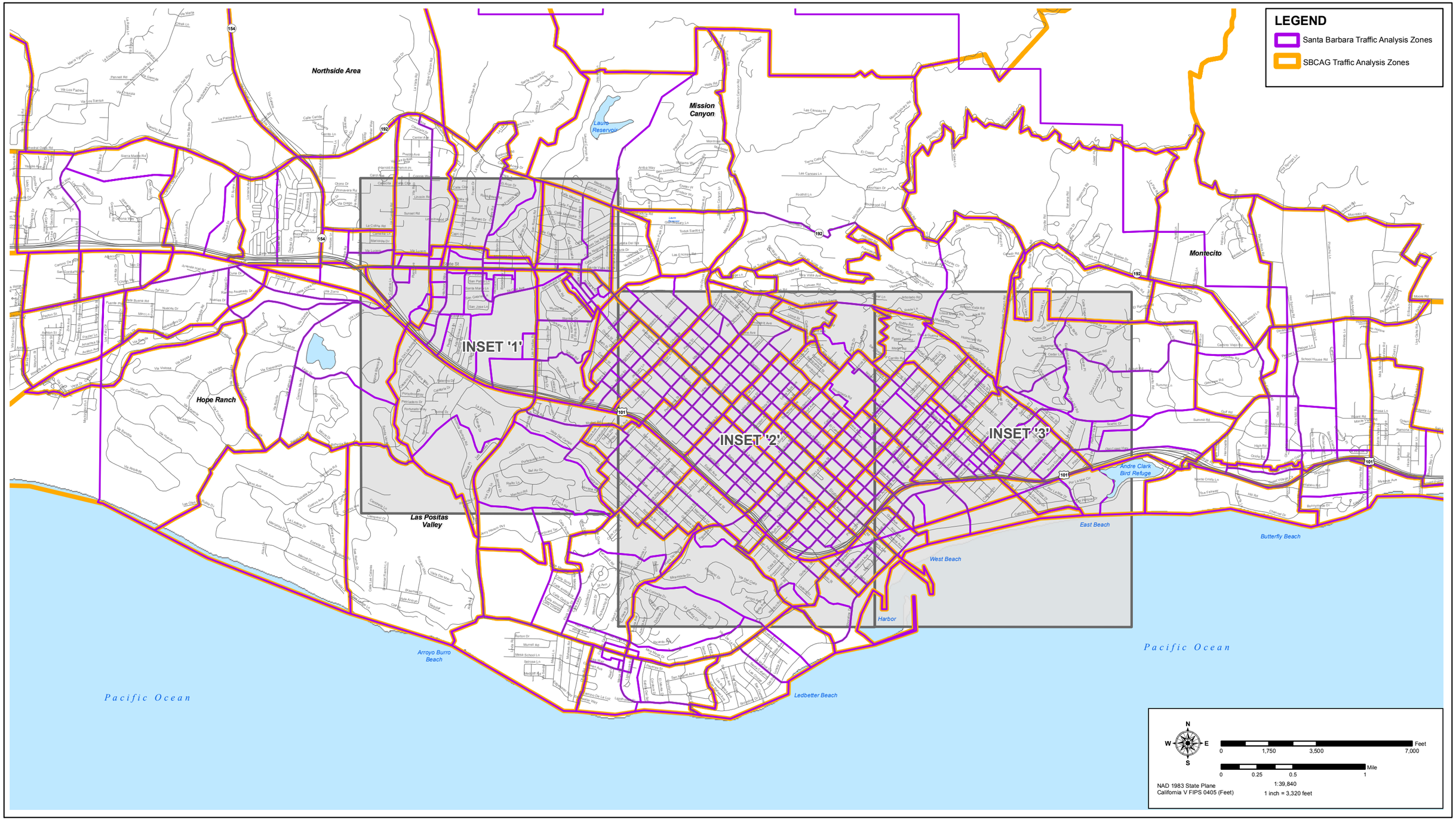
PLAN SANTA BARBARA PM PEAK HOUR MODEL DEVIATION
FIGURE 21

FIGURE 22
PM PEAK HOUR MODEL VALIDATION SCATTERPLOT



APPENDIX A:
TRAFFIC ANALYSIS ZONE (TAZ) BOUNDARY MAP



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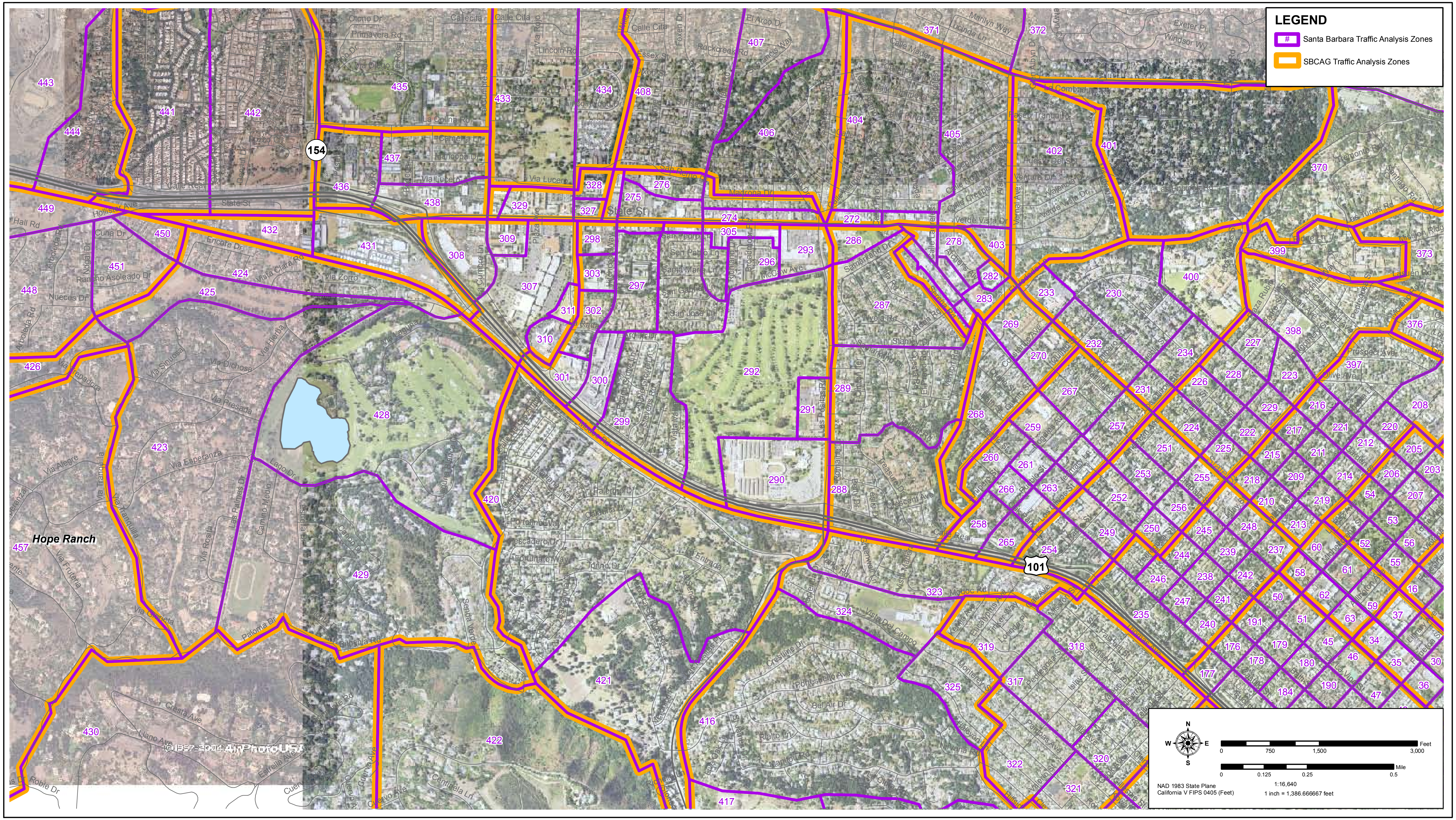
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES - KEY MAP
APPENDIX A



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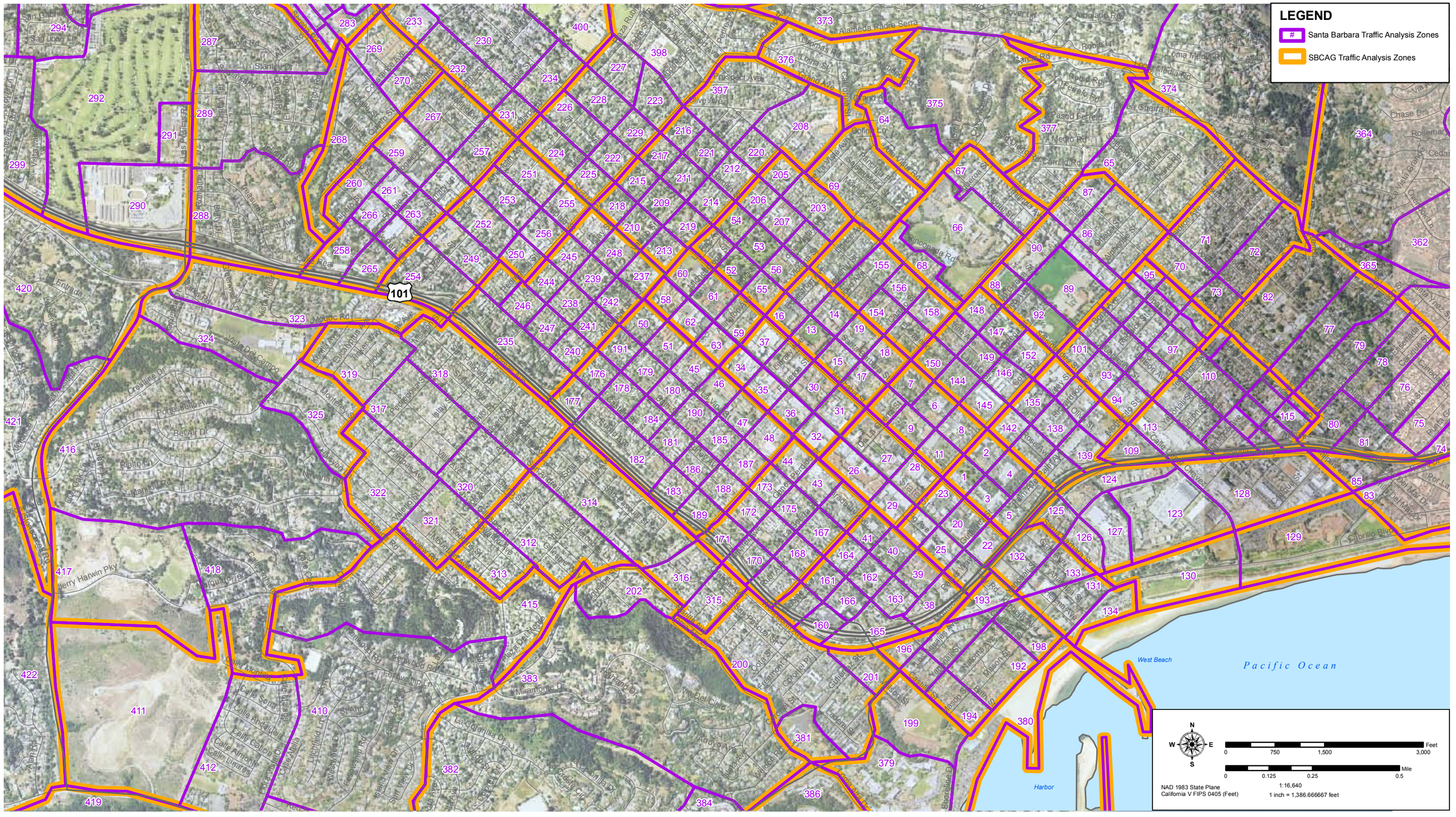
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 1



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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 2

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TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 3

APPENDIX B:
BASE YEAR LAND USE DATA BY TAZ

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	U_Spare0	U_Spare0	U_Spare0	U_Spare0	IX_P	IX_A	XI_P	XI_A
1	1	CBD	7	3	6	2	1	0.000	5.213	6.727	5.168	5.353	0.000	0.000	3.522	9.104	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
2	1	CBD	0	6	14	4	2	0.000	0.000	0.000	0.000	34.333	0.000	0.000	0.000	8.425	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
3	1	CBD	9	2	5	1	1	0.000	0.000	13.456	0.000	6.760	0.000	51.679	0.000	15.453	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
4	1	CBD	0	0	0	0	0	0.000	0.000	6.253	0.000	56.524	0.000	0.000	0.000	2.417	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
5	1	CBD	4	2	8	3	1	0.000	0.000	5.035	0.000	5.468	0.000	4.230	0.000	24.240	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
6	1	CBD	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	30.044	0.000	0.000	286	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
7	1	CBD	2	3	4	2	1	0.909	0.000	0.000	1.111	0.000	0.000	45.804	0.000	0.000	69	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
8	1	CBD	4	7	15	5	2	0.000	0.000	0.000	2.006	15.691	0.000	1.158	0.000	5.785	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
9	1	CBD	2	1	2	0	0	0.000	0.000	0.000	2.645	5.779	0.000	21.860	27.691	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
10	1	CBD	0	4	10	3	1	38.355	0.000	0.000	6.551	9.941	0.000	32.323	0.875	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
11	1	CBD	2	3	7	2	1	0.000	0.000	0.000	0.000	15.397	0.000	33.248	0.000	8.441	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
12	1	CBD	6	4	27	12	3	0.000	0.000	0.000	3.313	4.233	0.000	15.653	0.000	5.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
13	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	140.658	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
14	1	CBD	9	5	16	8	2	6.237	0.000	0.000	0.000	0.000	0.000	51.240	0.000	0.000	0	0	28	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
15	1	CBD	0	0	1	0	0	29.900	0.000	0.000	0.000	4.202	0.000	40.475	0.000	2.400	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
16	1	CBD	0	0	1	0	0	0.000	0.000	0.000	2.700	5.554	0.000	29.003	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
17	1	CBD	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	68.843	11.376	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
18	1	CBD	1	2	5	2	1	0.000	0.000	0.000	2.200	0.000	13.027	111.479	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
19	1	CBD	1	6	17	8	2	0.000	0.000	0.000	0.000	1.986	0.000	45.840	0.000	2.720	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
20	1	CBD	1	1	5	1	1	0.000	6.010	5.850	0.857	52.696	5.046	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
21	1	CBD	0	3	20	6	2	0.000	0.000	0.000	3.360	41.050	0.000	6.621	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
22	1	CBD	0	1	2	1	0	0.000	0.000	5.749	0.000	27.536	0.000	4.970	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
23	1	CBD	0	0	0	0	0	1.390	1.506	3.385	27.914	34.505	29.618	17.052	0.000	0.000	0	0	0	16	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
24	1	CBD	0	3	15	3	2	0.000	23.274	5.664	5.061	15.363	37.714	13.009	0.000	0.000	90	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
25	1	CBD	0	1	4	1	0	1.500	12.258	5.202	15.697	22.731	29.750	24.747	0.000	0.000	0	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
26	1	CBD	0	0	0	0	0	0.000	0.000	0.000	3.400	349.932	0.000	95.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
27	1	CBD	0	0	0	0	0	22.005	0.989	0.000	21.281	113.046	0.000	105.048	11.943	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
28	1	CBD	0	0	0	0	0	0.000	36.218	0.000	4.400	39.716	0.000	0.000	0.000	2.930	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
29	1	CBD	0	0	0	0	0	0.000	2.760	14.657	0.000	50.310	0.000	9.993	0.000	5.321	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
30	1	CBD	0	0	0	0	0	86.613	7.006	0.000	27.291	23.659	0.000	65.339	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
31	1	CBD	0	0	0	0	0	10.776	14.208	0.000	2.459	53.732	0.000	58.535	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
32	1	CBD	0	0	0	0	0	10.079	12.756	0.000	0.000	70.763	19.883	40.376	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
33	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	14.723	0.000	16.412	162.805	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
34	1	CBD	0	0	0	0	0	0.000	21.050	0.000	12.469	31.158	0.000	13.105	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
35	1	CBD	0	0	0	0	0	0.000	3.025	0.000	6.700	51.804	0.000	38.015	2.106	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
36	1	CBD	0	0	0	0	0	7.950	0.000	0.000	6.587	73.092	0.000	29.007	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
37	1	CBD	0	0	0	0	0	0.000	43.093	0.000	14.160	37.840	0.000	19.011	0.000	0.000	100	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
38	1	CBD	0	3	12	5	2	0.000	0.000	0.000	0.000	9.677	0.000	14.180	0.000	2.258	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
39	1	CBD	5	5	19	8	4	0.000	0.000	4.063	0.000	0.000	17.342	14.200	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
40	1	CBD	11	4	15	6	3	0.000	0.000	3.247	0.000	9.089	0.000	6.523	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
41	1	CBD	6	3	14	6	3	0.000	0.000	1.633	4.082	18.234	0.000	8.080	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
42	1	CBD	3	18	44	18	8	2.024	1.212	1.643	2.438	13.797	0.000	2.163	0.000	1.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
43	1	CBD	0	2	5	2	1	0.000	0.000	1.937	0.000	15.913	0.000	86.125	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
44	1	CBD	0	1	2	1	0	0.000	0.000	15.654	3.412	14.737	11.950	54.069	0.000	4.873	0	0	23	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
45	1	CBD	8	34	88	31	6	0.000	10.481	1.156	0.000	0.000	0.000	4.029	6.345	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
46	1	CBD	0	0	0	0	0	0.000	5.734	0.000	0.000	0.000	0.000	50.195	3.098	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
47	1	CBD	1	26	89	29	6	0.000	12.490	0.000	0.000	0.000	0.000	55.548	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
48	1	CBD	0	0	0	0	0	0.000	0.000	6.678	0.000	51.400	0.000	20.503	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
49	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
50	1	CBD	9	6	16	5	2	0.000	0.000	0.000	0.000	0.000	0.000	72.012	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
51	1	CBD	4	3	7	2	1	0.000	0.000	0.000	2.211	7.865	15.000	38.387	3.520	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
52	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
53	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
54	1	CBD	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
55	1	CBD	1	4	32	13	3	0.000	0.000	0.000	0.000	0.000	0.000	62.420	2.683	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
56	1	CBD	1	5	38	16	4	0.000	10.062	0.000	0.000	0.000	0.000	22.280	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
57	1	CBD	4	3	28	9	2	0.000	0.000	0.000	0.000	0.000	0.000	32.292	0.000	0.000	0	0	0	15	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
58	1	CBD	2	3	13	3	2	0.000	0.000	0.000	6.500	4.256	0.000	77.723	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
59	1	CBD	2	5	36	10	4	15.168	0.000	0.000	3.483	18.113	0.000	15.414	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
60	1	CBD	0	0	3	1	0	0.000	0.000	0.000	0.000	2.240	0.000	12.948	0.000	0.000	234	0	0	15	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
61	1	CBD	0	0	0	0	0	0.000	3.415	0.000	0.000	0.000	0.000	13.942	0.000	0.000	0	0	0	47	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
62	1	CBD	0	0	2	0	0	20.554	0.000	0.000	1.500	10.464	0.000	63.659	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
63	1	CBD	0	0	1	0	0	0.000	116.082	0.000	8.557	42.762	0.000	7.785	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
64	2	Outside Downtown	40	12	50	30	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
65	2	Outside Downtown	187	4	39	25	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
66	2	Outside Downtown	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	2,555	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
67	2	Outside Downtown	34	14	78	49	18	0.000	0.000	7.264	0.000	5.772	0.000	3.993	0.000	15.298	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
68	2	Outside Downtown	19	13	38	22	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
69	2	Outside Downtown	123	20	112	63	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
70	2	Outside Downtown	33	3	24	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
71	2	Outside Downtown	110	8	61	48	16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
72	2	Outside Downtown	72	4	14	18	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
73	2	Outside Downtown	15	2	9	9	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
74	2	Outside Downtown	33	29	146	72	30	0.000	0.000	0.000	0.000	1.443	0.000	0.000	0.000	1.750	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
75	2	Outside Downtown	56	17	58	36	17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
76	2	Outside Downtown	22	37	127	80	24	0.000	0.000	0.000	0.000	1.350	0.000	5.093	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
77	2	Outside Downtown	45	23	40	70	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
78	2	Outside Downtown	31	15	39	44	7	0.000	0.000	0.000	0.600	2.795	0.000	0.000	0.000	0.350	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
79	2	Outside Downtown	58	15	33	43	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
80	2	Outside Downtown	17	5	16	10	2	0.000	0.000	0.000	0.000	15.473	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
81	2	Outside Downtown	14	10	44	22	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
82	2	Outside Downtown	85	15	38	52	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.671	0.000	550	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
83	2	Outside Downtown	5	6	103	33	9	0.000	0.000	0.000	21.261	0.000	289.791	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
84	2	Outside Downtown	0	22	201	89	31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
85	2	Outside Downtown	2	1	5	2	1	0.000	2.000	0.606	0.000	9.804	0.000	1.978	0.000	27.562	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
86	2	Outside Downtown	92	10	28	23	11	0.000	0.000	7.035	9.857	14.457	0.000	2.900	0.000	8.145	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
87	2	Outside Downtown	27	5	20	12	4	3.700	0.000	1.629	0.000	9.378	0.000	2.123	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
88	2	Outside Downtown	5	8	11	9	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
89	2	Outside Downtown	2	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	740	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
90	2	Outside Downtown	2	17	23	20	12	22.180	0.000	0.000	5.089	2.424	0.000	5.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
91	2	Outside Downtown	1	0	1	1	0	0.000	0.000	1.656	0.000	25.327	0.000	0.000	0.000	54.601	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
92	2	Outside Downtown	12	10	14	12	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
93	2	Outside Downtown	0	1	1	1	0	0.000	0.000	23.451	7.199	18.550	0.000	0.000	0.000	33.945	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
94	2	Outside Downtown	4	0	0	0	0	0.000	0.000	2.500	0.000	5.580	0.000	4.111	19.735	47.203	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
95	2	Outside Downtown	5	1	10	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	5	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
96	2	Outside Downtown	6	1	4	3	1	0.000	0.000	12.915	2.944	13.539	0.000	47.659	1.474	17.438	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
97	2	Outside Downtown	1	2	4	4	1	0.000	0.000	3.743	2.709	22.491	0.000	29.499	0.000	22.615	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
98	2	Outside Downtown	0	0	0	0	0	0.000	4.410	5.428	0.000	12.619	0.000	3.899	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
99	2	Outside Downtown	0	1	3	2	1	0.000	0.000	2.092	2.756	24.009	0.000	1.843	0.000	0.000	44	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
100	2	Outside Downtown	5	2	3	3	1	0.000	0.000	6.340	0.000	15.000	0.000	10.000	0.000	12.335	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
101	2	Outside Downtown	1	5	6	4	2	0.000	0.000	1.778	0.000	6.995	0.000	1.225	0.000	1.732	0	0	0	13	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
102	2	Outside Downtown	10	2	6	5	2	0.000	4.000	11.306	4.645	5.420	0.000	3.707	0.000	14.067	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
103	2	Outside Downtown	8	2	3	2	1	0.000	0.000	30.349	3.420	7.216	0.000	1.095	0.000	27.737	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
104	2	Outside Downtown	13	3	4	4	2	0.000	1.969	2.088	0.000	6.656	0.000	11.625	0.000	22.463	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
105	2	Outside Downtown	8	1	7	5	2	0.000	0.000	0.000	0.000	23.001	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
106	2	Outside Downtown	6	1	3	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	62	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
107	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	4.505	16.916	0.000	2.782	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
108	2	Outside Downtown	9	3	4	6	0	0.000	0.000	6.587	1.329	6.243	0.000	10.488	0.000	77.604	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
109	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	89.135	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
110	2	Outside Downtown	16	6	8	12	1	0.000	0.000	7.203	1.855	11.722	0.000	7.645	2.198	31.976	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
111	2	Outside Downtown	31	7	10	14	1	0.000	0.000	0.980	2.079	7.300	0.000	2.956	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
112	2	Outside Downtown	5	0	0	0	0	0.000	0.000	0.000	7.500	12.368	0.000	2.958	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
113	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	50.345	0.000	17.398	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
114	2	Outside Downtown	5	2	2	3	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
115	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	46.406	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
116	2	Outside Downtown	5	2	4	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
117	2	Outside Downtown	4	1	3	2	0	0.000	0.000	0.000	0.000	6.226	0.000	3.744	0.000	18.387	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
118	2	Outside Downtown	0	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	22.893	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
119	2	Outside Downtown	0	0	0	0	0	8.444	0.000	2.899	0.000	1.597	0.000	1.261	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
120	2	Outside Downtown	6	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	1.486	0.000	2.584	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
121	2	Outside Downtown	0	1	2	3	0	0.000	0.000	0.000	3.899	8.802	0.000	4.544	0.000	2.091	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
122	2	Outside Downtown	0	0	0	0	0	0.000	0.000	2.736	0.000	30.640	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
123	2	Outside Downtown	0	0	0	0	0	0.000	0.000	3.000	0.000	37.480	0.000	38.593	0.000	149.679	0	0	0	39	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
124	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	30.057	4.934	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
125	2	Outside Downtown	0	2	29	9	3	0.000	0.000	0.000	0.000	6.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
126	2	Outside Downtown	0	0	0	0	0	0.000	5.645	0.000	0.000	144.556	0.000	0.000	0.000	46.442	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
127	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	109.961	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
128	2	Outside Downtown	1	0	3	1	0	22.509	0.520	27.297	1.787	12.471	0.000	3.065	24.747	87.800	0	0	6	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
129	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	431.815	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	2	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
130	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
131	2	Outside Downtown	0	0	1	0	0	0.000	0.000	5.427	18.310	61.653	0.819	53.840	0.000	42.349	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
132	2	Outside Downtown	4	0	2	1	0	0.000	10.550	10.637	17.962	33.159	0.000	10.810	0.000	29.846	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
133	2	Outside Downtown	2	0	2	1	0	0.000	13.084	0.887	1.060	31.119	0.000	45.289	0.000	29.467	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
134	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
135	2	Outside Downtown	2	2	3	1	0	0.000	0.000	16.487	0.000	15.532	0.000	34.866	0.000	1.800	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	5	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
136	2	Outside Downtown	0	0	0	0	0	2.428	1.887	8.563	2.601	18.871	0.000	0.800	0.000	72.825	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
137	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	7.534	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
138	2	Outside Downtown	0	0	0	0	0	0.000	0.000	5.126	4.614	59.643	0.000	0.000	0.000	11.553	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
139	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	40.135	0.000	23.250	300	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
140	2	Outside Downtown	0	0	0	0	0	0.000	0.000	2.013	0.000	9.320	0.000	8.816	5.750	10.072	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
141	2	Outside Downtown	4	2	3	1	0	0.000	0.000	12.150	3.341	21.239	0.000	0.000	0.000	21.953	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
142	2	Outside Downtown	0	2	3	1	0	3.563	0.000	6.700	0.000	20.180	0.000	27.741	0.000	26.517	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
143	2	Outside Downtown	0	0	0	0	0	21.091	0.000	0.000	0.000	24.167	0.000	14.285	0.000	5.735	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
144	2	Outside Downtown	0	35	42	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
145	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	18.660	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
146	2	Outside Downtown	1	5	6	3	1	0.000	0.000	0.000	0.468	2.156	0.000	26.844	17.192	6.006	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
147	2	Outside Downtown	4	13	16	10	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
148	2	Outside Downtown	11	17	22	14	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
149	2	Outside Downtown	3	28	34	16	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
150	2	Outside Downtown	4	23	28	13	4	0.000	0.000	0.000	0.000	0.000	0.000	26.026	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
151	2	Outside Downtown	1	20	25	11	4	0.000	0.000	0.000	0.000	4.507	0.000	6.002	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
152	2	Outside Downtown	3	4	5	3	2	0.000	0.000	0.000	2.295	23.446	0.000	5.000	0.000	39.949	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
153	2	Outside Downtown	31	13	48	28	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
154	2	Outside Downtown	4	18	43	27	5	0.000	0.000	0.000	0.000	0.498	0.000	37.035	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
155	2	Outside Downtown	18	26	78	45	17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
156	2	Outside Downtown	10	14	32	21	4	0.000	0.000	0.000	0.000	0.000	0.000	14.827	0.000	0.000	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
157	2	Outside Downtown	18	9	10	5	2	0.000	0.000	0.000	0.000	0.000	0.000	84.128	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
158	2	Outside Downtown	2	0	0	0	0	2.482	0.000	0.000	0.000	0.000	0.000	79.536	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
159	2	Outside Downtown	19	3	9	7	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
160	2	Outside Downtown	0	0	0	0	0	5.601	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
161	2	Outside Downtown	11	8	27	20	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
162	2	Outside Downtown	11	6	18	14	5	0.000	0.000	0.000	0.000	7.248	0.000	0.000	0.000	0.000	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
163	2	Outside Downtown	11	6	19	14	5	0.000	0.000	1.501	0.000	4.168	0.000	25.114	0.000	3.968	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
164	2	Outside Downtown	3	12	40	30	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
165	2	Outside Downtown	3	1	5	3	1	0.000	0.000	0.000	0.000	3.914	0.000	10.150	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
166	2	Outside Downtown	6	2	7	5	2	0.000	25.595	0.000	0.000	0.000	0.000	29.080	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
167	2	Outside Downtown	7	19	34	20	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.855	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
168	2	Outside Downtown	6	15	28	16	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
169	2	Outside Downtown	20	6	11	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
170	2	Outside Downtown	4	16	20	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
171	2	Outside Downtown	3	1	3	1	0	0.000	0.000	5.710	0.000	0.000	0.000	2.520	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
172	2	Outside Downtown	4	85	107	42	15	0.000	7.059	2.012	0.000	2.027	0.000	1.398	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
173	2	Outside Downtown	1	13	16	6	2	0.000	0.000	0.485	1.925	31.429	0.000	28.230	0.000	2.066	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
174	2	Outside Downtown	5	26	33	13	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
175	2	Outside Downtown	7	16	20	8	3	0.000	0.000	2.450	1.929	1.814	0.000	20.073	0.000	2.124	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
176	2	Outside Downtown	8	21	53	18	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
177	2	Outside Downtown	2	6	17	11	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
178	2	Outside Downtown	7	15	38	13	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
179	2	Outside Downtown	8	25	64	21	6	0.000	0.000	0.000	0.000	0.767	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
180	2	Outside Downtown	0	19	49	18	3	0.000	0.000	1.323	0.000	5.316	7.522	6.391	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
181	2	Outside Downtown	8	20	57	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
182	2	Outside Downtown	20	15	55	22	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
183	2	Outside Downtown	3	6	23	6	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
184	2	Outside Downtown	14	18	46	15	4	0.000	0.000	0.000	0.000	0.000	2.469	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
185	2	Outside Downtown	9	17	52	18	6	0.000	0.000	1.155	0.000	3.711	0.000	5.357	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
186	2	Outside Downtown	20	8	25	9	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
187	2	Outside Downtown	1	10	22	8	3	0.000	4.005	0.000	4.208	30.449	0.000	7.500	0.000	0.738	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
188	2	Outside Downtown	10	17	37	14	5	0.000	0.000	2.523	1.069	12.460	0.000	3.280	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
189	2	Outside Downtown	2	1	3	1	0	0.000	0.000	0.000	0.000	0.000	0.000	1.861	0.000	0.000	0	0	1	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
190	2	Outside Downtown	3	25	50	22	2	0.000	1.000	0.000	0.000	3.383	0.000	17.055	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
191	2	Outside Downtown	5	29	47	18	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
192	2	Outside Downtown	8	32	164	56	13	21.605	0.000	0.000	3.883	0.000	98.431	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
193	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	5.512	8.109	0.000	0.000	20.454	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
194	2	Outside Downtown	0	3	18	6	1	0.000	0.000	0.000	3.820	0.000	141.618	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
195	2	Outside Downtown	3	14	71	24	6	0.000	0.949	0.000	19.180	34.550	2.305	2.127	0.000	8.750	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
196	2	Outside Downtown	0	1	4	1	0	0.000	0.000	0.000	0.000	11.346	6.754	0.000	5.927	1.707	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
197	2	Outside Downtown	2	11	57	19	5	0.000	0.000	0.000	6.122	2.160	15.960	0.936	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
198	2	Outside Downtown	6	3	21	7	2	0.000	0.000	0.000	13.186	6.372	107.014	6.126	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
199	2	Outside Downtown	1	5	25	14	3	0.000	0.000	3.402	1.690	0.000	49.041	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
200	2	Outside Downtown	107	128	329	210	85	0.000	0.000	0.000	0.960	2.954	0.000	0.000	0.000	0.000	38	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
201	2	Outside Downtown	7	9	34	21	7	0.000	0.000	0.000	2.592	0.000	2.465	0.000	2.275	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
202	2	Outside Downtown	16	9	27	22	12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
203	2	Outside Downtown	30	16	68	35	4	0.000	0.000	0.000	1.368	0.000	0.000	0.000	0.000	0.000	0	0	2	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
204	2	Outside Downtown	15	3	34	18	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
205	2	Outside Downtown	18	5	35	10	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	OMEMPFU	NDEMPFU	FFEMPFU	EREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	U_Spare0	U_Spare0	U_Spare0	U_Spare0	IX_P	IX_A	XI_P	XI_A
206	2	Outside Downtown	11	5	61	20	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
207	2	Outside Downtown	4	9	98	32	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
208	2	Outside Downtown	19	15	81	32	6	0.000	0.000	0.000	0.000	0.000	0.000	52.056	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
209	2	Outside Downtown	10	1	11	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
210	2	Outside Downtown	10	4	34	7	3	0.000	0.000	0.000	0.000	0.992	0.000	26.718	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
211	2	Outside Downtown	14	2	12	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
212	2	Outside Downtown	3	8	73	20	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
213	2	Outside Downtown	4	6	40	10	4	0.000	0.000	0.000	0.000	4.901	5.396	16.314	2.906	0.000	50	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
214	2	Outside Downtown	4	2	22	6	2	0.000	0.000	0.000	4.500	0.000	0.000	0.000	0.000	0.000	0	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
215	2	Outside Downtown	15	0	3	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
216	2	Outside Downtown	19	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
217	2	Outside Downtown	16	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
218	2	Outside Downtown	14	0	3	1	0	0.000	0.000	3.105	0.000	1.599	8.028	7.756	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
219	2	Outside Downtown	2	1	4	1	0	0.000	0.000	0.000	0.000	0.000	3.864	12.970	0.000	0.000	0	0	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
220	2	Outside Downtown	16	2	16	4	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
221	2	Outside Downtown	16	1	6	1	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
222	2	Outside Downtown	20	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
223	2	Outside Downtown	19	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
224	2	Outside Downtown	28	2	15	11	2	0.000	0.000	0.000	0.000	0.000	0.000	8.438	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
225	2	Outside Downtown	8	1	4	2	0	0.000	0.000	2.581	0.000	0.000	22.357	17.375	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
226	2	Outside Downtown	18	1	7	5	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	20	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
227	2	Outside Downtown	29	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
228	2	Outside Downtown	18	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	1,500	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
229	2	Outside Downtown	13	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
230	2	Outside Downtown	77	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
231	2	Outside Downtown	18	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
232	2	Outside Downtown	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
233	2	Outside Downtown	0	3	17	12	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	50	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
234	2	Outside Downtown	23	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	31	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
235	2	Outside Downtown	23	35	100	65	21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
236	2	Outside Downtown	13	4	15	8	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
237	2	Outside Downtown	6	4	16	5	2	0.000	0.000	0.000	0.000	1.784	61.294	17.104	7.800	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
238	2	Outside Downtown	6	13	30	23	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
239	2	Outside Downtown	8	17	42	29	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
240	2	Outside Downtown	9	17	42	22	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
241	2	Outside Downtown	10	12	28	15	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
242	2	Outside Downtown	14	14	36	15	4	0.000	0.000	0.000	0.000	0.000	3.529	6.820	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
243	2	Outside Downtown	6	7	34	13	3	0.000	0.000	0.000	0.000	3.700	0.000	29.070	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
244	2	Outside Downtown	9	10	32	19	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
245	2	Outside Downtown	8	11	43	21	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
246	2	Outside Downtown	12	8	32	17	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
247	2	Outside Downtown	13	10	24	19	7	0.000	0.000	0.000	0.000	0.000	0.000	7.892	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
248	2	Outside Downtown	0	7	28	11	3	0.000	0.000	0.000	5.504	8.084	4.190	20.386	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
249	2	Outside Downtown	14	15	73	35	8	0.000	0.000	0.000	0.000	0.000	2.000	0.000	0.000	0.000	300	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
250	2	Outside Downtown	8	7	34	16	4	0.000	0.000	0.000	1.498	8.173	4.308	3.622	0.000	0.624	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
251	2	Outside Downtown	35	3	22	11	2	0.000	0.000	0.000	1.200	5.184	0.000	27.832	0.000	0.000	48	0	0	11	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
252	2	Outside Downtown	9	15	90	36	4	0.000	0.000	0.000	5.212	2.146	0.000	19.175	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
253	2	Outside Downtown	12	8	56	27	5	0.000	1.625	0.000	1.188	8.684	0.000	19.242	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
254	2	Outside Downtown	17	34	104	70	12	0.000	0.000	1.614	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
255	2	Outside Downtown	2	4	25	11	2	0.000	0.000	3.158	0.000	7.752	0.000	45.182	0.000	3.049	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
256	2	Outside Downtown	2	1	9	4	1	1.399	0.000	0.000	1.127	22.895	0.000	3.680	0.000	6.744	0	0	0	5	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
257	2	Outside Downtown	42	3	16	8	3	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
258	2	Outside Downtown	5	4	14	7	1	0.000	0.000	0.000	0.000	0.000	0.000	40.152	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
259	2	Outside Downtown	0	11	37	22	5	2.070	0.000	0.000	0.000	0.000	0.000	100.087	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
260	2	Outside Downtown	11	19	63	37	9	0.000	0.000	0.000	0.000	0.000	4.255	73.245	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
261	2	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	466	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
262	2	Outside Downtown	1	1	3	1	0	1.583	0.000	0.000	0.000	0.000	36.831	22.382	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
263	2	Outside Downtown	1	1	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	81.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
264	2	Outside Downtown	9	4	13	8	0	0.000	0.000	0.000	0.000	0.000	0.000	18.559	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
265	2	Outside Downtown	6	12	44	26	3	0.000	0.000	0.000	0.000	0.000	0.000	4.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
266	2	Outside Downtown	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	14.702	0.000	0.000	100	434	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
267	2	Outside Downtown	78	9	51	25	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	3	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
268	2	Outside Downtown	40	26	106	53	17	10.540	1.741	2.834	0.000	9.709	0.000	7.786	0.000	1.382	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
269	2	Outside Downtown	3	12	67	50	13	0.000	0.933	1.140	6.843	19.174	0.000	15.142	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
270	2	Outside Downtown	20	5	28	16	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
271	4	Outside Downtown	0	0	1	1	1	5.482	0.000	3.197	8.774	19.857	0.000	11.304	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
272	4	Outside Downtown	0	0	0	0	0	0.000	2.775	0.000	2.368	27.562	6.888	2.446	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
273	4	Outside Downtown	26	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
274	4	Outside Downtown	0	0	2	1	1	4.332	0.000	0.000	17.218	14.988	13.902	17.796	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
275	4	Outside Downtown	0	0	0	0	0	0.000	0.000	3.136	4.561	0.000	52.815	64.904	0.000	0.000	0	0	5	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
276	4	Outside Downtown	4	3	36	59	22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
277	4	Outside Downtown	0	10	40	23	7	7.117	0.000	0.000	0.000	0.000	0.000	19.961	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
278	3	Outside Downtown	0	15	42	41	19	2.982	4.864	0.000	0.000	18.619	5.000	0.000	0.000	0.000	0	0	0	4	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
279	3	Outside Downtown	28	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
280	3	Outside Downtown	0	0	1	0	0	0.000	0.000	0.000	2.476	23.084	0.000	0.500	7.995	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
281	3	Outside Downtown	0	2	13	7	1	0.000	0.000	0.000	3.304	36.031	0.000	23.746	0.000	2.139	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
282	3	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	42.099	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
283	3	Outside Downtown	0	2	6	4	1	0.000	0.000	0.000	0.000	41.263	0.000	0.600	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
284	3	Outside Downtown	0	0	1	0	0	0.000	0.000	0.000	2.200	12.834	0.000	11.206	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
285	3	Outside Downtown	0	0	2	1	0	0.000	0.000	2.353	1.720	4.300	0.000	4.300	0.000	2.745	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
286	3	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	25	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
287	3	Outside Downtown	182	4	23	8	3	0.000	0.000	0.000	0.000	0.000	7.128	0.000	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
288	3	Outside Downtown	91	23	88	51	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
289	3	Outside Downtown	212	12	69	31	10	0.000	0.000	0.000	0.480	1.878	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
290	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
291	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	585	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	110	0	0	0	0	0	0	0.00	0.00	0.00	0.00
292	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
293	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	0.000	92.711	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
294	4	Outside Downtown	118	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
295	4	Outside Downtown	30	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
296	4	Outside Downtown	0	59	137	71	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
297	4	Outside Downtown	18	40	92	48	20	0.000	0.000	0.000	0.000	2.716	0.000	46.642	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
298	4	Outside Downtown	0	1	3	1	1	23.608	0.000	0.000	1.604	44.425	0.000	12.347	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
299	4	Outside Downtown	142	4	9	6	3	0.000	0.000	0.000	5.344	0.000	0.000	0.000	0.000	10.600	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
300	4	Outside Downtown	0	0	0	0	0	0.000	0.000	85.890	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
301	4	Outside Downtown	0	0	0	0	0	0.000	0.000	50.458	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
302	4	Outside Downtown	0	29	66	35	14	0.000	7.800	0.000	2.965	0.000	0.000	35.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
303	4	Outside Downtown	0	0	0	0	0	0.000	63.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
304	4	Outside Downtown	0	0	0	0	0	0.000	0.000	4.469	10.007	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
305	4	Outside Downtown	0	0	0	0	0	8.756	0.000	2.838	5.720	48.002	52.218	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
306	4	Outside Downtown	0	0	0	0	0	0.000	0.000	0.000	4.515	23.607	14.346	1.425	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
307	4	Outside Downtown	0	0	0	0	0	0.000	0.000	3.526	0.000	431.087	0.000	3.790	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
308	4	Outside Downtown	0	6	17	11	2	2.205	0.000	3.338	0.000	195.407	0.000	11.590	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
309	4	Outside Downtown	0	3	7	4	2	7.310	0.000	0.000	2.016	44.148	0.000	27.687	0.000	0.000	0	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
310	4	Outside Downtown	0	0	0	0	0	0.000	0.000	60.523	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
311	4	Outside Downtown	0	2	4	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
312	2	Outside Downtown	104	19	93	76	30	0.000	3.415	0.000	5.672	11.272	0.000	0.000	0.000	0.000	25	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
313	2	Outside Downtown	73	1	15	14	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
314	2	Outside Downtown	36	91	263	147	48	0.000	0.000	2.644	1.959	6.996	0.000	5.375	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
315	2	Outside Downtown	27	22	34	21	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
316	2	Outside Downtown	17	49	74	47	16	0.000	0.000	1.024	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
317	2	Outside Downtown	87	16	76	68	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	23	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
318	2	Outside Downtown	116	62	215	139	37	0.000	0.000	1.358	3.086	0.000	0.000	4.422	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
319	2	Outside Downtown	142	0	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
320	2	Outside Downtown	99	9	50	37	9	0.000	0.000	0.000	0.000	14.434	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
321	2	Outside Downtown	77	1	11	9	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	600	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
322	2	Outside Downtown	178	2	20	22	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
323	3	Outside Downtown	51	35	132	94	27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
324	3	Outside Downtown	22	8	41	45	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	545	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
325	2	Outside Downtown	116	1	7	10	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
326	4	Outside Downtown	0	5	15	8	2	0.000	0.000	1.808	0.000	0.000	0.000	7.150	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
327	4	Outside Downtown	0	0	0	0	0	12.798	0.000	0.000	0.000	0.000	0.000	18.235	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
328	4	Outside Downtown	0	14	78	47	11	0.000	0.000	0.000	0.000	0.000	0.000	10.440	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
329	4	Outside Downtown	0	0	0	0	0	15.908	0.000	0.000	6.900	0.000	31.124	58.667	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
330	3	Outskirts	790	2	14	14	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	25.000	4.000	14.000	115.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
331	3	Outskirts	15	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
332	3	Outskirts	176	2	9	6	2	0.000	40.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	50.000	217.000	67.000	149.000	131.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
333	3	Outskirts	95	0	4	4	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	27.000	117.000	7.000	16.000	15.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
334	3	Outskirts	146	13	36	13	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	500	0	0	0	0	0	0.000	65.000	2.100	10.000	98.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
335	3	Outskirts	26	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
336	3	Outskirts	42	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
337	3	Outskirts	3	1	8	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
338	3	Outskirts	0	2	14	7	1	0.000	0.000	0.000	0.000	0.000	0.000	1.858	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
339	3	Outskirts	121	54	17	8	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	18.520	1.560	7.000	75.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
340	3	Outskirts	12	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
341	3	Outskirts	25	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	3.460	0.292	1.314	13.249	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
342	3	Outskirts	25	0	2	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	3.000	0.000	1.000	13.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
343	3	Outskirts	5	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
344	3	Outskirts	66	1	5	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
345	3	Outskirts	10	2	17	9	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
346	3	Outskirts	129	1	8	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.390	4.290	0.780	4.680	73.710	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
347	3	Outskirts	0	0	0	0	0	3.844	1.728	0.000	1.310	67.392	0.000	1.248	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
348	3	Outskirts	1	1	5	3	0	2.732	0.000	4.177	9.860	72.668	55.121	104.579	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
349	3	Outskirts	1	4	38	18	2	8.026	0.000	2.861	9.740	17.523	10.500	46.056	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
350	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	1	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
351	3	Outskirts	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	9.000	3.000	5.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
352	3	Outskirts	60	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
353	3	Outskirts	2	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
354	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
355	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
356	3	Outskirts	166	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.208	1.000	1.240	0.832	92.560	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
357	3	Outskirts	63	0	3	6	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
358	3	Outskirts	13	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
359	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
360	3	Outskirts	180	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
361	3	Outskirts	90	50	150	151	22	0.000	0.000	3.374	0.000	0.000	0.000	11.543	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
362	3	Outskirts	79	1	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	366	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
363	3	Outskirts	193	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	1,500	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
364	3	Outskirts	227	1	3	5	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
365	3	Outskirts	32	3	8	11	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
366	3	Outskirts	3	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	101	0	0	0	0	0	0	0.00	0.00	0.00	0.00
367	3	Outskirts	14	4	38	18	4	0.000	2.800	0.000	6.982	7.000	0.000	14.300	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
368	3	Outskirts	49	8	45	27	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
369	3	Outskirts	349	0	5	5	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	76	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
370	3	Outskirts	124	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	230	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
371	4	Outskirts	189	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
372	3	Outskirts	655	0	6	4	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
373	3	Outskirts	376	0	3	2	1	0.000	0.000	0.000	0.000	0.000	94.277	0.000	0.000	0.000	0	0	3	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
374	3	Outskirts	332	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
375	3	Outskirts	69	2	24	15	7	0.000	0.000	0.000	0.000	0.000	0.000	1.496	0.000	0.000	0	0	0	2	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
376	3	Outskirts	105	7	40	27	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
377	3	Outskirts	217	1	15	12	6	0.000	0.000	0.000	1.335	0.752	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
378	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	3.623	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
379	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	18,000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
380	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	17.420	7.007	0.000	0.205	6.327	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	10	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
381	3	Outskirts	7	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	450	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
382	3	Outskirts	310	0	1	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
383	3	Outskirts	176	43	135	114	63	0.000	0.000	0.000	0.000	0.000	0.000	23.494	0.000	0.000	30	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
384	3	Outskirts	127	16	53	67	37	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	3	13	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
385	3	Outskirts	0	0	0	0	0	0.000	1.782	0.000	8.418	10.487	0.000	3.785	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
386	3	Outskirts	0	2	9	7	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
387	3	Outskirts	108	31	102	162	92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
388	3	Outskirts	459	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
389	3	Outskirts	338	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	7	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
390	3	Outskirts	26	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
391	3	Outskirts	111	6	38	49	19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.414	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
392	3	Outskirts	6	5	40	23	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
393	3	Outskirts	9	4	7	10	4	3.440	0.000	0.000	0.000	0.000	0.000	4.019	0.000	0.000	573	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
394	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	32.644	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
395	3	Outskirts	0	0	0	0	0	0.000	0.000	5.330	5.071	0.000	0.000	40.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
396	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	14.088	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
397	3	Outskirts	77	9	81	34	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
398	3	Outskirts	113	10	91	48	21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	535	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
399	3	Outskirts	14	1	21	16	15	0.000	8.000	0.000	0.000	0.000	0.000	84.292	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
400	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	160	0	0	19	0	0	0.000	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
401	3	Outskirts	197	3	18	14	8	0.000	6.361	0.000	0.000	0.000	0.000	0.000	69.771	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
402	3	Outskirts	321	16	84	61	30	0.000	0.000	0.000	0.000	0.000	0.000	26.417	0.000	0.000	0	0	0	6	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
403	3	Outskirts	2	8	19	19	7	0.000	0.000	0.000	0.000	0.000	5.845	21.392	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
404	4	Outskirts	335	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	905	0	0	16	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
405	4	Outskirts	241	1	2	2	1	0.000	0.000	0.000	2.178	7.839	0.000	4.231	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
406	4	Outskirts	211	1	4	3	1	0.000	0.000	0.000	2.400	0.605	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
407	4	Outskirts	94	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
408	4	Outskirts	463	0	8	17	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
409	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
410	3	Outskirts	379	3	12	8	9	0.000	0.000	0.000	0.000	4.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

APPENDIX B - BASE YEAR LAND USE DATA BY TAZ

TAZ	Atype	Atype_Str	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	COMEMPFU	INDEMPFU	OFFEMPFU	SEREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	LU_Spare04	LU_Spare03	LU_Spare02	LU_Spare01	IX_P	IX_A	XI_P	XI_A
411	3	Outskirts	6	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
412	3	Outskirts	159	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	490	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
413	3	Outskirts	93	17	67	34	49	0.000	0.000	0.000	4.448	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
414	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	1.786	57.900	0.000	2.573	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
415	3	Outskirts	213	3	15	16	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
416	3	Outskirts	443	0	5	8	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
417	3	Outskirts	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
418	3	Outskirts	210	0	1	1	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
419	3	Outskirts	503	1	11	9	9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	20	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
420	4	Outskirts	338	77	311	181	58	0.000	7.869	2.493	2.605	17.835	0.000	5.274	0.000	0.000	0	0	0	31	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
421	4	Outskirts	80	0	0	0	0	0.000	0.000	0.000	0.000	2.004	0.000	0.000	0.000	10.100	0	0	0	11	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
422	4	Outskirts	327	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	1	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
423	4	Outskirts	142	0	1	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
424	4	Outskirts	73	6	33	23	5	0.000	0.000	0.000	0.000	0.000	0.000	5.400	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
425	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	380	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
426	4	Outskirts	48	0	2	2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.110	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
427	4	Outskirts	4	1	10	17	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	5.000	1.000	1.000	1.000	9.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
428	4	Outskirts	43	0	0	0	0	0.000	20.512	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	113	0	0	0	0	0	0	0.00	0.00	0.00	0.00
429	4	Outskirts	105	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	376	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
430	4	Outskirts	214	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
431	4	Outskirts	0	0	0	0	0	0.000	0.000	2.107	0.000	6.350	0.000	0.000	9.120	41.165	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
432	4	Outskirts	0	0	2	2	0	0.000	0.000	6.459	14.620	59.635	14.832	41.808	0.000	26.309	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
433	4	Outskirts	324	6	53	28	4	0.000	0.000	0.000	0.000	0.000	0.000	22.800	0.000	0.000	0	0	0	9	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
434	4	Outskirts	175	9	78	80	28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	480	0	0	10	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
435	4	Outskirts	180	42	250	165	28	0.000	0.000	0.000	0.000	2.918	0.000	3.627	0.000	0.000	0	0	0	31	1,951	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
436	4	Outskirts	1	12	52	44	5	0.000	0.000	0.000	0.000	0.000	0.000	126.821	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
437	4	Outskirts	96	27	99	52	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.770	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
438	4	Outskirts	0	21	66	35	7	3.949	20.000	9.610	3.608	25.774	0.000	65.648	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
439	4	Outskirts	203	0	1	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	26	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
440	4	Outskirts	550	3	18	30	11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	31.000	13.000	294.000	46.000	54.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
441	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	3.303	0.000	1.930	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
442	4	Outskirts	54	48	234	179	33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
443	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	2.000	0.000	0.000	1,136.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
444	4	Outskirts	130	1	6	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	1.000	0.000	0.000	364.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
445	4	Outskirts	323	1	11	16	7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	67.000	10.000	23.000	429.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
446	4	Outskirts	156	0	5	9	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	33.000	5.000	11.000	208.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
447	4	Outskirts	275	6	56	79	35	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	53.000	8.000	18.000	338.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
448	4	Outskirts	243	2	19	24	7	0.000	0.000	1.920	3.420	2.780	4.108	3.300	0.000	0.000	0	0	0	64	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
449	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	4.079	10.206	0.000	0.000	40.552	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
450	4	Outskirts	7	0	7	6	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
451	4	Outskirts	31	1	6	7	2	0.000	0.000	1.462	0.000	4.060	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
452	4	Outskirts	99	1	4	3	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	2,200	0	0.000	1.500	1.000	5.300	214.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
453	4	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.791	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
454	4	Outskirts	30	21	94	69	84	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	1.000	264.000	0.000	5.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
455	4	Outskirts	499	3	16	19	16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	25.000	22.000	8.000	18.000	159.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
456	4	Outskirts	77	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
457	4	Outskirts	221	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
458	4	Outskirts	166	0	0	1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
459	4	Outskirts	7	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
460	3	Outskirts	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
750	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
751	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
752	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
753	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
754	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
755	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
756	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
757	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
758	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
759	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
760	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
761	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
762	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
763	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
764	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
765	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
766	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
767	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
768	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
769	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
770	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
771	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
772	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
773	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
774	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
775	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
776	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
777	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
778	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
779	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
780	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
781	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
782	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
783	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
784	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
785	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
786	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
787	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
788	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
789	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
790	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
791	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
792	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
793	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
794	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
795	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
796	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
797	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
798	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
799	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
800	5	Extra	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
1001	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	141	52	0	0	0	0	0.00	17141.00	17458.00	0.00
1002	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	717	264	0	0	0	0	0.00	87186.00	97593.00	0.00
1003	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
1004	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	118	43	0	0	0	0	0.00	14319.00	14425.00	0.00
1005	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	138	51	0	0	0	0	0.00	16776.00	17638.00	0.00
1006	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	66	24	0	0	0	0	0.00	7994.00	7997.00	0.00
1007	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	42	15	0	0	0	0	0.00	5097.00	5097.00	0.00
1008	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	11	4	0	0	0	0	0.00	1292.00	1691.00	0.00
1009	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	513	189	0	0	0	0	0.00	62420.00	73710.00	0.00
1010	5	External	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00

	SF_DU	MF_DU_0	MF_DU_1	MF_DU_2	MF_DU_3P	COM_SERV	ENTNMT	AUTO	RESTRNT	RETAIL	HOTEL	OFFICE	INSTNL	INDUSTRL	ELEM_STU	HOSPITAL	SAFETY	CHURCH	HS	COLLEGE	AGREMPFU	COMEMPFU	INDEMPFU	OFFEMPFU	SEREMPFU	REC	GOLF_AC	EX_REC	EX_GOLF	LU_Spare04	LU_Spare03	LU_Spare02	LU_Spare01
Total LU	**21,246**	**3,114**	**10,902**	**6,645**	**2,200**	**495**	**627**	**649**	**634**	**4,251**	**1,902**	**4,858**	**545**	**1,480**	**10,463**	**900**	**96**	**738**	**6,706**	**21,000**	**140**	**921**	**414**	**336**	**3,538**	**29**	**324**	**1,746**	**642**	**0**	**0**	**0**	**0**
Total Area 1 LU	**107**	**182**	**648**	**229**	**74**	**253**	**349**	**108**	**210**	**1,493**	**179**	**2,015**	**236**	**100**	**799**	**0**	**51**	**134**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 2 LU	**3,901**	**2,027**	**6,546**	**3,631**	**1,073**	**129**	**90**	**279**	**239**	**1,241**	**1,312**	**1,785**	**158**	**1,233**	**2,927**	**900**	**9**	**262**	**2,555**	**1,500**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 3 LU	**10,148**	**439**	**1,752**	**1,365**	**575**	**21**	**66**	**18**	**80**	**429**	**220**	**428**	**85**	**5**	**3,899**	**0**	**31**	**135**	**0**	**19,500**	**78**	**463**	**87**	**209**	**627**	**21**	**101**	**0**	**0**	**0**	**0**	**0**	**0**
Total Area 4 LU	**7,091**	**466**	**1,956**	**1,420**	**478**	**91**	**123**	**243**	**105**	**1,088**	**190**	**630**	**67**	**141**	**2,838**	**0**	**5**	**207**	**4,151**	**0**	**62**	**458**	**327**	**127**	**2,911**	**1**	**223**	**0**	**0**	**0**	**0**	**0**	**0**

APPENDIX C:
ROADWAY NETWORK INFORMATION

DISCUSSION OF MASTER NETWORK CONCEPT

The City of Santa Barbara TDF model utilizes a 'master roadway network' that includes all input roadway network data for each scenario within one input roadway model network. A pre-processor script is used to create individual roadway networks for each scenario using the master roadway network as the input network. Discussed below are the network fields that can be modified for each scenario within the City of Santa Barbara TDF model master roadway network. The post-processor script is flexible so that fields may be included or excluded as necessary.

ROADWAY NETWORK FIELDS

The City Santa Barbara TDF model consists of four (4) fields that may vary between scenarios that consist of:

- Travel Speed
- Functional Class
- Capacity
- Lanes

Each of these variables is included for each of the scenarios years within the master network by a suffix of the corresponding scenario year. The City of Santa Barbara TDF model includes two (2) scenarios that consist of the following:

- Base Year (2008)
- General Plan Build-Out (2030)

The 2008 fields are therefore: AB_Speed08/BA_Speed08/Speed08, Func_Class08, Lane_Capaciy08, andAB_Lanes08/BA_Lanes08/Lanes08. The 2030 scenario fields follow the same format. Also included within the 'master roadway network' is a construction year field (CONST_YEAR) that consists of a value representing the opening day of the facility. The values are used to define links and centroid connectors for each scenario, with the value of "2008" for all existing roadways. Facilities that are removed/replaced in the future are turned off by removing the value for lanes in the appropriate year (i.e. AB_Lanes30 if the facility is removed by 2030).

The "master roadway network" pre-processor script uses these parameters to create each scenario roadway network. Each network only contains the list of fields that are associated with the specific scenario and other fields associated with other scenarios are not copied from the master network to the new roadway network. In addition, the scenario suffix is removed for each scenario network so that only the generic field name (AB_Speed/BA_Speed/Speed, Func_Class, Lane_Capaciy, and AB_Lanes/BA_Lanes/Lanes) are listed within each of the scenario roadway networks. The scenario specific network contains the year in the name (i.e. Roads_Loaded_2008). All other fields not included in the four listed above are copied over to each scenario network and the addition/deletion of these other fields can be modified within the pre-processor script.

APPENDIX D:
CITY OF SANTA BARBARA TDF MODEL TRIP GENERATION SUMMARY

SANTA BARBARA CROSS CLASSIFICATION TABLES

Input Table for Area 1

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	Total
1	DU	SF_DU	**8.05**	15.65%	45.00%	25.00%	0.35%	2.00%		7.00%	5.00%			100%
2	DU	MF_DU_0	**3.03**	8.00%	53.00%	29.00%		1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**4.23**	14.00%	47.00%	29.00%		1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**5.96**	12.25%	47.50%	30.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**7.60**	10.75%	50.00%	29.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**100.10**			15.00%			18.00%	32.00%	35.00%			100%
7	KSF	ENTNMT	**36.40**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**16.38**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**100.10**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**32.76**			18.00%		0.25%	6.00%	31.75%	44.00%			100%
11	KSF	HOTEL	**2.73**	9.00%	27.00%	20.00%	0.25%	20.75%	2.00%	10.00%	11.00%			100%
12	KSF	OFFICE	**8.27**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**45.50**			16.00%			20.00%	18.00%	46.00%			100%
14	KSF	INDUSTRL	**4.25**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**1.81**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**11.83**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**8.65**			30.00%			17.00%	10.00%	43.00%			100%
18	KSF	CHURCH	**8.29**			20.00%			2.00%	33.00%	45.00%			100%
19	enroll	HS	**0.61**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.24**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.54**						62.13%	0.00%	37.87%			100%
22	emp	COMEMPFUL	**4.04**						16.89%	46.62%	36.49%			100%
23	emp	INDEMPFUL	**3.36**						69.38%	0.00%	30.62%			100%
24	emp	OFFEMPFUL	**1.74**						39.27%	0.00%	60.73%			100%
25	emp	SEREMPFUL	**3.33**						37.16%	29.78%	33.06%			100%
26	KSF	REC	**0.91**										100%	100%
27	AC	GOLF_AC	**4.59**									100%		100%
28	prd	EX_REC	**1.00**					100%						100%
29	prd	EX_GOLF	**1.00**				100%							100%
			IX, XI	**20.0%**	**18.0%**	**21.2%**	**0.0%**	**0.0%**	**41.0%**	**38.0%**	**21.0%**	**40.0%**	**30.0%**	
			Internal	80.0%	82.0%	78.8%	100.0%	100.0%	59.0%	62.0%	79.0%	60.0%	70.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 2

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	Total
1	DU	SF_DU	**10.56**	16.00%	46.65%	24.00%	0.35%	2.00%		6.00%	5.00%			100%
2	DU	MF_DU_0	**3.55**	9.00%	53.00%	28.00%		1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**5.39**	18.00%	48.00%	28.00%		1.00%		3.00%	2.00%			100%
4	DU	MF_DU_2	**7.04**	13.25%	48.50%	28.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**8.89**	11.75%	50.00%	28.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**115.20**			15.00%			19.00%	35.00%	31.00%			100%
7	KSF	ENTNMT	**43.20**			15.00%			3.00%	46.00%	36.00%			100%
8	KSF	AUTO	**17.28**			3.00%			2.00%	46.00%	49.00%			100%
9	KSF	RESTRNT	**139.20**			16.00%		0.50%	2.00%	45.50%	36.00%			100%
10	KSF	RETAIL	**45.18**			19.75%		0.25%	6.00%	44.00%	30.00%			100%
11	KSF	HOTEL	**2.11**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**11.59**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**48.00**			16.00%			14.00%	18.00%	52.00%			100%
14	KSF	INDUSTRL	**4.48**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**1.91**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**12.48**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**9.12**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**8.75**			20.00%			2.00%	45.00%	33.00%			100%
19	enroll	HS	**0.64**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.25**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.62**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.26**			8.00%			18.00%	40.00%	34.00%			100%
23	emp	INDEMPFUL	**3.54**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**1.83**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.51**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**0.96**										100%	100%
27	AC	GOLF_AC	**4.84**									100%		100%
28	prd	EX_REC	**1.00**					100%						100%
29	prd	EX_GOLF	**1.00**				100%							100%
			IX, XI	**27.0%**	**19.0%**	**21.2%**	**0.0%**	**0.0%**	**45.0%**	**30.0%**	**20.3%**	**40.0%**	**30.0%**	
			Internal	73.0%	81.0%	78.8%	100.0%	100.0%	55.0%	70.0%	79.7%	60.0%	70.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 3

Prod Factor= Attr Factor=

Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					Total
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	
1	DU	SF_DU	**11.98**	18.00%	45.65%	23.00%	0.35%	1.25%		6.00%	5.75%			100%
2	DU	MF_DU_0	**4.02**	8.00%	53.00%	29.00%	0.00%	1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**6.18**	14.75%	48.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**8.08**	12.75%	50.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**10.24**	10.75%	52.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**128.40**			15.00%			17.00%	36.00%	32.00%			100%
7	KSF	ENTNMT	**48.15**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**19.26**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**136.05**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**40.28**			19.75%		0.25%	6.00%	44.00%	30.00%			100%
11	KSF	HOTEL	**3.75**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**12.92**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**53.50**			16.00%			14.00%	40.00%	30.00%			100%
14	KSF	INDUSTRL	**5.00**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**2.13**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**13.91**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**10.17**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**9.75**			20.00%			2.00%	33.00%	45.00%			100%
19	enroll	HS	**0.72**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.28**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.81**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.75**			8.00%			16.00%	42.00%	34.00%			100%
23	emp	INDEMPFUL	**3.95**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**2.04**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.92**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**1.07**										100.00%	100%
27	AC	GOLF_AC	**5.39**									100.00%		100%
28	prd	EX_REC	**1.00**					100.00%						100%
29	prd	EX_GOLF	**1.00**				100.00%							100%
			IX, XI	**40.0%**	**32.0%**	**22.5%**	**0.0%**	**0.0%**	**49.0%**	**31.0%**	**24.0%**	**35.0%**	**20.0%**	
			Internal	60.0%	68.0%	77.5%	100.0%	100.0%	51.0%	69.0%	76.0%	65.0%	80.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Input Table for Area 4

Prod Factor= Attr Factor=

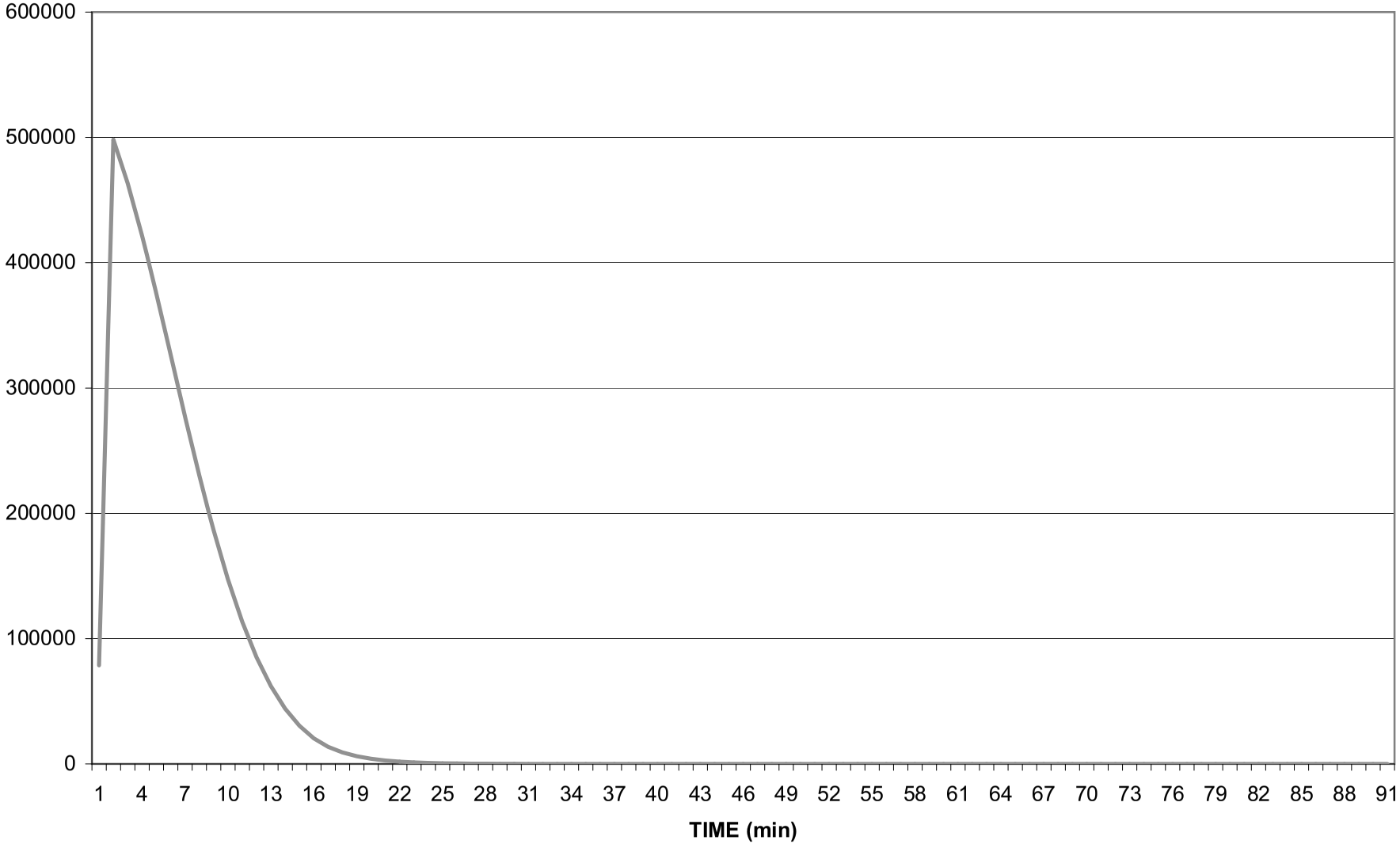
Emp. Type	Unit	Land Use Type	Daily Trip Rate	Productions					Attractions					Total
				HBW	HBO	NHB	GOLF	REC	HBW	HBO	NHB	GOLF	REC	
1	DU	SF_DU	**11.98**	18.00%	45.65%	23.00%	0.35%	1.25%		6.00%	5.75%			100%
2	DU	MF_DU_0	**4.02**	8.00%	53.00%	29.00%	0.00%	1.00%		5.00%	4.00%			100%
3	DU	MF_DU_1	**6.18**	14.75%	48.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
4	DU	MF_DU_2	**8.08**	12.75%	50.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
5	DU	MF_DU_3P	**10.24**	10.75%	52.00%	27.00%	0.25%	1.00%		5.00%	4.00%			100%
6	KSF	COM_SERV	**128.40**			15.00%			17.00%	32.00%	36.00%			100%
7	KSF	ENTNMT	**48.15**			15.00%			2.00%	47.00%	36.00%			100%
8	KSF	AUTO	**19.26**			3.00%			2.00%	55.00%	40.00%			100%
9	KSF	RESTRNT	**136.05**			14.50%		0.50%	2.00%	47.00%	36.00%			100%
10	KSF	RETAIL	**40.28**			19.75%		0.25%	6.00%	39.00%	35.00%			100%
11	KSF	HOTEL	**3.75**	10.00%	26.75%	12.00%	0.25%	20.00%	2.00%	10.00%	19.00%			100%
12	KSF	OFFICE	**12.92**			19.00%			55.00%	7.00%	19.00%			100%
13	KSF	INSTNL	**53.50**			16.00%			14.00%	18.00%	52.00%			100%
14	KSF	INDUSTRL	**5.00**			5.00%			64.00%	0.00%	31.00%			100%
15	enroll	ELEM_STU	**2.13**			5.00%			5.00%	85.00%	5.00%			100%
16	KSF	HOSPITAL	**13.91**			20.00%			38.00%	35.00%	7.00%			100%
17	KSF	SAFETY	**10.17**			30.00%			15.00%	10.00%	45.00%			100%
18	KSF	CHURCH	**9.75**			20.00%			2.00%	45.00%	33.00%			100%
19	enroll	HS	**0.72**			5.00%			15.00%	75.00%	5.00%			100%
20	enroll	COLLEGE	**0.28**			5.00%			20.00%	70.00%	5.00%			100%
21	emp	AGREMPFUL	**1.81**			4.00%			62.00%	0.00%	34.00%			100%
22	emp	COMEMPFUL	**4.75**			8.00%			16.00%	42.00%	34.00%			100%
23	emp	INDEMPFUL	**3.95**			5.00%			66.00%	0.00%	29.00%			100%
24	emp	OFFEMPFUL	**2.04**			10.00%			39.00%	0.00%	51.00%			100%
25	emp	SEREMPFUL	**3.92**			10.00%			35.00%	26.00%	29.00%			100%
26	KSF	REC	**1.07**										100.00%	100%
27	AC	GOLF_AC	**5.39**									100.00%		100%
28	prd	EX_REC	**1.00**					100.00%						100%
29	prd	EX_GOLF	**1.00**				100.00%							100%
			IX, XI	**44.0%**	**20.0%**	**21.2%**	**0.0%**	**0.0%**	**49.0%**	**33.0%**	**24.0%**	**35.0%**	**20.0%**	
			Internal	56.0%	80.0%	78.8%	100.0%	100.0%	51.0%	67.0%	76.0%	65.0%	80.0%	
			Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Output Table for All Areas

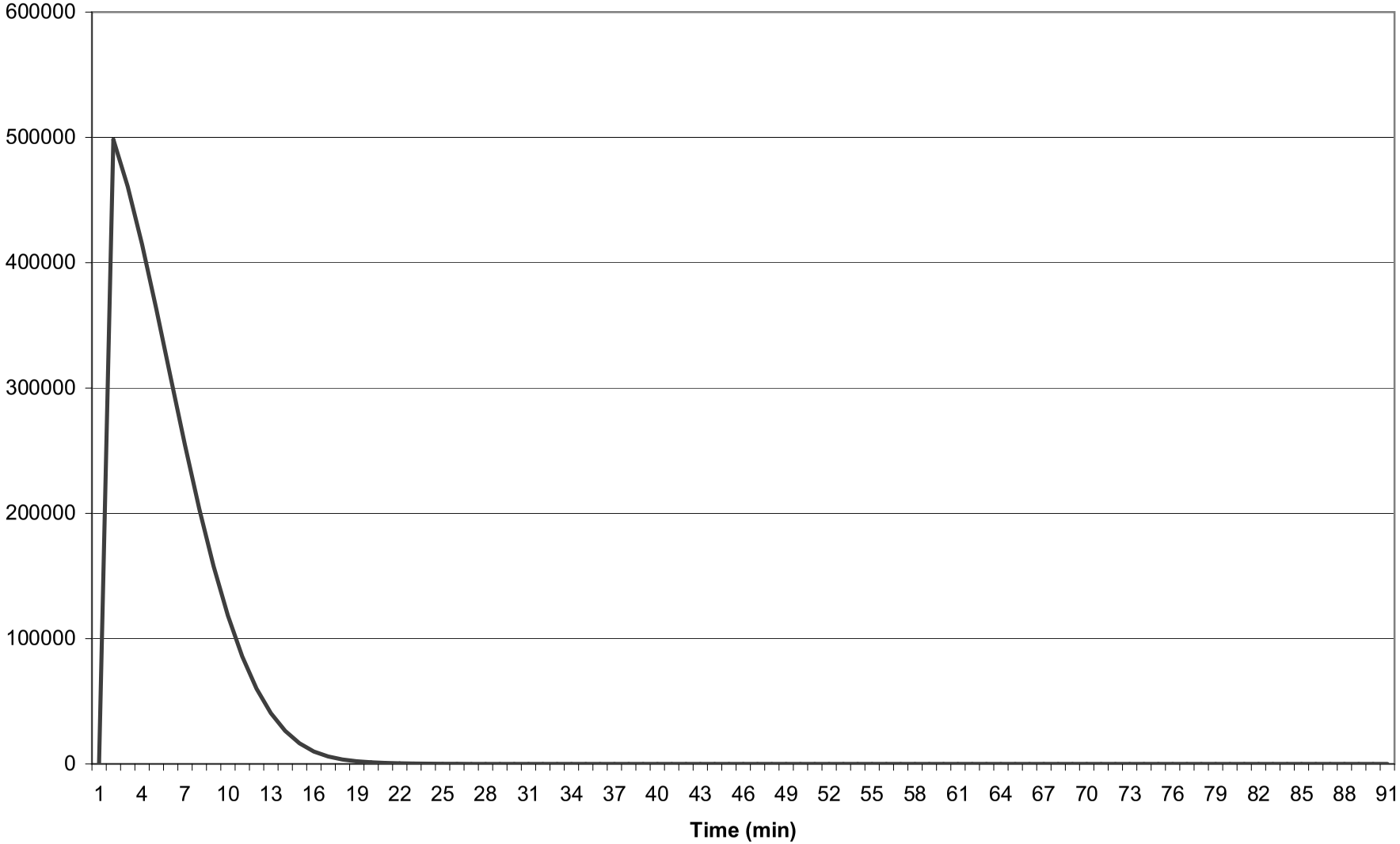
[Area Type	[Employme	LU_Type	LU_Unit	R_HBW_P	R_HBO_P	R_NHB_P	R_GOLF_P	R_REC_P	R_HBW_A	R_HBO_A	R_NHB_A	R_GOLF_A	R_REC_A	R_HBW_IX	R_HBO_IX	R_NHB_IX	R_GOLF_IX	R_REC_IX	R_HBW_XI	R_HBO_XI	R_NHB_XI	R_GOLF_XI	R_REC_XI
1	1	SF_DU	DU	1.008	2.972	1.586	0.028	0.161	0.000	0.350	0.318	0.000	0.000	0.252	0.652	0.427	0.000	0.000	0.000	0.214	0.085	0.000	0.000
1	2	MF_DU_0	DU	0.194	1.317	0.692	0.000	0.030	0.000	0.094	0.096	0.000	0.000	0.048	0.289	0.187	0.000	0.000	0.000	0.058	0.025	0.000	0.000
1	3	MF_DU_1	DU	0.474	1.631	0.967	0.000	0.042	0.000	0.131	0.134	0.000	0.000	0.118	0.358	0.261	0.000	0.000	0.000	0.080	0.036	0.000	0.000
1	4	MF_DU_2	DU	0.584	2.322	1.409	0.015	0.060	0.000	0.185	0.188	0.000	0.000	0.146	0.510	0.380	0.000	0.000	0.000	0.113	0.050	0.000	0.000
1	5	MF_DU_3P	DU	0.653	3.115	1.736	0.019	0.076	0.000	0.236	0.240	0.000	0.000	0.163	0.684	0.468	0.000	0.000	0.000	0.144	0.064	0.000	0.000
1	6	COM_SERV	KSF	0.000	0.000	11.827	0.000	0.000	10.631	19.860	27.678	0.000	0.000	0.000	0.000	3.188	0.000	0.000	7.387	12.172	7.357	0.000	0.000
1	7	ENTNMT	KSF	0.000	0.000	4.301	0.000	0.000	0.430	10.607	10.352	0.000	0.000	0.000	0.000	1.159	0.000	0.000	0.298	6.501	2.752	0.000	0.000
1	8	AUTO	KSF	0.000	0.000	0.387	0.000	0.000	0.193	5.586	5.176	0.000	0.000	0.000	0.000	0.104	0.000	0.000	0.134	3.423	1.376	0.000	0.000
1	9	RESTRNT	KSF	0.000	0.000	11.433	0.000	0.501	1.181	29.169	28.468	0.000	0.000	0.000	0.000	3.081	0.000	0.000	0.821	17.878	7.568	0.000	0.000
1	10	RETAIL	KSF	0.000	0.000	4.645	0.000	0.082	1.160	6.449	11.387	0.000	0.000	0.000	0.000	1.252	0.000	0.000	0.806	3.952	3.027	0.000	0.000
1	11	HOTEL	KSF	0.197	0.604	0.430	0.007	0.566	0.032	0.169	0.237	0.000	0.000	0.049	0.133	0.116	0.000	0.000	0.022	0.104	0.063	0.000	0.000
1	12	OFFICE	KSF	0.000	0.000	1.238	0.000	0.000	2.685	0.359	1.242	0.000	0.000	0.000	0.000	0.334	0.000	0.000	1.866	0.220	0.330	0.000	0.000
1	13	INSTNL	KSF	0.000	0.000	5.734	0.000	0.000	5.369	5.078	16.535	0.000	0.000	0.000	0.000	1.546	0.000	0.000	3.731	3.112	4.395	0.000	0.000
1	14	INDUSTRL	KSF	0.000	0.000	0.167	0.000	0.000	1.605	0.000	1.041	0.000	0.000	0.000	0.000	0.045	0.000	0.000	1.115	0.000	0.277	0.000	0.000
1	15	ELEM_STU	enroll	0.000	0.000	0.071	0.000	0.000	0.053	0.954	0.072	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.037	0.585	0.019	0.000	0.000
1	16	HOSPITAL	KSF	0.000	0.000	1.864	0.000	0.000	2.652	2.567	0.654	0.000	0.000	0.000	0.000	0.502	0.000	0.000	1.843	1.573	0.174	0.000	0.000
1	17	SAFETY	KSF	0.000	0.000	2.043	0.000	0.000	0.867	0.536	2.937	0.000	0.000	0.000	0.000	0.551	0.000	0.000	0.603	0.329	0.781	0.000	0.000
1	18	CHURCH	KSF	0.000	0.000	1.306	0.000	0.000	0.098	1.696	2.947	0.000	0.000	0.000	0.000	0.352	0.000	0.000	0.068	1.040	0.783	0.000	0.000
1	19	HS	enroll	0.000	0.000	0.024	0.000	0.000	0.054	0.284	0.024	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.037	0.174	0.006	0.000	0.000
1	20	COLLEGE	enroll	0.000	0.000	0.009	0.000	0.000	0.028	0.103	0.009	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.019	0.063	0.002	0.000	0.000
1	21	GREMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.564	0.000	0.460	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.392	0.000	0.122	0.000	0.000
1	22	OMEMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.403	1.168	1.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.280	0.716	0.310	0.000	0.000
1	23	NDEMPFUI	emp	0.000	0.000	0.000	0.000	0.000	1.374	0.000	0.812	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.955	0.000	0.216	0.000	0.000
1	24	FFEMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.403	0.000	0.834	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.280	0.000	0.222	0.000	0.000
1	25	EREMPFU	emp	0.000	0.000	0.000	0.000	0.000	0.730	0.615	0.870	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.507	0.377	0.231	0.000	0.000
1	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.637	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.273
1	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.835	0.000
1	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	1	SF_DU	DU	1.233	3.990	1.996	0.037	0.211	0.000	0.444	0.421	0.000	0.000	0.456	0.936	0.538	0.000	0.000	0.000	0.190	0.107	0.000	0.000
2	2	MF_DU_0	DU	0.233	1.525	0.783	0.000	0.036	0.000	0.124	0.113	0.000	0.000	0.086	0.358	0.211	0.000	0.000	0.000	0.053	0.029	0.000	0.000
2	3	MF_DU_1	DU	0.708	2.094	1.188	0.000	0.054	0.000	0.113	0.086	0.000	0.000	0.262	0.491	0.320	0.000	0.000	0.000	0.048	0.022	0.000	0.000
2	4	MF_DU_2	DU	0.681	2.764	1.552	0.018	0.070	0.000	0.246	0.224	0.000	0.000	0.252	0.648	0.418	0.000	0.000	0.000	0.106	0.057	0.000	0.000
2	5	MF_DU_3P	DU	0.763	3.600	1.961	0.022	0.089	0.000	0.311	0.284	0.000	0.000	0.282	0.845	0.528	0.000	0.000	0.000	0.133	0.072	0.000	0.000
2	6	COM_SERV	KSF	0.000	0.000	13.611	0.000	0.000	12.038	28.224	28.473	0.000	0.000	0.000	0.000	3.669	0.000	0.000	9.850	12.096	7.239	0.000	0.000
2	7	ENTNMT	KSF	0.000	0.000	5.104	0.000	0.000	0.713	13.910	12.400	0.000	0.000	0.000	0.000	1.376	0.000	0.000	0.583	5.962	3.152	0.000	0.000
2	8	AUTO	KSF	0.000	0.000	0.408	0.000	0.000	0.190	5.564	6.751	0.000	0.000	0.000	0.000	0.110	0.000	0.000	0.156	2.385	1.716	0.000	0.000
2	9	RESTRNT	KSF	0.000	0.000	17.544	0.000	0.696	1.531	44.335	39.954	0.000	0.000	0.000	0.000	4.728	0.000	0.000	1.253	19.001	10.158	0.000	0.000
2	10	RETAIL	KSF	0.000	0.000	7.028	0.000	0.113	1.491	13.914	10.806	0.000	0.000	0.000	0.000	1.894	0.000	0.000	1.220	5.963	2.747	0.000	0.000
2	11	HOTEL	KSF	0.154	0.462	0.200	0.000	0.422	0.023	0.148	0.320	0.000	0.000	0.057	0.108	0.054	0.000	0.000	0.019	0.063	0.081	0.000	0.000
2	12	OFFICE	KSF	0.000	0.000	1.735	0.000	0.000	3.506	0.568	1.756	0.000	0.000	0.000	0.000	0.467	0.000	0.000	2.868	0.243	0.446	0.000	0.000
2	13	INSTNL	KSF	0.000	0.000	6.050	0.000	0.000	3.696	6.048	19.901	0.000	0.000	0.000	0.000	1.630	0.000	0.000	3.024	2.592	5.059	0.000	0.000
2	14	INDUSTRL	KSF	0.000	0.000	0.177	0.000	0.000	1.578	0.000	1.108	0.000	0.000	0.000	0.000	0.048	0.000	0.000	1.291	0.000	0.282	0.000	0.000
2	15	ELEM_STU	enroll	0.000	0.000	0.075	0.000	0.000	0.053	1.137	0.076	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.043	0.487	0.019	0.000	0.000
2	16	HOSPITAL	KSF	0.000	0.000	1.966	0.000	0.000	2.608	3.058	0.697	0.000	0.000	0.000	0.000	0.530	0.000	0.000	2.134	1.310	0.177	0.000	0.000
2	17	SAFETY	KSF	0.000	0.000	2.155	0.000	0.000	0.752	0.638	3.272	0.000	0.000	0.000	0.000	0.581	0.000	0.000	0.616	0.274	0.832	0.000	0.000
2	18	CHURCH	KSF	0.000	0.000	1.378	0.000	0.000	0.096	2.755	2.301	0.000	0.000	0.000	0.000	0.371	0.000	0.000	0.079	1.181	0.585	0.000	0.000
2	19	HS	enroll	0.000	0.000	0.025	0.000	0.000	0.053	0.338	0.026	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.043	0.145	0.007	0.000	0.000
2	20	COLLEGE	enroll	0.000	0.000	0.010	0.000	0.000	0.027	0.122	0.010	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.022	0.052	0.003	0.000	0.000
2	21	GREMPFU	emp	0.000	0.000	0.051	0.000	0.000	0.553	0.000	0.440	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.453	0.000	0.112	0.000	0.000
2	22	OMEMPFU	emp	0.000	0.000	0.269	0.000	0.000	0.422	1.193	1.155	0.000	0.000	0.000	0.000	0.072	0.000	0.000	0.345	0.511	0.294	0.000	0.000
2	23	NDEMPFUI	emp	0.000	0.000	0.140	0.000	0.000	1.286	0.000	0.819	0.000	0.000	0.000	0.000	0.038	0.000	0.000	1.052	0.000	0.208	0.000	0.000
2	24	FFEMPFU	emp	0.000	0.000	0.144	0.000	0.000	0.393	0.000	0.746	0.000	0.000	0.000	0.000	0.039	0.000	0.000	0.322	0.000	0.190	0.000	0.000
2	25	EREMPFU	emp	0.000	0.000	0.277	0.000	0.000	0.676	0.639	0.812	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.553	0.274	0.207	0.000	0.000
2	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.672	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288
2	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.903	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.935	0.000
2	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	1	SF_DU	DU	1.294	3.720	2.136	0.042	0.150	0.000	0.496	0.524	0.000	0.000	0.863	1.751	0.620	0.000	0.000	0.000	0.223	0.165	0.000	0.000
3	2	MF_DU_0	DU	0.193	1.450	0.904	0.000	0.040	0.000	0.139	0.122	0.000	0.000	0.129	0.682	0.263	0.000	0.000	0.000	0.062	0.039	0.000	0.000
3	3	MF_DU_1	DU	0.547	2.019	1.294	0.015	0.062	0.000	0.213	0.188	0.000	0.000	0.365	0.950	0.376	0.000	0.000	0.000	0.096	0.059	0.000	0.000
3	4	MF_DU_2	DU	0.618	2.747	1.690	0.020	0.081	0.000	0.279	0.246	0.000	0.000	0.412	1.293	0.491	0.000	0.000	0.000	0.125	0.078	0.000	0.000
3	5	MF_DU_3P	DU	0.660	3.621	2.143	0.026	0.102	0.000	0.353	0.311	0.000	0.000	0.440	1.704	0.622	0.000	0.000	0.000	0.159	0.098	0.000	0.000
3	6	COM_SERV	KSF	0.000	0.000	14.927	0.000	0.000	11.132	31.895	31.227	0.000	0.000	0.000	0.000	4.334	0.000	0.000	10.696	14.329	9.861	0.000	0.000
3	7	ENTNMT	KSF	0.000	0.000	5.597	0.000	0.000	0.491	15.615	13.174	0.000	0.000	0.000	0.000	1.625	0.000	0.000	0.472	7.015	4.160	0.000	0.000
3	8	AUTO	KSF	0.000	0.000	0.448	0.000	0.000	0.196	7.309	5.855	0.000	0.000	0.000	0.000	0.130	0.000	0.000	0.189	3.284	1.849	0.000	0.000
3	9	RESTRNT	KSF	0.000	0.000	15.289	0.000	0.680	1.388	44.121	37.223	0.000	0.000	0.000	0.000	4.439	0.000	0.000	1.333	19.823	11.755	0.000	0.000
3	10	RETAIL	KSF	0.000	0.000	6.166	0.000	0.101	1.233	12.230	9.184	0.000	0.000	0.000	0.000	1.790	0.000	0.000	1.184	5.495	2.900	0.000	0.000
3	11	HOTEL	KSF	0.225	0.688	0.348	0.000	0.749	0.038	0.258	0.541	0.000	0.000	0.150	0.324	0.101	0.000	0.000	0.037	0.116	0.171	0.000	0.000
3	12	OFFICE	KSF	0.000	0.000	1.902	0.000	0.000	3.623	0.624	1.865	0.000	0.000	0.000	0.000	0.552	0.000	0.000	3.481	0.280	0.589	0.000	0.000
3	13	INSTNL	KSF	0.000	0.000	6.634	0.000	0.000	3.820	14.766	12.198	0.000	0.000	0.000	0.000	1.926	0.000	0.000	3.670	6.634	3.852	0.000	0.000
3	14	INDUSTRL	KSF	0.000	0.000	0.194	0.000	0.000	1.631	0.000	1.177	0.000	0.000	0.000	0.000	0.056	0.000	0.000	1.567	0.000	0.372	0.000	0.000
3	15	ELEM_STU	enroll	0.000	0.000	0.083	0.000	0.000	0.054	1.249	0.081	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.052	0.561	0.026	0.000	0.000
3	16	HOSPITAL	KSF	0.000	0.000	2.156	0.000	0.000	2.696	3.359	0.740	0.000	0.000	0.000	0.000	0.626	0.000	0.000	2.590	1.509	0.234	0.000	0.000
3	17	SAFETY	KSF	0.000	0.000	2.363	0.000	0.000	0.778	0.701	3.476	0.000	0.000	0.000	0.000	0.686	0.000	0.000	0.747	0.315	1.098	0.000	0.000
3	18	CHURCH	KSF	0.000	0.000	1.511	0.000	0.000	0.099	2.220	3.334	0.000	0.000	0.000	0.000	0.439	0.000	0.000	0.096	0.997	1.053	0.000	0.000
3	19	HS	enroll	0.000	0.000	0.028	0.000	0.000	0.055	0.371	0.027	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.053	0.167	0.009	0.000	0.000
3	20	COLLEGE	enroll	0.000	0.000	0.011	0.000	0.000	0.028	0.134	0.011	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.027	0.060	0.003	0.000	0.000
3	21	GREMPFU	emp	0.000	0.000	0.056	0.000	0.000	0.572	0.000	0.467	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.549	0.000	0.148	0.000	0.000
3	22	OMEMPFU	emp	0.000	0.000	0.295	0.000	0.000	0.388	1.377	1.228	0.000	0.000	0.000	0.000	0.086	0.000	0.000	0.372	0.619	0.388	0.000	0.000
3	23	NDEMPFUI	emp	0.000	0.000	0.153	0.000	0.000	1.329	0.000	0.870	0.000	0.000	0.000	0.000	0.044	0.000	0.000	1.277	0.000	0.275	0.000	0.000
3	24	FFEMPFU	emp	0.000	0.000	0.158	0.000	0.000	0.406	0.000	0.792	0.000	0.000	0.000	0.000	0.046	0.000	0.000	0.391	0.000	0.250	0.000	0.000
3	25	EREMPFU	emp	0.000	0.000	0.304	0.000	0.000	0.699	0.703	0.863	0.000	0.000	0.000	0.000	0.088	0.000	0.000	0.672	0.316	0.273	0.000	0.000
3	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.856	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
3	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.887	0.000
3	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	1	SF_DU	DU	1.208	4.377	2.171	0.042	0.150	0.000	0.482	0.524	0.000	0.000	0.949	1.094	0.585	0.000	0.000	0.000	0.237	0.165	0.000	0.000
4	2	MF_DU_0	DU	0.180	1.706	0.919	0.000	0.040	0.000	0.135	0.122	0.000	0.000	0.142	0.426	0.248	0.000	0.000	0.000	0.066	0.039	0.000	0.000
4	3	MF_DU_1	DU	0.511	2.375	1.315	0.015	0.062	0.000	0.207	0.188	0.000	0.000	0.401	0.594	0.355	0.000	0.000	0.000	0.102	0.059	0.000	0.000
4	4	MF_DU_2	DU	0.577	3.231	1.718	0.020	0.081	0.000	0.271	0.246	0.000	0.000	0.453	0.808	0.463	0.000	0.000	0.000	0.133	0.078	0.000	0.000
4	5	MF_DU_3P	DU	0.616	4.260	2.178	0.026	0.102	0.000	0.343	0.311	0.000	0.000	0.484	1.065	0.587	0.000	0.000	0.000	0.169	0.098	0.000	0.000
4	6	COM_SERV	KSF	0.000	0.000	15.171	0.000	0.000	11.132	27.529	35.130	0.000	0.000	0.000	0.000	4.089	0.000	0.000	10.696	13.559	11.094	0.000	0.000
4	7	ENTNMT	KSF	0.000	0.000	5.689	0.000	0.000	0.491	15.162	13.174	0.000	0.000	0.000	0.000	1.533	0.000	0.000	0.472	7.468	4.160	0.000	0.000
4	8	AUTO	KSF	0.000	0.000	0.455	0.000	0.000	0.196	7.097	5.855	0.000	0.000	0.000	0.000	0.123	0.000	0.000	0.189	3.496	1.849	0.000	0.000
4	9	RESTRNT	KSF	0.000	0.000	15.539	0.000	0.680	1.388	42.842	37.223	0.000	0.000	0.000	0.000	4.188	0.000	0.000	1.333	21.101	11.755	0.000	0.000
4	10	RETAIL	KSF	0.000	0.000	6.267	0.000	0.101	1.233	10.526	10.715	0.000	0.000	0.000	0.000	1.689	0.000	0.000	1.184	5.184	3.384	0.000	0.000
4	11	HOTEL	KSF	0.210	0.809	0.354	0.000	0.749	0.038	0.251	0.541	0.000	0.000	0.165	0.202	0.095	0.000	0.000	0.037	0.124	0.171	0.000	0.000
4	12	OFFICE	KSF	0.000	0.000	1.933	0.000	0.000	3.623	0.606	1.865	0.000	0.000	0.000	0.000	0.521	0.000	0.000	3.481	0.298	0.589	0.000	0.000
4	13	INSTNL	KSF	0.000	0.000	6.743	0.000	0.000	3.820	6.452	21.143	0.000	0.000	0.000	0.000	1.817	0.000	0.000	3.670	3.178	6.677	0.000	0.000
4	14	INDUSTRL	KSF	0.000	0.000	0.197	0.000	0.000	1.631	0.000	1.177	0.000	0.000	0.000	0.000	0.053	0.000	0.000	1.567	0.000	0.372	0.000	0.000
4	15	ELEM_STU	enroll	0.000	0.000	0.084	0.000	0.000	0.054	1.213	0.081	0.000	0.000	0.000	0.000	0.023	0.000	0.000	0.052	0.597	0.026	0.000	0.000
4	16	HOSPITAL	KSF	0.000	0.000	2.191	0.000	0.000	2.696	3.262	0.740	0.000	0.000	0.000	0.000	0.591	0.000	0.000	2.590	1.607	0.234	0.000	0.000
4	17	SAFETY	KSF	0.000	0.000	2.402	0.000	0.000	0.778	0.681	3.476	0.000	0.000	0.000	0.000	0.647	0.000	0.000	0.747	0.335	1.098	0.000	0.000
4	18	CHURCH	KSF	0.000	0.000	1.536	0.000	0.000	0.099	2.939	2.445	0.000	0.000	0.000	0.000	0.414	0.000	0.000	0.096	1.448	0.772	0.000	0.000
4	19	HS	enroll	0.000	0.000	0.028	0.000	0.000	0.055	0.360	0.027	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.053	0.177	0.009	0.000	0.000
4	20	COLLEGE	enroll	0.000	0.000	0.011	0.000	0.000	0.028	0.130	0.011	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.027	0.064	0.003	0.000	0.000
4	21	GREMPFU	emp	0.000	0.000	0.057	0.000	0.000	0.572	0.000	0.467	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.549	0.000	0.148	0.000	0.000
4	22	OMEMPFU	emp	0.000	0.000	0.299	0.000	0.000	0.388	1.337	1.228	0.000	0.000	0.000	0.000	0.081	0.000	0.000	0.372	0.658	0.388	0.000	0.000
4	23	NDEMPFUI	emp	0.000	0.000	0.156	0.000	0.000	1.329	0.000	0.870	0.000	0.000	0.000	0.000	0.042	0.000	0.000	1.277	0.000	0.275	0.000	0.000
4	24	FFEMPFU	emp	0.000	0.000	0.161	0.000	0.000	0.406	0.000	0.792	0.000	0.000	0.000	0.000	0.043	0.000	0.000	0.391	0.000	0.250	0.000	0.000
4	25	EREMPFU	emp	0.000	0.000	0.308	0.000	0.000	0.699	0.682	0.863	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.672	0.336	0.273	0.000	0.000
4	26	REC	KSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.856	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214
4	27	GOLF_AC	AC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.887	0.000
4	28	EX_REC	prd	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	29	EX_GOLF	prd	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

APPENDIX E:
CITY OF SANTA BARBARA TDF MODEL FRICTION FACTOR CURVES

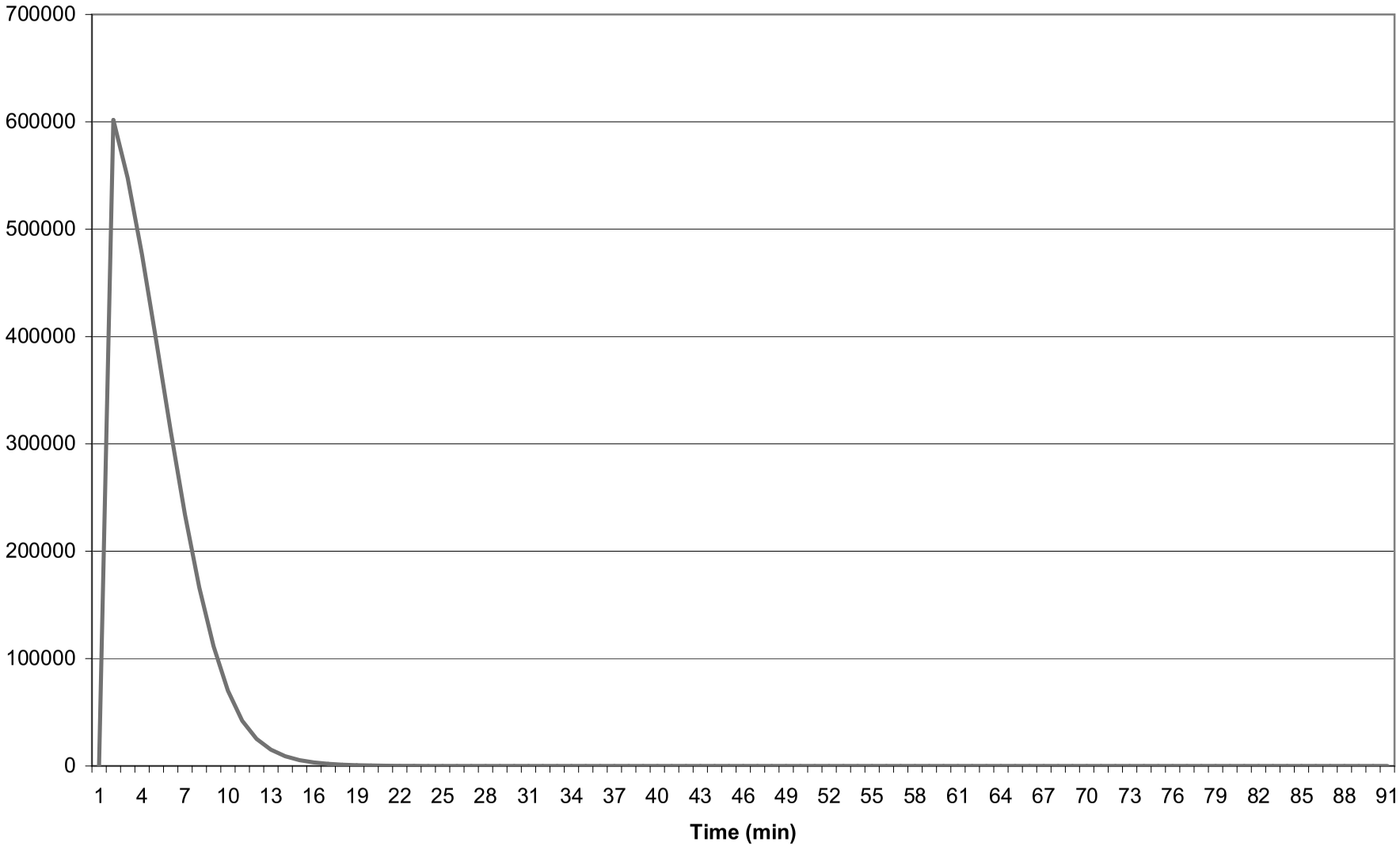
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBW



SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBO



SANTA BARBARA MODEL FRICTION FACTOR CURVES - NHB



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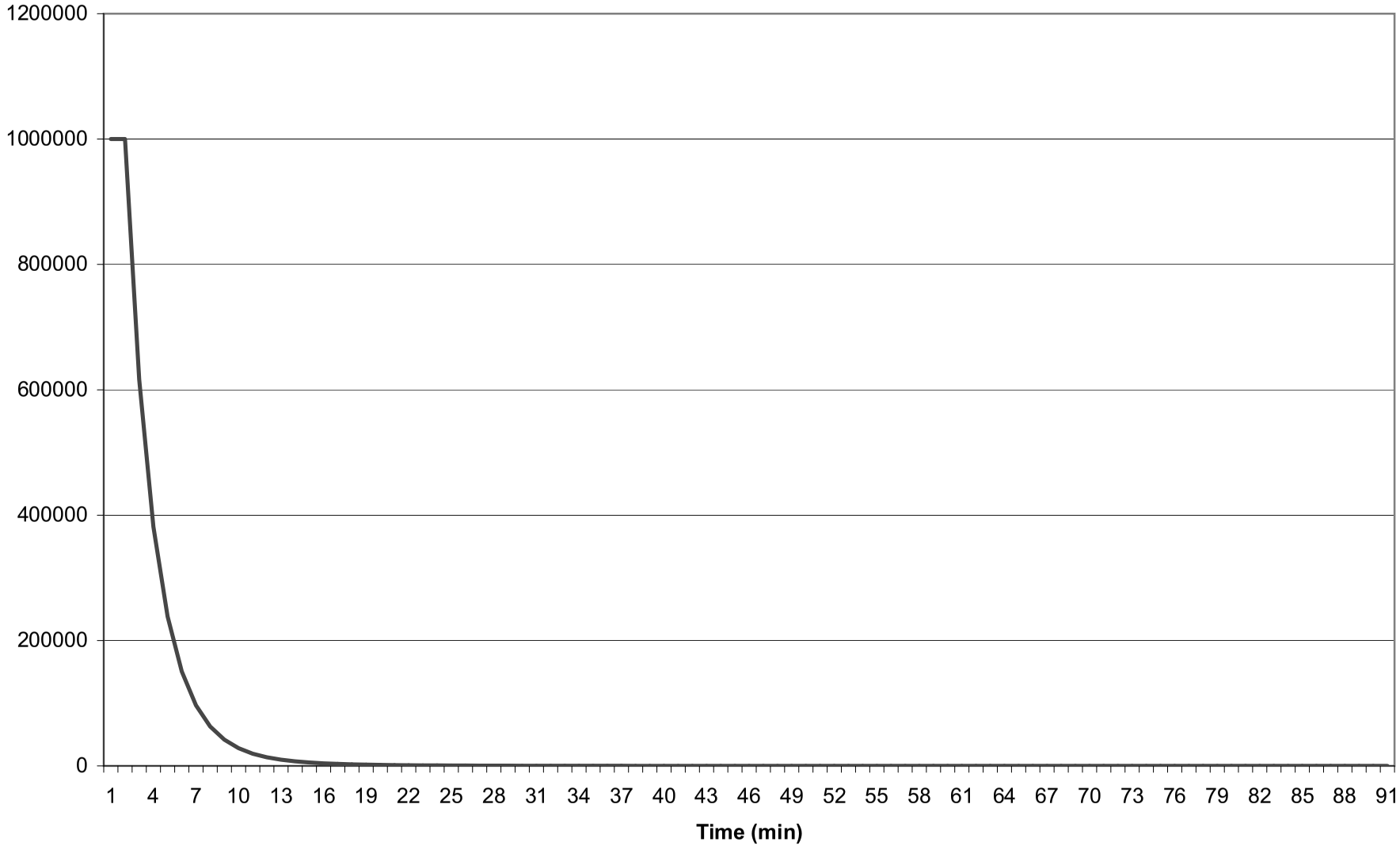

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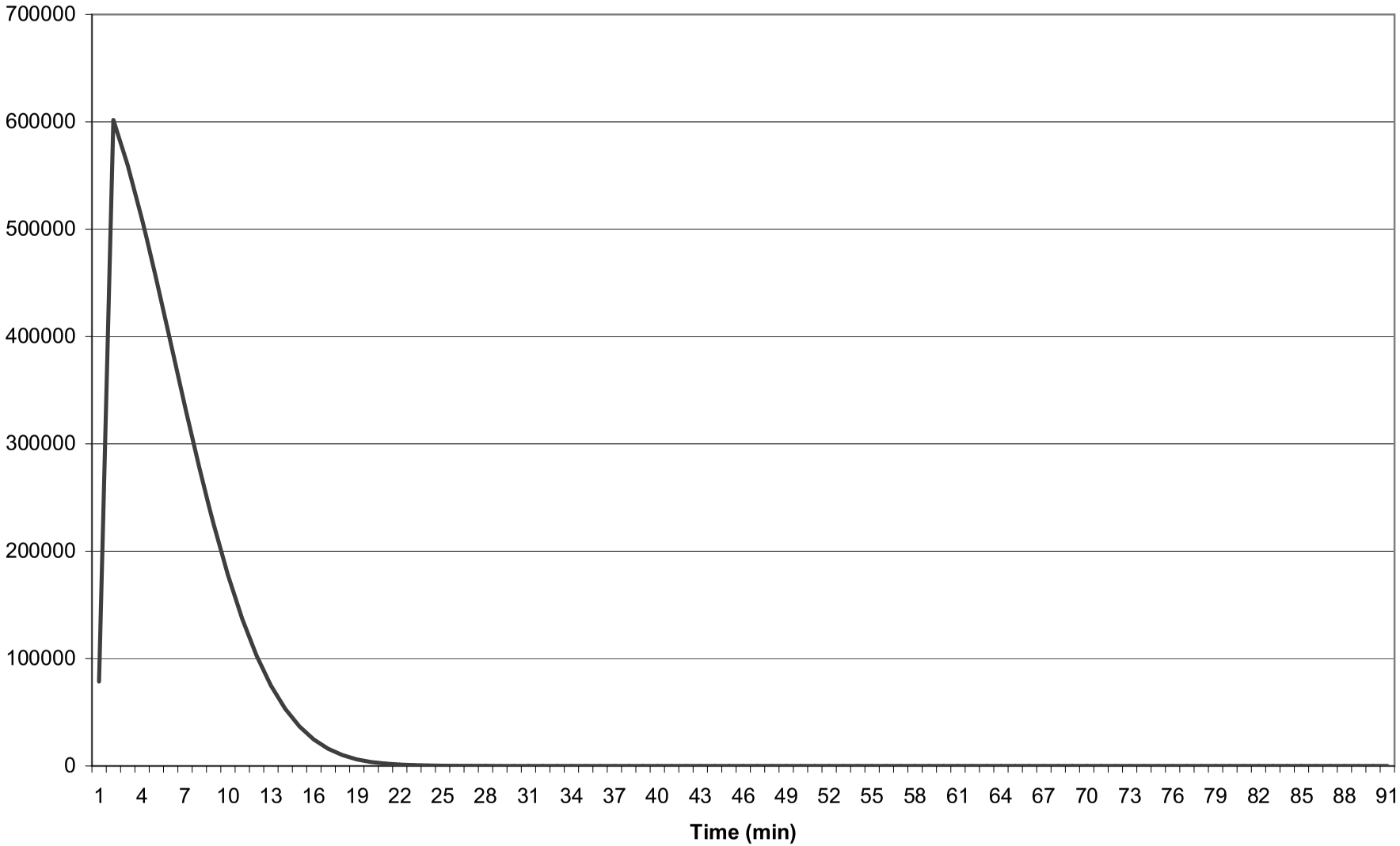
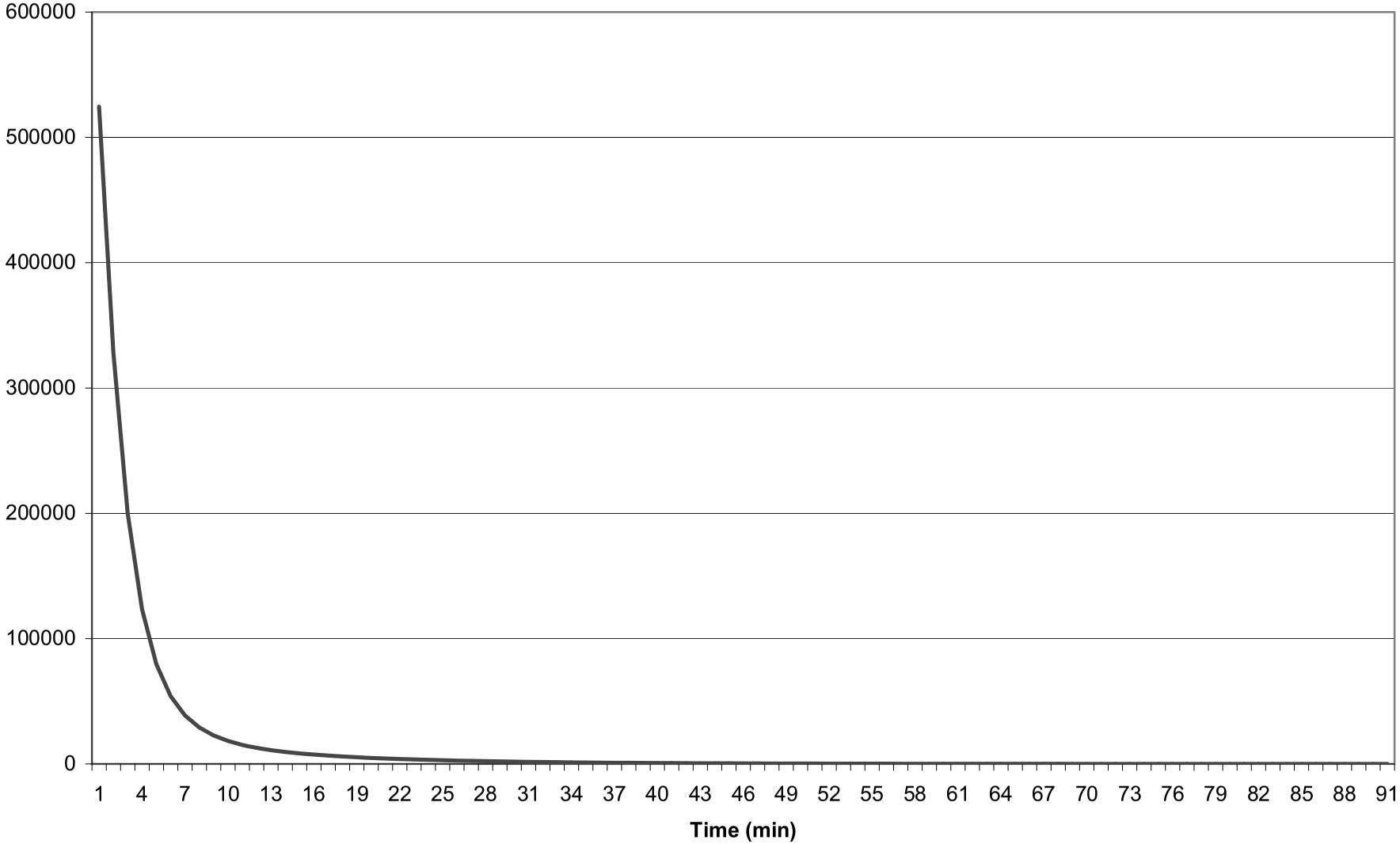


SANTA BARBARA MODEL FRICTION FACTOR CURVES - IX/XI



APPENDIX F:
VALIDATION SUMMARY REPORTS

SB GP Update Model Validation Results: Daily Two-Way Total Traffic Volumes

Roadway	Segment	Link ID	Traffic Count	Model Volume	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Foothill Rd	e/o San Marcos Pass Rd	30297	15061	19,994	1.33	1.08	0.30	**No**	4,933	24,330,035
Calle Real	e/o San Marcos Pass Rd	30298	18100	18,700	1.03	0.12	0.29	Yes	600	359,817
State St	e/o San Marcos Pass Rd	28950	13980	16,364	1.17	0.54	0.31	Yes	2,384	5,685,177
Las Palmas Dr	w/o Modoc Rd	28828	7,647	6,259	0.82	-0.44	0.41	Yes	-1,388	1,926,173
Modoc Rd	w/o Las Palmas Dr	28822	6,489	11,295	1.74	1.68	0.44	**No**	4,806	23,095,071
Las Positas Rd	s/o Hwy 101	2800	17,615	27,699	1.57	2.00	0.29	**No**	10,084	101,687,563
Las Positas Rd	s/o State St	38217	20,118	16,123	0.80	-0.72	0.28	Yes	-3,995	15,961,670
De La Vina St	w/o Alamar Ave	1631	13,463	8,009	0.59	-1.25	0.33	**No**	-5,454	29,746,669
Alamar Ave	s/o Verde Vista Dr	37037	6,628	7,703	1.16	0.37	0.44	Yes	1,075	1,155,068
State St	e/o Alamar Ave	37514	17,322	18,381	1.06	0.21	0.29	Yes	1,059	1,121,186
Mission St	n/o Hwy 101	27269	30,008	31,787	1.06	0.25	0.24	Yes	1,779	3,165,602
Laguna St	e/o Los Olivos St	37328	11,975	11,493	0.96	-0.12	0.34	Yes	-482	231,847
Micheltorena St	s/o Hwy 101	1433	9,029	9,401	1.04	0.11	0.38	Yes	372	138,210
Carrillo St	s/o San Andres St	38364	17,163	22,072	1.29	0.97	0.29	Yes	4,909	24,095,117
Carrillo St	n/o Hwy 101	1424	32,440	36,818	1.13	0.56	0.24	Yes	4,378	19,162,816
Loma Alta Dr	e/o Coronel St	1381	4,174	4,320	1.04	0.07	0.52	Yes	146	21,399
Haley St	n/o Castillo St	1498	12,250	15,333	1.25	0.74	0.34	Yes	3,083	9,505,556
Montecito St	n/o Loma Alta Dr	38438	18,676	17,258	0.92	-0.27	0.29	Yes	-1,418	2,010,175
Garden St	e/o Gutierrez St	1558	24,634	20,816	0.85	-0.60	0.26	Yes	-3,818	14,578,972
Haley St	n/o Laguna St	1486	10,943	12,751	1.17	0.46	0.36	Yes	1,808	3,268,565
Gutierrez St	n/o Laguna St	37277	10,348	14,463	1.40	1.11	0.36	**No**	4,115	16,934,188
Milpas St	e/o Quienientos St	1352	28,644	30,192	1.05	0.22	0.25	Yes	1,548	2,395,756
Alameda Padre Serra	n/o Salinas St	31682	7,467	6,896	0.92	-0.17	0.44	Yes	-571	325,958
Old Coast Hwy	e/o Salinas St	36988	5,928	5,589	0.94	-0.12	0.48	Yes	-339	114,642
Cabrillo Blvd	w/o Channel Dr	31253	9,837	13,324	1.35	0.93	0.38	Yes	3,487	12,156,020
Modoc Rd	e/o Hollister Ave	28750	7,790	8,578	1.10	0.25	0.41	Yes	788	620,390
Hollister Ave	w/o Modoc Rd	38685	17,775	23,193	1.30	1.07	0.29	**No**	5,418	29,350,315
State St	e/o Modoc Rd	38883	14,331	15,288	1.07	0.21	0.31	Yes	957	915,303
State St	w/o San Marcos Pass Rd	28859	21,161	25,406	1.20	0.73	0.28	Yes	4,245	18,023,600
Hot Springs Rd	n/o Coast Village Rd	39178	16,726	17,081	1.02	0.07	0.29	Yes	355	126,316
Olive Mill Rd	n/o Jameson Ln N	38938	7,848	4,835	0.62	-0.94	0.41	Yes	-3,013	9,078,402
San Ysidro Rd	n/o Jameson Ln N	36935	10,452	13,114	1.25	0.71	0.36	Yes	2,662	7,085,763
Foothill Rd	w/o San Roque Rd	31430	10,400	19,306	1.86	2.39	0.36	**No**	8,906	79,325,717
Mountain Dr	w/o Mission Ridge Rd	31665	3,600	2,333	0.65	-0.61	0.58	Yes	-1,267	1,605,187
San Marcos Pass Rd NB	n/o Calle Real	28896	9,000	9,427	1.05	0.12	0.38	Yes	427	182,694
San Marcos Pass Rd SB	n/o Calle Real	28897	9,000	9,762	1.08	0.22	0.38	Yes	762	580,415
Hwy 101 NB Mainline	s/o San Ysidro Rd	36702	42,500	48,239	1.14	0.63	0.21	Yes	5,739	32,930,545
Hwy 101 SB Mainline	s/o San Ysidro Rd	36774	42,500	47,999	1.13	0.60	0.21	Yes	5,499	30,234,042
Hwy 101 NB Mainline	s/o Olive Mill Rd	36704	45,000	50,101	1.11	0.54	0.21	Yes	5,101	26,018,899
Hwy 101 SB Mainline	s/o Olive Mill Rd	36772	45,000	48,800	1.08	0.40	0.21	Yes	3,800	14,437,502
Hwy 101 NB Mainline	n/o Olive Mill Rd	36704	42,500	50,101	1.18	0.84	0.21	Yes	7,601	57,773,261
Hwy 101 SB Mainline	n/o Olive Mill Rd	36772	42,500	48,800	1.15	0.69	0.21	Yes	6,300	39,685,858
Hwy 101 NB Mainline	s/o Salinas St	36708	46,000	52,405	1.14	0.67	0.21	Yes	6,405	41,020,222
Hwy 101 SB Mainline	s/o Salinas St	36769	46,000	52,813	1.15	0.71	0.21	Yes	6,813	46,412,201
Hwy 101 NB Mainline	n/o Milpas St	36712	52,000	55,736	1.07	0.36	0.20	Yes	3,736	13,956,499
Hwy 101 SB Mainline	n/o Milpas St	36766	52,000	56,648	1.09	0.45	0.20	Yes	4,648	21,600,064
Hwy 101 NB Mainline	s/o State St	36714	48,500	57,695	1.19	0.93	0.20	Yes	9,195	84,553,354
Hwy 101 SB Mainline	s/o State St	36764	48,500	56,860	1.17	0.84	0.20	Yes	8,360	69,883,781
Hwy 101 NB Mainline	s/o Carrillo St	36716	54,000	67,175	1.24	1.25	0.20	**No**	13,175	173,570,695
Hwy 101 SB Mainline	s/o Carrillo St	36762	54,000	62,501	1.16	0.81	0.20	Yes	8,501	72,260,059
Hwy 101 NB Mainline	s/o Micheltorena St	36718	60,500	73,388	1.21	1.18	0.18	**No**	12,888	166,099,211
Hwy 101 SB Mainline	s/o Micheltorena St	36760	60,500	72,398	1.20	1.09	0.18	**No**	11,898	141,567,746
Hwy 101 NB Mainline	s/o Las Positas Rd	36722	66,500	74,429	1.12	0.70	0.17	Yes	7,929	62,862,935
Hwy 101 SB Mainline	s/o Las Positas Rd	36758	66,500	79,733	1.20	1.17	0.17	**No**	13,233	175,125,010
Hwy 101 NB Mainline	n/o Las Positas Rd	36724	65,500	80,426	1.23	1.34	0.17	**No**	14,926	222,789,323
Hwy 101 SB Mainline	n/o Las Positas Rd	36756	65,500	76,914	1.17	1.03	0.17	**No**	11,414	130,271,711
Hwy 101 NB Mainline	s/o San Marcos Pass Rd	36728	64,000	67,274	1.05	0.29	0.18	Yes	3,274	10,717,187
Hwy 101 SB Mainline	s/o San Marcos Pass Rd	36753	64,000	60,211	0.94	-0.34	0.18	Yes	-3,789	14,353,559
Hwy 101 NB Mainline	n/o San Marcos Pass Rd	36728	58,000	67,274	1.16	0.86	0.19	Yes	9,274	86,001,726
Hwy 101 SB Mainline	n/o San Marcos Pass Rd	36753	58,000	60,211	1.04	0.21	0.19	Yes	2,211	4,890,250
Hwy 101 NB Mainline	s/o Turnpike Rd	36730	58,000	67,101	1.16	0.85	0.19	Yes	9,101	82,821,508
Hwy 101 SB Mainline	s/o Turnpike Rd	36752	58,000	66,426	1.15	0.79	0.19	Yes	8,426	70,992,801
Hwy 101 NB Mainline	s/o San Marcos Rd	36732	54,000	61,115	1.13	0.68	0.20	Yes	7,115	50,626,599
Hwy 101 SB Mainline	s/o San Marcos Rd	39080	54,000	61,115	1.13	0.68	0.20	Yes	7,115	50,626,599
Foothill Rd	w/o Mission Canyon Rd	1266	6,359	9,487	1.49	1.12	0.44	**No**	3,128	9,784,999
Turnpike Rd	s/o Hwy 101	38668	26,347	20,864	0.79	-0.83	0.25	Yes	-5,483	30,057,914
Turnpike Rd	s/o Hollister Ave	30782	4,407	6,013	1.36	0.70	0.52	Yes	1,606	2,580,540
Turnpike Rd	n/o Hollister Ave	28776	21,264	17,492	0.82	-0.66	0.27	Yes	-3,772	14,231,355
Turnpike Rd	s/o Calle Real	28798	18,996	19,134	1.01	0.03	0.28	Yes	138	19,091
Turnpike Rd	n/o Calle Real	28802	7,570	11,952	1.58	1.41	0.41	**No**	4,382	19,201,828
State St	e/o SR154	28950	19,890	16,364	0.82	-0.63	0.28	Yes	-3,526	12,430,132
Modoc Rd	w/o Via Senda	28822	8,240	11,295	1.37	0.90	0.41	Yes	3,055	9,331,395
Modoc Rd	s/o Hollister Ave	28750	7,790	8,578	1.10	0.25	0.41	Yes	788	620,390
Mission Canyon Rd	n/o Tunnel Rd	31448	1,565	1,879	1.20	0.32	0.63	Yes	314	98,464
Mission Canyon Rd	s/o SR192	1273	7,593	6,458	0.85	-0.36	0.41	Yes	-1,135	1,287,107
Mission Canyon Rd	n/o SR192	31447	2,989	2,022	0.68	-0.56	0.58	Yes	-967	934,141
La Cumbre	s/o SR192	30793	4,853	7,733	1.59	1.14	0.52	**No**	2,880	8,295,048

SB GP Update Model Validation Results: Daily Two-Way Total Traffic Volumes

Roadway	Segment	Link ID	Traffic Count	Model Volume	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Hollister Ave	w/o Turnpike Rd	38673	19,213	20,922	1.09	0.32	0.28	Yes	1,709	2,920,803
Hollister Ave	e/o Turnpike Rd	28775	19,344	16,795	0.87	-0.47	0.28	Yes	-2,549	6,496,841
Hollister Ave	w/o Modoc Rd	38685	17,775	23,193	1.30	1.07	0.29	**No**	5,418	29,350,315
Hollister Ave	e/o Modoc Rd	31144	14,331	15,288	1.07	0.21	0.31	Yes	957	915,303
Cathedral Oaks	w/o Turnpike Rd	28787	14,531	17,817	1.23	0.72	0.31	Yes	3,286	10,798,963
Cathedral Oaks	e/o Turnpike Rd	38736	13,220	8,730	0.66	-1.05	0.33	**No**	-4,490	20,163,861
Cathedral Oaks	w/o SR154	28760	11,957	10,719	0.90	-0.30	0.34	Yes	-1,238	1,533,141
Calle Real	e/o Turnpike Rd	28784	7,139	3,470	0.49	-1.17	0.44	**No**	-3,669	13,464,528
Calle Real	w/o Turnpike Rd	28786	4,704	5,261	1.12	0.23	0.52	Yes	557	310,202
Calle Real	w/o SR154	28858	10,055	9,389	0.93	-0.18	0.36	Yes	-666	443,955
Calle Real	w/o El Sueno Rd	28960	7,801	6,896	0.88	-0.28	0.41	Yes	-905	818,768
Alston Rd	w/o Hot Springs Rd	36976	2,943	1,735	0.59	-0.71	0.58	Yes	-1,208	1,458,065
Barker Pass Rd	s/o SR192	32774	3,607	2,010	0.56	-0.77	0.58	Yes	-1,597	2,550,724
Camino Viejo	w/o SR192	36971	2,358	2,479	1.05	0.08	0.63	Yes	121	14,620
Eucalyptus Hill Rd	s/o SR192	36974	1,011	389	0.38	-0.90	0.68	Yes	-622	386,768
Hot Springs Rd	s/o Alston Rd	31702	16,726	11,789	0.70	-1.00	0.29	**No**	-4,937	24,372,349
Hot Springs Rd	n/o Olive Mill Rd	1333	9,369	7,897	0.84	-0.41	0.38	Yes	-1,472	2,166,456
Hot Springs Rd	w/o Olive Mill Rd	27755	8,760	10,812	1.23	0.62	0.38	Yes	2,052	4,211,882
Hot Springs Rd	s/o SR192	1251	8,118	6,365	0.78	-0.53	0.41	Yes	-1,753	3,073,397
Hot Springs Rd	n/o SR192	31706	3,237	5,930	1.83	1.45	0.58	**No**	2,693	7,254,370
Jameson Ln N	e/o Olive Mill Rd	38934	3,975	2,107	0.53	-0.90	0.52	Yes	-1,868	3,489,808
Jameson Ln N	e/o San Ysidro Rd	36929	3,465	3,012	0.87	-0.23	0.58	Yes	-453	205,116
Jameson Ln N	w/o San Ysidro Rd	1315	4,041	2,014	0.50	-0.96	0.52	Yes	-2,027	4,108,672
Jameson Ln N	w/o Sheffield Dr	39092	2,636	2,177	0.83	-0.30	0.58	Yes	-459	211,138
Jameson Ln S	w/o Eucalyptus Ln	1315	1,748	2,014	1.15	0.24	0.63	Yes	266	70,763
Middle Rd	s/o Hot Springs Rd	31701	2,414	442	0.18	-1.30	0.63	**No**	-1,972	3,888,928
Olive Mill Rd	s/o Hot Springs Rd	36927	7,848	4,157	0.53	-1.15	0.41	**No**	-3,691	13,622,914
San Ysidro Rd	n/o SR192	36957	3,647	3,183	0.87	-0.22	0.58	Yes	-464	215,115
San Ysidro Rd	s/o SR192	1248	9,938	4,549	0.46	-1.43	0.38	**No**	-5,389	29,037,735
Sycamore Canyon Rd	s/o Camino Viejo	36949	7,299	5,729	0.78	-0.49	0.44	Yes	-1,570	2,464,795
Hwy 101	SHEFFIELD DR SB ON	39096	630	349	0.55	-0.65	0.68	Yes	-281	78,835
Hwy 101	SHEFFIELD DR NB OFF	39097	700	229	0.33	-0.99	0.68	Yes	-471	221,883
Hwy 101	SHEFFIELD DR SB OFF	1106	2,300	3,197	1.39	0.62	0.63	Yes	897	804,043
Hwy 101	SHEFFIELD DR NB ON	39095	2,750	3,437	1.25	0.43	0.58	Yes	687	472,125
Hwy 101	POSOLIPO LN SB ON	2866	2,100	2,455	1.17	0.27	0.63	Yes	355	125,679
Hwy 101	SAN YSIDRO NB OFF	1107	1,630	2,575	1.58	0.92	0.63	Yes	945	893,490
Hwy 101	SAN YSIDRO SB OFF	1108	3,800	4,383	1.15	0.30	0.52	Yes	583	340,085
Hwy 101	SAN YSIDRO NB ON	27214	4,500	5,030	1.12	0.23	0.52	Yes	530	280,414
Hwy 101	OLIVE MILL SB ON	33032	3,950	3,582	0.91	-0.18	0.52	Yes	-368	135,390
Hwy 101	OLIVE MILL NB OFF	1109	2,750	3,167	1.15	0.26	0.58	Yes	417	174,042
Hwy 101	OLIVE MILL SB OFF	36412	2,650	738	0.28	-1.25	0.58	**No**	-1,912	3,656,006
Hwy 101	HERMOSILLO NB OFF	1110	1,030	674	0.65	-0.51	0.68	Yes	-356	126,798
Hwy 101	RTE 101/225 NB OFF	31210	2,500	5,778	2.31	2.28	0.58	**No**	3,278	10,742,683
Hwy 101	RTE 101/225 SB ON	39228	3,200	5,800	1.81	1.41	0.58	**No**	2,600	6,758,936
Hwy 101	RTE 101/225 NB ON Q	1335	8,800	8,755	0.99	-0.01	0.38	Yes	-45	1,994
Hwy 101	RTE 101/225 SB OFF N	1117	5,650	9,075	1.61	1.28	0.48	**No**	3,425	11,729,547
Hwy 101	SALINAS NB OFF	1115	1,850	2,806	1.52	0.82	0.63	Yes	956	914,807
Hwy 101	SALINAS NB ON	1468	4,350	1,545	0.36	-1.24	0.52	**No**	-2,805	7,869,240
Hwy 101	RTE 101/144 SB ON	36607	7,350	9,542	1.30	0.68	0.44	Yes	2,192	4,803,755
Hwy 101	RTE 101/144 NB OFF	1118	5,200	7,539	1.45	0.95	0.48	Yes	2,339	5,472,928
Hwy 101	MILPAS (RTE 144) NB ON RA	1119	10,200	12,132	1.19	0.53	0.36	Yes	1,932	3,733,543
Hwy 101	101/144 SB OFF	1120	11,800	13,377	1.13	0.39	0.34	Yes	1,577	2,485,932
Hwy 101	GARDEN ST SB ON RAMP	27230	6,800	11,962	1.76	1.73	0.44	**No**	5,162	26,648,243
Hwy 101	GARDEN ST NB OFF RAMP	27226	7,750	8,730	1.13	0.31	0.41	Yes	980	961,083
Hwy 101	GARDEN ST NB ON RAMP	27237	9,750	12,998	1.33	0.88	0.38	Yes	3,248	10,546,525
Hwy 101	GARDEN ST SB OFF RAMP	37788	8,200	12,192	1.49	1.19	0.41	**No**	3,992	15,936,982
Hwy 101	BATH ST NB OFF RAMP	1168	4,700	6,135	1.31	0.59	0.52	Yes	1,435	2,058,676
Hwy 101	CASTILLO SB ON	27248	4,250	7,569	1.78	1.50	0.52	**No**	3,319	11,016,414
Hwy 101	CASTILLO NB ON	1169	12,400	15,614	1.26	0.76	0.34	Yes	3,214	10,330,709
Hwy 101	SB OFF CASTILLO/RTE 225	1173	10,440	13,210	1.27	0.74	0.36	Yes	2,770	7,673,111
Hwy 101	CARRILLO NB OFF	1175	7,000	9,191	1.31	0.71	0.44	Yes	2,191	4,800,569
Hwy 101	CARRILLO SB ON	27263	8,100	8,104	1.00	0.00	0.41	Yes	4	17
Hwy 101	CARRILLO NB ON	27253	14,750	15,404	1.04	0.14	0.31	Yes	654	428,168
Hwy 101	CARRILLO SB OFF	1205	15,400	18,002	1.17	0.56	0.30	Yes	2,602	6,769,321
Hwy 101	ARRELLAGA NB OFF	1206	4,400	2,626	0.60	-0.78	0.52	Yes	-1,774	3,145,367
Hwy 101	ARRELLAGA NB ON	1574	5,180	8,635	1.67	1.40	0.48	**No**	3,455	11,936,971
Hwy 101	MISSION SB ON	27275	7,470	7,982	1.07	0.16	0.44	Yes	512	262,599
Hwy 101	MISSION NB OFF	1209	5,000	5,163	1.03	0.07	0.48	Yes	163	26,573
Hwy 101	MISSION NB ON	27267	11,600	7,082	0.61	-1.15	0.34	**No**	-4,518	20,410,199
Hwy 101	MISSION SB OFF	1207	13,640	15,318	1.12	0.38	0.33	Yes	1,678	2,814,678
Hwy 101	PUEBLO NB OFF	1211	6,700	6,887	1.03	0.06	0.44	Yes	187	34,994
Hwy 101	LAS POSITAS AVE NB OFF	1213	7,200	3,340	0.46	-1.22	0.44	**No**	-3,860	14,901,019
Hwy 101	LAS POSITAS SB ON	1419	9,330	11,651	1.25	0.65	0.38	Yes	2,321	5,385,416
Hwy 101	LAS POSITAS NB ON	39245	10,850	9,337	0.86	-0.39	0.36	Yes	-1,513	2,288,170
Hwy 101	LAS POSITAS SB OFF	1212	8,430	8,831	1.05	0.12	0.41	Yes	401	160,667
Hwy 101	NB OFF TO HOPE AVE	28839	10,200	13,513	1.32	0.90	0.36	Yes	3,313	10,972,959
Hwy 101	NB ON FROM HOPE AVE	28842	4,530	2,109	0.47	-1.03	0.52	**No**	-2,421	5,861,458
Hwy 101	LA CUMBRE SB ON	28821	8,450	13,442	1.59	1.44	0.41	**No**	4,992	24,919,400
Hwy 101	LA CUMBRE SB OFF	28832	7,500	10,229	1.36	0.89	0.41	Yes	2,729	7,446,563
Hwy 101	101/154 NB OFF	28744	10,800	14,327	1.33	0.91	0.36	Yes	3,527	12,439,121
Hwy 101	101/154 SB ON HOLLISTER	28953	11,550	13,489	1.17	0.49	0.34	Yes	1,939	3,760,412
Hwy 101	101/154 NB ON HOLLISTER	28948	7,000	12,578	1.80	1.81	0.44	**No**	5,578	31,115,055
		Subtotal	**2,785,495**	**3,043,604**				**Model/Count Ratio =**	**1.09**	

Indicates Low Volume

Indicates High Volume

Percent Within Caltrans Maximum Deviation = 76% > 75%

Percent Root Mean Square Error = 23% < 40%

Correlation Coefficient = 0.99 > 0.88

SB GP Model Validation Results: Daily Screenline Validation

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Castillo Street									
Mission St	n/o Hwy 101	27269	31,787	30,008	1.06	0.24	Yes	-1,779	3,165,602
Micheltorena St	s/o Hwy 101	1433	9,401	9,029	1.04	0.38	Yes	372	138,210
Carrillo St	n/o Hwy 101	1424	36,818	32,440	1.13	0.24	Yes	4,378	19,162,816
Haley St	n/o Castillo St	1498	15,333	12,250	1.25	0.34	Yes	3,083	9,505,556
			93,339	83,727	**1.11**	0.26	Yes	9,612	92,383,309
			0.14	< 40%					
Screenline 2: S/O US-101 Downtown									
Las Positas Rd	s/o Hwy 101	2800	27,699	17,615	1.57	0.29	No	10,084	101,687,563
Micheltorena St	s/o Hwy 101	1433	9,401	9,029	1.04	0.38	Yes	372	138,210
Carrillo St	s/o San Andres St	38364	22,072	17,163	1.29	0.29	Yes	4,909	24,095,117
			59,171	43,807	**1.35**	0.35	Yes	15,364	236,066,911
			0.44	< 40%					
Screenline 3: S/O US-101 WCL									
Las Palmas Dr	w/o Modoc Rd	28828	6,259	7,647	0.82	0.41	Yes	-1,388	1,926,173
Modoc Rd	w/o Las Palmas Dr	28822	11,295	6,489	1.74	0.44	No	4,806	23,095,071
State St	e/o San Marcos Pass Rd	28950	16,364	13,980	1.17	0.31	Yes	2,384	5,685,177
			33,918	28,116	**1.21**	0.41	Yes	5,802	33,665,845
			0.34	< 40%					
Screenline 4: Downtown - Uptown									
Las Positas Rd	s/o State St	38217	16,123	20,118	0.80	0.28	Yes	-3,995	15,961,670
De La Vina St	w/o Alamar Ave	1631	8,009	13,463	0.59	0.33	No	-5,454	29,746,669
State St	e/o Alamar Ave	37514	18,381	17,322	1.06	0.29	Yes	1,059	1,121,186
Laguna St	e/o Los Olivos St	37328	11,493	11,975	0.96	0.34	Yes	-482	231,847
			54,006	62,878	**0.86**	0.30	Yes	-8,872	78,710,620
			0.22	< 40%					
Screenline 5: Salinas Street									
Cabrillo Blvd	w/o Channel Dr	31253	13,324	9,837	1.35	0.38	Yes	3,487	12,156,020
Old Coast Hwy	e/o Salinas St	36988	5,589	5,928	0.94	0.48	Yes	-339	114,642
Alameda Padre Serra	n/o Salinas St	31682	6,896	7,467	0.92	0.44	Yes	-571	325,958
			25,809	23,232	**1.11**	0.44	Yes	2,577	6,641,096
			0.26	< 40%					
Screenline 6: Montectio N/O US-101									
Hot Springs Rd	n/o Coast Village Rd	39178	17,081	16,726	1.02	0.29	Yes	355	126,316
Middle Rd	s/o Hot Springs Rd	31701	442	2,414	0.18	0.63	No	-1,972	3,888,928
Olive Mill Rd	n/o Jameson Ln N	38938	4,835	7,848	0.62	0.41	Yes	-3,013	9,078,402
San Ysidro Rd	n/o Jameson Ln N	36935	13,114	10,452	1.25	0.36	Yes	2,662	7,085,763
			35,472	37,440	**0.95**	0.38	Yes	-1,968	3,872,063
			0.24	< 40%					

Percent Within Caltrans Maximum Deviation = 100% = 100%

Total Count 6
Screenlines Within Deviation 6
Screenlines Outside Deviation 0

SB GP Update Model Validation Results: AM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Olive Mill Road	n/o Coast Village Road	38938	331	480	0.69	-0.60	0.52	Yes	-149	22,079
Olive Mill Road	**s/o Coast Village Road**	38601	62	427	0.14	-1.65	0.52	No	-365	133,468
Coast Village Road	**e/o Olive Mill Road**	38934	93	539	0.17	-1.74	0.48	No	-446	198,721
Coast Village Road	**w/o Olive Mill Road**	27754	187	590	0.32	-1.44	0.48	No	-403	162,012
Hot Springs Road	n/o Coast Village Road	38596	918	981	0.94	-0.17	0.38	Yes	-63	3,909
Coast Village Road	e/o Hot Springs Road	38598	569	835	0.68	-0.78	0.41	Yes	-266	70,808
Coast Village Road	w/o Hot Springs Road	36896	1,491	1,327	1.12	0.38	0.33	Yes	164	26,982
Cabrillo Boulevard	n/o US 101 SB Ramp	27222	880	914	0.96	-0.10	0.38	Yes	-34	1,181
Cabrillo Boulevard	s/o US 101 SB Ramp	2842	733	726	1.01	0.02	0.44	Yes	7	45
US 101 SB Ramp	e/o Cabrillo Boulevard	31210	500	423	1.18	0.35	0.52	Yes	77	5,942
US 101 SB Ramp	w/o Cabrillo Boulevard	1117	536	461	1.16	0.31	0.52	Yes	75	5,641
Milpas Street	n/o US 101 SB On Ramp	1349	1,061	1,014	1.05	0.13	0.36	Yes	47	2,222
Milpas Street	s/o US 101 SB On Ramp	37823	522	496	1.05	0.10	0.52	Yes	26	670
US 101 SB On Ramp	e/o Milpas Street	1470	702	582	1.21	0.44	0.48	Yes	120	14,508
Milpas Street	n/o US 101 SB Off Ramp	1351	1,633	1,655	0.99	-0.04	0.29	Yes	-22	473
Milpas Street	s/o US 101 SB Off Ramp	1350	1,202	1,206	1.00	-0.01	0.34	Yes	-4	16
US 101 SB Off Ramp	w/o Milpas Street	1120	958	949	1.01	0.02	0.38	Yes	9	79
Milpas Street	n/o Roundabout	1352	2,102	1,922	1.09	0.34	0.28	Yes	180	32,570
Milpas Street	s/o Roundabout	1351	1,633	1,584	1.03	0.10	0.30	Yes	49	2,426
Milpas Street	n/o Quinientos	31138	1,952	2,217	0.88	-0.44	0.27	Yes	-265	69,997
Milpas Street	s/o Quinientos	38950	2,038	2,297	0.89	-0.43	0.27	Yes	-259	67,047
Milpas Street	n/o Gutierrez Street	1355	1,715	1,800	0.95	-0.17	0.29	Yes	-85	7,238
Milpas Street	s/o Gutierrez Street	1354	1,847	1,791	1.03	0.11	0.29	Yes	56	3,144
Gutierrez Street	e/o Milpas Street	37169	232	390	0.60	-0.78	0.52	Yes	-158	24,807
Gutierrez Street	**w/o Milpas Street**	2665	586	359	1.63	1.10	0.58	No	227	51,624
Milpas Street	n/o Haley Street	1356	1,692	1,744	0.97	-0.10	0.29	Yes	-52	2,700
Milpas Street	s/o Haley Street	37208	1,642	1,840	0.89	-0.38	0.29	Yes	-198	39,189
Haley Street	w/o Milpas Street	1483	280	275	1.02	0.03	0.58	Yes	5	24
Cabrillo Boulevard	n/o Garden Street	2792	730	737	0.99	-0.02	0.44	Yes	-7	43
Cabrillo Boulevard	s/o Garden Street	2786	808	752	1.07	0.18	0.41	Yes	56	3,169
Garden Street	w/o Cabrillo Boulevard	37799	240	259	0.93	-0.13	0.58	Yes	-19	351
Yanonali Street	n/o Garden Street	31243	398	624	0.64	-0.76	0.48	Yes	-226	51,086
Yanonali Street	s/o Garden Street	37793	838	595	1.41	0.86	0.48	Yes	243	59,273
Garden Street	e/o Yanonali Street	1573	196	282	0.69	-0.53	0.58	Yes	-86	7,477
Garden Street	w/o Yanonali Street	27228	1,211	989	1.22	0.59	0.38	Yes	222	49,303
US 101 SB Ramps	**n/o Garden Street**	36569	655	372	1.76	1.32	0.58	No	283	79,916
US 101 SB Ramps	s/o Garden Street	36570	1,163	890	1.31	0.81	0.38	Yes	273	74,424
Garden Street	e/o US 101 SB Ramps	27228	1,211	960	1.26	0.69	0.38	Yes	251	63,023
Garden Street	w/o US 101 SB Ramps	27236	1,712	1,386	1.23	0.75	0.31	Yes	326	105,992
US 101 NB Ramps	**n/o Garden Street**	36571	859	301	2.85	3.22	0.58	No	558	311,307
US 101 NB Ramps	s/o Garden Street	36572	575	549	1.05	0.10	0.48	Yes	26	677
Garden Street	e/o US 101 NB Ramps	27243	1,712	1,359	1.26	0.80	0.33	Yes	353	124,301
Garden Street	**w/o US 101 NB Ramps**	27239	2,824	1,697	1.66	2.26	0.29	No	1,127	1,269,929
Gutierrez Street	n/o Garden Street	37394	879	878	1.00	0.00	0.38	Yes	1	0
Gutierrez Street	s/o Garden Street	2671	1,021	842	1.21	0.52	0.41	Yes	179	32,126
Garden Street	**e/o Gutierrez Street**	1570	2,787	1,609	1.73	2.42	0.30	No	1,178	1,386,599
Garden Street	w/o Gutierrez Street	1558	1,395	1,083	1.29	0.80	0.36	Yes	312	97,506
Cabrillo Boulevard	n/o State Street	38424	643	745	0.86	-0.31	0.44	Yes	-102	10,321
Cabrillo Boulevard	s/o State Street	2788	489	777	0.63	-0.91	0.41	Yes	-288	83,175
State Street	w/o Cabrillo Boulevard	1595	210	277	0.76	-0.42	0.58	Yes	-67	4,441
Gutierrez Street	n/o State Street	37601	506	372	1.36	0.63	0.58	Yes	134	17,909
Gutierrez Street	s/o State Street	2675	369	302	1.22	0.39	0.58	Yes	67	4,473
State Street	**e/o Gutierrez Street**	1621	814	439	1.85	1.64	0.52	No	375	140,668
State Street	w/o Gutierrez Street	1597	552	389	1.42	0.80	0.52	Yes	163	26,472
Cabrillo Boulevard	**n/o Castillo Street**	31784	374	793	0.47	-1.29	0.41	No	-419	175,952
Cabrillo Boulevard	**s/o Castillo Street**	1344	463	878	0.53	-1.24	0.38	No	-415	172,491
Castillo Street	**w/o Cabrillo Boulevard**	2782	123	377	0.33	-1.30	0.52	No	-254	64,460
Montecito Street	**n/o Castillo Street**	1375	933	421	2.22	2.34	0.52	No	512	262,198
Montecito Street	**s/o Castillo Street**	1368	2,019	1,364	1.48	1.48	0.33	No	655	428,776
Castillo Street	**e/o Montecito Street**	38398	231	631	0.37	-1.44	0.44	No	-400	160,311
Castillo Street	**w/o Montecito Street**	1366	2,369	1,652	1.43	1.48	0.29	No	717	514,329
Haley Street	n/o Castillo Street	1498	1,132	833	1.36	0.88	0.41	Yes	299	89,675
Castillo Street	**e/o Haley Street**	27246	1,753	1,321	1.33	1.01	0.33	No	432	186,257
Castillo Street	w/o Haley Street	38123	147	308	0.48	-0.91	0.58	Yes	-161	26,059
Haley Street	**n/o Bath Street**	1497	989	650	1.52	1.19	0.44	No	339	115,175
Haley Street	s/o Bath Street	1498	1,132	833	1.36	0.88	0.41	Yes	299	89,675
Bath Street	**e/o Haley Street**	38121	588	385	1.53	1.02	0.52	No	203	41,373
Bath Street	w/o Haley Street	38119	357	256	1.40	0.69	0.58	Yes	101	10,282
Carrillo Street	n/o Anacapa Street	1431	661	902	0.73	-0.70	0.38	Yes	-241	58,028
Carrillo Street	s/o Anacapa Street	1420	814	1,056	0.77	-0.64	0.36	Yes	-242	58,719
Anacapa Street	e/o Carrillo Street	1553	871	766	1.14	0.34	0.41	Yes	105	11,121
Anacapa Street	w/o Carrillo Street	37565	913	698	1.31	0.70	0.44	Yes	215	46,248
Carrillo Street	n/o Chapala Street	1422	931	925	1.01	0.02	0.38	Yes	6	38
Carrillo Street	s/o Chapala Street	1430	1,452	1,388	1.05	0.15	0.31	Yes	64	4,070
Chapala Street	e/o Carrillo Street	37882	626	439	1.42	0.82	0.52	Yes	187	34,792
Chapala Street	w/o Carrillo Street	1586	658	698	0.94	-0.13	0.44	Yes	-40	1,637
Carrillo Street	n/o De la Vina Street	37884	1,537	1,406	1.09	0.30	0.31	Yes	131	17,059
Carrillo Street	s/o De la Vina Street	1423	1,533	1,591	0.96	-0.12	0.30	Yes	-58	3,346
De la Vina Street	e/o Carrillo Street	1583	325	432	0.75	-0.48	0.52	Yes	-107	11,449
De la Vina Street	w/o Carrillo Street	37941	408	565	0.72	-0.58	0.48	Yes	-157	24,639
Carrillo Street	n/o Bath Street	37936	1,605	1,716	0.94	-0.22	0.29	Yes	-111	12,240
Carrillo Street	s/o Bath Street	1424	2,245	1,909	1.18	0.63	0.28	Yes	336	112,572
Bath Street	e/o Carrillo Street	2686	357	307	1.16	0.28	0.58	Yes	50	2,524
Bath Street	w/o Carrillo Street	37943	397	298	1.33	0.58	0.58	Yes	99	9,789
Carrillo Street	n/o Castillo Street	1424	2,245	1,964	1.14	0.51	0.28	Yes	281	78,690
Carrillo Street	**s/o Castillo Street**	1425	2,873	2,190	1.31	1.15	0.27	No	683	466,290
Castillo Street	e/o Carrillo Street	1540	381	260	1.46	0.81	0.58	Yes	121	14,599
Castillo Street	w/o Carrillo Street	38100	333	326	1.02	0.04	0.58	Yes	7	50
Carrillo Street	**n/o US 101 NB Ramp**	27251	2,873	2,167	1.33	1.21	0.27	No	706	498,230
Carrillo Street	s/o US 101 NB Ramp	1426	2,579	2,361	1.09	0.35	0.27	Yes	218	47,588
US 101 NB Ramp	e/o Carrillo Street	36567	495	381	1.30	0.58	0.52	Yes	114	13,097
US 101 NB Ramp	w/o Carrillo Street	36568	876	721	1.21	0.49	0.44	Yes	155	23,989

SB GP Update Model Validation Results: AM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Carrillo Street	n/o US 101 SB Ramp	27259	2,579	2,347	1.10	0.37	0.27	Yes	232	53,892
Carrillo Street	s/o US 101 SB Ramp	1427	1,718	1,923	0.89	-0.38	0.28	Yes	-205	41,874
US 101 SB Ramp	e/o Carrillo Street	36565	618	445	1.39	0.75	0.52	Yes	173	29,781
US 101 SB Ramp	**w/o Carrillo Street**	36566	1,455	855	1.70	1.71	0.41	No	600	359,501
Carrillo Street	n/o San Andres Street	31773	1,389	1,824	0.76	-0.83	0.29	Yes	-435	188,809
Carrillo Street	**s/o San Andres Street**	1428	887	1,424	0.62	-1.21	0.31	No	-537	288,613
San Andres Street	**e/o Carrillo Street**	38373	192	568	0.34	-1.39	0.48	No	-376	141,301
San Andres Street	w/o Carrillo Street	1384	505	700	0.72	-0.63	0.44	Yes	-195	37,989
Micheltorena Street	n/o San Andres Street	38360	656	726	0.90	-0.22	0.44	Yes	-70	4,840
Micheltorena Street	s/o San Andres Street	38895	504	617	0.82	-0.39	0.48	Yes	-113	12,852
San Andres Street	e/o Micheltorena Street	38362	513	610	0.84	-0.34	0.48	Yes	-97	9,427
San Andres Street	w/o Micheltorena Street	2855	431	549	0.78	-0.45	0.48	Yes	-118	13,961
Mission Street	n/o Modoc Road	38356	1,010	1,248	0.81	-0.56	0.34	Yes	-238	56,541
Mission Street	s/o Modoc Road	2867	716	1,109	0.65	-0.99	0.36	Yes	-393	154,356
Modoc Road	w/o Mission Street	38344	538	651	0.83	-0.40	0.44	Yes	-113	12,881
Mission Street	n/o US 101 SB Ramps	1444	2,200	2,082	1.06	0.21	0.28	Yes	118	13,868
Mission Street	s/o US 101 SB Ramps	27274	1,010	1,360	0.74	-0.79	0.33	Yes	-350	122,348
US 101 SB Ramps	e/o Mission Street	36563	638	600	1.06	0.13	0.48	Yes	38	1,436
US 101 SB Ramps	**w/o Mission Street**	36564	1,252	818	1.53	1.30	0.41	No	434	188,692
Mission Street	**n/o US 101 NB Ramps**	1445	2,483	1,939	1.28	1.00	0.28	No	544	296,002
Mission Street	s/o US 101 NB Ramps	27266	2,200	2,062	1.07	0.24	0.28	Yes	138	18,979
US 101 NB Ramps	e/o Mission Street	36561	331	382	0.87	-0.26	0.52	Yes	-51	2,583
US 101 NB Ramps	w/o Mission Street	36562	716	1,015	0.71	-0.82	0.36	Yes	-299	89,290
Mission Street	n/o Castillo Street	1446	1,824	1,810	1.01	0.03	0.29	Yes	14	185
Mission Street	s/o Castillo Street	38145	2,414	2,036	1.19	0.67	0.28	Yes	378	142,542
Castillo Street	e/o Mission Street	1534	243	187	1.30	0.48	0.63	Yes	56	3,141
Castillo Street	**w/o Mission Street**	38049	523	313	1.67	1.17	0.58	No	210	44,126
Mission Street	n/o Bath Street	1448	1,785	1,452	1.23	0.73	0.31	Yes	333	110,888
Mission Street	s/o Bath Street	38057	1,806	1,793	1.01	0.03	0.29	Yes	13	177
Bath Street	e/o Mission Street	2679	143	331	0.43	-0.99	0.58	Yes	-188	35,518
Bath Street	**w/o Mission Street**	38047	186	492	0.38	-1.20	0.52	No	-306	93,480
Mission Street	n/o De la Vina Street	1449	1,158	1,059	1.09	0.26	0.36	Yes	99	9,814
Mission Street	s/o De la Vina Street	37981	1,670	1,502	1.11	0.37	0.30	Yes	168	28,300
De la Vina Street	e/o Mission Street	1576	536	727	0.74	-0.60	0.44	Yes	-191	36,385
De la Vina Street	**w/o Mission Street**	37984	440	780	0.56	-1.06	0.41	No	-340	115,553
Mission Street	n/o State Street	1451	857	623	1.38	0.79	0.48	Yes	234	54,932
Mission Street	s/o State Street	37700	916	909	1.01	0.02	0.38	Yes	7	50
State Street	e/o Mission Street	37706	953	848	1.12	0.30	0.41	Yes	105	11,041
State Street	**w/o Mission Street**	1607	1,140	696	1.64	1.45	0.44	No	444	197,019
Meigs Road	**n/o Cliff Drive**	38307	609	1,016	0.60	-1.12	0.36	No	-407	165,918
Meigs Road	s/o Cliff Drive	1389	371	635	0.58	-0.95	0.44	Yes	-264	69,896
Cliff Drive	**e/o Meigs Road**	38498	736	1,182	0.62	-1.11	0.34	No	-446	199,107
Cliff Drive	w/o Meigs Road	1373	1,063	1,453	0.73	-0.86	0.31	Yes	-390	151,984
Las Positas Road	n/o Cliff Drive	38294	1,042	1,219	0.86	-0.43	0.34	Yes	-177	31,167
Cliff Drive	e/o Las Positas Road	1374	1,112	1,185	0.94	-0.18	0.34	Yes	-73	5,357
Cliff Drive	w/o Las Positas Road	2796	346	491	0.71	-0.57	0.52	Yes	-145	20,902
Las Positas Road	n/o Modoc Road	2800	1,831	1,980	0.92	-0.27	0.28	Yes	-149	22,268
Las Positas Road	s/o Modoc Road	2801	1,115	1,510	0.74	-0.86	0.30	Yes	-395	155,797
Modoc Road	e/o Las Positas Road	27786	779	614	1.27	0.56	0.48	Yes	165	27,085
Modoc Road	w/o Las Positas Road	2809	724	726	1.00	-0.01	0.44	Yes	-2	3
Las Positas Road	n/o US 101 SB Ramps	27283	1,967	2,316	0.85	-0.57	0.27	Yes	-349	121,928
Las Positas Road	s/o US 101 SB Ramps	2800	1,831	1,999	0.92	-0.30	0.28	Yes	-168	28,300
US 101 SB Ramps	e/o Las Positas Road	1419	809	739	1.09	0.21	0.44	Yes	70	4,850
US 101 SB Ramps	w/o Las Positas Road	1212	559	584	0.96	-0.09	0.48	Yes	-25	612
US 101 NB Ramp	s/o Calle Real	39245	853	1,005	0.85	-0.42	0.36	Yes	-152	23,205
Calle Real	e/o US 101 NB Ramp	1634	1,148	1,495	0.77	-0.74	0.31	Yes	-347	120,132
Calle Real	w/o US 101 NB Ramp	38587	297	499	0.60	-0.78	0.52	Yes	-202	40,604
Alamar Avenue	n/o State Street	37037	559	651	0.86	-0.32	0.44	Yes	-92	8,512
Alamar Avenue	**s/o State Street**	1279	255	557	0.46	-1.14	0.48	No	-302	91,059
State Street	e/o Alamar Avenue	37514	1,145	1,219	0.94	-0.18	0.34	Yes	-74	5,441
State Street	w/o Alamar Avenue	1610	811	1,075	0.75	-0.68	0.36	Yes	-264	69,690
De la Vina Street	s/o State Street	38203	559	659	0.85	-0.34	0.44	Yes	-100	9,970
State Street	e/o De la Vina Street	38213	1,107	1,234	0.90	-0.30	0.34	Yes	-127	16,197
State Street	w/o De la Vina Street	27775	1,646	1,857	0.89	-0.40	0.29	Yes	-211	44,509
Las Positas Road	n/o State Street	37057	831	772	1.08	0.19	0.41	Yes	59	3,444
Las Positas Road	s/o State Street	1283	1,065	1,210	0.88	-0.35	0.34	Yes	-145	20,943
State Street	e/o Las Positas Road	38219	1,839	1,882	0.98	-0.08	0.28	Yes	-43	1,810
State Street	w/o Las Positas Road	1613	2,101	1,802	1.17	0.58	0.29	Yes	299	89,687
Hitchcock Way	s/o State Street	38542	288	469	0.61	-0.74	0.52	Yes	-181	32,871
State Street	e/o Hitchcock Way	38540	1,963	1,599	1.23	0.75	0.30	Yes	364	132,339
State Street	**w/o Hitchcock Way**	31416	1,924	1,405	1.37	1.18	0.31	No	519	269,870
Hope Avenue	n/o State Street	38234	556	512	1.09	0.18	0.48	Yes	44	1,935
Hope Avenue	s/o State Street	28748	523	647	0.81	-0.44	0.44	Yes	-124	15,460
State Street	e/o Hope Avenue	38236	1,924	1,495	1.29	0.92	0.31	Yes	429	184,345
State Street	**w/o Hope Avenue**	28846	1,990	1,460	1.36	1.16	0.31	No	530	280,680
La Cumbre Road	**n/o State Street**	38244	791	1,244	0.64	-1.07	0.34	No	-453	205,613
La Cumbre Road	s/o State Street	28877	1,353	1,221	1.11	0.32	0.34	Yes	132	17,438
State Street	**e/o La Cumbre Road**	38516	2,102	1,394	1.51	1.62	0.31	No	708	501,417
State Street	**w/o La Cumbre Road**	28876	2,056	1,365	1.51	1.56	0.33	No	691	477,728
Hope Avenue	n/o US 101 NB Ramp/Calle Re	38556	578	666	0.87	-0.30	0.44	Yes	-88	7,800
US 101 NB Ramp/Calle Re	e/o Hope Avenue	31415	339	615	0.55	-0.94	0.48	Yes	-276	76,070
US 101 NB Ramp/Calle Re	w/o Hope Avenue	28823	723	1,102	0.66	-0.96	0.36	Yes	-379	143,732
La Cumbre Road	n/o US 101 SB Ramps	28934	1,972	1,714	1.15	0.51	0.29	Yes	258	66,624
La Cumbre Road	s/o US 101 SB Ramps	28831	901	1,156	0.78	-0.65	0.34	Yes	-255	64,872
US 101 SB Ramps	e/o La Cumbre Road	28821	854	693	1.23	0.53	0.44	Yes	161	25,882
US 101 SB Ramps	**w/o La Cumbre Road**	28832	890	573	1.55	1.17	0.48	No	317	100,710
La Cumbre Road	**n/o Calle Real**	28936	1,890	1,255	1.51	1.56	0.33	No	635	403,793
La Cumbre Road	s/o Calle Real	28830	1,972	1,688	1.17	0.57	0.29	Yes	284	80,722
Calle Real	e/o La Cumbre Road	28823	723	1,035	0.70	-0.84	0.36	Yes	-312	97,419
SR-154	s/o Calle Real	28860	1,220	1,266	0.96	-0.11	0.33	Yes	-46	2,143
Calle Real	e/o SR-154	30298	1,198	1,088	1.10	0.28	0.36	Yes	110	12,155
Calle Real	w/o SR-154	28858	596	752	0.79	-0.51	0.41	Yes	-156	24,244
SR-154	n/o US 101 SB On Ramp	28860	1,220	1,223	1.00	-0.01	0.34	Yes	-3	11
SR-154	**s/o US 101 SB On Ramp**	28951	584	1,045	0.56	-1.23	0.36	No	-461	212,795
US 101 SB On Ramp	**e/o SR-154**	28953	1,058	504	2.10	2.32	0.48	No	554	307,347
Indicates Low Volume		**Subtotal**	**195,929**	**189,621**				**Model/Count Ratio =**	**1.03**	
Indicates High Volume								**Percent Within Caltrans Maximum Deviation =**	**78%**	> 75%
								Percent Root Mean Square Error =	**30%**	< 40%
								Correlation Coefficient =	**0.90**	> 0.88

SB GP Model Validation Results: AM Peak Hour Screenlines

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Cabrillo Bl									
Garden Street	w/o Cabrillo Boulevard	37799	240	259	0.93	0.58	Yes	-19	351
State Street	w/o Cabrillo Boulevard	1595	210	277	0.76	0.58	Yes	-67	4,441
Castillo Street	w/o Cabrillo Boulevard	2782	123	377	0.33	0.52	No	-254	64,460
			574	913	**0.63**	0.57	Yes	-339	115,109
			0.50	< 40%					
Screenline 2: North of the Mesa									
Las Positas Road	s/o Modoc Road	2801	1,115	1,510	0.74	0.30	Yes	-395	155,797
Mission Street	n/o Modoc Road	38356	1,010	1,248	0.81	0.34	Yes	-238	56,541
Micheltorena Stree	n/o San Andres Street	38360	656	726	0.90	0.44	Yes	-70	4,840
Carrillo Street	s/o San Andres Street	1428	887	1,424	0.62	0.31	No	-537	288,613
Montecito Street	s/o Castillo Street	1368	2,019	1,364	1.48	0.33	No	655	428,776
Cabrillo Boulevard	s/o Castillo Street	1344	463	878	0.53	0.38	No	-415	172,491
			6,150	7,150	**0.86**	0.28	Yes	-1,000	999,609
			0.36	< 40%					
Screenline 3: Castillo Street									
Haley Street	n/o Castillo Street	1498	1,132	833	1.36	0.41	Yes	299	89,675
Carrillo Street	s/o Castillo Street	1425	2,873	2,190	1.31	0.27	No	683	466,290
Mission Street	s/o Castillo Street	38145	2,414	2,036	1.19	0.28	Yes	378	142,542
			6,419	5,059	**1.27**	0.32	Yes	1,360	1,849,220
			0.29	< 40%					
Screenline 4: West of Chapala									
Mission Street	s/o State Street	37700	916	909	1.01	0.38	Yes	7	50
Carrillo Street	n/o Chapala Street	1422	931	925	1.01	0.38	Yes	6	38
Gutierrez Street	s/o State Street	2675	369	302	1.22	0.58	Yes	67	4,473
			2,216	2,136	**1.04**	0.45	Yes	80	6,423
			0.05	< 40%					
Screenline 5: East of State									
Mission Street	n/o State Street	1451	857	623	1.38	0.48	Yes	234	54,932
Carrillo Street	s/o Anacapa Street	1420	814	1,056	0.77	0.36	Yes	-242	58,719
Gutierrez Street	n/o State Street	37601	506	372	1.36	0.58	Yes	134	17,909
			2,177	2,051	**1.06**	0.46	Yes	126	15,846
			0.31	< 40%					
Screenline 6: Haley Street									
Castillo Street	w/o Haley Street	38123	147	308	0.48	0.58	Yes	-161	26,059
Bath Street	w/o Haley Street	38119	357	256	1.40	0.58	Yes	101	10,282
State Street	w/o Gutierrez Street	1597	552	389	1.42	0.52	Yes	163	26,472
Garden Street	w/o Gutierrez Street	1558	1,395	1,083	1.29	0.36	Yes	312	97,506
			2,451	2,036	**1.20**	0.46	Yes	415	172,167
			0.39	< 40%					
Screenline 7: S/O Carrillo									
Castillo Street	e/o Carrillo Street	1540	381	260	1.46	0.58	Yes	121	14,599
Bath Street	e/o Carrillo Street	2686	357	307	1.16	0.58	Yes	50	2,524
Chapala Street	e/o Carrillo Street	37882	626	439	1.42	0.52	Yes	187	34,792
De la Vina Street	e/o Carrillo Street	1583	325	432	0.75	0.52	Yes	-107	11,449
Anacapa Street	e/o Carrillo Street	1553	871	766	1.14	0.41	Yes	105	11,121
			2,560	2,204	**1.16**	0.45	Yes	356	126,768
			0.18	< 40%					
Screenline 8: N/O Carrillo									
Castillo Street	w/o Carrillo Street	38100	333	326	1.02	0.58	Yes	7	50
Bath Street	w/o Carrillo Street	37943	397	298	1.33	0.58	Yes	99	9,789
Chapala Street	w/o Carrillo Street	1586	658	698	0.94	0.44	Yes	-40	1,637
De la Vina Street	w/o Carrillo Street	37941	408	565	0.72	0.48	Yes	-157	24,639
Anacapa Street	w/o Carrillo Street	37565	913	698	1.31	0.44	Yes	215	46,248
			2,709	2,585	**1.05**	0.42	Yes	124	15,290
			0.25	< 40%					
Screenline 9: S/O Mission									
Castillo Street	e/o Mission Street	1534	243	187	1.30	0.63	Yes	56	3,141
Bath Street	e/o Mission Street	2679	143	331	0.43	0.58	Yes	-188	35,518
De la Vina Street	e/o Mission Street	1576	536	727	0.74	0.44	Yes	-191	36,385
State Street	e/o Mission Street	37706	953	848	1.12	0.41	Yes	105	11,041
			1,875	2,093	**0.90**	0.46	Yes	-218	47,564
			0.28	< 40%					
Screenline 10: N/O Mission									
Castillo Street	w/o Mission Street	38049	523	313	1.67	0.58	No	210	44,126
Bath Street	w/o Mission Street	38047	186	492	0.38	0.52	No	-306	93,480
De la Vina Street	w/o Mission Street	37984	440	780	0.56	0.41	No	-340	115,553
State Street	w/o Mission Street	1607	1,140	696	1.64	0.44	No	444	197,019
			2,289	2,281	**1.00**	0.44	Yes	8	68
			0.59	< 40%					
Screenline 11: S/O Upper State									
Alamar Avenue	s/o State Street	1279	255	557	0.46	0.48	No	-302	91,059
Las Positas Road	s/o State Street	1283	1,065	1,210	0.88	0.34	Yes	-145	20,943
Hitchcock Way	s/o State Street	38542	288	469	0.61	0.52	Yes	-181	32,871
Hope Avenue	s/o State Street	28748	523	647	0.81	0.44	Yes	-124	15,460
La Cumbre Road	s/o State Street	28877	1,353	1,221	1.11	0.34	Yes	132	17,438
			3,484	4,104	**0.85**	0.36	Yes	-620	384,483
			0.23	< 40%					
Screenline 12: N/O Upper State									
Alamar Avenue	n/o State Street	37037	559	651	0.86	0.44	Yes	-92	8,512
Las Positas Road	n/o State Street	37057	831	772	1.08	0.41	Yes	59	3,444
Hope Avenue	n/o State Street	38234	556	512	1.09	0.48	Yes	44	1,935
La Cumbre Road	n/o State Street	38244	791	1,244	0.64	0.34	No	-453	205,613
			2,736	3,179	**0.86**	0.40	Yes	-443	196,277
			0.29	< 40%					

Percent Within Caltrans Maximum Deviation = 100% =100

Total Count 12
Screenlines Within Deviation 12
Screenlines Outside Deviation 0

SB GP Update Model Validation Results: PM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Olive Mill Road	n/o Coast Village Road	38938	327	550	0.59	-0.85	0.48	Yes	-223	49,803
Olive Mill Road	**s/o Coast Village Road**	38601	84	391	0.21	-1.51	0.52	No	-307	94,213
Coast Village Road	**e/o Olive Mill Road**	38934	145	598	0.24	-1.59	0.48	No	-453	205,242
Coast Village Road	**w/o Olive Mill Road**	27754	264	779	0.34	-1.61	0.41	No	-515	265,578
Hot Springs Road	n/o Coast Village Road	38596	1,099	1,026	1.07	0.20	0.36	Yes	73	5,332
Coast Village Road	e/o Hot Springs Road	38598	770	1,102	0.70	-0.84	0.36	Yes	-332	110,348
Coast Village Road	**w/o Hot Springs Road**	36896	1,807	1,356	1.33	1.02	0.33	No	451	203,554
Cabrillo Boulevard	n/o US 101 SB Ramp	27222	1,150	917	1.25	0.67	0.38	Yes	233	54,176
Cabrillo Boulevard	s/o US 101 SB Ramp	2842	1,010	917	1.10	0.27	0.38	Yes	93	8,660
US 101 SB Ramp	e/o Cabrillo Boulevard	31210	295	496	0.59	-0.78	0.52	Yes	-201	40,514
US 101 SB Ramp	**w/o Cabrillo Boulevard**	1117	698	294	2.37	2.39	0.58	No	404	163,033
Milpas Street	n/o US 101 SB On Ramp	1349	1,295	1,586	0.82	-0.61	0.30	Yes	-291	84,628
Milpas Street	s/o US 101 SB On Ramp	37823	554	847	0.65	-0.84	0.41	Yes	-293	85,888
US 101 SB On Ramp	e/o Milpas Street	1470	743	825	0.90	-0.24	0.41	Yes	-82	6,776
Milpas Street	n/o US 101 SB Off Ramp	1351	2,114	1,988	1.06	0.23	0.28	Yes	126	15,849
Milpas Street	s/o US 101 SB Off Ramp	1350	1,532	1,601	0.96	-0.14	0.30	Yes	-69	4,769
US 101 SB Off Ramp	w/o Milpas Street	1120	1,096	1,153	0.95	-0.14	0.34	Yes	-57	3,204
Milpas Street	n/o Roundabout	1352	2,460	2,024	1.22	0.78	0.28	Yes	436	190,404
Milpas Street	s/o Roundabout	1351	2,114	1,988	1.06	0.23	0.28	Yes	126	15,849
Milpas Street	n/o Quinientos	31138	2,190	2,126	1.03	0.11	0.27	Yes	64	4,048
Milpas Street	s/o Quinientos	38950	2,295	2,168	1.06	0.22	0.27	Yes	127	16,047
Milpas Street	n/o Gutierrez Street	1355	2,029	1,848	1.10	0.34	0.29	Yes	181	32,688
Milpas Street	s/o Gutierrez Street	1354	2,143	1,861	1.15	0.53	0.29	Yes	282	79,525
Gutierrez Street	e/o Milpas Street	37169	241	411	0.59	-0.79	0.52	Yes	-170	28,787
Gutierrez Street	w/o Milpas Street	2665	374	330	1.13	0.23	0.58	Yes	44	1,936
Milpas Street	n/o Haley Street	1356	1,871	1,701	1.10	0.34	0.29	Yes	170	28,802
Milpas Street	s/o Haley Street	37208	1,983	2,025	0.98	-0.08	0.28	Yes	-42	1,779
Haley Street	w/o Milpas Street	1483	540	731	0.74	-0.59	0.44	Yes	-191	36,335
Cabrillo Boulevard	n/o Garden Street	2792	1,060	1,131	0.94	-0.18	0.34	Yes	-71	4,993
Cabrillo Boulevard	s/o Garden Street	2786	1,165	1,185	0.98	-0.05	0.34	Yes	-20	405
Garden Street	w/o Cabrillo Boulevard	37799	351	348	1.01	0.02	0.58	Yes	3	11
Yanonali Street	n/o Garden Street	31243	481	719	0.67	-0.75	0.44	Yes	-238	56,491
Yanonali Street	s/o Garden Street	37793	1,025	713	1.44	0.99	0.44	Yes	312	97,156
Garden Street	e/o Yanonali Street	1573	266	397	0.67	-0.63	0.52	Yes	-131	17,074
Garden Street	w/o Yanonali Street	27228	1,455	1,151	1.26	0.78	0.34	Yes	304	92,238
US 101 SB Ramps	n/o Garden Street	36569	988	919	1.08	0.20	0.38	Yes	69	4,798
US 101 SB Ramps	s/o Garden Street	36570	824	577	1.43	0.90	0.48	Yes	247	60,984
Garden Street	e/o US 101 SB Ramps	27228	1,455	1,110	1.31	0.87	0.36	Yes	345	118,823
Garden Street	w/o US 101 SB Ramps	27236	2,345	1,964	1.19	0.69	0.28	Yes	381	145,072
US 101 NB Ramps	n/o Garden Street	36571	549	590	0.93	-0.15	0.48	Yes	-41	1,657
US 101 NB Ramps	**s/o Garden Street**	36572	1,118	734	1.52	1.19	0.44	No	384	147,570
Garden Street	e/o US 101 NB Ramps	27243	2,345	1,986	1.18	0.65	0.28	Yes	359	128,797
Garden Street	**w/o US 101 NB Ramps**	27239	3,060	2,218	1.38	1.41	0.27	No	842	708,707
Gutierrez Street	n/o Garden Street	37394	1,334	1,056	1.26	0.73	0.36	Yes	278	77,146
Gutierrez Street	s/o Garden Street	2671	957	838	1.14	0.35	0.41	Yes	119	14,189
Garden Street	**e/o Gutierrez Street**	1570	3,016	2,208	1.37	1.36	0.27	No	808	652,964
Garden Street	w/o Gutierrez Street	1558	1,670	1,536	1.09	0.29	0.30	Yes	134	18,076
Cabrillo Boulevard	n/o State Street	38424	943	1,063	0.89	-0.31	0.36	Yes	-120	14,438
Cabrillo Boulevard	**s/o State Street**	2788	631	1,051	0.60	-1.11	0.36	No	-420	176,001
State Street	w/o Cabrillo Boulevard	1595	357	538	0.66	-0.71	0.48	Yes	-181	32,799
Gutierrez Street	**n/o State Street**	37601	935	565	1.65	1.38	0.48	No	370	136,927
Gutierrez Street	s/o State Street	2675	647	426	1.52	1.00	0.52	Yes	221	48,828
State Street	**e/o Gutierrez Street**	1621	1,325	739	1.79	1.80	0.44	No	586	343,341
State Street	w/o Gutierrez Street	1597	552	634	0.87	-0.30	0.44	Yes	-82	6,773
Cabrillo Boulevard	**n/o Castillo Street**	31784	468	1,571	0.30	-2.32	0.30	No	-1,103	1,215,811
Cabrillo Boulevard	**s/o Castillo Street**	1344	611	1,652	0.37	-2.14	0.29	No	-1,041	1,083,007
Castillo Street	**w/o Cabrillo Boulevard**	2782	203	761	0.27	-1.79	0.41	No	-558	311,011
Montecito Street	**n/o Castillo Street**	1375	1,098	663	1.66	1.49	0.44	No	435	189,337
Montecito Street	**s/o Castillo Street**	1368	2,042	1,488	1.37	1.19	0.31	No	554	307,408
Castillo Street	**e/o Montecito Street**	38398	335	761	0.44	-1.36	0.41	No	-426	181,256
Castillo Street	**w/o Montecito Street**	1366	2,547	1,852	1.38	1.31	0.29	No	695	482,989
Haley Street	n/o Castillo Street	1498	1,178	1,180	1.00	0.00	0.34	Yes	-2	3
Castillo Street	e/o Haley Street	27246	2,035	1,843	1.10	0.36	0.29	Yes	192	36,880
Castillo Street	w/o Haley Street	38123	494	530	0.93	-0.14	0.48	Yes	-36	1,280
Haley Street	n/o Bath Street	1497	1,005	959	1.05	0.13	0.38	Yes	46	2,132
Haley Street	s/o Bath Street	1498	1,178	1,151	1.02	0.07	0.34	Yes	27	742
Bath Street	e/o Haley Street	38121	567	415	1.37	0.70	0.52	Yes	152	23,026
Bath Street	w/o Haley Street	38119	183	285	0.64	-0.62	0.58	Yes	-102	10,422
Carrillo Street	n/o Anacapa Street	1431	941	1,031	0.91	-0.24	0.36	Yes	-90	8,127
Carrillo Street	s/o Anacapa Street	1420	1,229	1,287	0.96	-0.14	0.33	Yes	-58	3,306
Anacapa Street	e/o Carrillo Street	1553	1,047	1,255	0.83	-0.51	0.33	Yes	-208	43,073
Anacapa Street	w/o Carrillo Street	37565	1,433	1,197	1.20	0.58	0.34	Yes	236	55,539
Carrillo Street	n/o Chapala Street	1422	1,266	1,227	1.03	0.09	0.34	Yes	39	1,491
Carrillo Street	s/o Chapala Street	1430	1,976	1,805	1.09	0.33	0.29	Yes	171	29,383
Chapala Street	e/o Carrillo Street	37882	1,311	1,009	1.30	0.83	0.36	Yes	302	90,946
Chapala Street	w/o Carrillo Street	1586	1,083	949	1.14	0.37	0.38	Yes	134	18,066
Carrillo Street	n/o De la Vina Street	37884	2,072	1,741	1.19	0.65	0.29	Yes	331	109,696
Carrillo Street	s/o De la Vina Street	1423	2,358	2,018	1.17	0.61	0.28	Yes	340	115,746
De la Vina Street	e/o Carrillo Street	1583	480	600	0.80	-0.42	0.48	Yes	-120	14,384
De la Vina Street	w/o Carrillo Street	37941	524	871	0.60	-0.97	0.41	Yes	-347	120,584
Carrillo Street	n/o Bath Street	37936	2,481	2,062	1.20	0.74	0.28	Yes	419	175,744
Carrillo Street	**s/o Bath Street**	1424	3,081	2,257	1.36	1.38	0.27	No	824	678,290
Bath Street	e/o Carrillo Street	2686	393	428	0.92	-0.16	0.52	Yes	-35	1,259
Bath Street	w/o Carrillo Street	37943	353	413	0.86	-0.28	0.52	Yes	-60	3,546
Carrillo Street	**n/o Castillo Street**	1424	3,081	2,220	1.39	1.44	0.27	No	861	740,604
Carrillo Street	**s/o Castillo Street**	1425	3,639	**2,529**	1.44	1.72	0.26	No	1,110	1,232,492
Castillo Street	e/o Carrillo Street	1540	275	407	0.67	-0.63	0.52	Yes	-132	17,524
Castillo Street	w/o Carrillo Street	38100	379	482	0.79	-0.41	0.52	Yes	-103	10,577
Carrillo Street	**n/o US 101 NB Ramp**	27251	3,639	**2,522**	1.44	1.74	0.26	No	1,117	1,248,084
Carrillo Street	s/o US 101 NB Ramp	1426	2,828	2,337	1.21	0.79	0.27	Yes	491	240,708
US 101 NB Ramp	**e/o Carrillo Street**	36567	683	444	1.54	1.03	0.52	No	239	57,034
US 101 NB Ramp	**w/o Carrillo Street**	36568	1,282	867	1.48	1.17	0.41	No	415	172,203

SB GP Update Model Validation Results: PM Peak Hour Two-Way Total Traffic Volumes

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Model Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Carrillo Street	n/o US 101 SB Ramp	27259	2,828	2,373	1.19	0.72	0.27	Yes	455	206,680
Carrillo Street	s/o US 101 SB Ramp	1427	1,965	1,951	1.01	0.03	0.28	Yes	14	207
US 101 SB Ramp	e/o Carrillo Street	36565	616	416	1.48	0.92	0.52	Yes	200	39,962
US 101 SB Ramp	w/o Carrillo Street	36566	1,391	1,058	1.31	0.88	0.36	Yes	333	110,635
Carrillo Street	n/o San Andres Street	31773	1,588	2,101	0.76	-0.89	0.28	Yes	-513	263,325
Carrillo Street	**s/o San Andres Street**	1428	879	1,647	0.53	-1.59	0.29	No	-768	589,287
San Andres Street	**e/o Carrillo Street**	38373	265	532	0.50	-1.06	0.48	No	-267	71,110
San Andres Street	w/o Carrillo Street	1384	745	856	0.87	-0.32	0.41	Yes	-111	12,375
Micheltorena Street	n/o San Andres Street	38360	588	732	0.80	-0.45	0.44	Yes	-144	20,866
Micheltorena Street	s/o San Andres Street	38895	527	504	1.04	0.09	0.48	Yes	23	509
San Andres Street	e/o Micheltorena Street	38362	737	705	1.05	0.10	0.44	Yes	32	1,014
San Andres Street	w/o Micheltorena Street	2855	517	747	0.69	-0.70	0.44	Yes	-230	52,865
Mission Street	n/o Modoc Road	38356	985	1,327	0.74	-0.79	0.33	Yes	-342	116,794
Mission Street	**s/o Modoc Road**	2867	681	1,229	0.55	-1.31	0.34	No	-548	300,628
Modoc Road	w/o Mission Street	38344	757	780	0.97	-0.07	0.41	Yes	-23	524
Mission Street	n/o US 101 SB Ramps	1444	2,249	2,086	1.08	0.28	0.28	Yes	163	26,484
Mission Street	s/o US 101 SB Ramps	27274	985	1,373	0.72	-0.87	0.33	Yes	-388	150,352
US 101 SB Ramps	e/o Mission Street	36563	728	517	1.41	0.86	0.48	Yes	211	44,367
US 101 SB Ramps	w/o Mission Street	36564	1,197	1,154	1.04	0.11	0.34	Yes	43	1,827
Mission Street	n/o US 101 NB Ramps	1445	2,637	2,253	1.17	0.64	0.27	Yes	384	147,744
Mission Street	s/o US 101 NB Ramps	27266	2,249	2,045	1.10	0.36	0.28	Yes	204	41,509
US 101 NB Ramps	e/o Mission Street	36561	530	417	1.27	0.52	0.52	Yes	113	12,670
US 101 NB Ramps	**w/o Mission Street**	36562	537	893	0.60	-1.05	0.38	No	-356	126,618
Mission Street	n/o Castillo Street	1446	1,998	1,855	1.08	0.27	0.29	Yes	143	20,474
Mission Street	s/o Castillo Street	38145	2,566	2,260	1.14	0.51	0.27	Yes	306	93,555
Castillo Street	e/o Mission Street	1534	273	374	0.73	-0.47	0.58	Yes	-101	10,249
Castillo Street	**w/o Mission Street**	38049	594	349	1.70	1.22	0.58	No	245	60,098
Mission Street	n/o Bath Street	1448	1,932	1,636	1.18	0.62	0.29	Yes	296	87,513
Mission Street	s/o Bath Street	38057	1,986	1,952	1.02	0.06	0.28	Yes	34	1,134
Bath Street	e/o Mission Street	2679	196	368	0.53	-0.81	0.58	Yes	-172	29,420
Bath Street	**w/o Mission Street**	38047	285	550	0.52	-1.01	0.48	No	-265	70,156
Mission Street	n/o De la Vina Street	1449	1,272	1,179	1.08	0.23	0.34	Yes	93	8,657
Mission Street	s/o De la Vina Street	37981	1,824	1,570	1.16	0.53	0.30	Yes	254	64,331
De la Vina Street	e/o Mission Street	1576	520	846	0.61	-0.94	0.41	Yes	-326	106,357
De la Vina Street	**w/o Mission Street**	37984	473	849	0.56	-1.08	0.41	No	-376	141,543
Mission Street	n/o State Street	1451	899	732	1.23	0.52	0.44	Yes	167	27,756
Mission Street	s/o State Street	37700	860	959	0.90	-0.27	0.38	Yes	-99	9,865
State Street	e/o Mission Street	37706	1,103	889	1.24	0.63	0.38	Yes	214	45,671
State Street	**w/o Mission Street**	1607	1,307	790	1.65	1.60	0.41	No	517	266,968
Meigs Road	**n/o Cliff Drive**	38307	712	1,143	0.62	-1.11	0.34	No	-431	185,919
Meigs Road	**s/o Cliff Drive**	1389	450	1,076	0.42	-1.62	0.36	No	-626	391,989
Cliff Drive	e/o Meigs Road	38498	941	1,155	0.81	-0.55	0.34	Yes	-214	45,823
Cliff Drive	w/o Meigs Road	1373	1,339	1,632	0.82	-0.61	0.29	Yes	-293	85,774
Las Positas Road	n/o Cliff Drive	38294	1,279	1,131	1.13	0.39	0.34	Yes	148	21,930
Cliff Drive	e/o Las Positas Road	1374	1,366	1,191	1.15	0.43	0.34	Yes	175	30,704
Cliff Drive	w/o Las Positas Road	2796	389	598	0.65	-0.74	0.48	Yes	-209	43,669
Las Positas Road	n/o Modoc Road	2800	2,183	2,288	0.95	-0.17	0.27	Yes	-105	11,037
Las Positas Road	s/o Modoc Road	2801	1,316	1,604	0.82	-0.59	0.30	Yes	-288	82,908
Modoc Road	e/o Las Positas Road	27786	1,141	874	1.31	0.75	0.41	Yes	267	71,278
Modoc Road	w/o Las Positas Road	2809	982	1,048	0.94	-0.18	0.36	Yes	-66	4,376
Las Positas Road	n/o US 101 SB Ramps	27283	2,362	**2,845**	0.83	-0.69	0.25	Yes	-483	233,760
Las Positas Road	s/o US 101 SB Ramps	2800	2,183	2,313	0.94	-0.21	0.27	Yes	-130	16,915
US 101 SB Ramps	e/o Las Positas Road	1419	937	725	1.29	0.66	0.44	Yes	212	44,940
US 101 SB Ramps	w/o Las Positas Road	1212	780	829	0.94	-0.14	0.41	Yes	-49	2,410
US 101 NB Ramp	s/o Calle Real	39245	722	707	1.02	0.05	0.44	Yes	15	240
Calle Real	e/o US 101 NB Ramp	1634	1,356	1,522	0.89	-0.36	0.30	Yes	-166	27,564
Calle Real	w/o US 101 NB Ramp	38587	633	818	0.77	-0.55	0.41	Yes	-185	34,046
Alamar Avenue	n/o State Street	37037	635	608	1.04	0.09	0.48	Yes	27	739
Alamar Avenue	s/o State Street	1279	576	694	0.83	-0.38	0.44	Yes	-118	13,820
State Street	e/o Alamar Avenue	37514	1,446	1,373	1.05	0.16	0.33	Yes	73	5,266
State Street	w/o Alamar Avenue	1610	1,333	1,425	0.94	-0.21	0.31	Yes	-92	8,436
De la Vina Street	s/o State Street	38203	528	823	0.64	-0.87	0.41	Yes	-295	86,857
State Street	e/o De la Vina Street	38213	1,657	1,583	1.05	0.15	0.30	Yes	74	5,438
State Street	w/o De la Vina Street	27775	2,163	2,372	0.91	-0.33	0.27	Yes	-209	43,494
Las Positas Road	n/o State Street	37057	866	841	1.03	0.07	0.41	Yes	25	633
Las Positas Road	s/o State Street	1283	1,336	1,434	0.93	-0.22	0.31	Yes	-98	9,683
State Street	e/o Las Positas Road	38219	2,372	2,411	0.98	-0.06	0.26	Yes	-39	1,513
State Street	w/o Las Positas Road	1613	2,790	2,256	1.24	0.89	0.27	Yes	534	285,188
Hitchcock Way	s/o State Street	38542	435	656	0.66	-0.76	0.44	Yes	-221	48,686
State Street	e/o Hitchcock Way	38540	2,428	2,170	1.12	0.44	0.27	Yes	258	66,503
State Street	w/o Hitchcock Way	31416	2,295	1,994	1.15	0.54	0.28	Yes	301	90,856
Hope Avenue	n/o State Street	38234	631	792	0.80	-0.49	0.41	Yes	-161	25,797
Hope Avenue	s/o State Street	28748	622	704	0.88	-0.26	0.44	Yes	-82	6,685
State Street	e/o Hope Avenue	38236	2,238	1,967	1.14	0.49	0.28	Yes	271	73,584
State Street	w/o Hope Avenue	28846	2,252	1,911	1.18	0.64	0.28	Yes	341	116,238
La Cumbre Road	n/o State Street	38244	774	1,018	0.76	-0.67	0.36	Yes	-244	59,619
La Cumbre Road	s/o State Street	28877	1,709	1,862	0.92	-0.29	0.29	Yes	-153	23,283
State Street	e/o La Cumbre Road	38516	2,407	2,212	1.09	0.33	0.27	Yes	195	38,025
State Street	w/o La Cumbre Road	28876	2,210	2,287	0.97	-0.13	0.27	Yes	-77	5,996
Hope Avenue	n/o US 101 NB Ramp/Calle Re	38556	681	926	0.73	-0.70	0.38	Yes	-245	60,268
US 101 NB Ramp/Calle Re	**e/o Hope Avenue**	31415	570	961	0.59	-1.07	0.38	No	-391	152,696
US 101 NB Ramp/Calle Re	**w/o Hope Avenue**	28823	838	1,350	0.62	-1.17	0.33	No	-512	262,409
La Cumbre Road	n/o US 101 SB Ramps	28934	2,419	1,902	1.27	0.97	0.28	Yes	517	267,796
La Cumbre Road	s/o US 101 SB Ramps	28831	1,002	918	1.09	0.24	0.38	Yes	84	7,009
US 101 SB Ramps	**e/o La Cumbre Road**	28821	1,262	744	1.70	1.58	0.44	No	518	268,838
US 101 SB Ramps	w/o La Cumbre Road	28832	816	680	1.20	0.45	0.44	Yes	136	18,405
La Cumbre Road	**n/o Calle Real**	28936	2,453	1,685	1.46	1.55	0.29	No	768	590,370
La Cumbre Road	s/o Calle Real	28830	2,419	1,920	1.26	0.93	0.28	Yes	499	249,490
Calle Real	**e/o La Cumbre Road**	28823	838	1,317	0.64	-1.12	0.33	No	-479	229,689
SR-154	s/o Calle Real	28860	1,350	1,193	1.13	0.39	0.34	Yes	157	24,757
Calle Real	e/o SR-154	30298	1,489	1,509	0.99	-0.04	0.30	Yes	-20	413
Calle Real	w/o SR-154	28858	818	882	0.93	-0.19	0.38	Yes	-64	4,159
SR-154	n/o US 101 SB On Ramp	28860	1,350	1,176	1.15	0.44	0.34	Yes	174	30,396
SR-154	s/o US 101 SB On Ramp	28951	810	1,099	0.74	-0.73	0.36	Yes	-289	83,572
US 101 SB On Ramp	**e/o SR-154**	28953	1,150	485	2.37	2.64	0.52	No	665	441,684
Indicates Low Volume		**Subtotal**	**235,162**	**227,597**				**Model/Count Ratio =**	**1.03**	
Indicates High Volume								**Percent Within Caltrans Maximum Deviation =**	**79%**	> 75%
								Percent Root Mean Square Error =	**28%**	< 40%
								Correlation Coefficient =	**0.91**	> 0.88

SB GP Model Validation Results: PM Peak Hour Screenlines

Roadway	Segment	Model Link ID	Model Volume	Traffic Count	Model /Count	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
Screenline 1: Cabrillo Bl									
Garden Street	w/o Cabrillo Boulevard	37799	351	348	1.01	0.58	Yes	3	11
State Street	w/o Cabrillo Boulevard	1595	357	538	0.66	0.48	Yes	-181	32,799
Castillo Street	w/o Cabrillo Boulevard	2782	203	761	0.27	0.41	No	-558	311,011
			911	1,647	**0.55**	0.49	Yes	-736	540,972
			0.62	< 40%					
Screenline 2: North of the Mesa									
Las Positas Road	s/o Modoc Road	2801	1,316	1,604	0.82	0.30	Yes	-288	82,908
Mission Street	n/o Modoc Road	38356	985	1,327	0.74	0.33	Yes	-342	116,794
Micheltorena Stree	n/o San Andres Street	38360	588	732	0.80	0.44	Yes	-144	20,866
Carrillo Street	s/o San Andres Street	1428	879	1,647	0.53	0.29	No	-768	589,287
Montecito Street	s/o Castillo Street	1368	2,042	1,488	1.37	0.31	No	554	307,408
Cabrillo Boulevard	s/o Castillo Street	1344	611	1,652	0.37	0.29	No	-1,041	1,083,007
			6,422	8,450	**0.76**	0.26	Yes	-2,028	4,112,871
			0.43	< 40%					
Screenline 3: Castillo Street									
Haley Street	n/o Castillo Street	1498	1,178	1,180	1.00	0.34	Yes	-2	3
Carrillo Street	s/o Castillo Street	1425	3,639	2,529	1.44	0.26	No	1,110	1,232,492
Mission Street	s/o Castillo Street	38145	2,566	2,260	1.14	0.27	Yes	306	93,555
			7,383	5,969	**1.24**	0.31	Yes	1,414	2,000,199
			0.33	< 40%					
Screenline 4: West of Chapala									
Mission Street	s/o State Street	37700	860	959	0.90	0.38	Yes	-99	9,865
Carrillo Street	n/o Chapala Street	1422	1,266	1,227	1.03	0.34	Yes	39	1,491
Gutierrez Street	s/o State Street	2675	647	426	1.52	0.52	Yes	221	48,828
			2,772	2,612	**1.06**	0.42	Yes	160	25,685
			0.16	< 40%					
Screenline 5: East of State									
Mission Street	n/o State Street	1451	899	732	1.23	0.44	Yes	167	27,756
Carrillo Street	s/o Anacapa Street	1420	1,229	1,287	0.96	0.33	Yes	-58	3,306
Gutierrez Street	n/o State Street	37601	935	565	1.65	0.48	No	370	136,927
			3,063	2,584	**1.19**	0.42	Yes	479	229,571
			0.27	< 40%					
Screenline 6: Haley Street									
Castillo Street	w/o Haley Street	38123	494	530	0.93	0.48	Yes	-36	1,280
Bath Street	w/o Haley Street	38119	183	285	0.64	0.58	Yes	-102	10,422
State Street	w/o Gutierrez Street	1597	552	634	0.87	0.44	Yes	-82	6,773
Garden Street	w/o Gutierrez Street	1558	1,670	1,536	1.09	0.30	Yes	134	18,076
			2,899	2,985	**0.97**	0.41	Yes	-86	7,348
			0.13	< 40%					
Screenline 7: S/O Carrillo									
Castillo Street	e/o Carrillo Street	1540	275	407	0.67	0.52	Yes	-132	17,524
Bath Street	e/o Carrillo Street	2686	393	428	0.92	0.52	Yes	-35	1,259
Chapala Street	e/o Carrillo Street	37882	1,311	1,009	1.30	0.36	Yes	302	90,946
De la Vina Street	e/o Carrillo Street	1583	480	600	0.80	0.48	Yes	-120	14,384
Anacapa Street	e/o Carrillo Street	1553	1,047	1,255	0.83	0.33	Yes	-208	43,073
			3,505	3,699	**0.95**	0.38	Yes	-194	37,542
			0.25	< 40%					
Screenline 8: N/O Carrillo									
Castillo Street	w/o Carrillo Street	38100	379	482	0.79	0.52	Yes	-103	10,577
Bath Street	w/o Carrillo Street	37943	353	413	0.86	0.52	Yes	-60	3,546
Chapala Street	w/o Carrillo Street	1586	1,083	949	1.14	0.38	Yes	134	18,066
De la Vina Street	w/o Carrillo Street	37941	524	871	0.60	0.41	Yes	-347	120,584
Anacapa Street	w/o Carrillo Street	37565	1,433	1,197	1.20	0.34	Yes	236	55,539
			3,772	3,912	**0.96**	0.37	Yes	-140	19,480
			0.26	< 40%					
Screenline 9: S/O Mission									
Castillo Street	e/o Mission Street	1534	273	374	0.73	0.58	Yes	-101	10,249
Bath Street	e/o Mission Street	2679	196	368	0.53	0.58	Yes	-172	29,420
De la Vina Street	e/o Mission Street	1576	520	846	0.61	0.41	Yes	-326	106,357
State Street	e/o Mission Street	37706	1,103	889	1.24	0.38	Yes	214	45,671
Bath Street	e/o Mission Street	2679	196	368	0.53	0.58	Yes	-172	29,420
De la Vina Street	e/o Mission Street	1576	520	846	0.61	0.41	Yes	-326	106,357
			2,808	3,691	**0.76**	0.38	Yes	-883	779,376
			0.38	< 40%					
Screenline 10: N/O Mission									
Castillo Street	w/o Mission Street	38049	594	349	1.70	0.58	No	245	60,098
Bath Street	w/o Mission Street	38047	285	550	0.52	0.48	No	-265	70,156
De la Vina Street	w/o Mission Street	37984	473	849	0.56	0.41	No	-376	141,543
State Street	w/o Mission Street	1607	1,307	790	1.65	0.41	No	517	266,968
			2,659	2,538	**1.05**	0.42	Yes	121	14,580
			0.58	< 40%					
Screenline 11: S/O Upper State									
Alamar Avenue	s/o State Street	1279	576	694	0.83	0.44	Yes	-118	13,820
Las Positas Road	s/o State Street	1283	1,336	1,434	0.93	0.31	Yes	-98	9,683
Hitchcock Way	s/o State Street	38542	435	656	0.66	0.44	Yes	-221	48,686
Hope Avenue	s/o State Street	28748	622	704	0.88	0.44	Yes	-82	6,685
La Cumbre Road	s/o State Street	28877	1,709	1,862	0.92	0.29	Yes	-153	23,283
			4,679	5,350	**0.87**	0.32	Yes	-671	450,191
			0.13	< 40%					
Screenline 12: N/O Upper State									
Alamar Avenue	n/o State Street	37037	635	608	1.04	0.48	Yes	27	739
Las Positas Road	n/o State Street	37057	866	841	1.03	0.41	Yes	25	633
Hope Avenue	n/o State Street	38234	631	792	0.80	0.41	Yes	-161	25,797
La Cumbre Road	n/o State Street	38244	774	1,018	0.76	0.36	Yes	-244	59,619
			2,907	3,259	**0.89**	0.39	Yes	-352	124,215
			0.18	< 40%					

Percent Within Caltrans Maximum Deviation = 100% =100

Total Count 12
Screenlines Within Deviation 12
Screenlines Outside Deviation 0

APPENDIX G:
SANTA BARBARA MODEL RESOURCE FILE

Note: This section consists of modeling code and is available by request from the Community Development Department.

APPENDIX I-3

TRAVEL DEMAND MODEL OVERVIEW

SANTA BARBARA TRAVEL DEMAND MODEL OVERVIEW

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March 2009

TABLE OF CONTENTS

INTRODUCTION 1
Background 1
General Discussion of the TDF Model 1
Study Area and Roadway Classification 2

SUMMARY OF THE INPUT DATA 3
Data Collection 3
Land Use Data 3
Traffic Analysis Zone System 3
Roadway Network 5

DESCRIPTION OF THE MODEL CALIBRATION PROCESS 9
Trip Generation Rates 9
Production/Attraction Balancing 10
Further Refinement 11
Trip Distribution (Gravity Model) 13

MODEL VALIDATION 21
Static Validation 21
Dynamic Validation 23

THE 4D PROCESS 28

LIST OF FIGURES

Figure 1 Study Area and Roadway Functional Classification 6

Figure 2 Plan Santa Barbara Model Area Types 12

Figure 3 Plan Santa Barbara External Station Weights 19

Figure 4 Plan Santa Barbara TAZs Used for Dynamic Validation 25

APPENDICES

Appendix A**:** Plan Santa Barbara Traffic Analysis Zones Key Map

Appendix B: Sample ITE Trip Generation Rates

Appendix C: Santa Barbara Model Friction Factor Curves

LIST OF TABLES

Table 1 Model Land Use Categories 4
Table 2 External Gateways 7
Table 3 Typical Roadway Speeds and Capacities 8
Table 4 Trip Production To Attraction Ratios by Purpose 11
Table 5 Daily Vehicle Trip Generation Rate Comparison 14
Table 6 Work Locations for Santa Barbara Residents 17
Table 7 Residential Locations for Santa Barbara Employees 17
Table 8 Percent of Trips by Purpose that are Internal/External for Each Area Type 18
Table 9 Matrix of Daily Through (EE) Trips 20
Table 10 Results of Daily Model Validation 22
Table 11 Results of Peak Hour Model Validation 22
Table 12 Results of Dynamic Validation Tests 26

INTRODUCTION

BACKGROUND

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The purpose of this project is to develop the City model in the TransCAD Transportation Geographic Information System (GIS) software, create the key model inputs such as land use, road network and trip generation parameters, and validate the model to current (2008) conditions. The TDF model will be used in the update of the City's General Plan and could be used to generate traffic volume forecasts and other travel demand data for various planning and engineering studies.

Although there are seasonal variations in traffic in Santa Barbara due to tourist visitations and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting data represent travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The purpose of this report is to introduce the interested citizens, elected and appointed officials of the City of Santa Barbara to their travel demand model. It describes the model development process in general, and how this process was applied to develop the City of Santa Barbara TDF model, including the sources of data used to develop key model inputs.

GENERAL DISCUSSION OF THE TDF MODEL

This section summarizes the answers to commonly asked questions related to TDF models and how the City can use a TDF model.

What is a TDF Model?

A TDF model is a computer program that simulates traffic levels and patterns for a specific geographic area. The program consists of input files that summarize the area's land uses, street network, travel characteristics, and other key factors. Using this data, the model performs a series of calculations to determine the amount of trips generated, where each trip begins and ends, and the route taken by the trip. The model's output includes projections of traffic volumes on major roads, and peak hour turning movements at certain key intersections.

How is a TDF Model Useful?

The City TDF model will be a valuable tool for the preparation of long-range transportation planning studies, such as the *Plan Santa Barbara* General Plan Update. The travel model will be used to estimate the average daily and peak hour traffic volumes on the major roads in response to future land use, transportation infrastructure, and policy assumptions, and form a consistent basis by which to analyze the different potential land use scenarios. Additionally, using these traffic projections, transportation improvements will be identified to accommodate the changing traffic patterns associated with the general plan's preferred land use alternative.

How do we know if the TDF Model is Accurate?

To be deemed accurate for projecting traffic volumes in the future, a model must first be calibrated to a year in which actual land use data and traffic volumes are available and well documented. A model is

accurately calibrated when it replicates the actual traffic counts on the major roads within certain ranges of error established in the "Travel Forecasting Guidelines," (Caltrans, 1992) and it demonstrates stable responses to varying levels of inputs. The City TDF model has been calibrated to 2008 (base year) conditions using actual traffic counts, census data, and land use data compiled by City staff.

Is the City of Santa Barbara TDF Model Consistent with Standard Practices?

The City of Santa Barbara TDF model is consistent in form and function with the standard traffic forecasting models used in the transportation planning profession. The model includes a land use/trip generation module, a gravity-based trip distribution model, and a capacity-restrained equilibrium traffic assignment process. The travel model utilizes Version 5.0 of the TransCAD Transportation GIS software, which is consistent with many of the models used by local jurisdictions in California and throughout the nation. The Santa Barbara County Association of Governments (SBCAG), the Metropolitan Planning Organization for Santa Barbara County, maintains the current regional travel demand model in TransCAD.

How Can the TDF Model be Used?

The TDF model can be used for many purposes related to planning and design of the City's transportation system. The following is a partial listing of the potential uses of the TDF model:

- To update the General Plan
- To update the Street Master Plan
- To update the city-wide traffic impact fee program
- To evaluate the traffic impacts of area-wide land use plan alternatives
- To evaluate the shift in traffic resulting from a roadway improvement
- To evaluate the traffic impacts of land development proposals
- To determine trip distribution patterns of land development proposals
- To support the development of transportation sections of Environmental Impact Reports (EIRs)
- To support the preparation of project development reports for Caltrans

STUDY AREA AND ROADWAY CLASSIFICATION

Figure 1 shows the study area for the City travel demand forecasting model. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas which are in or near the City's Sphere of Influence. The study area contains all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence.

SUMMARY OF THE INPUT DATA

DATA COLLECTION

A comprehensive data collection effort was undertaken at the outset of the *Plan Santa Barbara* process. The results of this effort are largely contained in the *Plan Santa Barbara: Transportation Existing Condition Report* (AMEC, 2008). This report served to guide the overall model development process by documenting the demographic profile, commute patterns, travel trends and traffic conditions which currently exist in Santa Barbara. In addition, certain data from this report were used directly in the model development process, such as traffic counts and household vehicle ownership data.

Other data sources include SBCAG for roadway network and regional travel data, Caltrans and the County of Santa Barbara for traffic count data, and the City of Santa Barbara for land use, and roadway network data.

LAND USE DATA

Land use data is one of the primary inputs to the travel model. These data are instrumental in estimating trip generation. This model primarily uses the City's parcel-level land use database (maintained in a GIS format) as the source for information on how much development currently exists within each traffic analysis zone (TAZ). These data were supplemented by County parcel-based data and SBCAG TAZ-based data for areas in and bordering the Sphere of Influence.

Land use in the model is divided into a variety of residential and non-residential categories. The City of Santa Barbara TDF model employs twenty-eight land use data categories to describe land use in the City, as shown in Table 1.

TRAFFIC ANALYSIS ZONE SYSTEM

Travel demand models use traffic analysis zones (TAZs) to subdivide the study area for the purpose of connecting land uses to the road network. The TAZs represent physical areas containing land uses that produce or attract vehicle-trip ends. Since the Santa Barbara County Association of Governments (SBCAG) is the Metropolitan Planning Organization (MPO) for the area, the TAZ system for the Santa Barbara model was developed to nest within the regional model TAZ system. After reviewing the TAZ layer used in the SBCAG regional model, along with the roadway network and recent aerial photographs, a set of TAZ boundaries was created for the Santa Barbara model to achieve the following local area enhancements.

- A number of large TAZs were subdivided which allows for a more detailed assignment of local traffic to the highway network. This level of detail is necessary to forecast traffic volumes at the turning movement level.

- Considerable detail was added to the TAZ system in the downtown street grid to allow for a detailed traffic assignment and a more accurate calculation of the 4D variables.

- TAZs were created to be consistent with large developments such as Paseo Nuevo and La Cumbre Plaza.

The resulting 2008 model TAZ system includes 460 zones in the model area. Detailed maps showing the TAZ numbers in all portions of the model area are included in Appendix A. Also included in the TAZ structure are the external stations or gateways at points where major roadways provide access into the model area. The external gateways represent all major routes by which traffic can enter or exit the study

TABLE 1
MODEL LAND USE CATEGORIES

Residential	
Land Use Type	**Units**
Single-Family (SF)	Dwelling Units
Multi-Family Zero Cars (MF_0)	Dwelling Units
Multi-Family One Car (MF_1)	Dwelling Units
Multi-Family Two Cars (MF_2)	Dwelling Units
Multi-Family Three or More Cars (MF_3P)	Dwelling Units
Non-Residential	
Land Use Type	**Units**
Commercial Services	Thousand Square-feet
Entertainment	Thousand Square-feet
Auto Related	Thousand Square-feet
Restaurant	Thousand Square-feet
Retail	Thousand Square-feet
Lodging	Thousand Square-feet
Office	Thousand Square-feet
Institutional	Thousand Square-feet
Industrial	Thousand Square-feet
Hospital	Thousand Square-feet
Religious Facilities	Thousand Square-feet
Police and Fire Services	Thousand Square-feet
Elementary and Middle School	Students
High Schools	Students
Colleges	Students
Recreation (Parks and Beaches)	Relative Popularity[2]
Golf	Acres
SBCAG_Agricultural[1]	Employees
SBCAG_Industrial[1]	Employees
SBCAG_Commercial[1]	Employees
SBCAG_Office[1]	Employees
SBCAG_Service[1]	Employees

[1] Data adapted from SBCAG TAZs uses SBCAG units of employment.

[2] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

area and capture the traffic entering, exiting, or passing through the model area. Table 2 contains a list of the eight external gateways numbered from 1001 to 1010 that were established for this model.

ROADWAY NETWORK

The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes; arterials, collectors, and a selection of local roads within the study area (see Figure 1).

The roads shown in Figure 1 are classified in four major categories and form the primary road network that is represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside of the City. The four major road categories are described below.

Freeways: Freeways are high-capacity facilities that primarily serve long-distance travel. Access is limited to interchanges that are typically spaced at least one mile apart. US-101 is the freeway which runs directly through the Santa Barbara model area. SR 217, which is west of the study area, connects UCSB and the Santa Barbara Airport to US-101.

Highways: Roadways designated as highways are typically State highways that are not limited-access freeways. These facilities serve travel between Santa Barbara and neighboring cities. The primary highway in Santa Barbara is SR 154. SR 192 runs generally parallel to US-101 along the foothills north of the City.

Arterials: Roadway segments classified as arterials are major roads that provide connections within the City, between the City and neighboring areas, or through the City (cut-through traffic). Arterials in Santa Barbara typically have two lanes in each direction, with travel speeds of 35 miles per hour (mph). Arterials are further classified as Major or Minor. Section 3 contains details on the distinction between these classes.

Collectors: Collectors are facilities that connect local streets to the arterial and highway system, and may also provide direct access to some local land uses. Collectors typically have one lane in each direction, with speeds of around 25-30 mph.

The roadway network database received from SBCAG includes street name, distance, functional class, speed, capacity, and number of lanes. These attributes were checked using maps, aerial photographs, and other data provided by the City. Table 3 shows the initial roadway speeds, lanes and capacities used for each roadway class in the model. Where necessary, these values were then modified to reflect current conditions at specific locations.

Additional Roadway Attributes

For a representative sample of network links, current daily, AM peak hour, and PM peak hour traffic counts have been coded for validating the model. The traffic count data was collected from several sources including Caltrans, the County, the City, and a comprehensive set of traffic counts conducted in March, 2008.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

STUDY AREA AND ROADWAY FUNCTIONAL CLASSIFICATION
FIGURE 1

TABLE 2
EXTERNAL GATEWAYS

Gateway Number	Gateway Description
1001	Hollister Avenue west of Turnpike Road
1002	US-101 west of Turnpike Road
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)
1004	Cathedral Oaks Road west of Turnpike Road
1005	State Route 154 north of State Route 192
1006	State Route 192 west of Sheffield Drive
1007	Sheffield Drive north of Ortega Hill Road
1008	Ortega Hill Road east of Ortega Ridge Road
1009	US-101 east of Sheffield Drive
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)

Source: Fehr & Peers, 2008.

TABLE 3
TYPICAL ROADWAY SPEEDS AND CAPACITIES

Roadway Classification [1]	Speed (MPH)	Total Through Lanes	Lane Capacity (Vehicles per hour per lane)	Total Facility Capacity (Vehicles per hour)
Freeway	65	4	2,000	8,000
Highway	50	4	1,200	4,800
Major Arterial	35	4	900	3,600
Minor Arterial	35	4	750	3,000
Collector	30	2	600	1,200
Local	25	2	600	1,200
Ramp	30	1	1,800	1,500
Centroid Connector[2]	30	2	10,000	20,000

[1] SBCAG, 2004.
[2] Centroid connectors are abstract representations of the starting and ending point of each trip, and thus should have no capacity constraints.
Source: Fehr & Peers, 2008.

DESCRIPTION OF THE MODEL CALIBRATION PROCESS

Model calibration is the process by which parameters are set based on a comparison of travel estimates computed by the model with actual data from the area being modeled. This section provides a general description of the calibration steps and the adjustments made during the process to achieve accuracy levels that are within Caltrans' guidelines.

TRIP GENERATION RATES

Trip generation rates relate the number of vehicle trips going to and from a site to some measure of the intensity of use at the site. Each trip has two ends, a "production" and an "attraction" end. By convention, trips with one end at a residence are defined as being "produced" by the residence and "attracted" to the other use (workplace, school, retail store, etc.), and are called "Home-Based" trips. Trips that do not have one end at a residence are called "Non-Home-Based" trips.

There are five trip purposes used in the Santa Barbara model:

1. Home-Based Work (HBW): trips between a residence and a workplace.
2. Home-Based Other (HBO): trips between a residence and any other destination.
3. Non-Home-Based (NHB): trips that do not begin or end at a residence, such as traveling from a workplace to a restaurant, or from a retail store to a bank.
4. Recreational (REC): trips to and from the beaches, parks and other attractions (such as the Mission) in the model area.

Trip generation rates are initially defined for total trips and later split by trip purpose, for both productions and attractions.

The most widely used source for individual project vehicle trip generation rates in the transportation planning field is the ITE *Trip Generation Manual*. This book contains national averages of trip generation rates for a variety of land uses collected by conducing driveway counts in what are generally suburban locations. The ITE land use categories tend to be very specific, while model land use categories (accounting for all land use in the City) tend to be more general. While ITE rates are appropriate for smaller site specific uses - such as traffic studies for development review - and can provide a starting point for travel models, capturing the interaction between all land uses in the City, in addition to the unique local characteristics of Santa Barbara requires the development of specific trip generation rates for the model.

A traffic impact study utilizes ITE trip generation rates because in most cases the project being examined shares characteristics with the information contained the *Trip Generation Manual*. In other words, both the traffic impact study and the ITE rates are going to rely on single-use, isolated projects that have plenty of free parking and little or no interaction with other nearby uses. When assessing the impact of an individual project, the ITE rates are typically appropriate since they can correctly mimic the site being analyzed in the traffic impact study.

The Santa Barbara TDF model, on the other hand, generates trips by purpose, and matches productions/attractions to have a balance. The model also has trip rates calibrated to local conditions and other advanced trip generation features such as cross classification that consider the effect of other variables such as vehicle availability. Traffic impact studies rely on ITE trip rates that only vary based on land use type or size. While they are a valid starting point for model calibration and validation, they have a different purpose and are not suitable for demand forecasting without customization.

Certain ITE rates will be more applicable to Santa Barbara model rates because they represent a comparable level of detail relative to what is contained in the model (e.g. "Office" = "Office"). Some ITE rates, however, cannot be used directly because the land use category is not the same as the City's land use classifications. For example, ITE's restaurant category has high turnover restaurant, fast food restaurant, fast food restaurant with drive-through with seating, fast food restaurant with drive through and no seating, etc. By necessity, Santa Barbara restaurant rates represent a compilation and average of those rates customized to the City. It is important to recognize that ITE rates are in fact averages based on driveway counts at multiple locations, so the utilization of average rates within the Santa Barbara model is entirely appropriate and accurate.

The 2008 trip generation rates were initially based on residential trip generation surveys, the SBCAG regional model, recently calibrated models in similar areas, and the ITE *Trip Generation Manual*. For example, we used as a starting point certain calibrated trip generation rates from San Luis Obispo and Lompoc. These areas were selected to the extent that they share at least partial socioeconomic and land use characteristics with the City of Santa Barbara. The rates were calibrated to account for local conditions based on counts, production-to-attraction balancing, and the difference between ITE and model land use definitions. So the final Santa Barbara trip generation rates are unique to the Santa Barbara model, and are ultimately based upon the results of successful model calibration and validation.

PRODUCTION/ATTRACTION BALANCING

Local trips (internal-to-internal, or I-I) are trips which both start and end in the study area. One of the basic assumptions of any travel model is that the total number of local trips produced is equal to the total number of local trips attracted. The logical assumption is that if someone starts on a journey from someplace they must end their journey someplace else. Otherwise, travelers would be disappearing into thin air. If the total productions and attractions are not equal, the model will typically adjust the attractions to match the productions (thus ensuring that each departing traveler finds a destination). While it is never possible to achieve a perfect match between productions and attractions prior to the automatic balancing procedure, the existence of a substantial mismatch in one or more trip purposes indicates that either land use inputs or trip generation factors may be in error.

Table 4 summarizes the local trip productions and attractions from the Santa Barbara travel model for each trip purpose, prior to the application of the automatic balancing procedure. Guidelines published by Federal Highway Administration's Transportation Model Improvement Program (TMIP) and National Highway Cooperative Research Program (NCHRP) suggest that, prior to balancing, the number of productions and attractions should match to within plus or minus 10% (i.e., the production-to-attraction ratio should be within the range of 0.90 to 1.10). The results shown in Table 4 indicate that the 2008 model meets the published guidelines for all trip purposes.

In addition to production and attraction balancing, the percent of total trips for each purpose were checked for reasonableness. Typical values are provided below:

- HBW trips 18% to 27% of all trips
- HBO trips: 47% to 54% of all trips
- NHB trips: 22% to 31% of all trips

While the Santa Barbara Model falls slightly outside of these ranges, the trip purpose percentages in the 2008 Santa Barbara model are generally reasonable and reflect a greater degree of trip chaining in Santa Barbara due to its long and narrow physical geography. This information, in conjunction with the trip generation rate comparisons and trip purpose distributions discussed later in this report, indicates that the trip generation component of the Santa Barbara model is performing reasonably.

FURTHER REFINEMENT

In addition to the standard trip generation procedures, certain enhancements were added to the Santa Barbara model to better capture local trip making characteristics and provide the ability to test certain policy options for future development scenarios. These enhancements include dividing the model area into four "area types" and cross-classifying multifamily households by auto-ownership.

Area Types

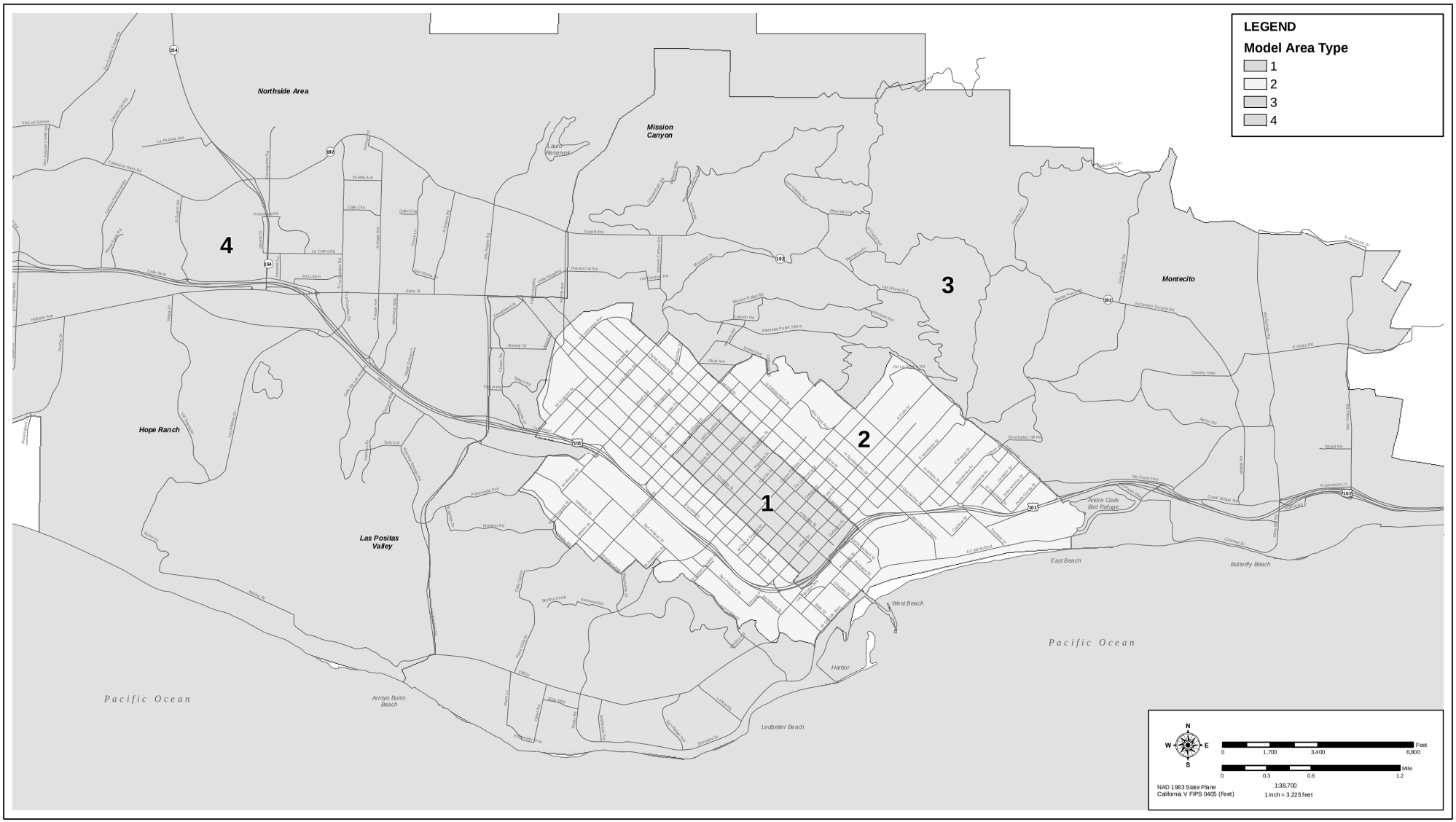
The model area contains a variety of development patterns, each with different land use characteristics and associated trip making patterns. To account for these differences, the model area was divided into four "area types". The four area types, which are shown in Figure 2, have their own associated trip generation rates and internal/external trip making characteristics.[1] Trip generation rates for each land use

TABLE 4
TRIP PRODUCTION TO ATTRACTION RATIOS BY PURPOSE

Trip Purpose	Production/ Attraction Ratio	Percent of Total Daily Vehicle Trips	
		2008 PlanSB model	California[1]
Home-Based Work (HBW)	1.00	15%	21%
Home-Based Other (HBO)	1.01	43%	48%
Non-Home-Based (NHB)	1.00	41%	31%
Recreational (REC)	N/A	2%	N/A
Total		101%	100%

[1] 2000-2001 California Statewide Household Travel Survey Final Report, June 2002.
Note: May not total 100% due to rounding
Source: Fehr & Peers, 2008.

[1] Internal/External trip making is explained in the Trip Distribution section below



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PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

in each area type are shown in Table 5. For reference, a table of ITE rates for which there are comparable land uses in the model is provided in Appendix B. Note that in some cases, Santa Barbara model rates are either higher or lower than the most applicable ITE rate. For example, the average ITE trip generation rate for single-family homes is 9.57 vehicle trips per day per unit. The Santa Barbara model single-family rates range from 8.05 to 11.98 vehicle trips per day per dwelling unit. The average ITE office rate, to provide another example, is 11.01 vehicle trips per day per thousand square feet. The Santa Barbara model rates range from 8.27 to 12.92 vehicle trips per day per thousand square feet.

As noted above, ITE trip generation rates for individual land uses can vary considerably from study to study, and ITE uses an average of these studies. For multi-family, for example, ITE does not provide stratification by auto-ownership – only a range from 4.18 to 6.72 vehicle trips per day per dwelling unit. The Santa Barbara model is based upon auto-ownership rates from the National Household Travel Survey (NHTS) specific to Santa Barbara. Both the levels of auto ownership, and the multi-family trip generation rates, are based upon the NHTS.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Area type 2 represents the remaining "grid" portion of the City. This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center which attracts trips from outside areas.

Multi-Family Unit Vehicle Ownership

In order to test certain potential policy alternatives, multi-family dwelling units were divided into four types representing varying levels of automobile ownership. Auto-ownership data for each census tract in Santa Barbara was obtained from the 2000 National Household Travel Survey, which is conducted by the United States Census Bureau. The percentage of households representing each level of automobile ownership was calculated and the total number of multifamily units in each census tract was apportioned to the relevant multi-family trip generation category based on this percentage.

TRIP DISTRIBUTION (GRAVITY MODEL)

Once the trip generation step has determined the number of trips that originate and terminate in each zone, the trip distribution process determines the specific destination of each originating trip. The destination may be within the zone itself, resulting in an intra-zonal trip. If the destination is outside of the zone of origin, it is an inter-zonal trip. Internal-internal (I-I) trips originate and terminate within the model area. Trips that originate within but terminate outside of the model area are internal-external (I-X), and trips that originate outside and terminate inside of the model area are external-internal (X-I). Trips passing completely through the model area are external-external (E-E).

The trip distribution model uses the gravity equation to distribute trips to all zones. This equation estimates an accessibility index for each zone based on the number of attractions in each zone and a friction factor, which is a function of travel time between zones. Each attraction zone is given its pro-rata

share of productions based on its share of the accessibility index. This process applies to the I-I, I-X, and X-I trips. The E-E trips are added to the trip table prior to final assignment.

Friction Factors

Friction factors, also known as travel time factors, determine the relative attractiveness of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ. These factors are used in the trip distribution stage of the model. The 2008 Santa Barbara model friction factors are based on data reported in national modeling reference documents such as National Cooperative Highway Research Program (NCHRP) 365, and modified based on local conditions and comparison with the SBCAG model. See Appendix C for friction factor curves.

TABLE 5
DAILY VEHICLE TRIP GENERATION RATE COMPARISON

Residential[1]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Single-Family (SF)	Dwelling Units	8.05	10.56	11.98	11.98
Multi-Family Zero Cars (MF_0)	Dwelling Units	3.03	3.55	4.02	4.02
Multi-Family One Car (MF_1)	Dwelling Units	4.23	5.39	6.18	6.18
Multi-Family Two Cars (MF_2)	Dwelling Units	5.96	7.04	8.08	8.08
Multi-Family Three or More Cars (MF_3P)	Dwelling Units	7.60	8.89	10.24	10.24
Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Commercial Services	Thousand Square-feet	100.10	115.20	128.40	128.40
Entertainment	Thousand Square-feet	36.40	43.20	48.15	48.15
Auto Related	Thousand Square-feet	16.38	17.28	19.26	19.26
Restaurant	Thousand Square-feet	100.10	139.20	136.05	136.05
Retail	Thousand Square-feet	32.76	45.18	40.28	40.28
Lodging	Thousand Square-feet	2.73	2.11	3.75	3.75

TABLE 5
DAILY VEHICLE TRIP GENERATION RATE COMPARISON
(CON'T)

Non-Residential[2]					
Land Use Type	**Units**	**2008 PlanSB Model Area Type 1**	**2008 PlanSB Model Area Type 2**	**2008 PlanSB Model Area Type 3**	**2008 PlanSB Model Area Type 4**
Office	Thousand Square-feet	8.27	11.59	12.92	12.92
Institutional	Thousand Square-feet	45.50	48.00	53.50	53.50
Industrial	Thousand Square-feet	4.25	4.48	5.00	5.00
Hospital	Thousand Square-feet	N/A	12.48	N/A	N/A
Religious Facilities	Thousand Square-feet	8.29	8.75	9.75	9.75
Police and Fire Services	Thousand Square-feet	8.65	9.12	10.17	10.17
Elementary and Middle School	Students	1.81	1.91	2.13	2.13
High Schools	Students	N/A	0.64	N/A	0.72
Colleges	Students	N/A	0.25	0.28	N/A
Recreation (Parks and Beaches)	Relative Popularity[3]	N/A	N/A	N/A	N/A
Golf	Acres	N/A	N/A	4.75	4.75
SBCAG_Agricultural[1]	Employees	N/A	N/A	3.95	3.95
SBCAG_Industrial[1]	Employees	N/A	N/A	2.04	2.04
SBCAG_Commercial[1]	Employees	N/A	N/A	3.92	3.92
SBCAG_Office[1]	Employees	N/A	N/A	1.07	1.07
SBCAG_Service[1]	Employees	N/A	N/A	5.39	5.39

[1] The ITE manual does not stratify multifamily dwelling units by auto-ownership. ITE multifamily rates range from 4.18 to 6.72 depending on the dwelling type. Rates based on auto-ownership were developed from National Household Travel Survey (NHTS) data for the City of Santa Barbara. NHTS rates range from a minimum of 0.69 to a maximum of 11.75.

[2] Not all non-residential land use categories are present in each area type. 2008 trip generation rates were only developed for land uses present in 2008 in each area type.

[3] Recreational trips are generated at the home end (either Residential or Lodging) and distributed to the various Recreational areas of the City based on their relative popularity. Relative popularity was calibrated using count data near the recreational sites.

Source: Fehr & Peers, 2008.

Trips between the Santa Barbara Area and External Areas

One of the important inputs to a travel model is an estimate of the amount of travel between the study area and neighboring areas outside the model. These are typically called internal-external, or I-X/X-I, trips.

The United States Census Bureau surveys residential and work locations at the place level. Table 6 illustrates the distribution of work locations for Santa Barbara residents, while Table 7 illustrates the distribution of residential locations for Santa Barbara employees.

Based on this data, the proportion of HBW trips entering and leaving the study area was estimated. For non-work trip purposes, information from the SBCAG Regional Model was used to develop and initial estimate the percent of HBO and NHB trips that travel between Santa Barbara and other areas. These estimates were then refined using the City's land use database. Table 8 summarizes the proportion of trips by purpose and area type that are assumed to have one end outside the model area.

After the number of I-X/X-I trips is estimated, those trips are distributed to the stations around the perimeter of the model area using external station weights. These external station weights are based on City, County, and Caltrans traffic count data and the SBCAG Regional Model. The resulting external station weights are presented on Figure 3.

Through Trips

Through trips (also called external-external, or EE trips) are those that pass through the study area without stopping inside the study area. The major flows of through traffic in the Santa Barbara area use US-101 and SR 154, with lower volumes of through traffic using SR 192. The majority of through trips use US-101 for at least a portion of their journey, even if they do not enter or exit the model area along this route. The size of these flows was estimated based on Caltrans traffic counts and the SBCAG Regional Model. The through trips were modified in conjunction with the external station weights so that results at the gateways accurately represented observed data. The resulting through trip matrix is summarized in Table 9.

Trip Assignment

The trip assignment process determines the route that each vehicle-trip follows to travel from origin to destination. The model selects these routes in a manner that is sensitive to congestion and the desire to minimize overall travel time. It uses an iterative, capacity-restrained assignment and equilibrium volume adjustments. This technique finds a travel path for each trip that minimizes the travel time, with recognition of the congestion caused by all other trips.

The general assignment process includes the following steps:

- Assign all trips to the links along their selected paths.
- After all assignments, examine the volume on each link and adjust its impedance based on the volume-to-capacity ratio.
- Repeat the assignment process for a set number of iterations or until specified criteria related to minimizing travel delays are satisfied.

Calibration of the roadway network included modification of the centroid connectors to more accurately represent the location at which traffic accessed the local roads, adjusting speeds from the posted speed

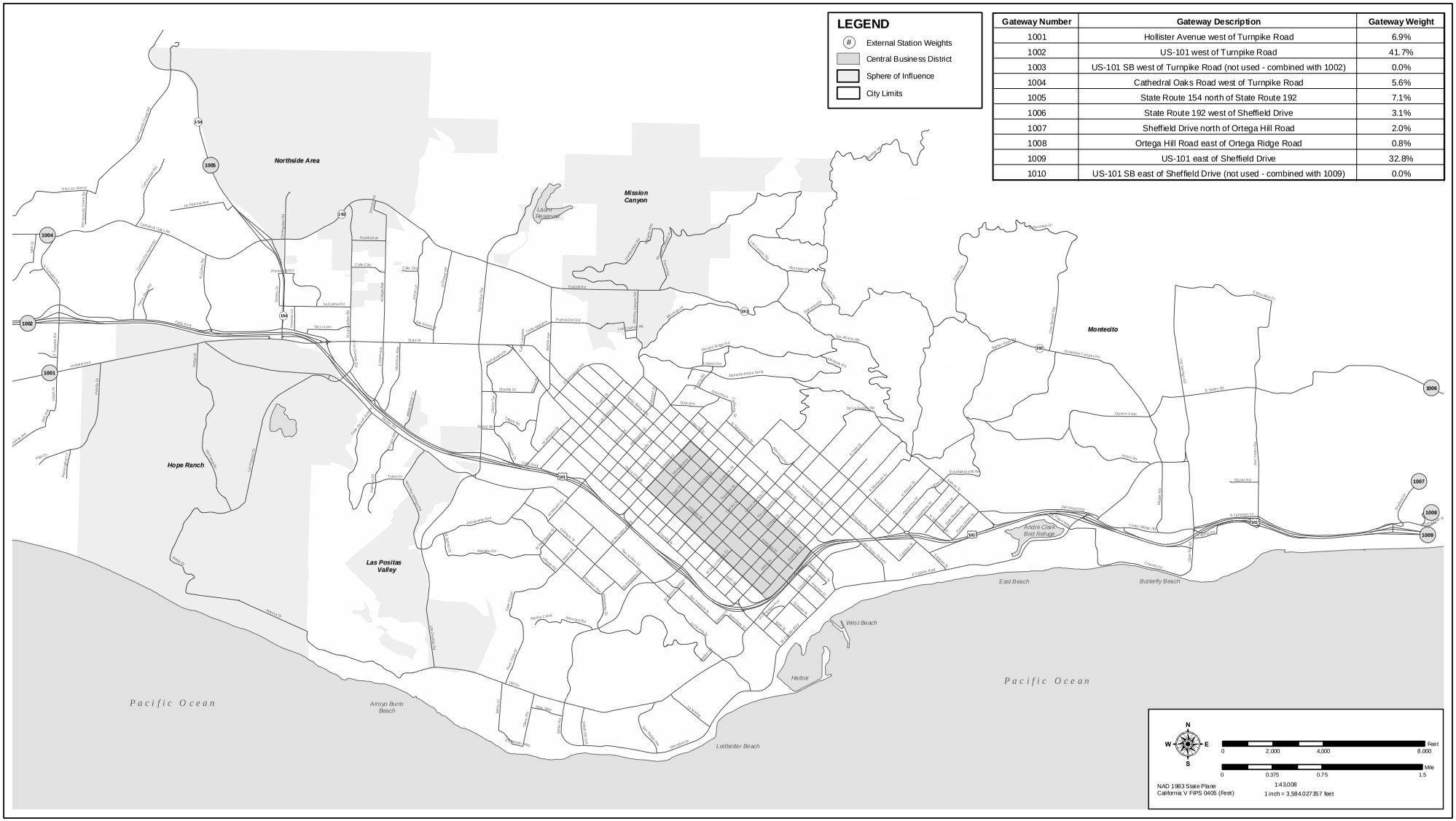
TABLE 6 WORK LOCATIONS FOR SANTA BARBARA RESIDENTS		
Year	**Percent Working Inside Santa Barbara**	**Percent Working Outside Santa Barbara**
2000	63%	37%
Source: U.S. Census Bureau.		

TABLE 7 RESIDENTIAL LOCATIONS FOR SANTA BARBARA EMPLOYEES		
Year	**Percent Living Inside Santa Barbara**	**Percent Living Outside Santa Barbara**
2000	49%	51%
Source: U.S. Census Bureau.		

TABLE 8
PERCENT OF TRIPS BY PURPOSE THAT ARE INTERNAL/EXTERNAL FOR EACH AREA TYPE

Purpose	Area Type 1		Area Type 2		Area Type 3		Area Type 4	
	Production	Attraction	Production	Attraction	Production	Attraction	Production	Attraction
Home-Based Work (HBW)	20%	41%	27%	45%	40%	49%	44%	49%
Home-Based Other (HBO)	18%	38%	19%	30%	32%	31%	20%	33%
Non-Home-Based (NHB)	21%	21%	21%	20%	23%	24%	21%	24%
Golf (GOLF)	0%	40%	0%	40%	0%	35%	0%	35%
Recreational (REC)	0%	30%	0%	30%	0%	20%	0%	20%

Source: Fehr & Peers, 2008.



Gateway Number	Gateway Description	Gateway Weight
1001	Hollister Avenue west of Turnpike Road	6.9%
1002	US-101 west of Turnpike Road	41.7%
1003	US-101 SB west of Turnpike Road (not used - combined with 1002)	0.0%
1004	Cathedral Oaks Road west of Turnpike Road	5.6%
1005	State Route 154 north of State Route 192	7.1%
1006	State Route 192 west of Sheffield Drive	3.1%
1007	Sheffield Drive north of Ortega Hill Road	2.0%
1008	Ortega Hill Road east of Ortega Ridge Road	0.8%
1009	US-101 east of Sheffield Drive	32.8%
1010	US-101 SB east of Sheffield Drive (not used - combined with 1009)	0.0%

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PLAN SANTA BARBARA EXTERNAL STATION WEIGHTS
FIGURE 3

TABLE 9
MATRIX OF DAILY THROUGH (EE) TRIPS

Destination / Origin	Hollister Ave west of Turnpike Rd	Hwy 101 west of Turnpike Rd	Cathedral Oaks Rd west of Turnpike Rd	Hwy 154 north of Hwy 192	Ortega Hill Rd north of Ortega Ridge Rd	Hwy 101 east of Sheffield Dr	**Total**
Hollister Ave west of Turnpike Rd		0	0	0	55	265	**320**
Hwy 101 west of Turnpike Rd	0		0	0	285	10120	**10405**
Cathedral Oaks Rd west of Turnpike Rd	0	0		0	30	75	**105**
Hwy 154 north of Hwy 192	0	0	0		30	830	**860**
Ortega Hill Rd east of Ortega Ridge Rd	55	285	30	30		0	**400**
Hwy 101 east of Sheffield Dr	265	10120	75	830	0		**11,290**
Total	**320**	**10405**	**105**	**860**	**400**	**11,290**	**23,380**

Note: All trips are rounded to the nearest 5 and external gateways with less than 100 trips are not shown on the above table.
Source: SBCAG

limit to adjust the attractiveness of the route and better reflect the prevailing speed of traffic, and refining the turn penalties.

Turn Penalties

Turn penalties are used to prohibit or add delay to certain turning movements. The Santa Barbara model prohibits traffic from getting off a freeway ramp and then immediately getting back on, as well as prohibits traffic from making turns across a median. In addition, all U-turns are prohibited throughout the model area in order to avoid counter-intuitive traffic routing. The PM peak hour assignment also prohibits left turns onto and off of State Street in the Central Business District.

MODEL VALIDATION

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. During the model development process, these outputs are used to further calibrate the model inputs. The extent to which the model outputs match existing travel data validates the assumptions of the inputs.

Traditionally, most model validation guidelines focus on the performance of the trip assignment function in accurately assigning trips to the roadway network. This is called static validation. This metric remains the most common and widely used means to measure model accuracy.

However, models are seldom used for static applications; by far the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Therefore, another test of a model's accuracy focuses on the model's ability to predict realistic differences in outputs as inputs are changed; or "dynamic" validation rather than static validation. In other words, it is good engineering practice take the model for a "test drive." This section describes the highest level validation checks that have been performed for the 2008 Santa Barbara TDF model.

STATIC VALIDATION

The most critical static measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. Caltrans has established certain trip assignment guidelines for models to be deemed acceptable for forecasting future year traffic in Travel Forecasting Guidelines (California Department of Transportation, November 1992). The validity of the PlanSB model was tested for daily, AM peak hour, and PM peak hour conditions. Model volumes were compared to existing traffic counts at 159 individual count sites for the daily validation, and 187 count sites for the AM and PM peak hour validation. The results are shown in Tables 10 through 11.

Link volume results from the model runs were examined and checked for reasonableness. Links were identified where model results varied substantially from the observed counts, and the characteristics of those links were reviewed to ensure that the link attributes reflected local operating conditions. In some cases, link characteristics such as speeds were modified to better reflect conditions on the ground.

Comparison Techniques

Travel model accuracy is usually tested using four comparison techniques:

- The volume-to-count ratio is computed by dividing the volume assigned by the model and the actual traffic count for individual roadways (or intersections) area-wide.
- The maximum deviation is the difference between the model volume and the actual count divided by the actual count.
- The correlation coefficient estimates the correlation between the actual traffic counts and the estimated traffic volumes from the model.
- The percent root mean square error (RMSE) is the square root of the model volume minus the actual count squared divided by the number of counts. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model.

TABLE 10 RESULTS OF DAILY MODEL VALIDATION		
Validation Item	**Criterion for Acceptance**	**Model Results**
Count Locations	N/A	159
% of Links Within Caltrans Standard Deviations	At Least 75%	77%
% of Screenlines Within Caltrans Standard Deviations	100%	100%
2-way Sum of All Links Counted	Within ± 10%	9%
Correlation Coefficient	Greater than 88%	99%
RMSE	40% or less	23%
Source: Fehr & Peers, 2008.		

TABLE 11 RESULTS OF PEAK HOUR MODEL VALIDATION			
Validation Item	**Criterion for Acceptance**	**AM Peak Hour Model Results**	**PM Peak Hour Model Results**
Count Locations	N/A	187	187
% of Links Within Caltrans Standard Deviations	At Least 75%	77%	78%
% of Screenlines Within Caltrans Standard Deviations	100%	100%	100%
2-way Sum of All Links Counted	Within ± 10%	3%	3%
Correlation Coefficient	Greater than 88%	90%	91%
RMSE	40% or less	29%	28%
Source: Fehr & Peers, 2008.			

Validation Guidelines

For a model to be considered accurate and appropriate for use in travel forecasting, it must replicate actual conditions within a certain level of accuracy. Since it would be impossible for any model to replicate all counts precisely, validation guidelines have been established by Caltrans and other agencies. Key validation standards for daily travel models based on the Caltrans guidelines are summarized below:

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).
- All of the roadway screenlines should be within the maximum desirable deviation, which ranges from approximately 15 to 64 percent depending on total volume.
- The two-way sum of the volumes on all roadway links for which counts are available should be within 10 percent of the counts.
- The correlation coefficient between the actual ground counts and the estimated traffic volumes should be greater than 88 percent.

Although not stated in the Caltrans standards, an additional Fehr & Peers validation guideline was applied to the 2008 PlanSB model:

- The RMSE should not exceed 40 percent.

Tables: Results of Daily and Peak Hour Validation

DYNAMIC VALIDATION

The traditional approach to the validation of travel demand models is to compare the link volumes for the model's base year to actual traffic counts taken in the same year. This approach provides information on a model's ability to reproduce a static condition. While reproducing these conditions is very important, it is also important to know that the model will produce stable and reasonable results when various inputs such as land use are changed. The following section presents a selection of the dynamic validation results

Land Use Changes

A basic form of dynamic validation is to vary the amounts of a particular land use type and compare the magnitude and direction of change from the original forecast. Of particular interest are the resulting changes in:

- Vehicle Trips (VT)
- Change in VT per land use unit change (VT/DU or KSF)
- Vehicle Miles Traveled (VMT)
- Change in VMT per land use unit change (VMT/DU or KSF)
- Vehicle Hours Traveled (VHT)
- Change in VHT per land use unit change (VHT/DU or KSF)
- Vehicle miles traveled per vehicle trip (VMT/VT)

This form of dynamic validation was performed on the Santa Barbara model by adjusting the number of multi-family one car dwelling units and the retail development in TAZs 41, 320, 370, and 297. These zones were selected due to their geographic location, the existing land use mix within the zone, and to test one zone from each of the four area types. To isolate each of these changes, tests were done sequentially, changing one item at a time.

Figure 4 shows the location of the zones that were used for dynamic validation. Zone 41 is located downtown near Chapala Street/Ortega Street and contains a broad mix of residential and non-residential land uses. Zone 320 is located in the Westside and contains residential and retail land uses. Zone 370 is located on the Riviera and contains single family land uses and an elementary school. Zone 297 is located in the Upper State Street Area and contains a broad mix of residential and non-residential land uses. The values added to a zone were selected based on the interaction with adjacent land use, and to determine if the model is sensitive to the location and magnitude of various land use changes. The results are shown in Table 12.

- The change in VT per added DU ranges from 3.0 – 5.0. This is reasonable given the mix of land uses in the various zones and the different trip generation rates of each area type. Within each individual area type there is very little variability, showing stable trip generation across the range of land use magnitudes. The average vehicle trips per added DU are lowest for zone 41 due to the abundance of other land uses for the residents to interact with.

- Adding a single DU to the model is a test of how much noise (random error) is in the model. Total VMT changed by between 9 and 229 vehicle-miles per day per dwelling unit added, depending on the zone it was added to. Three of the four zones behaved very well with zones 41, 370 and 297 showing the appropriate increases in VMT relative to the land use mix surrounding these zones. Zone 41 has the lowest increase in VMT, while zone 370 has the highest and zone 297 falls in between. Only zone 320 returns unreasonable results. However, with only a modest increase in dwelling units in this zone, representing a realistic level of development, the model performed as expected.

- The VHT per DU change is fairly stable around -1.0 to 1.4, with the exception of adding to zone 320. However, the noise at this extremely small level of change is no longer present if increased to a normal level of development.

- As shown in Table 12, the VMT/VT is very stable and typically is around 4.2. This measure is used to reduce the influence of vehicle trip generation differences between land use types by normalizing the trip distance by total trips. As land use is added near existing compatible uses, the distance traveled decreases slightly. The opposite is also true: as land use is removed from nearby uses or added further from compatible uses, the distance traveled increases.

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PLAN SANTA BARBARA TAZs USED FOR DYNAMIC VALIDATION

FIGURE 4

TABLE 12
RESULTS OF DYNAMIC VALIDATION TESTS

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Residential Land Use Results - Multifamily Unit with 1 Car								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 DU	595,482	3.0	2,500,903	9.0	59,667	-1.0	4.20
	Added 25 DUs	595,557	3.1	2,501,338	17.8	59,690	0.9	4.20
	Added 50 DUs	595,635	3.1	2,501,440	10.9	59,698	0.6	4.20
320 - Westside	Added 1 DU	595,483	4.0	2,501,123	229.0	59,680	12.0	4.20
	Added 25 DUs	595,581	4.1	2,501,403	20.4	59,695	1.1	4.20
	Added 50 DUs	595,683	4.1	2,501,683	15.8	59,706	0.8	4.20
370 - Riveria	Added 1 DU	595,484	5.0	2,500,913	19.0	59,669	1.0	4.20
	Added 25 DUs	595,595	4.6	2,501,488	23.8	59,707	1.6	4.20
	Added 50 DUs	595,712	4.7	2,501,935	20.8	59,713	0.9	4.20
297 - Upper State Street	Added 1 DU	595,484	5.0	2,500,906	12.0	59,668	0.0	4.20
	Added 25 DUs	595,595	4.6	2,501,485	23.6	59,702	1.4	4.20
	Added 50 DUs	595,711	4.6	2,501,968	21.5	59,703	0.7	4.20
Retail Land Use Results								
Base Case		595,479	N/A	2,500,894	N/A	59,668	N/A	4.20
41 - Downtown	Added 1 KSF	595,499	20.0	2,501,174	280.0	59,683	15.0	4.20
	Added 10 KSF	595,684	20.5	2,501,615	72.1	59,710	4.2	4.20
	Added 50 KSF	596,501	20.4	2,504,277	67.7	59,816	3.0	4.20

TABLE 12
RESULTS OF DYNAMIC VALIDATION TESTS
(CON'T)

TAZ	Scenario	Vehicle Trips (VT)	Change in VT/DU or KSF Change	Vehicle Miles Traveled (VMT)	Change in VMT/DU or KSF Change	Vehicle Hours Traveled (VHT)	Change in VHT/DU or KSF Change	VMT/VT
Retail Land Use Results								
320 - Westside	Added 1 KSF	595,502	23.0	2,501,190	296.0	59,686	18.0	4.20
	Added 10 KSF	595,707	22.8	2,501,932	103.8	59,706	3.8	4.20
	Added 50 KSF	596,618	22.8	2,505,330	88.7	59,852	3.7	4.20
370 - Riveria	Added 1 KSF	595,550	71.0	2,501,174	280.0	59,685	17.0	4.20
	Added 10 KSF	595,686	20.7	2,501,955	106.1	59,708	4.0	4.20
	Added 50 KSF	596,513	20.7	2,505,378	89.7	59,828	3.2	4.20
297 - Upper State Street	Added 1 KSF	595,501	22.0	2,501,204	310.0	59,684	16.0	4.20
	Added 10 KSF	595,702	22.3	2,504,967	407.3	59,721	5.3	4.21
	Added 50 KSF	596,594	22.3	2,505,739	96.9	59,868	4.0	4.20

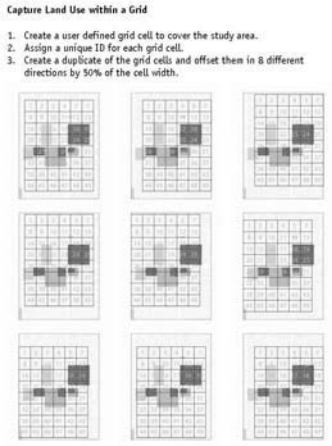
Source: Fehr & Peers, 2008.

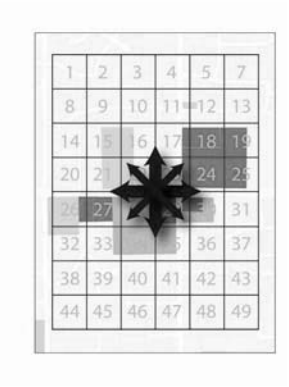
THE 4D PROCESS

The Ds method (commonly known as the 4Ds, although later expanded to include more than four built environment factors) will allow the City to evaluate the transportation effects of *Plan Santa Barbara Framework* policies, and to identify potential site-plan refinements that will further reduce its traffic impacts. The methods are based on a substantial library of research on the relationship between travel and the built environment, which has been distilled to a single set of numerical values by a panel of national experts.

The Ds will predict the degree to which each Plan Santa Barbara horizon-year land use scenario's trip generation will increase or decline with changes to the plan's:

- Density - residential and non-residential development per acre;
- Diversity - mix of residential, retail and employment land uses on the site;
- Design - connectivity and walkability of the site's transportation networks; and
- Destination Accessibility - location relative to major regional attractions, as infill sites generate fewer and shorter vehicle trips than fringe area development.

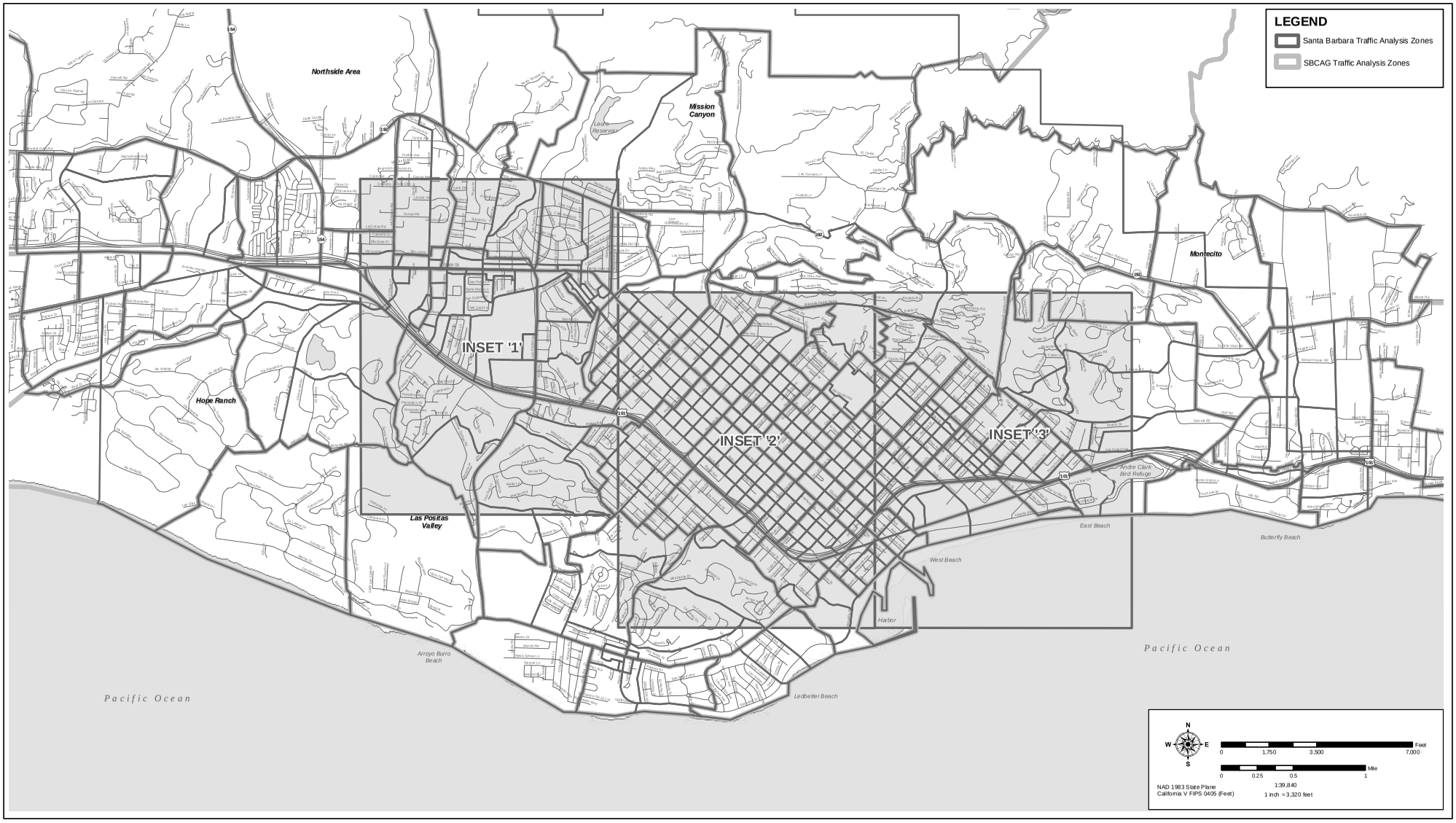




The Santa Barbara travel demand model will include advanced features that allow it to better capture the effects of *Plan Santa Barbara Framework* policy options. These features include:

- Integrated 4D refinements to enhance the sensitivity of the model to account for how travel behavior is affected by the built environment, which are necessary for evaluating the change in vehicle trips and vehicle miles of travel associated with infill development.
- GIS-based ¼ mile grid-cell analysis for calculating 4D variables for input into the traffic model. The grid-cell approach uses parcel-level land use to increase the accuracy of the variable estimates by capturing all land use intersections in ¼ grids. This method is superior to calculating variables based on traffic analysis zone geography, which can be too large to capture many nuances of the built environment.
- Refined multi-family household trip generation structure cross-classified by automobile ownership.
- Trip assignment that isolates drive alone and shared ride (2 and 3+) trips by purpose.
- District-based TDF model structure to capture different travel characteristics in different areas of the City.
- Refined TAZ system in high activity areas to allow for detailed traffic assignment.

APPENDIX A:
TRAFFIC ANALYSIS ZONES KEY MAP



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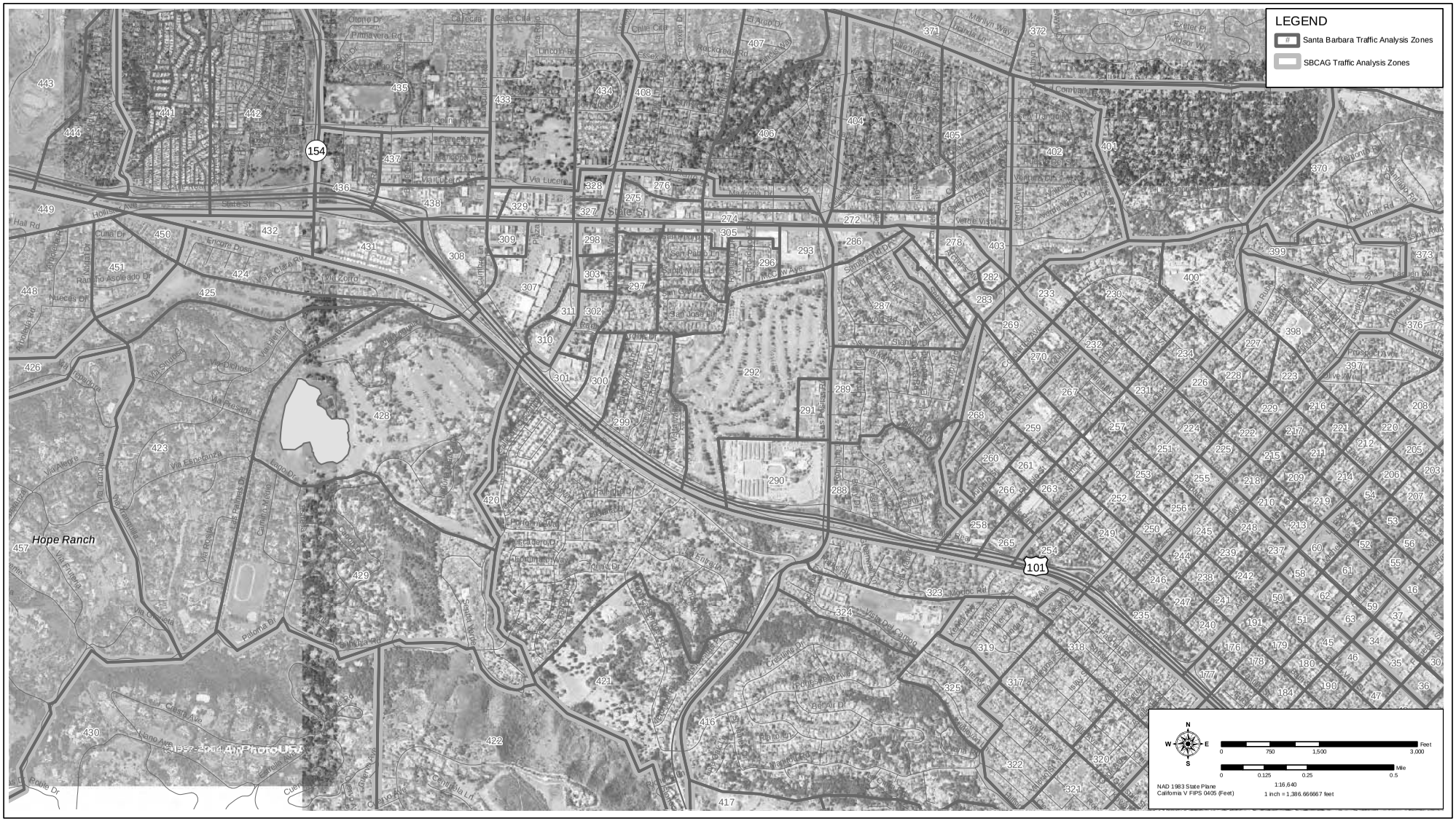
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES - KEY MAP
APPENDIX A



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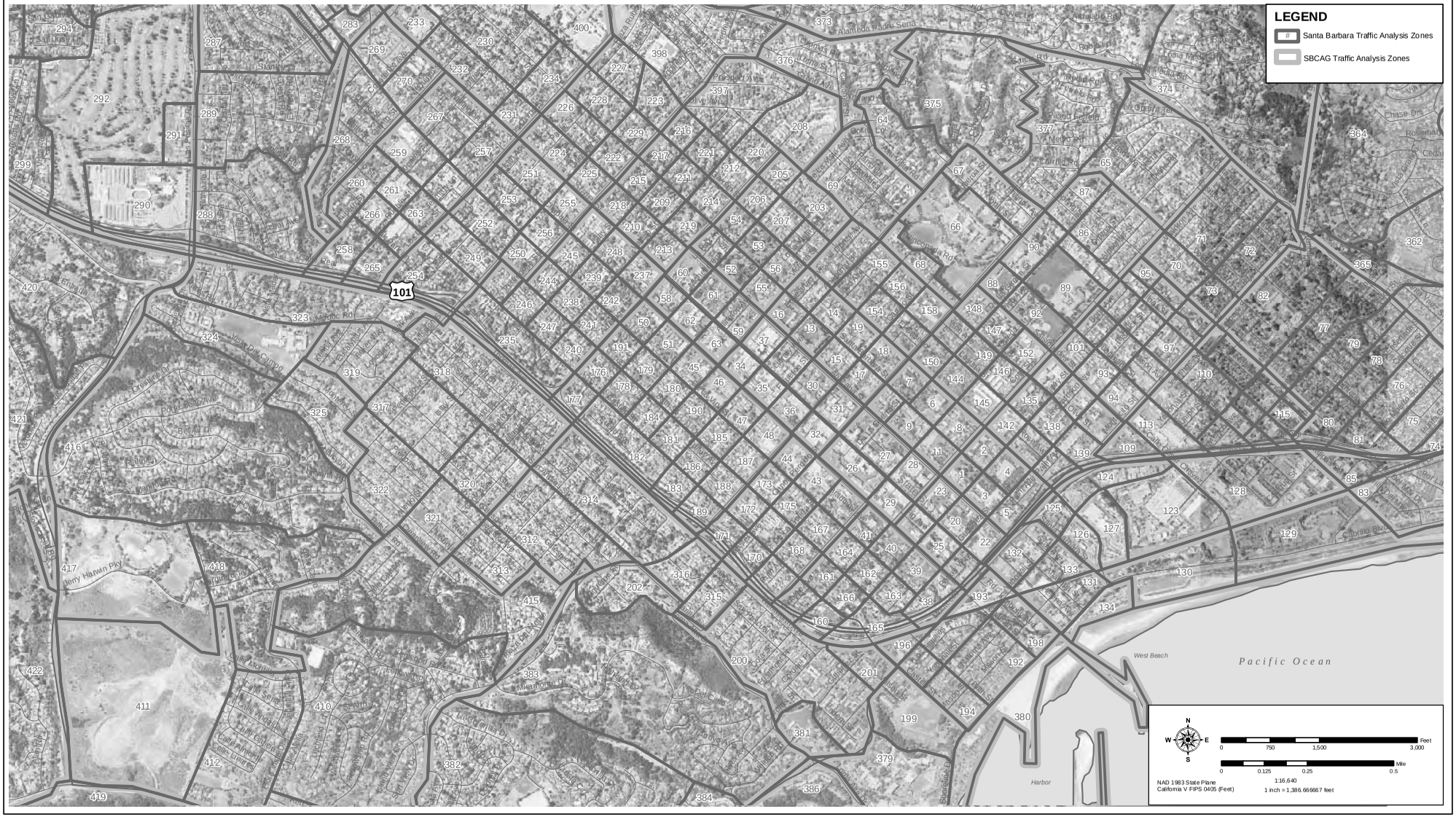
PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 1



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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 2

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PLAN SANTA BARBARA TRAFFIC ANALYSIS ZONES
INSET 3

APPENDIX B:
SAMPLE ITE TRIP GENERATION RATES

APPENDIX B

SAMPLE ITE TRIP GENERATION RATES[1]

Residential

Land Use Type	Units	Rate
Single-Family (SF)	Dwelling Units	9.57
Apartment	Dwelling Units	6.72
Residential Condominium/Townhouse	Dwelling Units	5.86

Non-Residential

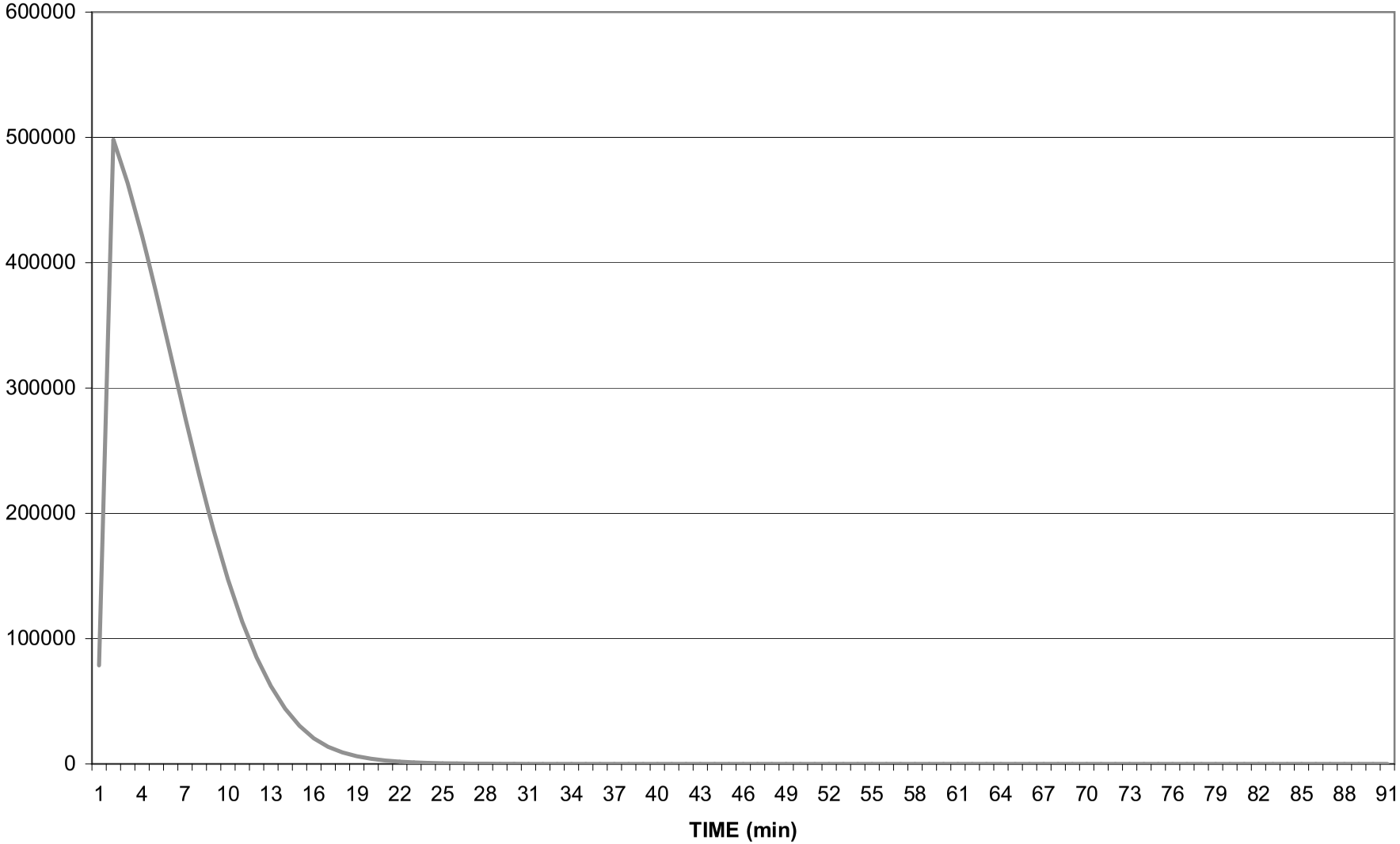
Land Use Type	Units	Rate
Office	Thousand Square-feet	11.01
General Light Industrial	Thousand Square-feet	6.97
Hospital	Thousand Square-feet	17.57
Elementary chool	Students	1.29
High Schools	Students	1.71
Junior/Community Colleges	Students	1.20
Golf	Acres	5.04

[1] ITE trip generation rates are provided for land use categories that are closely comparable between the model and ITE definitions. In general, ITE categories are more specific than the model land use categories and a direct comparison is not possible.

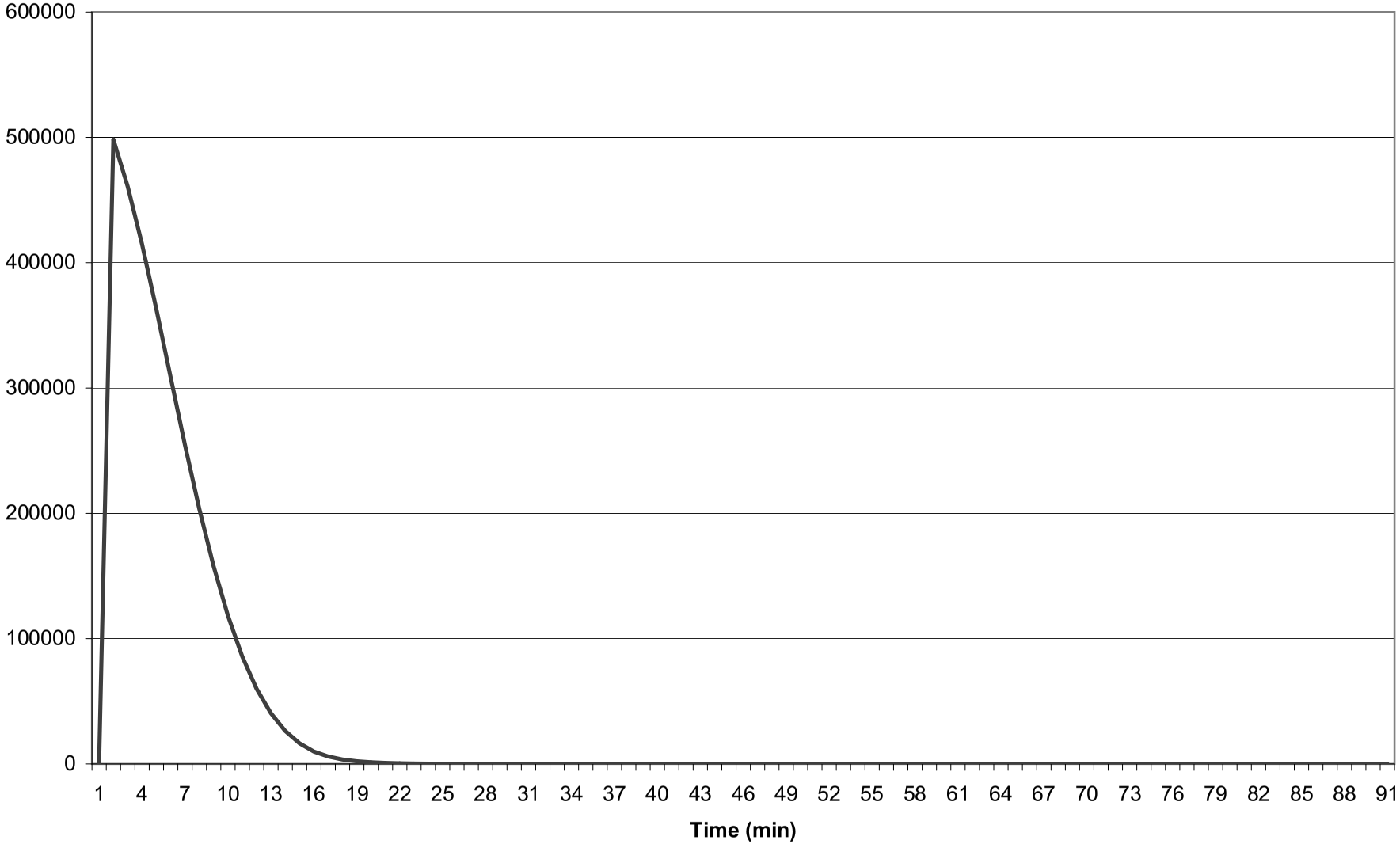
Source: Trip Generation, 7th Edition (Institute of Transportation Engineers, 2003)

APPENDIX C:
SANTA BARBARA MODEL FRICTION FACTOR CURVES-HBW

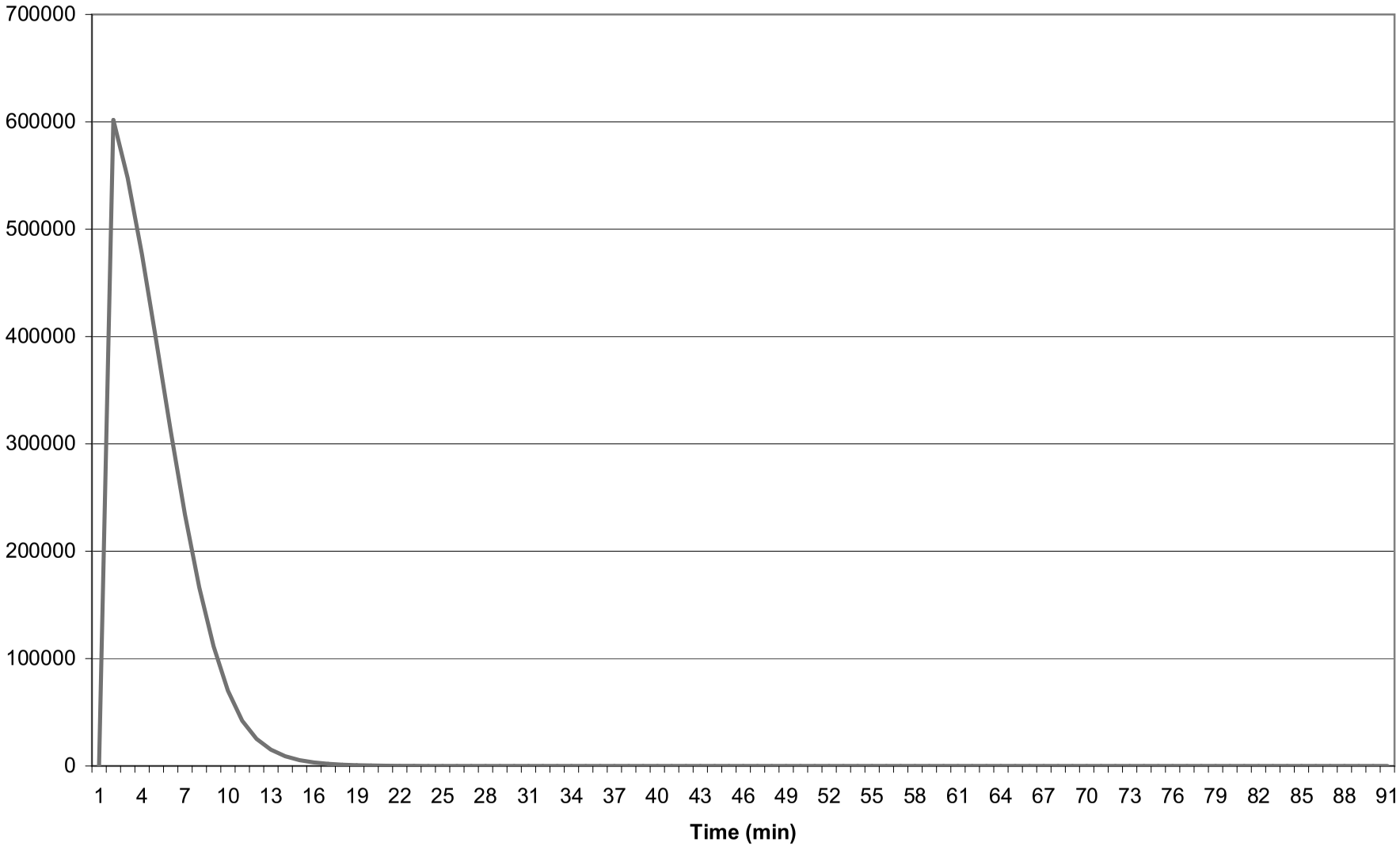
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBW



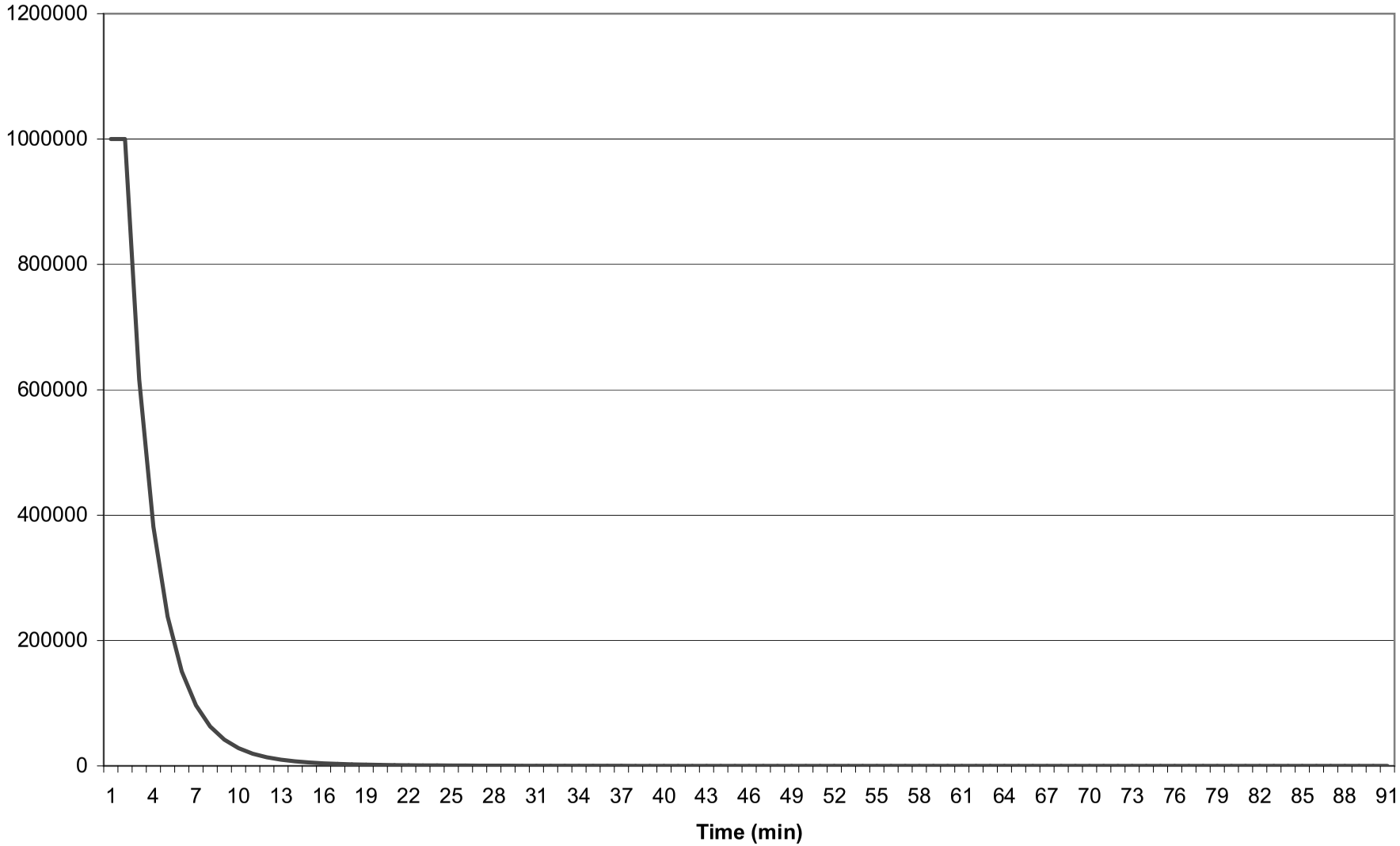
SANTA BARBARA MODEL FRICTION FACTOR CURVES - HBO



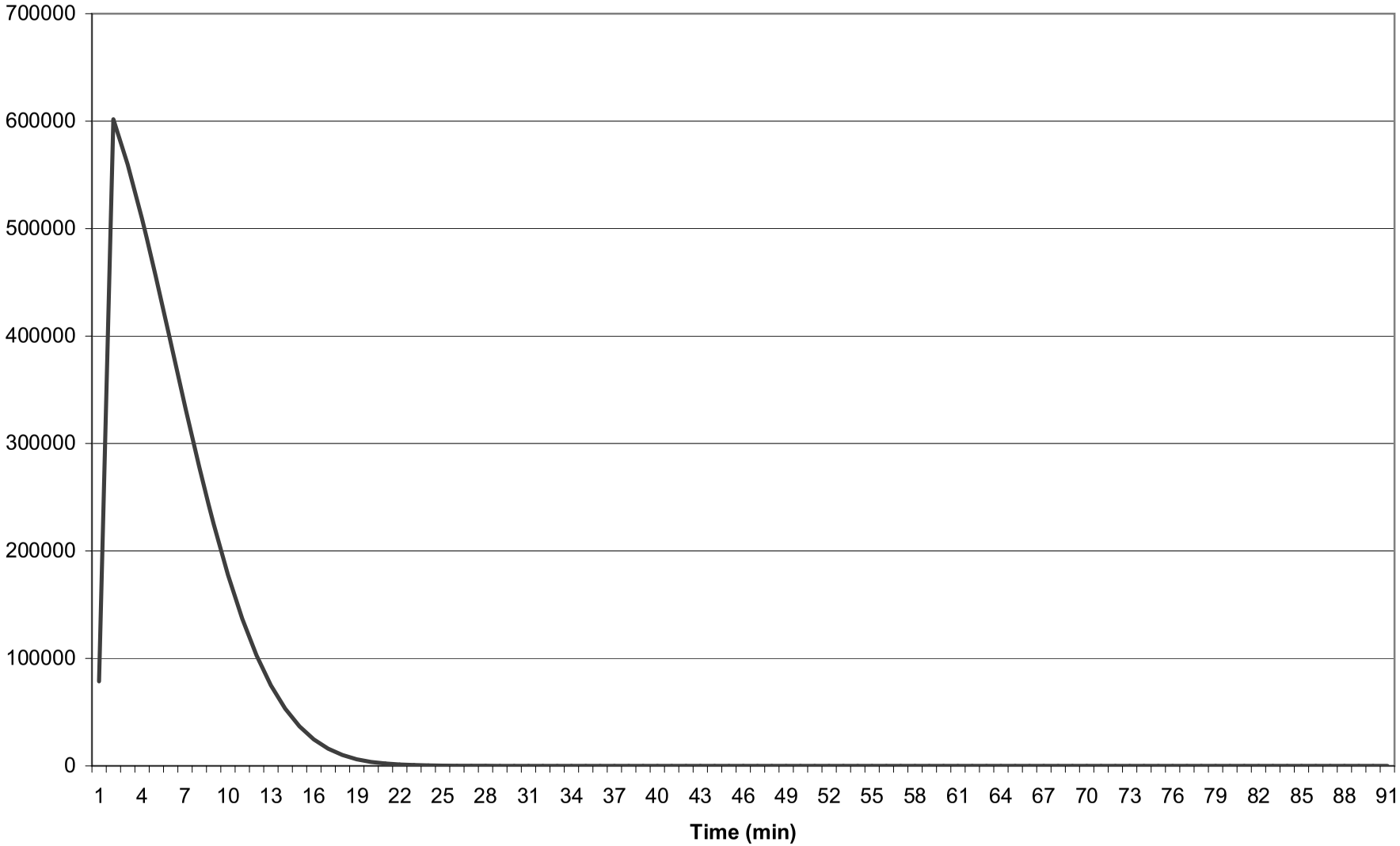
SANTA BARBARA MODEL FRICTION FACTOR CURVES - NHB



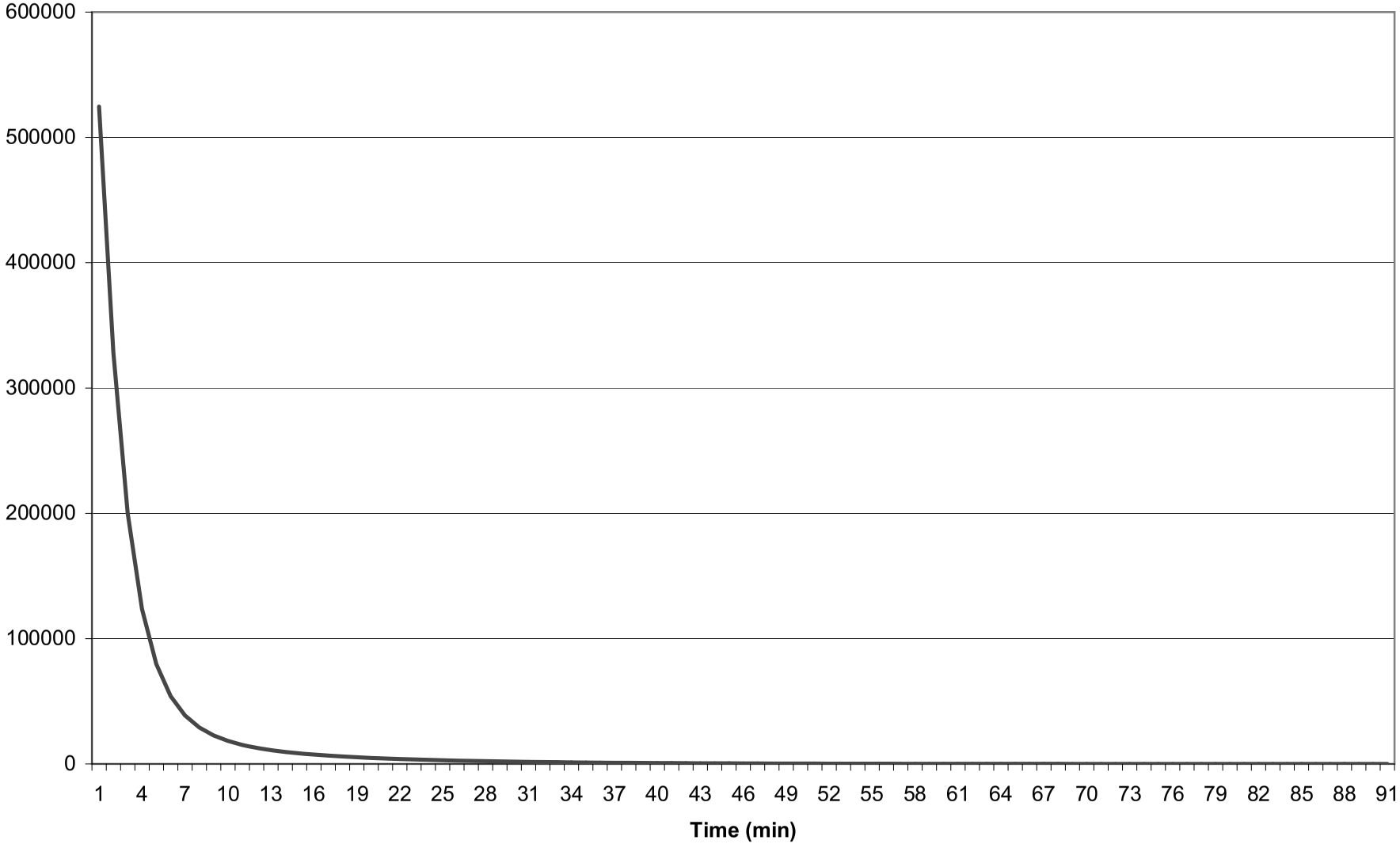
SANTA BARBARA MODEL FRICTION FACTOR CURVES - GOLF



SANTA BARBARA MODEL FRICTION FACTOR CURVES - REC



SANTA BARBARA MODEL FRICTION FACTOR CURVES - IX/XI



APPENDIX I-4

FUTURE TRAFFIC CONDITIONS FOR *PLAN SANTA BARBARA* AND THE NO PROJECT ALTERNATIVE

FEHR & PEERS
TRANSPORTATION CONSULTANTS

REVISED FINAL TECHNICAL MEMORANDUM

Date: January 27, 2010

To: Dan Gira, AMEC

From: Brian Welch and Reid Keller

Subject: ***Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario***

LA08-2253

INTRODUCTION

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The City model, developed in the TransCAD Transportation Geographic Information System (GIS) software, was successfully calibrated and validated to current conditions. [1] Although there are seasonal variations in traffic in Santa Barbara due to tourist visitation and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting model represents travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The primary purpose of the model is to test proposed *Plan Santa Barbara* policy options to see which policies are successful in meeting community objectives. The circulation goals, objectives, and policies for *Plan Santa Barbara* focus on creating a multi-modal transportation system that provides choice and decreases vehicle traffic congestion. The plan includes objectives related to mode share and traffic congestion, featuring (1) a 50/50 mode share between the single-occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions. The travel demand model provides metrics and indicators (traffic volumes, levels of service, vehicle miles traveled, etc.) that document the plan's ability to meet the *motor vehicular-related* goals, objectives, and policies. In addition, indicators and results from the model will be utilized to support forthcoming California Environmental Quality Act (CEQA) documentation

This technical memorandum summarizes traffic volume forecasts, intersection operational conditions, and a variety of other performance measures associated with implementation of the *Plan Santa Barbara* Proposed Project scenario. This scenario forms the Project scenario of the *Plan Santa Barbara* General Plan Update. These future conditions represent the change in traffic in Santa Barbara under the policy and land use changes of the *Plan Santa Barbara* Proposed Project scenario. We have also included, for ease of reference, a brief summary of existing

[1] For details regarding the model development, including calibration and validation statistics, please refer to *Plan Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

conditions as well as results for the No Project scenario. Forthcoming technical memoranda will provide similar documentation for additional horizon year plan alternatives.

As noted, the forecasts for this memo were prepared using the *Plan Santa Barbara* Travel Demand Model developed by Fehr & Peers on the TransCAD platform. The travel demand model is based around three core components:

- A **land use database** – in this case a parcel level database provided by the City with detailed information on the type and amount of development on each parcel, stratified into numerous categories. Land use databases were prepared by the City for existing conditions and projected amounts and locations of future residential and non-residential growth, based on historic growth rates and existing/proposed City growth control policies and mechanisms for the No Project (Existing Policies) Alternative and Project (*Plan Santa Barbara* policies). The type, location, and amount of growth permitted under *Plan Santa Barbara* were further modified to account for the policy framework of *Plan Santa Barbara*. These land use databases were compiled on a parcel-specific level for the entire City as well as the Sphere of Influence, and provide detailed information on the type and amount of development existing and projected for each parcel, broken down into multiple land use categories to reflect the diversity of existing and proposed land uses accurately.
- A **highway network database** – Based on the Santa Barbara County Association of Governments (SBCAG) regional travel demand model, with added detail using data provided by the City. The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes, arterials, collectors, and a selection of local roads in the study area (see Figure 1).
- The roads shown in Figure 1 are classified in four major categories and form the primary road network represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside the City.
- A **table of trip generation rates** – initial rates was researched from sources including SBCAG, the census National Household Travel Survey, the San Diego Association of Governments (SANDAG), and the Institute of Transportation Engineers (ITE). Trip generation rates were then calibrated to match the existing trip making characteristics that are unique to Santa Barbara.

The model was validated and calibrated to Caltrans, Federal Highway Administration (FHWA), and Fehr & Peers' internal standards. Once the model met the required set of criteria to be deemed adequately validated and calibrated, the land use database was modified to reflect future development growth. This growth can be attributed to two sources:

1. Currently **pending**, **approved**, and **under construction** development projects. Forecasted amounts of growth were based on the extrapolation of historic trends for residential development, and existing and proposed policy caps for non-residential development. These forecasts account for planned and pending development projects, and;

2. The City's distribution of the **future growth and development** projected to occur under both the No Project/Existing Policies Alternative and Project/*Plan Santa Barbara* scenario. Forecasted growth has been provided for the No Project/Existing Policies scenario, which includes development under the framework of the existing General Plan, as well as for the *Plan Santa Barbara* Draft Policies scenario, which accounts for the proposed policy changes set forth by the City Council for the project.

In addition to the land use database changes, currently fully funded roadway improvements were added to the highway network database. These improvements generally consisted of the Measure D funded projects along the US-101 corridor between Hot Springs Road and Milpas Street. Examples of projects include the Cacique Street freeway under-crossing, the roundabout at Old Coast Highway and Hot Springs Road and Coast Village Road and the addition of a travel lane to both directions of US-101 between Milpas Street and Hot Springs Road. US-101 improvements are currently under construction from Milpas to Hot Springs and are anticipated to be complete by 2012.

The remaining sections of this memo present relevant portions of the existing conditions analysis, the results of the future No Project analysis, and the future Proposed Project analysis for the *Plan Santa Barbara* study area, shown in Figure 1. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas in or near the City's Sphere of Influence. The study area includes all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence. The Santa Barbara Airport does not fit these criteria, and is not within the modeling framework. Airport existing and future conditions will be documented within the CEQA documentation for *Plan Santa Barbara*, based upon recently completed studies.

EXISTING CONDITIONS[2]

Average Daily Traffic Volumes

Average Daily Traffic (ADT) and AM and PM peak hour turning movement counts were collected in the *Plan Santa Barbara* study area in March 2008. Additional recent ADT counts were compiled from a variety of sources including Environmental Impact Reports (EIRs), the County of Santa Barbara count program, and Caltrans. These data were used to assess current traffic conditions in the City of Santa Barbara and inform the model development process.

Figure 2 illustrates existing ADT volumes on major thoroughfares in the study area. Certain travel patterns can be seen in the figure:

- As expected, the freeway carries the greatest daily volume of vehicles, reaching a peak of 133,000 vehicles per day (vpd) between Mission Street and Las Positas Roads.
- Arterial traffic volumes are generally greatest on segments approaching freeway ramps. This pattern is common throughout the United States, since these locations generally experience the most significant confluence of surface street traffic. The busiest locations include the following:

[2] Some relevant portions of the existing conditions data are presented here for comparative convenience. For a detailed presentation of existing transportation conditions in the City of Santa Barbara, please refer to *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008).

- Carrillo north of US-101: 32,440 vpd
- Mission north of US-101: 30,010 vpd
- Milpas north of US-101: 28,640 vpd
- Garden north of US-101: 24,630 vpd
- State west of San Marcos Pass: 21,160 vpd
- Las Positas north of US-101: 20,120 vpd

Peak Hour Freeway Volumes

Figure 3 illustrates peak hour freeway volumes for the base year. The following observations are shown in the figure:

- During the AM peak hour, traffic volumes on US-101 northbound reach their peak between Milpas Street and Garden Street. During the PM peak hour, traffic volumes peak on the US-101 northbound between Mission Street and Las Positas Road. During the AM peak hour, traffic volumes on US-101 northbound reach a peak of 6,430 vehicles per hour between Milpas and Garden Streets. These volumes do not exceed the capacity of this six-lane segment of US-101, which operates at LOS E during the AM peak.
- During the AM peak hour, traffic volumes on the two-lane segment of US-101 northbound reach a peak of 5,895 vehicles per hour south of Olive Mill Road. These volumes exceed the capacity of this two-lane segment of US-101, which operates at LOS F during the AM peak.
- During the PM peak hour, traffic volumes on US-101 northbound reach a peak of 5,895 vehicles per hour between Mission Street and Las Positas Road. These volumes do not exceed the capacity of this three-lane segment of US-101, which operates at LOS E during the PM peak.
- Traffic patterns during the AM peak hour show directional peaking, where one direction of the freeway has substantially more traffic than the other, approaching Garden Street from the south. For example, northbound AM peak hour volumes of 6,430 peak trips north of Garden Street are nearly four times as great as southbound volumes of 1,718 trips. Northbound and southbound AM peak hour volumes are more in balance in the rest of the City.
- Although the southbound direction of the freeway carries more traffic leading up to Garden Street from the north, the volumes are not substantially higher than the opposing direction. This pattern suggests that residents of Santa Barbara interact more with areas to the north of the City, but the City draws visitors (especially employees) from both the north and the south, and more traffic passes through the City from the south to the north in the morning and from the north to the south in the evening.
- The PM peak hour shows less directional peaking. Volumes on US-101 southbound south of Garden Street do exceed the opposing flow, but not to the same extent as during the morning peak hour. Traffic volumes north of Garden Street show little if any directional peaking during the PM peak hour.

- During the PM peak hour, traffic volumes on the two-lane segment of US-101 south of the City also show directional peaking. However, this is not as pronounced as in the AM. While southbound PM volumes reach a peak of 4,545 vehicles per hour south of Olive Mill Road, northbound PM peak volumes of 2,926 vehicles per hour are substantially lower. Southbound PM peak volumes do not exceed the capacity of this two-lane segment of US-101, which operates at LOS E during the PM peak period.

Relatively high peak hour peak direction freeway volumes within the study area include:

- Northbound AM peak, west of Milpas, 6,430 vehicles per hour (vph)
- Northbound AM peak, west of San Ysidro, 5,895 vph
- Northbound AM peak, west of Carrillo, 5,719 vph
- Southbound PM peak, west of San Roque, 5,806 vph
- Northbound PM peak, west of San Roque, 5,853 vph
- Northbound PM peak, west of Mission, 5,895 vph

Peak Hour Intersection Level of Service Analysis

Table 1 and Figure 4 illustrate existing intersection level of service (LOS) at the 52 *Plan Santa Barbara* study intersections during the AM and PM peak hours. Three distinct intersection control types are present in Santa Barbara and were analyzed using their respective methodologies:

- Signalized intersections, which were analyzed using the Intersection Capacity Utilization (ICU) methodology;[3]
- Unsignalized, or stop-controlled, intersections were analyzed using the Highway Capacity Manual (HCM) unsignalized intersection methodology; and
- The Milpas Roundabout was analyzed using the HCM roundabout methodology.[4]

The intersection of Hot Springs Road & Coast Village Road was stop-controlled and was analyzed using the HCM unsignalized methodology for the existing conditions. This intersection was assumed to be controlled by roundabout in future 2030 conditions and was analyzed using HCM roundabout methodology for future 2030 conditions.

The City has a target LOS of C with a volume-to-capacity (V/C) ratio of 0.77 or less for signalized intersections and a target LOS of C with less than 22 seconds of delay for unsignalized intersections. There are currently 13 intersections exceeding this threshold during one or both peak hours, as shown in Table 2.

Other Measures of Effectiveness

In addition to roadway segment volumes and intersection LOS, other measures of effectiveness (MOEs) are often analyzed when considering the effects of different general plan development scenarios. These measures are discussed at the end of this document and include:

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[3] Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity* (Transportation Research Board, 1980).

[4] Source for both unsignalized and roundabout methodologies*: Highway Capacity Manual* (Transportation Research Board, 2000).

- **Vehicle Miles Traveled** (VMT) – a measure of total vehicle travel activity for the entire study area for a given scenario.
- **Vehicle Hours Traveled** (VHT) – a measure of total time spent traveling in vehicles in the study area affected by factors including length of trip making, amount of trip making and congestion levels.
- **Vehicle Trips** (VT) – the total number of vehicle trips made in the study area (including into, out of and through the study area).
- **Average Trip Length** – calculated by dividing the total VMT by the total number of vehicle trips.

Table 6 provides 2008 results for each of these measures. It should be noted that these numbers may be held artificially low. While many trips made within the study area are relatively short, most trips leaving the study area travel considerably further than the end of the model area (i.e., Ventura or Lompoc). These numbers represent only the portion of the trip in the study area.

FUTURE YEAR (2030) TRAFFIC CONDITIONS FORECASTS

Development of the Forecast Volumes

The development of the forecast volumes for this analysis followed the approach presented in the *National Cooperative Highway Research Program (NCHRP) Report 255* (Transportation Research Board, 1982). This method is the accepted professional standard for preparing traffic forecasts for urbanized area planning applications.[5]

The NCHRP Report 255 approach involves post-processing model data and applying the growth to existing counts collected in the field. The first step in the process is to run the validated base year model and collect data for the desired segments and intersection turning movements. The model is then updated with future year land use changes and highway network improvements and run again. The data for the same study segments and turning movements is again collected from the future year model run.

The data from both model runs is then compared and applied to the existing counts using one of three methods:

- The **difference method** – directly applies the difference between the future and base year model runs to the existing count.
- The **ratio method** – factors the existing counts by the ratio of the future year data to the base year data.
- The **combined method** – takes the average of the output from both the difference method and the ratio method.

[5] While the NCHRP 255 method is the accepted professional standard, and post-processing model volumes is the typical approach to preparing traffic forecasts for sub-regional models, it is by no means required and in certain situations it may be appropriate to use raw model output as opposed to post-processed count volumes. SBCAG, in *The Travel Forecast for Santa Barbara County*, did not post-process counts and instead reported raw model volumes. The differences between freeway volumes reported here, and those reported by SBCAG, are generally attributable to this difference in methodologies. Differences between forecasts in this case are logical and both approaches are technically correct. The reasons for SBCAG's decision to report model volumes can be found on page 12 of *The Travel Forecast for Santa Barbara County* (SBCAG, 2004).

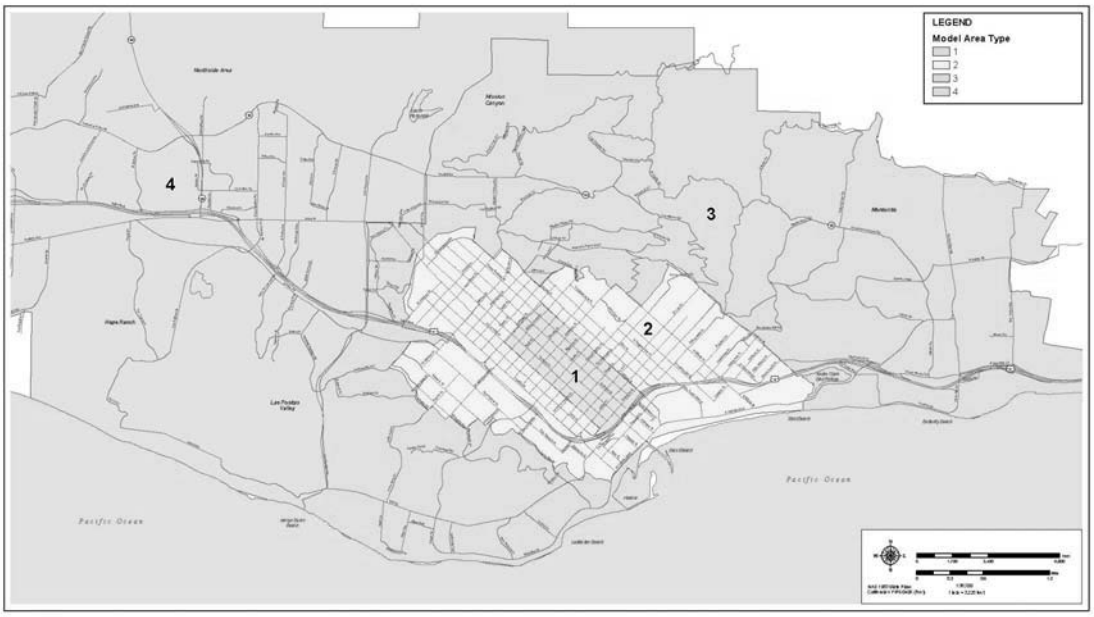
In addition to the NCHRP process described above, more sophisticated trip adjustments were implemented within the modeling framework. These are described below. For background, however, it is helpful to understand the four area types developed for the Santa Barbara model. Area types are discussed in more detail in previous reports[6], and are summarized here and shown below.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation. Area type 2 represents the remaining "grid" portion of the City, and includes most of the Mobility-Oriented Development Area (MODA). This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center that attracts trips from outside areas.

When incorporating the estimated effects of policy-based trip-reduction strategies, peak hour vehicle trips starting and ending within the model area were reduced by a greater percentage than peak-hour vehicle trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not substantially affect trip making in other jurisdictions.

[6] *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).



Travel Demand Model Area Types

Trip Adjustments for Land Use and Policy Strategies

As part of the *Plan Santa Barbara* General Plan Update, the City decided to develop a Travel Demand Forecasting model to support this and other long-range transportation planning efforts. The broadest *Plan Santa Barbara* circulation goals and policies cited in the Introduction – (1) a 50/50 mode share between the single occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions – find their manifestation in detailed implementation strategies in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09." Examining **Appendix A** reveals a very comprehensive approach to meet these goals and objectives, addressing the built environment, transportation-related policies, and transportation network assumptions.

The Santa Barbara Travel Model contains a number of enhancements that allow it to capture the effects of land use and policy initiatives contained in *Plan Santa Barbara* on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation network, parking management, and Travel Demand Management (TDM) programs. A more detailed analysis of how the fabric of urban design affects trip making and travel is also included. This is assessed using a modeling strategy known as the 4Ds, which includes an analysis of density, diversity, design, and destinations associated with the built environment.

More specifically, the Santa Barbara model features two key innovative components that are specifically intended to analyze the broadest circulation-related goals, policies, and objectives included in *Plan Santa Barbara* and articulated in **Appendix A**: the first component focuses on the built environment (the 4D process), and the second component focuses on transportation-related policies (policy-based trip reduction strategies). Each is discussed in concept below, and

their effects are described during the presentation of No Project and *Plan Santa Barbara* model results.

Built Environment 4D Factors: Density, Diversity, Design, Destination - Overview

The following narrative, prepared by Reid Ewing[7], summarizes the 4D process and is included to provide an overview of the approach:

> Some of today's most vexing problems—sprawl, congestion, oil dependence, climate change—are prompting states and localities to turn to land planning and urban design for help in reducing automobile use. Many have concluded that roads cannot be built fast enough to keep up with travel demands induced by road building itself and by the sprawling development patterns it spawns. Travel demand must somehow be moderated.
>
> The potential to moderate travel demand through changes in the built environment is the subject of more than 150 empirical studies. It has become the most heavily researched subject in urban planning.
>
> In travel research, urban development patterns have come to be characterized by "D" variables.
>
> **D**ensity is measured in terms of activity level per unit area. Density may be measured on gross or net area basis, on a population or dwelling unit basis, and on an employment or building area basis. Population and employment density are two distinct dimensions. The two are sometimes summed to compute an overall "activity density."
>
> **D**iversity is related to the number of different land uses in an area and the degree to which they are "balanced" in land area, floor area, or employment. Entropy measures of diversity are widely used in travel studies. Job-housing or job-population balance measures are less frequently used.
>
> **D**esign includes street network characteristics within a neighborhood. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming "loops and lollipops." Street accessibility usually is measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. In the occasional study, design also is measured in terms of sidewalk coverage, building setbacks, streets widths, pedestrian crossings, presence of street trees, or other physical variables that differentiate pedestrian-oriented environments from auto-oriented ones.
>
> **D**estination accessibility is synonymous with regional accessibility. In some studies, regional accessibility is simply represented by distance to the central business district. In other studies, it is represented by the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model of trip attraction measures regional accessibility.

[7] *Travel and the Built Environment*, Reid Ewing, 2009.

The 4D's compare the built environment characteristics of the future scenarios to the existing conditions on the ground as of March 2008. For each of the "D" variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each traffic analysis zone (TAZ[8]). The elasticities employed in the Santa Barbara model are as follows:

Variable[9]	**Vehicle Trip Elasticity**
Density	-0.04
Diversity	-0.06
Design	-0.02
Destination	-0.03

In practice, elasticity is a measure of the percentage change that occurs in an independent variable (vehicle trips) as a result of a percentage change in an influential variable (density, diversity, design, or destinations). For example, if vehicle trips decrease by -0.04 percent for each 1 percent increase in density, then vehicle trips are said to have an elasticity of -0.04 with respect to density. This technical memorandum documents changes between existing conditions and a future horizon-year scenario, in this case the No Project and *Plan Santa Barbara.*

Because the 4Ds are based on physical characteristics of the built environment, the calculation of these variables is an exercise in spatial modeling and the process is performed outside of the travel demand model using GIS desktop software. GIS files with land use data and the location of intersections are used as inputs. A "D" variable value for each TAZ is the output.

The density and diversity "D" variables for each TAZ take into account not only the total land use within that zone, but also the land use that is within a ¼ mile radius of that zone (¼ mile is assumed to be a reasonably conservative distance that people can easily walk). Both variables use employment and population as inputs. This process is designed to account for land uses that are "right across the street" for a person on foot or a bicycle, but would require a trip of a much longer distance if the traveler follows the model network. Thus these variables are calculated to take into account the experience of a person on foot or bike.

The design variable looks at street connectivity and sidewalk design. More connected streets (as opposed to cul-de-sacs for instance) generally allow for more direct walking and cycling, making these modes more attractive. The design variable uses the number of intersections within ¼ mile. Santa Barbara is a built-out city and there is only one notable change, the Cacique Street under-crossing, to street connectivity. Furthermore, with small block lengths, a dense grid network, and near complete sidewalk connectivity, Santa Barbara already reflects many of the ideal urban design characteristics that the design "D" looks for. This is why trip generation rates in Areas Types 1 and 2 were found to be lower than national averages. As a result, the design "D"

[8] Travel demand models use TAZs to subdivide the study area for the purpose of connecting land uses to the roadway network. For a detailed description of TAZs in the Santa Barbara Model refer to *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, 2009).

[9] Formulation of the equations uses the following data: For density, employment and population; for diversity, employment and population; for design (1) street density, (2) sidewalk completeness, and (3) route directness.

does not result in substantial vehicle trip reductions in Santa Barbara since most of the mode shift associated with it has already been achieved.

The destinations "D" is calibrated in the model structure using area types. Areas further from major regional commercial centers have higher trip rates, while areas closer to major regional commercial centers have lower trip rates. The geographic distribution of these regional commercial centers is not anticipated to change to any great extent, and so the future year scenarios carry forward the current rates for the destinations "D."

The "D" variables were calculated for both the No Project and Proposed Project (*Plan Santa Barbara*) scenarios. The No Project/Existing Policies model run assumed a continuation of the existing policy framework, including existing transportation programs, while the *Plan Santa Barbara* model run assumed a range of substantial changes in land use polices and transportation programs. A key policy issue for the City is to use the information contained in these model runs to determine the effectiveness of the proposed *Plan Santa Barbara* polices and programs on reducing trip making and congestion.

Implementation of the 4D process is not mathematically linked to the area types discussed above. Area types were developed primarily for model calibration and validation purposes, and were used in the trip reduction strategy exercise (discussed below). There is no direct causal relationship between area types and the 4Ds. However, the *effectiveness* of the 4Ds is more pronounced in areas 1 and 2, and this is discussed in more detail later in this technical memorandum.

Policy-Based Trip Reduction Strategies: Overview

In addition to a land use plan, *Plan Santa Barbara* contains a number of policy initiatives and TDM strategies aimed at strengthening Santa Barbara's alternative transportation network and encouraging travelers to shift modes. A potential range of policies was outlined by City staff and their likely effect was investigated and reported in *Plan Santa Barbara Trip Reduction Impacts Analysis* (Nelson/Nygaard, 2009). The entire report is included as **Appendix B**. (Please note that Appendix B contains within its body Nelson\Nygaard-labeled Appendices A, B, C, D, and E).

Analytical Methodology Employed

In addition to a land use plan, *Plan Santa Barbara* contains a number of transportation policies, programs and initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed to estimate the effects of these peak-hour vehicle trip reduction strategies was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall *Plan Santa Barbara* policy (please see **Appendix A**). Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as TDM requirements for new development projects), while others could also reduce existing traffic congestion (such as an expanded

subsidized transit pass program and more comprehensive parking pricing/cash-out program).

- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.
- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak hour vehicle trips in some areas and a lesser effect in others (please see discussion and figure above for location of area types).

Nelson\Nygaard estimates of the likely peak-hour vehicle trip reduction effects of *Plan Santa Barbara's* proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the *Plan Santa Barbara* context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis, we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

The analysis represents the highest and best professional standards of transportation planning. The team is confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak hour vehicle trip reduction benefits of transportation policies and programs under consideration in *Plan Santa Barbara*.

Overview of Analytical Outputs

Appendix B contains a detailed explanation of the methodology used and outputs of the analysis. Outputs of the analysis include a summary of the trip reduction strategies by area for each scenario, their effectiveness in daily versus peak hour contexts, and examples of these strategies. Highlights are provided below.

Summary of Outputs

Nelson\Nygaard's findings suggest that Santa Barbara can certainly reduce per capita vehicle trips with the implementation of trip reduction strategies. While the precise effects of specific trip reduction policies can vary depending on a number of factors, peer-reviewed empirical evidence, real-world experience of Santa Barbara[10] and other peer communities, basic economic theory,[11]

[10] The trip reduction and mode shift effects of the City of Santa Barbara's, Metropolitan Transit District, and SBCAG's programs are documented in this report and in *Plan Santa Barbara: Transportation Existing Conditions Report* (AMEC Earth & Environmental, Inc., August 2008).

[11] An oft-repeated adage of economists to guide policymakers is to "Subsidize those behaviors you want to see more of and tax those behaviors you want to see less of."

and simple common sense provide overwhelmingly support for our findings in this report that a concerted and comprehensive effort to promote mode shift and reduce vehicle trips can be effective. The order-of-magnitude estimates of likely trip reduction effects for the four different policy scenarios and each potential policy are summarized below.[12]

Aggregate Effects: Peak-Hour Trip Generation Reductions[13]

The aggregate order of magnitude reductions in peak-hour vehicle trips that result from implementation of a comprehensive package of strategies discussed in **Appendix B** are summarized below and in the table entitled "Summary of Estimated Reductions in Peak Hour Vehicle Trips," included at the end of this section.

- **No Project.** In the "No Project" scenario, there will likely be no reduction in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- ***Plan Santa Barbara*.** In the "*Plan Santa Barbara*" scenario, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 25%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 5%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 5%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 2%
- **Alternative 1.**[14] In the "Alternative 1" scenario, there will likely be no reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- **Alternative 2.** In the "Alternative 1" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 45%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 15%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

[12] The full analysis and findings, including definitions of area types and trip types, are presented in **Appendix B**.
[13] The full analysis and findings are presented in **Appendix B**.
[14] Alternatives 1 and 2 will be presented in forthcoming Technical Memoranda.

Stand-Alone Effects: Individual Strategies for Influence on Peak-Hour Trips[15]

The order-of-magnitude estimated reductions in peak-hour vehicle trips that result from implementation of individual strategies and the full findings and analysis are discussed in **Appendix B**. These estimates of the order-of-magnitude effects are based on the empirical research of each strategy's influence on peak-hour vehicle trips (as presented in Appendix B and C) and tailored to the unique conditions in Santa Barbara to influence peak-hour vehicle trips, travel behavior and mode choice.[16] Based on these considerations, Nelson\Nygaard estimates that the most effective individual trip reduction strategies in Santa Barbara will likely be a continuation and/or enhancement of the following policies and programs:

- Public parking management/pricing to discourage commuter parking.
- Parking cashout programs, including a local ordinance.[17]
- Subsidized transit pass programs.
- Safe Routes to School, with an emphasis on education and capacity building, as well as physical improvements.
- Carpooling incentives.
- Telecommuting and alternative work schedules.

As discussed below, other strategies will certainly have a substantial effect on reducing peak hour vehicle trips (e.g., enhancements to transit service), but those effects could not be quantified at this time. For more information see "Effects of Some Strategies not Quantifiable with Available Information."

Reductions in Vehicle Trip Generation Rates versus Vehicle Ownership Rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies affect each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g., lower auto ownership rates certainly correlate with lower trip generation rates), there is currently

[15] The full analysis and findings are presented in **Appendix B**.

[16] Existing conditions are discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008). As noted in **Appendix B**, there are other strategies that can affect peak-hour vehicle trips (such as enhanced transit service, expanded bicycle networks, and sidewalk and pedestrian realm improvements). Some of these strategies have been excluded from the stand-alone analysis either because there was not enough data available to reliably analyze their effects at this time (e.g., transit enhancements), their effects were accounted for in another step in the analysis (e.g., bicycle network improvements), or their impacts on *commuter* peak-hour vehicle trips was estimated to be negligible and/or within the margin of error for the purposes of this analysis (e.g., pedestrian improvements, which are important to accommodate non-commuter/non-peak trips and support peak-hour transit commuters walking to transit, but do not have a substantial impact on commuter, peak-hour vehicle trips as the vast majority of Santa Barbara residents' and employees' homes and workplaces are not located close enough to allow them to walk to work).

[17] As discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008), the State of California has adopted an existing "Parking Cashout" law that requires certain employers who offer free parking to *any* employee to offer the cash value equivalent of the free parking space to *all* employees who choose not to use the employee-provided free parking space (i.e., to "cash out" their parking space). The California Air Resource Board (CARB) is nominally responsible for enforcement of these regulations, but does not have the resources necessary to do so effectively. For this reason, many local jurisdictions (such as Santa Monica, Los Angeles, and several jurisdictions in the San Francisco Bay Area) have already adopted or are currently exploring locally- or regionally-based mechanisms to monitor compliance of employers located in their jurisdictions. For new development/employers, the City can require as a condition of approval for entitlements that any employers located in the project annually submit proof of compliance. For existing development/employers, the City can require that proof of compliance be submitted at the same time employers apply for business license renewal or pay any local business taxes.

insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those effects are already accounted for by trip reduction strategies that we were able to quantify.

Effects of Some Strategies not Quantifiable with Available Information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely effect, we indicated in our analysis in **Appendix B** that the effect was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no effect on reducing vehicle trips in reality.* Instead, these designations mean that a) the effect on peak hour trips is not significant enough to model (e.g., the effect could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g., empirical research or published case studies) to allow us to document the precise trip reduction effects for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the effects of this strategy. We have therefore excluded the effects of certain strategies from this analysis in order to avoid the risk of misstating highly localized, context-dependent benefits (e.g., enhanced transit service) or to avoid "double counting" the benefits (e.g., pedestrian improvements adequately accounted for under "street connectivity" factor of the 4D model adjustments). [18]

[18] The trip-reduction effects of bicycle network improvements and bike share programs is a good example that can be elaborated on. Naturally there will be observable before-and-after effects (e.g., mode split, percent of bicycle commuters, etc.) with the implementation of discrete bike facilities (e.g., new on-street bike lanes filling in a network gap, a new bike/ped multi-use trail, retrofitting a bridge or other "missing link" with bike/ped infrastructure). We're aware of several before-and-after studies of discrete facilities (including studies from the City of Portland and San Francisco, as well as bicycle counts included in Santa Barbara's current *Bicycle Master Plan*). One problem with some of these studies is that it is often not clear how much of the observed increase in bicycle trips is a result of mode shift (e.g., *new* bike trips coming from other modes) and how much of the observed increase is actually due to bicyclists shifting routes (e.g., choosing to travel on the enhanced route rather than their former, perhaps suboptimal, route). Another problem is that we are not aware of any studies that disaggregate the increase in bicycle trips into commuter/peak trips and non-commuter/non-peak trips (which is the purpose of this study). For example: the available research only comments on general increases in bike commuting that result from the addition of bike facilities (0.0075% increase for each additional mile per 100,000 residents) and has basically nothing to say on the effect of bike facilities on peak-hour vehicle trips. None of these potential issues means that bicycle facility improvements shouldn't be implemented, it simply means that the current state of the research doesn't allow us to disaggregate the estimated reduction in peak-hour vehicle trips because we can't reliably derive an estimate of how many of the new bicycle trips are former auto commuters. So while bike facilities and bike share programs are recommended and certainly do have impacts (especially on non-peak, non-commuter trips) and should be continued to leverage network effects and build on the success of previous investments, we don't think the research currently exists to allow us to make a reliable estimate or peak-hour vehicle trips, which is the metric deployed in the traffic model. Finally, we believe that the net effect on peak-hour commuter vehicle trips in Santa Barbara would still be relatively small (perhaps a 2-3% reduction in peak-hour vehicle trips at the most) because a) many of the gains have already been realized from previous investment in bicycle facilities, b) Santa Barbara's unique geography (e.g., hills) limits the feasible catchment area for bicycle commuting and c) Santa Barbara's jobs/housing imbalance results in long commute distances for the low-income households that are pre-disposed to commute to work by bicycle. The same is true for research on bike sharing: the current research focuses on the increase in bicycling trips rather than the decrease in peak-hour commuter vehicle trips. Even if we could reliably derive an estimate of the vehicle trip reduction effects of bikeshare programs, we believe that – even if a very robust program were to be implemented in Santa Barbara – very few existing auto commuters would be able to commute daily via a bike share program (which requires a "bikeshare pod"

Non-Additive Effects for each Policy Alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation of such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occurs concurrently. For example, a city may implement a subsidized transit pass program at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater effects when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total effects that can be achieved. For these reasons, it is not prudent to expect that the stand-alone effects of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total effects of various strategies together. Because the transportation policies and programs under consideration in the various *Plan Santa Barbara* alternatives would be implemented concurrently as a package (in fact some trip reduction strategies are already in effect), we have estimated the total effect for each alternative using a non-additive methodology. For example, when summing the effects of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated effects of other trip reduction strategies when developing our estimate of the total estimated effects for certain policy alternatives.

The No Project/Existing Policies Alternative generally assumes a continuation of successful City polices and programs that have the potential to effectuate a gradual continued shift from the automobile to other forms of transportation. However, in order to provide a conservative and reasonable worst-case analysis, this scenario assumes a continuation of the existing mode split. The Proposed Project scenario introduces an array of additional policies and programs and the vehicle trip generation rates are reduced to varying degrees based on their purpose, origin and destination.

The reductions in *Plan Santa Barbara Trip Reduction Effects Analysis* were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas (shown below) were reduced by different levels. Trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4. Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

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within walking distance of both trip ends to avoid accruing usage fees for all day). However, bike share programs can support auto commuters switching to other modes (transit, carshare, etc.) by providing them with more mobility choices at the work destination should the need arise for an unscheduled trip that is too far to walk. Since bike share programs don't have a substantial *direct* effect on peak-hour commuter trips (but instead *indirectly* leverage the effectiveness of other programs), we have excluded them from our analysis.

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

FUTURE (YEAR 2030) NO PROJECT SCENARIO MODEL DISCUSSION

4D Effects

The total amount of new growth projected in the No Project scenario is quite modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to the existing General Plan can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[19]	7.3 percent
Employment[20]	9.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated to change is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

Figure 5 illustrates the change in the density variable between existing conditions and the No Project scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. The figure illustrates that density increases are anticipated largely within the MODA boundaries, and these are modest based upon built environment assumptions. The darker green colors indicate the most pronounced change in density changes, resulting in the highest trip rate reductions. In outlying portions of Santa Barbara, large areas have minimal or no change, reflecting little change in density. Again, these density results show the extent to which the change in density is relatively higher or lower when comparing existing conditions and future conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the No Project scenario. Diversity focuses on the relative mix of jobs and population relative to regional jobs and population, and the figure shows the rate of change between the two scenarios (existing conditions and the No Project scenario). These results are a direct derivation of built environment characteristics. The diversity variable reflects the degree to which an existing area has a jobs/housing mix more or less diverse than regional averages, and Figure 6 shows the extent to which that changed (the TAZ became more diverse) and effected vehicular traffic between existing conditions and the No Project scenario.

The 4Ds are an elasticity, and just as an increase in the "D" variables between existing and future conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

[19] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[20] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

No Project Policy-Based Trip Reduction Strategy Effects

There will likely be no reduction in peak-hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Commuter Trip Reduction Effects: 0%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%

Based on this conclusion, there is no effect of policy-based trip reduction due to the policy strategies for the No Project scenario. Please see **Appendix B** for the No Project conclusion for each strategy.

No Project Model Results

Figure 7 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2 (existing conditions). The figure illustrates a variety of trends, described below:

- Traffic volumes across all study segments are projected to grow by approximately 17% with the addition of the existing general plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 14%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 23%.

While traffic volumes will increase on all facilities, the relative share of study area traffic carried by the freeway is expected to decline slightly. An expanded discussion of this topic is provided in the *Plan Santa Barbara* discussion below.

Future No Project Peak Hour Freeway Volumes

Figure 8 presents AM and PM Future (Year 2030) No Project scenario peak hour freeway forecast volumes. The figure illustrates the following trends:

- Overall, peak hour freeway volumes are projected to grow by 14% during the AM peak hour and 14% during the PM peak hour.
- As in the existing conditions, the travel patterns change slightly depending on whether one is looking at the volumes north or south of Garden Street. The additional southbound lane has the most pronounced impact south of Garden Street.
- Many of these freeway segments will be operating at or worse than LOS D, including sections operating at LOS F. Highlights include the following:
    - Freeway segments north of Carrillo will operate at LOS E or F in the PM peak hour in both directions
    - Northbound 101 north of Milpas shows volumes exceeding theoretical capacities during the AM peak hour
    - Freeway segments south of Milpas will operate at LOS E or F, southbound, in the PM peak hour

  - Freeway segments south of Hot Springs show volumes exceeding theoretical capacities, northbound in the AM peak and southbound in the PM peak

- As a result, the percentage growth in freeway volumes in the off-peak direction will likely outpace growth in the peak direction since the off-peak direction has more capacity to accommodate the growth. As mentioned, growth in traffic in the peak direction would likely take the form of peak spreading. This phenomenon is now common in the United States, where the peak period occurs for more than one hour during the evening.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 13% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 30% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 14% on US-101 northbound and while traffic volumes are projected to grow by 12% on US-101 southbound.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street. This is due to shifting travel patterns south of Garden Street and additional southbound capacity south of Garden Street.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street, growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two. This is primarily due to changes in capacity southbound south of Garden Street.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 24% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 17% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 12% on US-101 northbound and traffic volumes are also projected to grow by 12% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

Future No Project Peak Hour Intersection LOS

Table 3 and Figure 9 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, additional development under the existing general plan in the coming two decades will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the

City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represent 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. This number falls to 20 study intersections, or 38%, with further development under the existing General Plan.

While this increase in deficient intersections is substantial, it should not necessarily be extrapolated to all intersections in the City. City staff specifically selected the study intersections for this analysis in areas with higher levels of activity and in places that were likely to become congested. It is likely that many intersections in areas removed from the City's major activity centers would not be affected to the same extent.

Figures 10 and 11 chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the No Project (2030) scenario, and the Proposed Project (2030) scenario. Congestion levels are generally lower during the AM peak hour in both analysis years. The PM peak hour shows a trend towards worse LOS between 2008 and 2030 under the No Project scenario, with the most frequent LOS moving down to C from B and a greater frequency of intersections operating and LOS E or F.

A closer examination of the forecast data, shown on Figure 9, reveals some notable trends. The greatest congestion levels are currently experienced during the peak hours at or near freeway ramps. This trend will not only continue, but will escalate with the additional development under the existing general plan, as shown by the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and seven, or 44%, are deficient during both peak hours. These rates are substantially higher than for the study intersections as a whole, when 33% are deficient during one peak hour and 29% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, 10, or 63%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

FUTURE (YEAR 2030) PROPOSED PROJECT MODEL DISCUSSION

4D Effects

The total amount of new growth projected in *Plan Santa Barbara* is relatively modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to *Plan Santa Barbara* can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[21]	7.4 percent
Employment[22]	8.2 percent

[21] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[22] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

In addition, since the 4D effects measure change from a base condition, those communities with base level (1) higher density; (2) better diversity; (3) stronger design; and (4) establishment as a destination – compared to regional and national averages – will show less overall impact of the Ds when comparing base conditions with future conditions. In other words, if existing Santa Barbara transformed from low density, wholly residential, poorly connected, remote community to something just the opposite in the future, the Ds would show significant effects on trip generation between existing and future conditions. However, as the model effort shows, Santa Barbara's base condition is characterized by beneficial densities, good diversity, excellent design, and a strong role as a destination. It is therefore much more difficult to realize high trip reductions attributable to the Ds. In order to emphasize this issue further, a model run was conducted to *Plan Santa Barbara* without the Ds and with the Ds to measure the difference. The results are as follows:

Daily Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of trips reduced: 1,498
- Percent reduction: -0.22 percent
- Vehicle miles of travel reduced: 3,703
- Percent reduction: -0.13 percent

VMT is most strongly influenced by destination accessibility; effects of density, diversity, and design. Since downtown Santa Barbara is already a strong regional destination, the overall impact of this D on trip generation is somewhat muted.

Peak Hour Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of total trips reduced: 254
- Percent reduction: -0.24 percent
- Number of home-based work trips reduced: 28
- Percent reduction: -0.54 percent

While these reductions are arithmetically modest, they in no way indicate a lack of 4D effectiveness in Santa Barbara. Quite the contrary, the City is already experiencing many of the benefits attributable to the D factors, and *Plan Santa Barbara* furthers that trend.

Figure 5 illustrates the change in the density variable between the existing conditions and the Proposed Project scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. Overall, the changes are rather modest reflecting the magnitude of changes inherent in the built environment assumptions for *Plan Santa Barbara* when compared to existing conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Proposed Project scenario. The 4Ds are an elasticity, and just as an increase in the "D" variables

between future and existing conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

An overview comparison of Figures 5 and 6, focusing on the No Project scenario and *Plan Santa Barbara* reveals the following:

- Built environment assumptions reveal only modest changes in density compared to existing conditions. As discussed above, elasticities will be most noticeable in results when changes in a variable such as density have 50 percent, 100 percent, or even higher percentage changes compared to a base condition.
- Both scenarios include built environment assumptions that result in noticeable changes in diversity. The most pronounced effects are west of US-101 and south of State Street, indicating that is where the existing mix of jobs and housing was most purposefully altered.

These conclusions do not indicate that the D effects are not important. Quite the contrary, Santa Barbara happens to be characterized by effective density and diversity when compared to regional and national averages. However, the figures do show that major density and diversity changes – 50 percent, 100 percent, or more – would be necessary to alter the overall theme of Figures 5 and 6 for a city with substantial development. Such changes may be entirely inconsistent with other quality of life goals, policies, and objectives. The beneficial relationship between Santa Barbara's existing 4D qualities with policy-based trip reduction strategies, as discussed below, is significant.

Policy-Based Trip Reduction Strategy Effects

When compared to the 4D process, these trip reduction strategies have a much more pronounced impact on trip generation. To better understand the magnitude of these strategies, model runs were conducted with and without the trip reduction strategies to document the results, presented as follows:

Daily Traffic Volume Changes Attributable to trip reduction strategies, *Plan Santa Barbara*:

- Number of trips reduced: 5,183
- Percent reduction: -0.77 percent
- Vehicle miles of travel reduced: 15,227
- Percent reduction: -0.53 percent

Peak Hour Traffic Volume Changes Attributable to the Ds, *Plan Santa Barbara*:

- Number of total trips reduced: 963
- Percent reduction: -0.92 percent
- Number of home-based work trips reduced: 239
- Percent reduction: -4.65 percent

The combined effect of the 4D process and trip reduction strategies yields the following conclusions:

- Changes in the built environment, measured by the 4D process, result in less than a one percent decrease in trips when compared to a model run without the 4D process.
- Implementation of trip reduction strategies results in over a 4.5 percent decrease in trips when compared to a model run without the trip reduction strategies.
- The combined effect of the 4D process and the trip reduction strategies results in a 5.19 percent decrease in peak hour home-based work trips, which is a measurable and significant conclusion.

On a TAZ-specific level, Cottage Hospital experienced the largest decrease in daily trips, totaling 131 trips. This is because of the change in land use in and around this zone and the raw number of trips that go there. The traffic analysis zone bounded by US-101, Calle Cesar Chavez, Montecito Street, and Quarantina experienced the greatest individual percent reduction, or 1.27 percent of all trips. This reflects the relatively low existing density and diversity and the effects that small changes in land use in and around this TAZ can have.

There are a number of reasons why the overall magnitude of trip reduction appears relatively modest. As discussed, the 4D process is most pronounced when changes occur in a relatively "poor" built environment (from the 4D perspective) to a relatively better built environment (from the 4D perspective). The trip reduction strategies, which have a more pronounced impact, must be considered within the context of trip purposes. These strategies, as extensively discussed earlier and in Appendix B, have their primary impact on home-based work trips during the peak hour. *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009), documented the fact that only 15 percent of total daily trips in Santa Barbara are home-based work trips (compared to the California average of 21 percent). The strategies, therefore, will have their most pronounced impact on 15 percent of all daily traffic. This helps explain why the percentage reduction is not significantly higher.

The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities used are conservative, so there is an absence of significant 4D-related effects when we compare existing conditions with future runs and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter and the City's development focus within the MODA has great merit. The majority of future growth through 2030 is projected to occur within the MODA.

The *Plan Santa Barbara* employment and residential density concentration, first in the Downtown core, and then in the MODA, is a sound strategy to address the City's high-level circulation goals and objectives. Since the 4Ds are an elasticity based on percentage change, and Downtown already has the highest 4D variables, it is hard to achieve a large percentage change. Having said that, the reason to focus development Downtown, especially employment, is to take advantage of centralizing activity to be serviced by various TDM programs as quantified by Nelson\Nygaard. This did take advantage of all the D variables, since Downtown has the most responsiveness to diversity, density, design, and destinations.

Note that the trip reduction strategies were numerically strongest within area type 1 (Downtown) and area type 2 (which incorporates the MODA). Centralizing residential and commercial uses in the MODA surrounding Downtown had the greatest *incremental* effect related to the 4Ds and the

most successful realization of trip reduction strategies. The impact of the 4D process and the trip reduction strategies is relatively less significant outside the MODA.

Plan Santa Barbara Model Results

Figure 12 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2. The figure illustrates a variety of trends:

- Traffic volumes across all study segments are projected to grow by approximately 16% with the addition of the Proposed Project General Plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 14%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 20%.

Traffic volumes will increase on all facilities relative to the existing conditions. Freeway volumes will see an increase similar to the No Project scenario, but surface streets will see a lesser increase than the No Project scenario. Surface street volume increases are directly attributable to land use changes inherent in the 2030 socioeconomic data set. Freeway volume changes are more complex.

The following table illustrates the percentage share of freeway volumes for both existing conditions and *Plan Santa Barbara*:

Freeway Trip Category	**Existing % of Total**	**PlanSB % of Total**
Internal trips (within model area)	24%	20%
Internal-external trips	19%	15%
External-internal trips	36%	39%
Santa Barbara subtotal	*79%*	*74%*
External-external (through)	21%	26%
Total Freeway	100%	100%

This indicates that fewer Santa Barbara internal trips will utilize the freeway in the future when compared to existing conditions. Congestion associated with increasing through trips and external-internal trips is pushing internal trips and internal-external trips off the freeway, hence the decline. The increase in freeway capacity for trips heading south toward Ventura is reflected in the external-internal increase (since those trips are generally motorists heading to jobs in Santa Barbara). There is no real gain in capacity heading north toward Goleta, which is closer and probably draws more internal-external trips compared to the southbound direction. Travel patterns change north and south of Garden in direct response to changes in freeway capacity in those locations – adding an additional freeway lane south of Garden, but not north of Garden.

Future Proposed Project Peak Hour Freeway Volumes

Figure 13 presents AM and PM Future (Year 2030) Proposed Project scenario peak hour freeway forecast volumes. The figure illustrates the same general trends as the No Project scenario, though increases are less than the No Project scenario:

- Overall, peak hour freeway volumes are projected to grow by 12% during the AM peak hour and 13% during the PM peak hour.
- In general, peak hour freeway volumes show the same pattern and trends as the No Project scenarios, with a slightly smaller increase over the existing conditions.
- Overall highlights include the following:
    - Freeway segments north of Mission will operate at LOS E or F northbound in the AM peak hour and southbound in the PM peak hour
    - The northbound 101 segment north of Milpas will operate in excess of its theoretical capacity during the AM peak hour
    - Freeway segments south of Hot Springs show volumes that exceed the freeway's theoretical capacity, northbound in the AM peak hour and southbound in the PM peak hour

As described, peak hour forecasts that indicate volumes in excess of capacity point to peak hour spreading, since these oversaturated conditions cannot be achieved during one peak hour.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 11% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 28% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 11% on US-101 northbound while traffic volumes are projected to grow by 8% on US-101 southbound.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 22% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 16% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 10% on US-101 northbound and traffic volumes are also projected to grow by 10% on US-101 southbound.

- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

In general, there are no significant differences between freeway segment peak hour forecasts when comparing No Project (Figure 8) with *Plan Santa Barbara* (Figure 13) volumes. While there are some numerical differences, they are relatively insignificant from a forecasting perspective. This conclusion is consistent with the previous analysis of freeway traffic composition, including the anticipated increase in through traffic associated with both future model runs.

Future Proposed Project Peak Hour Intersection LOS

Table 5 and Figure 14 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, development of the Proposed Project will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represents 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. Under the No Project scenario, this number falls to 20 study intersections, or 38%. Under the Proposed Project 26 study intersections, or 50%, will operate at or better than the City's LOS standard during both peak hours.

As mentioned, the study intersections were selected in the areas most likely to become congested, and so the results should not necessarily be extrapolated to the City as a whole. Notably, the peak hour conditions at the study intersections do deteriorate from the existing conditions however, they do not fall to the same level as conditions under the No Project scenario.

Figures 10 and 11, chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the No Project (2030) scenario, and the Proposed Project (2030) scenario. During the AM peak hour, considerably more intersections are maintained at LOS A than under the No Project Alternative. During the PM peak hour, considerably more intersections are maintained at LOS B than under the No Project scenario.

Plan Santa Barbara is anticipated to result in fewer LOS E and LOS F intersections when compared to the No Project alternative. These beneficial level of service results for *Plan Santa Barbara*, when compared to the No Project, are explained by two factors:

- The built environment assumptions. *Plan Santa Barbara* features more population and less employment than the No Project, resulting in fewer impacts at busy intersections. This effect, however, is minimal since the population and employment differences between the scenarios are small.
- Implementation of the Nelson\Nygaard trip reduction strategies. These strategies, which are only implemented with *Plan Santa Barbara*, have ramifications that translate into superior results at busy intersections.

Traffic forecasts for the Proposed Project scenario show the same trends as the existing conditions and the No Project scenario. Specifically, the intersections with the greatest levels of congestion are typically freeway ramps, or within ¼ mile of freeway ramps. The other continuing trend is that traffic volumes increase less than under the No Project scenario, including the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and five, or 31%, are deficient during both

peak hours. These rates are substantially higher than for the study intersections as a whole, when 32% are deficient during one peak hour and 19% are deficient during both peak hours.

- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, seven, or 44%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

Other Measures of Effectiveness

Table 6 illustrates four macro-scale MOEs used to compare general plan scenarios. The trends these measures show are consistent with the trends shown in the segment volumes and intersection levels of service. In general both future scenarios show increases in travel, and in general the Proposed Project scenario shows smaller increases in travel than the No Project scenario.

The notable exception to the latter point is with average vehicle trip length. There are two factors causing this number to rise between the existing conditions and the future conditions, and again slightly between the No Project scenario and the Proposed Project scenario. The first is that Santa Barbara will continue to attract more trips than it generates. As such, people will continue to visit Santa Barbara to work, shop, and recreate. Having more travelers entering and exiting the study area means more travelers making the longest trip measurable in the model area.

The second factor contributing to the rise in average trip length is the expected mode shift as quantified by the 4Ds and the policy based reductions. In general, these factors are more likely to reduce shorter vehicle trips than longer vehicle trips. People who are currently driving to meet their basic needs – a trip to the grocery store, drug store, or dry cleaners – may now be able to meet these needs without the use of a vehicle. Even when longer range trips see a shift to another mode (e.g., a work trip), there is often a corresponding shorter range trip that also shifts to another mode (e.g., a lunch trip). Thus, a mode shift in common shorter range trips can actually serve to increase the overall average vehicle trip length.

Overall the forecast results presented show a logical consistency with the differences in policies and land use between the two future scenarios and the existing conditions.

RECOMMENDED GUIDANCE FOR POLICY EFFECTIVENESS

Based on the results of the first two horizon year model runs, we recommend the following areas of emphasis. These recommendations are provided to (1) further reduce VMT; and (2) improve level of service at LOS E and F intersections:

1. The total amount of new growth projected in *Plan Santa Barbara* is relatively modest compared to the quantity of existing development given the 22-year time horizon. Major reductions in the sheer amount of growth are therefore not a recommended strategy.

2. The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities we use are conservative, so we are not experiencing dramatic 4D-related effects when we compare existing conditions with future runs and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter, and where there is the opportunity to guide new development between multiple locations, we recommend the following in order to ensure that all new development contributes as minimal amount of new vehicle trips as possible:

    a. Employment and residential density should be concentrated first in the Downtown core, then in the MODA. Since the 4Ds are an elasticity based on percentage change, and Downtown already has the highest 4D variables, it is hard to achieve a large percentage change. The reason to focus development Downtown, especially employment, is to take advantage of centralizing activity to be serviced by various TDM programs as quantified by Nelson\Nygaard. This will take advantage of all the D variables, since Downtown has the most responsiveness to diversity, density, design, and destinations.
    b. Centralizing residential and commercial uses in the MODA surrounding Downtown will have the greatest *incremental* effect related to the 4Ds.
    c. Employment and residential uses should be clustered whenever possible around the richest fixed-route transit (bus and rail) nodes and corridors.

3. Peak hour commute trips continue to be an issue, as evident in (1) continued intersection LOS issues at all ramp terminals; and (2) average vehicle trip length getting longer with the *Plan Santa Barbara* (compared to existing conditions). This could be addressed by adding additional housing in the Downtown core and in the MODA and implementing new or expanded commuter/peak-hour transit service and TDM programs such as subsidized transit pass programs, carpool/vanpool programs, telecommute programs, and parking pricing to discourage commuter parking downtown.[23]

    Santa Barbara is an existing and projected job-rich area. Non-residential trips are projected to grow at a greater rate than the residential trips. Which is to say, under the *Plan Santa Barbara* land use scenario, the model area is attracting more trips than it is producing. We had to make certain adjustments in the model environment, since the 2030 model "exacerbates" to some extent the existing jobs/housing balance in Santa Barbara – we had to bring in relatively more workers, compared to 2009, to balance the 2030 model. More specifically, the following changes were completed relative to current travel patterns:

[23] Nelson\Nygaard's *Trip Reduction Impact Analysis Memo* provided highly conservative estimates of the effects of all of these programs with the exception of regional transit services (there wasn't enough information was available to confidently derive a reliable estimate of the reduction in vehicle trips due to enhanced commuter/peak-hour transit service).

- For home-based work trips, we decreased internal-external/external-internal productions by 1% and increased internal-external/external-internal attractions by 2%. In other words, we exported fewer Santa Barbara residents to work outside Santa Barbara, and imported more non-Santa Barbara workers to fill Santa Barbara jobs.

- For home-based other trips, we decreased internal-external/external-internal productions by 3% and increased internal-external/external-internal attractions by 5%. In other words, for other trips between a residence and any non-workplace location, we decreased the number of Santa Barbara residents leaving the study are and increased the number of non-Santa Barbara residents entering the study area.

- For non-home-based trips, we decreased internal-external/external-internal productions by 1% and increased internal-external/external-internal attractions by 1%. In other words, for trips that do not begin or end at a residence, we increased those that would be met by Santa Barbara workers traveling outside the study area and increased trips by those by workers from outside the study area entering Santa Barbara.

The sum of these adjustments, while not excessive relative to the total number of trips in the model, is symptomatic of conditions in a job-rich, regional destination with significant shopping and service resources. As indicated above, additional housing within Downtown and the MODA will have beneficial effects on addressing these conditions. And while the travel demand model does not specifically distinguish between affordable and non-affordable housing product types, "workforce" housing in Downtown and the MODA will provide a beneficial match to nearby available job locations.

4. The trip reduction strategies articulated in Nelson\Nygaard's work are very effective at reducing vehicle trips compared to scenarios without the strategies. Trip for trip, they are going to have a more significant incremental effect than the 4Ds *because many of the trip reduction strategies are not already in place – and those that are in place could be enhanced and expanded – and therefore have a more pronounced impact on existing and future trips*. These strategies will be most effective when employed simultaneously with the areas where the 4D effects are most pronounced, so recommendations 2 and 3 work in sync with one another.

5. Many of the vehicle trip reduction effects related to bicycles and pedestrians (calculated with the 4Ds) have already been realized due to the long-standing and forward-thinking investments in pedestrian and bicycle improvements by the City of Santa Barbara and its regional partners. For this reason, while additional pedestrian and bicycle improvements are important to leverage network effects and build on the success of previous investments, the model estimates that Transportation Demand Management policies (e.g., parking management, subsidized transit passes, etc.) will have larger effects on reducing peak hour vehicle trips in the future.

It is important to recognize that without any major changes in travel behavior by Santa Barbara's residents and visitors, traffic congestion will increase with increased development. Similarly, Santa Barbara's role as regional destination will contribute to increased congestion as surrounding areas grow and more people visit Santa Barbara. Changing behavior for residents

and visitors may include shifting travel to non-drive-alone modes, such as transit and carpooling for longer distance trips, and walking, biking, and transit for shorter distance trips. City policies that encourage walkable neighborhoods to decrease the reliance on the automobile for those who wish to move to those areas, and decrease the desirability of driving alone for everyone in areas of concentrated activity, will help allow Santa Barbara to grow while minimizing adverse affects to traffic.

FIGURES:

1. PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS

2. EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES

3. EXISTING (YEAR 2008) PEAK HOUR FREEWAY FORECAST VOLUMES

4. EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE

5. PERCENT CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE NO PROJECT AND PROPOSED PROJECT SCENARIO

6. PERCENT CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE NO PROJECT AND PROPOSED PROJECT SCENARIO

7. FUTURE (YEAR 2030) NO PROJECT SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

8. FUTURE (YEAR 2030) NO PROJECT SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

9. FUTURE (YEAR 2030) NO PROJECT SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

10. AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

11. PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

12. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

13. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

14. FUTURE (YEAR 2030) PROPOSED PROJECT SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

TABLES:

1. YEAR 2008 WEEKDAY EXISTING CONDITIONS INTERSECTION LEVELS OF SERVICE

2. PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER

3. YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS INTERSECTION LEVELS OF SERVICE

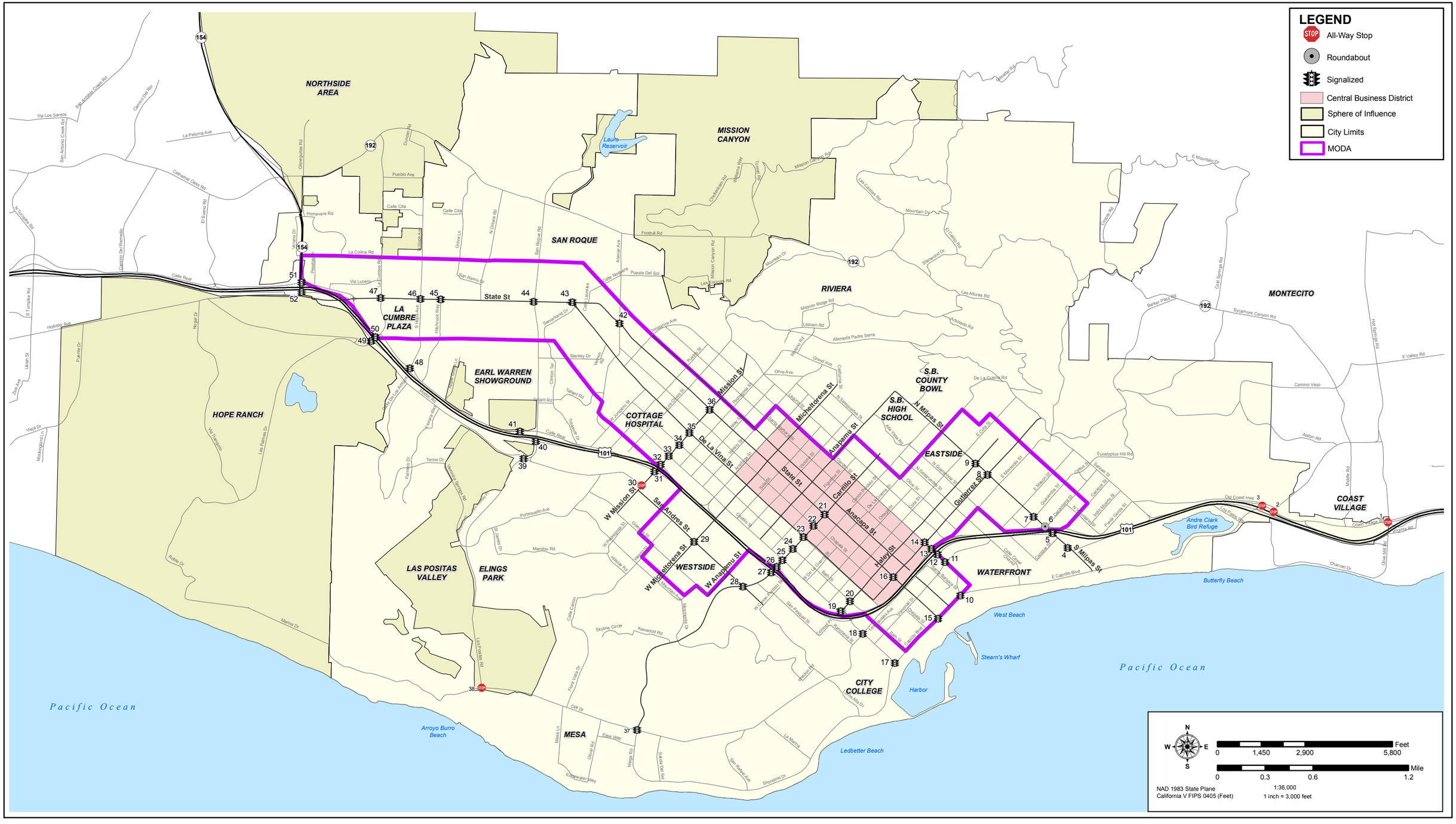
4. NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

5. YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS INTERSECTION LEVELS OF SERVICE

6. MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

APPENDIX A: *Plan Santa Barbara* EIR Assumptions 4-15-09 (City of Santa Barbara)

APPENDIX B: Nelson\Nygaard Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis 7-8-09



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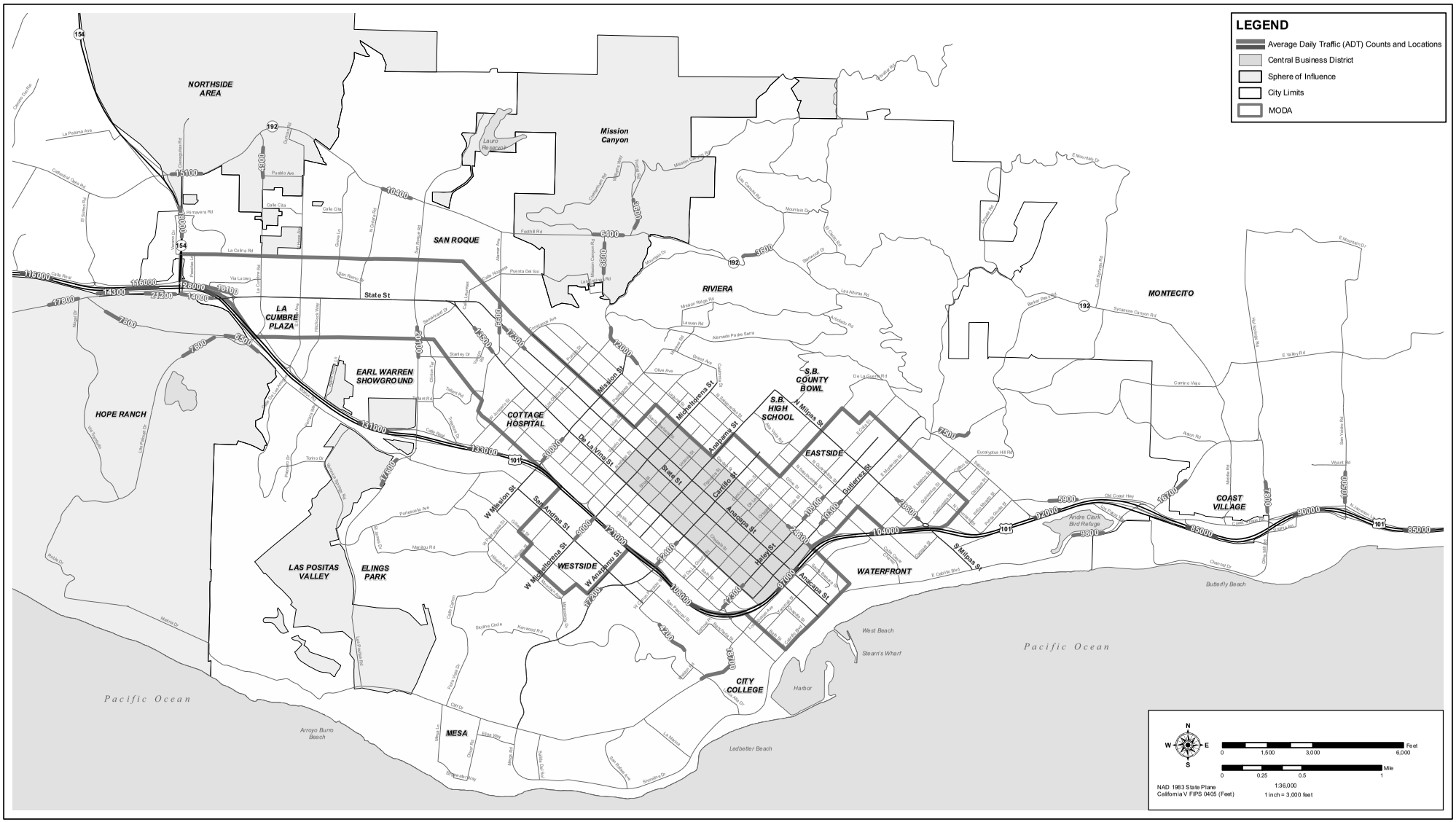
PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS
FIGURE 1



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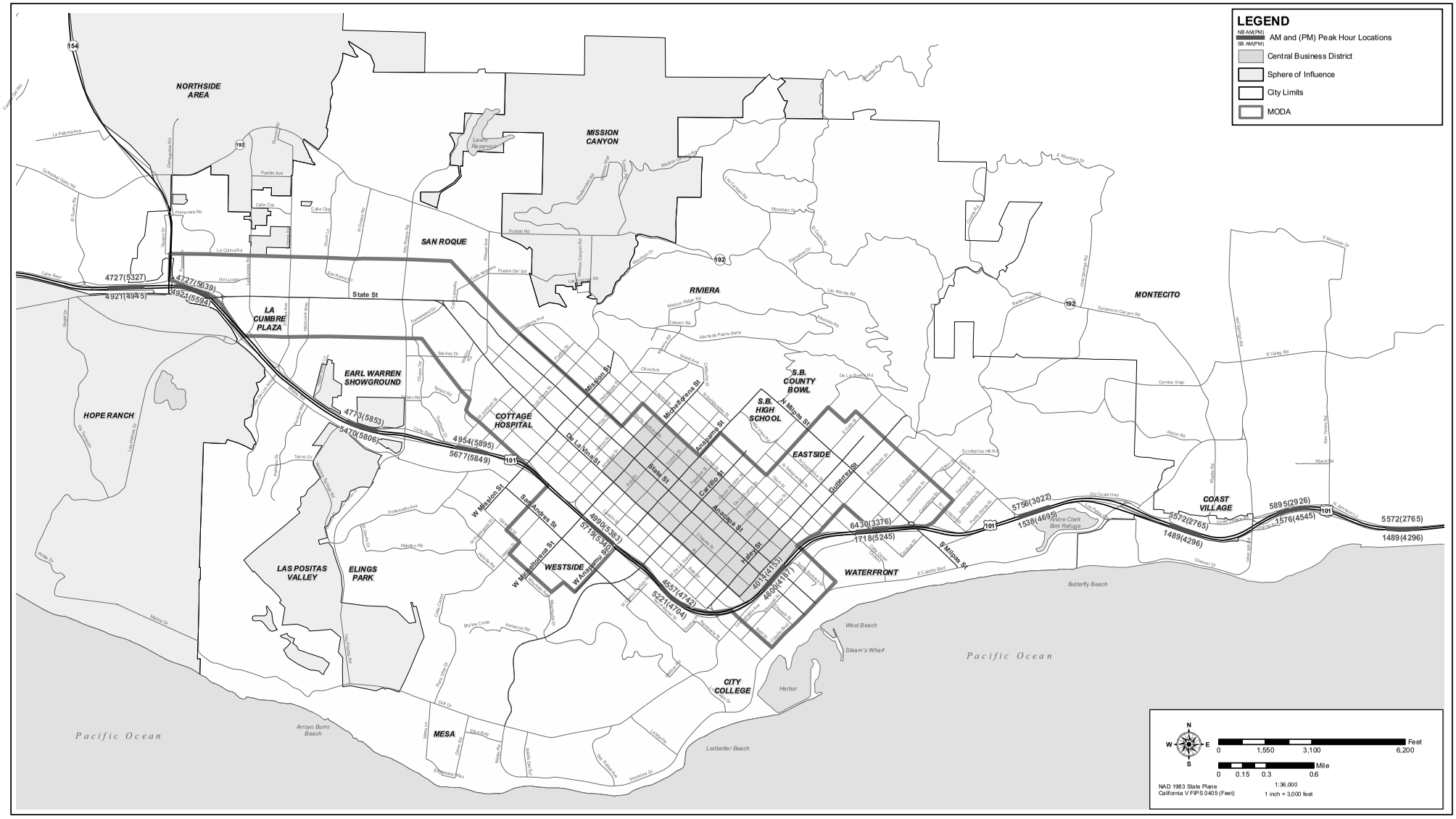
EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES
FIGURE 2



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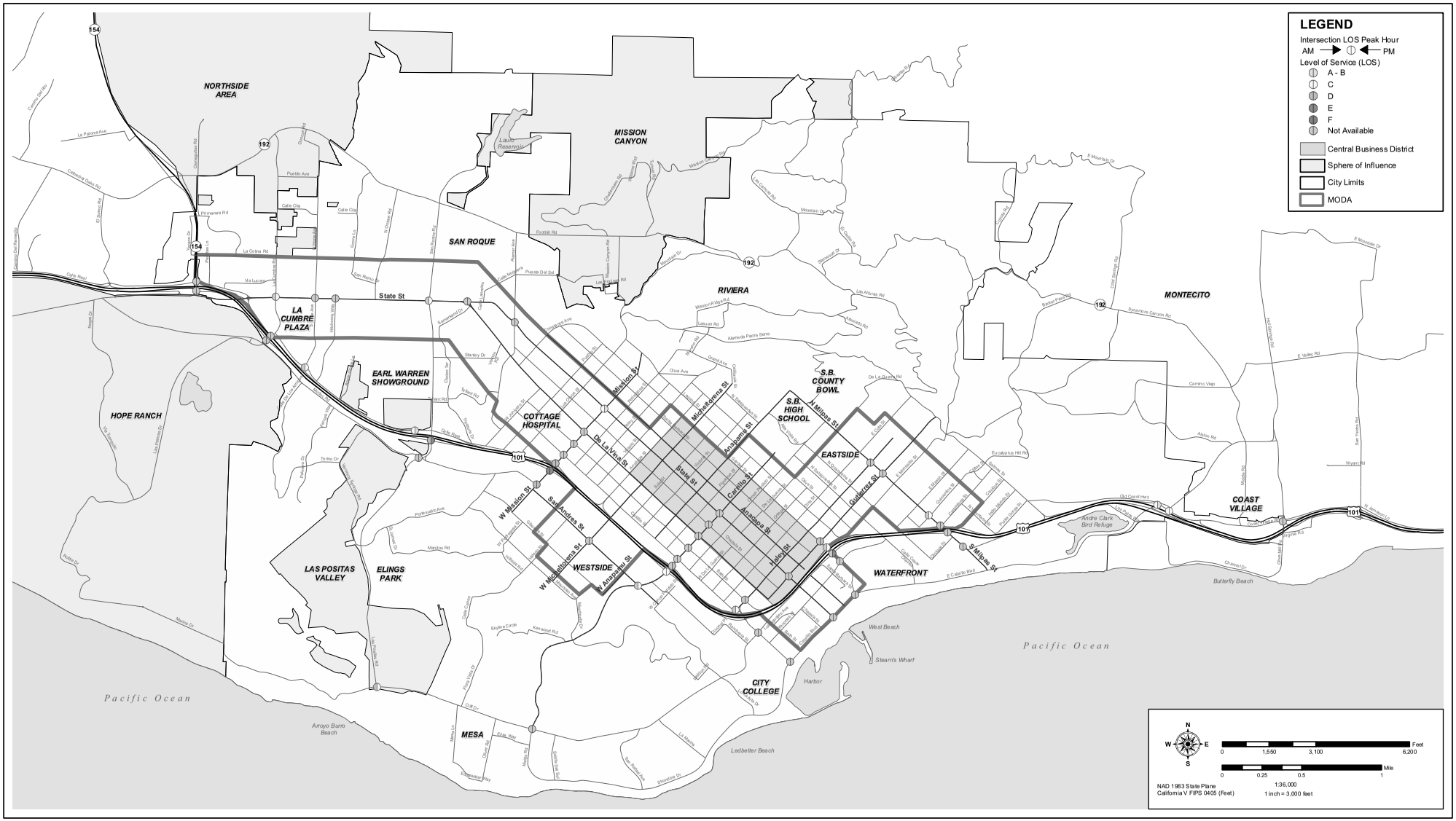
EXISTING (YEAR 2008) PEAK HOUR FREEWAY VOLUMES
FIGURE 3



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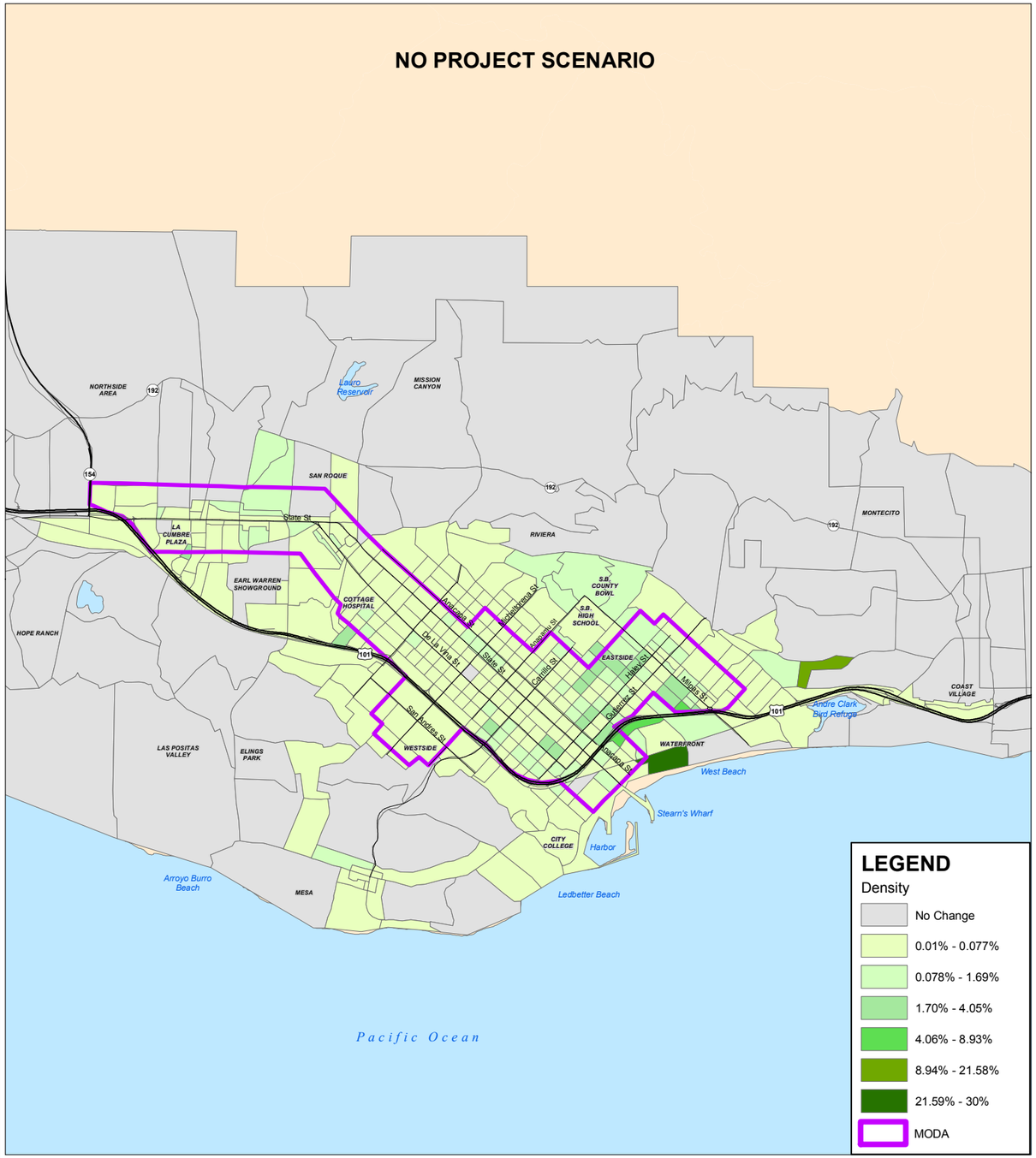
EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE
FIGURE 4

NO PROJECT SCENARIO

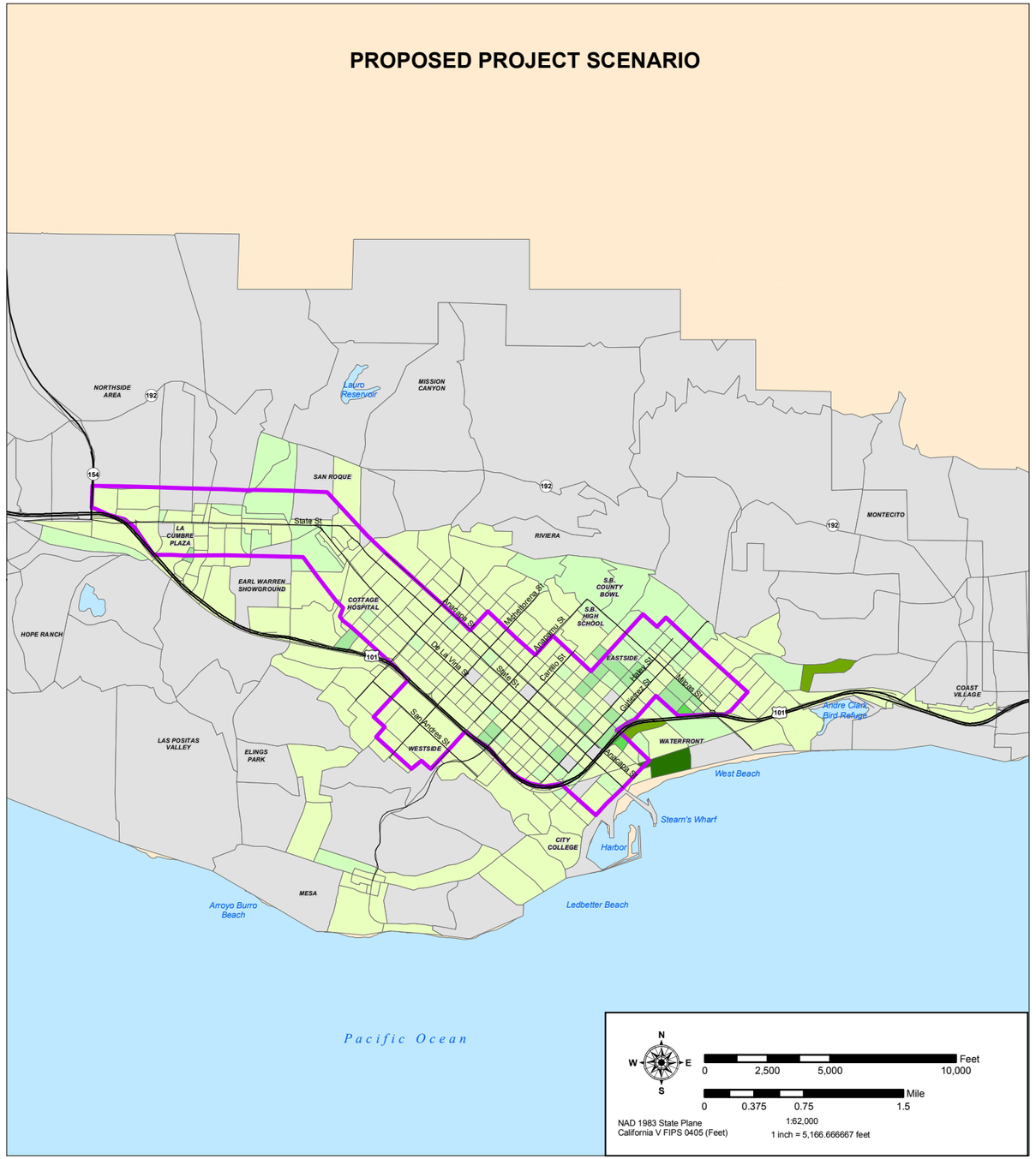


LEGEND

Density

- No Change
- 0.01% - 0.077%
- 0.078% - 1.69%
- 1.70% - 4.05%
- 4.06% - 8.93%
- 8.94% - 21.58%
- 21.59% - 30%
- MODA

PROPOSED PROJECT SCENARIO



N
W E
S

0 2,500 5,000 10,000 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane
California V FIPS 0405 (Feet)

1:62,000
1 inch = 5,166.666667 feet

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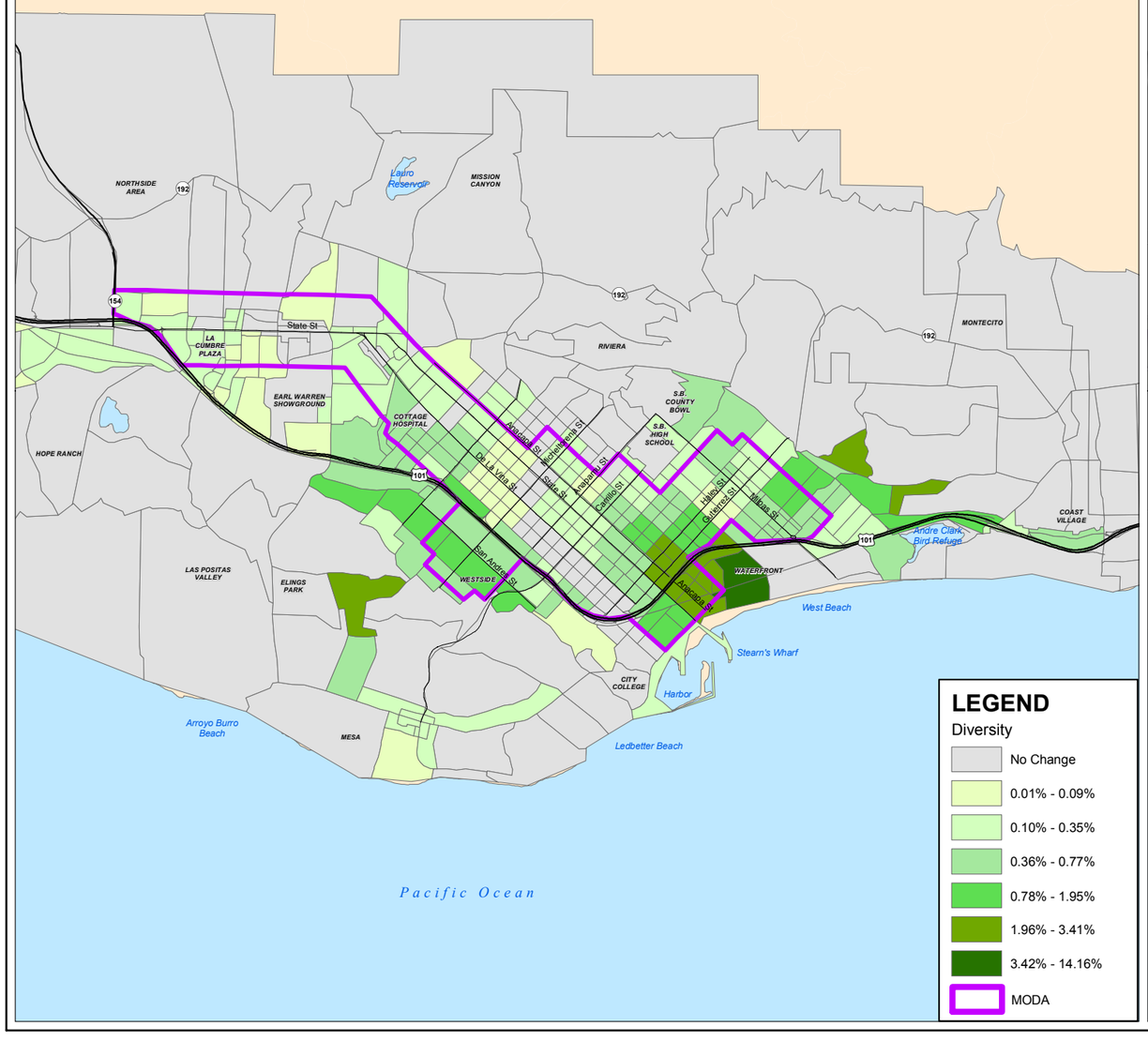
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE *NO PROJECT* AND *PROPOSED PROJECT SCENARIO*

FIGURE 5

NO PROJECT SCENARIO

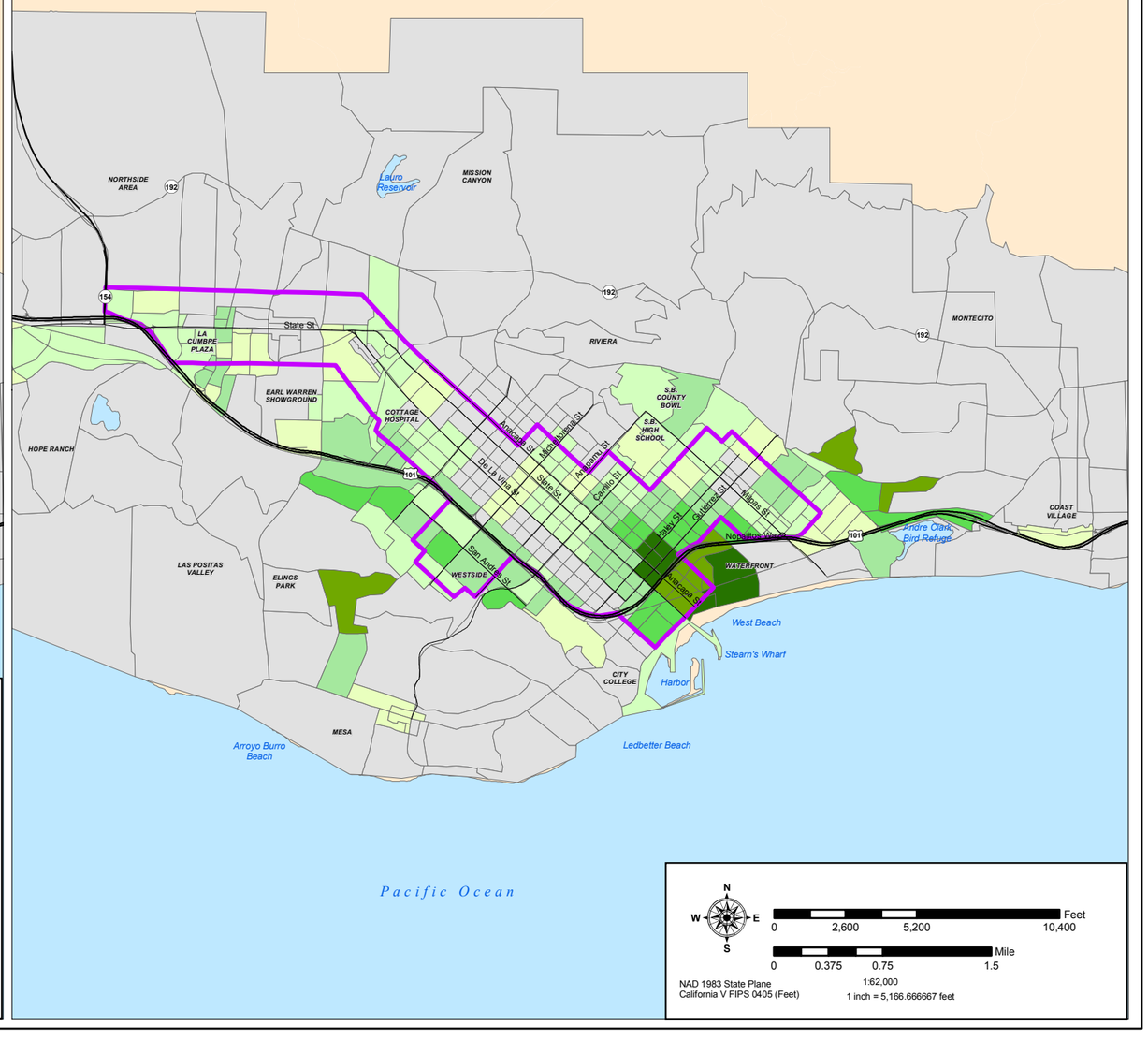


LEGEND

Diversity

- No Change
- 0.01% - 0.09%
- 0.10% - 0.35%
- 0.36% - 0.77%
- 0.78% - 1.95%
- 1.96% - 3.41%
- 3.42% - 14.16%
- MODA

PROPOSED PROJECT SCENARIO



N
W E
S

0 2,600 5,200 10,400 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000

1 inch = 5,166.666667 feet

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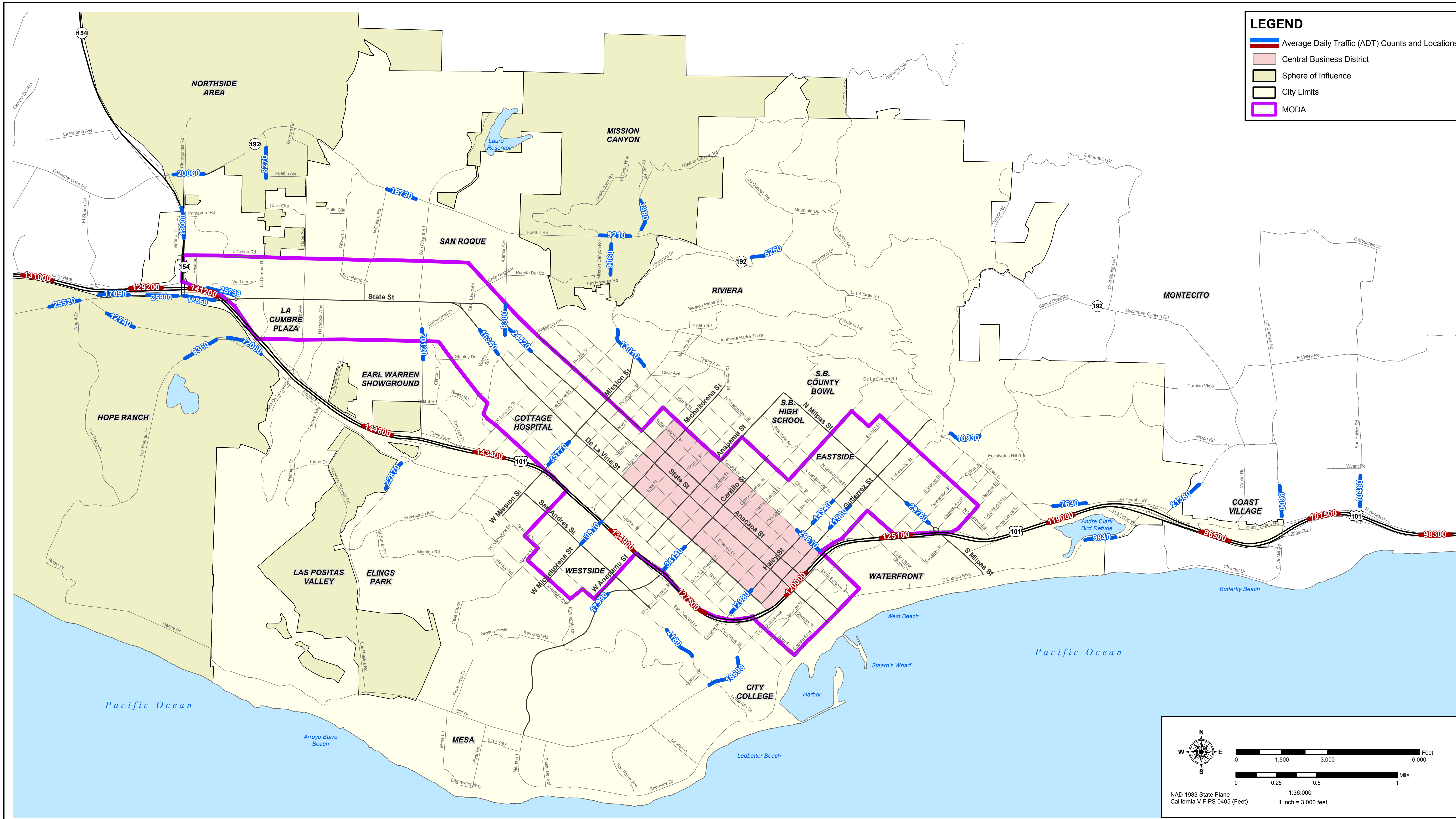
PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE *NO PROJECT* AND *PROPOSED PROJECT SCENARIO*

FIGURE 6



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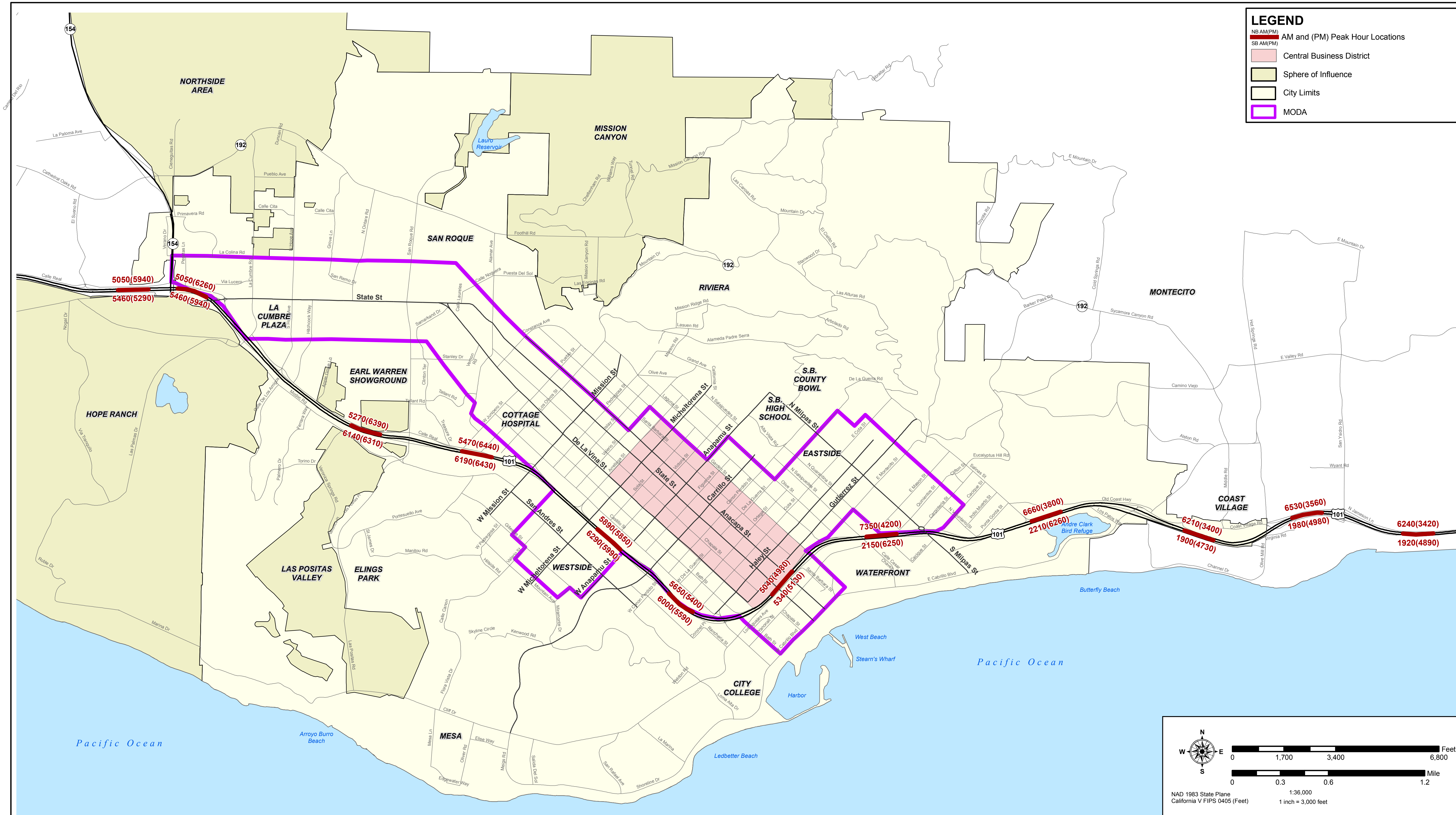
FUTURE (YEAR 2030) *NO PROJECT SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 7



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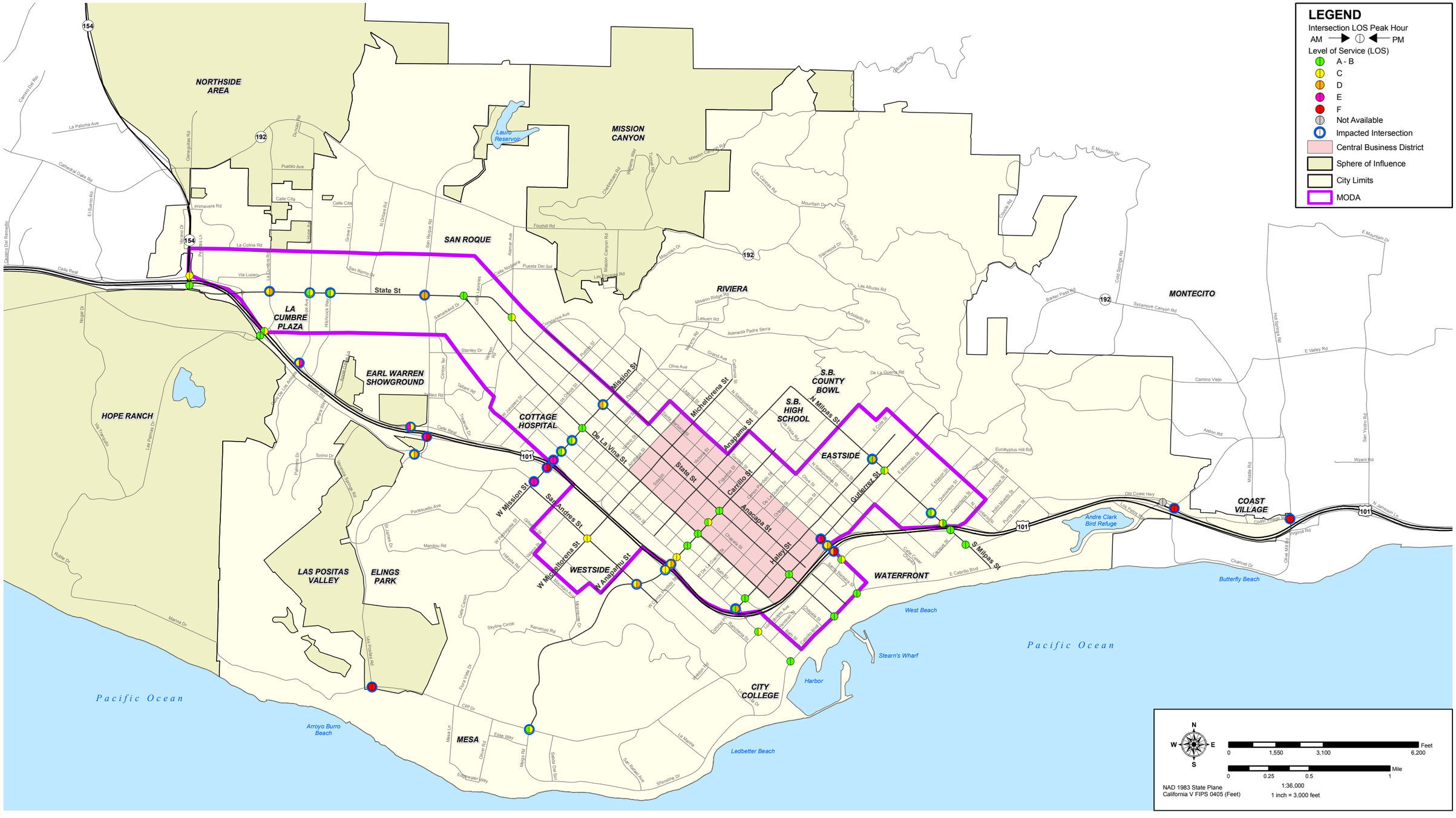
FUTURE (YEAR 2030) *NO PROJECT SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 8



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FUTURE (YEAR 2030) *NO PROJECT SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 9

FIGURE 10
AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

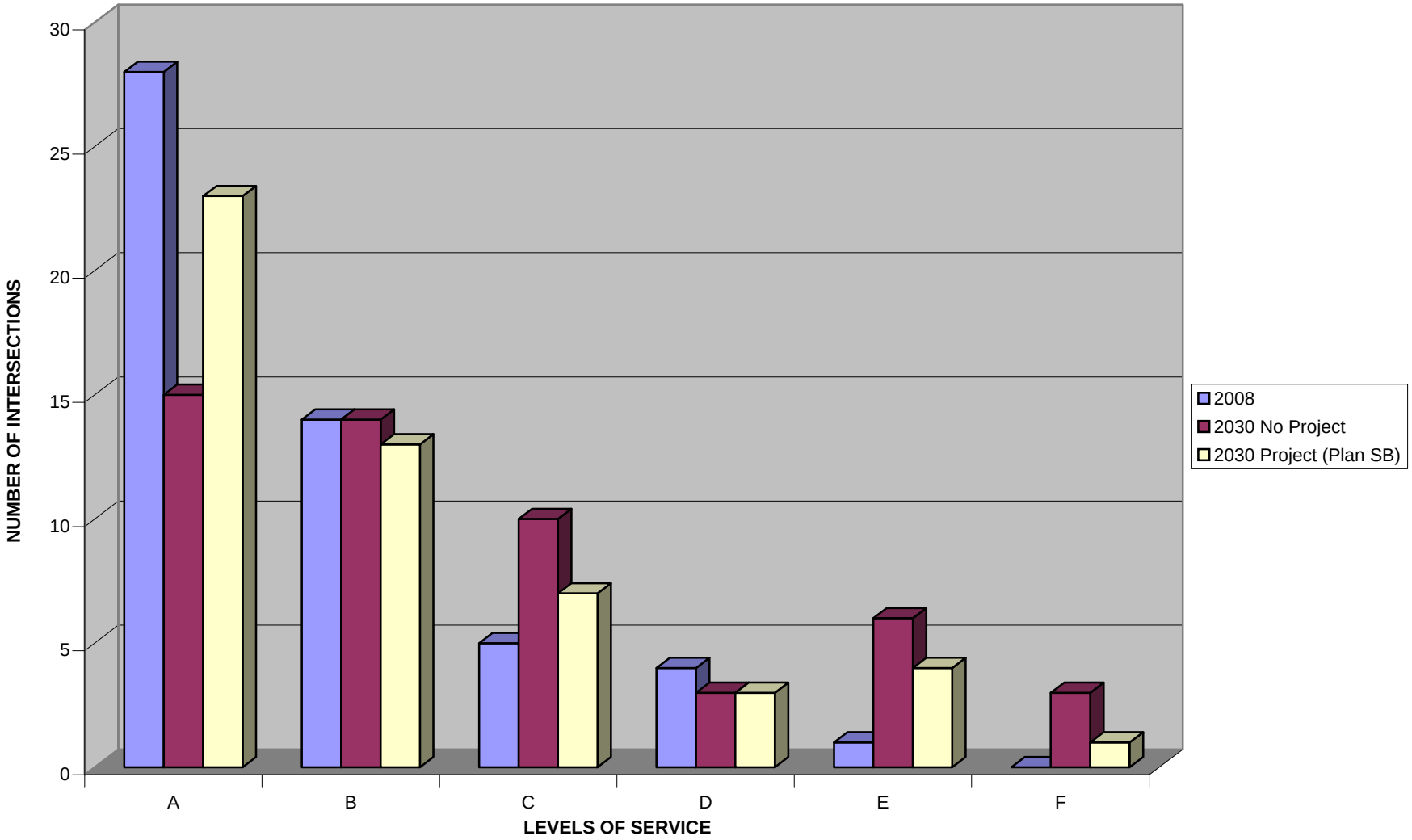
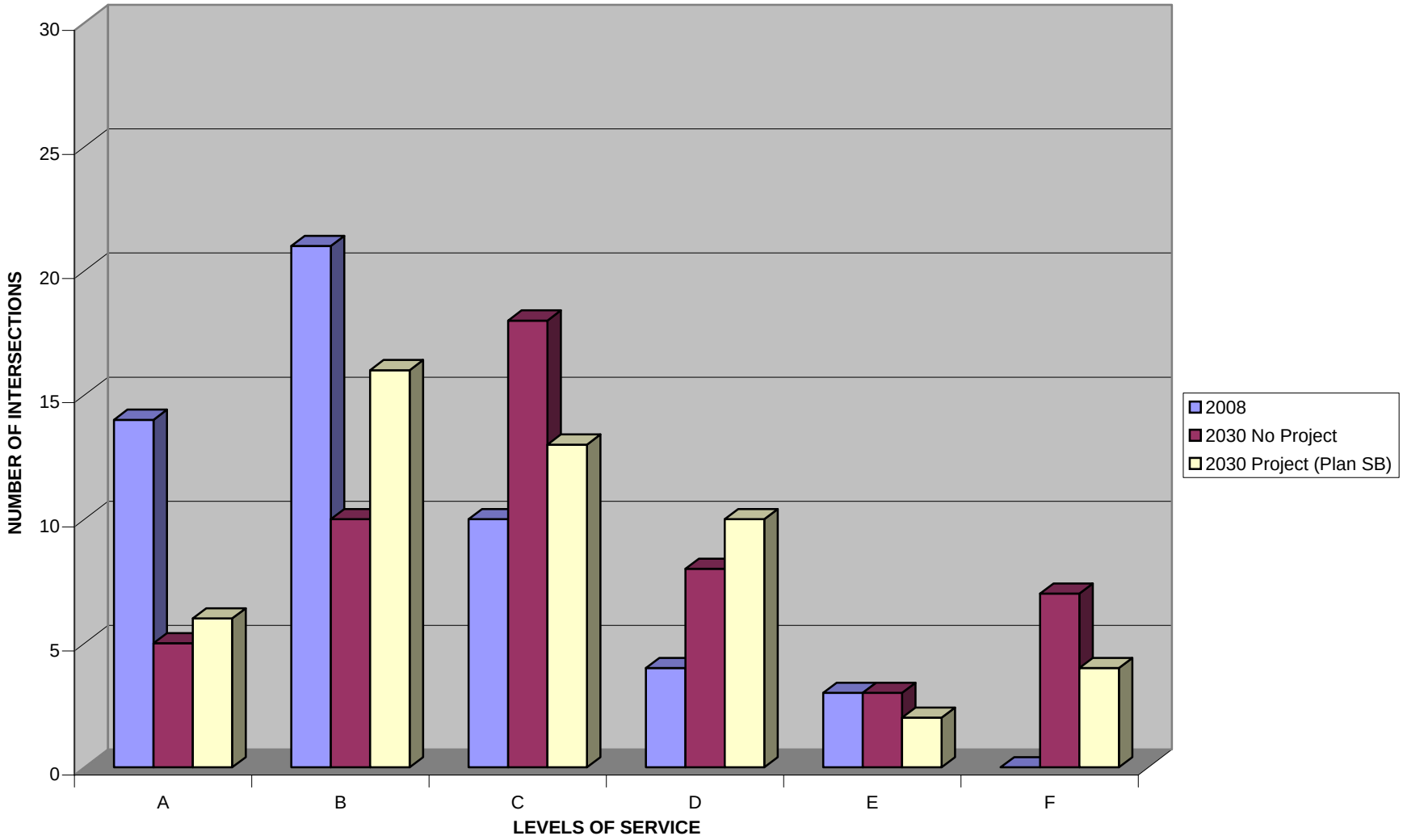
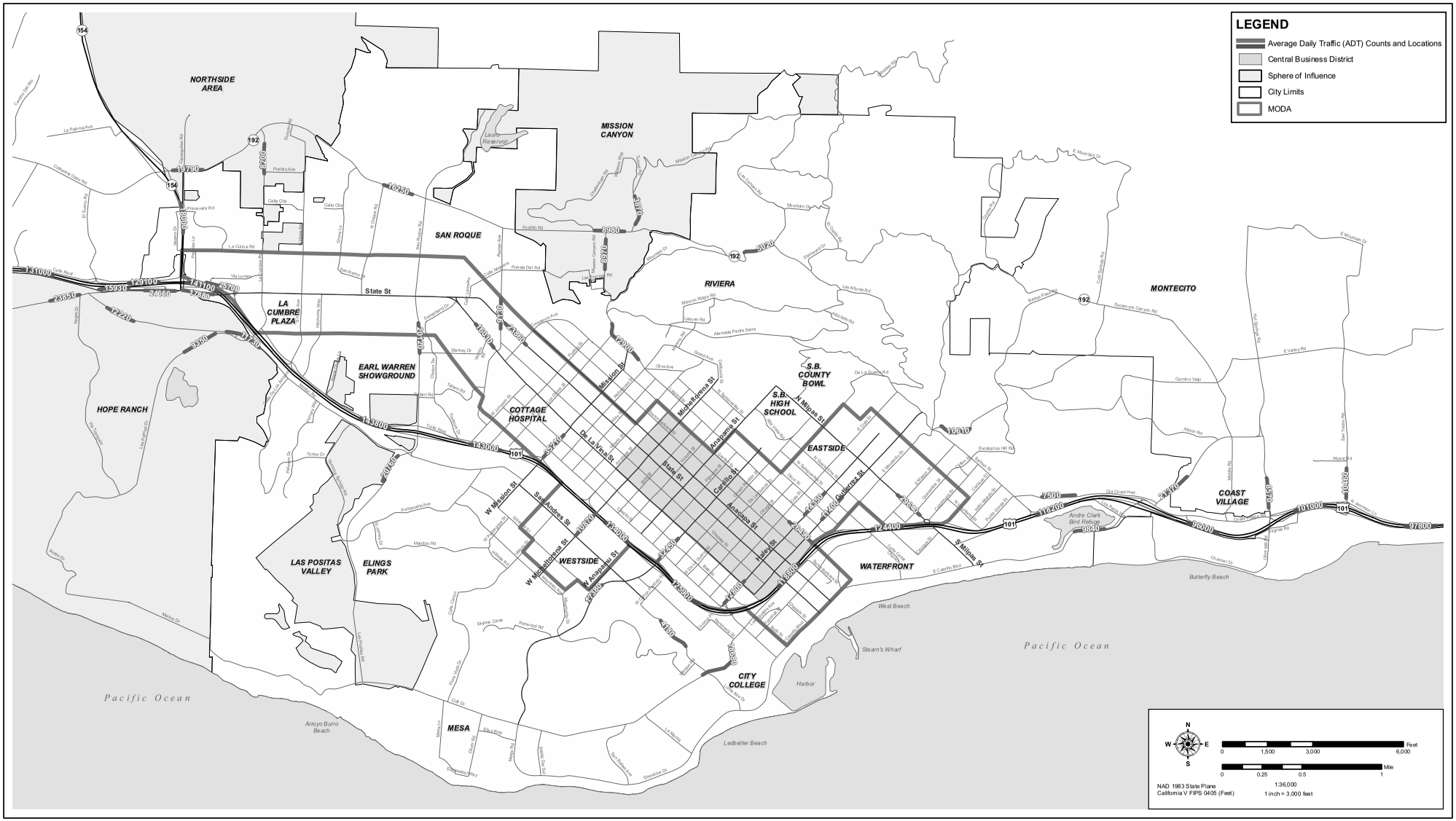


FIGURE 11
PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION





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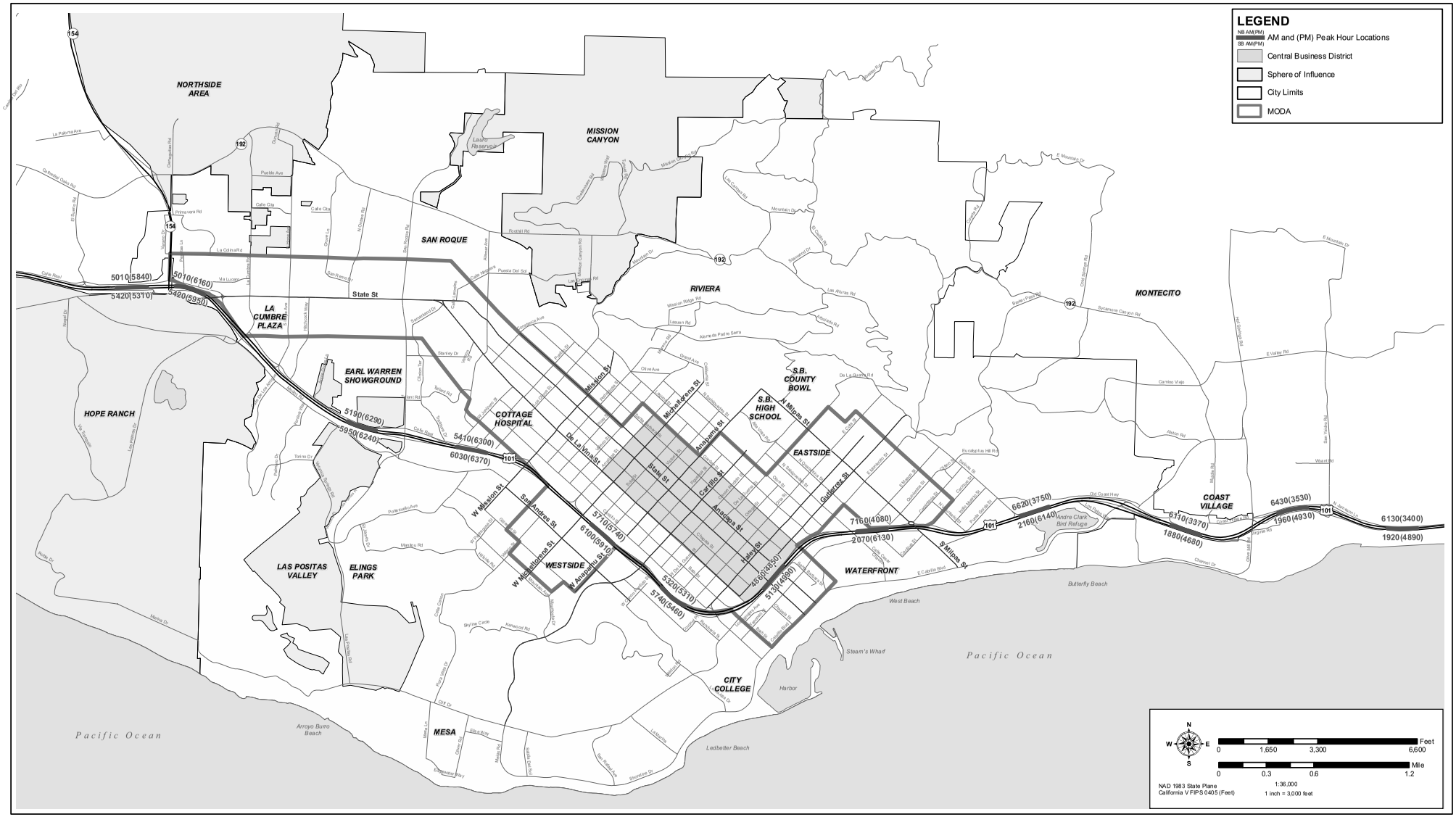
FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES
FIGURE 12



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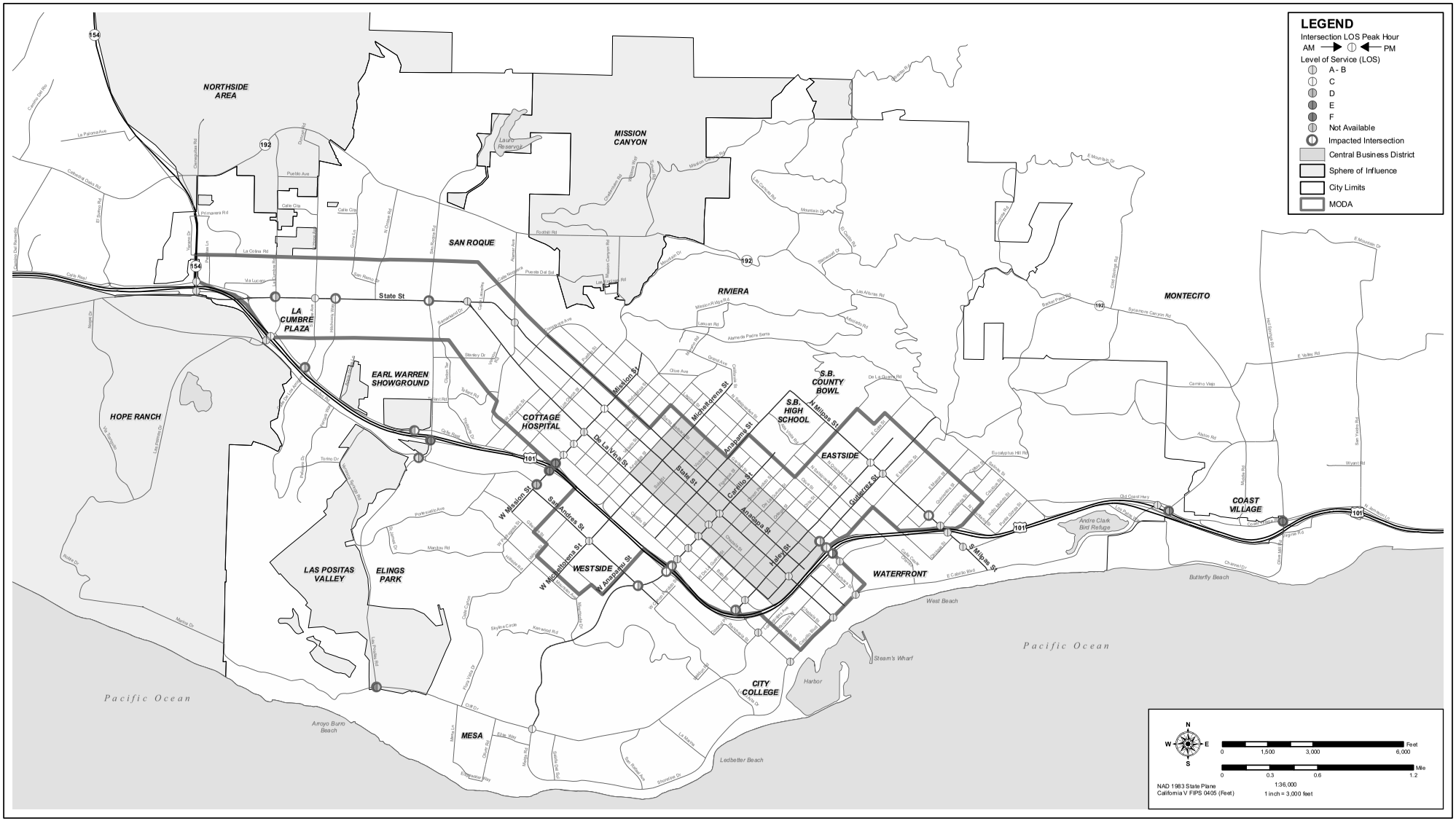
FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES
FIGURE 13



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FUTURE (YEAR 2030) *PROPOSED PROJECT SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 14

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B
2 Hot Springs Road & Coast Village Road [b]	AM PM	20 25	C C
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM PM	20 15	C B
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B
6 Milpas Street Roundabout [c]	AM PM	15 14	B B
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B
	PM	0.61	B
30 Mission Street & Modoc Road [b]	AM	27	D
	PM	29	D
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E
	PM	0.97	E
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D
	PM	0.81	D
33 Mission Street & Castillo Street [a]	AM	0.51	A
	PM	0.55	A
34 Mission Street & Bath Street [a]	AM	0.56	A
	PM	0.61	B
35 Mission Street & De la Vina Street [a]	AM	0.52	A
	PM	0.56	A
36 Mission Street & State Street [a]	AM	0.72	C
	PM	0.70	B
37 Meigs Road & Cliff Drive [a]	AM	0.62	B
	PM	0.69	B
38 Las Positas Road & Cliff Drive [b]	AM	30	D
	PM	23	C
39 Las Positas Road & Modoc Road [a]	AM	0.61	B
	PM	0.67	B
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D
	PM	0.95	E
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C
	PM	0.68	B
42 Alamar Avenue & State Street [a]	AM	0.50	A
	PM	0.56	A
43 De la Vina Street & State Street [a]	AM	0.47	A
	PM	0.54	A
44 Las Positas Road & State Street [a]	AM	0.64	B
	PM	0.77	C
45 Hitchcock Way & State Street [a]	AM	0.48	A
	PM	0.67	B
46 Hope Avenue & State Street [a]	AM	0.51	A
	PM	0.66	B
47 La Cumbre Road & State Street [a]	AM	0.61	B
	PM	0.70	C
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A
	PM	0.77	C
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B
	PM	0.67	B
50 La Cumbre Road & Calle Real [a]	AM	0.54	A
	PM	0.66	B
51 SR-154 & Calle Real [a]	AM	0.52	A
	PM	0.55	A
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A
	PM	0.40	A

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy.

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology.

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology.

TABLE 2 PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER		
North/South Street	**East/West Street**	**Peak Hour with V/C 0.77 or Greater**
Hot Springs Road	Coast Village Road	PM [a]
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	PM
Carrillo St	U.S. Highway 101 SB Ramp	AM
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	Both [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State Street	PM

[a] For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

TABLE 3
YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) No Project Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM	13	B	275	F	**Yes**
	PM	13	B	102	F	**Yes**
2 Hot Springs Road & Coast Village Road [e]	AM	20	C	204	F	**Yes**
	PM	25	C	352	F	**Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM	20	C	N/A [f]	N/A [f]	N/A [f]
	PM	15	B	N/A [f]	N/A [f]	N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.37	A	0.50	A	No
	PM	0.53	A	0.62	B	No
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.59	A	0.47	A	No
	PM	0.62	B	0.61	B	No
6 Milpas Street Roundabout [c]	AM	15	B	21	C	No
	PM	14	B	12	B	No
7 Milpas Street & Quinientos Street [a]	AM	0.59	A	0.68	B	No
	PM	0.72	C	0.77	C	**Yes**
8 Milpas Street & Gutierrez Street [a]	AM	0.52	A	0.63	B	No
	PM	0.58	A	0.70	C	No
9 Milpas Street & Haley Street [a]	AM	0.48	A	0.62	B	No
	PM	0.64	B	0.83	D	**Yes**
10 Cabrillo Boulevard & Garden Street [a]	AM	0.30	A	0.37	A	No
	PM	0.37	A	0.42	A	No
11 Yanonali Street & Garden Street [a]	AM	0.43	A	0.58	A	No
	PM	0.49	A	0.71	C	No
12 US 101 SB Ramps & Garden Street [a]	AM	0.64	B	0.86	D	**Yes**
	PM	0.93	E	1.24	F	**Yes**
13 US 101 NB Ramps & Garden Street [a]	AM	0.58	A	0.72	C	No
	PM	0.75	C	0.84	D	**Yes**
14 Gutierrez Street & Garden Street [a]	AM	0.68	B	0.96	E	**Yes**
	PM	0.81	D	1.00	F	**Yes**
15 Cabrillo Boulevard & State Street [a]	AM	0.30	A	0.34	A	No
	PM	0.42	A	0.46	A	No
16 Gutierrez Street & State Street [a]	AM	0.29	A	0.33	A	No
	PM	0.38	A	0.51	A	No
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.36	A	0.38	A	No
	PM	0.60	A	0.62	B	No
18 Montecito Street & Castillo Street [a]	AM	0.64	B	0.65	B	No
	PM	0.67	B	0.71	C	No
19 Haley Street & Castillo Street [a]	AM	0.55	A	0.57	A	No
	PM	0.78	C	0.86	D	**Yes**
20 Haley Street & Bath Street [a]	AM	0.54	A	0.63	B	No
	PM	0.70	B	0.66	B	No
21 Carrillo Street & Anacapa Street [a]	AM	0.47	A	0.53	A	No
	PM	0.62	B	0.68	B	No
22 Carrillo Street & Chapala Street [a]	AM	0.45	A	0.46	A	No
	PM	0.64	B	0.74	C	No
23 Carrillo Street & De la Vina Street [a]	AM	0.55	A	0.59	A	No
	PM	0.64	B	0.69	B	No
24 Carrillo Street & Bath Street [a]	AM	0.55	A	0.59	A	No
	PM	0.54	A	0.57	A	No
25 Carrillo Street & Castillo Street [a]	AM	0.66	B	0.73	C	No
	PM	0.67	B	0.70	C	No
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.70	B	0.79	C	**Yes**
	PM	0.81	D	0.84	D	**Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.78	C	0.80	C	**Yes**
	PM	0.74	C	0.79	C	**Yes**
28 Carrillo Street & San Andres Street [a]	AM	0.68	B	0.74	C	No
	PM	0.76	C	0.86	D	**Yes**

TABLE 3
YEAR 2030 WEEKDAY FUTURE NO PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) No Project Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.73	C	No
	PM	0.61	B	0.73	C	No
30 Mission Street & Modoc Road [b]	AM	27	D	39	E	**Yes**
	PM	29	D	37	E	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	1.00	E	**Yes**
	PM	0.97	E	1.28	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.94	E	**Yes**
	PM	0.81	D	0.99	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.60	A	No
	PM	0.55	A	0.77	C	**Yes**
34 Mission Street & Bath Street [a]	AM	0.56	A	0.60	B	No
	PM	0.61	B	0.78	C	**Yes**
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.59	A	No
	PM	0.56	A	0.66	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.81	D	**Yes**
	PM	0.70	B	0.77	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.66	B	No
	PM	0.69	B	0.78	C	**Yes**
38 Las Positas Road & Cliff Drive [b]	AM	30	D	55	F	**Yes**
	PM	23	C	57	F	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.74	C	No
	PM	0.67	B	0.87	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.96	E	**Yes**
	PM	0.95	E	1.01	F	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.92	E	**Yes**
	PM	0.68	B	0.73	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.63	B	No
	PM	0.56	A	0.73	C	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.68	B	No
	PM	0.54	A	0.67	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.84	D	**Yes**
	PM	0.77	C	0.90	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.62	B	No
	PM	0.67	B	0.79	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.70	B	No
	PM	0.66	B	0.77	C	**Yes**
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.71	C	No
	PM	0.70	C	0.85	D	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.73	C	No
	PM	0.77	C	0.98	E	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.63	B	No
	PM	0.67	B	0.70	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.64	B	No
	PM	0.66	B	0.72	C	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.73	C	No
	PM	0.55	A	0.75	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.53	A	No
	PM	0.40	A	0.50	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 4
NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

Peak Hour	Number of Cases 2008	2008 Rate [a]	Number of Cases 2030 No Project	2030 No Project Rate [a]	Number of Cases 2030 Proposed Project (Plan SB)	2030 Proposed Project Rate [a]
AM Only	2	4%	2	4%	1	2%
PM Only	6	12%	13	25%	11	21%
Both AM and PM	5	10%	12	23%	9	17%
Neither Peak Deficient	39	75%	25	48%	31	60%

[a] Number may not add up to 100% due to rounding

TABLE 5
YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Proposed Project Conditions		Impact? [d]
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B	230 81	F F	**Yes** **Yes**
2 Hot Springs Road & Coast Village Road [e]	AM PM	20 25	C C	32 209	D F	**Yes** **Yes**
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM PM	20 15	C B	N/A [f] N/A [f]	N/A [f] N/A [f]	N/A [f] N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A	0.47 0.60	A B	No No
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B	0.45 0.59	A A	No No
6 Milpas Street Roundabout [c]	AM PM	15 14	B B	16 10	B A	No No
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C	0.68 0.77	B C	No **Yes**
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A	0.57 0.67	A B	No No
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B	0.55 0.76	A C	No No
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A	0.34 0.42	A A	No No
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A	0.53 0.66	A B	No No
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E	0.75 1.15	C F	No **Yes**
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C	0.66 0.78	B C	No **Yes**
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D	0.73 0.89	C D	No **Yes**
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A	0.34 0.45	A A	No No
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A	0.31 0.45	A A	No No
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A	0.37 0.61	A B	No No
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B	0.65 0.69	B B	No No
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C	0.56 0.83	A D	No **Yes**
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B	0.60 0.65	A B	No No
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B	0.50 0.65	A B	No No
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B	0.46 0.70	A B	No No
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B	0.57 0.65	A B	No No
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A	0.56 0.55	A A	No No
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B	0.67 0.68	B B	No No
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D	0.79 0.83	C D	**Yes** **Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C	0.78 0.78	C C	No **Yes**
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C	0.72 0.82	C D	No **Yes**

TABLE 5
YEAR 2030 WEEKDAY FUTURE PROPOSED PROJECT CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Proposed Project Conditions		Impact? [d]
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.70	B	No
	PM	0.61	B	0.69	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	34	D	**Yes**
	PM	29	D	34	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	0.98	E	**Yes**
	PM	0.97	E	1.09	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.91	E	**Yes**
	PM	0.81	D	0.96	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.55	A	No
	PM	0.55	A	0.73	C	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.57	A	No
	PM	0.61	B	0.70	C	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.54	A	No
	PM	0.56	A	0.61	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.76	C	No
	PM	0.70	B	0.74	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.64	B	No
	PM	0.69	B	0.73	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	40	E	**Yes**
	PM	23	C	32	D	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.68	B	No
	PM	0.67	B	0.82	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.90	E	**Yes**
	PM	0.95	E	0.98	E	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.87	D	**Yes**
	PM	0.68	B	0.71	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.57	A	No
	PM	0.56	A	0.68	B	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.59	A	No
	PM	0.54	A	0.63	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.76	C	No
	PM	0.77	C	0.87	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.58	A	No
	PM	0.67	B	0.77	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.66	B	No
	PM	0.66	B	0.75	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.68	B	No
	PM	0.70	C	0.81	D	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.68	B	No
	PM	0.77	C	0.87	D	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.64	B	No
	PM	0.67	B	0.70	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.59	A	No
	PM	0.66	B	0.70	C	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.68	B	No
	PM	0.55	A	0.73	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.49	A	No
	PM	0.40	A	0.48	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] Based on existing CEQA and City of Santa Barbara standards, traffic impacts are identified as significant if the peak hour traffic of the proposed project would cause an intersection to exceed the V/C ratio of 0.77 or would contribute traffic to a signalized intersection already exceeding V/C ratio of 0.77 or to an unsignalized intersection already exceeding 22 seconds of delay.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 6

MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

MEASURE	2008	2030 No Project	Change Over Existing	2030 Proposed Project	Change Over Existing
Vehicle Miles Traveled (VMT)	2,500,894	2,868,962	15%	2,835,571	13%
Vehicle Hours Traveled (VHT)	59,668	74,550	25%	73,054	22%
Vehicle Trips (VT)	595,479	677,244	14%	667,784	12%
Average Vehicle Trip Length (VMT/VT)	4.20	4.24	1%	4.25	1%

Appendix A
Plan Santa Barbara EIR Assumptions 4-15-09
LAND USE POLICIES

EIR Land Use Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Amount of Growth (net increase) Non-Residential	Continue existing Measure Policies. Extrapolate historic growth rate: City 2,291,700 SF Sphere 178,202 SF Total 2,469,902 SF	Extend existing Measure E policies; and remaining net new square footage. Extrapolate historic growth rate: Project (2030): City 2,000,000 SF Sphere 178,202 SF Total 2,178,202 SF Extended Range (2050+): City 3,000,000 SF Sphere 208,100 SF Total 3,208,100 SF	Reduce Nonresidential growth cap City 1,000.000 SF Sphere 178,202 SF Total 1,178,202 SF	Reduce Nonresidential growth cap City 1,000,000 SF Sphere 178,202 SF Total 1,178,202 SF
Amount of Growth (net increase) Residential	Extrapolate historic rate City 2,795 DU Sphere 403 DU Total 3,198 DU	Extrapolate historic rate Project (2030) City 2,795 DU Sphere 403 DU Total 3,198 DU Extended Range (2050+) City 8,000 DU Sphere 620 DU Total 8,620 DU	Reduced amount of residential growth City 2,000 DU Sphere 403 DU Total 2,403 DU	Increased amount of residential growth. More affordable housing. City **4,360** DU Sphere **443** DU Total 4,403 DU
Distribution of Growth	Per future Land Use data	Per future Land Use data	Per future Land Use data	Per future Land Use data

(net increase)	base assumptions.	base assumptions.	base assumptions.	base assumptions.
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Affordable Housing% new residential growth citywide affordable to low, moderate, middle incomes	30 % of total du (838 du of total 2795 du)	35% of total du (978 du of total 2795 du)	20% of total du (400 du of total 2000 du)	40% of total du (1,768 du of total 4420 du)
New Residential Growth %/DU inside MODA	56 % residential growth in MODA (1579 DU of total 2795 DU)	66% % residential growth in MODA (1857 DU of total 2795 DU)	61 % residential growth in MODA (1217 DU of total 2000 DU)	65% residential growth in MODA (2878 DU of total 4420 DU)
New NonResidential Growth %/SF in MODA	69% non-residential growth in MODA (1,580,307 SF of total 2,291,700 SF)	65 % non-residential growth in MODA (1,309,516 SF of total 2,000,000 SF))	46 % non-residential growth in MODA (463,479 SF of total 1,000,000 SF))	47 % non-residential growth in MODA (468,161 SF of total 1,000,000 SF)
Residential Densities inside MODA (MF and Commercial Zones)	Existing Variable Density Average 20 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 25 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 15 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 50 du/ac in MODA
Residential Densities inside MODA (R2 and Single Family Zones)	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre (160 du) SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre
Residential Densities outside MODA (in MF zones)	Average 20 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 22 du/ac outside MODA in MF zones
Residential Densities outside MODA (in SF zones)	1-5 du/ac; Average 3 du/ac	Average 3 du/ac	Average 3 du/ac	Average 3 du/ac
Second Unit production (DU) inside MODA	Existing policies constrain units. 0 2nd units assumed per historic rate	Draft PlanSB policies encourage 2nd units within MODA 57 2nd units	Same as No Proj – existing policies 0 2nd units assumed	Strong encouragement of 2nd units in MODA. 173 of total 400 2nd units
Second Unit production (DU) outside MODA	Existing policies constrain units. 0 2nd units assumed	Draft PlanSB policies allow 2nd units per existing policies outside MODA, and restrict in High Fire	Same as No Proj – existing policies 0 2nd units assumed	Encouragement of 2nd units outside MODA 227 units of 400 assumed.

		Hazard areas		
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Density/Unit Size: Smaller residential unit sizes and revised variable density provisions in MODA	Existing variable density provisions based on # bedrooms & no unit size limits have resulted in many large, upper income condos. Average density 20 du/ac	Amend variable density provisions to provide range of unit sizes (rather than # bedrooms) with associated densities. Maximum unit size 1300 SF See density/unit size chart below	Include same revised smaller unit size ranges with lower densities than for project. See chart below.	Include same revised smaller unit size ranges with higher densities than for project. See chart below
Density/Unit size outside MODA	Existing variable density; SF FAR	Remove variable density; allow >1300 SF w/ new maximum unit size	Remove variable density; allow >1300 SF w/ new maximum unit size	New variable density w/ unit size ranges (similar to Project in MODA)

Density/Unit Size Chart for Inside MODA– Assumptions for EIR Analysis of Policy Changes

Unit Size	**Base Density (units/acre)**	**Density +25% Affordable Hsg** *(Inclusionary Housing Ordinance IHO or State bonus Density law)*	**Density + 100% Affordable owner or Rental Housing**
Project - PlanSB			
<400 SF	35 du/ac	44 du/ac	70 du/ac
401-700 SF	25 du/ac	31 du/ac	50 du/ac
701-1000 SF	22 du/ac	27 du/ac	44 du/ac
1001-1300 SF	19 du/ac	24 du/ac	38 du/ac
Alternative ,Lower Growth			
<400 SF	25 du/ac	31 du/ac	50 du/ac
401-700 SF	15 du/ac	19 du/ac	30 du/ac
701-1000 SF	12 du/ac	15 du/ac	24 du/ac
1001-1300 SF	9 du/ac	11 du/ac	18 du/ac
Alternative 2, More Hsg			
<400 SF	70 du/ac	88 du/ac	140 du/ac
401-700 SF	50 du/ac	62 du/ac	100 du/ac
701-1000 SF	44 du/ac	55 du/ac	88 du/ac
1001-1300 SF	38 du/ac	47 du/ac	76 du/ac

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Mixed Use & use of store of non-residential SF demolished & not replaced	Existing ordinance provisions for amount of non-residential and residential allowed on site.	Existing ordinance provisions Draft PlanSB Policy LG7 Study TEDR Ordinance	Cannot maximize both residential & commercial SF	Existing ordinance provisions
Land Use Element Map Land Use designations	Existing Land Use Element Map	The Draft PlanSB LUE Map provides largely the same LU designations and location as the existing LUE Map, but with the following amendments: -Delineate the MODA boundary -LU designation amendments to reflect changes to Variable Density inside and outside MODA -Provide LU designations and densities by acre -Establish a parcel-based map -Include some minor LU designation amendments to clarify LU designations by parcel and provide for consistency between GP LUE and Zoning designations.	Same as Existing LUE Map	Same as Project/PlanSB Draft LUE Map
Affordable Housing Policies	Existing policies per Housing Element, inclusionary, State/City bonus density provisions	Draft PlanSB policies -No more specific EIR assumption [H1-Opportunity Sites; H5-Incentives for Affordable by Design; H9-Inclusionary Amds; H10-Density Incentive for sustainable resource use; H11-Rentail incentives; H13-Residential Density Stds]	Same as Existing Policies	Increase affordable housing incentives Streamline housing permit procedures

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Building Heights	Existing building height policies per Charter, GP, and Zoning	Draft PlanSB Policy C10 – -Lower heights/step back buildings adjacent to residential zones in DT urban core, and -Lower heights in conjunction with form-based codes adjacent to historic structures. EIR Assumptions: -Lower heights to 40 ft in EPV and 45 ft in other commercial zones -Amend build height definition for commercial zones to allow for sloped sites, flood control standards, sloped roofs. -Exception to building height allowed for: >Community Priority projects (per current definition: community need, non-profit), > Residential - requirement for minimum 30% affordable up to middle income (all projects, no minimum number of units, both ownership or rental) >Substantial building area in rental units >Findings for adequate open space, quality architecture, front yard setback	Lower building height limits citywide per Save EPV initiative: -40 ft in EPV -45 feet in other commercial zones	Maintain current height limitations -Existing City height limitations

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing

Non-Development Intensification (The "Churn")

Non-Residential: Apart from net new square feet of development, background intensification of non-residential uses within existing structures, such as adding more employees within existing space.

Residential: Intensification of residential use from illegal units and overcrowding, e.g., multiple families.

Existing Condition baselines reflect current effect from these sources, such as traffic trips, air pollution, public services.

Future Conditions (No Project, Project, Alternative 1 and 2 Scenarios)

- For traffic, customized trip generation rates were calibrated with the existing conditions traffic counts and therefore incorporate/reflect traffic associated with intensification. In addition, the land use distributions for future conditions are overly conservative because they cannot reflect ongoing implementation of Charter policies for no net increase in traffic for net new non-residential square footage, which results in rejection of applications to avoid such impacts. The excess traffic effects built into the estimates based on the land use distribution therefore incorporate the background intensification effects of non-residential and residential uses.

-Similarly water use, wastewater generation, public schools, and other public facility effects are also based on average use rates derived from existing use, which incorporates intensification. Air pollution and energy impacts are also based on average existing traffic and utility assumptions that reflect intensification.

Questions

-Is there any basis for estimating non-residential intensification or illegal unit/overcrowding rates?

-Is there any basis for assuming that the non-residential and residential intensification factors and the application rejection rates are similar?

-Alternatives - Non-Residential: The No Project & Project assume 2 million SF and Alternatives 1 & 2 assume 1 million SF. Should Alternatives 1 & 2 which are limiting new development more assume more intensification occurs?

-Alternatives – Residential: The No Project & Project assume 2800 DU, while Alternative 1 assumes 2000 DU and Alternative 2 assumes 4400 DU. Should Alternative 1 assume more pressure for illegal units and overcrowding than the Project, and Alternative 2 assume less?

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses <u>Non-Residential</u>	Existing Measure E policies and process for Community Priority and Economic Development LU categories of new net Sq Ft of non-residential use.	PlanSB Policy LG10 economic development appears to allow all uses currently allowed. Implementation/incentives unclear. No policy/impact change from existing policy [LG10 – new net non-residential use to include one or more of following uses: -Community Priority (parks & recreation, community centers, educational, public cultural or arts facilities, youth development and childcare facilities, community gardens/ urban farm) -Economic Development (Enhances standard of living, strengthens economy by expanding economic diversity) -Green Economic Development (Provides green products or jobs) -Small & Local Businesses -Development for people w/disabilities]	Same as No Project – no change from existing policies? Or with less Sq Ft., shorter list of Community Necessities only?	Same – no change? Or with less Sq Ft, shorter list of Community Necessities only? Or stronger policy/incentive for community benefit uses?
Community Benefit Land Uses <u>Residential</u>	Existing HE policies	PlanSB Policy LG11 Residential: No policy/impact change from existing policy [LG11 – new residential to include one or more of following: -Affordable Housing (Low to Middle income housing; housing dedicated for critical work force; housing for local workers, rental housing, transitional housing]		

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses – Residential – Open Space provisions	Existing Ordinance requirements for open space in residential development.	LG11 – Residential – Open Space requirements Amount of open space and public spaces would increase. [LG11 – Open Space Requiremt: -Open Space (through access to adequate public open space within ½ mile radius and/ or dedication of sufficient usable open space on site and/or contribution through in-lieu fees) Note CTI projects future park demand in SB based on SBCAG pop growth projections and nat'l park demand stds. Table 3 projections for range of park categories. Fig 1 & 2 illustrate locations of deficiencies for neighborhood & community parks. For MODA, need to identify demand std for indoor recreational facilities.	Same as Project	Same as Project or less?

Adaptive Management Program

PLANSB - PROJECT OBJECTIVES *(& EXTENDED RANGE)*	PLAN SB - EIR ASSUMPTIONS *(Working Draft AMP Indicators)* FOR COMMUNITY INDICATORS TO MONITOR OBJECTIVES
LU/Growth Mgmt 1-Sufficient resource/infrastructure 2-Improvement in affordable housing supply relative to jobs 3-Majority of neighborhoods have Sustainable Neighborhood Plans 4-Increased use of alternative modes relative to single-occupancy vehicles	**LandUse/Growth Management** **1-Sufficient resources & infrastructure** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **2-Affordable Housing supply relative to Jobs** ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **3-Sustainable Neighborhood Plans** ▪ # of Sustainable Neighborhood Plans (SNPs) **4-Increased use of alternative modes relative to SOV** ▪ Transportation mode share ratio (miles, or # of people using each mode.)

Economy/Fiscal Health 1-Economic sector diversity is stable or expands; City revenues from commercial sources stable or increased. 2-Greater proportion of local jobs filled by local residents 3-Regional cooperation increased, progress made on regional blueprint for LU, housing, & transportation	**Economy/Fiscal Health** **1-Economic sector diversity; stable City revenues** ▪ Employment by economic sector ▪ % of total employment contributed by the top 10 employers ▪ Income by economic sector ▪ Taxable gross receipts **2-% local jobs filled by local employees?** **3-Regional cooperation/ progress on blueprint?** Status report
Environmental Resources 1-Citywide 50% reduction in fossil fuel use in buildings by 2020 and carbon neutrality by 2030. 2-Natural areas along creeks and elsewhere retained or expanded, and quality preserved or enhanced. 3-Opportunities for residents & students to get fresh locally-grown produce increased. 4-Reduction of greenhouse gas emissions from light vehicle & truck to 1990 levels by 2020. 5 **(New)** AQ, Water Q maintain/improved	**Environmental Resources** **1- 50% reduction bldg fossil fuel use by 2020 (neutrality 2030)** ▪ Fossil fuel consumption ▪ % renewable energy use **2-Naturals areas preserved, enhanced** ▪ New, total & per capita acres open space, by type, ownership ▪ Acres habitat area restored, enhanced, protected; bird counts **3-Increased opportunities for local produce** Informational report on ag, farmer's mkts, schools, etc. **4-Reduce GHG from vehicles to 1990 levels by 2020** Vehicle Miles Traveled (VMT) **5-(New) AQ, Water Quality maintained/improved** ▪ Ocean & creek water quality compared to standards ▪ Air quality compared to standards
Historic Resources/ Com Design 1-Distinctive character of City districts & neighborhoods retained & public places enhanced. 2-Designations of historic resources have increased. 3-Public health has improved through community design.	**Historic Resources/ Com Design** **1-Distinctive character of City districts & neighborhoods retained & public places enhanced.** New & total public open space & recreational facilities in downtown & neighborhoods ▪ # of design awards ▪ # of Sustainable Neighborhood Plans (SNPs) ▪ Review of new projects for size, bulk & scale **2-Designations of historic resources have increased.** ▪ # new historic resources evaluations, surveys, "potentials" list ▪ # new historic resource designations and/or districts **3-Public health has improved through community design**. ▪ (Obesity rates by age and gender) ▪ # beach health warnings ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas (See also air quality measure above)
Housing 1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations. 2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages. 3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes.	**Housing** **1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations**. ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages** Periodic HE review **3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes**. Densities in MODA projects reviewed for time frame

Circulation 1-Public transit service & facilities, miles of sidewalks, trails, bike paths & lanes have increased or upgraded and links between modes available. 2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020. 3-Traffic congestion has not increased or is less than the 2008 baseline study.	**Circulation** **1-Transit, sidewalks, trails, bike paths & lanes & links incr or u** ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas ▪ Transit service levels **2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020.** ▪ Transportation mode share ratio (miles, or # of people using each mode.) **3-Traffic congestion has not increased or is less than the 2008 baseline study.** ▪ Intersection level of service (LOS) and Travel Time measures ▪ Street traffic volumes ▪ Hwy 101 traffic volume
Public Services and Safety 1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program. 2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand. 3-Conservation & management practices are maintained or improved.	**Public Services and Safety** **1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program.?** Status report **2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand.** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **3-Conservation & management practices are maintained or improved**. Status report

H:\Group Folders\PLAN\Long Range Planning\PlanSB\CEQA\CEQA Document\Project Description\EIR Assumptions Chart - Land Use April 15 09.doc

APPENDIX I-5

FUTURE TRAFFIC CONDITIONS FOR THE LOWER GROWTH AND ADDITIONAL HOUSING ALTERNATIVES

FEHR & PEERS
TRANSPORTATION CONSULTANTS

FINAL TECHNICAL MEMORANDUM

Date: January 28, 2010

To: Dan Gira, AMEC

From: Brian Welch and Reid Keller

Subject: ***Future Traffic Conditions for the 2030 Alternative 1 and Alternative 2 Scenarios***

LA08-2253

INTRODUCTION

As part of the *Plan Santa Barbara* General Plan Update, the City of Santa Barbara (City) decided to develop a Travel Demand Forecasting (TDF) model to support this and other long-range transportation planning efforts. The City had not previously developed a model.

The City model, developed in the TransCAD Transportation Geographic Information System (GIS) software, was successfully calibrated and validated to current conditions. [1] Although there are seasonal variations in traffic in Santa Barbara due to tourist visitation and resident vacations, the model was calibrated and validated to average mid-week traffic. The land use data, roadway network, and traffic counts reflect March 2008 conditions. Care was taken to avoid school spring breaks, inclement weather, and other major disruptions to traffic. The resulting model represents travel during a period when people in Santa Barbara are participating in their normal day-to-day activities.

The primary purpose of the model is to test proposed *Plan Santa Barbara* policy options to see which policies are successful in meeting community objectives. The circulation goals, objectives, and policies for *Plan Santa Barbara* focus on creating a multi-modal transportation system that provides choice and decreases vehicle traffic congestion. The plan includes objectives related to mode share and traffic congestion, featuring (1) a 50/50 mode share between the single-occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions. The travel demand model provides metrics and indicators (traffic volumes, levels of service, vehicle miles traveled, etc.) that document the plan's ability to meet the *motor vehicular-related* goals, objectives, and policies. In addition, indicators and results from the model will be utilized to support forthcoming California Environmental Quality Act (CEQA) documentation

This technical memorandum summarizes traffic volume forecasts, intersection operational conditions, and a variety of other performance measures associated with *Plan Santa Barbara* Alternatives 1 and 2. These future conditions represent future Santa Barbara under policy and land use changes that would diverge from *Plan Santa Barbara*, and which can be summarized as follows:[2]

[1] For details regarding the model development, including calibration and validation statistics, please refer to *Plan Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

[2] Details regarding Alternatives 1 and 2 are provided in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09."

Compared to *Plan Santa Barbara*

Alternative 1 "Lower Growth"

- Reduced non-residential growth cap;
- Reduced amount of residential growth;
- Less affordable housing;
- Slightly less residential growth in the MODA; and
- Less non-residential growth in the MODA.

Alternative 2 "More Housing"

- The MODA boundary is modified to exclude areas west of US-101;
- Reduced nonresidential growth cap;
- Increased amount of residential growth;
- More affordable housing;
- Slightly less residential growth in the MODA; and
- Less non-residential growth in the MODA.

This technical memorandum also includes, for ease of reference, a brief summary of existing conditions. An additional technical memorandum (*Revised Final Technical Memorandum, Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario, January 27, 2010)* provides similar documentation for *Plan Santa Barbara* and the No Project scenario. Forthcoming environmental documentation will provide an overall summary comparison of existing conditions, *Plan Santa Barbara*; the No Project Scenario, Alternative 1, and Alternative 2 in one document.

As noted, the forecasts for this memo were prepared using the *Plan Santa Barbara* Travel Demand Model developed by Fehr & Peers on the TransCAD platform. The travel demand model is based around three core components:

- A **land use database** – in this case a parcel level database provided by the City with detailed information on the type and amount of development on each parcel, stratified into numerous categories. Land use databases were prepared by the City for existing conditions and projected amounts and locations of future residential and non-residential growth, based on historic growth rates and existing/proposed City growth control policies and mechanisms for the No Project (Existing Policies) Alternative and Project (*Plan Santa Barbara* policies). The type, location, and amount of growth permitted under *Plan Santa Barbara* were further modified to account for the policy framework of *Plan Santa Barbara*. These land use databases were compiled on a parcel-specific level for the entire City as well as the Sphere of Influence, and provide detailed information on the type and amount of development existing and projected for each parcel, broken down into multiple land use categories to reflect the diversity of existing and proposed land uses accurately.

- A **highway network database** – Based on the Santa Barbara County Association of Governments (SBCAG) regional travel demand model, with added detail using data provided by the City. The roadway network for the base year conditions is based on the SBCAG's GIS roadway centerline file. The model roadway network includes all State Routes, arterials, collectors, and a selection of local roads in the study area (see Figure 1).
- The roads shown in Figure 1 are classified in four major categories and form the primary road network represented in the model structure. As is typical for urban-area models, the model network focuses on facilities in the higher functional classes and does not attempt to replicate travel patterns on local residential streets, but does include some of them to distribute traffic. The travel model includes eight external stations to represent travel to and from areas outside the City.
- A **table of trip generation rates** – initial rates was researched from sources including SBCAG, the census National Household Travel Survey, the San Diego Association of Governments (SANDAG), and the Institute of Transportation Engineers (ITE). Trip generation rates were then calibrated to match the existing trip making characteristics that are unique to Santa Barbara.

The model was validated and calibrated to Caltrans, Federal Highway Administration (FHWA), and Fehr & Peers' internal standards. Once the model met the required set of criteria to be deemed adequately validated and calibrated, the land use database was modified to reflect future development growth. This growth can be attributed to two sources:

1. Currently **pending**, **approved**, and **under construction** development projects. Forecasted amounts of growth were based on the extrapolation of historic trends for residential development, and existing and proposed policy caps for non-residential development. These forecasts account for planned and pending development projects, and;

2. The City's distribution of the **future growth and development** projected to occur under both the Alternative 1 and Alternative 2 scenarios.

In addition to the land use database changes, currently fully funded roadway improvements were added to the highway network database. These improvements generally consisted of the Measure D funded projects along the US-101 corridor between Hot Springs Road and Milpas Street. Examples of projects include the Cacique Street freeway under-crossing, the roundabout at Old Coast Highway and Hot Springs Road and Coast Village Road and the addition of a travel lane to both directions of US-101 between Milpas Street and Hot Springs Road. US-101 improvements are currently under construction from Milpas to Hot Springs and are anticipated to be complete by 2012.

The remaining sections of this memo present relevant portions of the existing conditions analysis, the results of the future Alternative 1 analysis, and the future Alternative 2 analysis for the *Plan Santa Barbara* study area, shown in Figure 1. The model area encompasses the City of Santa Barbara and portions of neighboring unincorporated County areas in or near the City's Sphere of Influence. The study area includes all areas that may experience land use changes under *Plan Santa Barbara* and areas directly adjacent that interact frequently with the City and its Sphere of Influence. The Santa Barbara Airport does not fit these criteria, and is not within the modeling framework. Airport existing and future conditions will be documented within the CEQA documentation for *Plan Santa Barbara*, based upon recently completed studies.

EXISTING CONDITIONS[3]

Average Daily Traffic Volumes

Average Daily Traffic (ADT) and AM and PM peak hour turning movement counts were collected in the *Plan Santa Barbara* study area in March 2008. Additional recent ADT counts were compiled from a variety of sources including Environmental Impact Reports (EIRs), the County of Santa Barbara count program, and Caltrans. These data were used to assess current traffic conditions in the City of Santa Barbara and inform the model development process.

Figure 2 illustrates existing ADT volumes on major thoroughfares in the study area. Certain travel patterns can be seen in the figure:

- As expected, the freeway carries the greatest daily volume of vehicles, reaching a peak of 133,000 vehicles per day (vpd) between Mission Street and Las Positas Roads.
- Arterial traffic volumes are generally greatest on segments approaching freeway ramps. This pattern is common throughout the United States, since these locations generally experience the most significant confluence of surface street traffic. The busiest locations include the following:

  - Carrillo north of US-101: 32,440 vpd
  - Mission north of US-101: 30,010 vpd
  - Milpas north of US-101: 28,640 vpd
  - Garden north of US-101: 24,630 vpd
  - State west of San Marcos Pass: 21,160 vpd
  - Las Positas north of US-101: 20,120 vpd

Peak Hour Freeway Volumes

Figure 3 illustrates peak hour freeway volumes for the base year. The following observations are shown in the figure:

- During the AM peak hour, traffic volumes on US-101 northbound reach their peak between Milpas Street and Garden Street. During the PM peak hour, traffic volumes peak on the US-101 northbound between Mission Street and Las Positas Road. During the AM peak hour, traffic volumes on US-101 northbound reach a peak of 6,430 vehicles per hour between Milpas and Garden Streets. These volumes do not exceed the capacity of this six-lane segment of US-101, which operates at LOS E during the AM peak.
- During the AM peak hour, traffic volumes on the two-lane segment of US-101 northbound reach a peak of 5,895 vehicles per hour south of Olive Mill Road. These volumes exceed

[3] Some relevant portions of the existing conditions data are presented here for comparative convenience. For a detailed presentation of existing transportation conditions in the City of Santa Barbara, please refer to *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008).

the capacity of this two-lane segment of US-101, which operates at LOS F during the AM peak.

- During the PM peak hour, traffic volumes on US-101 northbound reach a peak of 5,895 vehicles per hour between Mission Street and Las Positas Road. These volumes do not exceed the capacity of this three-lane segment of US-101, which operates at LOS E during the PM peak.
- Traffic patterns during the AM peak hour show directional peaking, where one direction of the freeway has substantially more traffic than the other, approaching Garden Street from the south. For example, northbound AM peak hour volumes of 6,430 peak trips north of Garden Street are nearly four times as great as southbound volumes of 1,718 trips. Northbound and southbound AM peak hour volumes are more in balance in the rest of the City.
- Although the southbound direction of the freeway carries more traffic leading up to Garden Street from the north, the volumes are not substantially higher than the opposing direction. This pattern suggests that residents of Santa Barbara interact more with areas to the north of the City, but the City draws visitors (especially employees) from both the north and the south, and more traffic passes through the City from the south to the north in the morning and from the north to the south in the evening.
- The PM peak hour shows less directional peaking. Volumes on US-101 southbound south of Garden Street do exceed the opposing flow, but not to the same extent as during the morning peak hour. Traffic volumes north of Garden Street show little if any directional peaking during the PM peak hour.
- During the PM peak hour, traffic volumes on the two-lane segment of US-101 south of the City also show directional peaking. However, this is not as pronounced as in the AM. While southbound PM volumes reach a peak of 4,545 vehicles per hour south of Olive Mill Road, northbound PM peak volumes of 2,926 vehicles per hour are substantially lower. Southbound PM peak volumes do not exceed the capacity of this two-lane segment of US-101, which operates at LOS E during the PM peak period.

Relatively high peak hour peak direction freeway volumes within the study area include:

- Northbound AM peak, west of Milpas, 6,430 vehicles per hour (vph)
- Northbound AM peak, west of San Ysidro, 5,895 vph
- Northbound AM peak, west of Carrillo, 5,719 vph
- Southbound PM peak, west of San Roque, 5,806 vph
- Northbound PM peak, west of San Roque, 5,853 vph
- Northbound PM peak, west of Mission, 5,895 vph

Peak Hour Intersection Level of Service Analysis

Table 1 and Figure 4 illustrate existing intersection level of service (LOS) at the 52 *Plan Santa Barbara* study intersections during the AM and PM peak hours. Three distinct intersection control types are present in Santa Barbara and were analyzed using their respective methodologies:

- Signalized intersections, which were analyzed using the Intersection Capacity Utilization (ICU) methodology;[4]
- Unsignalized, or stop-controlled, intersections were analyzed using the Highway Capacity Manual (HCM) unsignalized intersection methodology; and
- The Milpas Roundabout was analyzed using the HCM roundabout methodology.[5]

The intersection of Hot Springs Road & Coast Village Road was stop-controlled and was analyzed using the HCM unsignalized methodology for the existing conditions. This intersection was assumed to be controlled by roundabout in future 2030 conditions and was analyzed using HCM roundabout methodology for future 2030 conditions.

The City has a target LOS of C with a volume-to-capacity (V/C) ratio of 0.77 or less for signalized intersections and a target LOS of C with less than 22 seconds of delay for unsignalized intersections. There are currently 13 intersections exceeding this threshold during one or both peak hours, as shown in Table 2.

Other Measures of Effectiveness

In addition to roadway segment volumes and intersection LOS, other measures of effectiveness (MOEs) are often analyzed when considering the effects of different general plan development scenarios. These measures are discussed at the end of this document and include:

- **Vehicle Miles Traveled** (VMT) – a measure of total vehicle travel activity for the entire study area for a given scenario.
- **Vehicle Hours Traveled** (VHT) – a measure of total time spent traveling in vehicles in the study area affected by factors including length of trip making, amount of trip making and congestion levels.
- **Vehicle Trips** (VT) – the total number of vehicle trips made in the study area (including into, out of and through the study area).
- **Average Trip Length** – calculated by dividing the total VMT by the total number of vehicle trips.

Table 6 provides 2008 results for each of these measures. It should be noted that these numbers may be held artificially low. While many trips made within the study area are relatively short, most trips leaving the study area travel considerably further than the end of the model area (i.e., Ventura or Lompoc). These numbers represent only the portion of the trip in the study area.

FUTURE YEAR (2030) TRAFFIC CONDITIONS FORECASTS

Development of the Forecast Volumes

The development of the forecast volumes for this analysis followed the approach presented in the *National Cooperative Highway Research Program (NCHRP) Report 255* (Transportation

[4] Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity* (Transportation Research Board, 1980).
[5] Source for both unsignalized and roundabout methodologies*: Highway Capacity Manual* (Transportation Research Board, 2000).

Research Board, 1982). This method is the accepted professional standard for preparing traffic forecasts for urbanized area planning applications.[6]

The NCHRP Report 255 approach involves post-processing model data and applying the growth to existing counts collected in the field. The first step in the process is to run the validated base year model and collect data for the desired segments and intersection turning movements. The model is then updated with future year land use changes and highway network improvements and run again. The data for the same study segments and turning movements is again collected from the future year model run.

The data from both model runs is then compared and applied to the existing counts using one of three methods:

- The **difference method** – directly applies the difference between the future and base year model runs to the existing count.
- The **ratio method** – factors the existing counts by the ratio of the future year data to the base year data.
- The **combined method** – takes the average of the output from both the difference method and the ratio method.

In addition to the NCHRP process described above, more sophisticated trip adjustments were implemented within the modeling framework. These are described below. For background, however, it is helpful to understand the four area types developed for the Santa Barbara model. Area types are discussed in more detail in previous reports[7], and are summarized here and shown below.

Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation. Area type 2 represents the remaining "grid" portion of the City, and includes most of the Mobility-Oriented Development Area (MODA). This area has older development patterns of connecting streets, smaller lots, and a mixture or residential and non-residential land uses.

Area types 3 and 4 are similar in development patterns and land use characteristics. They are generally residential areas with limited non-residential land uses. The primary difference between the two is the internal/external and external/internal trip making, which is mostly a function of geography. More trips from area type 3 remain in the study area. This is largely because it is the eastern end of developed land and the study area provides the most destinations for travelers from this area. Area type 4, which borders urbanized areas of the unincorporated county and is close to Goleta, has greater interaction with areas outside the model. In addition, area type 4 contains a regional retail center that attracts trips from outside areas.

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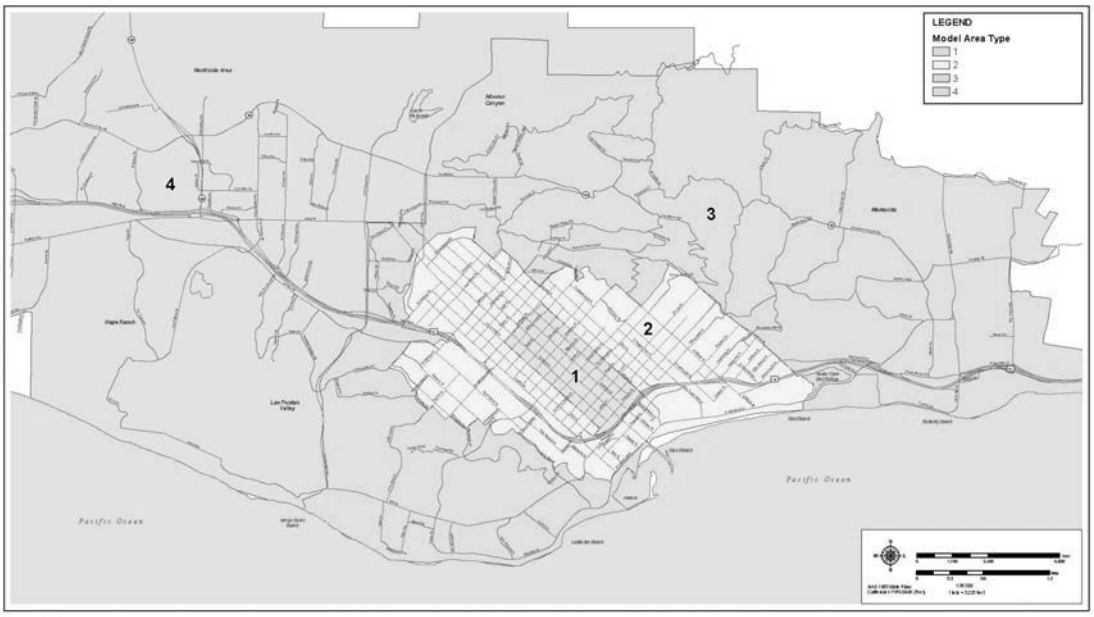
[6] While the NCHRP 255 method is the accepted professional standard, and post-processing model volumes is the typical approach to preparing traffic forecasts sub-regional models, it is by no means required and in certain situations it may be appropriate to use raw model output as opposed to post-processed count volumes. SBCAG, in *The Travel Forecast for Santa Barbara County*, did not post-process counts and instead reported raw model volumes. The differences between freeway volumes reported here, and those reported by SBCAG, are generally attributable to this difference in methodologies. Differences between forecasts in this case are logical and both approaches are technically correct. The reasons for SBCAG's decision to report model volumes can be found on page 12 of *The Travel Forecast for Santa Barbara County* (SBCAG, 2004).

[7] *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, February 25, 2009).

When incorporating the estimated effects of policy-based trip-reduction strategies, peak hour vehicle trips starting and ending within the model area were reduced by a greater percentage than peak-hour vehicle trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not substantially affect trip making in other jurisdictions.



Travel Demand Model Area Types

Trip Adjustments for Land Use and Policy Strategies

As part of the *Plan Santa Barbara* General Plan Update, the City decided to develop a Travel Demand Forecasting model to support this and other long-range transportation planning efforts. The broadest *Plan Santa Barbara* circulation goals and policies cited in the Introduction – (1) a 50/50 mode share between the single occupant vehicle and all other modes of travel by 2020; and (2) traffic congestion no worse than existing conditions – find their manifestation in detailed implementation strategies in **Appendix A**, "*Plan Santa Barbara* EIR Assumptions 4-15-09." Examining **Appendix A** reveals a very comprehensive approach to meet these goals and objectives, addressing the built environment, transportation-related policies, and transportation network assumptions.

The Santa Barbara Travel Model contains a number of enhancements that allow it to capture the effects of land use and policy initiatives contained in *Plan Santa Barbara* on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation network, parking management, and Travel Demand Management (TDM) programs. A more detailed analysis of how the fabric of urban design affects trip making and travel is also included. This is assessed using a modeling strategy known as the 4Ds, which includes an analysis of density, diversity, design, and destinations associated with the built environment.

More specifically, the Santa Barbara model features two key innovative components that are specifically intended to analyze the broadest circulation-related goals, policies, and objectives included in *Plan Santa Barbara* and articulated in **Appendix A**: the first component focuses on the built environment (the 4D process), and the second component focuses on transportation-related policies (policy-based trip reduction strategies). Each is discussed in concept below, and their effects are described during the presentation of No Project and *Plan Santa Barbara* model results.

Built Environment 4D Factors: Density, Diversity, Design, Destination - Overview

The following narrative, prepared by Reid Ewing[8], summarizes the 4D process and is included to provide an overview of the approach:

> Some of today's most vexing problems—sprawl, congestion, oil dependence, climate change—are prompting states and localities to turn to land planning and urban design for help in reducing automobile use. Many have concluded that roads cannot be built fast enough to keep up with travel demands induced by road building itself and by the sprawling development patterns it spawns. Travel demand must somehow be moderated.
>
> The potential to moderate travel demand through changes in the built environment is the subject of more than 150 empirical studies. It has become the most heavily researched subject in urban planning.
>
> In travel research, urban development patterns have come to be characterized by "D" variables.
>
> **D**ensity is measured in terms of activity level per unit area. Density may be measured on gross or net area basis, on a population or dwelling unit basis, and on an employment or building area basis. Population and employment density are two distinct dimensions. The two are sometimes summed to compute an overall "activity density."
>
> **D**iversity is related to the number of different land uses in an area and the degree to which they are "balanced" in land area, floor area, or employment. Entropy measures of diversity are widely used in travel studies. Job-housing or job-population balance measures are less frequently used.
>
> **D**esign includes street network characteristics within a neighborhood. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming "loops and lollipops." Street accessibility usually is measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. In the occasional study, design also is measured in terms of sidewalk coverage, building setbacks, streets widths, pedestrian crossings, presence of street trees, or other physical variables that differentiate pedestrian-oriented environments from auto-oriented ones.
>
> **D**estination accessibility is synonymous with regional accessibility. In some studies, regional accessibility is simply represented by distance to the central

[8] *Travel and the Built Environment*, Reid Ewing, 2009.

business district. In other studies, it is represented by the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model of trip attraction measures regional accessibility.

The 4D's compare the built environment characteristics of the future scenarios to the existing conditions on the ground as of March 2008. For each of the "D" variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each traffic analysis zone (TAZ[9]). The elasticities employed in the Santa Barbara model are as follows:

Variable[10]	**Vehicle Trip Elasticity**
Density	-0.04
Diversity	-0.06
Design	-0.02
Destination	-0.03

In practice, elasticity is a measure of the percentage change that occurs in an independent variable (vehicle trips) as a result of a percentage change in an influential variable (density, diversity, design, or destinations). For example, if vehicle trips decrease by -0.04 percent for each 1 percent increase in density, then vehicle trips are said to have an elasticity of -0.04 with respect to density. This technical memorandum documents changes between existing conditions and a future horizon-year scenario, in this case the No Project and *Plan Santa Barbara.*

Because the 4Ds are based on physical characteristics of the built environment, the calculation of these variables is an exercise in spatial modeling and the process is performed outside of the travel demand model using GIS desktop software. GIS files with land use data and the location of intersections are used as inputs. A "D" variable value for each TAZ is the output.

The density and diversity "D" variables for each TAZ take into account not only the total land use within that zone, but also the land use that is within a ¼ mile radius of that zone (¼ mile is assumed to be a reasonably conservative distance that people can easily walk). Both variables use employment and population as inputs. This process is designed to account for land uses that are "right across the street" for a person on foot or a bicycle, but would require a trip of a much longer distance if the traveler follows the model network. Thus these variables are calculated to take into account the experience of a person on foot or bike.

The design variable looks at street connectivity and sidewalk design. More connected streets (as opposed to cul-de-sacs for instance) generally allow for more direct walking and cycling, making these modes more attractive. The design variable uses the number of intersections within ¼ mile. Santa Barbara is a built-out city and there is only one notable change, the Cacique Street under-crossing, to street connectivity. Furthermore, with small block lengths, a dense grid network, and near complete sidewalk connectivity, Santa Barbara already reflects many of the

[9] Travel demand models use TAZs to subdivide the study area for the purpose of connecting land uses to the roadway network. For a detailed description of TAZs in the Santa Barbara Model refer to *Santa Barbara Travel Demand Model Overview* (Fehr & Peers, 2009).

[10] Formulation of the equations uses the following data: For density, employment and population; for diversity, employment and population; for design (1) street density, (2) sidewalk completeness, and (3) route directness.

ideal urban design characteristics that the design "D" looks for. This is why trip generation rates in Areas Types 1 and 2 were found to be lower than national averages. As a result, the design "D" does not result in substantial vehicle trip reductions in Santa Barbara since most of the mode shift associated with it has already been achieved.

The destinations "D" is calibrated in the model structure using area types. Areas further from major regional commercial centers have higher trip rates, while areas closer to major regional commercial centers have lower trip rates. The geographic distribution of these regional commercial centers is not anticipated to change to any great extent, and so the future year scenarios carry forward the current rates for the destinations "D."

The "D" variables were calculated for both the Alternative 1 and Alternative 2 scenarios. Implementation of the 4D process is not mathematically linked to the area types discussed above. Area types were developed primarily for model calibration and validation purposes, and were used in the trip reduction strategy exercise (discussed below). There is no direct causal relationship between area types and the 4Ds. However, the *effectiveness* of the 4Ds is more pronounced in areas 1 and 2, and this is discussed in more detail later in this technical memorandum.

Policy-Based Trip Reduction Strategies: Overview

In addition to a land use plan, *Plan Santa Barbara* contains a number of policy initiatives and TDM strategies aimed at strengthening Santa Barbara's alternative transportation network and encouraging travelers to shift modes. A potential range of policies was outlined by City staff and their likely effect was investigated and reported in *Plan Santa Barbara Trip Reduction Impacts Analysis* (Nelson/Nygaard, 2009). The entire report is included as **Appendix B**. (Please note that Appendix B contains within its body Nelson\Nygaard-labeled Appendices A, B, C, D, and E).

Analytical Methodology Employed

In addition to a land use plan, *Plan Santa Barbara* contains a number of transportation policies, programs and initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed to estimate the effects of these peak-hour vehicle trip reduction strategies was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall *Plan Santa Barbara* policy (please see **Appendix A**). Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as TDM requirements for new development projects), while others could also reduce existing traffic congestion (such as an expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in peak-hour vehicle trips that could be anticipated with the a) continuation of existing

policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak hour vehicle trips in some areas and a lesser effect in others (please see discussion and figure above for location of area types).

Nelson\Nygaard estimates of the likely peak-hour vehicle trip reduction effects of *Plan Santa Barbara's* proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the *Plan Santa Barbara* context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis, we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

The analysis represents the highest and best professional standards of transportation planning. The team is confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak hour vehicle trip reduction benefits of transportation policies and programs under consideration in *Plan Santa Barbara*.

Overview of Analytical Outputs

Appendix B contains a detailed explanation of the methodology used and outputs of the analysis. Outputs of the analysis include a summary of the trip reduction strategies by area for each scenario, their effectiveness in daily versus peak hour contexts, and examples of these strategies. Highlights are provided below.

Summary of Outputs

Nelson\Nygaard's findings suggest that Santa Barbara can certainly reduce per capita vehicle trips with the implementation of trip reduction strategies. While the precise effects of specific trip reduction policies can vary depending on a number of factors, peer-reviewed empirical evidence, real-world experience of Santa Barbara[11] and other peer communities, basic economic theory,[12] and simple common sense provide overwhelmingly support for our findings in this report that a concerted and comprehensive effort to promote mode shift and reduce vehicle trips can be effective. The order-of-magnitude estimates of likely trip reduction effects for the four different policy scenarios and each potential policy are summarized below.[13]

[11] The trip reduction and mode shift effects of the City of Santa Barbara's, Metropolitan Transit District, and SBCAG's programs are documented in this report and in *Plan Santa Barbara: Transportation Existing Conditions Report* (AMEC Earth & Environmental, Inc., August 2008).

[12] An oft-repeated adage of economists to guide policymakers is to "Subsidize those behaviors you want to see more of and tax those behaviors you want to see less of."

[13] The full analysis and findings, including definitions of area types and trip types, are presented in **Appendix B**.

Aggregate Effects: Peak-Hour Trip Generation Reductions[14]

The aggregate order of magnitude reductions in peak-hour vehicle trips that result from implementation of a comprehensive package of strategies discussed in **Appendix B** are summarized below and in the table entitled "Summary of Estimated Reductions in Peak Hour Vehicle Trips," included at the end of this section.

- **No Project.**[15] In the "No Project" scenario, there will likely be no reduction in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- ***Plan Santa Barbara*.** In the "*Plan Santa Barbara*" scenario, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 25%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 5%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 5%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 2%
- **Alternative 1.** In the "Alternative 1" scenario, there will likely be no reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 0%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%
- **Alternative 2.** In the "Alternative 2" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:
  - Areas 1 & 2 Commuter Trip Reduction Effects: 45%
  - Areas 3 & 4 Commuter Trip Reduction Effects: 15%
  - Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
  - Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

Stand-Alone Effects: Individual Strategies for Influence on Peak-Hour Trips[16]

The order-of-magnitude estimated reductions in peak-hour vehicle trips that result from implementation of individual strategies and the full findings and analysis are discussed in **Appendix B**. These estimates of the order-of-magnitude effects are based on the empirical

[14] The full analysis and findings are presented in **Appendix B**.
[15] No Project and *Plan Santa Barbara* were presented in *Future Traffic Conditions for the 2030 Proposed Project (Plan Santa Barbara) Scenario, September 8, 2009*.
[16] The full analysis and findings are presented in **Appendix B**.

research of each strategy's influence on peak-hour vehicle trips (as presented in Appendix B and C) and tailored to the unique conditions in Santa Barbara to influence peak-hour vehicle trips, travel behavior and mode choice.[17] Based on these considerations, Nelson\Nygaard estimates that the most effective individual trip reduction strategies in Santa Barbara will likely be a continuation and/or enhancement of the following policies and programs:

- Public parking management/pricing to discourage commuter parking.
- Parking cashout programs, including a local ordinance.[18]
- Subsidized transit pass programs.
- Safe Routes to School, with an emphasis on education and capacity building, as well as physical improvements.
- Carpooling incentives.
- Telecommuting and alternative work schedules.

As discussed below, other strategies will certainly have a substantial effect on reducing peak hour vehicle trips (e.g., enhancements to transit service), but those effects could not be quantified at this time. For more information see "Effects of Some Strategies not Quantifiable with Available Information."

Reductions in Vehicle Trip Generation Rates versus Vehicle Ownership Rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies affect each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g., lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those effects are already accounted for by trip reduction strategies that we were able to quantify.

[17] Existing conditions are discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008). As noted in **Appendix B**, there are other strategies that can affect peak-hour vehicle trips (such as enhanced transit service, expanded bicycle networks, and sidewalk and pedestrian realm improvements). Some of these strategies have been excluded from the stand-alone analysis either because there was not enough data available to reliably analyze their effects at this time (e.g., transit enhancements), their effects were accounted for in another step in the analysis (e.g., bicycle network improvements), or their impacts on *commuter* peak-hour vehicle trips was estimated to be negligible and/or within the margin of error for the purposes of this analysis (e.g., pedestrian improvements, which are important to accommodate non-commuter/non-peak trips and support peak-hour transit commuters walking to transit, but do not have a substantial impact on commuter, peak-hour vehicle trips as the vast majority of Santa Barbara residents' and employees' homes and workplaces are not located close enough to allow them to walk to work).

[18] As discussed in *Plan Santa Barbara: Transportation Existing Conditions Report* (City of Santa Barbara, August 2008), the State of California has adopted an existing "Parking Cashout" law that requires certain employers who offer free parking to *any* employee to offer the cash value equivalent of the free parking space to *all* employees who choose not to use the employee-provided free parking space (i.e., to "cash out" their parking space). The California Air Resource Board (CARB) is nominally responsible for enforcement of these regulations, but does not have the resources necessary to do so effectively. For this reason, many local jurisdictions (such as Santa Monica, Los Angeles, and several jurisdictions in the San Francisco Bay Area) have already adopted or are currently exploring locally- or regionally-based mechanisms to monitor compliance of employers located in their jurisdictions. For new development/employers, the City can require as a condition of approval for entitlements that any employers located in the project annually submit proof of compliance. For existing development/employers, the City can require that proof of compliance be submitted at the same time employers apply for business license renewal or pay any local business taxes.

Effects of Some Strategies not Quantifiable with Available Information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely effect, we indicated in our analysis in **Appendix B** that the effect was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no effect on reducing vehicle trips in reality.* Instead, these designations mean that a) the effect on peak hour trips is not significant enough to model (e.g., the effect could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g., empirical research or published case studies) to allow us to document the precise trip reduction effects for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the effects of this strategy. We have therefore excluded the effects of certain strategies from this analysis in order to avoid the risk of misstating highly localized, context-dependent benefits (e.g., enhanced transit service) or to avoid "double counting" the benefits (e.g., pedestrian improvements adequately accounted for under "street connectivity" factor of the 4D model adjustments). [19]

Non-Additive Effects for each Policy Alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation of such policies and programs in order to understand the

[19] The trip-reduction effects of bicycle network improvements and bike share programs is a good example that can be elaborated on. Naturally there will be observable before-and-after effects (e.g., mode split, percent of bicycle commuters, etc.) with the implementation of discrete bike facilities (e.g., new on-street bike lanes filling in a network gap, a new bike/ped multi-use trail, retrofitting a bridge or other "missing link" with bike/ped infrastructure). We're aware of several before-and-after studies of discrete facilities (including studies from the City of Portland and San Francisco, as well as bicycle counts included in Santa Barbara's current *Bicycle Master Plan*). One problem with some of these studies is that it is often not clear how much of the observed increase in bicycle trips is a result of mode shift (e.g., *new* bike trips coming from other modes) and how much of the observed increase is actually due to bicyclists shifting routes (e.g., choosing to travel on the enhanced route rather than their former, perhaps suboptimal, route). Another problem is that we are not aware of any studies that disaggregate the increase in bicycle trips into commuter/peak trips and non-commuter/non-peak trips (which is the purpose of this study). For example: the available research only comments on general increases in bike commuting that result from the addition of bike facilities (0.0075% increase for each additional mile per 100,000 residents) and has basically nothing to say on the effect of bike facilities on peak-hour vehicle trips. None of these potential issues means that bicycle facility improvements shouldn't be implemented, it simply means that the current state of the research doesn't allow us to disaggregate the estimated reduction in peak-hour vehicle trips because we can't reliably derive an estimate of how many of the new bicycle trips are former auto commuters. So while bike facilities and bike share programs are recommended and certainly do have impacts (especially on non-peak, non-commuter trips) and should be continued to leverage network effects and build on the success of previous investments, we don't think the research currently exists to allow us to make a reliable estimate or peak-hour vehicle trips, which is the metric deployed in the traffic model. Finally, we believe that the net effect on peak-hour commuter vehicle trips in Santa Barbara would still be relatively small (perhaps a 2-3% reduction in peak-hour vehicle trips at the most) because a) many of the gains have already been realized from previous investment in bicycle facilities, b) Santa Barbara's unique geography (e.g., hills) limits the feasible catchment area for bicycle commuting and c) Santa Barbara's jobs/housing imbalance results in long commute distances for the low-income households that are pre-disposed to commute to work by bicycle. The same is true for research on bike sharing: the current research focuses on the increase in bicycling trips rather than the decrease in peak-hour commuter vehicle trips. Even if we could reliably derive an estimate of the vehicle trip reduction effects of bikeshare programs, we believe that – even if a very robust program were to be implemented in Santa Barbara – very few existing auto commuters would be able to commute daily via a bike share program (which requires a "bikeshare pod" within walking distance of both trip ends to avoid accruing usage fees for all day). However, bike share programs can support auto commuters switching to other modes (transit, carshare, etc.) by providing them with more mobility choices at the work destination should the need arise for an unscheduled trip that is too far to walk. Since bike share programs don't have a substantial *direct* effect on peak-hour commuter trips (but instead *indirectly* leverage the effectiveness of other programs), we have excluded them from our analysis.

actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occurs concurrently. For example, a city may implement a subsidized transit pass program at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater effects when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total effects that can be achieved. For these reasons, it is not prudent to expect that the stand-alone effects of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total effects of various strategies together. Because the transportation policies and programs under consideration in the various *Plan Santa Barbara* alternatives would be implemented concurrently as a package (in fact some trip reduction strategies are already in effect), we have estimated the total effect for each alternative using a non-additive methodology. For example, when summing the effects of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated effects of other trip reduction strategies when developing

The reductions in *Plan Santa Barbara Trip Reduction Effects Analysis* were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose. In addition, trips ending in different areas (shown below) were reduced by different levels. Trips ending in area types 1 and 2 were reduced by a greater percentage than trips ending in area types 3 and 4. Area type 1 represents the Central Business District. This area contains the greatest concentration of commercial and retail land uses. In addition, it is generally coterminous with the Parking Zone of Benefit. These land uses are grouped together because of their similar density and their shared parking situation.

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO MODEL DISCUSSION

4D Effects

The total amount of new growth projected in the Alternative 1 scenario is quite modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to the existing General Plan can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[20]	5.4 percent
Employment[21]	3.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated to change is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

Figure 5 illustrates the change in the density variable between existing conditions and the Alternative 1 scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. The figure illustrates that density increases are anticipated largely within the MODA boundaries, and these are modest based upon built environment assumptions. The darker green colors indicate the most pronounced change in density changes, resulting in the highest trip rate reductions. In outlying portions of Santa Barbara, large areas have minimal or no change, reflecting little change in density. Again, these density results show the extent to which the change in density is relatively higher or lower when comparing existing conditions and future conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Alternative 1 scenario. Diversity focuses on the relative mix of jobs and population relative to regional jobs and population, and the figure shows the rate of change between the two scenarios (existing conditions and the Alternative 1 scenario). These results are a direct derivation of built environment characteristics. The diversity variable reflects the degree to which an existing area has a jobs/housing mix more or less diverse than regional averages, and Figure 6 shows the extent to which that changed (the TAZ became more diverse) and effected vehicular traffic between existing conditions and the Alternative 1 scenario.

The 4Ds are an elasticity, and just as an increase in the "D" variables between existing and future conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

[20] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[21] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

Alternative 1 Policy-Based Trip Reduction Strategy Effects

There will likely be no reduction in peak-hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Commuter Trip Reduction Effects: 0%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 0%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 0%

Based on this conclusion, there is no effect of policy-based trip reduction due to the policy strategies for the Alternative 1 scenario. Please see **Appendix B** for the Alternative 1 conclusion for each strategy.

Alternative 1 Model Results

Figure 7 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2 (existing conditions). The figure illustrates a variety of trends, described below:

- Traffic volumes across all study segments are projected to grow by approximately 12% with the addition of the existing general plan development.
- Traffic volumes on freeway segments are projected to grow by approximately 10%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 14%.

Future Alternative 1 Peak Hour Freeway Volumes

Figure 8 presents AM and PM Future (Year 2030) Alternative 1 scenario peak hour freeway forecast volumes. The figure illustrates the following trends:

- Overall, peak hour freeway volumes are projected to grow by 10.75% during the AM peak hour and 11.25% during the PM peak hour.
- As in the existing conditions, the travel patterns change slightly depending on whether one is looking at the volumes north or south of Garden Street. The additional southbound lane has the most pronounced impact south of Garden Street.
- Many of these freeway segments will be operating at or worse than LOS D, including sections operating at LOS F. Highlights include the following:
    - Freeway segments north of Carrillo will operate at LOS E or F during the PM peak hour in the southbound direction during both peak hours
    - Northbound 101 north of Milpas shows volumes exceeding theoretical capacities in the AM peak hour
    - Freeway segments south of Milpas will operate at LOS F, northbound in the AM peak hour
    - Freeway segments south of Hot Springs show volumes exceeding theoretical capacities, northbound in the AM peak hour and southbound in the PM peak hour

- As a result, the percentage growth in freeway volumes in the off-peak direction will likely outpace growth in the peak direction since the off-peak direction has more capacity to accommodate the growth. As mentioned, growth in traffic in the peak direction would likely take the form of peak spreading. This phenomenon is now common in the United States, where the peak period occurs for more than one hour during the evening.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 9.5% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 27% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 13.25% on US-101 northbound and while traffic volumes are projected to grow by 9.5% on US-101 southbound.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the AM directional peak imbalance will diminish to a small extent south of Garden Street. This is due to shifting travel patterns south of Garden Street and additional southbound capacity south of Garden Street.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street, growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two. This is primarily due to changes in capacity southbound south of Garden Street.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 20.25% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 14% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 7.75% on US-101 northbound and traffic volumes are also projected to grow by 9.5% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

Future Alternative 1 Peak Hour Intersection LOS

Table 3 and Figure 9 illustrate AM and PM peak hour LOS at the 52 *Plan Santa Barbara* study intersections. As the data show, additional development under the existing general plan in the coming two decades will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represent 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. This number falls to 32 study intersections, or 62%, with further development under Alternative 1.

While this increase in deficient intersections is substantial, it should not necessarily be extrapolated to all intersections in the City. City staff specifically selected the study intersections for this analysis in areas with higher levels of activity and in places that were likely to become congested. It is likely that many intersections in areas removed from the City's major activity centers would not be affected to the same extent.

Figures 10 and 11 chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the Alternative 1 (2030) scenario, and the Alternative 2 (2030) scenario. Congestion levels are generally lower during the AM peak hour in both analysis years. When compared to existing conditions during the PM peak hour, Alternative 1 results in fewer A intersections, fewer B intersections, more C intersections, more D intersections, the same number of E intersections, and more F locations.

The greatest Alternative 1 congestion levels, as show on Figure 9, are currently experienced during the peak hours at or near freeway ramps. This trend will not only continue, but will escalate with the additional development Alternative 1, as shown by the following:

- 16 of the study intersections include freeway ramps. 11 of these intersections, or 69%, are deficient during at least one peak hour and four, or 25%, are deficient during both peak hours. These rates are substantially higher than for the study intersections as a whole, when 23% are deficient during one peak hour and 15% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, six, or 38%, are deficient during at least one peak hour. These intersections were already the most problematic, so it is not surprising that they were most sensitive to potential worsening LOS conditions.

FUTURE (YEAR 2030) ALTERNATIVE 2 MODEL DISCUSSION

4D Effects

The total amount of new growth projected in Alternative 2 is relatively modest compared to the quantity of existing development given the 22-year time horizon. Growth attributable to Alternative 2 can be summarized as follows (please note that these figures are based on conversion factors applied to dwelling units and square footage in the model, and are provided for comparative purposes only; actual population and employment totals may differ):

Measure	**Percent Change**
Population[22]	10.9 percent
Employment[23]	3.7 percent

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of development within a given area anticipated is modest, the 4D effects will therefore be somewhat muted just due to the relatively small amount of change compared to the base condition.

In addition, since the 4D effects measure change from a base condition, those communities with base level (1) higher density; (2) better diversity; (3) stronger design; and (4) establishment as a destination – compared to regional and national averages – will show less overall impact of the Ds when comparing base conditions with future conditions. In other words, if existing Santa

[22] Population represents travel demand model area, which encompasses City plus Sphere of Influence
[23] Employment represents travel demand model area, which encompasses City plus Sphere of Influence

Barbara transformed from low density, wholly residential, poorly connected, remote community to something just the opposite in the future, the Ds would show significant effects on trip generation between existing and future conditions. However, as the model effort shows, Santa Barbara's base condition is characterized by beneficial densities, good diversity, excellent design, and a strong role as a destination. It is therefore much more difficult to realize high trip reductions attributable to the Ds.

Figure 5 illustrates the change in the density variable between the existing conditions and the Alternative 2 scenario. As the legend indicates, the percent reduction in vehicle trips due to changes in the density "D" is shown by color gradations. Overall, the changes are rather modest reflecting the magnitude of changes inherent in the built environment assumptions for Alternative 2 when compared to existing conditions.

Figure 6 illustrates the change in the diversity variable between the existing conditions and the Alternative 2 scenario. The 4Ds are an elasticity, and just as an increase in the "D" variables between future and existing conditions results in a decrease in vehicle trip making, a decrease in the variables could result in an increase in vehicle trip making.

An overview comparison of Figures 5 and 6, focusing on the Alternative 1 scenario and Alternative 2 reveals the following:

- Built environment assumptions reveal only modest changes in density compared to existing conditions. As discussed above, elasticities will be most noticeable in results when changes in a variable such as density have 50 percent, 100 percent, or even higher percentage changes compared to a base condition.
- Both scenarios include built environment assumptions that result in noticeable changes in diversity. The most pronounced effects are west of US-101 and south of State Street, indicating that is where the existing mix of jobs and housing was most purposefully altered.

These conclusions do not indicate that the D effects are not important. Quite the contrary, Santa Barbara happens to be characterized by effective density and diversity when compared to regional and national averages. However, the figures do show that major density and diversity changes – 50 percent, 100 percent, or more – would be necessary to alter the overall theme of Figures 5 and 6 for a city with substantial development. Such changes may be entirely inconsistent with other quality of life goals, policies, and objectives. The beneficial relationship between Santa Barbara's existing 4D qualities with policy-based trip reduction strategies, as discussed below, is significant.

Policy-Based Trip Reduction Strategy Effects

Alternative 2. In the "Alternative 2" scenario, there will likely be substantial reductions in peak hour vehicle trips (relative to existing) as follows:

- Areas 1 & 2 Commuter Trip Reduction Effects: 45%
- Areas 3 & 4 Commuter Trip Reduction Effects: 15%
- Areas 1 & 2 Non-Commuter Trip Reduction Effects: 6%
- Areas 3 & 4 Non-Commuter Trip Reduction Effects: 3%

This level of reduction is significantly higher than other studied scenarios; including *Plan Santa Barbara* and Alternative 1 (the latter has zero effects, as described previously). **Appendix B**

provides a detailed explanation for the sizable Alternative 2 reductions, which are primarily attributable to public parking pricing within the MODA and are summarized here:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour. These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail.
- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, “pay-by-cell,” etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with available spaces.

Alternative 2 Model Results

Figure 12 presents the average daily traffic forecast volumes on the same study segments presented in Figure 2. The figure illustrates a variety of trends:

- Traffic volumes across all study segments are projected to grow by approximately 4% with the addition of the Alternative 2 development.
- Traffic volumes on freeway segments are projected to grow by approximately 5%.
- Traffic volumes on surface streets (arterials, collectors and local streets) are projected to grow by 2%.

Traffic volumes will increase on all facilities relative to existing conditions. Freeway volumes will see an increase roughly half of the Alternative 1 scenario, and surface streets will see a much lower increase than the Alternative 1 scenario. Surface street volume increases are directly attributable to land use changes inherent in the 2030 socioeconomic data set. For Alternative 2, increases attributable to new development are dampened by the 45 percent decrease associated with trip reduction strategies. Freeway volume changes are more complex.

The following table illustrates the percentage share of freeway volumes for both existing conditions and Alternatives 1 and 2:

Freeway Trip Category	**--------- Percentages of Total Traffic -------**		
	Existing	**Alt. 1**	**Alt. 2**
Internal trips (within model area)	24%	20%	23%
Internal-external trips	19%	16%	19%
External-internal trips	36%	36%	28%
Santa Barbara subtotal	*79%*	*73%*	*71%*
External-external (through)	21%	27%	29%
Total Freeway	100%	100%	100%

This indicates that fewer Santa Barbara internal trips will utilize the freeway in the future when compared to existing conditions. The Alternative 2 results indicate that the overall commute pattern has changed, with more Santa Barbara residents working within the City, plus more Santa Barbara residents are commuting to jobs outside Santa Barbara (both relative to existing conditions).

Future Alternative 2 Peak Hour Freeway Volumes

Figure 13 presents AM and PM Future (Year 2030) Alternative 2 scenario peak hour freeway forecast volumes. The figure illustrates the same general trends as the Alternative 1 scenario, though the increases are less than the Alternative 1 scenario:

- Overall, peak hour freeway volumes are projected to grow by 2% during the AM peak hour and 4.5% during the PM peak hour.
- In general, peak hour freeway volumes show the same pattern and trends as the Alternative 1 scenarios, with a slightly smaller increase over the existing conditions.
- Overall highlights include the following:
    - Freeway segments north of Mission and south of SR-154 will operate at LOS E northbound during the PM peak and at LOS F southbound during the PM peak
    - The northbound 101 segment north of Milpas will operate in excess of its theoretical capacity during the AM peak hour
    - Freeway segments south of Hot Springs show volumes that exceed the freeway's theoretical capacity, northbound in the AM peak hour and southbound in the PM peak hour

As described, peak hour forecasts that indicate volumes in excess of capacity point to peak hour spreading, since these oversaturated conditions cannot be achieved during one peak hour.

AM Peak Hour Trends

- During the AM peak hour, freeway volumes are projected to grow by approximately 0.19% (i.e. less than one percent) on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 18% on US-101 southbound south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 2.25% on US-101 northbound while traffic volumes are projected to grow by 0.19% (i.e. less than one percent) on US-101 southbound.
- It terms of both absolute and percentage growth, traffic volume on US-101 northbound is projected to slightly outpace the growth on US-101 southbound north of Garden Street during the AM peak hour.
- The southbound direction will still have greater volumes during the AM peak hour, but as is the case north of Garden Street growth in the off-peak direction will outpace growth in the peak direction, diminishing the imbalance between the two.

PM Peak Hour Trends

- During the PM peak hour, freeway volumes are projected to grow by approximately 16.75% on US-101 northbound south of Garden Street, while traffic volumes are projected to grow by 1.15% on US-101 southbound south of Garden Street.
- While absolute growth in the peak direction is larger, the rate of growth over the existing volumes is smaller, suggesting that the PM directional peak imbalance will diminish to a small extent south of Garden Street.
- North of Garden Street, traffic volumes are projected to grow by approximately 1.35% on US-101 northbound and traffic volumes are also projected to grow by 4.63% on US-101 southbound.
- Traffic on US-101 north of Garden Street will continue to show little directional peaking, with substantial traffic flows in both directions during the PM peak hour.

In general, there are consistent differences between freeway segment peak hour forecasts when comparing Alternative 1 (Figure 8) with Alternative 2 (Figure 13) volumes – Alternative 2 is uniformly lower. Although Alternative 1 has less additional housing growth than Alternative 2, the aggressive Alternative 2 trip reduction strategy implementation more than offsets this housing increase.

Future Alternative 2 Peak Hour Intersection LOS

Table 5 and Figure 14 illustrate AM and PM peak hour LOS at the 52 Alternative 2 study intersections. As the data show, development of Alternative 2 will contribute to increased traffic congestion at many of the study intersections. Table 4 shows the number of deficient intersections – intersections not meeting the City's LOS standard – for existing and forecasted conditions. Currently 39 of 52 study intersections, which represents 75% of the study intersections, are operating at or better than the City's LOS standard during both peak hours. Under the Alternative 1 scenario, this number falls to 32 study intersections, or 62%. Under Alternative 2, 37 study intersections, or 71%, will operate at or better than the City's LOS standard during both peak hours.

As mentioned, the study intersections were selected in the areas most likely to become congested, and so the results should not necessarily be extrapolated to the City as a whole. Notably, the peak hour conditions at the study intersections do deteriorate from the existing

conditions however, they do not fall to the same level as conditions under the Alternative 1 scenario.

Figures 10 and 11, chart the frequency distribution of LOS during the AM and PM peak hours, respectively, for the existing year (2008), the Alternative 1 (2030) scenario, and the Alternative 2 (2030) scenario. When compared to existing conditions, Alternative 2 results in more intersections operating at LOS C or better, more D intersections, fewer E intersections, and more LOS F intersections. At the D/E/F level, Alternative 2 is actually fairly close in performance to existing conditions. The aggressive Alternative 2 trip reduction strategy implementation is primarily responsible for this conclusion.

Traffic forecasts for the Alternative 2 scenario show fewer poorly performing intersections than the existing conditions compared to the Alternative 1 scenario. However, the intersections with the greatest levels of congestion are typically freeway ramps, or within ¼ mile of freeway ramps. The other continuing trend is that traffic volumes increase less than under the Alternative 1 scenario, including the following:

- 16 of the study intersections include freeway ramps. Seven of these intersections, or 44%, are deficient during at least one peak hour and three, or 19%, are deficient during both peak hours. These rates are higher than the study intersections as a whole, when 19% are deficient during at least one peak hour and 10% are deficient during both peak hours.
- There are further 16 study intersections within ¼ mile of a freeway ramp. Of those intersections, four, or 25%, are deficient during at least one peak hour.

Other Measures of Effectiveness

Table 6 illustrates four macro-scale MOEs used to compare general plan scenarios. The trends these measures show are consistent with the trends shown in the segment volumes and intersection levels of service. In general, both Alternatives 1 and 2 show increases in travel, and in general the Alternative 2 scenario shows noticeably smaller increases in travel than the Alternative 1 scenario. The trip reduction effect is strong enough in Alternative 2 that vehicle hours traveled (VHT) is actually lower for Alternative 2 than existing conditions.

Average vehicle trip length increases slightly for Alternative 1 and is stable for Alternative 2 when compared to existing conditions. There are two factors causing this number to rise between the existing conditions and the future conditions, and again slightly between the Alternative 1 scenario and the Alternative 2 scenario. The first is that Santa Barbara will continue to attract more trips than it generates. As such, people will continue to visit Santa Barbara to work, shop, and recreate. Having more travelers entering and exiting the study area means more travelers making the longest trip measurable in the model area.

The second factor contributing to the rise in average trip length is the expected mode shift as quantified by the 4Ds and the policy based reductions. In general, these factors are more likely to reduce shorter vehicle trips than longer vehicle trips. People who are currently driving to meet their basic needs – a trip to the grocery store, drug store, or dry cleaners – may now be able to meet these needs without the use of a vehicle. Even when longer range trips see a shift to another mode (e.g., a work trip), there is often a corresponding shorter range trip that also shifts to another mode (e.g., a lunch trip). Thus, a mode shift in common shorter range trips can actually serve to increase the overall average vehicle trip length.

Overall the forecast results presented show a logical consistency with the differences in policies and land use between the two future scenarios and the existing conditions.

CONCLUSIONS BASED ON ALTERNATIVES 1 AND 2 MODEL RUNS

Based on the results of the Alternative 1 and 2 model runs, we can discern the following:

1. Alternatives 1 and 2 perform similarly *when compared to existing conditions* at LOS F, with both Alternatives resulting in more F intersections. Alternative 2 is performing better at the intersection level during both peak hours when compared to Alternative 1.

2. Alternative 2 includes two key components that result in relatively more favorable intersection results when compared to Alternative 1: (1) additional Alternative 2 housing keeps more trips within Santa Barbara; and (2) the aggressive Alternative 2 trip reduction strategies have a significant effect on intersection LOS when compared to Alternative 1.

3. The results indicate that lower growth (Alternative 1) provides less favorable intersection LOS than more housing combined with aggressive trip reduction effects (Alternative 2). This finding is consistent with one of the conclusions stated in the review of *Plan Santa Barbara* -- the total amount of new growth projected in Alternatives 1 and 2 is relatively modest compared to the quantity of existing development given the 22-year time horizon; major reductions in the sheer amount of growth are therefore not a recommended strategy.

4. The model is sensitive to the existing 4D characteristics within 2009 Santa Barbara, and the elasticities we use are conservative, so we are not experiencing dramatic 4D-related effects when we compare existing conditions with Alternatives 1 and 2; and focus on the 4Ds. Having said that, the location and character of new development in Santa Barbara does matter. Where there is the opportunity to guide new development between multiple locations, such more housing within the MODA (Alternative 2), beneficial LOS conditions are evident.

5. Peak hour commute trips continue to be an issue, as evident in (1) continued intersection LOS issues at all ramp terminals; and (2) average vehicle trip length getting slightly higher with Alternatives 1 and 2. Alternative 2 addressed these issues by (1) adding additional housing in the Downtown core and in the MODA; reducing non-residential development in the MODA; and (3) implementing an aggressive parking pricing program. The result is that with Alternative 2, most of the remaining intersection LOS failure occurs at or near freeway ramp terminals.

6. Santa Barbara is an existing and projected job-rich area. Non-residential trips are projected to grow at a greater rate than the residential trips. Alternative 2 demonstrated favorable intersection results relative to Alternative 1 in part by increasing housing and decreasing non-residential development within the MODA.

7. Santa Barbara currently exhibits strong directional peaking characteristics. Future land use scenarios that follow existing patterns will lead to further increases in peak hour, peak direction traffic. Areas within the City that have strong peak hour/peak direction flows often have underutilized capacity in the off-peak direction. Alternative 2 features a different development pattern, with resulting difference in commute patterns, which compliments this available capacity. Specifically, the additional housing in the MODA, combined with a reduction in non-residential development, means more workers seeking jobs outside Santa Barbara. These new workers will utilize the relatively less congested reverse peak direction. In other words, additional Alternative 2 scenario housing growth in the MODA would occur with less pronounced level of service degradation. The strong

Alternative 2 TDM measures would simultaneously reduce the effect of peak hour, peak direction traffic on sensitive intersections.

8. The trip reduction strategies articulated in Nelson\Nygaard's work are very effective at reducing vehicle trips compared to scenarios without the strategies. Trip for trip, they are going to have a more significant incremental effect than the 4Ds *because many of the trip reduction strategies are not already in place – and those that are in place could be enhanced and expanded – and therefore have a more pronounced impact on existing and future trips*. This was demonstrated clearly with Alternative 2.

FIGURES:

1. PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS

2. EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES

3. EXISTING (YEAR 2008) PEAK HOUR FREEWAY FORECAST VOLUMES

4. EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE

5. PERCENT CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE ALTERNATIVE 1 AND ALTERNATIVE 2 SCENARIO

6. PERCENT CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE ALTERNATIVE 1 AND ALTERNATIVE 2 SCENARIO

7. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

8. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

9. FUTURE (YEAR 2030) ALTERNATIVE 1 SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

10. AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

11. PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

12. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

13. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO PEAK HOUR FREEWAY FORECAST VOLUMES

14. FUTURE (YEAR 2030) ALTERNATIVE 2 SCENARIO FORECAST INTERSECTION LEVELS OF SERVICE

TABLES:

1. YEAR 2008 WEEKDAY EXISTING CONDITIONS INTERSECTION LEVELS OF SERVICE

2. SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER

3. YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS INTERSECTION LEVELS OF SERVICE

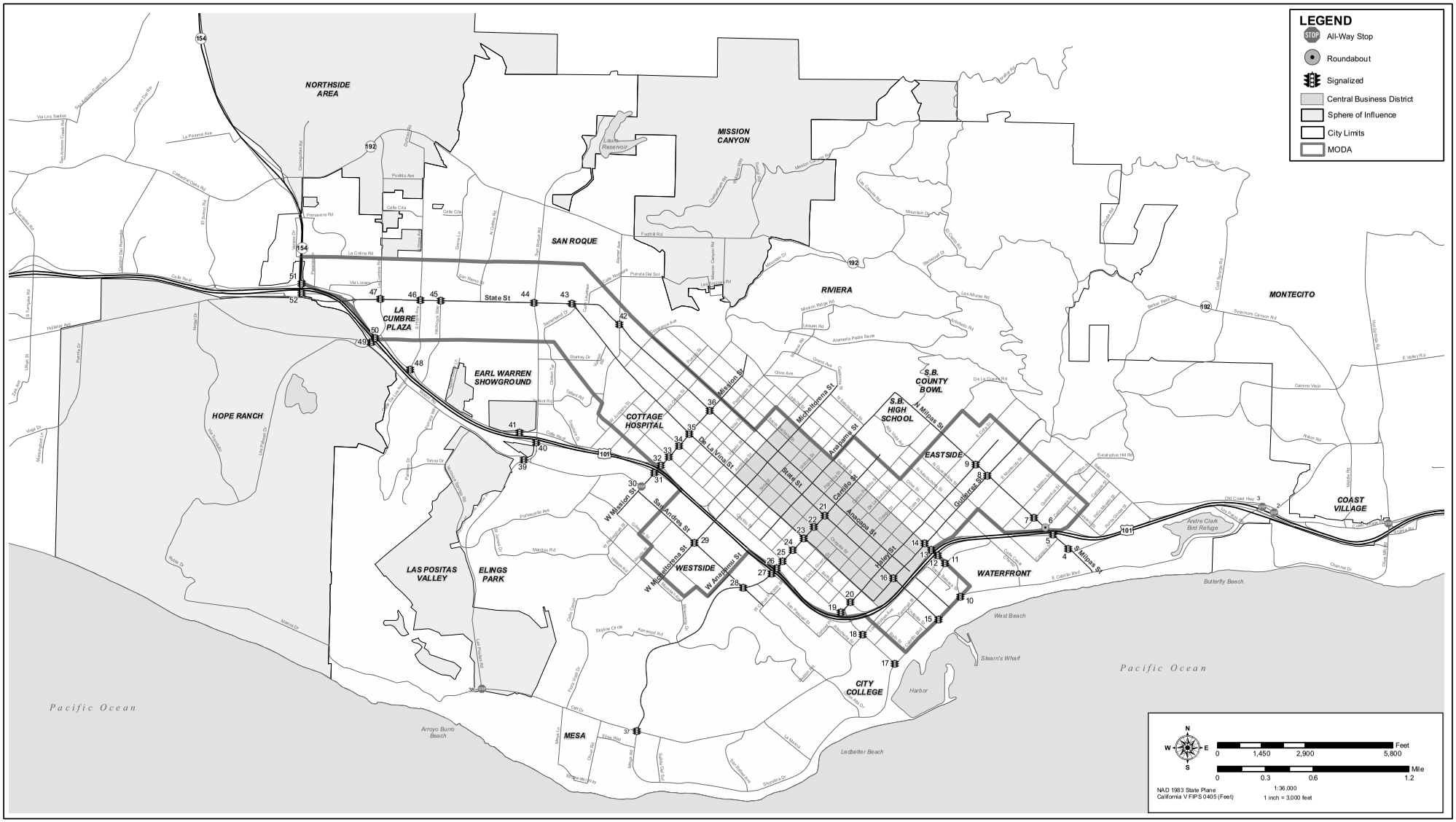
4. NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

5. YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 2 CONDITIONS INTERSECTION LEVELS OF SERVICE

6. MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS

APPENDIX A: Plan Santa Barbara EIR Assumptions 4-15-09 (City of Santa Barbara)

APPENDIX B: Nelson\Nygaard Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis 7-8-09



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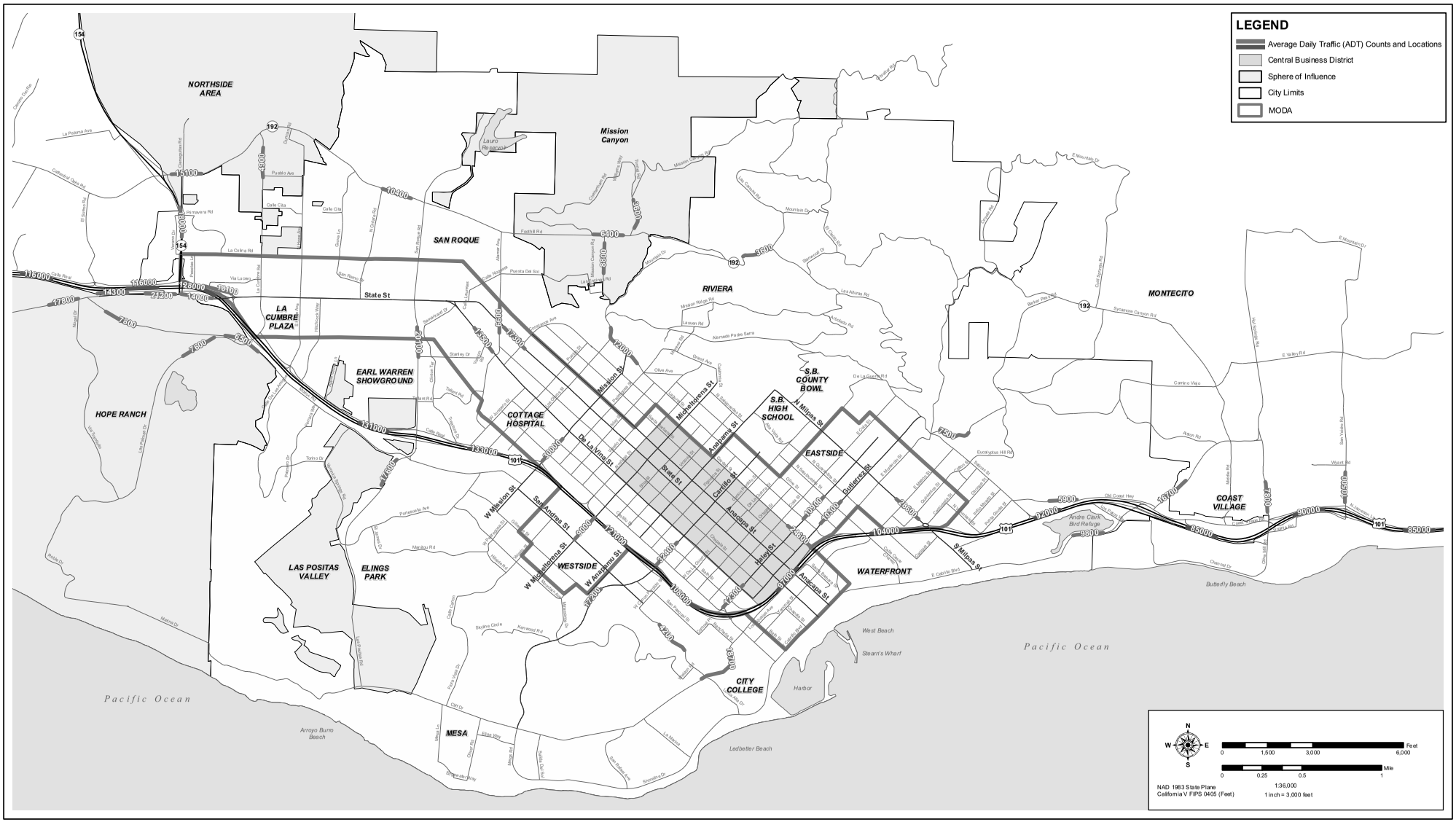
PLAN SANTA BARBARA STUDY AREA AND ANALYZED INTERSECTIONS
FIGURE 1



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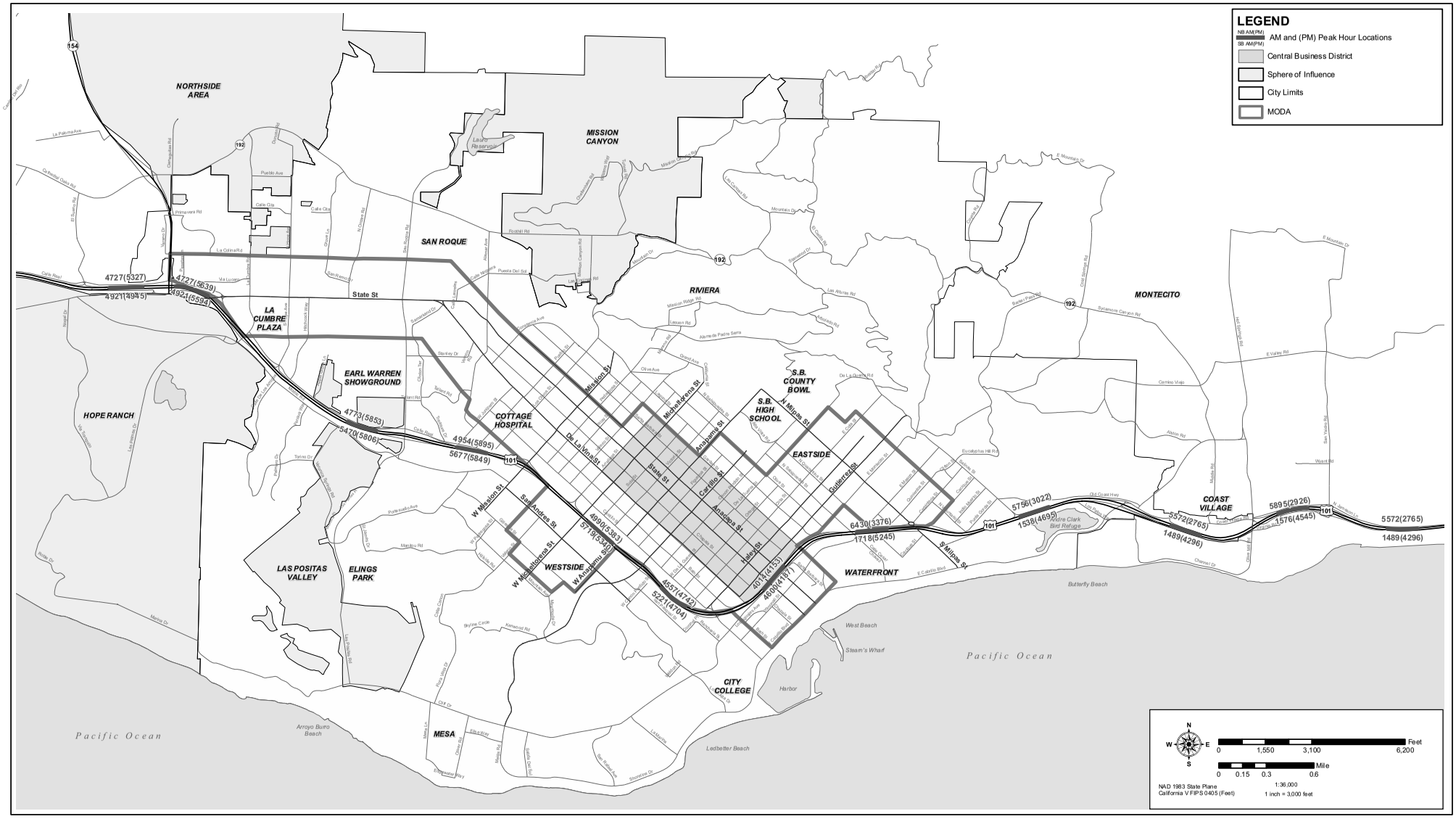
EXISTING (YEAR 2008) AVERAGE DAILY TRAFFIC (ADT) VOLUMES
FIGURE 2



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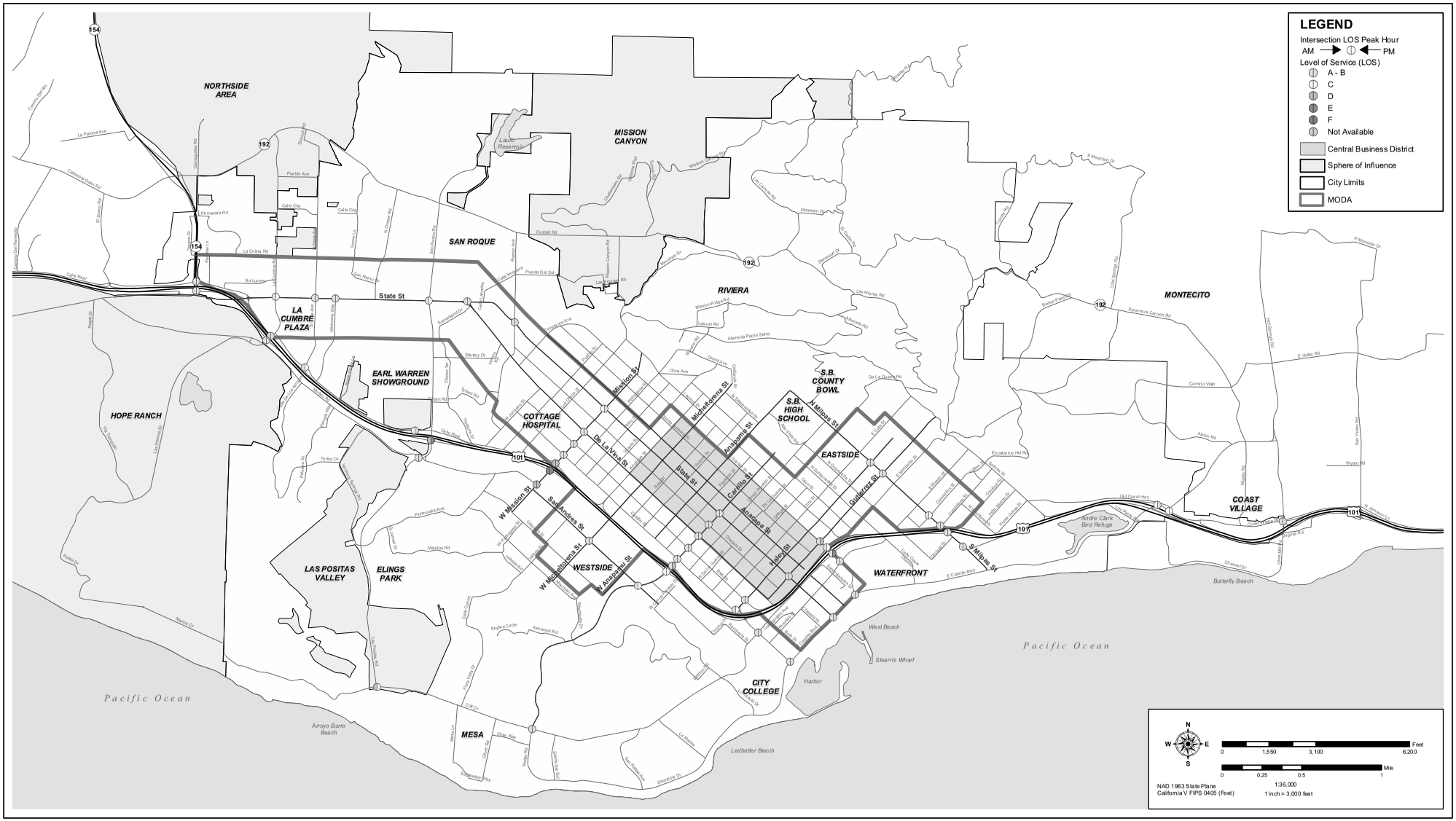
EXISTING (YEAR 2008) PEAK HOUR FREEWAY VOLUMES
FIGURE 3



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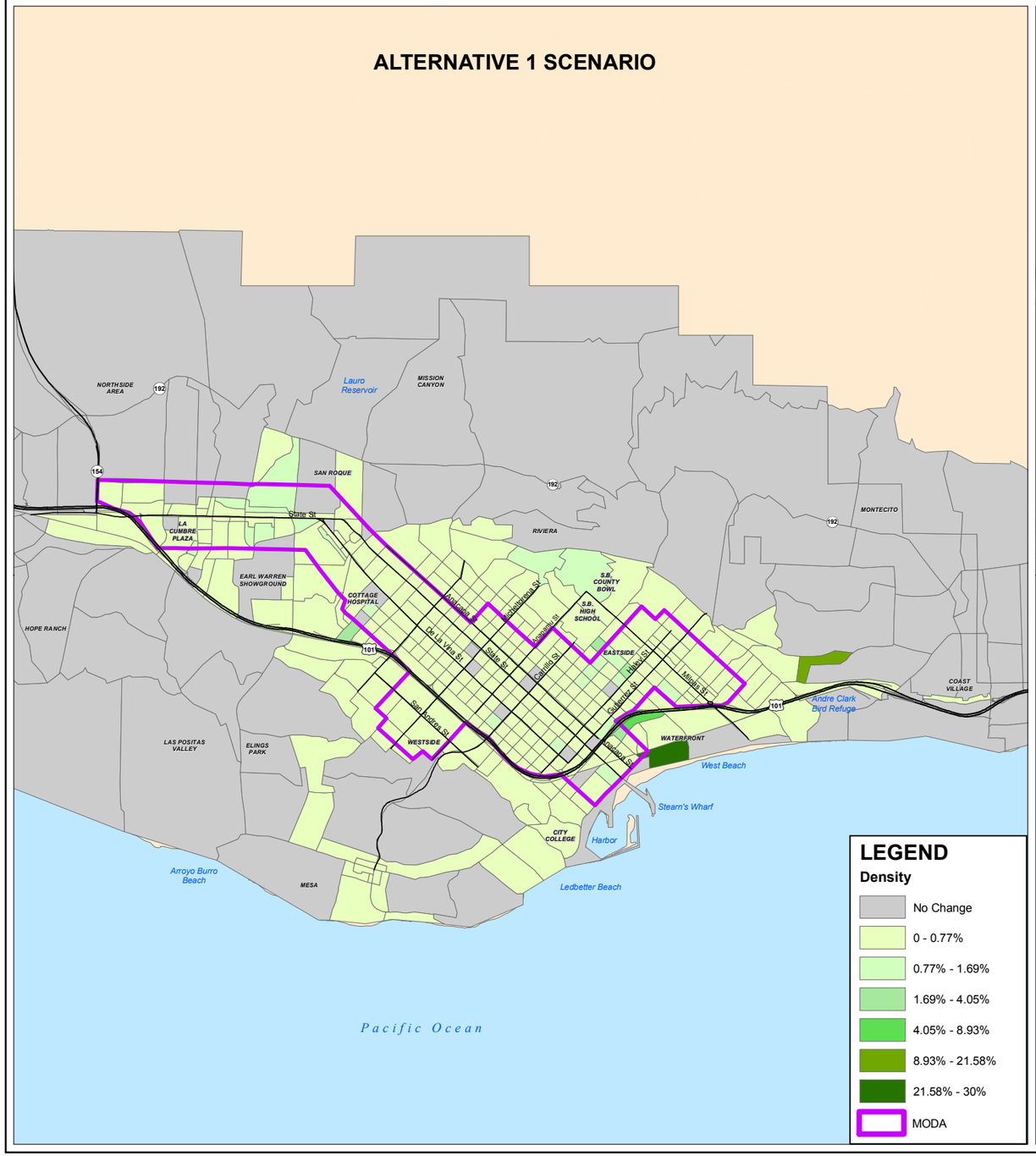
EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE
FIGURE 4

ALTERNATIVE 1 SCENARIO

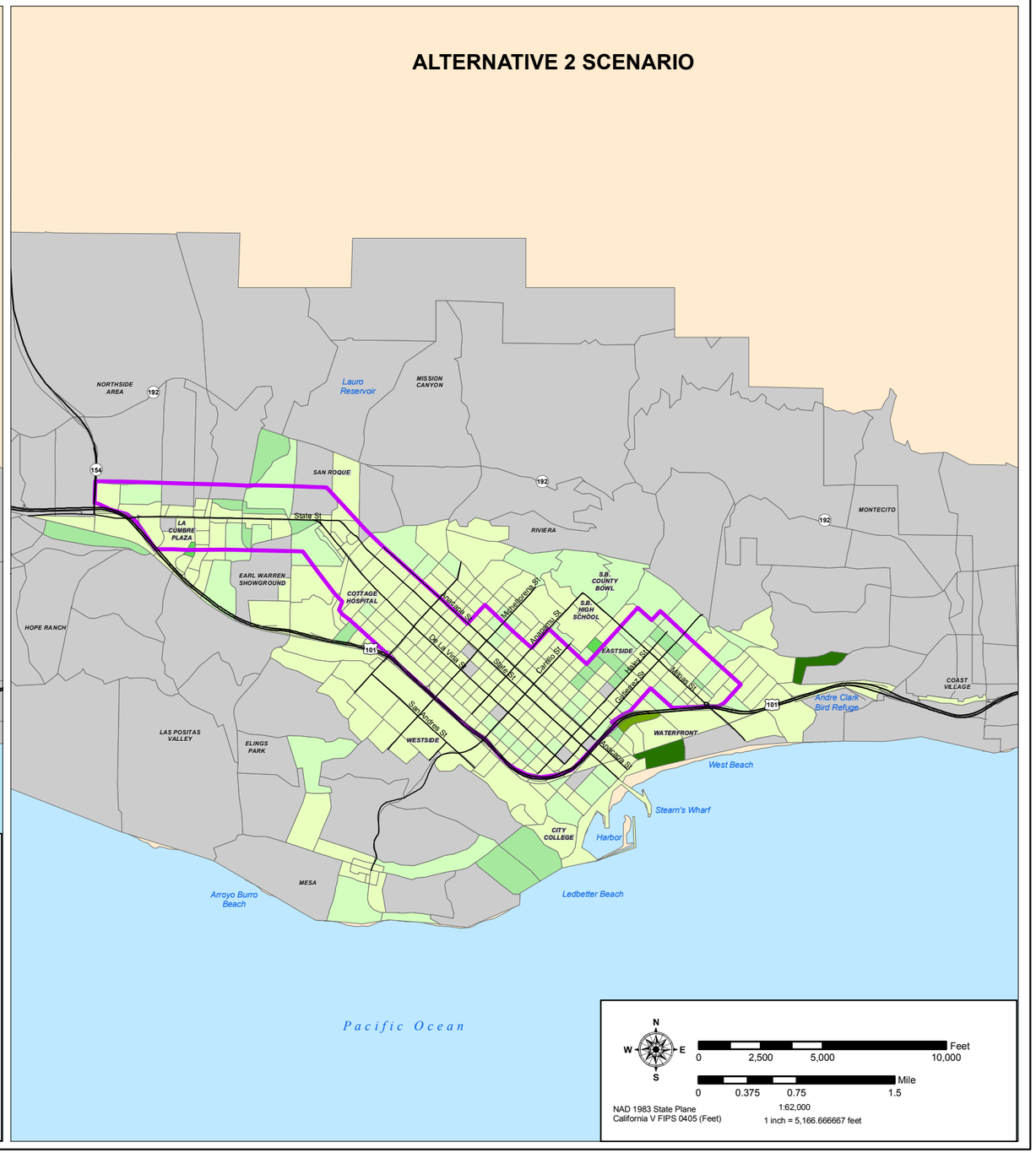


LEGEND

Density

- No Change
- 0 - 0.77%
- 0.77% - 1.69%
- 1.69% - 4.05%
- 4.05% - 8.93%
- 8.93% - 21.58%
- 21.58% - 30%
- MODA

ALTERNATIVE 2 SCENARIO



N
W E
S

Feet
0 2,500 5,000 10,000

Mile
0 0.375 0.75 1.5

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000
1 inch = 5,166.666667 feet

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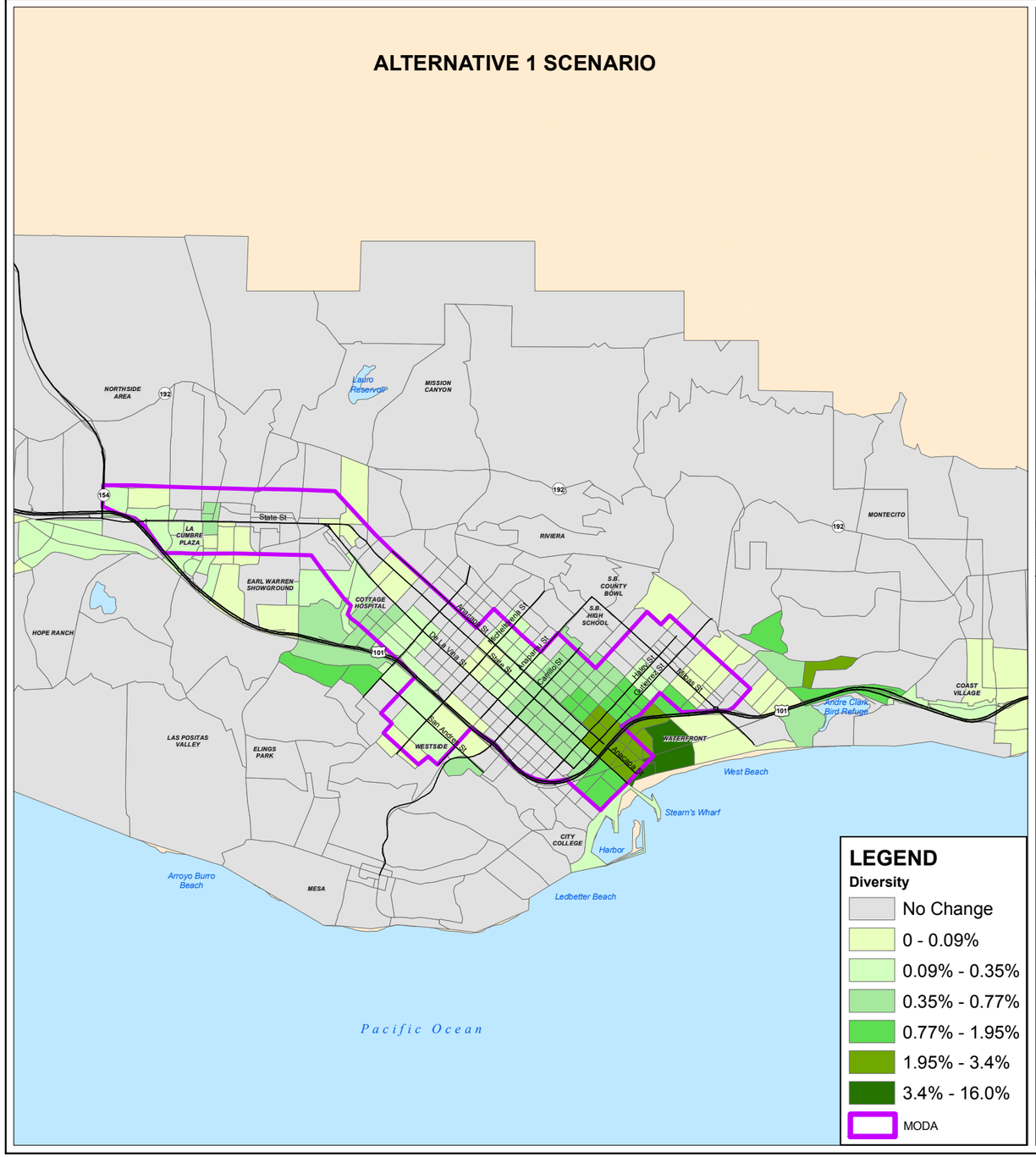
TRANSPORTATION CONSULTANTS

PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DENSITY RELATIVE TO EXISTING CONDITIONS FOR THE *ALTERNATIVE 1* AND *ALTERNATIVE 2 SCENARIO*

FIGURE 5

ALTERNATIVE 1 SCENARIO

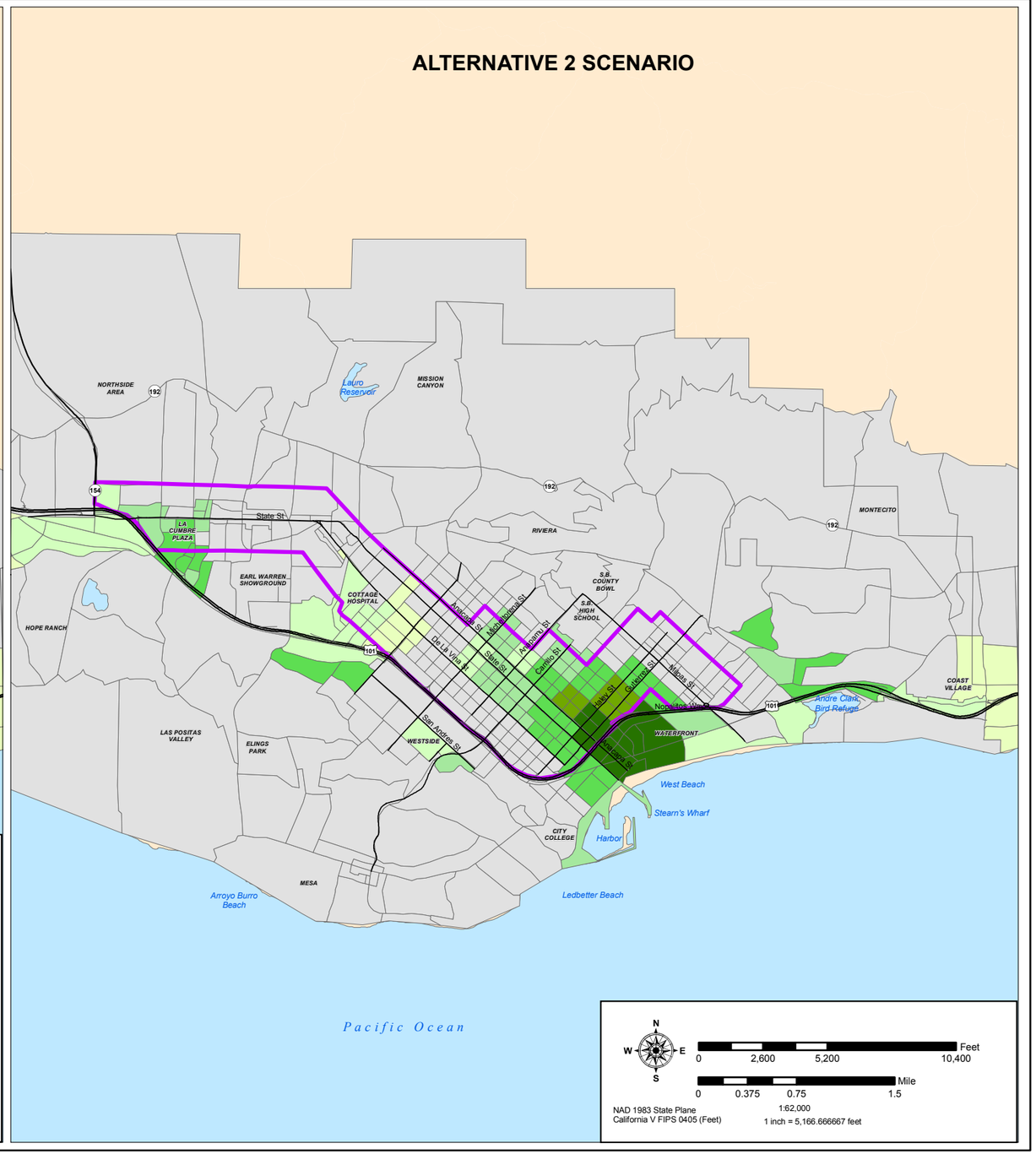


LEGEND

Diversity

- No Change
- 0 - 0.09%
- 0.09% - 0.35%
- 0.35% - 0.77%
- 0.77% - 1.95%
- 1.95% - 3.4%
- 3.4% - 16.0%
- MODA

ALTERNATIVE 2 SCENARIO



N
W E
S

0 2,600 5,200 10,400 Feet

0 0.375 0.75 1.5 Mile

NAD 1983 State Plane California V FIPS 0405 (Feet)

1:62,000

1 inch = 5,166.666667 feet

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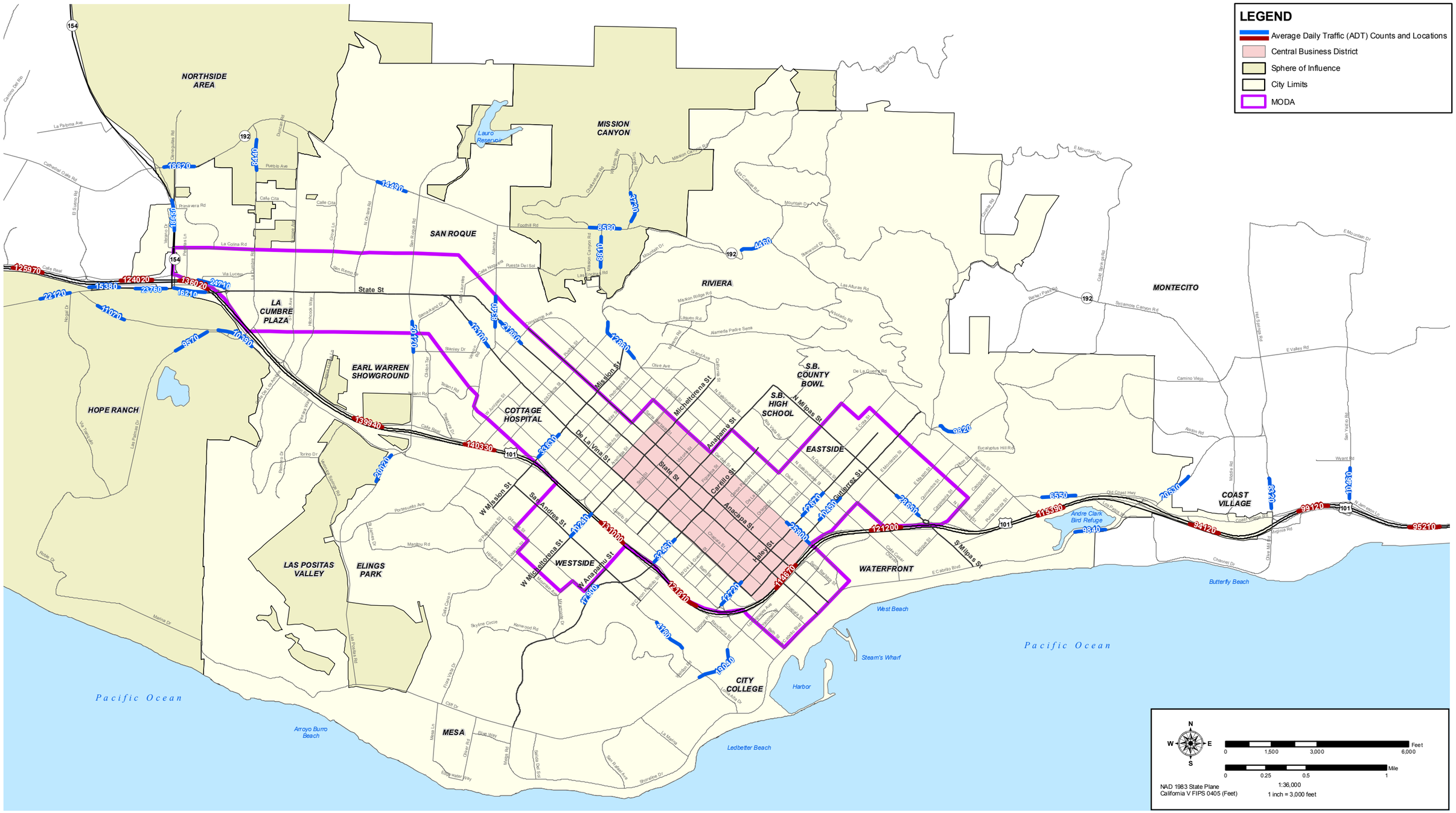
TRANSPORTATION CONSULTANTS

PERCENT REDUCTION IN VEHICLE TRIPS FROM CHANGE IN DIVERSITY RELATIVE TO EXISTING CONDITIONS FOR THE *ALTERNATIVE 1* AND *ALTERNATIVE 2 SCENARIO*

FIGURE 6



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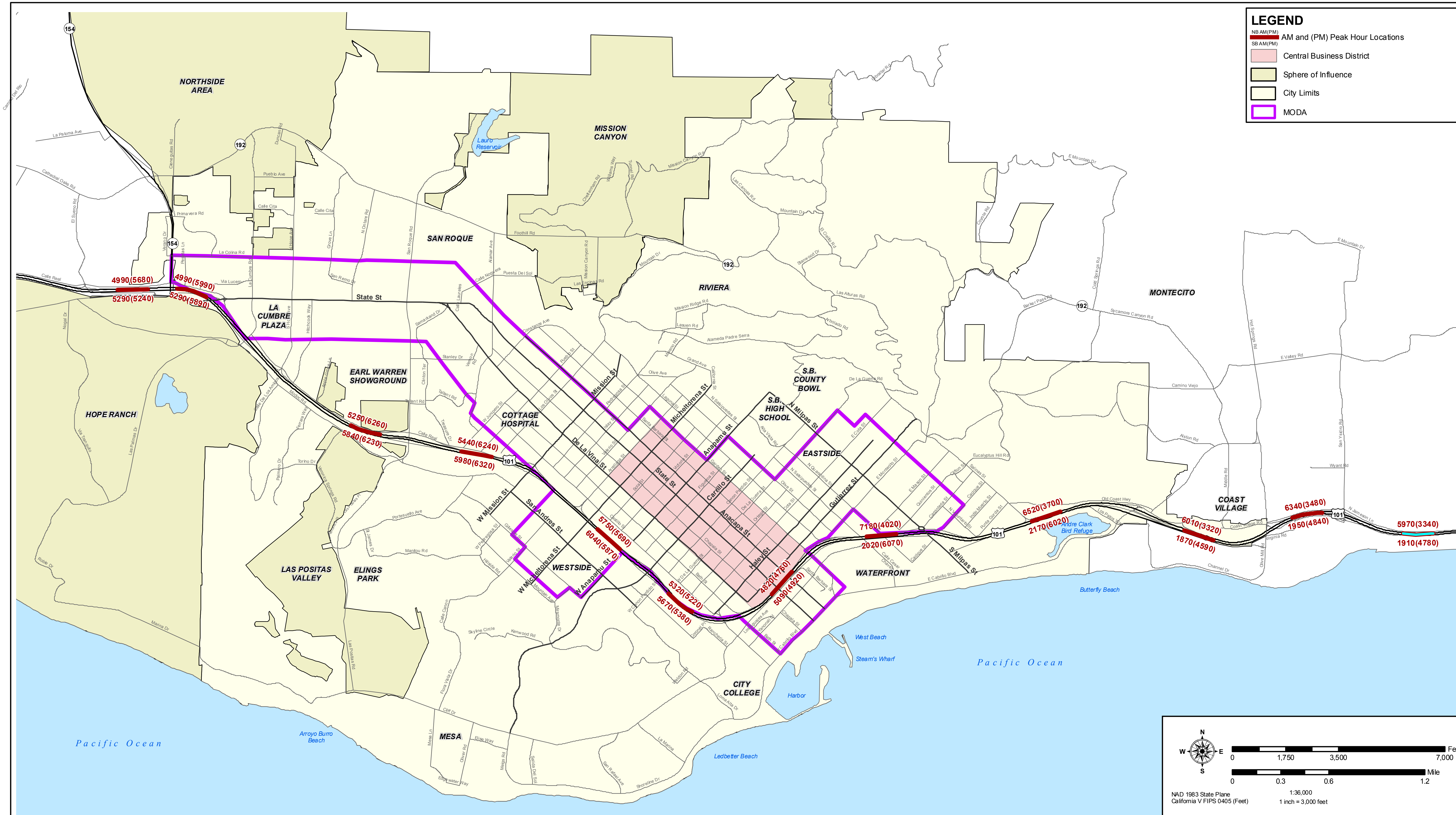
FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 7



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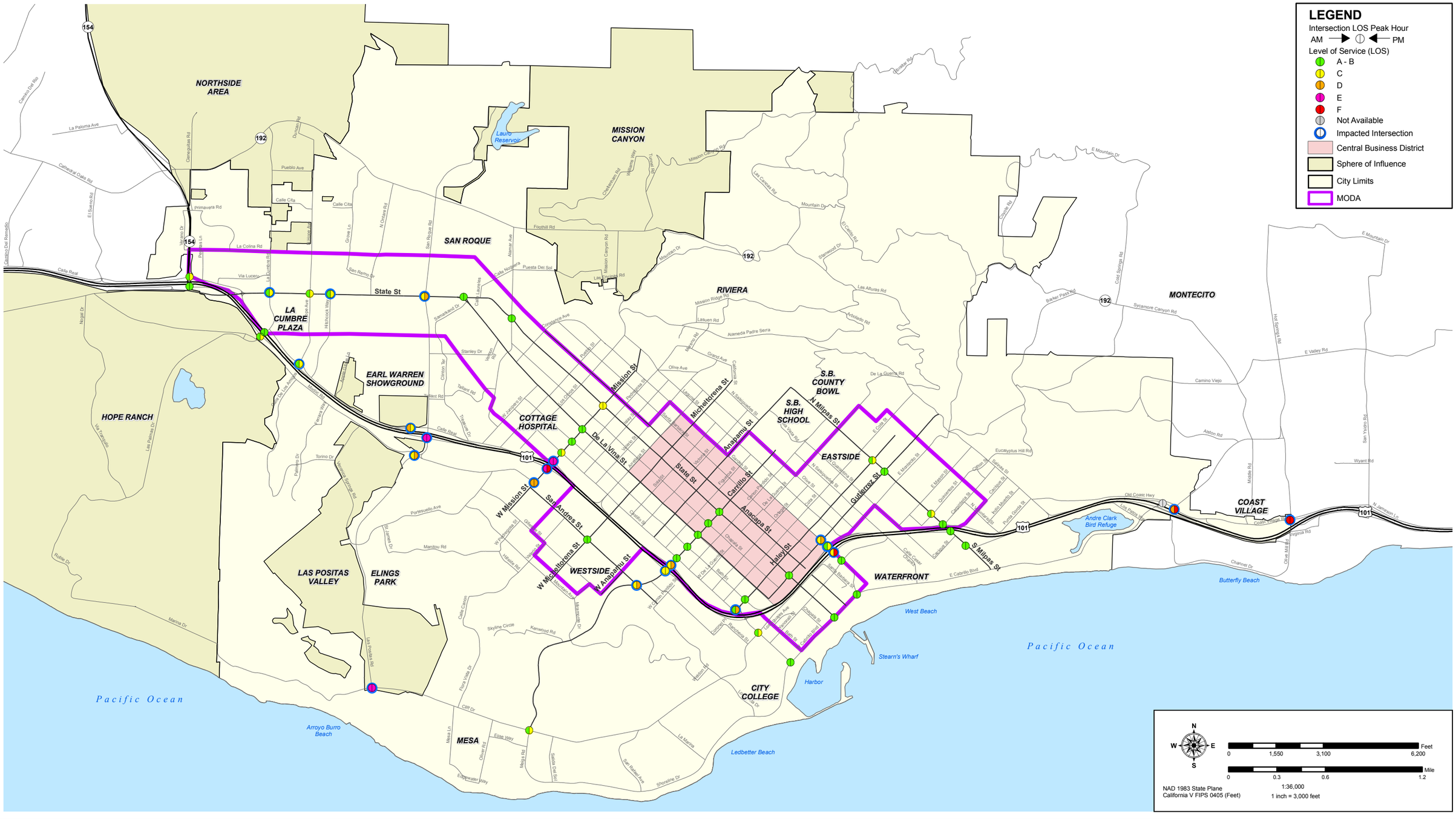
FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 8



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FUTURE (YEAR 2030) *ALTERNATIVE 1 SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 9

FIGURE 10
AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

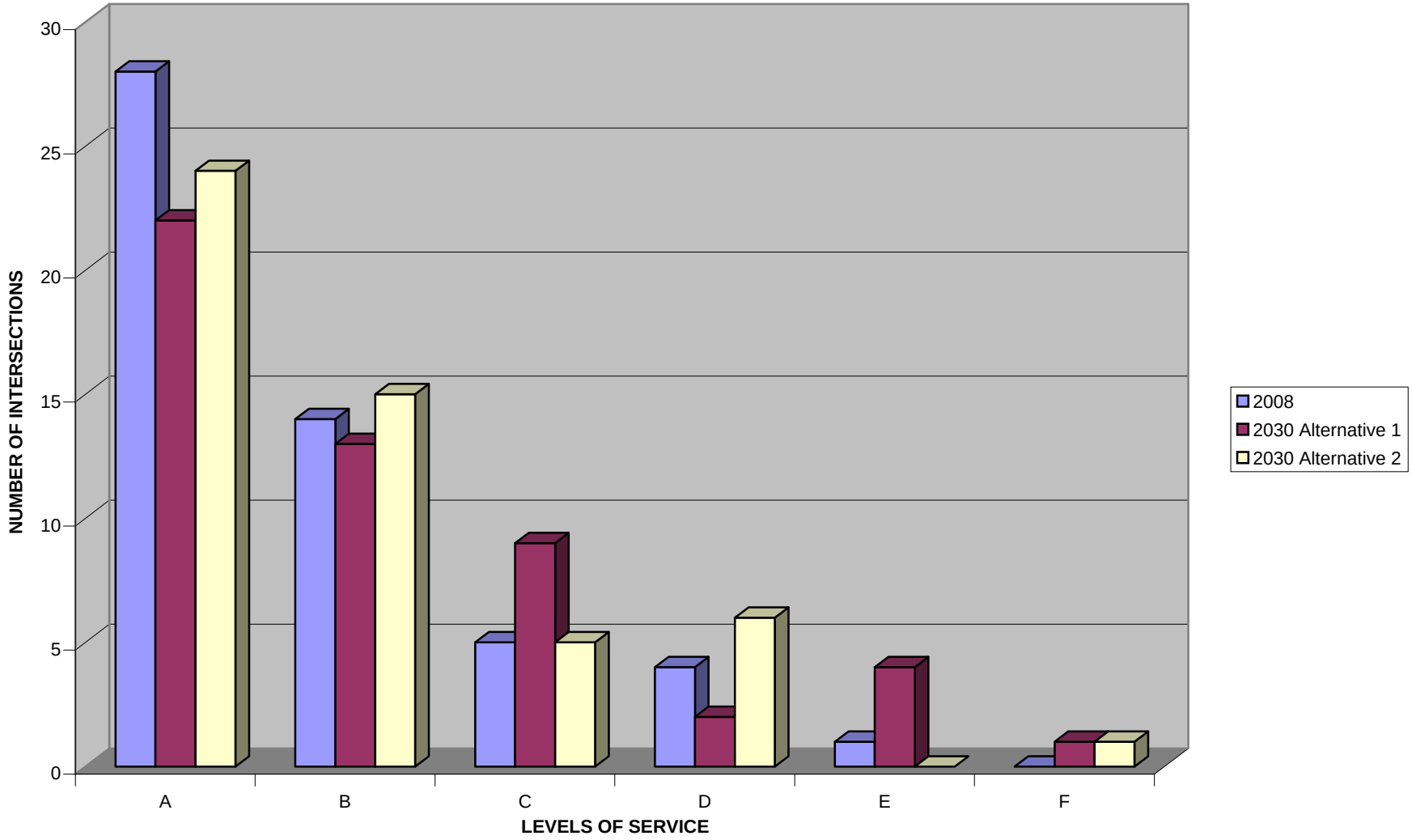
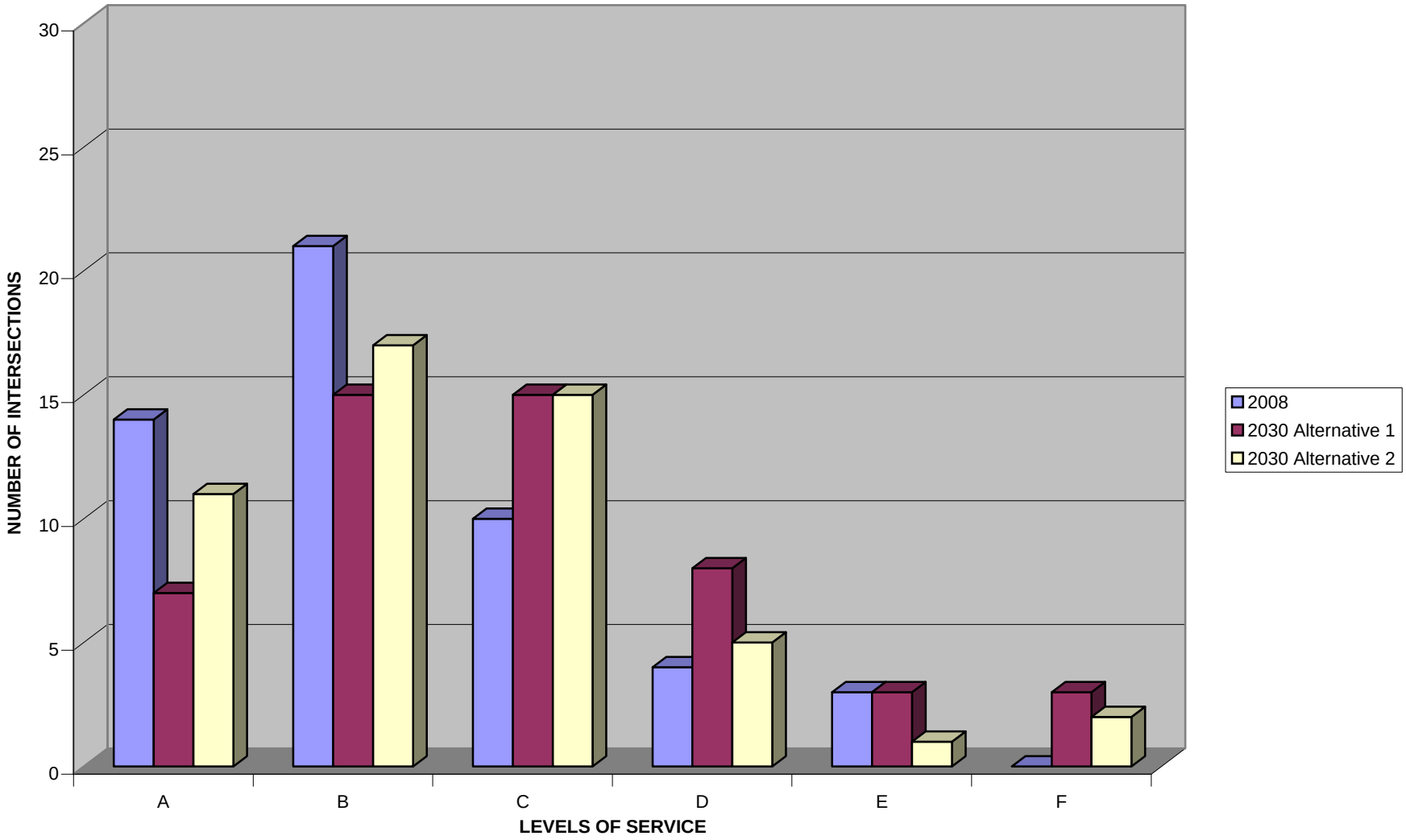
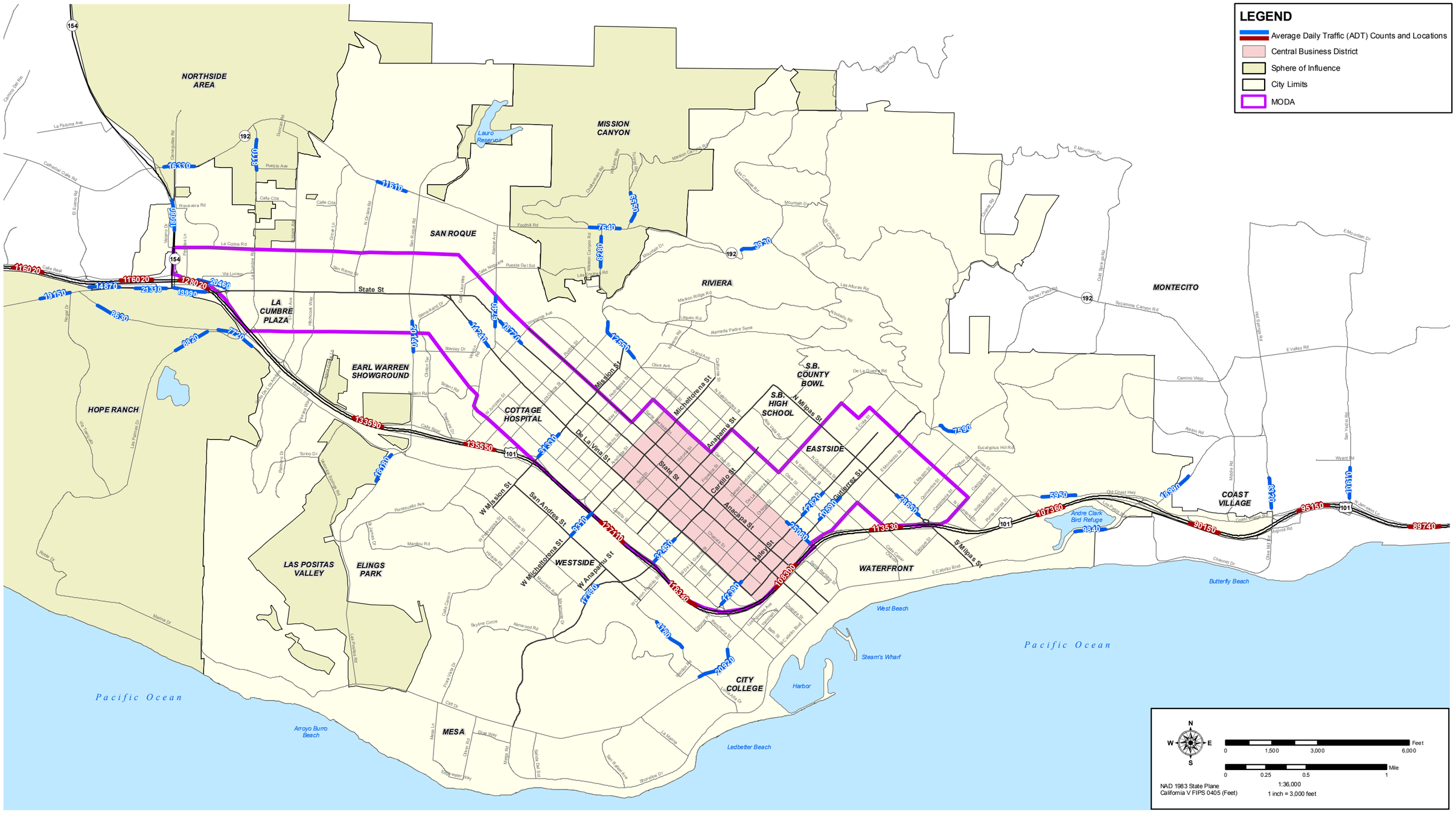


FIGURE 11
PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION





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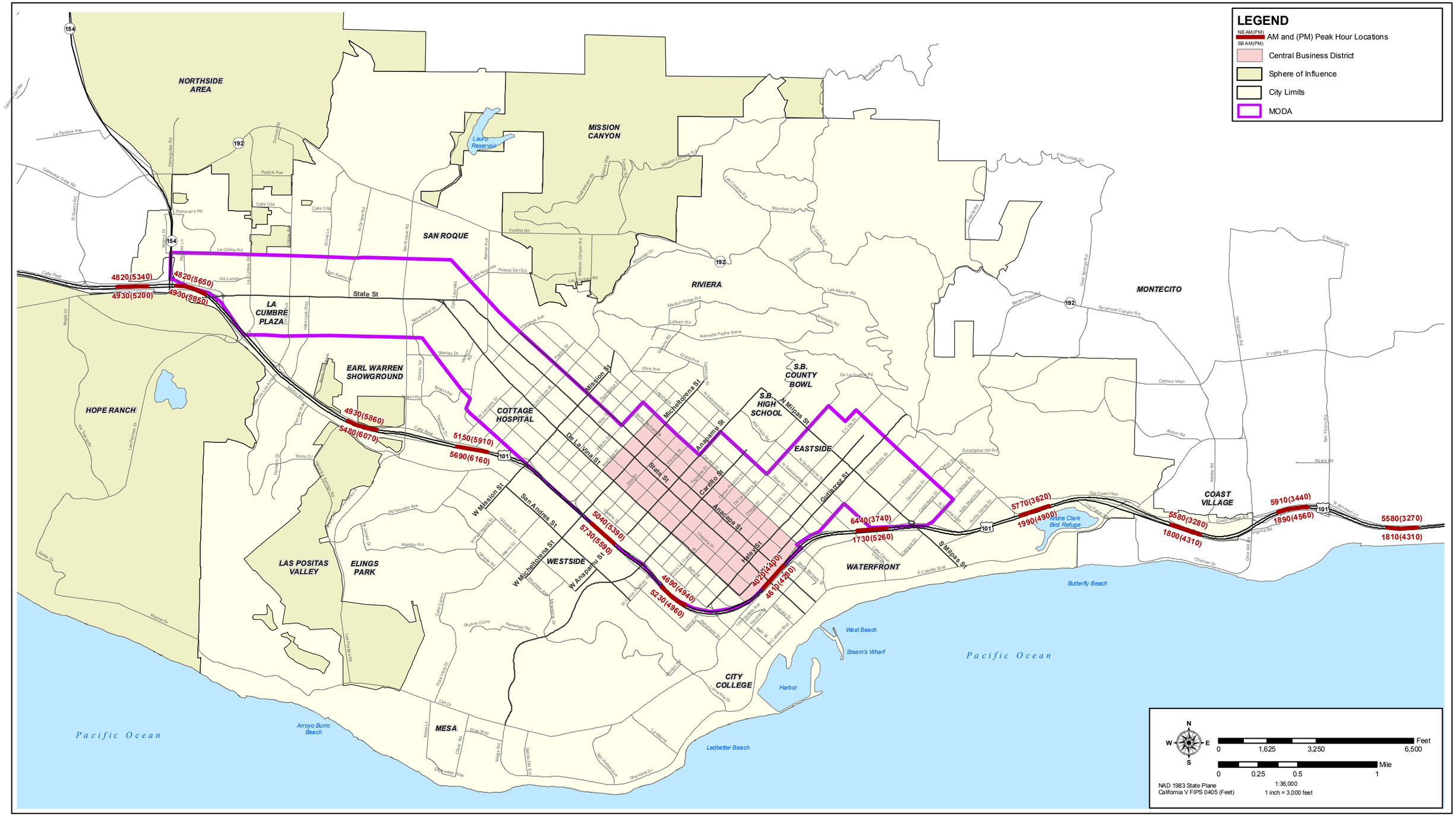
FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* AVERAGE DAILY TRAFFIC (ADT) FORECAST VOLUMES

FIGURE 12



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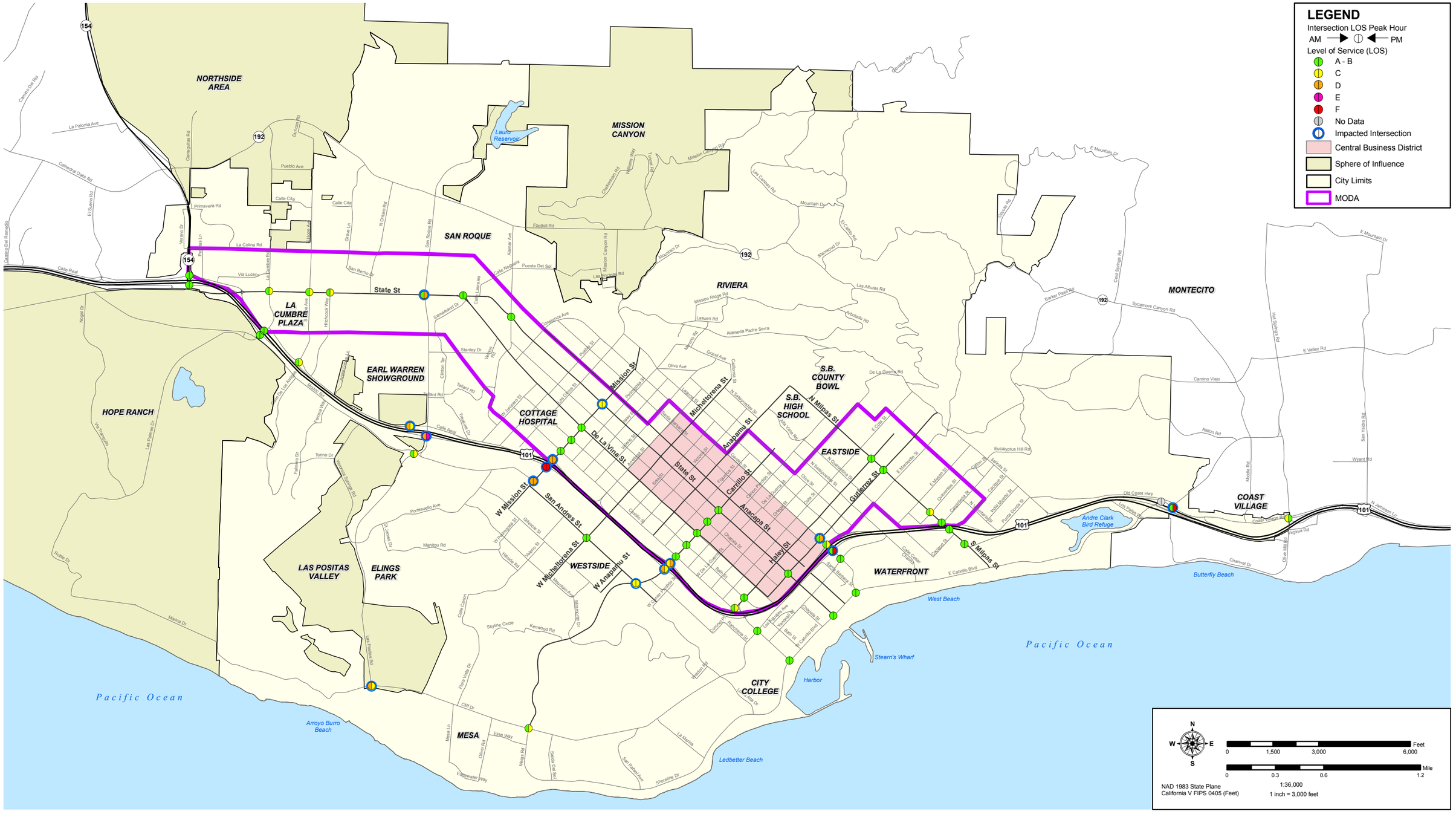
TRANSPORTATION CONSULTANTS

FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* PEAK HOUR FREEWAY FORECAST VOLUMES

FIGURE 13



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FUTURE (YEAR 2030) *ALTERNATIVE 2 SCENARIO* FORECAST INTERSECTION LEVELS OF SERVICE

FIGURE 14

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
1 Olive Mill Road & Coast Village Road [b]	AM	13	B
	PM	13	B
2 Hot Springs Road & Coast Village Road [b]	AM	20	C
	PM	25	C
3 Cabrillo Boulevard & US 101 SB Ramp [b]	AM	20	C
	PM	15	B
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.367	A
	PM	0.526	A
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.585	A
	PM	0.622	B
6 Milpas Street Roundabout [c]	AM	15	B
	PM	14	B
7 Milpas Street & Quinientos Street [a]	AM	0.592	A
	PM	0.715	C
8 Milpas Street & Gutierrez Street [a]	AM	0.520	A
	PM	0.582	A
9 Milpas Street & Haley Street [a]	AM	0.479	A
	PM	0.641	B
10 Cabrillo Boulevard & Garden Street [a]	AM	0.298	A
	PM	0.370	A
11 Yanonali Street & Garden Street [a]	AM	0.431	A
	PM	0.491	A
12 US 101 SB Ramps & Garden Street [a]	AM	0.640	B
	PM	0.929	E
13 US 101 NB Ramps & Garden Street [a]	AM	0.575	A
	PM	0.748	C
14 Gutierrez Street & Garden Street [a]	AM	0.675	B
	PM	0.808	D
15 Cabrillo Boulevard & State Street [a]	AM	0.303	A
	PM	0.420	A
16 Gutierrez Street & State Street [a]	AM	0.288	A
	PM	0.383	A
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.357	A
	PM	0.598	A
18 Montecito Street & Castillo Street [a]	AM	0.638	B
	PM	0.665	B
19 Haley Street & Castillo Street [a]	AM	0.552	A
	PM	0.784	C
20 Haley Street & Bath Street [a]	AM	0.538	A
	PM	0.697	B
21 Carrillo Street & Anacapa Street [a]	AM	0.474	A
	PM	0.618	B
22 Carrillo Street & Chapala Street [a]	AM	0.445	A
	PM	0.635	B
23 Carrillo Street & De la Vina Street [a]	AM	0.551	A
	PM	0.636	B
24 Carrillo Street & Bath Street [a]	AM	0.551	A
	PM	0.540	A
25 Carrillo Street & Castillo Street [a]	AM	0.664	B
	PM	0.666	B
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.700	B
	PM	0.814	D
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.776	C
	PM	0.744	C
28 Carrillo Street & San Andres Street [a]	AM	0.682	B
	PM	0.755	C

TABLE 1
YEAR 2008 WEEKDAY EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions	
		Delay or V/C	LOS
29 Micheltorena Street & San Andres Street [a]	AM	0.608	B
	PM	0.613	B
30 Mission Street & Modoc Road [b]	AM	27	D
	PM	29	D
31 Mission Street & US 101 SB Ramps [a]	AM	0.938	E
	PM	0.969	E
32 Mission Street & US 101 NB Ramps [a]	AM	0.858	D
	PM	0.812	D
33 Mission Street & Castillo Street [a]	AM	0.512	A
	PM	0.554	A
34 Mission Street & Bath Street [a]	AM	0.556	A
	PM	0.606	B
35 Mission Street & De la Vina Street [a]	AM	0.524	A
	PM	0.558	A
36 Mission Street & State Street [a]	AM	0.719	C
	PM	0.697	B
37 Meigs Road & Cliff Drive [a]	AM	0.621	B
	PM	0.688	B
38 Las Positas Road & Cliff Drive [b]	AM	30	D
	PM	23	C
39 Las Positas Road & Modoc Road [a]	AM	0.609	B
	PM	0.666	B
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.812	D
	PM	0.947	E
41 US 101 NB Ramps & Calle Real [a]	AM	0.798	C
	PM	0.683	B
42 Alamar Avenue & State Street [a]	AM	0.495	A
	PM	0.563	A
43 De la Vina Street & State Street [a]	AM	0.465	A
	PM	0.535	A
44 Las Positas Road & State Street [a]	AM	0.637	B
	PM	0.772	C
45 Hitchcock Way & State Street [a]	AM	0.477	A
	PM	0.671	B
46 Hope Avenue & State Street [a]	AM	0.511	A
	PM	0.661	B
47 La Cumbre Road & State Street [a]	AM	0.607	B
	PM	0.704	C
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.589	A
	PM	0.765	C
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.605	B
	PM	0.668	B
50 La Cumbre Road & Calle Real [a]	AM	0.539	A
	PM	0.663	B
51 SR-154 & Calle Real [a]	AM	0.517	A
	PM	0.546	A
52 SR-154 & US 101 SB On Ramp [a]	AM	0.417	A
	PM	0.400	A

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy.

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology.

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology.

TABLE 2 PLAN SANTA BARBARA STUDY INTERSECTIONS CURRENTLY OPERATING WITH A PEAK HOUR V/C OF 0.77 OR GREATER		
North/South Street	**East/West Street**	**Peak Hour with V/C 0.77 or Greater**
Hot Springs Road	Coast Village Road	PM [a]
U.S. Highway 101 SB Ramps	Garden St	PM
Gutierrez St	Garden St	PM
Haley Street	Castillo St	PM
Carrillo St	U.S. Highway 101 NB Ramp	PM
Carrillo St	U.S. Highway 101 SB Ramp	AM
Mission St	Modoc Rd	Both [a]
Mission St	U.S. Highway 101 SB Ramps	Both
Mission St	U.S. Highway 101 NB Ramps	Both
Las Positas Rd	Cliff Dr	Both [a]
Las Positas Rd	U.S. Highway 101 SB Ramps	Both
U.S. Highway 101 NB Ramp	Calle Real	AM
Las Positas Road	State Street	PM

[a] For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

TABLE 3
YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 1 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM PM	13 13	B B	144 65	F F	**Yes** **Yes**
2 Hot Springs Road & Coast Village Road [e]	AM PM	20 25	C C	26 189	D F	**Yes** **Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM PM	20 15	C B	N/A [f] N/A [f]	N/A [f] N/A [f]	N/A [f] N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM PM	0.37 0.53	A A	0.47 0.57	A A	No No
5 Milpas Street & US 101 SB Off Ramp [a]	AM PM	0.59 0.62	A B	0.45 0.59	A A	No No
6 Milpas Street Roundabout [c]	AM PM	15 14	B B	14 14	B B	No No
7 Milpas Street & Quinientos Street [a]	AM PM	0.59 0.72	A C	0.63 0.74	B C	No No
8 Milpas Street & Gutierrez Street [a]	AM PM	0.52 0.58	A A	0.56 0.63	A B	No No
9 Milpas Street & Haley Street [a]	AM PM	0.48 0.64	A B	0.54 0.72	A C	No No
10 Cabrillo Boulevard & Garden Street [a]	AM PM	0.30 0.37	A A	0.34 0.41	A A	No No
11 Yanonali Street & Garden Street [a]	AM PM	0.43 0.49	A A	0.55 0.68	A B	No No
12 US 101 SB Ramps & Garden Street [a]	AM PM	0.64 0.93	B E	0.75 1.15	C F	No **Yes**
13 US 101 NB Ramps & Garden Street [a]	AM PM	0.58 0.75	A C	0.65 0.78	B C	No **Yes**
14 Gutierrez Street & Garden Street [a]	AM PM	0.68 0.81	B D	0.72 0.88	C D	No **Yes**
15 Cabrillo Boulevard & State Street [a]	AM PM	0.30 0.42	A A	0.33 0.45	A A	No No
16 Gutierrez Street & State Street [a]	AM PM	0.29 0.38	A A	0.32 0.45	A A	No No
17 Cabrillo Boulevard & Castillo Street [a]	AM PM	0.36 0.60	A A	0.37 0.61	A B	No No
18 Montecito Street & Castillo Street [a]	AM PM	0.64 0.67	B B	0.65 0.71	B C	No No
19 Haley Street & Castillo Street [a]	AM PM	0.55 0.78	A C	0.57 0.81	A D	No **Yes**
20 Haley Street & Bath Street [a]	AM PM	0.54 0.70	A B	0.59 0.63	A B	No No
21 Carrillo Street & Anacapa Street [a]	AM PM	0.47 0.62	A B	0.50 0.65	A B	No No
22 Carrillo Street & Chapala Street [a]	AM PM	0.45 0.64	A B	0.47 0.69	A B	No No
23 Carrillo Street & De la Vina Street [a]	AM PM	0.55 0.64	A B	0.57 0.64	A B	No No
24 Carrillo Street & Bath Street [a]	AM PM	0.55 0.54	A A	0.56 0.55	A A	No No
25 Carrillo Street & Castillo Street [a]	AM PM	0.66 0.67	B B	0.67 0.68	B B	No No
26 Carrillo Street & US 101 NB Ramps [a]	AM PM	0.70 0.81	B D	0.78 0.83	C D	**Yes** **Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM PM	0.78 0.74	C C	0.80 0.77	C C	**Yes** No
28 Carrillo Street & San Andres Street [a]	AM PM	0.68 0.76	B C	0.72 0.82	C D	No **Yes**

TABLE 3
YEAR 2030 WEEKDAY FUTURE ALTERNATIVE 1 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 1 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.70	B	No
	PM	0.61	B	0.69	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	34	D	**Yes**
	PM	29	D	34	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	0.98	E	**Yes**
	PM	0.97	E	1.11	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.91	E	**Yes**
	PM	0.81	D	0.93	E	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.57	A	No
	PM	0.55	A	0.72	C	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.61	B	No
	PM	0.61	B	0.69	B	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.54	A	No
	PM	0.56	A	0.61	B	No
36 Mission Street & State Street [a]	AM	0.72	C	0.76	C	No
	PM	0.70	B	0.74	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.66	B	No
	PM	0.69	B	0.75	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	47	E	**Yes**
	PM	23	C	37	E	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.71	C	No
	PM	0.67	B	0.81	D	**Yes**
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.91	E	**Yes**
	PM	0.95	E	0.98	E	**Yes**
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.88	D	**Yes**
	PM	0.68	B	0.75	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.58	A	No
	PM	0.56	A	0.67	B	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.57	A	No
	PM	0.54	A	0.62	B	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.75	C	No
	PM	0.77	C	0.87	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.56	A	No
	PM	0.67	B	0.78	C	**Yes**
46 Hope Avenue & State Street [a]	AM	0.51	A	0.63	B	No
	PM	0.66	B	0.75	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.65	B	No
	PM	0.70	C	0.78	C	**Yes**
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.69	B	No
	PM	0.77	C	0.79	C	**Yes**
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.63	B	No
	PM	0.67	B	0.72	C	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.58	A	No
	PM	0.66	B	0.69	B	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.66	B	No
	PM	0.55	A	0.73	C	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.48	A	No
	PM	0.40	A	0.49	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 4
NUMBER OF DEFICIENT INTERSECTIONS BY PEAK HOUR IMPACTED

Peak Hour	Number of Cases 2008	2008 Rate [a]	Number of Cases 2030 Alternative 1	2030 Alternative 1 Rate [a]	Number of Cases 2030 Alternative 2	2030 Alternative 2 Rate [a]
AM Only	2	4%	2	4%	3	6%
PM Only	6	12%	10	19%	7	13%
Both AM and PM	5	10%	8	15%	5	10%
Neither Peak Deficient	39	75%	32	62%	37	71%

[a] Number may not add up to 100% due to rounding

TABLE 5
YEAR 2030 FUTURE WEEKDAY ALTERNATIVE 2 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 2 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
1 Olive Mill Road & Coast Village Road [b]	AM	13	B	16	C	No
	PM	13	B	14	B	No
2 Hot Springs Road & Coast Village Road [e]	AM	20	C	14	B	No
	PM	25	C	66	F	**Yes**
3 Cabrillo Boulevard & US 101 SB Ramps [b]	AM	20	C	N/A [f]	N/A [f]	N/A [f]
	PM	15	B	N/A [f]	N/A [f]	N/A [f]
4 Milpas Street & US 101 SB On Ramp [a]	AM	0.37	A	0.45	A	No
	PM	0.53	A	0.62	B	No
5 Milpas Street & US 101 SB Off Ramp [a]	AM	0.59	A	0.42	A	No
	PM	0.62	B	0.51	A	No
6 Milpas Street Roundabout [c]	AM	15	B	14	B	No
	PM	14	B	9	A	No
7 Milpas Street & Quinientos Street [a]	AM	0.59	A	0.62	B	No
	PM	0.72	C	0.74	C	No
8 Milpas Street & Gutierrez Street [a]	AM	0.52	A	0.54	A	No
	PM	0.58	A	0.63	B	No
9 Milpas Street & Haley Street [a]	AM	0.48	A	0.53	A	No
	PM	0.64	B	0.65	B	No
10 Cabrillo Boulevard & Garden Street [a]	AM	0.30	A	0.32	A	No
	PM	0.37	A	0.39	A	No
11 Yanonali Street & Garden Street [a]	AM	0.43	A	0.45	A	No
	PM	0.49	A	0.59	A	No
12 US 101 SB Ramps & Garden Street [a]	AM	0.64	B	0.68	B	No
	PM	0.93	E	1.06	F	**Yes**
13 US 101 NB Ramps & Garden Street [a]	AM	0.58	A	0.61	B	No
	PM	0.75	C	0.76	C	No
14 Gutierrez Street & Garden Street [a]	AM	0.68	B	0.68	B	No
	PM	0.81	D	0.83	D	**Yes**
15 Cabrillo Boulevard & State Street [a]	AM	0.30	A	0.32	A	No
	PM	0.42	A	0.45	A	No
16 Gutierrez Street & State Street [a]	AM	0.29	A	0.30	A	No
	PM	0.38	A	0.39	A	No
17 Cabrillo Boulevard & Castillo Street [a]	AM	0.36	A	0.37	A	No
	PM	0.60	A	0.61	B	No
18 Montecito Street & Castillo Street [a]	AM	0.64	B	0.66	B	No
	PM	0.67	B	0.67	B	No
19 Haley Street & Castillo Street [a]	AM	0.55	A	0.57	A	No
	PM	0.78	C	0.79	C	No
20 Haley Street & Bath Street [a]	AM	0.54	A	0.60	A	No
	PM	0.70	B	0.63	B	No
21 Carrillo Street & Anacapa Street [a]	AM	0.47	A	0.49	A	No
	PM	0.62	B	0.63	B	No
22 Carrillo Street & Chapala Street [a]	AM	0.45	A	0.47	A	No
	PM	0.64	B	0.65	B	No
23 Carrillo Street & De la Vina Street [a]	AM	0.55	A	0.60	B	No
	PM	0.64	B	0.65	B	No
24 Carrillo Street & Bath Street [a]	AM	0.55	A	0.57	A	No
	PM	0.54	A	0.54	A	No
25 Carrillo Street & Castillo Street [a]	AM	0.66	B	0.67	B	No
	PM	0.67	B	0.68	B	No
26 Carrillo Street & US 101 NB Ramps [a]	AM	0.70	B	0.75	C	No
	PM	0.81	D	0.85	D	**Yes**
27 Carrillo Street & US 101 SB Ramps [a]	AM	0.78	C	0.80	D	**Yes**
	PM	0.74	C	0.76	C	No
28 Carrillo Street & San Andres Street [a]	AM	0.68	B	0.70	C	No
	PM	0.76	C	0.78	C	**Yes**

TABLE 5
YEAR 2030 FUTURE WEEKDAY ALTERNATIVE 2 CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing (2008) Conditions		Future (2030) Alternative 2 Conditions		Impact?
		Delay or V/C	LOS	Delay or V/C	LOS	
29 Micheltorena Street & San Andres Street [a]	AM	0.61	B	0.65	B	No
	PM	0.61	B	0.63	B	No
30 Mission Street & Modoc Road [b]	AM	27	D	31	D	**Yes**
	PM	29	D	32	D	**Yes**
31 Mission Street & US 101 SB Ramps [a]	AM	0.94	E	1.01	F	**Yes**
	PM	0.97	E	1.01	F	**Yes**
32 Mission Street & US 101 NB Ramps [a]	AM	0.86	D	0.90	D	**Yes**
	PM	0.81	D	0.86	D	**Yes**
33 Mission Street & Castillo Street [a]	AM	0.51	A	0.53	A	No
	PM	0.55	A	0.59	A	No
34 Mission Street & Bath Street [a]	AM	0.56	A	0.57	A	No
	PM	0.61	B	0.62	B	No
35 Mission Street & De la Vina Street [a]	AM	0.52	A	0.53	A	No
	PM	0.56	A	0.59	A	No
36 Mission Street & State Street [a]	AM	0.72	C	0.78	C	**Yes**
	PM	0.70	B	0.75	C	No
37 Meigs Road & Cliff Drive [a]	AM	0.62	B	0.63	B	No
	PM	0.69	B	0.70	C	No
38 Las Positas Road & Cliff Drive [b]	AM	30	D	32	D	**Yes**
	PM	23	C	24	C	**Yes**
39 Las Positas Road & Modoc Road [a]	AM	0.61	B	0.64	B	No
	PM	0.67	B	0.70	C	No
40 Las Positas Road & US 101 SB Ramps [a]	AM	0.81	D	0.84	D	**Yes**
	PM	0.95	E	0.95	E	No
41 US 101 NB Ramps & Calle Real [a]	AM	0.80	C	0.82	D	**Yes**
	PM	0.68	B	0.74	C	No
42 Alamar Avenue & State Street [a]	AM	0.50	A	0.51	A	No
	PM	0.56	A	0.59	A	No
43 De la Vina Street & State Street [a]	AM	0.47	A	0.47	A	No
	PM	0.54	A	0.56	A	No
44 Las Positas Road & State Street [a]	AM	0.64	B	0.65	B	No
	PM	0.77	C	0.82	D	**Yes**
45 Hitchcock Way & State Street [a]	AM	0.48	A	0.48	A	No
	PM	0.67	B	0.74	C	No
46 Hope Avenue & State Street [a]	AM	0.51	A	0.54	A	No
	PM	0.66	B	0.73	C	No
47 La Cumbre Road & State Street [a]	AM	0.61	B	0.68	B	No
	PM	0.70	C	0.73	C	No
48 Hope Avenue & US 101 NB Ramp/Calle Real [a]	AM	0.59	A	0.61	B	No
	PM	0.77	C	0.77	C	No
49 La Cumbre Road & US 101 SB Ramps [a]	AM	0.61	B	0.67	B	No
	PM	0.67	B	0.68	B	No
50 La Cumbre Road & Calle Real [a]	AM	0.54	A	0.56	A	No
	PM	0.66	B	0.68	B	No
51 SR-154 & Calle Real [a]	AM	0.52	A	0.55	A	No
	PM	0.55	A	0.63	B	No
52 SR-154 & US 101 SB On Ramp [a]	AM	0.42	A	0.42	A	No
	PM	0.40	A	0.46	A	No

Notes:

[a] Intersection is controlled by signal and uses ICU methodolgy

[b] Intersection is controlled by stop signs and uses HCM unsignalized methodology

[c] Intersection is controlled by roundabout and uses HCM roundabout methodology

[d] For signalized intersections, target LOS is C, with a V/C <= 0.77. For unsignalized intersections, LOS C with delay less than 22 seconds was taken as the minimum acceptable LOS.

[e] For existing conditions analysis, intersection is controlled by stop signs and uses HCM unsignalized methodology. For future 2030 conditions, intersection was assumed to be controlled by roundabout and was analyzed using HCM roundabout methodology.

[f] This intersection has been closed by Caltrans and will not reopen in the future.

TABLE 6 MEASURES OF EFFECTIVENESS (MOEs) FOR EXISTING (YEAR 2008) AND FUTURE (YEAR 2030) CONDITIONS					
MEASURE	**2008**	**2030 Alternative 1**	**Change Over Existing**	**2030 Alternative 2**	**Change Over Existing**
Vehicle Miles Traveled (VMT)	2,500,894	2,721,109	9%	2,513,533	1%
Vehicle Hours Traveled (VHT)	59,668	67,528	13%	59,026	-1%
Vehicle Trips (VT)	595,479	641,233	8%	600,784	1%
Average Vehicle Trip Length (VMT/VT)	4.20	4.24	1%	4.18	0%

Appendix A
Plan Santa Barbara EIR Assumptions 4-15-09
LAND USE POLICIES

EIR Land Use Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Amount of Growth (net increase) Non-Residential	Continue existing Measure Policies. Extrapolate historic growth rate: City 2,291,700 SF Sphere 178,202 SF Total 2,469,902 SF	Extend existing Measure E policies; and remaining net new square footage. Extrapolate historic growth rate: Project (2030): City 2,000,000 SF Sphere 178,202 SF Total 2,178,202 SF Extended Range (2050+): City 3,000,000 SF Sphere 208,100 SF Total 3,208,100 SF	Reduce Nonresidential growth cap City 1,000.000 SF Sphere 178,202 SF Total 1,178,202 SF	Reduce Nonresidential growth cap City 1,000,000 SF Sphere 178,202 SF Total 1,178,202 SF
Amount of Growth (net increase) Residential	Extrapolate historic rate City 2,795 DU Sphere 403 DU Total 3,198 DU	Extrapolate historic rate Project (2030) City 2,795 DU Sphere 403 DU Total 3,198 DU Extended Range (2050+) City 8,000 DU Sphere 620 DU Total 8,620 DU	Reduced amount of residential growth City 2,000 DU Sphere 403 DU Total 2,403 DU	Increased amount of residential growth. More affordable housing. City **4,360** DU Sphere **443** DU Total 4,403 DU
Distribution of Growth	Per future Land Use data	Per future Land Use data	Per future Land Use data	Per future Land Use data

(net increase)	base assumptions.	base assumptions.	base assumptions.	base assumptions.
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Affordable Housing% new residential growth citywide affordable to low, moderate, middle incomes	30 % of total du (838 du of total 2795 du)	35% of total du (978 du of total 2795 du)	20% of total du (400 du of total 2000 du)	40% of total du (1,768 du of total 4420 du)
New Residential Growth %/DU inside MODA	56 % residential growth in MODA (1579 DU of total 2795 DU)	66% % residential growth in MODA (1857 DU of total 2795 DU)	61 % residential growth in MODA (1217 DU of total 2000 DU)	65% residential growth in MODA (2878 DU of total 4420 DU)
New NonResidential Growth %/SF in MODA	69% non-residential growth in MODA (1,580,307 SF of total 2,291,700 SF)	65 % non-residential growth in MODA (1,309,516 SF of total 2,000,000 SF))	46 % non-residential growth in MODA (463,479 SF of total 1,000,000 SF))	47 % non-residential growth in MODA (468,161 SF of total 1,000,000 SF)
Residential Densities inside MODA (MF and Commercial Zones)	Existing Variable Density Average 20 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 25 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 15 du/ac in MODA	Amendments to Variable Density (See chart next pg) Average 50 du/ac in MODA
Residential Densities inside MODA (R2 and Single Family Zones)	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre (160 du) SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre	R2 – 12 du/acre SF – 3 du/acre
Residential Densities outside MODA (in MF zones)	Average 20 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 12 du/ac outside MODA in MF zones	Average 22 du/ac outside MODA in MF zones
Residential Densities outside MODA (in SF zones)	1-5 du/ac; Average 3 du/ac	Average 3 du/ac	Average 3 du/ac	Average 3 du/ac
Second Unit production (DU) inside MODA	Existing policies constrain units. 0 2nd units assumed per historic rate	Draft PlanSB policies encourage 2nd units within MODA 57 2nd units	Same as No Proj – existing policies 0 2nd units assumed	Strong encouragement of 2nd units in MODA. 173 of total 400 2nd units
Second Unit production (DU) outside MODA	Existing policies constrain units. 0 2nd units assumed	Draft PlanSB policies allow 2nd units per existing policies outside MODA, and restrict in High Fire	Same as No Proj – existing policies 0 2nd units assumed	Encouragement of 2nd units outside MODA 227 units of 400 assumed.

		Hazard areas		
EIR Assumptions	**No Project Existing Policies**	**Project *PlanSB* Policies**	**Alternative 1 Lower Growth**	**Alternative 2 More Housing**
Density/Unit Size: Smaller residential unit sizes and revised variable density provisions in MODA	Existing variable density provisions based on # bedrooms & no unit size limits have resulted in many large, upper income condos. Average density 20 du/ac	Amend variable density provisions to provide range of unit sizes (rather than # bedrooms) with associated densities. Maximum unit size 1300 SF See density/unit size chart below	Include same revised smaller unit size ranges with lower densities than for project. See chart below.	Include same revised smaller unit size ranges with higher densities than for project. See chart below
Density/Unit size outside MODA	Existing variable density; SF FAR	Remove variable density; allow >1300 SF w/ new maximum unit size	Remove variable density; allow >1300 SF w/ new maximum unit size	New variable density w/ unit size ranges (similar to Project in MODA)

Density/Unit Size Chart for Inside MODA– Assumptions for EIR Analysis of Policy Changes

Unit Size	**Base Density (units/acre)**	**Density +25% Affordable Hsg** *(Inclusionary Housing Ordinance IHO or State bonus Density law)*	**Density + 100% Affordable owner or Rental Housing**
Project - PlanSB			
<400 SF	35 du/ac	44 du/ac	70 du/ac
401-700 SF	25 du/ac	31 du/ac	50 du/ac
701-1000 SF	22 du/ac	27 du/ac	44 du/ac
1001-1300 SF	19 du/ac	24 du/ac	38 du/ac
Alternative ,Lower Growth			
<400 SF	25 du/ac	31 du/ac	50 du/ac
401-700 SF	15 du/ac	19 du/ac	30 du/ac
701-1000 SF	12 du/ac	15 du/ac	24 du/ac
1001-1300 SF	9 du/ac	11 du/ac	18 du/ac
Alternative 2, More Hsg			
<400 SF	70 du/ac	88 du/ac	140 du/ac
401-700 SF	50 du/ac	62 du/ac	100 du/ac
701-1000 SF	44 du/ac	55 du/ac	88 du/ac
1001-1300 SF	38 du/ac	47 du/ac	76 du/ac

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Mixed Use & use of store of non-residential SF demolished & not replaced	Existing ordinance provisions for amount of non-residential and residential allowed on site.	Existing ordinance provisions Draft PlanSB Policy LG7 Study TEDR Ordinance	Cannot maximize both residential & commercial SF	Existing ordinance provisions
Land Use Element Map Land Use designations	Existing Land Use Element Map	The Draft PlanSB LUE Map provides largely the same LU designations and location as the existing LUE Map, but with the following amendments: -Delineate the MODA boundary -LU designation amendments to reflect changes to Variable Density inside and outside MODA -Provide LU designations and densities by acre -Establish a parcel-based map -Include some minor LU designation amendments to clarify LU designations by parcel and provide for consistency between GP LUE and Zoning designations.	Same as Existing LUE Map	Same as Project/PlanSB Draft LUE Map
Affordable Housing Policies	Existing policies per Housing Element, inclusionary, State/City bonus density provisions	Draft PlanSB policies -No more specific EIR assumption [H1-Opportunity Sites; H5-Incentives for Affordable by Design; H9-Inclusionary Amds; H10-Density Incentive for sustainable resource use; H11-Rentail incentives; H13-Residential Density Stds]	Same as Existing Policies	Increase affordable housing incentives Streamline housing permit procedures

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Building Heights	Existing building height policies per Charter, GP, and Zoning	Draft PlanSB Policy C10 – -Lower heights/step back buildings adjacent to residential zones in DT urban core, and -Lower heights in conjunction with form-based codes adjacent to historic structures. EIR Assumptions: -Lower heights to 40 ft in EPV and 45 ft in other commercial zones -Amend build height definition for commercial zones to allow for sloped sites, flood control standards, sloped roofs. -Exception to building height allowed for: >Community Priority projects (per current definition: community need, non-profit), > Residential - requirement for minimum 30% affordable up to middle income (all projects, no minimum number of units, both ownership or rental) >Substantial building area in rental units >Findings for adequate open space, quality architecture, front yard setback	Lower building height limits citywide per Save EPV initiative: -40 ft in EPV -45 feet in other commercial zones	Maintain current height limitations -Existing City height limitations

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing

Non-Development Intensification (The "Churn")

Non-Residential: Apart from net new square feet of development, background intensification of non-residential uses within existing structures, such as adding more employees within existing space.

Residential: Intensification of residential use from illegal units and overcrowding, e.g., multiple families.

Existing Condition baselines reflect current effect from these sources, such as traffic trips, air pollution, public services.

Future Conditions (No Project, Project, Alternative 1 and 2 Scenarios)

- For traffic, customized trip generation rates were calibrated with the existing conditions traffic counts and therefore incorporate/reflect traffic associated with intensification. In addition, the land use distributions for future conditions are overly conservative because they cannot reflect ongoing implementation of Charter policies for no net increase in traffic for net new non-residential square footage, which results in rejection of applications to avoid such impacts. The excess traffic effects built into the estimates based on the land use distribution therefore incorporate the background intensification effects of non-residential and residential uses.

-Similarly water use, wastewater generation, public schools, and other public facility effects are also based on average use rates derived from existing use, which incorporates intensification. Air pollution and energy impacts are also based on average existing traffic and utility assumptions that reflect intensification.

Questions

-Is there any basis for estimating non-residential intensification or illegal unit/overcrowding rates?

-Is there any basis for assuming that the non-residential and residential intensification factors and the application rejection rates are similar?

-Alternatives - Non-Residential: The No Project & Project assume 2 million SF and Alternatives 1 & 2 assume 1 million SF. Should Alternatives 1 & 2 which are limiting new development more assume more intensification occurs?

-Alternatives – Residential: The No Project & Project assume 2800 DU, while Alternative 1 assumes 2000 DU and Alternative 2 assumes 4400 DU. Should Alternative 1 assume more pressure for illegal units and overcrowding than the Project, and Alternative 2 assume less?

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses <u>Non-Residential</u>	Existing Measure E policies and process for Community Priority and Economic Development LU categories of new net Sq Ft of non-residential use.	PlanSB Policy LG10 economic development appears to allow all uses currently allowed. Implementation/incentives unclear. No policy/impact change from existing policy [LG10 – new net non-residential use to include one or more of following uses: -Community Priority (parks & recreation, community centers, educational, public cultural or arts facilities, youth development and childcare facilities, community gardens/ urban farm) -Economic Development (Enhances standard of living, strengthens economy by expanding economic diversity) -Green Economic Development (Provides green products or jobs) -Small & Local Businesses -Development for people w/disabilities]	Same as No Project – no change from existing policies? Or with less Sq Ft., shorter list of Community Necessities only?	Same – no change? Or with less Sq Ft, shorter list of Community Necessities only? Or stronger policy/incentive for community benefit uses?
Community Benefit Land Uses <u>Residential</u>	Existing HE policies	PlanSB Policy LG11 Residential: No policy/impact change from existing policy [LG11 – new residential to include one or more of following: -Affordable Housing (Low to Middle income housing; housing dedicated for critical work force; housing for local workers, rental housing, transitional housing]		

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More Housing
Community Benefit Land Uses – Residential – Open Space provisions	Existing Ordinance requirements for open space in residential development.	LG11 – Residential – Open Space requirements Amount of open space and public spaces would increase. [LG11 – Open Space Requiremt: -Open Space (through access to adequate public open space within ½ mile radius and/ or dedication of sufficient usable open space on site and/or contribution through in-lieu fees) Note CTI projects future park demand in SB based on SBCAG pop growth projections and nat'l park demand stds. Table 3 projections for range of park categories. Fig 1 & 2 illustrate locations of deficiencies for neighborhood & community parks. For MODA, need to identify demand std for indoor recreational facilities.	Same as Project	Same as Project or less?

Adaptive Management Program

PLANSB - PROJECT OBJECTIVES *(& EXTENDED RANGE)*	PLAN SB - EIR ASSUMPTIONS *(Working Draft AMP Indicators)* FOR COMMUNITY INDICATORS TO MONITOR OBJECTIVES
LU/Growth Mgmt 1-Sufficient resource/infrastructure 2-Improvement in affordable housing supply relative to jobs 3-Majority of neighborhoods have Sustainable Neighborhood Plans 4-Increased use of alternative modes relative to single-occupancy vehicles	**LandUse/Growth Management** **1-Sufficient resources & infrastructure** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **2-Affordable Housing supply relative to Jobs** ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **3-Sustainable Neighborhood Plans** ▪ # of Sustainable Neighborhood Plans (SNPs) **4-Increased use of alternative modes relative to SOV** ▪ Transportation mode share ratio (miles, or # of people using each mode.)

Economy/Fiscal Health 1-Economic sector diversity is stable or expands; City revenues from commercial sources stable or increased. 2-Greater proportion of local jobs filled by local residents 3-Regional cooperation increased, progress made on regional blueprint for LU, housing, & transportation	**Economy/Fiscal Health** **1-Economic sector diversity; stable City revenues** ▪ Employment by economic sector ▪ % of total employment contributed by the top 10 employers ▪ Income by economic sector ▪ Taxable gross receipts **2-% local jobs filled by local employees?** **3-Regional cooperation/ progress on blueprint?** Status report
Environmental Resources 1-Citywide 50% reduction in fossil fuel use in buildings by 2020 and carbon neutrality by 2030. 2-Natural areas along creeks and elsewhere retained or expanded, and quality preserved or enhanced. 3-Opportunities for residents & students to get fresh locally-grown produce increased. 4-Reduction of greenhouse gas emissions from light vehicle & truck to 1990 levels by 2020. 5 **(New)** AQ, Water Q maintain/improved	**Environmental Resources** **1- 50% reduction bldg fossil fuel use by 2020 (neutrality 2030)** ▪ Fossil fuel consumption ▪ % renewable energy use **2-Naturals areas preserved, enhanced** ▪ New, total & per capita acres open space, by type, ownership ▪ Acres habitat area restored, enhanced, protected; bird counts **3-Increased opportunities for local produce** Informational report on ag, farmer's mkts, schools, etc. **4-Reduce GHG from vehicles to 1990 levels by 2020** Vehicle Miles Traveled (VMT) **5-(New) AQ, Water Quality maintained/improved** ▪ Ocean & creek water quality compared to standards ▪ Air quality compared to standards
Historic Resources/ Com Design 1-Distinctive character of City districts & neighborhoods retained & public places enhanced. 2-Designations of historic resources have increased. 3-Public health has improved through community design.	**Historic Resources/ Com Design** **1-Distinctive character of City districts & neighborhoods retained & public places enhanced.** New & total public open space & recreational facilities in downtown & neighborhoods ▪ # of design awards ▪ # of Sustainable Neighborhood Plans (SNPs) ▪ Review of new projects for size, bulk & scale **2-Designations of historic resources have increased.** ▪ # new historic resources evaluations, surveys, "potentials" list ▪ # new historic resource designations and/or districts **3-Public health has improved through community design**. ▪ (Obesity rates by age and gender) ▪ # beach health warnings ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas (See also air quality measure above)
Housing 1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations. 2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages. 3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes.	**Housing** **1-Increased housing availability for different levels of affordability to middle income for local workforce & special needs populations**. ▪ # of affordable units by income category ▪ % affordable of new units and of all units, by income category **2-An expanded range of housing types available to accommodate different types of households, lifestyles, life stages** Periodic HE review **3-Increased in density to accommodate affordable housing in multi-family or commercial development has been off-set by reduced unit sizes**. Densities in MODA projects reviewed for time frame

Circulation 1-Public transit service & facilities, miles of sidewalks, trails, bike paths & lanes have increased or upgraded and links between modes available. 2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020. 3-Traffic congestion has not increased or is less than the 2008 baseline study.	**Circulation** **1-Transit, sidewalks, trails, bike paths & lanes & links incr or u** ▪ Miles of sidewalks, total and new ▪ Pedestrian and bicycle use - counts in selected areas ▪ Transit service levels **2-50/50 mode share between single occupant vehicle and all other modes of travel by 2020.** ▪ Transportation mode share ratio (miles, or # of people using each mode.) **3-Traffic congestion has not increased or is less than the 2008 baseline study.** ▪ Intersection level of service (LOS) and Travel Time measures ▪ Street traffic volumes ▪ Hwy 101 traffic volume
Public Services and Safety 1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program. 2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand. 3-Conservation & management practices are maintained or improved.	**Public Services and Safety** **1-Long range plans for essential infrastructure, services, & emergency preparedness are up-to-date, consistent with one another and General Plan, and incorporated into capital improvement program.?** Status report **2-Infrastructure, facilities, & services have capacity to meet existing and foreseeable demand.** ▪ Compare water supply and consumption ▪ Compare treatment capacity and wastewater treated ▪ Compare remaining landfill capacity and solid waste landfilled **3-Conservation & management practices are maintained or improved**. Status report

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MEMORANDUM

To: Plan Santa Barbara City and Consultant Team

From: Jeff Tumlin, Jeremy Nelson, Brian Canepa, Francesca Napolitan

Date: 7/8/09

Subject: Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis

What is Plan Santa Barbara?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community- based planning process called Plan Santa Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the Plan Santa Barbara process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. Specifically, the transportation consultant team will assist City staff in developing and analyzing strategies that can reasonably be expected to help reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

Purpose of this Memo

This technical memorandum was developed by Nelson\Nygaard to assist the City and consultant team in evaluating the trip reduction impacts of various transportation and parking policies and programs under consideration as part of Plan Santa Barbara. It should be noted that the purpose of this memo is to provide planning-level, order-of-magnitude estimates of the quantitative impacts of proposed/planned system changes on auto trips and mode split. Portions of this introductory text will be integrated into Fehr & Peers' report summarizing the traffic modeling analysis of each of the Plan Santa Barbara policy alternatives, and the entire memo will be attached as an Appendix to that report.

What this Memo Contains

- **Appendix A** contains maps created by Fehr & Peers and AMEC showing the areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo.[1]
- **Appendix B** contains the summary table of Plan Santa Barbara proposed policies and programs under four different policy alternatives. This table was provided to Nelson\Nygaard by the City of Santa Barbara and dated 4/2/09. The table was compiled by City staff with feedback from the consultant team. The assumptions in Appendix B are based on direction contained in the "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" and were used by Nelson\Nygaard as a guide in development of trip reduction estimates under each of the four alternatives.[2]
- **Appendix C** provides a summary of Nelson\Nygaard's order-of-magnitude, planning-level estimates of the likely anticipated reduction in peak-hour vehicle trips that could be achieved with the implementation of 13 policies under consideration in the four different Plan Santa Barbara alternatives.
- **Appendix D** provides more detailed description of each of the strategies from Appendix C and the research used to develop the trip reduction estimates in the Appendix B summary table.
- **Appendix E** provides a select list of works cited in the development of our estimates of trip reduction impacts.

Analytical Methodology Employed

In addition to a land use plan, Plan Santa Barbara contains a number of transportation policies and programs initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall Plan Santa Barbara policy framework.[3] Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation framework was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as Transportation Demand Management requirements for new development projects) while others could also reduce existing traffic congestion (such as expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in

[1] This map showing Areas 1-4 was included as Figure 2 in Fehr and Peers "Plan Santa Barbara Travel Demand Model Overview" dated 2/25/09. These four area types are listed in Appendix C. More information on the characteristics of these area types is contained in this report. The map showing the Mobility Oriented Development Areas (MODAs) was included as Figure 2.5 in AMEC's "Plan Santa Barbara Draft Environmental Impact Report" provided to Nelson\Nygaard on 4/2/09.

[2] Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

[3] The four alternatives are "No Project," "Plan Santa Barbara," "Alternative 1", and "Alternative 2" as discussed in detail in Appendix B. Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose.[4] In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in Area Types 1 and 2 were reduced by a greater percentage than trips ending in Area Types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak-hour vehicle trips in some areas and a lesser effect in others.[5] Trips starting and ending within the model area were reduced by a greater percentage than trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not significantly regulate trips to other jurisdictions.

Our estimates of the likely peak-hour vehicle trip reduction impacts of Plan Santa Barbara's proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically-derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the Plan Santa Barbara context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

We believe that our analysis represents the highest and best professional standards of transportation planning. We are confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak-hour vehicle trip reduction benefits of transportation policies and programs under consideration in Plan Santa Barbara.

Overview of Analytical Outputs

Appendices B and C contain detailed explanation of the methodology utilized and outputs of the analysis. Highlights are provided below.

Reductions in vehicle trip generation rates versus vehicle ownership rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies impact each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those impacts are already accounted for by trip reduction strategies that we were able to quantify.

[4] Commuter Trips" are Home-Based Work (HBW) trips, including school trips (within the model structure, Fehr & Peers applied strategies targeting school trips for Home-Based School trips only). All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers' "Travel Demand Model Overview" dated February 25, 2009.

[5] See Appendix A for a map of the four areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo. Fehr & Peers, June 2009.

Impacts of some strategies not quantifiable with available information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely impact, we indicated in our analysis in Appendix C and D that the impact was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality.* Instead, these designations mean that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the impacts of this strategy. We have therefore excluded the impacts of certain strategies from this analysis in order to avoid the risk of misstating highly-localized, context-dependent benefits (e.g. enhanced transit service) or to avoid "double counting" the benefits (e.g. pedestrian improvements which are adequately accounted for under "street connectivity" factor of the 4D model adjustments).

Non-additive impacts for each policy alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occur concurrently. For example, a city may implement a subsidized transit pass at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater impacts when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total impacts that can be achieved. For these reasons, it is not prudent to expect that the stand-alone impacts of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total impacts of various strategies together. Because the transportation policies and programs under consideration in the various Plan Santa Barbara alternatives would be implemented concurrently as a package (in fact some programs are already in effect), we have estimated the total impact for each alternative using a non-additive methodology. For example, when summing the impacts of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated impacts of other trip reduction strategies when developing our estimate of the total estimated impacts for certain policy alternatives.

Appendix A

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

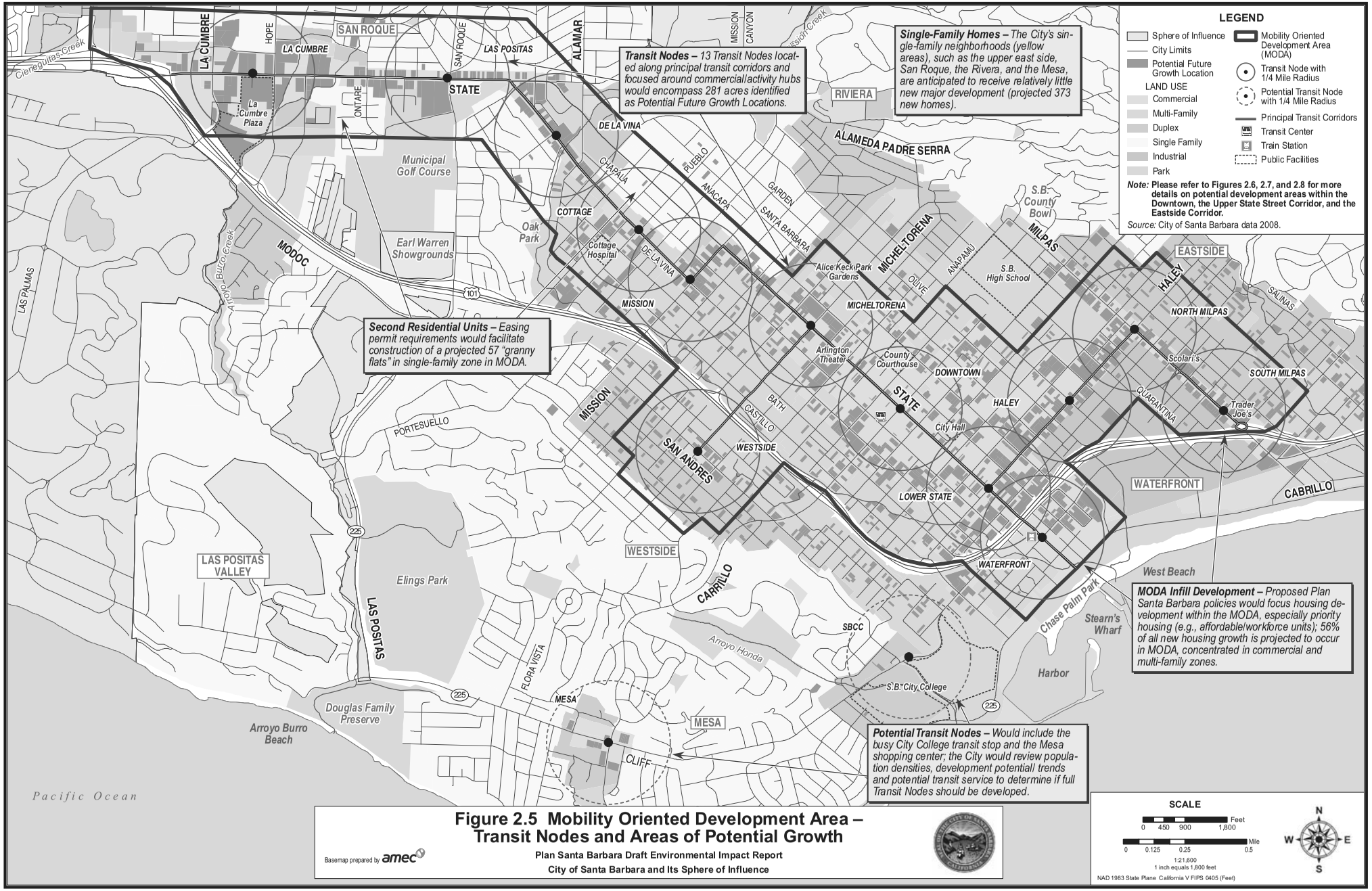


Figure 2.5 Mobility Oriented Development Area – Transit Nodes and Areas of Potential Growth

Plan Santa Barbara Draft Environmental Impact Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Appendix B

Plan Santa Barbara EIR Assumptions
Provided by the City of Santa Barbara (4/2/09)

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Transportation				
Residential parking requirements within MODA	Existing Policies: Average 2 spaces/unit + guest (per Ord 28.90) More can be provided if demand identified or if proposed. No requirement for unbundled parking	Average 1 space/unit regardless of unit size Maximum No Guest Parking Required unbundled residential parking for all unit types within MODA Exclude residential on-street parking in commercial zones, Allow required residential parking off-site in commercial zones.	Increase beyond Ordinance requirement of average 2 spaces/unit Increase beyond Ordinance requirement for Guest Parking More can be provided if demand identified or if proposed. No requirement for unbundled parking	Downtown Core – 0 spaces/unit Transit Corridors in MODA average ½ space (1 block) *(e.g., Milpas, Upper State)* Rest of MODA average 1 space/unit for all unit types. Maximums No Guest Parking Required unbundled residential parking for all unit types within MODA
Residential parking requirements outside MODA	Existing Policy Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance
Second Unit Parking inside or outside MODA	Existing : 1 space/unit	0 space/unit	1 space/unit	0 space/unit
Commercial/Retail Employee Parking inside MODA	Existing per current ordinance: DT 2/1000, Elsewhere 4/1000	Expand delineated Central Business Dist area to reduce by half parking requirements (to 2/1000)	Per current ordinance	No requirement Downtown
Commercial/Retail Employee Parking outside MODA	Existing per current ordinance	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Public Parking Pricing (on and off-street) within MODA	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Strong mgmt changes for on- and off-street: Identify aggressive price increases for off-street. Add on-street parking pricing w/mid-block kiosks, payment by cell phones, etc. (Pair w/ car share program identified under TDM)
Public Parking Pricing (on- and off-street) outside MODA	Existing management policies for on- and –off street.	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance
Bike system improvements	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report <$500K per improvement. Bike lanes priority over curbside parking in PHs plus other improvements: SB St – Haley to Micheltorena Chapala – Carrillo to Mission DelaVina–Haley to Constance Garden–Haley to Micheltorena Canon Perdido-Anacapa to Castillo	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements).	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Bike Plan to achieve low single-digit changes in mode shift. Include Peak-Hour parking restricted bike lanes on streets such as Santa Barbara, Anacapa, Anapamu, etc.

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Pedestrian system improvements	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable pedestrian improvements Existing Conditions Report (<$500,000 improvements) Complete sidewalk missing links in MODA. High quality ped crossings per vehicle yields in MODA.	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Ped Plan.
Transit system improvements	Continue existing Transit levels and locations per Existing Conditions Report.	Modest improvement in local & So. Coast transit routes/ headways. -More main lines with 10-minute peak-period headways, i.e add Crosstown Shuttle. -More lines outside of peak period. Minor reasonably foreseeable limited expense planned and funded improvements per Transit Plan	Same as "No Project" Alternative – existing conditions	Larger improvement in local & MTD regional transit routes/ headways to reflect gold-plated service, but account for diminishing returns where appropriate. -Headways from 10-5 minutes on City main lines? -Higher frequency on MTD regional express lines (i.e to Carpinteria, UCSB/Isla Vista) Reasonably foreseeable Transit Plan improvements
Regional bus service	Existing service levels per Existing Conditions Report	Modest Increase: Continued demand responsive expansion of regional bus service, e.g., Clean Air Express. Assume growth in service based on average growth rates in years prior to big spike in gas prices.	Same as PlanSB - Modest Increase	Assume aggressive expansion of regional bus service, e.g., Clean Air Express, to reflect high rates of growth during gas price run up, with corresponding reductions in regional SOV commuting. Assume some shift in funding from roads to transit to expand regional bus service. -More shoulder times for main lines and better headways 7-9. -Light rail upper State Street

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Commuter rail	Existing AMTRAK limited service per Existing Cond Report	Modest increase: Existing rail service plus limited AMTRAK Commuter Rail service improvements, i.e., re-timing of existing AMTRAK service to be commuter-oriented.	Same as PlanSB project Modest AMTRAK PH Commuter Increases	Full commuter rail service from Ventura with existing service and 2 trains each in AM and PM peak hours. Identify point where commuter rail may qualify for Federal funding according to FTA ridership criteria for New Starts.
TDM	Current levels continue per Existing Conditions Report	Modest Expansion: Subsidized Transit Pass program – modest expansion to bring in more user groups, e.g., employers Parking Cash-Out – yes, per current law - >50 employees Car Sharing – expanded - low level, City funded (i.e., can take transit to work and have a car if needed) Bike Sharing –expanded to modest program, similar to Paris Safe Routes to School – Continue, modest increase Carpooling – modest increase- Telecommuting – modest expansion (increased allowance for telecommuting)	Same as "No Project" Alternative – existing TDM programs	Aggressive increases for public and private sector: Subsidized Transit Program – strong expansion Parking Cash Out – Improved program, expand to existing employers; aggressive pricing structure Car Sharing – Strong program – commuters and neighborhoods Bike-sharing – strong program Safe Routes to School – complete program Carpooling - increased efforts to facilitate, incentivize Telecommuting – Strong expansion.

Appendix C

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

Appendix D

Category 1: Parking Policies

1.1 Reduced/Eliminated Minimum Parking Requirements

Overview

Most cities minimum parking requirements typically take into account only two variables: land use and the size of development. However, they fail to take into account a number of other factors which affect parking demand including geographic factors (e.g. pedestrian environment, proximity to transit, and availability of services), demographic factors (e.g. income, household size, and vehicle ownership rates), and other relevant factors that affect parking demand (e.g. the presence of transportation demand management programs like car-sharing).

Minimum parking requirements are intended to achieve specific goals (most commonly identified by cities as avoiding spillover parking problems and reducing congestion of on-street parking). However, these goals can also be achieved through other policies, such as pricing curb parking at market rates, residential parking permit programs, and other on-street parking management techniques.

Reduced parking requirements could be established in locations where parking demand will be lower to due to the geographic and demographic factors described above. Eliminating parking requirements would not mean that no new parking would be constructed. Rather, it would mean that market forces would determine the appropriate level of supply, based on market demands. That is to say, individual developers will construct as much parking as they deem necessary to meet consumer demand regardless in the absence of minimum requirements. Minimum parking requirements could be waived entirely anywhere in the City of Santa Barbara where there are measures in place to combat parking spillover but especially in mixed used areas like downtown and in proximity to major transit corridors.

Current Policy

For commercial and retail uses, the Santa Barbara municipal code generally requires 2 parking spaces per 1,000 sq. ft. in downtown and 4 parking spaces per 1,000 sq. ft. outside of the downtown area. For residential uses, parking requirements vary based on number of bedrooms and location.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes within the Mobility Oriented Development Area (MODA):

- Reduce commercial parking requirements by half (to 2 parking spaces per 1,000 sq. ft.).
- Average 1 space per unit for all residential units.
- No guest parking.

Assumes outside of the MODA: maintenance existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or “granny flat”) within or outside of the MODA.

Assumes that maximum parking requirements would apply to residential parking.

Alternative 1

Assumes within the MODA: an increase residential parking requirements beyond current ordinance and maintain current commercial parking requirements.

Assumes outside the MODA" maintenance of existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes 1 dedicated parking space for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Alternative 2

Assumes for residential parking within the MODA:

- No minimum or maximum commercial or retail parking requirements downtown.
- Average ½ space per unit in transit corridors (i.e. within one block) for residential parking.
- Average 1 space per unit for all unit types for residential parking outside of the transit corridors.
- No guest parking.

Assumes outside of the MODA: maintenance of existing commercial, retail, and residential parking requirements per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Summary of Literature and Study Impacts

Research shows that there is an indirect link between reduced minimum parking requirements and a decline in vehicle trips. Setting minimum parking requirements often results in lower parking prices, as the supply of parking exceeds demand, which in turn increases vehicle ownership. Studies reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[1]

Average income households spend an average of $3,800 annually per vehicle.[2] Assuming that residential parking spaces have an annualized cost of $800 per year, parking costs add 21% to vehicle costs for an average income household. If we assume a vehicle price elasticity of –0.7 (Figure 1), minimum parking requirements that exceed the actual demand for parking increase vehicle ownership about 14%. The resulting increase in vehicle ownership will likely produce more vehicle trips. Conversely, decreasing or eliminating requirements would likely result in a reduction in residential vehicle trips.

Figure 1 Vehicle Ownership Reductions from Residential Parking Pricing

Annual (Monthly) Fee	-0.4 Elasticity	-0.7 Elasticity	-1.0 Elasticity
$300 ($25)	4%	6%	8%
$600 ($50)	8%	11%	15%
$900 ($75)	11%	17%	23%
$1,200 ($100)	15%	23%	30%
$1,500 ($125)	19%	28%	38%

[1] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[2] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard has insufficient data to estimate the impacts of potential changes to minimum parking requirements on vehicle trips or vehicle ownership in Santa Barbara.[3] This does not imply that reduced/eliminated parking requirements have no impact on vehicle ownership and trips (they clearly do through Tiebout Sorting, or self-selection effects). However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[4]

[3] For example: even if minimum parking requirements are reduced or eliminated, many developers might still build projects with the same amount of parking as the old minimums in order to be competitive with older projects that were previously required to meet those minimums. Regardless of how many parking spaces were actually built, there is no way to estimate how many of those parking spaces would actually be occupied.

[4] For example, using site-level data on the number of parking spaces constructed and the amount of the constructed parking actually occupied in several "high parking" and "low parking" development projects located in similar contexts in Santa Barbra would allow us to estimate the impact of parking supply on vehicle ownership and vehicle trips generated (by multiplying the number of vehicles at the differently-parked projects by an average factor for "peak hour trips generated per vehicle" in Santa Barbara).

1.2 Unbundled Parking

Overview

Parking costs are generally subsumed into the sale or rental price of housing and commercial space. But although the cost of parking is often hidden in this way, parking is never free; instead the cost to construct and maintain the "free" parking is hidden in the cost of all other goods and services. For all commercial and residential development in Santa Barbara, the cost to lease or purchase parking could be unbundled from the cost to lease or purchase the usable space.

Such a policy would provide a financial incentive to residents and employers to lease only the amount of parking they need. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. Among households with below-average vehicle ownership rates (e.g., low-income people, singles and single parents, seniors on fixed incomes, and college students), unbundled parking can also provide a substantial financial benefit that increases housing affordability. Unbundled parking can allow employers to provide employees with an equitable transportation benefit that can reduce vehicle commuting.

Current Policy

The City of Santa Barbara does not require the unbundling of parking in residential or commercial developments.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA. No change outside MODA.[5]

Alternative 1

Assumes increased parking for commercial uses and allowable increases in residential parking.

Alternative 2

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA.

Summary of Literature and Study Impacts

Charging separately for parking is the single most effective strategy to encourage households to own fewer cars, and subsequently reduce vehicle trips. According to a study by Todd Litman, unbundling residential parking can significantly reduce household vehicle ownership.[6] Studies

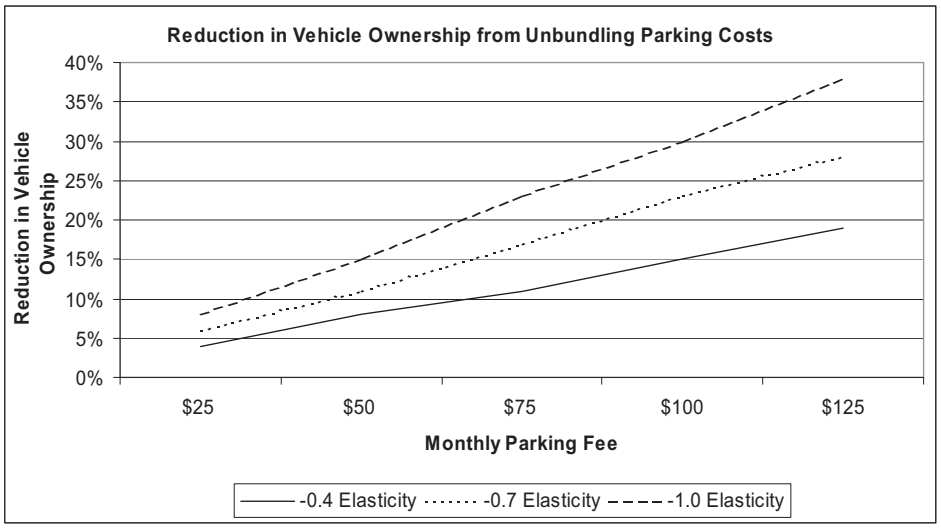
[5] Unbundled parking is recommended for multifamily attached housing including both rental apartments and for-sale condominiums and townhouses. For single-family detached housing where the parking is incorporated into the residential unit, unbundled parking is technically feasible and often occurs informally but not recommended as formal policy. For single-family detached housing where the parking is separate from the main structure (such as a carriage house garage with a residential Accessory Dwelling Unit above or where parking can be leased from a centralized "community" lot or garage serving multiple residences) then unbundled parking for single-family detached housing is feasible.

[6] Victoria Transport Policy Institute (2009), *Parking Requirement Impacts on Housing Affordability,* http://www.vtpi.org/park-hou.pdf

reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[7]

Average income households spend an average of $3,800 annually per vehicle.[8] Assuming that residential parking spaces have a monthly cost of $70, and a vehicle price elasticity of –0.7 (Figure 2), the unbundling of parking costs would decrease vehicle ownership about 15%. This decrease would result in a proportionate reduction in residential vehicle trips.

Figure 2 Reduction in Vehicle Ownership from Unbundling Parking Costs



Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

Alternative 1

This alternative assumes no unbundled parking, therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

[7] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[8] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

1.3 Public Parking Pricing

Overview

One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. In addition, studies have shown that an average of 28% of traffic congestion in urban mixed-use and commercial districts (such as downtown Santa Barbara and proposed MODA areas) is attributable to cruising for parking: motorists who have already arrived at their destination but are searching and circling to find a free or below market-rate curb parking space.[9] This phenomenon is compounded in Santa Barbara with employees engaging in the "parking shuffle" in which workers continually move their vehicles from one space to another throughout the day to avoid citations for overstay of the 75- and 90-minute time limits, thereby parking all day for free.

In these circumstances, managing on- and off-street parking prices as part of an integrated district-wide parking system is an important strategy for reducing peak-hour trip generation and localized traffic congestion, especially for trips to areas with high employment densities. Demand-responsive, market-based prices for parking pricing also have secondary benefits including:

1. Distributing highly variable parking demand to match available supply to ensure that there are available curb parking spaces at all times of day.

2. Promoting parking turnover to prevent commuters parking all-day in on-street parking spaces intended for short-term parking.

3. Reducing "ticket anxiety" of shoppers and visitors to commercial areas by allowing motorists to park for longer periods of time that with time limits so long as they pay for all the parking they use.

Based on the findings of Nelson\Nygaard's downtown on-street parking survey, both of these conditions apply in downtown Santa Barbara, and likely in other mixed-used districts in Santa Barbara such as proposed MODA areas (for more information, see the Plan Santa Barbara *DRAFT Summary of Downtown Santa Barbara On-Street Parking Survey* (dated 4/29/09).

Current Policies and Programs

Downtown parking in the non-commuter lots is free for the first 75 minutes and $1.50 per hour after. There are no time limits on the length of stay. Priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm. Monthly parking passes are available in 12 short-term lots and garages and the price varies from $100 to $150 depending on the location of the parking lot or garage. The two downtown commuter lots are reserved for commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). On-street parking is free for the first 15 to 75 minutes depending on the street.

Outside of the downtown area on-street parking is free for up to the first 90 minutes. See the Plan Santa Barbara *Transportation Existing Conditions Report* (August 2008) for more details on existing parking policies and conditions.

[9] Shoup, Donald. *The High Cost of Free Parking.* APA Planner's Press. 2005.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate program of parking management changes to on- and off-street parking within the MODA including the following:

- Relax time limits for on-street parking to allow motorists to park for longer time periods so long as they pay for the parking they use.
- Continue time limits for off-street parking.
- Eliminate parking discounts and begin charging tiered rates for off-street parking based on "length of stay" and/or "time of day."
- Begin charging for on-street parking at roughly 33 cents per hour.[10]
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Alternative 1

Assumes maintenance of existing pricing and time limit policies for on and off-street parking within and outside the MODA.

Alternative 2

Assumes implementation of a robust parking management program for both on- and off-street parking within the MODA as follows:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour.[11] These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the

[10] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

[11] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail

- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Summary of Literature and Study Impacts

The reduction in employee vehicle trips from public parking pricing varies both in the amount charged for parking and in the type of location the pricing is implemented. Parking pricing has a much more profound effect in denser areas, such as within the MODA, where more alternative mode choices are present and as a result, vehicle trips face greater reductions in those districts. Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[12] According to the information developed by Litman regarding "place types" and summarized in Figure 3, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With a citywide employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1% (and Areas 1 – 4 all showing similar figures), the travel characteristics for the entire city of Santa Barbara indicate that the city is very similar to what Litman terms an Activity Center.[13]

Figure 3 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%

[12] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

[13] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

If we assume that a public parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in commuter vehicle trips would be between 37% and 46.8%, for both current and future traffic, given that Santa Barbara is an "Activity Center."[14] Research regarding the pricing effects on short-term visitor vehicle trips is insufficient to make an estimate of impacts. No documented drop in visitor vehicle trips has been found from cities that have implemented public parking pricing. Instead, common responses by short-term parkers to changes in public parking prices are to slightly reduce the amount of time they park for or to seek out lower priced parking in facilities that may be further away from high demand areas (and are therefore underutilized) and then walk or take a transit to their final destination.

Figure 4 Vehicle Trips Reduced by Daily Parking Fees[15]

Worksite Setting	$1.49	$2.98	$4.47	$5.96
Low Density Suburb	6.5%	15.1%	25.3%	36.1%
Activity Center	12.3%	25.1%	37.0%	46.8%
Regional CBD/Corridor	17.5%	31.8%	42.6%	50.0%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a moderate increase in parking price to an average daily charge of $2.98 (approximately 33 cents per hour), research from VTPI shows the decrease in employee vehicle trips would be 25.1% in Areas 1 and 2 given that Santa Barbara is an "Activity Center." No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

This alternative assumes no change in parking policies and therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume that a parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in employee vehicle trips would be 44.2% in Areas 1 and 2 given that Santa Barbara is an "Activity Center."[16] No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[14] The $120 is based on an average of the current prices for downtown off-street monthly permits - http://www.santabarbaraca.gov/Resident/Transportation_and_Parking/Parking/PERMITS.htm.

[15] Victoria Transport Policy Institute (2008), *Land Use Impacts on Transport*, http://www.vtpi.org/landtravel.pdf

[16] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 4 (y = 0.0774x + 0.0145).

Category 2: Transportation System Improvements

2.1 Bike System Improvements

Overview

Bicycle system improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. Bike facilities can serve direct door-to-door trips, especially those trips that are "too far too walk but too far to drive" (e.g. trips of between one and two miles are too long to walk for most people, but are a short bicycle ride). In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area"[17] of the transit stop or station and increasing ridership. Bicycle access can also reduce parking pressure on heavily-used and/or heavily-subsidized feeder bus lines and auto-oriented park-and-ride facilities.

Current Policies and Programs

The city of Santa Barbara has a comprehensive bicycle network that connects nearly every part of the City, with approximately 28 miles of bike lanes and 6 miles of separated off-street bike paths. These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Santa Barbara has a high rate of biking, with Census data showing that 3.4% of residents bike to work, compared to 0.6% nationwide. For more details on existing bike facilities, see the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. On-street bicycle is available throughout downtown Santa Barbara and merchants may request to have bike parking installed near their business. On-street (sidewalk) and off-street lockers are provided for "long term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. The City of Santa Barbara also provides secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations. Off-street bicycle parking requirements are dictated by municipal code.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to bicycle network connectivity and completeness by prioritizing bike lanes over curbside parking during peak hours, including:

- Peak-hour parking restrictions would be in place to allow for curb-side bike lanes at the following locations (the curb lane would revert back to parking at all other times):
  - Santa Barbara Street - Haley to Micheltorena
  - Chapala – Haley to Constance
  - Dela Vina – Haley to Constance
  - Garden – Haley to Micheltorena
  - Canon Perdido – Anacapa to Castillo

[17] A transit catchment area is the geographic area from which a transit station draws riders.

- Improvements to bicycle travelways and parking are a priority use of rights-of-way within MODA.

Alternative 1

Assumes minor improvements to the bicycle network and facilities (a total investment of less than $500,000 each).

Alternative 2

In addition to improvements in Plan SB Alternative, assumes major improvement to the bicycle network by:

- Improvements to bicycle travelways and parking are a priority use of rights-of-way throughout the City, including implementation of all of the recommended improvements within the City of Santa Barbara's Bicycle Master Plan.
- Implement other bicycle infrastructure and programs as necessary to achieve Platinum designation as a Bicycle-Friendly Community from the League of American Cyclists.[18]
- Improve coordination between City, County, UCSB, SBCAG, and other South Coast cities and entities to improve and expand regional bike paths and routes that cross jurisdictional boundaries.

Summary of Literature and Study Impacts

One important advantage of bicycling compared to walking is that bicycling can substitute directly for automobile trips with longer distances. A before-after study of bicycle facility implementation found that each mile of bikeway per 100,000 residents increases bicycle commuting 0.075%, all else being equal.[19]

Summary of Estimated Impacts in Santa Barbara

Because the estimated impacts of bicycle system improvements are relatively small, and because Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for these impacts for purposes of the modeling effort, we have excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort.. This does not imply that bicycle system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

The introduction of bike lines on Santa Barbara St. (Haley to Micheltorena), Chapala St. (Carrillo to Mission), De la Vina St. (Haley to Constance), Garden St. (Haley to Micheltorena), and Canon Perdido (Anacapa to Castillo) would equal 5.5 miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.46% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[18] There are no definitive criteria to achieve this designation; instead a number of factors related to the 5 E's (engineering, education, encouragement, enforcement and evaluation) are considered that are tailored to the individual community seeking the designation. For more information see the League of American Bicyclists' "Bicycle Friendly Communities" website at http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities.

[19] Arthur Nelson and David Allen (1997), *If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities,* Transportation Research Record 1578, http://www.enhancements.org/download/trb/1578-10.PDF.

Alternative 1

No increase in bicycle trips is anticipated due to minor system improvements.

Alternative 2

Filling in gaps in the bicycle network and implementing additional measures will essentially have the effect of introducing 11 additional miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.92% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.2 Pedestrian System Improvements

Overview

A walkable environment gives people more transportation choices and improves quality of life. A well-designed network of streets and pedestrian ways is key to improving pedestrian accessibility, and includes streets, alleys, trails, midblock crossings and pedestrian paseos. Walking is also a free transportation option for accessing public transit, and is available to most people within a quarter to half mile of transit stations and stops. Thus creating a safe, comfortable, and convenient walking environment is key part of supporting transit. A well-designed network of streets with a high degree of pedestrian amenity is a key factor in enhancing pedestrian accessibility and connectivity to transit.

Current Policies and Programs

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service. Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. See the City of Santa Barbara's Pedestrian Master Plan for more information on current pedestrian system conditions by area.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links within the MODA as identified in the City's "Sidewalks Missing Links" program.
- Implementing enhanced pedestrian crossings at high volume intersections.

Alternative 1

Assumes minor improvements to the pedestrian network and facilities (a total investment of less than $500,000).

Alternative 2

Assumes major improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links throughout the City as identified in the City's "Sidewalks Missing Links" program.
- Constructing enhanced pedestrian crosswalk treatments at high volume intersections.
- Installing pedestrian amenities (e.g. pedestrian-scaled street lighting, benches, trees and other landscaping) along high volume pedestrian corridors, around transit stops and stations, and at other key pedestrian destinations (parks, schools, etc.).
- Continuing with the installation of corner curb ramps in compliance with Federal and State universal access requirements for public rights-of-way.
- Implementing traffic calming measures as needed.
- Implementing other improvements as identified in the City's Pedestrian Master Plan.

Summary of Literature and Study Impacts

It can be difficult to estimate precisely how much walkability investments affect travel, since it is often accompanied by investments in other alternative transportation means and changes in land use. However, studies have found that there is a direct connection between a high quality pedestrian environment and usage of travel modes other than driving:

- Walking is three times more common in a community with pedestrian friendly streets than in otherwise comparable communities that are less conducive to walking.[20]
- Residents in a pedestrian friendly community walk, bicycle, or ride transit for 49% of work trips (18 percentage points higher than in a comparable automobile community) and 15% of their non-work trips (11 percentage points higher than in a comparable automobile-oriented community).[21]
- Investments in the pedestrian environment have positive impacts on all road users. Benefits include: reduces auto-dependency and air pollution, improves livability, increases mobility for low-income households, and even increases retail sales and property values.[22]

In addition to the studies discussed above, a significant amount of research had been conducted on how urban form affects travel behavior. Urban design elements that impact pedestrian access such as street patterns (grid versus cul-de-sacs), topography, ease of street crossings, sidewalk continuity have been shown to reduce VMT and daily vehicle trips.[23] In another study which examined how urban form variables affected the number of pedestrian trips for recreation and shopping, it was shown that perceived safety, shade, and the frequency and desirability of seeing people while walking had a significant impact (for shopping trips, distance, the ease of walking and comfort were significant variables).[24]

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts, specifically in terms of street connectivity criteria in the model. We have therefore excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort. This does not imply that pedestrian system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

Major improvements to the pedestrian network will result in a 1 percentage point increase in alternative mode use for work trips and a .5 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[20] Anne Vernez Moudon, Paul Hess, Mary Catherine Snyder and Kiril Stanilov (2003), *Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments*, http://www.wsdot.wa.gov/research/reports/fullreports/432.1.pdf

[21] Robert Cervero and Carolyn Radisch (1995), *Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods*, http://www.uctc.net/papers/281.pdf.

[22] Local Government Commission (2001) *The Economic Benefits of Walkable Communities*. http://www.lgc.org/freepub/docs/community_design/focus/walk_to_money.pdf

[23] 1000 Friends of Portland (1993) *The Pedestrian Environment: LUTRAQ Report Volume 4A*, http://ntl.bts.gov/DOCS/tped.html

[24] Susan Handy, Kelly Clifton, and Janice Fisher (1998) The Effectiveness of Land Use Policies as a Strategy for Reducing Auto Dependence : A Study of Austin Neighborhoods, http://www.des.ucdavis.edu/faculty/handy/Austin_Report.pdf

Alternative 1

No increase in pedestrian trips is anticipated due to minor system improvements.

Alternative 2

Major improvements to the pedestrian network will result in a 2 percentage point increase in alternative mode use for work trips and a 1 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.3 Transit System Improvements

Overview

In most cities that have succeeded in growing while limiting the growth of vehicle trips, a fundamental component of their success has been improved transit services. Existing transit services can be improved in several ways, including:

- Increasing frequency (e.g. reduced headways).
- Increasing reliability and on-time performance.
- Reducing travel time and travel time variability.
- Increasing service span (e.g. hours of operation).
- Enhancing passenger amenities (both in-vehicle and at stations and stops).

The connectivity and convenience of the transit system can also be enhanced through the addition of new bus routes running in mixed-flow travel lanes or by adding new service running in dedicated transit rights-of-way, such as Bus Rapid Transit (BRT),[25] light rail, or heavy/commuter rail service.

Current Policies and Programs

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Santa Barbara has a typical rate of transit use, with Census data showing that 4.5% of residents bike to work, compared to 4.4% nationwide. A summary of existing services is below, and more information is presented in the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

Local MTD Transit

Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles.

Regional Bus Service

MTD operates the Valley Express which is a regional bus service. Additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal Express (the latter co-managed by the Ventura County Transportation Commission).

Commuter Rail

Amtrak serves Santa Barbara with passenger rail service along the Coast Starlight and Pacific Surfliner Routes. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara. The current schedules provide limited service during peak commute hours and existing passenger rail service is therefore not a feasible option for most commuter trips to and from Santa Barbara.

[25] A definition of BRT can be found at the Bus Rapid Transit Institute, http://www.nbrti.org/CBRT.html

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes the following service enhancements:

Local MTD Service

A modest increase in local and South Coast bus service as follows:

- Reduce peak period headways to 10 minutes on routes serving of primary transit corridors ("main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Introduce "crosstown shuttle" service.
- Implement other low-cost transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 1

Assumes the following service enhancements:

Local MTD Service

Maintenance of existing transit system and service levels as detailed in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

Regional Bus Service

As in the Plan Santa Barbara alternative, a modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 2

Assumes the following service enhancements:

Local MTD Service

In addition to the improvements in Plan Santa Barbara alternative, a robust increase in local and South Coast bus service as follows:

- Reduce peak period headways from 10 to 5 minutes on routes serving of primary transit corridors (e.g. Routes 1, 2, 6, 11 and other "main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Increase frequency of MTD regional express lines (e.g. Capinteria, UCSB/Isla Vista, etc.).
- Introduce light rail service on upper State Street.
- Implement all other transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A robust increase in regional bus service as follows:

- Shift of regional transportation funding from highway capacity projects to dramatic expansion of regional bus services (such as the Clean Air Express), including:
  - Increased frequency (reduced headways) during peak commute periods.
  - Additional services during non-peak travel times to allow peak-hour commuters to rely on the service in emergency, accommodate occasional flex-work commuters, etc.
- Service capacity and ridership to expand at the historical annual growth rate experienced during the Fall 2007 to Fall 2008 spike in gas prices.

Commuter Rail Service

A robust expansion of commuter rail service from Ventura with existing Amtrak service and two additional trains in both the AM and PM peak hours.

Summary of Literature and Study Impacts

The elasticity of transit use with respect to transit service frequency is about 0.5, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.5%.[26] The elasticity of transit use to service expansion (e.g. routes into new parts of a community already served by transit) is in the range of 0.6 to 1.0, which means that 1.0% of additional service increases ridership by 0.6-1.0%.

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would

[26] Richard Pratt (2000) *Traveler Response to Transportation System Changes*, Interim Handbook, TCRP Web Document 12. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_webdoc_12.pdf

otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%). Impacts of other expansions in transit vary depending on the conditions in which it is implemented.[27]

Local experience in Santa Barbara suggest that increasing transit service results in ridership growth: when the headways on several MTD routes (1, 2, 6, 11) were decreased from 15 minutes to 10 minutes, peak period ridership on these routes increased by 13%.[28]

Summary of Estimated Impacts in Santa Barbara

Because the extent and phasing of the transit system improvements are not known at a level of precision that would allow Nelson\Nygaard to derive a reliable estimate of peak hour vehicle trip, VMT, or vehicle ownership reductions, we have excluded these impacts from the analysis in order to maintain a conservative methodology. This does not imply that transit system improvements will have no impact on vehicle ownership and trips in Santa Barbara; quite the contrary, the available research shows that enhanced transit service will have significant impacts. However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[29]

Nelson\Nygaard also believes that some of the impacts of transit system improvements will be accounted for in the 4-D model adjustments (density, design, diversity, destinations), since areas with enhanced transit service will likely correspond to areas with increased density, mixing of uses, and reduced parking.

[27] Victoria Transport Policy Institute (2008). *Traffic Calming*. http://www.vtpi.org/tdm/tdm4.htm.
[28] Information provided by City of Santa Barbara staff.
[29] For example: service type (e.g. bus operating in mixed-flow travel lanes or BRT, light rail, heavy rail operating in a dedicated transit rights-of-way), service span and headways, and routing. Using this information, we could derive estimates of both ridership growth generated by the transit improvements (i.e. number of new transit trips net of existing transit trips in this corridor or parallel corridors) and reductions in peak-hour vehicle trips as result of the transit improvements (e.g. the number of the new transit trips occurring in peak travel periods vs. non-peak, the number of new transit trips that shifted from single-occupant vehicle trips vs. carpooling, other transit services, bicycling, etc.).

Category 3: Transportation Demand Management (TDM) Policies[30]

3.1 Subsidized Transit Passes

Overview

In recent years, growing numbers of transit agencies have teamed with universities, employers, building developers, or entire districts or neighborhoods to provide universal or subsidized transit passes to certain riders (students, employees, etc). These passes typically provide unlimited transit rides on local or regional transit providers for a low monthly fee, often absorbed entirely by the employer, school, or developers.

Current Policy and Programs

The City of Santa Barbara currently has a subsidized transit pass program as follows:

- Current City employees receive free MTD transit passes.
- All downtown employers established in the past 15 years must provide free MTD transit passes to their employees.
- Downtown employers that were established prior to 15 years ago may qualify for discounted MTD transit passes.
- Any downtown employee may request a discounted MTD transit pass.
- Non-downtown employers may voluntarily participate in the program in order to provide subsidized transit passes to their employees.
- Large development projects are sometimes required by the City (as a condition of approving entitlements) to provide subsidized transit passes to the development's employees and/or residents.

For employees eligible for discounted MTD transit passes the Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. The program is funded by revenue generated at parking lots and garages in the downtown area. For additional information on the existing program, please see the *Plan Santa Barbara Existing Conditions Report* (dated August 2008).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara Alternative

A modest expansion in the participation in the existing subsidized transit pass program as follows:

- Target expanded enrollment among these new user groups:
  - All large employers citywide.
  - All employers within MODAs.
  - All employers within a ¼ mile of high-transit corridors.
  - Schools.

[30] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Encourage these new user groups to enroll in the existing subsidized transit pass program by:
  - Promoting and marketing the program via Transportation Management Association to these new user groups.
  - Incentivizing enrollment in the program via administrative and logistical support to these new user groups.
  - Considering additional financial subsidy as necessary to enroll certain new user groups (e.g. non-profits, etc).
- Encourage expansion of participation rates by *existing* user groups through:
  - Increased promotion and marketing.
  - Lowering barriers to entry (e.g. requiring automatic opt-in).
  - Deeper financial subsidy as necessary to lower out-of-pocket costs for certain user groups (e.g. non-profits, etc.).

Alternative 1

Maintenance of existing subsidized transit pass program as described above.

Alternative 2

In addition to the policies in Plan Santa Barbara alternative, a robust expansion of the existing subsidized transit pass program as follows:

- Require passes to be provided as part of the conditions of approval for entitlements for all residents and employees of:
  - New development within downtown.
  - New development within MODAs.
  - New development within a ¼ mile of high-transit corridors.
  - New large developments citywide.
- Require subsidized transit passes be provided to the employees of:
  - All new employers citywide as part of the conditions of approval for entitlements.
  - All existing employers citywide who propose physical expansions as part of the conditions of approval for entitlements.
- Work with regional partners to ensure that:
  - The subsidized transit pass program encompasses all existing and future regional bus and/or rail transit services (in addition to MTD services).
  - The fare media used by the subsidized transit pass program is compatible for use on all services to increase user convenience and reduce barriers to entry for new participants.

Summary of Literature and Study Impacts

Current research regarding the impacts of subsidized transit passes can be generally broken into two categories.

1. The first set of research focuses on demonstrating the effects transit passes on mode splits by surveying users before and after implementation.

2. The second method bases the results of a transit pass implementation on the actual percent of vehicle trips reduced.

Both of these types of research can be useful for different purposes, as discussed below.

The first set of data is useful in illustrating the impacts of transit passes in various settings. Figure 1 shows the drive-alone and transit mode splits before and after subsidized transit pass implementation in different locations. These studies show reductions in drive-alone mode share of 4% to 42%, with an average reduction of 19%. In addition, these case studies show a wide range of increased transit mode share of between 25% and 145% with an average rise of 95%.

Figure 5 Employee Mode Splits Before & After Implementation of Subsidized Transit Pass Programs

Location	Drive Alone to work			Transit to work		
Municipalities	*Before*	*After*	*% Change*	*Before*	*After*	*% Change*
Santa Clara (County)[31]	76%	60%	27%	11%	27%	145%
Bellevue, Washington (Downtown)[32]	81%	57%	42%	13%	18%	38%
Ann Arbor, Michigan (Downtown)[33]	N/A	N/A	4%	20%	25%	25%
Universities						
UCLA (faculty and staff)[34]	46%	42%	9%	9%	20%	122%
Univ. of Washington, Seattle (faculty)[35]	60%	47%	22%	11%	27%	145%
Univ. of Washington, Seattle (staff)	44%	39%	11%	25%	36%	44%
Average Percent Change	-	-	19%	-	-	87%

Source: Table created by Nelson\Nygaard from studies cited in table footnotes.

Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[36] According to the information developed by Litman regarding "place types" and summarized in Figure 2, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With an

[31] Santa Clara Valley Transportation Authority (1997). *Eco Pass Pilot Program Survey Summary of Findings*.
[32] King County Metro (2000) *FlexPass: Excellence in Commute Reduction, Eight Years and Counting*. www.commuterchallenge.org/cc/newsmar01_flexpass.html.
[33] Christopher White, Jonathan Levine, and Moira Zellner (2002). *Impacts of an Employer-Based Transit Pass Program: The Go Pass in Ann Arbor, Michigan*. www.apta.com/research/info/briefings/documents/white.pdf
[34] Jeffrey Brown, Daniel Baldwin Hess, and Donald Shoup (2003). *Fare-Free Public Transit at Universities*. http://shoup.bol.ucla.edu/FareFreePublicTransitAtUniversities.pdf
[35] University of Washington Facilities Services, *The U-PASS Online and Telephone Survey Report (2006)*, www.washington.edu/commuterservices/programs/upass/reports.php
[36] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1%, the travel characteristics of Santa Barbara indicate that the city is very similar to an Activity Center.[37]

Figure 6 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%
Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

Furthermore, Figure 7 breaks each category into three subcategories of rideshare oriented, mode neutral, and transit oriented. Essentially, if transit or ridesharing comprises more than 50% of the alternate mode share, the site is transit oriented or rideshare oriented, respectively. If neither transit nor ridesharing dominates, then the area is considered mode neutral. In the case of Santa Barbara, carpooling is roughly equivalent to transit usage making the city mode neutral.

We have updated the daily transit subsidy information used by Litman to account for inflation since the Litman data was compiled; the source for this escalation was the U.S. Bureau of Labor Statistics Consumer Price Index.[38] Given the $52 monthly cost of an MTD pass, it can be estimated that the necessary daily transit subsidy necessary for an employee would be $2.39.[39] As shown in Figure 7, this sum falls between the $1.49 and $2.98 subsidies. By calculating the statistical relationship between transit subsidy and percent decrease in vehicle trips we find that a likely percent reduction in vehicle trips from a transit pass subsidy covering all employees in Santa Barbara would be 13.7%.[40]

Figure 7 Vehicle Trip Reduction by Workplace Setting and Daily Transit Subsidy[41]

	Daily Transit Subsidy			
Worksite Setting	**$0.75**	**$1.49**	**$2.98**	**$5.96**
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	**7.3%**	**16.4%**	38.7%
Activity center, transit oriented	5.2%	10.9%	23.5%	49.7%
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%

[37] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

[38] Bureau of Labor Statistics, *Consumer Price Index*, http://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.

[39] Based on an average 260.7 weekdays per year and 21.7 weekdays per month.

[40] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 8 (y = 0.0684x - 0.0267).

[41] Victoria Transport Policy Institute (2008), *Transportation Elasticities*, http://www.vtpi.org/elasticities.pdf

Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%	54.3%
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%	64.0%

Summary of Estimated Impacts in Santa Barbara

For this analysis, we have assumed that 20% of employees are currently participating in a transit subsidy program under Alternative 1 in Areas 1 and 2, resulting in a 2.7% reduction in auto trips (13.7% multiplied by 20%).[42] The Plan Santa Barbara alternative envisions an expansion of the program to cover 40% of employees in Areas 1 and 2 with a 5.5% reduction in trips. Alternative 2 covers 60% of employees in all areas with an 8.2% reduction in trips. These estimates are summarized in Figure 8.

Figure 8 Estimated Impacts on Auto Trips

Policy/Program	PlanSB	Alternative 1	Alternative 2
Subsidized Transit Passes	(5.5%)	(2.7%)	(8.2%)

Similarly, the impacts of a transit pass subsidy on drive-alone and transit mode shares given the ranges of 4% to 42% decreases in drive alone share and 25% to 145% increases in transit share are relative to the percentage of participating employees (20%, 40%, and 60%). For example, Alternative 1 will result in a 5% to 29% increase in transit share (25% to 145% multiplied by 20%). These estimates are summarized in Figure 9.

Figure 9 Estimated Impacts on Mode Splits

Mode	PlanSB	Alternative 1	Alternative 2
Drive Alone	(2% -16%)	(1% - 8%)	(2% - 25%)
Transit	10% - 58%	5% - 29%	15% - 87%

No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[42] Because the City already has a subsidized transit pass program and Alternative 1 assumes no expansion of that program, vehicle trip reductions from continuation of the current program under this alternative would already be accounted for in the current mode splits that are used in the traffic modeling process. For this reason, Appendix C (which is an input into the traffic model) assumes 0% reduction in peak-hour vehicle trips for the transit pass program in Alternative 1 to avoid "double counting."

3.2 Parking Cash-Out

Overview

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash-out requirement, employers are allowed to continue this practice on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work. Offering employees the option of "cashing out" their subsidized parking space can incentivize employees to ride transit, bike, walk, or carpool to work, thereby reducing vehicle commute trips and emissions.

The cash value of the parking subsidy can be offered in one of three forms:

- A transit/vanpool subsidy equal to the value of the parking subsidy (of which up to $230 per month is tax-free for both employer and employee).
- A taxable carpool/walk/bike subsidy equal to the value of the parking subsidy.
- Alternately, employees can be given a general "transportation fringe benefit" equal to the market value of an employee parking space, and all employee parking can simply be priced with a daily fee.[43]

Parking cash-out is a state law in California, but the state law only applies to employers with 50 employees or more who lease their parking and whose parking costs can be separated out as a line item on their lease. In addition, the California Air Resources Board (CARB) is nominally tasked with monitoring compliance, but CARB currently has no dedicated enforcement resources. For this reasons, some California jurisdictions such as Santa Monica and Los Angeles have implemented local parking cash-out requirements and enforcement mechanisms.[44]

Current Policies and Programs

SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace. Implementation and enforcement of a citywide or countywide parking cash-out program would therefore likely have a significant impact on travel behavior, by providing a financial incentive for some auto commuters to shift to other modes.

Some private employers in Santa Barbara already offer parking cash-out. For example, Cottage Hospital in Santa Barbara has a parking cash-out program in which all employees are paid an additional $75 per month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest increase in parking cash out programs as follows:

[43] There are a number of ways to determine the actual market value of an employee parking space that is currently provided for free in order to determine the amount of cash that should be offered in lieu of the free parking. In general these are: a) align with prices charged at comparable parking facilities in the vicinity, b) calculate the total capital and operating cost of the parking, or c) calculate the total social costs of the parking, including not only capital and operating costs but also opportunity costs and costs of mitigating externalities.

[44] Enforcement mechanisms for ensuring compliance with the existing state parking cash-out law and potential local parking cash-out requirements include measures such as requiring a signed affidavit certifying compliance when an employer's business licenses is renewed. Additional information on this topic is included in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Coordinate with local and regional partner agencies to promote the existing state parking cash-out law to subject employers (i.e. those employers with more than 50 employees who lease their parking and whose parking costs can be separated out as a line item on their lease).

- Require periodic submittal of proof of compliance with existing state parking cash-out law as a condition of approval for all new development entitlements.

Alternative 1

Assumes maintenance of existing parking cash-out programs.

Alternative 2

Assumes a robust expansion of parking cash-out program by:

- Develop a local parking cash-out ordinance that would apply to a broader number of employers than the current State law (e.g. employers with less than 50 employees, employers who own their own parking, etc). Require compliance for new employers and promote voluntary phased compliance for existing employers.

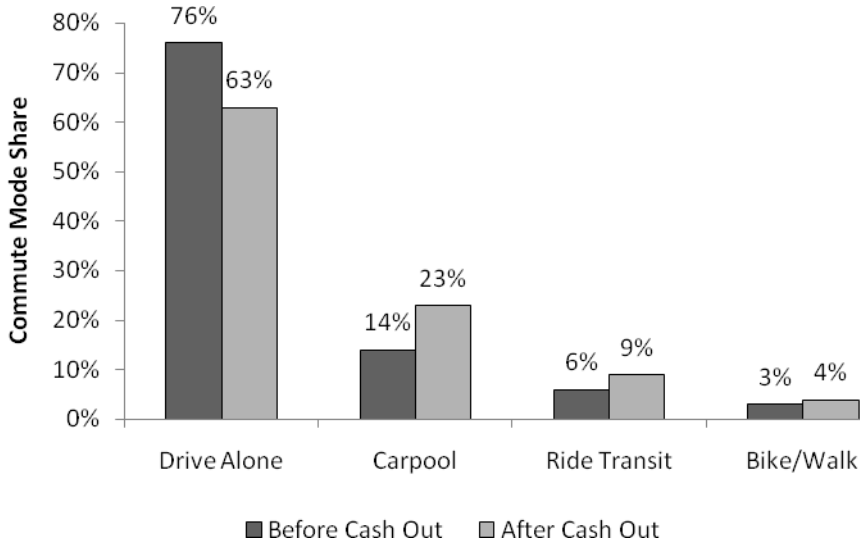
- Require periodic submittal of proof of compliance with the local and/or existing state parking cash-out requirements for all subject employers. For example, proof of compliance could be submitted as part of the application for a new or renewed business license.

Summary of Literature and Study Impacts

Research performed by Donald Shoup at the University of California-Los Angeles found that single occupancy vehicle trips declined by 17% and other modes increased significantly (carpooling by 64%, transit by 50%, and walking/biking by 33%) after a parking cash-out program was introduced at various urban and suburban worksites with varying levels of transit service. These findings are illustrated in Figure 10. These mode shifts resulted in an average 12% fewer vehicle miles traveled (VMT) per year per employee. This reduction is equivalent to removing one of every eight cars driven to work.[45] The analysis found that reductions in auto trips tend to increase over time, as more employees find opportunities to reduce their driving and take advantage of the parking cash-out "fringe benefit."

[45] Donald C. Shoup, *Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies*, http://www.arb.ca.gov/research/apr/past/93-308a.pdf.

Figure 10 Parking Cash-Out Impacts on Commute Mode



Another parking cash-out case study is that of suburban Pleasanton. The City initiated a daily form of parking cash-out in January 1994. The City offers $2 per day to employees who use a commute alternative instead of driving to work alone. All City employees are eligible to participate with no minimum days required. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 2004 doubled to 57 employees per month, which has resulted in an annualized reduction of 20,625 commuter vehicle trips.[46]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

By promoting the current parking cash-out law to subject employers and requiring new employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 3% reduction in peak-hour vehicle trips in Areas 1 and 2 and 1% reduction peak-hour vehicle trips in Areas 3 and 4. These figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

Alternative 1

This alternative assumes no expansion of parking cash-out programs, therefore no reductions in vehicle trips can be estimated.

Alternative 2

By developing a local parking cash-out ordinance that would apply to a broader number of employers and requiring all employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 12% reduction in peak-hour vehicle trips in Areas 1 and 2 and a 6% reduction in peak-hour vehicle trips in Areas 3 and 4. As noted in the Plan Santa Barbara scenario, these figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual

[46] U.S. Environmental Protection Agency (2005), *Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters,* http://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf

parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

3.3 Car Sharing

Overview

Car-sharing programs allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis. Usage charges are assessed at an hourly and/or mileage rate, in addition to a refundable deposit and/or a low annual membership fee. Car-sharing is similar to conventional car rental programs with a few key differences:

- System users must be members of a car-sharing organization.
- Fee structures typically emphasize short-term rentals rather than daily or weekly rentals.
- Vehicle reservations and access is "self-service."
- Vehicle locations are widely distributed rather than concentrated.
- Vehicles must be picked up and dropped off at the same location.

Car-sharing programs reduce the need for businesses or households to own their own vehicles, and reduce personal transportation costs and vehicle miles traveled (VMT). Through car-sharing, individuals gain access to vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations.

Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile. For example, vehicles available near a person's workplace or school can enable them to commute to work via transit or other means, knowing that they'll have a car-share vehicle available during the day only if needed for work or personal trips.

Current Policies and Programs

The City of Santa Barbara allows employees to use City fleet vehicles for work-related trips, unplanned overtime, medical appointments, approved emergency trips, occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies.

At UCSB, a car-share program with 2-3 vehicles is operated by ZipCar and is offered to all students, faculty and staff, and at discounted rate for Transportation Alternative Program (TAP) enrollees.

There are currently no car-share programs in Santa Barbara that are available to the general public.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest car-sharing program available to the public as follows:

- Limited number of vehicles at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Free on- and off-street public parking space in high-demand locations.
    - In-kind promotion and marketing support.
    - Small financial subsidy to recognized car-sharing service provider.

Alternative 1

Assumes maintenance of existing car-sharing programs (none available to the general public).

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust car-sharing program available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara and neighboring communities.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Partial conversion of city fleet to car-sharing operations
    - Larger financial subsidy to a car-sharing service provider.
- Require new development to offer "right of first refusal" parking spaces to recognized car-sharing service provider.

Summary of Literature and Study Impacts

According to the Transportation Research Board, each car-sharing vehicle takes nearly 15 private cars off the road – a net reduction of almost 14 vehicles.[47] A UC Berkeley study of San Francisco's City CarShare found that members drive nearly 50% less after joining. The study also found that when people joined the car-sharing organization, nearly 30% reduced their household vehicle ownership and two-thirds avoided purchasing another car. In addition, the study found that nearly three-quarters of the vehicle trips made by members were for running errands, visiting friends and other social activities, meaning that only roughly one-quarter of trips were for commuting to work or for recreation. The research also indicates that most trips were made outside of peak periods, thereby generating a limited impact on peak period traffic.[48]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2. (This estimate assumes that two-car households are selling one of their vehicles.)
- No measurable reduction on peak-hour vehicle trips.

Alternative 1

This alternative assumes no expansion of car-sharing programs to make these services available to the general public, therefore no reductions in vehicle trips or auto ownership can be estimated.

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[47] Transportation Research Board (2005), *Car-Sharing: Where and How it Succeeds*, Transit Cooperative Research Program Report 108. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rpt_108.pdf

[48] Robert Cervero and Yu-Hsin Tsai (2003), *San Francisco City CarShare: Travel-Demand Trends and Second-Year Impacts, Institute of Urban and Regional Development*, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1026&context=iurd

Alternative 2

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2 and a 50% reduction in 10% of households (or 5% overall reduction) in Areas 3 and 4. (This estimate assumes that two-car households are selling one of their vehicles.)

- No measurable reduction on peak-hour vehicle trips.

3.4 Bike Sharing

Overview

Bike sharing is a form of bike rental where people can have access to a shared fleet of bicycles on an as-needed basis. Bike share programs provide safe and convenient access to bicycles for short trips, such as running errands during lunch or for accessing the transit system by helping to bridge "first mile/last mile" barriers.

Bike sharing programs have been implemented in various forms for the past 40 years. Until recently, bike share programs worldwide have experienced low to moderate success. However, in the last 5 years innovations in technology have given rise to a new (third) generation of technology-driven bike share programs. These new bike share programs can dramatically lower barrier to use by allowing reservations and/or payment via smart card, credit card, or even cell phone. In addition, damage or theft of bicycles is minimized by linking accounts to a user's credit card.

The most common operational models for 3rd generation bike sharing programs are:

- The first and most common model is a privately–operated program, where contracts for exclusive rights to outdoor advertising space (bus stops, billboards, etc.) include a provision that requires the advertising company to install, operate, and maintain a bike sharing system. The Vélib system in Paris is an example of this first model.

- The second model is a publicly-operated program run by a government agency as part of a larger transit access or TDM/parking management strategy. Montreal's Bixi and Long Beach's employee-based program are examples of this second model. Some cities sell advertising rights at the bike stations and on the bikes themselves to help defray program costs, but the program is not operated by an advertising company.

Pricing of bike sharing programs is structured to encourage short trips in order to prevent users from tying up a single bicycle for long periods of time and to optimize utilization of the fleet.

The Vélib program in Paris, France is one of the most successful examples of the 3rd generation bicycle sharing programs. Vélib provides rental bikes that are available day or night throughout the city and stations are densely distributed. The system has 1,450 stations located about 900 – 1500 feet apart. Stations consist of terminals and stands for securing the bikes. Bicycles are accessed through Smart Cards that can be swiped at any station. Bicycles can also be returned at any station. Annual membership is not required, but accounts are linked to a credit card which is charged in the event of loss or damage to a bicycle. The first 30 minutes of each use are free, $1.30 for the second half hour, $2.60 for the third half hour and $5.20 for the fourth half hour and each additional half hour. The maximum ride time is three hours. Credit cards may also be used to purchase a short-term pass of one-day or seven-day subscriptions.

Current Policies and Programs

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara provides bicycle parking as well as short-term bicycle rentals as part of the "Green Bike Program."

The City of Santa Barbara has also purchased and maintains a fleet of bicycles that are located at a number of city buildings and that City employees can use during business hours.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest expansion of existing City-operated bike sharing program available to the public as follows:

- Limited number of bikes at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Providing indoor space for stations in existing City facilities (similar to existing downtown Bike Station).
    - Promotion and marketing support.
    - Small increase to existing financial subsidy.

Alternative 1

Assumes maintenance of existing bike sharing programs.

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust expansion of bike sharing programs available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Conversion of select number of on-street parking spaces to bike sharing stations.
    - Larger increase to existing financial subsidy.
- In order to realize greater expansion in a cost-effective manner, consider shifting from a City-operated program to a privately-operated program, similar to the Vélib model.

Summary of Literature and Study Impacts

Successful bike sharing programs have resulted in automobile to bike mode shifts as large as 5% to 8% in the areas they serve.[49] Impacts may be lower if conditions are not conducive to bicycling (few available bicycles, insufficient bike routes, poor weather).

In general, bike share programs are not utilized for regular commuter trips: since there is a per-use fee, regular bicycle commuters will ultimately purchase their own bicycle. Instead, bike-share programs are a “supportive” mode in that that they provide on-demand and roughly door-to-door travel for short, unscheduled trips that are too far to walk and not well-served by transit. Similar to car-sharing programs, bike sharing programs – while not used primarily for commuting – play an important role in the transportation system by allowing commuters to travel by transit knowing that they will have multiple travel options available to them during the workday.

[49] Victoria Transport Policy Institute (2008), *Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips*, http://www.vtpi.org/tdm/tdm126.htm

Summary of Estimated Impacts in Santa Barbara

The available research does not allow Nelson\Nygaard to develop a meaningful estimate of the impacts of bike sharing programs on peak hour vehicle trips, vehicle ownership, or VMT. In addition, it is our professional opinion that implementation of a bike sharing program would likely result in a relatively small reduction in peak hour vehicle trips. This does not imply that a bike sharing program would have no impact on vehicle ownership and trips in Santa Barbara, or offer secondary benefits to the residents, employees, and visitors (such as expanded mobility options, better public health outcomes through encouragement of active transportation, etc.). However, any benefits realized from a bike sharing program have been excluded from the impacts analysis in order to maintain a conservative methodology.

Category 4: Mode Shift Policies

4.1 Safe Routes to School

Overview

Safe Routes to Schools (SR2S) programs integrate health, fitness, traffic relief, environmental awareness and safety under one program. The goal is typically to increase the number of non-motorized (walk and bike) and higher occupancy (carpool and transit) trips to schools, in order to:

- Reduce traffic congestion around schools.
- Increase physical activity for children and youth.
- Foster a healthier lifestyle for the whole family.
- Create safer, calmer streets and neighborhoods.
- Improve air quality and a cleaner environment.

A SR2S program typically consists of five key components:

- *Education.* Classroom lessons teach children the skills necessary to navigate through busy streets and show them how to be active participants in the program.
- *Engineering.* A licensed traffic engineer can assist schools in developing a plan to provide a safer environment for children to walk and bike to school.
- *Encouragement.* Events, contests and promotional materials are incentives that encourage children and parents to try walking and biking.
- *Enforcement.* Police officers, crossing guards and other law enforcement officials can participate throughout the Safe Routes process to encourage safe travel through the community.
- *Evaluation.* Program participation should regularly be monitored to determine the growth in student and parent participation. Typically, “before and after” surveys are taken to ascertain any change in travel mode to school over the course of the year.

Current Policies and Programs

The City of Santa Barbara currently partners with schools and community groups to assist with the development of SR2S activities. The non-profit Coalition for Sustainable Transportation (COAST) is the lead coordinator of SR2S efforts in Santa Barbara in partnership with 20 agency and community partners, including the Santa Barbara Bicycle Coalition, the PTA Safety Committee, various government and law enforcement agencies, SBCAG’s Traffic Solutions, and the Diabetes Resource Center. The COAST SR2S program has developed a school zone safety package, a public awareness program (including two bilingual safety videos), and an education and safety-training program. The program also and distributes low-cost bicycle helmets (free to low-income children). In addition to funding from the City of Santa Barbara, SR2S activities have received funding from the Santa Barbara Foundation and from private donations. In the past, sixteen schools have participated in SR2S activities.

The City of Santa Barbara has further supported the SR2S activities by:

- Developing “Suggested Route to School Maps” for all 18 public elementary, junior high, and high schools in the City of Santa Barbara.
- Developing Concept Improvement Plans for select schools.
- Generally prioritizing pedestrian improvements in the vicinity of schools.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate expansion in the existing Safe Routes to Schools program.

Alternative 1

Assumes maintenance of the existing Safe Routes to Schools program.

Alternative 2

Assumes a robust expansion of the existing Safe Routes to Schools program.

Summary of Literature and Study Impacts

Marin County's Safe Routes to Schools program is considered very successful, particularly in reducing "chauffeured student trips." To measure the effectiveness of the program, individual classroom teachers administer "before" and "after" surveys at participating schools (both public and private) to determine how students travel to school. The "before" survey is generally taken at the beginning of the semester in which Safe Routes education is offered and the "after" survey is taken at the conclusion of the school year. A survey conducted between fall 2004 and spring 2005 shows that the annual education program reduced the chauffeured student trips by 24%, and increased walking by 43%, biking by 29% and carpooling by 29%.[50]

Figure 11 Mode Shift Impacts

	Fall 2004	Spring 2005	% Change
Single Student Car	55%	42%	-24%
Carpool	17%	22%	+29%
Bus	7%	7%	0%
Bike	7%	9%	+29%
Walk	14%	20%	+43%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a modest expansion of the existing Safe Routes to Schools program will result in a roughly 9% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 3% decrease in Areas 3 and 4. No estimates can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

Alternative 1

No increase in the existing Safe Routes to Schools program is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of the existing Safe Routes to Schools program will result in a roughly 12% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 6% decrease in Areas 3 and 4. No estimates

[50] Transportation Authority of Marin (2006), *Safe Routes to School, Evaluations and Recommendations 2005-2006*, http://www.tam.ca.gov/index.aspx?page=180.

can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

4.2 Carpooling

Overview

Carpooling is the shared use of a car by the driver—usually the owner of the vehicle—and one or more passengers. When carpooling, people either get a ride or offer a ride to others instead of each driving separately. Carpooling arrangements and schemes involve varying degrees of formality and regularity. Carpools may be formal - arranged through an employer, public website, etc. - or casual, where the driver and passenger might not know each other or have agreed upon arrangements.

Current Policies and Programs

The City of Santa Barbara provides a 75% subsidy for costs of a full vanpool. The City has established a "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rest of the vehicle costs funded by the department providing the vehicle. As of 2008 (the program's second year) there were 53 City employees in 18 registered carpools. Preferential parking is available for carpools and vanpools.

The County of Santa Barbara offers free parking passes to carpools and vanpools on a space-available basis. UC Santa Barbara offers a no charge vanpool program and parking passes for TAP registered carpools and vanpools. SBCC has a dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai) and a carpool matching program. There are also several private employers which offer subsidized carpool or vanpool programs.

Plan Santa Barbara Assumptions

Plan Santa Barbara

Assumes a moderate increase in employee participation rates in carpools and vanpools.

Alternative 1

Assumes maintenance of existing employee participation rates in carpools and vanpools.

Alternative 2

Assumes a robust increase in employee participation rates in carpools and vanpools.

Summary of Literature and Study Impacts

Experience indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies.[51]

Rideshare programs that include incentives such as HOV priority and parking cash-out often reduce affected commute trips by 10-30%.[52] If implemented without such incentives travel impacts are usually smaller. A study conducted by Reid Ewing concluded that ridesharing programs can reduce daily vehicle commute trips to specific worksites by 5-15%, and up to 20% or more if implemented with parking pricing.[53]

[51] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov.
[52] Philip Winters and Daniel Rudge (1995), *Commute Alternatives Educational Outreach*, www.cutr.eng.usf.edu.
[53] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips.*

Analysis by other researchers indicate that the elasticity of vanpool ridership with respect to fees is -2.6% using a 1997 data set and -14.8% using a less statistically robust 1999 data set, that is, a one dollar decrease in vanpool fares is associated with a 2.6% to 14.8% increase in the predicted odds of choosing vanpool with respect to drive alone. The same study found that the elasticity of vanpooling with respect to price to be -0.61 (1997) and 13.4% (1999), meaning that for each 10% increase in vanpool price, there is a 6% to 13% decrease in vanpool choice with respect to auto. Conversely, a 10% decrease in vanpool price will increase the odds of choosing vanpool (with respect to auto) by 6% to 13%. Using a nested logit model, the study found the elasticity of vanpooling with respect to fares to be -1.14.[54]

One study estimates the price elasticity of vanpooling at about 1.5, meaning that a 10% reduction in vanpool fares increases ridership by about 15%.[55] For example, if vanpool fares that are currently $50 per month are reduced to $40 (a 20% reduction), ridership is likely to increase by about 30% (20% x 1.5). Of course, exact impacts will vary depending on the specific market and whether other ridesharing incentives are also provided.

Because rideshare passengers tend to have relatively long commutes, mileage reductions can be relatively large. For example, if ridesharing reduces 5% of commute trips it may reduce 10% of vehicle miles because the trips that are reduced are twice as long as average. Rideshare programs can typically reduce up to 8.3% of commute VMT, up to 3.6% of total regional VMT, and up to 1.8% of regional vehicle trips.[56]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a moderate expansion of carpool and vanpool programs will result in an employee rideshare increase of 5%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

Alternative 1

No increase in carpool and vanpool programs is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of carpool and vanpool programs will result in an employee rideshare increase of 10%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

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[54] Francis Wambalaba, Sisinnio Concas and Marlo Chavarria (2004), *Price Elasticity of Rideshare: Commuter Fringe Benefits for Vanpools*, http://www.nctr.usf.edu/pdf/527-14.pdf
Sisinnio Concas, Philip L. Winters and Francis W. Wambalaba (2005), *Fare Pricing Elasticity, Subsidies And The Demand For Vanpool Services*

[55] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov

[56] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
TDM Resource Center (1996), *Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects*, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).

4.3 Telecommuting/Alternative Work Schedules

Overview

Telecommuting and alternative work schedules typically allow or require employees to start and/or leave work outside of peak hours. These strategies are often a part of a company's travel demand management program and include:

- *Flextime.* Employees are allowed some flexibility in their daily work schedules, e.g. starting at 7:30AM or after 9AM and leaving at 4 PM pr after 6 PM.
- *Compressed Workweek (CWW).* Employees work fewer but longer days, such as four 10-hour days each week (4/40), or 9-hour days with one day off every two weeks (9/80).
- *Staggered Shifts.* Shifts are staggered to reduce the number of employees arriving and leaving a worksite at one time, e.g. one shift works between 8:00 and 4:30, another shift 8:30 and 5:00, and a third 9:00 and 5:30.

Employer participation can be pursued through a combination of incentives for existing employers and commercial development and requirements for new employers and commercial development.[57]

Current Policies and Programs

The City of Santa Barbara currently offers a 9/80 work schedule option to all employees and 81 percent of employees participate. For private employers, SBCAG administers the Flexwork SB program. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

UC Santa Barbara offers flexible work schedules and telecommuting for certain staff.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate increase employer participation in offering telecommuting and alternative work schedule to employees.

Alternative 1

Assumes maintenance of existing telecommuting and alternative work schedule programs.

Alternative 2

Assumes a robust increase in employer participation in offering telecommuting and alternative work schedule to employees.

Summary of Literature and Study Impacts

Flextime reduces peak period congestion directly, and can make ridesharing and transit use more feasible.[58] Staggered shifts can reduce peak-period trips, particularly around large employment

[57] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

centers. Reid Ewing estimates that flextime and telecommuting together can reduce peak-hour vehicle commute trips by 20-50%.[59]

Flexible work schedules can also reduce total vehicle travel. One survey of commuters found that it could reduce vehicle trips by up to 8% if 50% of employees are participating in the program, making it among the most effective commute trip reduction strategies considered.[60]

Another analysis estimates that compressed work weeks can reduce up to 0.6% of VMT and up to 0.5% of vehicle trips in a region.[61] However, other research indicates that compressed work weeks may provide modest reductions in total vehicle travel, in part because participants make additional trips during their non-work days.[62] Compressed work weeks may also encourage some employees to move further from worksites or to drive rather than rideshare.

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, we conservatively estimate that a modest increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 10% in Areas 1 and 2, and by 5% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

No increase in telecommuting/alternative work schedules is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, we conservatively estimate that a robust increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 25% in Areas 1 and 2, and by 15% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

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[58] Alyssa Freas and Stuart Anderson (1991), *Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321*.
[59] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips*
[60] Center for Urban Transportation Research (1998), *A Market-Based Approach to Cost-Effective Trip Reduction Program Design*, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf.
[61] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
[62] Amy Ho and Jakki Stewart (1992), "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," *Transportation Research Record 1346*, TRB (www.trb.org), pp. 25-32 and Genevieve Giuliano (1995), "The Weakening Transportation-Land Use Connection, *ACCESS*, Vol. 6, University of California Transportation Center (www.uctc.net), Spring 1995, pp. 3-11.

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APPENDIX I-6

PLAN SANTA BARBARA TRIP REDUCTION IMPACTS ANALYSIS (NELSON/NYGAARD)

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MEMORANDUM

To: Plan Santa Barbara City and Consultant Team

From: Jeff Tumlin, Jeremy Nelson, Brian Canepa, Francesca Napolitan

Date: 7/8/09

Subject: Technical Memorandum: Plan Santa Barbara Trip Reduction Impacts Analysis

What is Plan Santa Barbara?

In California, every city and county is required to develop a General Plan. General Plans are often described as the "constitution" or "blueprint" for a community, articulating a community's vision for the future and policies to guide its growth and development. The city of Santa Barbara is currently engaged in a growth policy update, a community- based planning process called Plan Santa Barbara, to update General Plan policies to govern development through the year 2030.

One of the central aims of the Plan Santa Barbara process is to evaluate what changes the city of Santa Barbara could implement that would allow the City to sustain its success as a vibrant, dynamic place that provides a high quality of life and economic opportunity, while minimizing traffic congestion.

A transportation planning consultant team was tasked with assisting City staff accomplish the objective to continue sustainable growth while reducing the rate of increase in traffic and congestion. Specifically, the transportation consultant team will assist City staff in developing and analyzing strategies that can reasonably be expected to help reduce per capita vehicle traffic and promote increased use of carpooling, transit, bicycling, and walking.

Purpose of this Memo

This technical memorandum was developed by Nelson\Nygaard to assist the City and consultant team in evaluating the trip reduction impacts of various transportation and parking policies and programs under consideration as part of Plan Santa Barbara. It should be noted that the purpose of this memo is to provide planning-level, order-of-magnitude estimates of the quantitative impacts of proposed/planned system changes on auto trips and mode split. Portions of this introductory text will be integrated into Fehr & Peers' report summarizing the traffic modeling analysis of each of the Plan Santa Barbara policy alternatives, and the entire memo will be attached as an Appendix to that report.

What this Memo Contains

- **Appendix A** contains maps created by Fehr & Peers and AMEC showing the areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo.[1]
- **Appendix B** contains the summary table of Plan Santa Barbara proposed policies and programs under four different policy alternatives. This table was provided to Nelson\Nygaard by the City of Santa Barbara and dated 4/2/09. The table was compiled by City staff with feedback from the consultant team. The assumptions in Appendix B are based on direction contained in the "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" and were used by Nelson\Nygaard as a guide in development of trip reduction estimates under each of the four alternatives.[2]
- **Appendix C** provides a summary of Nelson\Nygaard's order-of-magnitude, planning-level estimates of the likely anticipated reduction in peak-hour vehicle trips that could be achieved with the implementation of 13 policies under consideration in the four different Plan Santa Barbara alternatives.
- **Appendix D** provides more detailed description of each of the strategies from Appendix C and the research used to develop the trip reduction estimates in the Appendix B summary table.
- **Appendix E** provides a select list of works cited in the development of our estimates of trip reduction impacts.

Analytical Methodology Employed

In addition to a land use plan, Plan Santa Barbara contains a number of transportation policies and programs initiatives intended to help reduce per capita vehicle trips, strengthen Santa Barbara's alternative transportation network, and encourage travelers to shift to sustainable travel modes. The analytical methodology employed was as follows:

- The potential range of transportation policies and programs under four different policy alternatives was outlined by City staff based on City Council direction on the overall Plan Santa Barbara policy framework.[3] Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in Santa Barbara. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation framework was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as Transportation Demand Management requirements for new development projects) while others could also reduce existing traffic congestion (such as expanded subsidized transit pass program and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in Santa Barbara, Nelson\Nygaard derived planning-level order of magnitude estimates of the reductions in

[1] This map showing Areas 1-4 was included as Figure 2 in Fehr and Peers "Plan Santa Barbara Travel Demand Model Overview" dated 2/25/09. These four area types are listed in Appendix C. More information on the characteristics of these area types is contained in this report. The map showing the Mobility Oriented Development Areas (MODAs) was included as Figure 2.5 in AMEC's "Plan Santa Barbara Draft Environmental Impact Report" provided to Nelson\Nygaard on 4/2/09.

[2] Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

[3] The four alternatives are "No Project," "Plan Santa Barbara," "Alternative 1", and "Alternative 2" as discussed in detail in Appendix B. Policy direction drawn from "Plan Santa Barbara General Plan Update: Draft Policy Preferences / City Council Direction" dated January 2009.

peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown have a proven effect on mode choice and travel behavior.

- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose.[4] In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in Area Types 1 and 2 were reduced by a greater percentage than trips ending in Area Types 3 and 4 based on the assessment that certain strategies would have a greater effect on reducing peak-hour vehicle trips in some areas and a lesser effect in others.[5] Trips starting and ending within the model area were reduced by a greater percentage than trips starting outside the model area and ending inside the model area. Trips starting inside the model area and ending outside the model area were not reduced because it was assumed that Santa Barbara policies and programs would not significantly regulate trips to other jurisdictions.

Our estimates of the likely peak-hour vehicle trip reduction impacts of Plan Santa Barbara's proposed policies and programs were drawn from our own library of best practice case studies as well as a literature review. Wherever possible, we based our estimates on quantitative data (empirically-derived or modeled). When appropriate, we used our professional judgment to refine the estimates as appropriate for the Plan Santa Barbara context, based on our expertise as industry leaders in the transportation planning profession with decades of collective experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis we were conservative in our assumptions and analysis to avoid overstating potential benefits. At the same time we avoided the inverse error of being overly conservative and thereby understating potential benefits.

We believe that our analysis represents the highest and best professional standards of transportation planning. We are confident in the validity and accuracy of our conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak-hour vehicle trip reduction benefits of transportation policies and programs under consideration in Plan Santa Barbara.

Overview of Analytical Outputs

Appendices B and C contain detailed explanation of the methodology utilized and outputs of the analysis. Highlights are provided below.

Reductions in vehicle trip generation rates versus vehicle ownership rates

Household vehicle ownership is called out separately from vehicle trip reductions in our analysis because different policies impact each metric differently. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those impacts are already accounted for by trip reduction strategies that we were able to quantify.

[4] Commuter Trips" are Home-Based Work (HBW) trips, including school trips (within the model structure, Fehr & Peers applied strategies targeting school trips for Home-Based School trips only). All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers' "Travel Demand Model Overview" dated February 25, 2009.

[5] See Appendix A for a map of the four areas types analyzed in the Plan Santa Barbara process and referenced throughout this memo. Fehr & Peers, June 2009.

Impacts of some strategies not quantifiable with available information

It should be noted that the estimated reduction in peak-hour vehicle trips that will likely be achieved can be quantified with greater certainty for some policies and programs due to available data while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely impact, we indicated in our analysis in Appendix C and D that the impact was "not known" or "not applicable." *It must be stated emphatically that such a designation doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality.* Instead, these designations mean that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error); or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model; or c) we believe the 4D built environment model adjustments (density, design, diversity, destinations) conducted by Fehr & Peers will adequately account for the impacts of this strategy. We have therefore excluded the impacts of certain strategies from this analysis in order to avoid the risk of misstating highly-localized, context-dependent benefits (e.g. enhanced transit service) or to avoid "double counting" the benefits (e.g. pedestrian improvements which are adequately accounted for under "street connectivity" factor of the 4D model adjustments).

Non-additive impacts for each policy alternative

Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementation such policies and programs in order to understand the actual relationship of the independent and dependent variables. Oftentimes it is difficult to isolate these effects because in reality, implementation of several changes to the transportation system occur concurrently. For example, a city may implement a subsidized transit pass at the same time that it implements enhanced transit service, and it is difficult to say with absolute certainty which of the two changes caused the resulting increase in transit ridership. Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater impacts when compared to stand-alone implementation. Even so, traffic demand reduction strategies realistically have a maximum limit on total impacts that can be achieved. For these reasons, it is not prudent to expect that the stand-alone impacts of trip reductions observed in the literature and case studies can simply be "added up" to estimate the total impacts of various strategies together. Because the transportation policies and programs under consideration in the various Plan Santa Barbara alternatives would be implemented concurrently as a package (in fact some programs are already in effect), we have estimated the total impact for each alternative using a non-additive methodology. For example, when summing the impacts of multiple strategies for each policy alternative, we considered telecommuting to be a mutually-exclusive strategy (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.) and therefore "netted out" the estimated impacts of other trip reduction strategies when developing our estimate of the total estimated impacts for certain policy alternatives.

Appendix A

FEHR & PEERS
TRANSPORTATION CONSULTANTS

PLAN SANTA BARBARA MODEL AREA TYPES
FIGURE 2

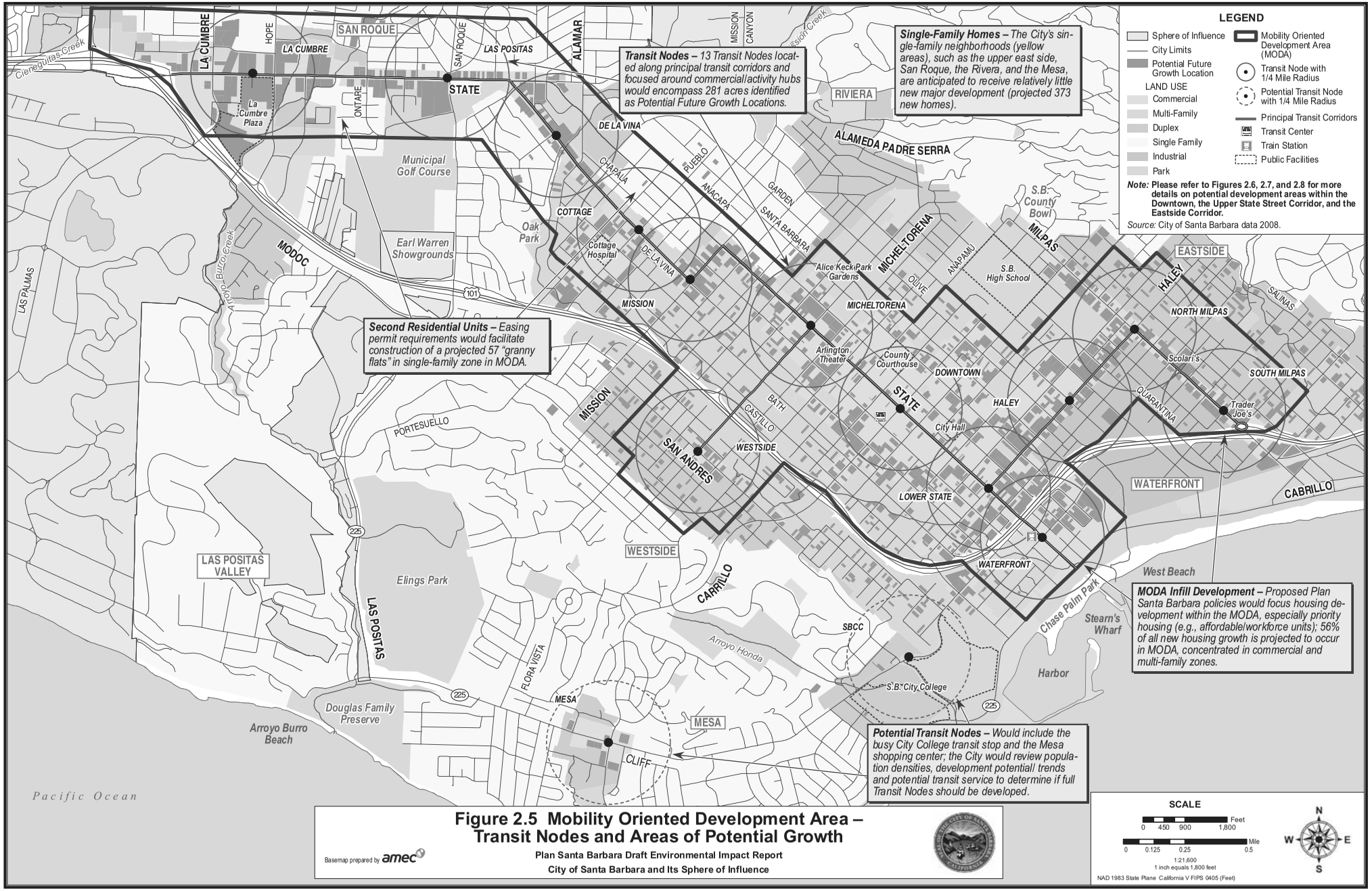


Figure 2.5 Mobility Oriented Development Area – Transit Nodes and Areas of Potential Growth

Plan Santa Barbara Draft Environmental Impact Report
City of Santa Barbara and Its Sphere of Influence

Basemap prepared by amec

Appendix B

Plan Santa Barbara EIR Assumptions
Provided by the City of Santa Barbara (4/2/09)

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Transportation				
Residential parking requirements within MODA	Existing Policies: Average 2 spaces/unit + guest (per Ord 28.90) More can be provided if demand identified or if proposed. No requirement for unbundled parking	Average 1 space/unit regardless of unit size Maximum No Guest Parking Required unbundled residential parking for all unit types within MODA Exclude residential on-street parking in commercial zones, Allow required residential parking off-site in commercial zones.	Increase beyond Ordinance requirement of average 2 spaces/unit Increase beyond Ordinance requirement for Guest Parking More can be provided if demand identified or if proposed. No requirement for unbundled parking	Downtown Core – 0 spaces/unit Transit Corridors in MODA average ½ space (1 block) *(e.g., Milpas, Upper State)* Rest of MODA average 1 space/unit for all unit types. Maximums No Guest Parking Required unbundled residential parking for all unit types within MODA
Residential parking requirements outside MODA	Existing Policy Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance	No Policy change Per Current Ordinance
Second Unit Parking inside or outside MODA	Existing : 1 space/unit	0 space/unit	1 space/unit	0 space/unit
Commercial/Retail Employee Parking inside MODA	Existing per current ordinance: DT 2/1000, Elsewhere 4/1000	Expand delineated Central Business Dist area to reduce by half parking requirements (to 2/1000)	Per current ordinance	No requirement Downtown
Commercial/Retail Employee Parking outside MODA	Existing per current ordinance	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Public Parking Pricing (on and off-street) within MODA	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Current pricing and minutes policies for on- and off-street per Existing Conditions Report	Strong mgmt changes for on- and off-street: Identify aggressive price increases for off-street. Add on-street parking pricing w/mid-block kiosks, payment by cell phones, etc. (Pair w/ car share program identified under TDM)
Public Parking Pricing (on- and off-street) outside MODA	Existing management policies for on- and –off street.	No policy change Current ordinance	No policy change Current ordinance	No policy change Current ordinance
Bike system improvements	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report <$500K per improvement. Bike lanes priority over curbside parking in PHs plus other improvements: SB St – Haley to Micheltorena Chapala – Carrillo to Mission DelaVina–Haley to Constance Garden–Haley to Micheltorena Canon Perdido-Anacapa to Castillo	Minor reasonably foreseeable bike improvements listed in Existing Conditions Report (<$500,000 improvements).	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Bike Plan to achieve low single-digit changes in mode shift. Include Peak-Hour parking restricted bike lanes on streets such as Santa Barbara, Anacapa, Anapamu, etc.

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Pedestrian system improvements	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Minor reasonably foreseeable pedestrian improvements Existing Conditions Report (<$500,000 improvements) Complete sidewalk missing links in MODA. High quality ped crossings per vehicle yields in MODA.	Minor reasonably foreseeable pedestrian improvements listed in Existing Conditions Report (<$500,000 improvements)	Assume stronger commitment to implementing "platinum" level improvements as envisioned by Ped Plan.
Transit system improvements	Continue existing Transit levels and locations per Existing Conditions Report.	Modest improvement in local & So. Coast transit routes/ headways. -More main lines with 10-minute peak-period headways, i.e add Crosstown Shuttle. -More lines outside of peak period. Minor reasonably foreseeable limited expense planned and funded improvements per Transit Plan	Same as "No Project" Alternative – existing conditions	Larger improvement in local & MTD regional transit routes/ headways to reflect gold-plated service, but account for diminishing returns where appropriate. -Headways from 10-5 minutes on City main lines? -Higher frequency on MTD regional express lines (i.e to Carpinteria, UCSB/Isla Vista) Reasonably foreseeable Transit Plan improvements
Regional bus service	Existing service levels per Existing Conditions Report	Modest Increase: Continued demand responsive expansion of regional bus service, e.g., Clean Air Express. Assume growth in service based on average growth rates in years prior to big spike in gas prices.	Same as PlanSB - Modest Increase	Assume aggressive expansion of regional bus service, e.g., Clean Air Express, to reflect high rates of growth during gas price run up, with corresponding reductions in regional SOV commuting. Assume some shift in funding from roads to transit to expand regional bus service. -More shoulder times for main lines and better headways 7-9. -Light rail upper State Street

EIR Assumptions	No Project Existing Policies	Project *PlanSB* Policies	Alternative 1 Lower Growth	Alternative 2 More housing
Commuter rail	Existing AMTRAK limited service per Existing Cond Report	Modest increase: Existing rail service plus limited AMTRAK Commuter Rail service improvements, i.e., re-timing of existing AMTRAK service to be commuter-oriented.	Same as PlanSB project Modest AMTRAK PH Commuter Increases	Full commuter rail service from Ventura with existing service and 2 trains each in AM and PM peak hours. Identify point where commuter rail may qualify for Federal funding according to FTA ridership criteria for New Starts.
TDM	Current levels continue per Existing Conditions Report	Modest Expansion: Subsidized Transit Pass program – modest expansion to bring in more user groups, e.g., employers Parking Cash-Out – yes, per current law - >50 employees Car Sharing – expanded - low level, City funded (i.e., can take transit to work and have a car if needed) Bike Sharing –expanded to modest program, similar to Paris Safe Routes to School – Continue, modest increase Carpooling – modest increase- Telecommuting – modest expansion (increased allowance for telecommuting)	Same as "No Project" Alternative – existing TDM programs	Aggressive increases for public and private sector: Subsidized Transit Program – strong expansion Parking Cash Out – Improved program, expand to existing employers; aggressive pricing structure Car Sharing – Strong program – commuters and neighborhoods Bike-sharing – strong program Safe Routes to School – complete program Carpooling - increased efforts to facilitate, incentivize Telecommuting – Strong expansion.

Appendix C

Summary of Estimated Reductions in Peak Hour Vehicle Trips
Plan Santa Barbara Policy Scenarios

Strategy	Trip Type Affected[1]	Reduction in Peak Hour Vehicle Trips[3]				Impact on Household Auto Ownership			
		Plan SB	No Project	Alternative 1	Alternative 2	Plan SB	No Project	Alternative 1	Alternative 2
Reduced or Eliminated Minimum Parking Requirements	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Unbundled Parking	Commuter, Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 15%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 15%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%
Public Parking Pricing	Commuter	Area 1/2: 25.1%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 44.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Bike System Improvements[4]	Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Pedestrian System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Transit System Improvements	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Subsidized Transit Passes	Commuter	Area 1/2: 5.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 8.2%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Parking Cash-Out	Commuter	Area 1/2: 3%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 1%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Car Sharing	Non-Commuter	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: 12.5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12.5%
		Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 5%
Bike Sharing[5]	Commuter, Non-Commuter	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Safe Routes to School[6]	Non-Commuter	Area 1/2: 9%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 12%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 3%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 6%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Carpooling[7]	Commuter	Area 1/2: 5%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 10%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 10%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Telecommuting/Alternative Work Schedules[8]	Commuter	Area 1/2: 10%	Area 1/2: 0%	Area 1/2: 0%	Area 1/2: 25%	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]	Area 1/2: N/A[2]
		Area 3/4: 5%	Area 3/4: 0%	Area 3/4: 0%	Area 3/4: 15%	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]	Area 3/4: N/A[2]
Commuter Trip Impact (Areas 1 & 2)[9]	Commuter	25.4%	0%	0%	45.3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Commuter Trip Impact (Areas 3 & 4)[10]	Commuter	5%	0%	0%	15%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 1 & 2)[11]	Non-Commuter	5%	0%	0%	6%	N/A[2]	N/A[2]	N/A[2]	N/A[2]
Non-Commuter Trip Impact (Areas 3 & 4)[11]	Non-Commuter	2%	0%	0%	3%	N/A[2]	N/A[2]	N/A[2]	N/A[2]

Notes and Sources

[1] "Commuter Trips" are Home-Based Work (HBW) trips, including school trips. All other trip types are "Non Commuter." For more information see page 9 of Fehr and Peers Travel Demand Model Overview, March 2009.

[2] N/A doesn't necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead it means that a) the impact on peak hour trips is not significant enough to model (e.g. the impact could fall within the margin of error) or b) in our professional opinion there is not a solid enough basis (e.g. empirical research or published case studies) to allow us to document the precise trip reduction impacts for the purposes of traffic model, c) we believe the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts and we have therefore excluded these impacts to avoid "double counting" (e.g. pedestrian improvements are adequately accounted for under "street connectivity" factor of the 4-D model adjustments), or d) the policy alternatives considered in Plan Santa Barbara and their impacts are not well understood (e.g. reducing and/or eliminating minimum parking requirements will certainly have some impact on vehicle ownership through Tiebout Sorting, (e.g. self-selection) effects; however the order of magnitude impacts depend on a number of factors that are not known at this time such as: phased implementation of recommendations, how developers respond to reduced/eliminated parking minimums and/or parking maximums, and Santa Barbara households' sensitivity to changes in the costs of auto ownership, know as price elasticity of demand). Where 0% reduction is noted, this indicates that we estimate the strategy to have no measurable impact at all in reducing peak-hour vehicle trips (or no additional impact beyond impacts of current programs).

[3] For impacts on peak hour vehicle trip reduction and household vehicle ownership, area types are defined as follows: Area 1 - Central Business District, Area 2 - Remaining "grid" portion of the City, Area 3 - Primarily residential with mainly intra-area trips, Area 4 - Primarily residential with trips to external areas. For more information see page 13 of Fehr and Peers Travel Demand Model Overview, March 2009. Household vehicle ownership is called out separately from vehicle trip reductions because different policies impact each metric differently and although there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g. lower auto ownership rates certainly correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both.

[4] The available research on the impact of this suggests a 0.46% to 0.96% increase in bike commuting trips, but does not document the reduction in peak hour vehicle trips.

[5] The available research on the impact of this strategy suggests a 5% to 8% shift from auto commuters (both those in single occupant vehicles and those in carpools) to bike commuters.

[6] The available research on the impact of this strategy suggests a 12% to 24% decrease in drive-alone chauffeured student trips, but does not document the reduction in peak hour vehicle trips. While not all of these trips are chained with commuter trips, we have conservatively estimated that the reduction of peak hour trips is 50% of the reduction in total reduction in drive-alone chauffeured school trips, assuming that the remaining 50% of these trips occur at non-peak travel times. It should be noted that the best available research was an evaluation for a program that implemented very few changes to the transportation system, but instead focused on programmatic changes (social marketing, walking school bus, prizes and other incentives) to encourage walking. For this reason it is our opinion that analyzing the impacts of this strategy will not result in "double counting" as part of the 4-D model adjustments (see footnote 2 for additional information).

[7] The available research on the impact of this strategy suggests a 5% to 15% increase in ridesharing, but does not document the reduction in peak hour vehicle trips.

[8] The available research on the impact of this strategy suggests a 20% to 50% decrease in peak hour vehicle trips, but does not specify participation rates. For this reason we have conservatively estimated the reduction in peak hour vehicle trips as 50% of the total documented decrease, assuming that participation rates will only be half of the participation rates in the case studies researched.

[9] These estimates assume that 90% of the parking supply in Areas 1 and 2 is public (per estimates provided by City staff May 2009) and include the impacts of transit pass programs. In addition, the Plan SB and Alternative 2 estimates only model the net impacts of each strategy beyond current practices (i.e. they take into account the present transit pass program in Alternative 1).

[10] We have conservatively assumed that telecommuting is the *only* effective trip reduction strategy in Areas 3 and 4. It should be noted that when summing the impacts of multiple strategies, telecommuting is a mutually-exclusive strategy (e.g. telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.).

[11] We have conservatively estimated non-commuter trip impacts as 50% of the total impact of this Safe Routes to Schools program, as only AM school trips coincide with peak commuter travel periods while PM school trips typically take place outside peak commuter travel periods.

Appendix D

Category 1: Parking Policies

1.1 Reduced/Eliminated Minimum Parking Requirements

Overview

Most cities minimum parking requirements typically take into account only two variables: land use and the size of development. However, they fail to take into account a number of other factors which affect parking demand including geographic factors (e.g. pedestrian environment, proximity to transit, and availability of services), demographic factors (e.g. income, household size, and vehicle ownership rates), and other relevant factors that affect parking demand (e.g. the presence of transportation demand management programs like car-sharing).

Minimum parking requirements are intended to achieve specific goals (most commonly identified by cities as avoiding spillover parking problems and reducing congestion of on-street parking). However, these goals can also be achieved through other policies, such as pricing curb parking at market rates, residential parking permit programs, and other on-street parking management techniques.

Reduced parking requirements could be established in locations where parking demand will be lower to due to the geographic and demographic factors described above. Eliminating parking requirements would not mean that no new parking would be constructed. Rather, it would mean that market forces would determine the appropriate level of supply, based on market demands. That is to say, individual developers will construct as much parking as they deem necessary to meet consumer demand regardless in the absence of minimum requirements. Minimum parking requirements could be waived entirely anywhere in the City of Santa Barbara where there are measures in place to combat parking spillover but especially in mixed used areas like downtown and in proximity to major transit corridors.

Current Policy

For commercial and retail uses, the Santa Barbara municipal code generally requires 2 parking spaces per 1,000 sq. ft. in downtown and 4 parking spaces per 1,000 sq. ft. outside of the downtown area. For residential uses, parking requirements vary based on number of bedrooms and location.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes within the Mobility Oriented Development Area (MODA):

- Reduce commercial parking requirements by half (to 2 parking spaces per 1,000 sq. ft.).
- Average 1 space per unit for all residential units.
- No guest parking.

Assumes outside of the MODA: maintenance existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or “granny flat”) within or outside of the MODA.

Assumes that maximum parking requirements would apply to residential parking.

Alternative 1

Assumes within the MODA: an increase residential parking requirements beyond current ordinance and maintain current commercial parking requirements.

Assumes outside the MODA" maintenance of existing parking requirements for commercial, retail, and residential uses per the current ordinance.

Assumes 1 dedicated parking space for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Alternative 2

Assumes for residential parking within the MODA:

- No minimum or maximum commercial or retail parking requirements downtown.
- Average ½ space per unit in transit corridors (i.e. within one block) for residential parking.
- Average 1 space per unit for all unit types for residential parking outside of the transit corridors.
- No guest parking.

Assumes outside of the MODA: maintenance of existing commercial, retail, and residential parking requirements per the current ordinance.

Assumes no dedicated parking spaces for each Accessory Dwelling Unit (ADU, or "granny flat") within or outside of the MODA.

Summary of Literature and Study Impacts

Research shows that there is an indirect link between reduced minimum parking requirements and a decline in vehicle trips. Setting minimum parking requirements often results in lower parking prices, as the supply of parking exceeds demand, which in turn increases vehicle ownership. Studies reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[1]

Average income households spend an average of $3,800 annually per vehicle.[2] Assuming that residential parking spaces have an annualized cost of $800 per year, parking costs add 21% to vehicle costs for an average income household. If we assume a vehicle price elasticity of –0.7 (Figure 1), minimum parking requirements that exceed the actual demand for parking increase vehicle ownership about 14%. The resulting increase in vehicle ownership will likely produce more vehicle trips. Conversely, decreasing or eliminating requirements would likely result in a reduction in residential vehicle trips.

Figure 1 Vehicle Ownership Reductions from Residential Parking Pricing

Annual (Monthly) Fee	-0.4 Elasticity	-0.7 Elasticity	-1.0 Elasticity
$300 ($25)	4%	6%	8%
$600 ($50)	8%	11%	15%
$900 ($75)	11%	17%	23%
$1,200 ($100)	15%	23%	30%
$1,500 ($125)	19%	28%	38%

[1] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[2] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard has insufficient data to estimate the impacts of potential changes to minimum parking requirements on vehicle trips or vehicle ownership in Santa Barbara.[3] This does not imply that reduced/eliminated parking requirements have no impact on vehicle ownership and trips (they clearly do through Tiebout Sorting, or self-selection effects). However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[4]

[3] For example: even if minimum parking requirements are reduced or eliminated, many developers might still build projects with the same amount of parking as the old minimums in order to be competitive with older projects that were previously required to meet those minimums. Regardless of how many parking spaces were actually built, there is no way to estimate how many of those parking spaces would actually be occupied.

[4] For example, using site-level data on the number of parking spaces constructed and the amount of the constructed parking actually occupied in several "high parking" and "low parking" development projects located in similar contexts in Santa Barbra would allow us to estimate the impact of parking supply on vehicle ownership and vehicle trips generated (by multiplying the number of vehicles at the differently-parked projects by an average factor for "peak hour trips generated per vehicle" in Santa Barbara).

1.2 Unbundled Parking

Overview

Parking costs are generally subsumed into the sale or rental price of housing and commercial space. But although the cost of parking is often hidden in this way, parking is never free; instead the cost to construct and maintain the "free" parking is hidden in the cost of all other goods and services. For all commercial and residential development in Santa Barbara, the cost to lease or purchase parking could be unbundled from the cost to lease or purchase the usable space.

Such a policy would provide a financial incentive to residents and employers to lease only the amount of parking they need. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. Among households with below-average vehicle ownership rates (e.g., low-income people, singles and single parents, seniors on fixed incomes, and college students), unbundled parking can also provide a substantial financial benefit that increases housing affordability. Unbundled parking can allow employers to provide employees with an equitable transportation benefit that can reduce vehicle commuting.

Current Policy

The City of Santa Barbara does not require the unbundling of parking in residential or commercial developments.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA. No change outside MODA.[5]

Alternative 1

Assumes increased parking for commercial uses and allowable increases in residential parking.

Alternative 2

Assumes unbundled parking required for all residential developments and unit types of 5 or more units within the MODA.

Summary of Literature and Study Impacts

Charging separately for parking is the single most effective strategy to encourage households to own fewer cars, and subsequently reduce vehicle trips. According to a study by Todd Litman, unbundling residential parking can significantly reduce household vehicle ownership.[6] Studies

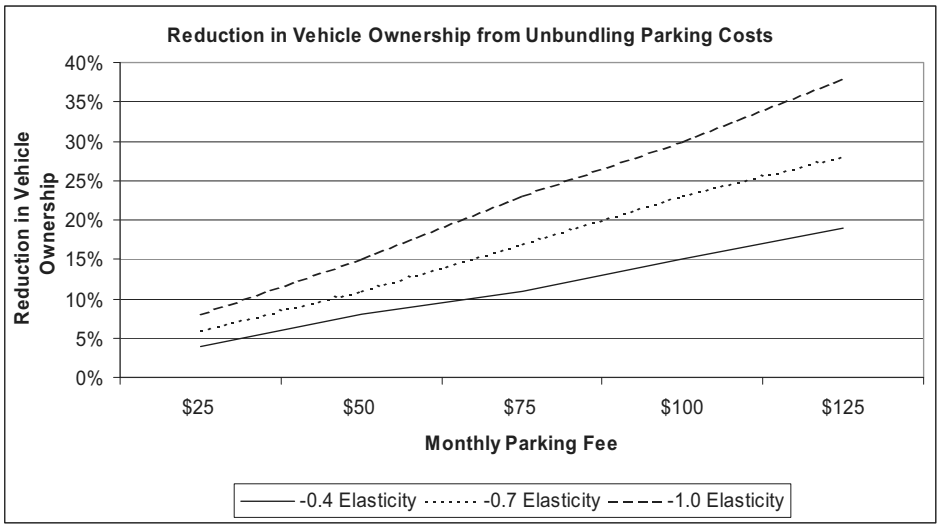
[5] Unbundled parking is recommended for multifamily attached housing including both rental apartments and for-sale condominiums and townhouses. For single-family detached housing where the parking is incorporated into the residential unit, unbundled parking is technically feasible and often occurs informally but not recommended as formal policy. For single-family detached housing where the parking is separate from the main structure (such as a carriage house garage with a residential Accessory Dwelling Unit above or where parking can be leased from a centralized "community" lot or garage serving multiple residences) then unbundled parking for single-family detached housing is feasible.

[6] Victoria Transport Policy Institute (2009), *Parking Requirement Impacts on Housing Affordability,* http://www.vtpi.org/park-hou.pdf

reveal that the elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0, so a 10% increase in total vehicle costs reduces vehicle ownership 4-10%.[7]

Average income households spend an average of $3,800 annually per vehicle.[8] Assuming that residential parking spaces have a monthly cost of $70, and a vehicle price elasticity of –0.7 (Figure 2), the unbundling of parking costs would decrease vehicle ownership about 15%. This decrease would result in a proportionate reduction in residential vehicle trips.

Figure 2 Reduction in Vehicle Ownership from Unbundling Parking Costs



Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

Alternative 1

This alternative assumes no unbundled parking, therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume a monthly cost of $70 per space for unbundled parking in all residential developments and unit types within the MODA, residential vehicle ownership should fall by roughly 15% within Areas 1 and 2. No estimates can be made regarding the possible reduction in peak-hour vehicle trips or VMT given the lack of available research.

[7] Victoria Transport Policy Institute (2009), *Transportation Elasticities,* http://www.vtpi.org/tdm/tdm11.htm
[8] Bureau of Labor Statistics (2003), *Consumer Expenditure Survey, 2002*, www.bls.gov.

1.3 Public Parking Pricing

Overview

One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. In addition, studies have shown that an average of 28% of traffic congestion in urban mixed-use and commercial districts (such as downtown Santa Barbara and proposed MODA areas) is attributable to cruising for parking: motorists who have already arrived at their destination but are searching and circling to find a free or below market-rate curb parking space.[9] This phenomenon is compounded in Santa Barbara with employees engaging in the "parking shuffle" in which workers continually move their vehicles from one space to another throughout the day to avoid citations for overstay of the 75- and 90-minute time limits, thereby parking all day for free.

In these circumstances, managing on- and off-street parking prices as part of an integrated district-wide parking system is an important strategy for reducing peak-hour trip generation and localized traffic congestion, especially for trips to areas with high employment densities. Demand-responsive, market-based prices for parking pricing also have secondary benefits including:

1. Distributing highly variable parking demand to match available supply to ensure that there are available curb parking spaces at all times of day.

2. Promoting parking turnover to prevent commuters parking all-day in on-street parking spaces intended for short-term parking.

3. Reducing "ticket anxiety" of shoppers and visitors to commercial areas by allowing motorists to park for longer periods of time that with time limits so long as they pay for all the parking they use.

Based on the findings of Nelson\Nygaard's downtown on-street parking survey, both of these conditions apply in downtown Santa Barbara, and likely in other mixed-used districts in Santa Barbara such as proposed MODA areas (for more information, see the Plan Santa Barbara *DRAFT Summary of Downtown Santa Barbara On-Street Parking Survey* (dated 4/29/09).

Current Policies and Programs

Downtown parking in the non-commuter lots is free for the first 75 minutes and $1.50 per hour after. There are no time limits on the length of stay. Priced parking is only in effect Monday to Thursday 7:30 am-9 pm, Friday to Saturday 7:30 am-1:15 am, and Sunday 11 am-6 pm. Monthly parking passes are available in 12 short-term lots and garages and the price varies from $100 to $150 depending on the location of the parking lot or garage. The two downtown commuter lots are reserved for commuter parking, with monthly passes priced at $30 (Carrillo Lot) or $40 (Cota Lot). On-street parking is free for the first 15 to 75 minutes depending on the street.

Outside of the downtown area on-street parking is free for up to the first 90 minutes. See the Plan Santa Barbara *Transportation Existing Conditions Report* (August 2008) for more details on existing parking policies and conditions.

[9] Shoup, Donald. *The High Cost of Free Parking.* APA Planner's Press. 2005.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate program of parking management changes to on- and off-street parking within the MODA including the following:

- Relax time limits for on-street parking to allow motorists to park for longer time periods so long as they pay for the parking they use.
- Continue time limits for off-street parking.
- Eliminate parking discounts and begin charging tiered rates for off-street parking based on "length of stay" and/or "time of day."
- Begin charging for on-street parking at roughly 33 cents per hour.[10]
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Alternative 1

Assumes maintenance of existing pricing and time limit policies for on and off-street parking within and outside the MODA.

Alternative 2

Assumes implementation of a robust parking management program for both on- and off-street parking within the MODA as follows:

- Eliminate time limits for on- and off-street parking.
- Adopt a policy goal of keeping on-street occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one space per block, will always be available) and off-street occupancy rates at 95% through pricing. An anticipated price would be 61 cents per hour.[11] These are widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion, and collisions. This policy will also ensure turnover of the

[10] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

[11] Because we could not feasibly develop a block-by-block price elasticity model (and this level of detail would be inappropriate for a an EIR traffic model with a 20-year plan horizon), we have therefore used average cost pricing to estimate the impacts of parking charges for both on-and off-street public parking. Current monthly off-street parking charges average to an hourly charge of $0.61 which was used for the Alternative 2 scenario. For the "middle ground" option of Plan Santa Barbara scenario, we converted Litman's daily parking charge of $2.98 shown in Figure 4 into an hourly charge of $0.33.

most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail

- Allow flexibility for adjusting parking prices under guidance of Parking Committee for on- and off-street parking to achieve adopted occupancy standards. In order for market prices to be effective, the committee needs to be able to adjust prices when occupancy rates consistently dip well below or go over the adopted standards. Under this policy, Council sets the overall occupancy goal and then delegates to the committee the responsibility of achieving that goal.
- Install necessary technology and signage to support implementation of market rate pricing including: on-street multi-space meters capable of accepting multiple forms of payment (credit and debit cards, "pay-by-cell," etc.), making parking price and availability information available to motorists before they begin their trip, and on-site wayfinding signage directing motorists to available parking.
- Conduct regular monitoring of occupancy rates and adjust parking prices if necessary to achieve occupancy goals. Make occupancy checks and rate adjustments at a minimum on a quarterly basis. Some meter technologies have the capability to monitor hour-by-hour occupancy so that quarterly meter rate changes can be based on recent and historical occupancy patterns.
- Strengthen residential permit parking program and potentially allow non-residents to pay to park in permit districts with spaces available.

Assumes outside the MODA: maintenance of existing management policies for on- and off-street parking.

Summary of Literature and Study Impacts

The reduction in employee vehicle trips from public parking pricing varies both in the amount charged for parking and in the type of location the pricing is implemented. Parking pricing has a much more profound effect in denser areas, such as within the MODA, where more alternative mode choices are present and as a result, vehicle trips face greater reductions in those districts. Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[12] According to the information developed by Litman regarding "place types" and summarized in Figure 3, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With a citywide employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1% (and Areas 1 – 4 all showing similar figures), the travel characteristics for the entire city of Santa Barbara indicate that the city is very similar to what Litman terms an Activity Center.[13]

Figure 3 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%

[12] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

[13] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

If we assume that a public parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in commuter vehicle trips would be between 37% and 46.8%, for both current and future traffic, given that Santa Barbara is an "Activity Center."[14] Research regarding the pricing effects on short-term visitor vehicle trips is insufficient to make an estimate of impacts. No documented drop in visitor vehicle trips has been found from cities that have implemented public parking pricing. Instead, common responses by short-term parkers to changes in public parking prices are to slightly reduce the amount of time they park for or to seek out lower priced parking in facilities that may be further away from high demand areas (and are therefore underutilized) and then walk or take a transit to their final destination.

Figure 4 Vehicle Trips Reduced by Daily Parking Fees[15]

Worksite Setting	$1.49	$2.98	$4.47	$5.96
Low Density Suburb	6.5%	15.1%	25.3%	36.1%
Activity Center	12.3%	25.1%	37.0%	46.8%
Regional CBD/Corridor	17.5%	31.8%	42.6%	50.0%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

If we assume a moderate increase in parking price to an average daily charge of $2.98 (approximately 33 cents per hour), research from VTPI shows the decrease in employee vehicle trips would be 25.1% in Areas 1 and 2 given that Santa Barbara is an "Activity Center." No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

This alternative assumes no change in parking policies and therefore no reductions in vehicle ownership or vehicle trips can be estimated.

Alternative 2

If we assume that a parking space in Santa Barbara costs $120 per month, or an average daily charge of $5.52, research from VTPI shows the decrease in employee vehicle trips would be 44.2% in Areas 1 and 2 given that Santa Barbara is an "Activity Center."[16] No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[14] The $120 is based on an average of the current prices for downtown off-street monthly permits - http://www.santabarbaraca.gov/Resident/Transportation_and_Parking/Parking/PERMITS.htm.

[15] Victoria Transport Policy Institute (2008), *Land Use Impacts on Transport*, http://www.vtpi.org/landtravel.pdf

[16] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 4 (y = 0.0774x + 0.0145).

Category 2: Transportation System Improvements

2.1 Bike System Improvements

Overview

Bicycle system improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. Bike facilities can serve direct door-to-door trips, especially those trips that are "too far too walk but too far to drive" (e.g. trips of between one and two miles are too long to walk for most people, but are a short bicycle ride). In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area"[17] of the transit stop or station and increasing ridership. Bicycle access can also reduce parking pressure on heavily-used and/or heavily-subsidized feeder bus lines and auto-oriented park-and-ride facilities.

Current Policies and Programs

The city of Santa Barbara has a comprehensive bicycle network that connects nearly every part of the City, with approximately 28 miles of bike lanes and 6 miles of separated off-street bike paths. These bikeways also connect to regional routes that lead to nearby major destinations such as UCSB and the Santa Barbara Municipal Airport. Santa Barbara has a high rate of biking, with Census data showing that 3.4% of residents bike to work, compared to 0.6% nationwide. For more details on existing bike facilities, see the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

In addition to bicycle routes, the city of Santa Barbara has also implemented distinctive bicycle wayfinding signage under the South Coast Bike Signage Program. On-street bicycle is available throughout downtown Santa Barbara and merchants may request to have bike parking installed near their business. On-street (sidewalk) and off-street lockers are provided for "long term" bicycle parking at six locations in Santa Barbara, largely concentrated in public garages in and around the downtown area. The City of Santa Barbara also provides secure bicycle parking (lockers, covered storage, or indoor cages) at nearly all City work locations. Off-street bicycle parking requirements are dictated by municipal code.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to bicycle network connectivity and completeness by prioritizing bike lanes over curbside parking during peak hours, including:

- Peak-hour parking restrictions would be in place to allow for curb-side bike lanes at the following locations (the curb lane would revert back to parking at all other times):
  - Santa Barbara Street - Haley to Micheltorena
  - Chapala – Haley to Constance
  - Dela Vina – Haley to Constance
  - Garden – Haley to Micheltorena
  - Canon Perdido – Anacapa to Castillo

[17] A transit catchment area is the geographic area from which a transit station draws riders.

- Improvements to bicycle travelways and parking are a priority use of rights-of-way within MODA.

Alternative 1

Assumes minor improvements to the bicycle network and facilities (a total investment of less than $500,000 each).

Alternative 2

In addition to improvements in Plan SB Alternative, assumes major improvement to the bicycle network by:

- Improvements to bicycle travelways and parking are a priority use of rights-of-way throughout the City, including implementation of all of the recommended improvements within the City of Santa Barbara's Bicycle Master Plan.
- Implement other bicycle infrastructure and programs as necessary to achieve Platinum designation as a Bicycle-Friendly Community from the League of American Cyclists.[18]
- Improve coordination between City, County, UCSB, SBCAG, and other South Coast cities and entities to improve and expand regional bike paths and routes that cross jurisdictional boundaries.

Summary of Literature and Study Impacts

One important advantage of bicycling compared to walking is that bicycling can substitute directly for automobile trips with longer distances. A before-after study of bicycle facility implementation found that each mile of bikeway per 100,000 residents increases bicycle commuting 0.075%, all else being equal.[19]

Summary of Estimated Impacts in Santa Barbara

Because the estimated impacts of bicycle system improvements are relatively small, and because Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for these impacts for purposes of the modeling effort, we have excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort.. This does not imply that bicycle system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

The introduction of bike lines on Santa Barbara St. (Haley to Micheltorena), Chapala St. (Carrillo to Mission), De la Vina St. (Haley to Constance), Garden St. (Haley to Micheltorena), and Canon Perdido (Anacapa to Castillo) would equal 5.5 miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.46% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[18] There are no definitive criteria to achieve this designation; instead a number of factors related to the 5 E's (engineering, education, encouragement, enforcement and evaluation) are considered that are tailored to the individual community seeking the designation. For more information see the League of American Bicyclists' "Bicycle Friendly Communities" website at http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities.

[19] Arthur Nelson and David Allen (1997), *If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities,* Transportation Research Record 1578, http://www.enhancements.org/download/trb/1578-10.PDF.

Alternative 1

No increase in bicycle trips is anticipated due to minor system improvements.

Alternative 2

Filling in gaps in the bicycle network and implementing additional measures will essentially have the effect of introducing 11 additional miles of new bikeways. With 90,000 residents in the City of Santa Barbara, we can anticipate a 0.92% increase in bicycle commuting. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.2 Pedestrian System Improvements

Overview

A walkable environment gives people more transportation choices and improves quality of life. A well-designed network of streets and pedestrian ways is key to improving pedestrian accessibility, and includes streets, alleys, trails, midblock crossings and pedestrian paseos. Walking is also a free transportation option for accessing public transit, and is available to most people within a quarter to half mile of transit stations and stops. Thus creating a safe, comfortable, and convenient walking environment is key part of supporting transit. A well-designed network of streets with a high degree of pedestrian amenity is a key factor in enhancing pedestrian accessibility and connectivity to transit.

Current Policies and Programs

The city of Santa Barbara's pedestrian facilities are relatively well developed. The downtown and waterfront areas in particular have a high quality pedestrian environment, with high pedestrian volumes. Other neighborhoods have varying levels of pedestrian service. Santa Barbara has a high rate of walking, with Census data showing that 6.2% of residents walk to work, compared to 2.7% nationwide. The high rates of walking in Santa Barbara suggest that conditions are favorable for walking. See the City of Santa Barbara's Pedestrian Master Plan for more information on current pedestrian system conditions by area.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes minor improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links within the MODA as identified in the City's "Sidewalks Missing Links" program.
- Implementing enhanced pedestrian crossings at high volume intersections.

Alternative 1

Assumes minor improvements to the pedestrian network and facilities (a total investment of less than $500,000).

Alternative 2

Assumes major improvements to the pedestrian network and facilities by:

- Completing all missing sidewalk connections and links throughout the City as identified in the City's "Sidewalks Missing Links" program.
- Constructing enhanced pedestrian crosswalk treatments at high volume intersections.
- Installing pedestrian amenities (e.g. pedestrian-scaled street lighting, benches, trees and other landscaping) along high volume pedestrian corridors, around transit stops and stations, and at other key pedestrian destinations (parks, schools, etc.).
- Continuing with the installation of corner curb ramps in compliance with Federal and State universal access requirements for public rights-of-way.
- Implementing traffic calming measures as needed.
- Implementing other improvements as identified in the City's Pedestrian Master Plan.

Summary of Literature and Study Impacts

It can be difficult to estimate precisely how much walkability investments affect travel, since it is often accompanied by investments in other alternative transportation means and changes in land use. However, studies have found that there is a direct connection between a high quality pedestrian environment and usage of travel modes other than driving:

- Walking is three times more common in a community with pedestrian friendly streets than in otherwise comparable communities that are less conducive to walking.[20]
- Residents in a pedestrian friendly community walk, bicycle, or ride transit for 49% of work trips (18 percentage points higher than in a comparable automobile community) and 15% of their non-work trips (11 percentage points higher than in a comparable automobile-oriented community).[21]
- Investments in the pedestrian environment have positive impacts on all road users. Benefits include: reduces auto-dependency and air pollution, improves livability, increases mobility for low-income households, and even increases retail sales and property values.[22]

In addition to the studies discussed above, a significant amount of research had been conducted on how urban form affects travel behavior. Urban design elements that impact pedestrian access such as street patterns (grid versus cul-de-sacs), topography, ease of street crossings, sidewalk continuity have been shown to reduce VMT and daily vehicle trips.[23] In another study which examined how urban form variables affected the number of pedestrian trips for recreation and shopping, it was shown that perceived safety, shade, and the frequency and desirability of seeing people while walking had a significant impact (for shopping trips, distance, the ease of walking and comfort were significant variables).[24]

Summary of Estimated Impacts in Santa Barbara

Nelson\Nygaard believes that the 4-D model adjustments (density, design, diversity, destinations) will adequately account for the impacts, specifically in terms of street connectivity criteria in the model. We have therefore excluded these impacts for all alternatives to avoid "double counting" as part of the modeling effort. This does not imply that pedestrian system improvements will have no impact on vehicle ownership and trips in Santa Barbara, but they have been excluded from the impacts analysis in order to maintain a conservative methodology. Without the 4-D model, one could anticipate the following alternative impacts:

Plan Santa Barbara

Major improvements to the pedestrian network will result in a 1 percentage point increase in alternative mode use for work trips and a .5 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

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[20] Anne Vernez Moudon, Paul Hess, Mary Catherine Snyder and Kiril Stanilov (2003), *Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments*, http://www.wsdot.wa.gov/research/reports/fullreports/432.1.pdf

[21] Robert Cervero and Carolyn Radisch (1995), *Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods*, http://www.uctc.net/papers/281.pdf.

[22] Local Government Commission (2001) *The Economic Benefits of Walkable Communities*. http://www.lgc.org/freepub/docs/community_design/focus/walk_to_money.pdf

[23] 1000 Friends of Portland (1993) *The Pedestrian Environment: LUTRAQ Report Volume 4A*, http://ntl.bts.gov/DOCS/tped.html

[24] Susan Handy, Kelly Clifton, and Janice Fisher (1998) The Effectiveness of Land Use Policies as a Strategy for Reducing Auto Dependence : A Study of Austin Neighborhoods, http://www.des.ucdavis.edu/faculty/handy/Austin_Report.pdf

Alternative 1

No increase in pedestrian trips is anticipated due to minor system improvements.

Alternative 2

Major improvements to the pedestrian network will result in a 2 percentage point increase in alternative mode use for work trips and a 1 percentage point increase in alternative mode use for non-work trips. No estimates can be made regarding the possible reduction in vehicle ownership, VMT, or peak-hour vehicle trips given the lack of available research.

2.3 Transit System Improvements

Overview

In most cities that have succeeded in growing while limiting the growth of vehicle trips, a fundamental component of their success has been improved transit services. Existing transit services can be improved in several ways, including:

- Increasing frequency (e.g. reduced headways).
- Increasing reliability and on-time performance.
- Reducing travel time and travel time variability.
- Increasing service span (e.g. hours of operation).
- Enhancing passenger amenities (both in-vehicle and at stations and stops).

The connectivity and convenience of the transit system can also be enhanced through the addition of new bus routes running in mixed-flow travel lanes or by adding new service running in dedicated transit rights-of-way, such as Bus Rapid Transit (BRT),[25] light rail, or heavy/commuter rail service.

Current Policies and Programs

A variety of public and private transportation services are available within the city of Santa Barbara, and connect to other communities in Santa Barbara County and beyond. Santa Barbara has a typical rate of transit use, with Census data showing that 4.5% of residents bike to work, compared to 4.4% nationwide. A summary of existing services is below, and more information is presented in the Plan Santa Barbara *Existing Transportation Conditions Report* (dated August 2008).

Local MTD Transit

Santa Barbara Metropolitan Transportation District (MTD) provides fixed route bus service in southern Santa Barbara County, including the city of Santa Barbara and the adjacent communities of Goleta, Carpinteria, Isla Vista, Montecito, and Summerland. MTD operates 76 vehicles at peak travel periods on 21 routes within a total service area of 52 square miles.

Regional Bus Service

MTD operates the Valley Express which is a regional bus service. Additional regional commuter bus service is provided by SBCAG, including the Clean Air Express and the Coastal Express (the latter co-managed by the Ventura County Transportation Commission).

Commuter Rail

Amtrak serves Santa Barbara with passenger rail service along the Coast Starlight and Pacific Surfliner Routes. The Pacific Surfliner services Carpinteria, Santa Barbara, and Goleta, with six trains daily in each direction to and from Los Angeles, or San Diego for some trips. The Coast Starlight provides one trip daily in each direction between Los Angeles and Seattle, stopping along the South Coast only in Santa Barbara. The current schedules provide limited service during peak commute hours and existing passenger rail service is therefore not a feasible option for most commuter trips to and from Santa Barbara.

[25] A definition of BRT can be found at the Bus Rapid Transit Institute, http://www.nbrti.org/CBRT.html

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes the following service enhancements:

Local MTD Service

A modest increase in local and South Coast bus service as follows:

- Reduce peak period headways to 10 minutes on routes serving of primary transit corridors ("main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Introduce "crosstown shuttle" service.
- Implement other low-cost transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 1

Assumes the following service enhancements:

Local MTD Service

Maintenance of existing transit system and service levels as detailed in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

Regional Bus Service

As in the Plan Santa Barbara alternative, a modest increase in regional bus service as follows:

- Continued demand-responsive expansion of regional bus services (such as the Clean Air Express).
- Service capacity and ridership to expand at the average annual growth rate experienced during the 5 year period prior to Fall 2007 spike in gas prices.

Commuter Rail Service

A modest expansion of commuter rail service by improving existing Amtrak service by adjusting current schedule to be more commuter-orientated by providing at least some service in the AM and PM commute hours.

Alternative 2

Assumes the following service enhancements:

Local MTD Service

In addition to the improvements in Plan Santa Barbara alternative, a robust increase in local and South Coast bus service as follows:

- Reduce peak period headways from 10 to 5 minutes on routes serving of primary transit corridors (e.g. Routes 1, 2, 6, 11 and other "main lines").
- Reduce headways during non-peak periods for routes serving primary transit corridors ("main lines").
- Increase frequency of MTD regional express lines (e.g. Capinteria, UCSB/Isla Vista, etc.).
- Introduce light rail service on upper State Street.
- Implement all other transit system improvements as identified in the MTD's *Short-Range Transit Plan*.

Regional Bus Service

A robust increase in regional bus service as follows:

- Shift of regional transportation funding from highway capacity projects to dramatic expansion of regional bus services (such as the Clean Air Express), including:
  - Increased frequency (reduced headways) during peak commute periods.
  - Additional services during non-peak travel times to allow peak-hour commuters to rely on the service in emergency, accommodate occasional flex-work commuters, etc.
- Service capacity and ridership to expand at the historical annual growth rate experienced during the Fall 2007 to Fall 2008 spike in gas prices.

Commuter Rail Service

A robust expansion of commuter rail service from Ventura with existing Amtrak service and two additional trains in both the AM and PM peak hours.

Summary of Literature and Study Impacts

The elasticity of transit use with respect to transit service frequency is about 0.5, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.5%.[26] The elasticity of transit use to service expansion (e.g. routes into new parts of a community already served by transit) is in the range of 0.6 to 1.0, which means that 1.0% of additional service increases ridership by 0.6-1.0%.

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would

[26] Richard Pratt (2000) *Traveler Response to Transportation System Changes*, Interim Handbook, TCRP Web Document 12. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_webdoc_12.pdf

otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%). Impacts of other expansions in transit vary depending on the conditions in which it is implemented.[27]

Local experience in Santa Barbara suggest that increasing transit service results in ridership growth: when the headways on several MTD routes (1, 2, 6, 11) were decreased from 15 minutes to 10 minutes, peak period ridership on these routes increased by 13%.[28]

Summary of Estimated Impacts in Santa Barbara

Because the extent and phasing of the transit system improvements are not known at a level of precision that would allow Nelson\Nygaard to derive a reliable estimate of peak hour vehicle trip, VMT, or vehicle ownership reductions, we have excluded these impacts from the analysis in order to maintain a conservative methodology. This does not imply that transit system improvements will have no impact on vehicle ownership and trips in Santa Barbara; quite the contrary, the available research shows that enhanced transit service will have significant impacts. However, Nelson\Nygaard would require additional data in order to calculate a meaningful estimate.[29]

Nelson\Nygaard also believes that some of the impacts of transit system improvements will be accounted for in the 4-D model adjustments (density, design, diversity, destinations), since areas with enhanced transit service will likely correspond to areas with increased density, mixing of uses, and reduced parking.

[27] Victoria Transport Policy Institute (2008). *Traffic Calming*. http://www.vtpi.org/tdm/tdm4.htm.
[28] Information provided by City of Santa Barbara staff.
[29] For example: service type (e.g. bus operating in mixed-flow travel lanes or BRT, light rail, heavy rail operating in a dedicated transit rights-of-way), service span and headways, and routing. Using this information, we could derive estimates of both ridership growth generated by the transit improvements (i.e. number of new transit trips net of existing transit trips in this corridor or parallel corridors) and reductions in peak-hour vehicle trips as result of the transit improvements (e.g. the number of the new transit trips occurring in peak travel periods vs. non-peak, the number of new transit trips that shifted from single-occupant vehicle trips vs. carpooling, other transit services, bicycling, etc.).

Category 3: Transportation Demand Management (TDM) Policies[30]

3.1 Subsidized Transit Passes

Overview

In recent years, growing numbers of transit agencies have teamed with universities, employers, building developers, or entire districts or neighborhoods to provide universal or subsidized transit passes to certain riders (students, employees, etc). These passes typically provide unlimited transit rides on local or regional transit providers for a low monthly fee, often absorbed entirely by the employer, school, or developers.

Current Policy and Programs

The City of Santa Barbara currently has a subsidized transit pass program as follows:

- Current City employees receive free MTD transit passes.
- All downtown employers established in the past 15 years must provide free MTD transit passes to their employees.
- Downtown employers that were established prior to 15 years ago may qualify for discounted MTD transit passes.
- Any downtown employee may request a discounted MTD transit pass.
- Non-downtown employers may voluntarily participate in the program in order to provide subsidized transit passes to their employees.
- Large development projects are sometimes required by the City (as a condition of approving entitlements) to provide subsidized transit passes to the development's employees and/or residents.

For employees eligible for discounted MTD transit passes the Downtown Bus Pass Program offers a 90-day MTD transit pass to all downtown employees at the steeply discounted rate of $45, which is one-third the normal price. The program is funded by revenue generated at parking lots and garages in the downtown area. For additional information on the existing program, please see the *Plan Santa Barbara Existing Conditions Report* (dated August 2008).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara Alternative

A modest expansion in the participation in the existing subsidized transit pass program as follows:

- Target expanded enrollment among these new user groups:
  - All large employers citywide.
  - All employers within MODAs.
  - All employers within a ¼ mile of high-transit corridors.
  - Schools.

[30] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Encourage these new user groups to enroll in the existing subsidized transit pass program by:
  - Promoting and marketing the program via Transportation Management Association to these new user groups.
  - Incentivizing enrollment in the program via administrative and logistical support to these new user groups.
  - Considering additional financial subsidy as necessary to enroll certain new user groups (e.g. non-profits, etc).
- Encourage expansion of participation rates by *existing* user groups through:
  - Increased promotion and marketing.
  - Lowering barriers to entry (e.g. requiring automatic opt-in).
  - Deeper financial subsidy as necessary to lower out-of-pocket costs for certain user groups (e.g. non-profits, etc.).

Alternative 1

Maintenance of existing subsidized transit pass program as described above.

Alternative 2

In addition to the policies in Plan Santa Barbara alternative, a robust expansion of the existing subsidized transit pass program as follows:

- Require passes to be provided as part of the conditions of approval for entitlements for all residents and employees of:
  - New development within downtown.
  - New development within MODAs.
  - New development within a ¼ mile of high-transit corridors.
  - New large developments citywide.
- Require subsidized transit passes be provided to the employees of:
  - All new employers citywide as part of the conditions of approval for entitlements.
  - All existing employers citywide who propose physical expansions as part of the conditions of approval for entitlements.
- Work with regional partners to ensure that:
  - The subsidized transit pass program encompasses all existing and future regional bus and/or rail transit services (in addition to MTD services).
  - The fare media used by the subsidized transit pass program is compatible for use on all services to increase user convenience and reduce barriers to entry for new participants.

Summary of Literature and Study Impacts

Current research regarding the impacts of subsidized transit passes can be generally broken into two categories.

1. The first set of research focuses on demonstrating the effects transit passes on mode splits by surveying users before and after implementation.

2. The second method bases the results of a transit pass implementation on the actual percent of vehicle trips reduced.

Both of these types of research can be useful for different purposes, as discussed below.

The first set of data is useful in illustrating the impacts of transit passes in various settings. Figure 1 shows the drive-alone and transit mode splits before and after subsidized transit pass implementation in different locations. These studies show reductions in drive-alone mode share of 4% to 42%, with an average reduction of 19%. In addition, these case studies show a wide range of increased transit mode share of between 25% and 145% with an average rise of 95%.

Figure 5 Employee Mode Splits Before & After Implementation of Subsidized Transit Pass Programs

Location	Drive Alone to work			Transit to work		
Municipalities	*Before*	*After*	*% Change*	*Before*	*After*	*% Change*
Santa Clara (County)[31]	76%	60%	27%	11%	27%	145%
Bellevue, Washington (Downtown)[32]	81%	57%	42%	13%	18%	38%
Ann Arbor, Michigan (Downtown)[33]	N/A	N/A	4%	20%	25%	25%
Universities						
UCLA (faculty and staff)[34]	46%	42%	9%	9%	20%	122%
Univ. of Washington, Seattle (faculty)[35]	60%	47%	22%	11%	27%	145%
Univ. of Washington, Seattle (staff)	44%	39%	11%	25%	36%	44%
Average Percent Change	-	-	19%	-	-	87%

Source: Table created by Nelson\Nygaard from studies cited in table footnotes.

Data regarding vehicle trip reductions are drawn from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE), and translated into informative tables by Todd Litman of the Victoria Transport Policy Institute (VTPI).[36] According to the information developed by Litman regarding "place types" and summarized in Figure 2, every community fits into one of three categories – Low Density Suburb, Activity Center, or Regional CBD/Corridor. With an

[31] Santa Clara Valley Transportation Authority (1997). *Eco Pass Pilot Program Survey Summary of Findings*.
[32] King County Metro (2000) *FlexPass: Excellence in Commute Reduction, Eight Years and Counting*. www.commuterchallenge.org/cc/newsmar01_flexpass.html.
[33] Christopher White, Jonathan Levine, and Moira Zellner (2002). *Impacts of an Employer-Based Transit Pass Program: The Go Pass in Ann Arbor, Michigan*. www.apta.com/research/info/briefings/documents/white.pdf
[34] Jeffrey Brown, Daniel Baldwin Hess, and Donald Shoup (2003). *Fare-Free Public Transit at Universities*. http://shoup.bol.ucla.edu/FareFreePublicTransitAtUniversities.pdf
[35] University of Washington Facilities Services, *The U-PASS Online and Telephone Survey Report (2006)*, www.washington.edu/commuterservices/programs/upass/reports.php
[36] Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.
Victoria Transport Policy Institute (2009), *Trip Reduction Tables*, http://www.vtpi.org/tdm/tdm41.htm

employee drive alone rate of 68.8%, a rideshare rate of 14.1%, and a transit share of 17.1%, the travel characteristics of Santa Barbara indicate that the city is very similar to an Activity Center.[37]

Figure 6 Typical Mode Split by Location

	Low Density Suburb	Activity Center	Regional CBD/Corridor
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%
Rideshare	8%	18%	29%
Average Vehicle Occupancy	*1.05*	*1.20*	*1.35*
Average Vehicle Ridership	*1.13*	*1.35*	*1.90*

Source: Victoria Transport Policy Institute, TDM Encyclopedia, Trip Reduction Tables, http://www.vtpi.org/tdm/tdm41.htm

Furthermore, Figure 7 breaks each category into three subcategories of rideshare oriented, mode neutral, and transit oriented. Essentially, if transit or ridesharing comprises more than 50% of the alternate mode share, the site is transit oriented or rideshare oriented, respectively. If neither transit nor ridesharing dominates, then the area is considered mode neutral. In the case of Santa Barbara, carpooling is roughly equivalent to transit usage making the city mode neutral.

We have updated the daily transit subsidy information used by Litman to account for inflation since the Litman data was compiled; the source for this escalation was the U.S. Bureau of Labor Statistics Consumer Price Index.[38] Given the $52 monthly cost of an MTD pass, it can be estimated that the necessary daily transit subsidy necessary for an employee would be $2.39.[39] As shown in Figure 7, this sum falls between the $1.49 and $2.98 subsidies. By calculating the statistical relationship between transit subsidy and percent decrease in vehicle trips we find that a likely percent reduction in vehicle trips from a transit pass subsidy covering all employees in Santa Barbara would be 13.7%.[40]

Figure 7 Vehicle Trip Reduction by Workplace Setting and Daily Transit Subsidy[41]

	Daily Transit Subsidy			
Worksite Setting	**$0.75**	**$1.49**	**$2.98**	**$5.96**
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	**7.3%**	**16.4%**	38.7%
Activity center, transit oriented	5.2%	10.9%	23.5%	49.7%
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%

[37] In this case, the term transit encompasses all non-drive alone and carpool modes (i.e. buses, shuttles, walking, biking, etc.). In Santa Barbara, the employee mode split is 4% transit, 4.8% walking, 3.2% biking, .8% other, and 4.3% working at home. Source: AMEC Earth & Environmental, Inc. (August 2008) *Plan Santa Barbara: Transportation Existing Conditions Report.*

[38] Bureau of Labor Statistics, *Consumer Price Index*, http://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.

[39] Based on an average 260.7 weekdays per year and 21.7 weekdays per month.

[40] The percentage decrease in vehicle trips is calculated using the formula derived from the relationship between Activity Center vehicle trip reductions and daily parking fees in Figure 8 (y = 0.0684x - 0.0267).

[41] Victoria Transport Policy Institute (2008), *Transportation Elasticities*, http://www.vtpi.org/elasticities.pdf

Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%	54.3%
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%	64.0%

Summary of Estimated Impacts in Santa Barbara

For this analysis, we have assumed that 20% of employees are currently participating in a transit subsidy program under Alternative 1 in Areas 1 and 2, resulting in a 2.7% reduction in auto trips (13.7% multiplied by 20%).[42] The Plan Santa Barbara alternative envisions an expansion of the program to cover 40% of employees in Areas 1 and 2 with a 5.5% reduction in trips. Alternative 2 covers 60% of employees in all areas with an 8.2% reduction in trips. These estimates are summarized in Figure 8.

Figure 8 Estimated Impacts on Auto Trips

Policy/Program	PlanSB	Alternative 1	Alternative 2
Subsidized Transit Passes	(5.5%)	(2.7%)	(8.2%)

Similarly, the impacts of a transit pass subsidy on drive-alone and transit mode shares given the ranges of 4% to 42% decreases in drive alone share and 25% to 145% increases in transit share are relative to the percentage of participating employees (20%, 40%, and 60%). For example, Alternative 1 will result in a 5% to 29% increase in transit share (25% to 145% multiplied by 20%). These estimates are summarized in Figure 9.

Figure 9 Estimated Impacts on Mode Splits

Mode	PlanSB	Alternative 1	Alternative 2
Drive Alone	(2% -16%)	(1% - 8%)	(2% - 25%)
Transit	10% - 58%	5% - 29%	15% - 87%

No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

[42] Because the City already has a subsidized transit pass program and Alternative 1 assumes no expansion of that program, vehicle trip reductions from continuation of the current program under this alternative would already be accounted for in the current mode splits that are used in the traffic modeling process. For this reason, Appendix C (which is an input into the traffic model) assumes 0% reduction in peak-hour vehicle trips for the transit pass program in Alternative 1 to avoid "double counting."

3.2 Parking Cash-Out

Overview

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash-out requirement, employers are allowed to continue this practice on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work. Offering employees the option of "cashing out" their subsidized parking space can incentivize employees to ride transit, bike, walk, or carpool to work, thereby reducing vehicle commute trips and emissions.

The cash value of the parking subsidy can be offered in one of three forms:

- A transit/vanpool subsidy equal to the value of the parking subsidy (of which up to $230 per month is tax-free for both employer and employee).
- A taxable carpool/walk/bike subsidy equal to the value of the parking subsidy.
- Alternately, employees can be given a general "transportation fringe benefit" equal to the market value of an employee parking space, and all employee parking can simply be priced with a daily fee.[43]

Parking cash-out is a state law in California, but the state law only applies to employers with 50 employees or more who lease their parking and whose parking costs can be separated out as a line item on their lease. In addition, the California Air Resources Board (CARB) is nominally tasked with monitoring compliance, but CARB currently has no dedicated enforcement resources. For this reasons, some California jurisdictions such as Santa Monica and Los Angeles have implemented local parking cash-out requirements and enforcement mechanisms.[44]

Current Policies and Programs

SBCAG's 2007 Commuter Profile Report indicates that 88% of Santa Barbara residents who commute by car park for free at their workplace. Implementation and enforcement of a citywide or countywide parking cash-out program would therefore likely have a significant impact on travel behavior, by providing a financial incentive for some auto commuters to shift to other modes.

Some private employers in Santa Barbara already offer parking cash-out. For example, Cottage Hospital in Santa Barbara has a parking cash-out program in which all employees are paid an additional $75 per month, and then charged for each daily use of parking facilities (at a rate in which daily use would equal about $75).

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest increase in parking cash out programs as follows:

[43] There are a number of ways to determine the actual market value of an employee parking space that is currently provided for free in order to determine the amount of cash that should be offered in lieu of the free parking. In general these are: a) align with prices charged at comparable parking facilities in the vicinity, b) calculate the total capital and operating cost of the parking, or c) calculate the total social costs of the parking, including not only capital and operating costs but also opportunity costs and costs of mitigating externalities.

[44] Enforcement mechanisms for ensuring compliance with the existing state parking cash-out law and potential local parking cash-out requirements include measures such as requiring a signed affidavit certifying compliance when an employer's business licenses is renewed. Additional information on this topic is included in the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

- Coordinate with local and regional partner agencies to promote the existing state parking cash-out law to subject employers (i.e. those employers with more than 50 employees who lease their parking and whose parking costs can be separated out as a line item on their lease).

- Require periodic submittal of proof of compliance with existing state parking cash-out law as a condition of approval for all new development entitlements.

Alternative 1

Assumes maintenance of existing parking cash-out programs.

Alternative 2

Assumes a robust expansion of parking cash-out program by:

- Develop a local parking cash-out ordinance that would apply to a broader number of employers than the current State law (e.g. employers with less than 50 employees, employers who own their own parking, etc). Require compliance for new employers and promote voluntary phased compliance for existing employers.

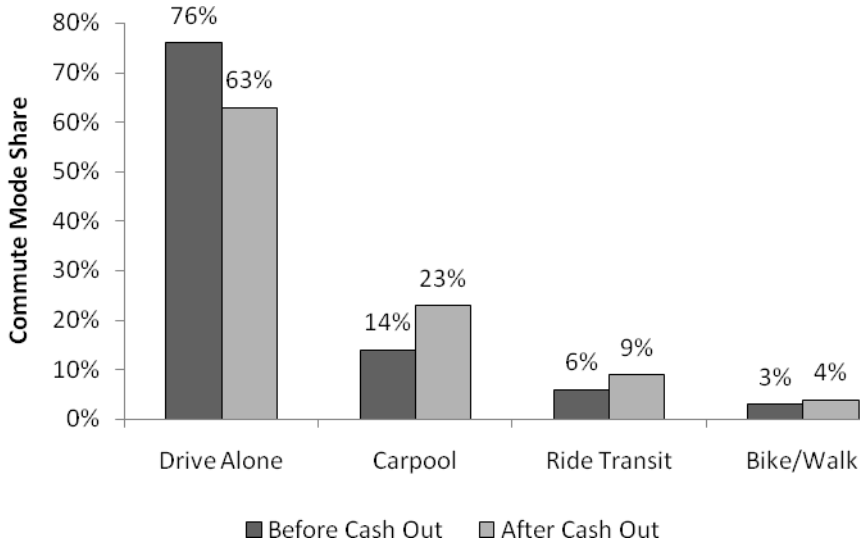
- Require periodic submittal of proof of compliance with the local and/or existing state parking cash-out requirements for all subject employers. For example, proof of compliance could be submitted as part of the application for a new or renewed business license.

Summary of Literature and Study Impacts

Research performed by Donald Shoup at the University of California-Los Angeles found that single occupancy vehicle trips declined by 17% and other modes increased significantly (carpooling by 64%, transit by 50%, and walking/biking by 33%) after a parking cash-out program was introduced at various urban and suburban worksites with varying levels of transit service. These findings are illustrated in Figure 10. These mode shifts resulted in an average 12% fewer vehicle miles traveled (VMT) per year per employee. This reduction is equivalent to removing one of every eight cars driven to work.[45] The analysis found that reductions in auto trips tend to increase over time, as more employees find opportunities to reduce their driving and take advantage of the parking cash-out "fringe benefit."

[45] Donald C. Shoup, *Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies*, http://www.arb.ca.gov/research/apr/past/93-308a.pdf.

Figure 10 Parking Cash-Out Impacts on Commute Mode



Another parking cash-out case study is that of suburban Pleasanton. The City initiated a daily form of parking cash-out in January 1994. The City offers $2 per day to employees who use a commute alternative instead of driving to work alone. All City employees are eligible to participate with no minimum days required. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 2004 doubled to 57 employees per month, which has resulted in an annualized reduction of 20,625 commuter vehicle trips.[46]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

By promoting the current parking cash-out law to subject employers and requiring new employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 3% reduction in peak-hour vehicle trips in Areas 1 and 2 and 1% reduction peak-hour vehicle trips in Areas 3 and 4. These figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

Alternative 1

This alternative assumes no expansion of parking cash-out programs, therefore no reductions in vehicle trips can be estimated.

Alternative 2

By developing a local parking cash-out ordinance that would apply to a broader number of employers and requiring all employers subject to the law to submit periodic proof of compliance, Nelson\Nygaard estimates a 12% reduction in peak-hour vehicle trips in Areas 1 and 2 and a 6% reduction in peak-hour vehicle trips in Areas 3 and 4. As noted in the Plan Santa Barbara scenario, these figures represent a conservative estimate based on professional judgment and available research that suggest an average 12% VMT reduction observed in a number of actual

[46] U.S. Environmental Protection Agency (2005), *Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters,* http://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf

parking cash-out programs. No estimates can be made regarding the possible reduction in vehicle ownership given the lack of available research.

3.3 Car Sharing

Overview

Car-sharing programs allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis. Usage charges are assessed at an hourly and/or mileage rate, in addition to a refundable deposit and/or a low annual membership fee. Car-sharing is similar to conventional car rental programs with a few key differences:

- System users must be members of a car-sharing organization.
- Fee structures typically emphasize short-term rentals rather than daily or weekly rentals.
- Vehicle reservations and access is "self-service."
- Vehicle locations are widely distributed rather than concentrated.
- Vehicles must be picked up and dropped off at the same location.

Car-sharing programs reduce the need for businesses or households to own their own vehicles, and reduce personal transportation costs and vehicle miles traveled (VMT). Through car-sharing, individuals gain access to vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations.

Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile. For example, vehicles available near a person's workplace or school can enable them to commute to work via transit or other means, knowing that they'll have a car-share vehicle available during the day only if needed for work or personal trips.

Current Policies and Programs

The City of Santa Barbara allows employees to use City fleet vehicles for work-related trips, unplanned overtime, medical appointments, approved emergency trips, occasional personal trips during breaks and lunch as well as transporting family members for doctor's appointments and medical emergencies.

At UCSB, a car-share program with 2-3 vehicles is operated by ZipCar and is offered to all students, faculty and staff, and at discounted rate for Transportation Alternative Program (TAP) enrollees.

There are currently no car-share programs in Santa Barbara that are available to the general public.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest car-sharing program available to the public as follows:

- Limited number of vehicles at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Free on- and off-street public parking space in high-demand locations.
    - In-kind promotion and marketing support.
    - Small financial subsidy to recognized car-sharing service provider.

Alternative 1

Assumes maintenance of existing car-sharing programs (none available to the general public).

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust car-sharing program available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara and neighboring communities.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Partial conversion of city fleet to car-sharing operations
    - Larger financial subsidy to a car-sharing service provider.
- Require new development to offer "right of first refusal" parking spaces to recognized car-sharing service provider.

Summary of Literature and Study Impacts

According to the Transportation Research Board, each car-sharing vehicle takes nearly 15 private cars off the road – a net reduction of almost 14 vehicles.[47] A UC Berkeley study of San Francisco's City CarShare found that members drive nearly 50% less after joining. The study also found that when people joined the car-sharing organization, nearly 30% reduced their household vehicle ownership and two-thirds avoided purchasing another car. In addition, the study found that nearly three-quarters of the vehicle trips made by members were for running errands, visiting friends and other social activities, meaning that only roughly one-quarter of trips were for commuting to work or for recreation. The research also indicates that most trips were made outside of peak periods, thereby generating a limited impact on peak period traffic.[48]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2. (This estimate assumes that two-car households are selling one of their vehicles.)
- No measurable reduction on peak-hour vehicle trips.

Alternative 1

This alternative assumes no expansion of car-sharing programs to make these services available to the general public, therefore no reductions in vehicle trips or auto ownership can be estimated.

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[47] Transportation Research Board (2005), *Car-Sharing: Where and How it Succeeds*, Transit Cooperative Research Program Report 108. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rpt_108.pdf

[48] Robert Cervero and Yu-Hsin Tsai (2003), *San Francisco City CarShare: Travel-Demand Trends and Second-Year Impacts, Institute of Urban and Regional Development*, http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1026&context=iurd

Alternative 2

Based on the available research and professional judgment, Nelson\Nygaard estimates:

- A 50% reduction in vehicle ownership by 25% of households (or 12.5% overall reduction) in Areas 1 and 2 and a 50% reduction in 10% of households (or 5% overall reduction) in Areas 3 and 4. (This estimate assumes that two-car households are selling one of their vehicles.)

- No measurable reduction on peak-hour vehicle trips.

3.4 Bike Sharing

Overview

Bike sharing is a form of bike rental where people can have access to a shared fleet of bicycles on an as-needed basis. Bike share programs provide safe and convenient access to bicycles for short trips, such as running errands during lunch or for accessing the transit system by helping to bridge "first mile/last mile" barriers.

Bike sharing programs have been implemented in various forms for the past 40 years. Until recently, bike share programs worldwide have experienced low to moderate success. However, in the last 5 years innovations in technology have given rise to a new (third) generation of technology-driven bike share programs. These new bike share programs can dramatically lower barrier to use by allowing reservations and/or payment via smart card, credit card, or even cell phone. In addition, damage or theft of bicycles is minimized by linking accounts to a user's credit card.

The most common operational models for 3rd generation bike sharing programs are:

- The first and most common model is a privately–operated program, where contracts for exclusive rights to outdoor advertising space (bus stops, billboards, etc.) include a provision that requires the advertising company to install, operate, and maintain a bike sharing system. The Vélib system in Paris is an example of this first model.

- The second model is a publicly-operated program run by a government agency as part of a larger transit access or TDM/parking management strategy. Montreal's Bixi and Long Beach's employee-based program are examples of this second model. Some cities sell advertising rights at the bike stations and on the bikes themselves to help defray program costs, but the program is not operated by an advertising company.

Pricing of bike sharing programs is structured to encourage short trips in order to prevent users from tying up a single bicycle for long periods of time and to optimize utilization of the fleet.

The Vélib program in Paris, France is one of the most successful examples of the 3rd generation bicycle sharing programs. Vélib provides rental bikes that are available day or night throughout the city and stations are densely distributed. The system has 1,450 stations located about 900 – 1500 feet apart. Stations consist of terminals and stands for securing the bikes. Bicycles are accessed through Smart Cards that can be swiped at any station. Bicycles can also be returned at any station. Annual membership is not required, but accounts are linked to a credit card which is charged in the event of loss or damage to a bicycle. The first 30 minutes of each use are free, $1.30 for the second half hour, $2.60 for the third half hour and $5.20 for the fourth half hour and each additional half hour. The maximum ride time is three hours. Credit cards may also be used to purchase a short-term pass of one-day or seven-day subscriptions.

Current Policies and Programs

Launched in the spring of 2007, the Bikestation in downtown Santa Barbara provides bicycle parking as well as short-term bicycle rentals as part of the "Green Bike Program."

The City of Santa Barbara has also purchased and maintains a fleet of bicycles that are located at a number of city buildings and that City employees can use during business hours.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a modest expansion of existing City-operated bike sharing program available to the public as follows:

- Limited number of bikes at a limited number of locations focused in Areas 1 and 2.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Providing indoor space for stations in existing City facilities (similar to existing downtown Bike Station).
    - Promotion and marketing support.
    - Small increase to existing financial subsidy.

Alternative 1

Assumes maintenance of existing bike sharing programs.

Alternative 2

In addition to the programs discussed in the Plan Santa Barbara alternative, assumes a robust expansion of bike sharing programs available to the public as follows:

- An appropriately-sized vehicle fleet sized to provide on-demand vehicle access.
- A distributed network of vehicle locations throughout Santa Barbara.
- Supported by the City of Santa Barbara via one or more of the following methods:
    - Conversion of select number of on-street parking spaces to bike sharing stations.
    - Larger increase to existing financial subsidy.
- In order to realize greater expansion in a cost-effective manner, consider shifting from a City-operated program to a privately-operated program, similar to the Vélib model.

Summary of Literature and Study Impacts

Successful bike sharing programs have resulted in automobile to bike mode shifts as large as 5% to 8% in the areas they serve.[49] Impacts may be lower if conditions are not conducive to bicycling (few available bicycles, insufficient bike routes, poor weather).

In general, bike share programs are not utilized for regular commuter trips: since there is a per-use fee, regular bicycle commuters will ultimately purchase their own bicycle. Instead, bike-share programs are a “supportive” mode in that that they provide on-demand and roughly door-to-door travel for short, unscheduled trips that are too far to walk and not well-served by transit. Similar to car-sharing programs, bike sharing programs – while not used primarily for commuting – play an important role in the transportation system by allowing commuters to travel by transit knowing that they will have multiple travel options available to them during the workday.

[49] Victoria Transport Policy Institute (2008), *Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips*, http://www.vtpi.org/tdm/tdm126.htm

Summary of Estimated Impacts in Santa Barbara

The available research does not allow Nelson\Nygaard to develop a meaningful estimate of the impacts of bike sharing programs on peak hour vehicle trips, vehicle ownership, or VMT. In addition, it is our professional opinion that implementation of a bike sharing program would likely result in a relatively small reduction in peak hour vehicle trips. This does not imply that a bike sharing program would have no impact on vehicle ownership and trips in Santa Barbara, or offer secondary benefits to the residents, employees, and visitors (such as expanded mobility options, better public health outcomes through encouragement of active transportation, etc.). However, any benefits realized from a bike sharing program have been excluded from the impacts analysis in order to maintain a conservative methodology.

Category 4: Mode Shift Policies

4.1 Safe Routes to School

Overview

Safe Routes to Schools (SR2S) programs integrate health, fitness, traffic relief, environmental awareness and safety under one program. The goal is typically to increase the number of non-motorized (walk and bike) and higher occupancy (carpool and transit) trips to schools, in order to:

- Reduce traffic congestion around schools.
- Increase physical activity for children and youth.
- Foster a healthier lifestyle for the whole family.
- Create safer, calmer streets and neighborhoods.
- Improve air quality and a cleaner environment.

A SR2S program typically consists of five key components:

- *Education.* Classroom lessons teach children the skills necessary to navigate through busy streets and show them how to be active participants in the program.
- *Engineering.* A licensed traffic engineer can assist schools in developing a plan to provide a safer environment for children to walk and bike to school.
- *Encouragement.* Events, contests and promotional materials are incentives that encourage children and parents to try walking and biking.
- *Enforcement.* Police officers, crossing guards and other law enforcement officials can participate throughout the Safe Routes process to encourage safe travel through the community.
- *Evaluation.* Program participation should regularly be monitored to determine the growth in student and parent participation. Typically, “before and after” surveys are taken to ascertain any change in travel mode to school over the course of the year.

Current Policies and Programs

The City of Santa Barbara currently partners with schools and community groups to assist with the development of SR2S activities. The non-profit Coalition for Sustainable Transportation (COAST) is the lead coordinator of SR2S efforts in Santa Barbara in partnership with 20 agency and community partners, including the Santa Barbara Bicycle Coalition, the PTA Safety Committee, various government and law enforcement agencies, SBCAG’s Traffic Solutions, and the Diabetes Resource Center. The COAST SR2S program has developed a school zone safety package, a public awareness program (including two bilingual safety videos), and an education and safety-training program. The program also and distributes low-cost bicycle helmets (free to low-income children). In addition to funding from the City of Santa Barbara, SR2S activities have received funding from the Santa Barbara Foundation and from private donations. In the past, sixteen schools have participated in SR2S activities.

The City of Santa Barbara has further supported the SR2S activities by:

- Developing “Suggested Route to School Maps” for all 18 public elementary, junior high, and high schools in the City of Santa Barbara.
- Developing Concept Improvement Plans for select schools.
- Generally prioritizing pedestrian improvements in the vicinity of schools.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate expansion in the existing Safe Routes to Schools program.

Alternative 1

Assumes maintenance of the existing Safe Routes to Schools program.

Alternative 2

Assumes a robust expansion of the existing Safe Routes to Schools program.

Summary of Literature and Study Impacts

Marin County's Safe Routes to Schools program is considered very successful, particularly in reducing "chauffeured student trips." To measure the effectiveness of the program, individual classroom teachers administer "before" and "after" surveys at participating schools (both public and private) to determine how students travel to school. The "before" survey is generally taken at the beginning of the semester in which Safe Routes education is offered and the "after" survey is taken at the conclusion of the school year. A survey conducted between fall 2004 and spring 2005 shows that the annual education program reduced the chauffeured student trips by 24%, and increased walking by 43%, biking by 29% and carpooling by 29%.[50]

Figure 11 Mode Shift Impacts

	Fall 2004	Spring 2005	% Change
Single Student Car	55%	42%	-24%
Carpool	17%	22%	+29%
Bus	7%	7%	0%
Bike	7%	9%	+29%
Walk	14%	20%	+43%

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a modest expansion of the existing Safe Routes to Schools program will result in a roughly 9% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 3% decrease in Areas 3 and 4. No estimates can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

Alternative 1

No increase in the existing Safe Routes to Schools program is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of the existing Safe Routes to Schools program will result in a roughly 12% decrease in drive alone chauffeured student trips in Areas 1 and 2, and a 6% decrease in Areas 3 and 4. No estimates

[50] Transportation Authority of Marin (2006), *Safe Routes to School, Evaluations and Recommendations 2005-2006*, http://www.tam.ca.gov/index.aspx?page=180.

can be made regarding the possible reduction in VMT or vehicle ownership given the lack of available research.

4.2 Carpooling

Overview

Carpooling is the shared use of a car by the driver—usually the owner of the vehicle—and one or more passengers. When carpooling, people either get a ride or offer a ride to others instead of each driving separately. Carpooling arrangements and schemes involve varying degrees of formality and regularity. Carpools may be formal - arranged through an employer, public website, etc. - or casual, where the driver and passenger might not know each other or have agreed upon arrangements.

Current Policies and Programs

The City of Santa Barbara provides a 75% subsidy for costs of a full vanpool. The City has established a "Rideshare" carpool program, which makes City vehicles available to registered City employee carpools of three or more persons. Carpoolers pay $0.20 per mile plus the costs of gas, with the rest of the vehicle costs funded by the department providing the vehicle. As of 2008 (the program's second year) there were 53 City employees in 18 registered carpools. Preferential parking is available for carpools and vanpools.

The County of Santa Barbara offers free parking passes to carpools and vanpools on a space-available basis. UC Santa Barbara offers a no charge vanpool program and parking passes for TAP registered carpools and vanpools. SBCC has a dedicated Vanpool Program (currently running weekdays round-trip to SBCC from Santa Maria, Ventura and Ojai) and a carpool matching program. There are also several private employers which offer subsidized carpool or vanpool programs.

Plan Santa Barbara Assumptions

Plan Santa Barbara

Assumes a moderate increase in employee participation rates in carpools and vanpools.

Alternative 1

Assumes maintenance of existing employee participation rates in carpools and vanpools.

Alternative 2

Assumes a robust increase in employee participation rates in carpools and vanpools.

Summary of Literature and Study Impacts

Experience indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies.[51]

Rideshare programs that include incentives such as HOV priority and parking cash-out often reduce affected commute trips by 10-30%.[52] If implemented without such incentives travel impacts are usually smaller. A study conducted by Reid Ewing concluded that ridesharing programs can reduce daily vehicle commute trips to specific worksites by 5-15%, and up to 20% or more if implemented with parking pricing.[53]

[51] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov.
[52] Philip Winters and Daniel Rudge (1995), *Commute Alternatives Educational Outreach*, www.cutr.eng.usf.edu.
[53] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips.*

Analysis by other researchers indicate that the elasticity of vanpool ridership with respect to fees is -2.6% using a 1997 data set and -14.8% using a less statistically robust 1999 data set, that is, a one dollar decrease in vanpool fares is associated with a 2.6% to 14.8% increase in the predicted odds of choosing vanpool with respect to drive alone. The same study found that the elasticity of vanpooling with respect to price to be -0.61 (1997) and 13.4% (1999), meaning that for each 10% increase in vanpool price, there is a 6% to 13% decrease in vanpool choice with respect to auto. Conversely, a 10% decrease in vanpool price will increase the odds of choosing vanpool (with respect to auto) by 6% to 13%. Using a nested logit model, the study found the elasticity of vanpooling with respect to fares to be -1.14.[54]

One study estimates the price elasticity of vanpooling at about 1.5, meaning that a 10% reduction in vanpool fares increases ridership by about 15%.[55] For example, if vanpool fares that are currently $50 per month are reduced to $40 (a 20% reduction), ridership is likely to increase by about 30% (20% x 1.5). Of course, exact impacts will vary depending on the specific market and whether other ridesharing incentives are also provided.

Because rideshare passengers tend to have relatively long commutes, mileage reductions can be relatively large. For example, if ridesharing reduces 5% of commute trips it may reduce 10% of vehicle miles because the trips that are reduced are twice as long as average. Rideshare programs can typically reduce up to 8.3% of commute VMT, up to 3.6% of total regional VMT, and up to 1.8% of regional vehicle trips.[56]

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, a moderate expansion of carpool and vanpool programs will result in an employee rideshare increase of 5%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

Alternative 1

No increase in carpool and vanpool programs is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, a robust expansion of carpool and vanpool programs will result in an employee rideshare increase of 10%. No estimates can be made regarding the possible reduction in peak-hour vehicle trips, VMT, or vehicle ownership given the lack of available research.

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[54] Francis Wambalaba, Sisinnio Concas and Marlo Chavarria (2004), *Price Elasticity of Rideshare: Commuter Fringe Benefits for Vanpools*, http://www.nctr.usf.edu/pdf/527-14.pdf
Sisinnio Concas, Philip L. Winters and Francis W. Wambalaba (2005), *Fare Pricing Elasticity, Subsidies And The Demand For Vanpool Services*

[55] Bryon York and David Fabricatore (2001), *Puget Sound Vanpool Market Assessment*, www.wsdot.wa.gov

[56] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
TDM Resource Center (1996), *Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects*, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).

4.3 Telecommuting/Alternative Work Schedules

Overview

Telecommuting and alternative work schedules typically allow or require employees to start and/or leave work outside of peak hours. These strategies are often a part of a company's travel demand management program and include:

- *Flextime.* Employees are allowed some flexibility in their daily work schedules, e.g. starting at 7:30AM or after 9AM and leaving at 4 PM pr after 6 PM.
- *Compressed Workweek (CWW).* Employees work fewer but longer days, such as four 10-hour days each week (4/40), or 9-hour days with one day off every two weeks (9/80).
- *Staggered Shifts.* Shifts are staggered to reduce the number of employees arriving and leaving a worksite at one time, e.g. one shift works between 8:00 and 4:30, another shift 8:30 and 5:00, and a third 9:00 and 5:30.

Employer participation can be pursued through a combination of incentives for existing employers and commercial development and requirements for new employers and commercial development.[57]

Current Policies and Programs

The City of Santa Barbara currently offers a 9/80 work schedule option to all employees and 81 percent of employees participate. For private employers, SBCAG administers the Flexwork SB program. SBCAG works with individual employers to help them develop programs for their employees such as flexible work schedules, outside of the traditional 8 am to 5 pm schedule. Some employers support employees working a compressed work week, either eight hours in nine days or 40 hours in four days. Another option is for employees to perform their normal work duties at a location away from the conventional office, to reduce the frequency of work commute trips.

UC Santa Barbara offers flexible work schedules and telecommuting for certain staff.

Plan Santa Barbara EIR Assumptions

Plan Santa Barbara

Assumes a moderate increase employer participation in offering telecommuting and alternative work schedule to employees.

Alternative 1

Assumes maintenance of existing telecommuting and alternative work schedule programs.

Alternative 2

Assumes a robust increase in employer participation in offering telecommuting and alternative work schedule to employees.

Summary of Literature and Study Impacts

Flextime reduces peak period congestion directly, and can make ridesharing and transit use more feasible.[58] Staggered shifts can reduce peak-period trips, particularly around large employment

[57] The legal basis for incentivizing and requiring employers to implement travel demand management programs is discussed in detail in the Transportation Demand Management chapter (pages 68-69) of the *Plan Santa Barbara Existing Transportation Conditions Report* (dated August 2008).

centers. Reid Ewing estimates that flextime and telecommuting together can reduce peak-hour vehicle commute trips by 20-50%.[59]

Flexible work schedules can also reduce total vehicle travel. One survey of commuters found that it could reduce vehicle trips by up to 8% if 50% of employees are participating in the program, making it among the most effective commute trip reduction strategies considered.[60]

Another analysis estimates that compressed work weeks can reduce up to 0.6% of VMT and up to 0.5% of vehicle trips in a region.[61] However, other research indicates that compressed work weeks may provide modest reductions in total vehicle travel, in part because participants make additional trips during their non-work days.[62] Compressed work weeks may also encourage some employees to move further from worksites or to drive rather than rideshare.

Summary of Estimated Impacts in Santa Barbara

Plan Santa Barbara

Based on the available research and our professional judgment, we conservatively estimate that a modest increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 10% in Areas 1 and 2, and by 5% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

Alternative 1

No increase in telecommuting/alternative work schedules is assumed under this scenario; there is therefore no anticipated net reduction in peak-hour vehicle commuting trips.

Alternative 2

Based on the available research and our professional judgment, we conservatively estimate that a robust increase in telecommuting/alternative work schedule programs could reduce peak-hour vehicle commuting trips by roughly 25% in Areas 1 and 2, and by 15% in Areas 3 and 4. No estimates can be made regarding the possible reduction in vehicle ownership or VMT given the lack of available research.

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[58] Alyssa Freas and Stuart Anderson (1991), *Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321*.
[59] Reid Ewing (1993), *TDM, Growth Management, and the Other Four Out of Five Trips*
[60] Center for Urban Transportation Research (1998), *A Market-Based Approach to Cost-Effective Trip Reduction Program Design*, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf.
[61] Apogee (1994), *Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature*, National Association of Regional Councils (www.narc.org).
[62] Amy Ho and Jakki Stewart (1992), "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," *Transportation Research Record 1346*, TRB (www.trb.org), pp. 25-32 and Genevieve Giuliano (1995), "The Weakening Transportation-Land Use Connection, *ACCESS*, Vol. 6, University of California Transportation Center (www.uctc.net), Spring 1995, pp. 3-11.

Appendix E

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APPENDIX I-7

PLAN SANTA BARBARA PARKING ANALYSIS (NELSON/NYGAARD)

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M E M O R A N D U M

To: Rob Dayton

From: Jeremy Nelson and Magnus Barber

Date: June 5, 2009

Subject: Summary of Downtown Santa Barbara On-Street Parking Survey

Executive Summary

At the direction of the City of Santa Barbara, Nelson\Nygaard conducted survey of on-street parking in downtown Santa Barbara and downtown-adjacent neighborhoods.

The purpose of this survey was to gain a better understanding of on-street parking in downtown Santa Barbara- as was identified in the *Plan Santa Barbara Existing Conditions Report* the City has good data for downtown parking lots and garages (both total supply and occupancy patterns), but no recent data on on-street parking.

For this reason, the survey provided a field-based estimate of existing on-street parking spaces (supply) and surveyed both how many spaces were utilized throughout the day (occupancy) and how cars were parked in each space (length of stay). At the request of City staff, Nelson\Nygaard also collected data on residential permit utilization.

The survey was conducted Friday 3/20/09 and Saturday 3/21/09. Nelson\Nygaard staff managed the data gathering process and conducted an inventory of the parking supply. In addition, Nelson\Nygaard supervised a team of surveyors (consisting of both temporary labor and City staff) to carry out the parking survey. The weather during the survey was unusually cool and overcast, and so the levels of occupancy observed should be viewed as conservative.

Finally, Nelson\Nygaard analyzed and mapped the on-street parking data. As discussed in greater detail in this memo, key findings include:

- **Occupancy:** At the peak demand hour for the entire on-street parking system, parking demand was highly variable, with some blocks at full capacity and some blocks with excess capacity. This pattern was observed at the peak demand hour for both Friday (see Appendix A) and Saturday (see Appendix B). This finding suggests that current on-street parking management policies are not succeeding in geographically balancing supply and demand, resulting in on-street parking being difficult to find on certain blocks while readily available a few blocks away.

- **Length of Stay:** A significant portion of vehicles were found to park for considerably longer than the posted time limits. This pattern was observed on for both Friday (see Appendix C) and Saturday (see Appendix D). This finding suggests that current on-street parking management policies are not promoting the most efficient utilization of the limited on-street parking supply, resulting in the short-term curb spaces intended for downtown visitors and shoppers being used for long-term parking by commuters.

- **Permit Utilization:** Very few vehicles were observed using residential parking permits during the survey periods.

Methodology

Parking Supply Inventory

An inventory of parking spaces was conducted by examining parking regulations on all block faces in the study area. Special note was made of no parking zones, accessible parking spaces, and time limits and other restrictions.

Because most on-street parking in downtown Santa Barbara is not striped, the total number of available parking spaces was estimated by measuring the length of curb between the parcel lines at each corner of each block where parking is allowed. A geo-referenced CAD file was available for most of the downtown area, which was used to find the length on each block consisting of curb cuts or designated as no parking. Outside the downtown commercial area, several representative blocks were measured to find the typical amount of parking lost to curb cuts, fire hydrants etc. in different types of neighborhoods. From this the curb length available to parking on each block was generated. Each of these curb lengths were divided by 20 feet, a typical length for a parking space.

Each block face was then assigned a unique ID number. GIS software was used to determine the length of each block face. By dividing the total curb length available for parking by the average length of a parking space, the number of spaces on each block face could be estimated.

The actual number of parking spaces on a street face may vary somewhat, depending on how tightly cars are packed and the types of vehicles parked on that block at that time. For example, the field-estimate methodology may estimate fewer spaces than are actually available if there are a disproportionate number of small vehicles parked on a particular block or if vehicles are parked very close together. Conversely, if there is a disproportionate number of longer vehicles parked on a particular block or if vehicles are parked very far apart, then the field-estimate methodology may estimate more spaces that are actually available. This variability “averages out” across the 88-block survey area and the 2-day survey period.

Bearing the above limitations in mind, the estimated total supply in the survey area is 4,250 spaces and the supply within the 75-minute zone is 1,680 spaces.

Parking Occupancy and Length of Stay Survey

The parking survey was carried out on Friday 3/20/09 from 11 am to 7 pm, and Saturday 3/21/09 from 3 pm to 11 pm.

The survey area was bounded to the west and east by the 101 Freeway and Garden Street, and to the north and south by Sola Street and the 101 freeway, an area of approximately 88 blocks.

20 temps and 2 city staff carried out bi-hourly surveys within the survey area. The number of staff required was based on previous survey experience in dense urban environments with high utilization of on-street parking.[1] Surveyor recorded the number of vehicles parked on each block (to be used to derive occupancy) and the license plate of each vehicle (to be used to derive length of stay).

All temps currently lived in Santa Barbara and many had lived there most of their lives. Their local knowledge provided insight into traffic and parking patterns and what could be considered normal activity levels; for example, the temps provided the following anecdotal information:

- Most thought the levels of pedestrian traffic on State Street were unusually low and temps attributed this to the unseasonal cool and overcast weather during the survey.
- With regards to parking, the temps observed that most visitors either park off-street downtown or park in the public lots south of 101.
- Temps reported that motorists perceive that enforcement is only robust for a few blocks on either side of State Street and so in other areas of downtown people park for extended times at white and green curbs without being afraid of getting a ticket.

The methodology used to calculate average duration of stay might best be explained by an example:

Say a block has three parking spaces and was surveyed four times at two hourly intervals, and the 3 digits of the license plates are recorded:

	11 am	**1 pm**	**3 pm**	**5 pm**
Space 1	ABC	ABC	ABC	ABC
Space 2	DEF	<empty>	JKL	JKL
Space 3	GHI	GHI	<empty>	<empty>

Here we can see that there are a total of 9 cars parked for two hours per survey period, but there are only 4 unique license plate IDs. So the average time of stay per unique vehicle is 2 hours x 9 vehicles/4 unique vehicle IDs = 4.5 hours. The distribution is:

8 hours – 1 vehicle

[1] Future surveys could be carried out either with fewer staff, or with more frequent survey periods, as the relatively low level of occupancy and extensive no parking areas meant that surveyors could maintain higher travel speeds than anticipated.

6 hours – 0 vehicles

4 hours – 2 vehicles

2 hours – 1 vehicle

It is common practice to define the length of stay as one full survey period for each time a vehicle is observed, though this is a simplification. It is only possible to know the location of a vehicle when it is present in a space at the time a surveyor passes it. It is not possible to know if it arrived a few minutes after the previous survey registered an empty space, or a few minutes before the current survey. Likewise, it is not possible to know how long a vehicle stays after it was counted by the surveyor – did it leave a few minutes later, or only a few minutes before the following survey measurement? Hence, some uncertainty is inevitable, though it is minimized by more frequent survey intervals. The frequency of survey intervals needs to be balanced against the available budget for each survey – as shorter survey intervals require more surveyors to cover any given area.

Findings

Occupancy

The observed peak demand hour for the on-street parking system for Friday was:

- 1 pm for the entire survey area (2,230 cars, 52%)
- 11 am within the 75 minute zone (977 cars, 58%)

While the observed occupancy at both Friday 3 pm and Friday 5 pm was lower than the Friday peak demand hour, the 5 pm occupancy was higher than at 3pm and almost as high as the peak. It is possible that occupancy later on Friday (i.e. after the end of the Friday survey period at 7pm) was higher than the observed Friday peak occupancy.

The observed peak demand hour for the on-street parking system for Saturday was:

- 7 pm for the entire survey area (2,430 cars, 57%)
- 7 pm within the 75 minute zone (1,062 cars, 63%)

Table 1 summarizes the occupancy for all survey periods. Occupancy was generally higher on Saturday than on Friday.

Table 1: Level of Occupancy, Friday and Saturday

Area	Friday				Saturday			
	11:00 AM	1:00 PM	3:00 PM	5:00 PM	3:00 PM	5:00 PM	7:00 PM	9:00 PM
Survey area	52%	52%	49%	50%	49%	52%	57%	52%
75-minute zone	58%	56%	57%	54%	48%	50%	63%	58%

On both days, occupancy was higher in the streets within a few blocks of State Street throughout the length of the survey area from Gutierrez Street to Sola Street. Here there were several areas where multiple blocks were between 75 - 100% occupancy, meaning that it would be challenging for visitors to find a space. The largest of these areas was seen on Saturday around the Paseo Nuevo Shopping Center, both to the west and the east. On Saturday there was also a large group of high occupancy blocks between Sola Street and Victoria Street, from De la Vina Street to Anacapa Street. See occupancy maps in Appendices A and B, showing the parking occupancy for each block at the peak demand hour for each day of the survey. It is likely occupancy in and near these popular areas would have been even higher had the weather not been cool and cloudy during the survey.

The high variability of parking demand at the peak demand hour (with some blocks at full capacity and some blocks with excess capacity) suggests that current on-street parking management policies are not succeeding in geographically balancing supply and demand, resulting in on-street parking being difficult to find on certain blocks while readily available a few blocks away. At the most popular destinations with high on-street occupancy, visitors may need to cruise to find on-street parking. This is inconvenient for visitors, and the additional traffic causes unnecessary pollution and potentially congestion.

The *Plan Santa Barbara Existing Conditions Report* showed that the there was surplus off-street parking capacity even at peak demand hour for the off-street parking system. Changes to on-street parking management including demand-responsive pricing at the appropriate level would encourage long-term parking to move to off-street facilities or to blocks with on-street capacity, and increase turnover of curb spaces for those visitors seeking short-term parking. Best practices suggest that the price should be set so that each block always has 15% of spaces available. This ensures that on-street parking is available for short-term parkers such as visitors to restaurants or retail shopping, while long-term parkers such as employees are encouraged to park further away from the downtown core or in off-street facilities.

Average Duration of Stay

A significant portion of vehicles were found to park for considerably longer than the posted time limits.

Average duration of stay on Friday was:

- Survey area: 3 hours and 6 minutes
- 75 minute zone: 2 hours and 23 minutes
- Outside the 75 minute zone: 3 hours and 46 minutes

Average duration of stay on Saturday was:

- Survey area: 3 hours and 22 minutes
- 75 minute zone: 2 hours and 33 minutes
- Outside the 75 minute zone: 4 hours and 6 minutes

See the length of stay maps in Appendices C and D, showing the average length of stay per block for Friday and Saturday. Note that almost all blocks show an average length of stay greater than two hours.[2]

As could be reasonably expected, the longest average stays were seen in the residential neighborhoods to the west of downtown and bordering the 101 freeway, where there are no time limits. A large proportion of these blocks had an average stay of four to six hours.

Overstay of Time Limits

As can be seen from the average duration of stay, a significant portion of vehicles were found to overstay the posted time limits in the 75- and 90- minute zones. Very few vehicles were observed with residential parking permits, except as noted below.

The percentage of vehicles overstaying time limits varied between 30 - 70% of vehicles parked, depending on the block. This is relatively conservative and includes only vehicles parked for 2 hours or more[3]. That means a 30-minute overstay in the 90-minute zones and a 45-minute overstay in the 75-minute zones. If shorter overstays had been captured the number of violations would have been higher still.

This finding suggests that current on-street parking management policies are not promoting the most efficient utilization of the limited on-street parking supply, resulting in the short-term curb spaces intended for downtown visitors and shoppers being used for long-term parking by commuters.

The intention of time-limited parking is usually to preserve premium on-street parking close to popular destinations as short term parking for visitors. The long average duration of stay could either indicate that on-street parking is being used by employees at nearby businesses, in which case short term visitors will find availability of parking to be limited, or it could indicate that visitors prefer to stay for longer than the time limit. In the first case, employees should be encouraged not to park in short term parking, for example by making this parking unattractive to long term use or by implementing a transportation demand management program for downtown businesses that would help commuters transition to a different mode of transportation. In the latter case, local businesses might be losing customers if their patrons feel pressured to return to their vehicles.

The data also shows that some drivers moved their vehicles within the same block or nearby as a way of working around time restrictions. This is technically illegal and should be considered a

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[2] For this analysis, the 75-minute zone was assumed to be bordered by Victoria Street to the north, Santa Barbara Street to the east, up to but not including De la Vina to the west and Gutierrez-Motor Way-Parker Way-Chapala-Cota to the south. This is a simplification, since the area is not uniformly marked as 75 minutes, but also contains many short segments of various types of short stay parking (white, green and yellow curbs). This simplification should not distract from the central finding that the average duration of stay for all types of parking within that area was significantly in excess of posted time limits for both survey days. Most blocks in the downtown area had average stays of two to three hours.

[3] Given the 2-hour sample periods, it is not possible to say anything about events on a shorter time scale than 120 minutes. But it does mean that if a vehicle is observed for 2 consecutive periods, then it definitely parked too long. It is necessary to sample at least twice the frequency of the most frequent event, but doing surveys at 37.5 minute or 45 minute intervals would not be practical.

violation of time limits since it is effectively using the short-term parking system for long-term parking. This type of violation is difficult to enforce against, because the number of parking control officers required for robust enforcement is impractical.

Newer meter technologies or occupancy sensors can relay back to a central server whether a parking space is occupied and for how long. In addition, enforcement vehicles with automated license plate reader technology such as the City's new AutoVue system, linked to a database of parking restrictions, would potentially be able to enforce against the "time limit shuffle." These technologies are expensive, though increased citation revenue can over time make it revenue neutral. Many cities have found that a more effective way to manage on-street parking is to eliminate time limits and implement paid parking in order to encourage higher turnover and promote better utilization of public streets.

The following table summarizes the advantages and disadvantages of solving the overstay of time limits either by increased enforcement or by eliminating time limits and implementing paid parking.

Increased Enforcement		Paid Parking	
Pro	**Con**	**Pro**	**Con**
No up front capital investments necessary	Substantial cost increase out of proportion with increased revenue from citations	Low running costs	Potentially significant up front capital investment
	Time limit continues to discourage visitors from staying as long as they like	Visitors can stay as long as they wish	
	Increased enforcement does little to increase availability of parking	When priced correctly, it will ensure that there is always parking available where and when a short-term parker needs it	
	Citation revenue is unlikely to cover enforcement costs, let alone provide revenue for downtown improvements.	Parking revenue can be reinvested in the downtown area to provide improved amenities, better maintenance etc.	

Permit Utilization

Very few parked vehicles were observed with residential parking permits. In general those permits that were observed were seen in residential areas to the west of downtown, with some exceptions. The vast majority of blocks observed did not have any vehicles displaying residential permits.

For example, there was a high proportion of vehicles displaying residential parking permits in the blocks immediately to the west of the Paseo Nuevo Shopping Center, particularly along De la Guerra, Ortega and blocks branching off these, between Chapala Street and Bath Street. These vehicles also parked for considerable lengths of time, resulting in high average lengths of stay (from just less than three hours to over four hours). For more information, see the length of stay maps in Appendices C and D and the data analysis master spreadsheet tabs routes 10 and 17.

Conclusions

The central findings of the parking survey are as follows:

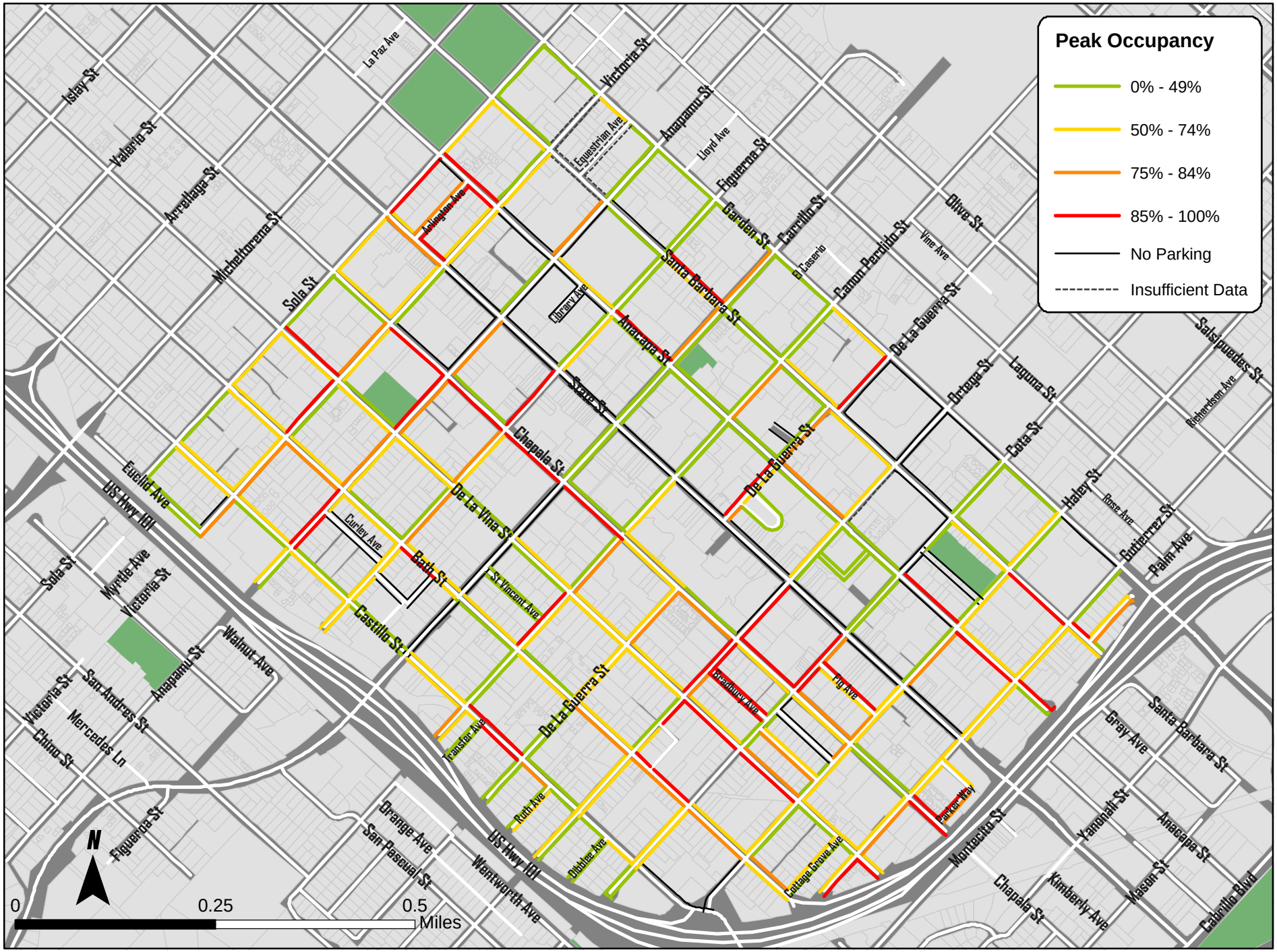
- Current parking management policies are not discouraging parkers from staying significantly longer than the posted time limits.
- As a whole there is plenty of on-street parking available in downtown Santa Barbara, even at the peak demand hour; however, usage is not uniformly distributed.
- Residential permits do not appear to be frequently used to park for extended periods in the downtown area.

Based on these findings, the City of Santa Barbara might consider the following policies to make best use of available public street space:

- Relax or eliminate time limits, which do not appear to be having the desired effect of managing occupancy or turnover.
- The relative prices of on- and off-street parking ought to give long term parkers an incentive to park off-street.
- Implement demand-responsive paid parking on streets with high parking demand to:
  - Ensure better availability of on-street parking for all visitors.
  - Minimize “cruising” for free parking.
  - Encourage a balancing of parking demand and supply and a shift to underutilized streets and off-street parking near the most popular destinations.
  - Encourage employees not to park on-street all day, taking up valuable on-street spots.

Appendix A: Peak Occupancy, Friday

Parking - Friday Peak Hour Occupancy (1PM)

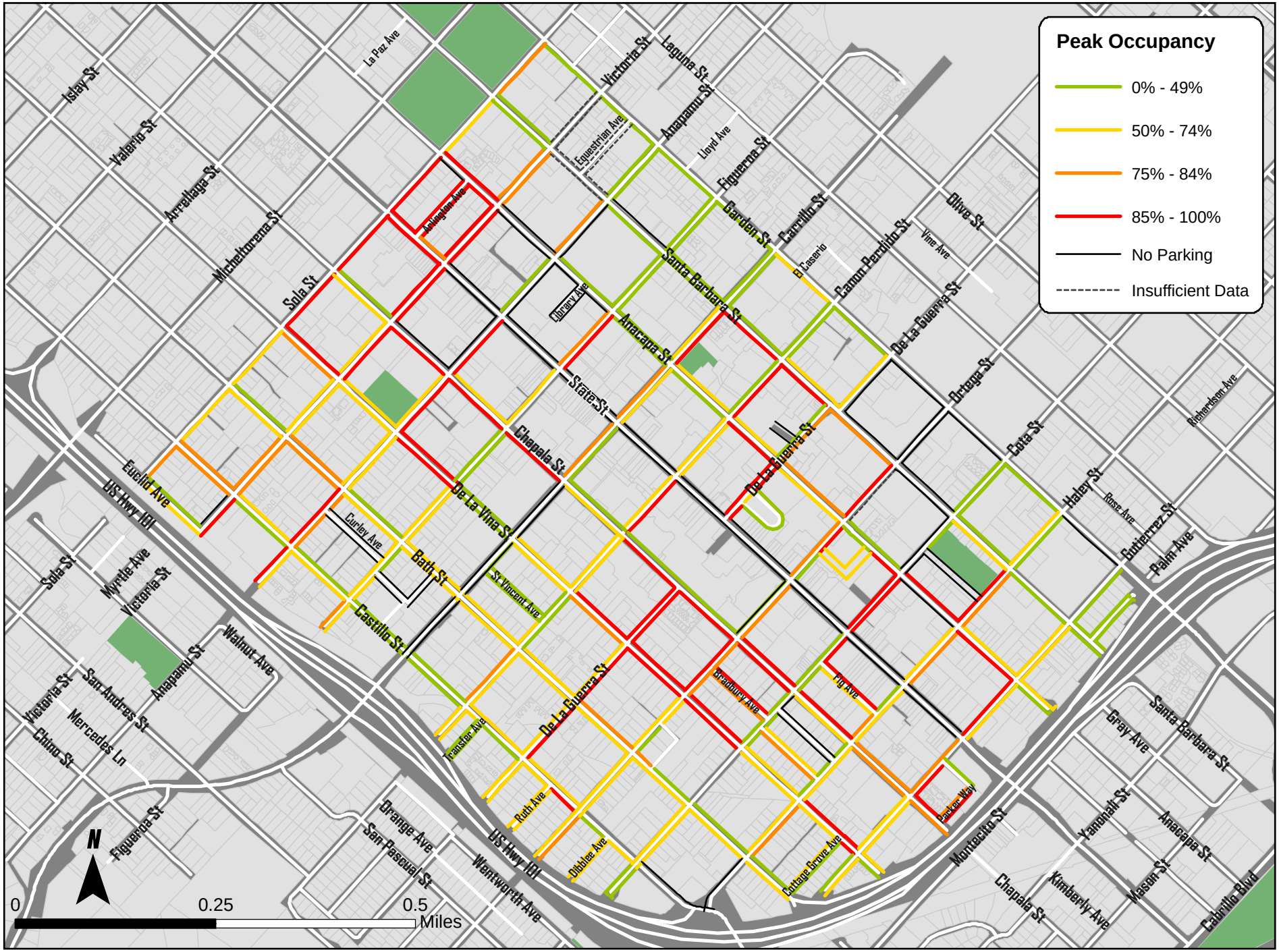


Nelson|Nygaard
consulting associates

GIS Data Source: City of Santa Barbara

Appendix B: Peak Occupancy, Saturday

Parking - Saturday Peak Hour Occupancy (7PM)

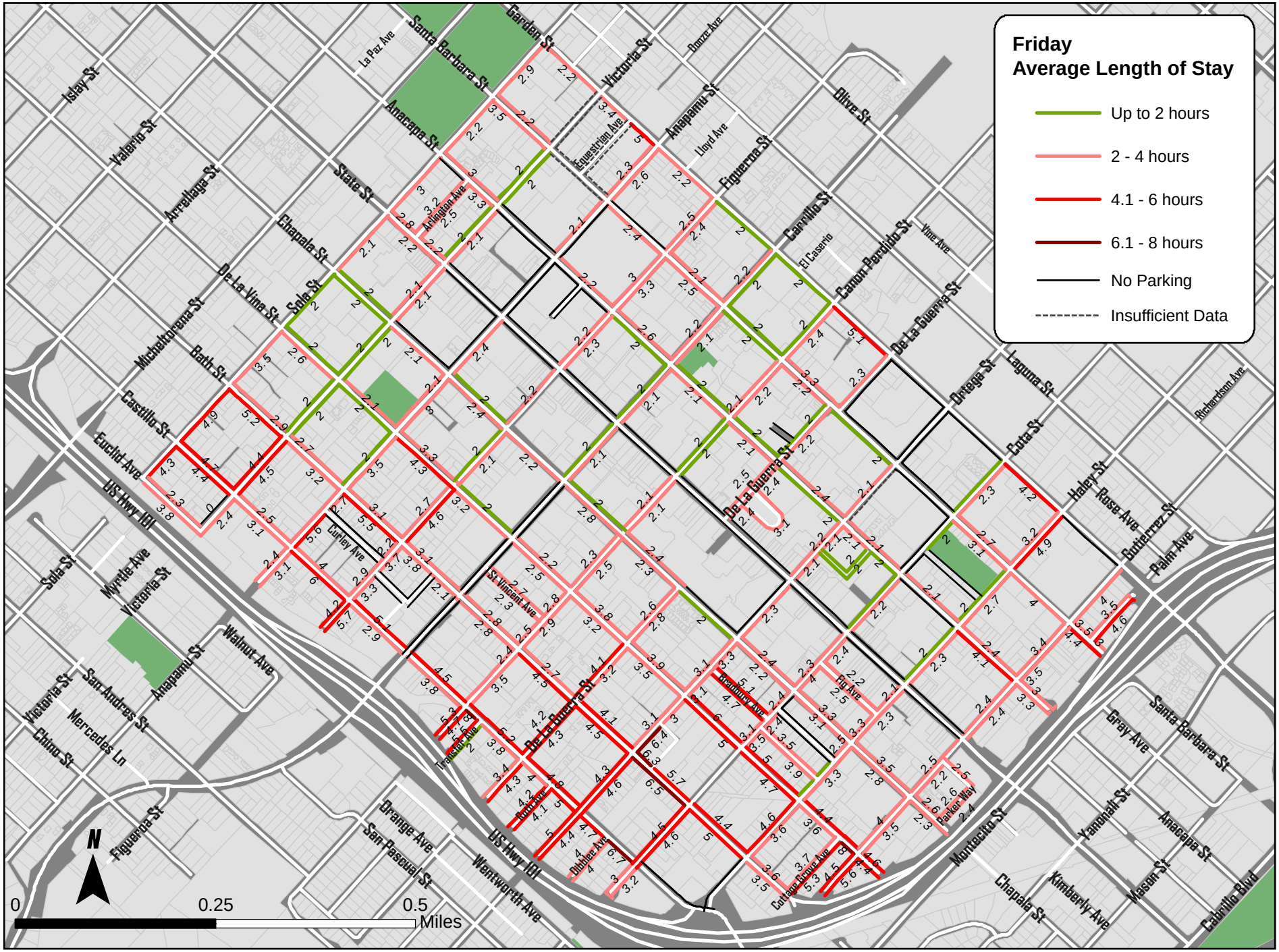


Nelson|Nygaard consulting associates

GIS Data Source: City of Santa Barbara

Appendix C: Average Length of Stay, Friday

Parking - Friday Average Length of Stay

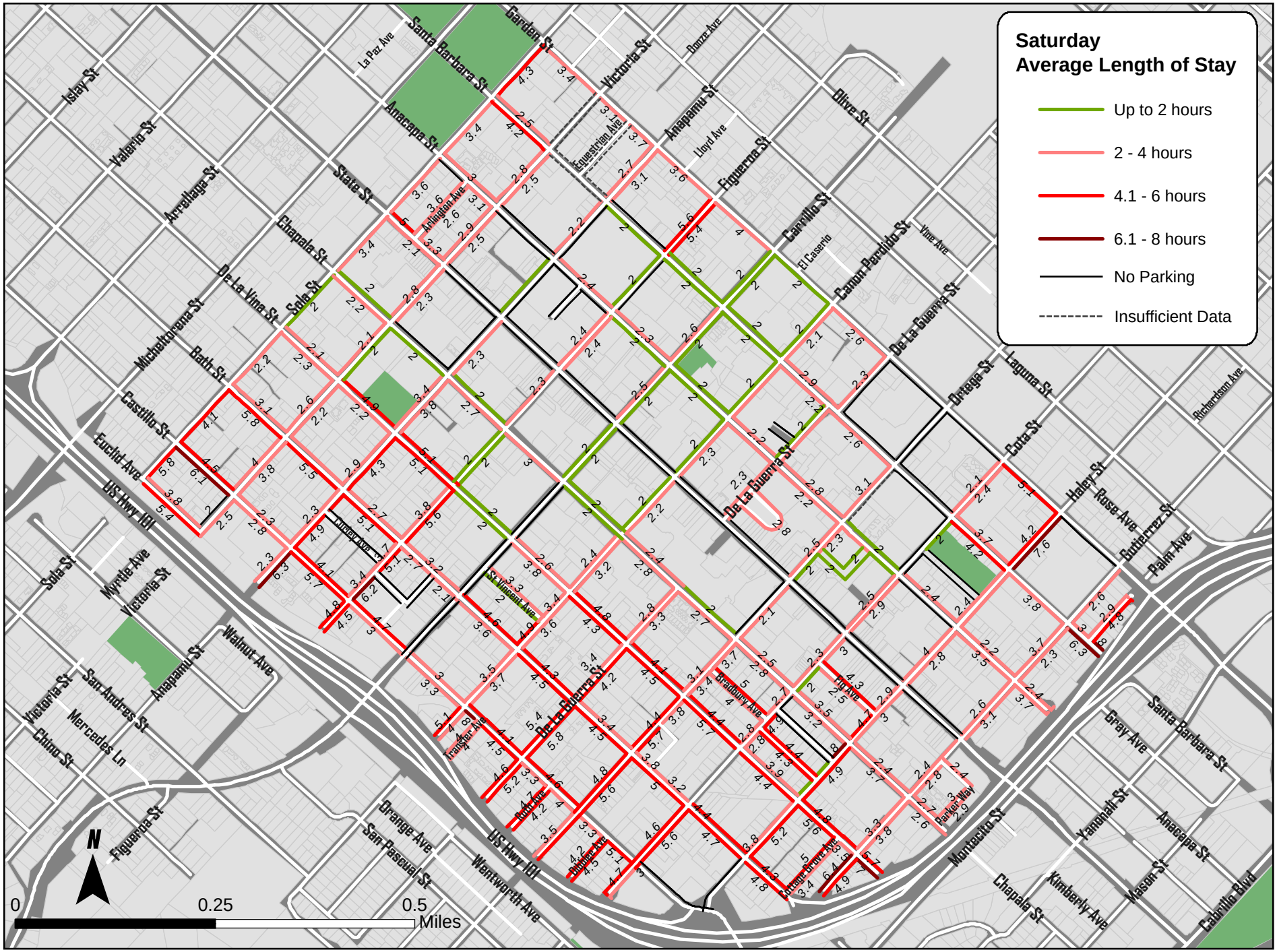


Nelson|Nygaard consulting associates

GIS Data Source: City of Santa Barbara

Appendix D: Average Length of Stay, Saturday

Parking - Saturday Average Length of Stay



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consulting associates

GIS Data Source: City of Santa Barbara

APPENDIX J

ENERGY

APPENDIX J: ENERGY

State and Regional Energy Setting

California

California's largest energy sources are crude oil and natural gas, followed by coal and nuclear power (California Energy Commission [CEC] 2008a). Additional sources of energy include renewable sources (e.g., geothermal, small hydroelectric) and large hydroelectric facilities. Renewable energy sources currently comprise less than 10% of California's total energy supply. California consumes the second greatest quantity of natural gas in the U.S. after Texas, but ranks 45th in coal consumption, with by far the lowest per capita coal consumption in the nation.

In terms of energy use by sector, transportation consumes more than the stationary source energy consumed by residential and commercial uses together.

Electricity Supply

Currently, there is no public region-wide system in the western U.S. that identifies delivery of contracted electricity generation sources and short-term market purchases to specific locations in California. The California Energy Commission (CEC) makes estimates and uses general assumptions to allocate the quantities of imported electricity to specific fuel types and locations (CEC 2008b).

California's largest source of energy for electrical power generation is natural gas, followed by coal and nuclear power (Figure J-1). Natural gas power plants dominate in-state power generation due to air quality restrictions. However, nuclear power plants such as those at San Onofre and Diablo Canyon are also important sources of in-state power generation. Conversely, California imports the vast majority of electricity supplied from coal-fired power plants located out of state, often from southwestern states such as Nevada. As of 2007, only 8% of the State's coal-derived electricity was generated in-state, accounting for less than 2%t of the State's total energy sources (CEC 2008a).

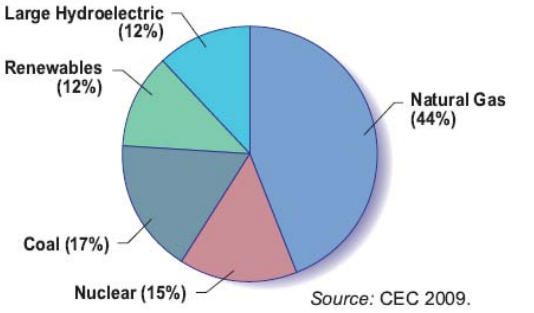

Figure J-1 California Electrical Generation Mix (2007)

Although California relies on non-renewable natural gas and coal for 61% of its electricity supply, California also leads the U.S. in generation of electricity from non-hydroelectric renewable energy sources, and is also the leading generator of hydroelectric power in the Country. However, California imports more electricity from other parts of the country than any other state, importing approximately 30% of its power from the Pacific Northwest and Southwestern U.S. (EIA 2008b; CEC 2008a). Of the renewable sources of electricity, approximately 38% are derived from geothermal, 24% from small hydroelectric power, 20% from wind power, 18% from biomass and waste products, and only 2% from solar energy (CEC 2008a & 2008b). The vast majority of the State's renewable energy sources are generated in-state – 100% of solar, 99% of geothermal, 92% of biomass, 93% of small hydroelectric, and 92% of wind (CEC 2007).

Electricity Consumption

Commercial uses are the leading consumer of electricity in California, followed by residential and then industrial uses (Figure J-2). California uses less electricity per capita than any other state in the nation. While per capita electricity consumption in the United States increased by nearly 50% over the past 30 years,

California's per capita electricity use remained almost flat, due in large part to cost-effective building and appliance efficiency standards and other energy efficiency programs (CEC 2007a). From 1999 to 2006, electricity costs in California increased by more than 50%, which may also have played a role in slowing increased demand (CEC 2007a). Nevertheless, California is a major consumer of global electricity, consuming a total of 254 billion kWh in 2005, exceeding the country of Mexico (190 billion kWh in 2005), but representing only approximately 6.7% of U.S. demand (3,811 billion kWh in 2005).

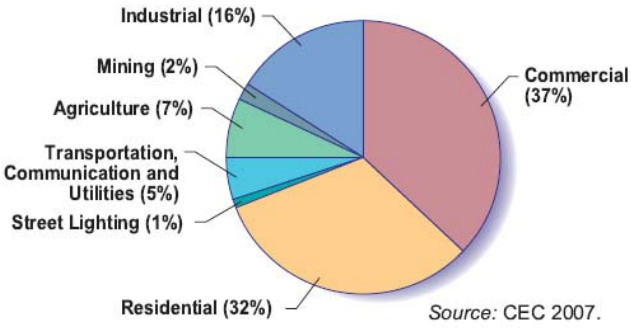

Figure J-2 Electrical Consumption in California by Sector (2006)

Natural Gas

Natural gas is a major component of home energy use in California, with space and water heating accounting for 88% of residential natural gas use (Figure J-3). Thirty years ago, serious air quality problems in the state caused the state to require a shift to use of natural gas for electric power generation because it is cleaner burning and releases fewer pollutants. Natural gas was also relatively inexpensive and helped diversify the state's electricity generation system. As a result, an increasing percentage of the state's power plants rely on natural gas for fuel (CEC 2008c). However, when combined with decreased production from the State's gas fields, increasing reliance on natural gas for power generation has resulted in increasing imports from out of state. In 2006, only 13.5% of the state's natural gas supply came from in-state sources, while 40% came from the U.S. Southwest, 23.5% from Canada, and 23% from the Rockies. Importation of such a high percentage of natural gas consumed can leave the state vulnerable to price shocks and supply disruptions (CEC 2007 and 2008c). From 1999 to 2008, the cost of natural gas in California more than doubled, with a 2008 price of $12.74 per thousand cubic feet (EIA 2009).

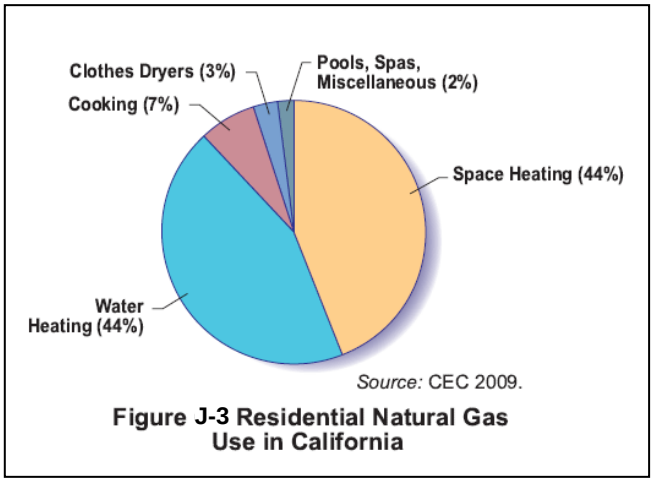

Figure J-3 Residential Natural Gas Use in California

Oil and Gasoline

In 2006 39% of the crude oil consumed in California was produced in-state while the majority (45%) was imported from other nations; 16% was shipped from Alaska (CEC 2008a). Currently, 21 petroleum refineries operate in California. Their combined crude oil distillation capacity totals more than 1.9 million barrels per day, ranking the state the third highest producer of transportation fuels in the nation. Ten of these refineries are located in the Los Angeles Basin and five in the San Francisco Bay Area. Between these two refining centers, more than 90% of California's crude oil input is processed. Of the remaining six refineries, three operate in Bakersfield, two in Santa Maria, and one in Oxnard. Until the mid-1990s, California refineries kept pace with the demand for gasoline and diesel fuel, but since then, refineries have had to import more finished products. Californians used almost 16 billion gallons of gasoline (including aviation gasoline and jet fuel) in 2006, making it the third largest consumer in the world, behind only the entire United States and China (CEC 2007). Per capita use of motor gasoline in 2008 (i.e., excluding jet fuel)

was 435 gallons per year, slightly less than the national per capita use of 484 gallons per year but substantially more than other large states such as Texas (352 gallons per year) (EIA 2009, U.S. Census 2009).

Santa Barbara County

Energy in Santa Barbara County is obtained from the following sources, in order of magnitude from greatest to least: (1) gasoline, (2) natural gas, (3) electricity, (4) diesel, and (5) aviation fuel (Community Environmental Council 2008a). A detailed summary of energy use in the County is provided in Table J-1.

More than half of the County's energy is used for transportation, nearly 34% is used for residential and industrial uses, and approximately 12% is used for commercial uses (Figure J-4). The largest source of energy is gasoline, nearly all of which goes towards transportation.

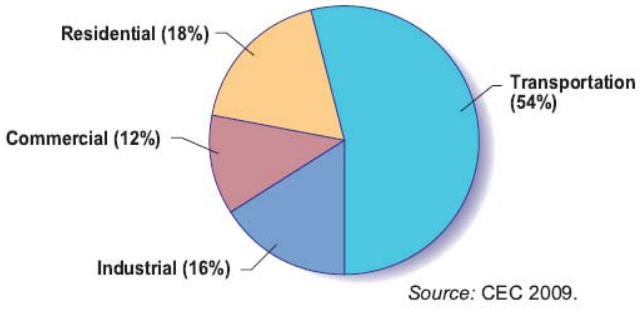

Figure J-4 Energy End Uses by Sector in Santa Barbara County in 2005

Table J-1: Energy Use in Santa Barbara County in 2005

Source	End Use (Percent Contributed)[1]	Percentage of Total County Energy
Gasoline[1] *Gasoline* *Ethanol*	Transportation 77% 5% 82% of total Transportation energy	43%
Natural Gas	45% of total Electricity energy 72% of Residential Heating energy 49% of Commercial Heating energy 62% of Industrial Heating	39%
Diesel *Diesel* *Biodiesel*	Transportation 13.7% 0.3% 14% of total Transportation energy	7%
Nuclear	18% of total Electrical energy	3%
Renewables *Geothermal* *Small Hydroelectric* *Wind* *Biomass & Waste* *Solar*	*Electricity* 10% 2% 2% 2% 1% 17% of total Electrical energy	3%
Large Hydroelectric	14% of total Electrical energy	2%
Aviation Fuel *Jet Fuel* *Aviation Gas*	Transportation 3.8% 0.2% 4% of total Transportation energy	2%
Coal	6% of total Electrical energy	1%

[1]Electricity is distributed to residential, commercial, and industrial uses. After the original energy source creates electricity, there is no way to determine how much each of the original sources contributed to specific sectors; therefore, only the percent contribution to total electricity generated is shown.
[2]Gasoline as sold in California contains a minimum of 5% ethanol.
Source: Community Environmental Council 2008a.

Electrical Supply

Electricity is the third largest source of energy in Santa Barbara County, behind natural gas and gasoline. The County's electric power is generated primarily from natural gas, followed by nuclear power, combined renewable energy sources, and large hydroelectric (Community Environmental Council 2008a).

No major electrical power-generating facilities are located in Santa Barbara County. The closest electrical power generation facilities are the Diablo Canyon nuclear plant and the Dynegy gas-fired power plant, both of which are located in San Luis Obispo County, and the Mandalay gas-fired generating station in Oxnard. Electricity in northern Santa Barbara County is distributed by Pacific Gas & Electric (PG&E) and in southern Santa Barbara County by Southern California Edison (SCE). Since the deregulation that occurred in the 1990s, SCE purchases electricity from various sources and is responsible for transmission and distribution to the public (CEC 2008b). Since utility deregulation occurred, SCE purchases the majority of its electricity from independent energy producers. SCE retains ownership of three generation facilities:

- Big Creek Powerhouse: Located in Fresno County and supplies 90% of SCE's hydroelectric power generation. The Big Creek Powerhouse has a combined capacity of approximately 1,000 megawatts (MW), or enough for half a million homes.
- San Onofre Nuclear Generating Station (SONGS): Located in San Diego County. SONGS generates approximately 2,200 MW of power, or enough to power 1.5 million southern California homes (SCE 2008a).
- Mohave Generation Station: Located in Laughlin, Nevada, this inactive 1,580 MW coal plant could serve approximately 1.55 million southern California homes (SCE 2008a). Closed in 2005 after 34 years of service per an agreement with several environmental groups, Mohave Generation Station obtained all of its coal supply from the Black Mesa coal mine, 275 miles from the plant in northeast Arizona (SCE 2008a).

In addition to these SCE-owned sources, Santa Barbara County receives non-renewable power from in-state facilities using natural gas, nuclear power and large hydroelectric (IEPA 2008). The percentage of power that the County receives from nuclear facilities is on par with state averages, while use of large hydropower is significantly higher than the statewide average[1]. The 6% of the electricity used in Santa Barbara County that is generated from out-of-state coal-fired power plants is less than 50% of the statewide average (Community Environmental Council 2008a).

Electric Consumption

County residents and businesses used 3,240 gigawatt-hours (GWh)[2] of electricity in 2007, with 43% provided by PG&E and 57% provided by SCE (Santa Barbara County 2008). The average electricity usage in a single-family home in the County is 7,431 kilowatt-hours (kWh) per year, in a multi-family home is 4,320 kWh per year, and in a mobile home is 4,189 kWh per year (Community Environmental Council 2008b). Mobile homes consume a surprising amount of electricity due to the lack of insulation and less efficient construction. Commercial and industrial use varies widely by type; however, large retail commercial centers and office complexes are major consumers of electric power for lighting, cooling, and heating purposes. Average electricity usage in retail commercial stores in the County[3] is 11,300 kWh annually per thousand square feet, for offices is 16,800 kWh per year for each thousand square feet, and for hotels is 14,000 kWh annually per

[1] Energy advocates consider large hydro-electric facilities as non-renewable sources due to sedimentation filling in lakes behind the dams and other environmental related damage (e.g., impacts to steelhead/ salmon).
[2] One GWh is equal to one million kWh, where one kWh is enough electricity to power 10 100-watt light bulbs for one hour (Community Environmental Council 2007a).
[3] Based on Climate Zone 4 of the Commercial Building Energy Consumption Survey (EIA 2006).

thousand square feet (EIA 2006). Light industrial uses are not surveyed by the EIA in the same manner as residential and commercial uses. From 1999-2008, the average retail cost of electricity from SCE rose approximately 25%, from 11.0 cents per kWh to 13.8 cents per kWh.

Natural Gas

As shown in Table J-1 above, natural gas accounts for approximately 39% of the County's total energy use, using 155 billion cubic feet in 2005 (Community Environmental Council 2008a; 2007a). The majority of natural gas is used for electrical power generation, representing approximately 45% of the total state electricity use (Community Environmental Council 2008a). The rest of the natural gas is used by residential, commercial, and industrial sectors, contributing 72%, 49%, and 62% of each sectors' total energy use, respectively (refer to Table 6-1). The residential sector uses 22% of the total natural gas, 88% of which is used for space and water heating (Community Environmental Council 2008c). The average natural gas usage in a single-family home in the County is 1,440 cubic feet, or 14.4 therms per year, in a multi-family home is 840 cubic feet or 8.4 therms per year, and is 990 cubic feet or 9.9 therms per year in a mobile home (Community Environmental Council 2008b). Commercial and industrial use varies widely by type. The approximate average gas usage in the County[2] is 17,000 cubic feet annually per thousand square feet for retail commercial stores, 14,400 cubic feet per year for each thousand square feet for offices, and 35,300 cubic feet annually per thousand square feet for hotels (EIA 2006). Light industrial uses are not surveyed by the EIA in the same manner as residential and commercial uses.

Oil and Gasoline Supply and Consumption

Santa Barbara County has historically been and continues to be a major source of oil and natural gas production, the bulk of which is extracted from offshore fields. The County's annual onshore production in 2007 was estimated at 3,178,000 barrels of oil and 3,139,171 thousand cubic feet (MCF) of natural gas, and 2007 offshore production was estimated at 7,348,559 barrels of oil and 15,677,063 MCF of natural gas (Department of Oil, Gas and Geothermal Resources [DOGGR] 2008). DOGGR estimated in 2006 that County onshore reserves totaled approximately 29 million barrels. State offshore submerged lands and tidelands were estimated to hold 13.2 million barrels of oil and 13.9 billion cubic feet of gas within currently producing leases, while leases that are either not currently producing or are unleased (this includes the Tranquillon Ridge field) were estimated to hold reserves of 948 million barrels of oil and 236.9 billion cubic feet of gas.

In 2006, a total of 169 million gallons of gasoline, 27 million gallons of diesel, 8.4 million gallons of jet fuel, and 525,000 gallons of aviation gasoline were consumed within the County (Santa Barbara County Board of Supervisors 2008, Caltrans 2007). These values translate to per capita usage of approximately 428 gallons of gasoline, 69 gallons of diesel, 21 gallons of jet fuel, and 1.3 gallons of aviation gasoline. These values include all consumption within the County; therefore, these per capita consumption values are inflated by the consumption of non-residents and tourists traveling through the County. However, they do not reflect consumption by county residents traveling outside Santa Barbara County. Therefore, these consumption rates should be relatively good approximations of the actual values.

Gasoline consumption within the County requires refinement of approximately 34 million barrels of oil annually[4], or approximately three times onshore and offshore oil production in the County.

[4] Assumes that 19.8 gallon s of refined gasoline are produced from one barrel of oil (ratio from American Petroleum Institute)

Calculation of Existing and Future Energy Consumption in the City

Existing and future energy consumption within the City was calculated in several different ways, depending on the availability of data. For electricity and natural gas consumption, total consumption and consumption by sector was available for the years 1990, 2004 and 2007. Existing electricity consumption is shown in Table J-2. This data was sourced from Southern California Edison and Southern California Gas. Natural gas data was broken down by Southern California Gas into residential, commercial and industrial consumption. Electrical consumption was broken down in a different way which required conversion into residential, commercial and industrial sectors. This conversion is displayed in Table J-3. The additional electricity and natural gas consumption that would occur in the City as a result of development under *Plan Santa Barbara* policies or alternatives was based on the projected development and existing per unit (residential) or per square foot (commercial and industrial) consumption rates. Because the energy efficiency of future construction is expected to be greater than current construction, use of these rates produces a conservative estimate of future energy consumption.

Table J-2: City of Santa Barbara Electricity Consumption, by Sector, 2007

Sector	Consumption (kWh)	Consumption per Unit or sf
Agriculture	5,048,698	N/A
Residential	169,071,579	4,428 kWh per unit[1]
Commercial[2]	240,080,580	16.8 kWh per sf
Industrial[3]	86,752,362	63 kWh per sf
Street Lighting and Traffic Control	4,395,153	N/A
Total	505,348,372	N/A

[1]Assumes a total of 38,172 residential units (U.S. Census 2007); [2]SCE Rate Class GS-1 and GS-2;2; [3]SCE Rate Class TOU-8.
Source: SCE 2009.

Table J-3. Conversion of SCE Rate Classes into Sectors for *Plan Santa Barbara* Analysis

SCE Rate Class	SCE Description of Rate Class	Assigned *Plan Santa Barbara* Sector
AG TOU	Where 70% or more of demand is for agricultural purposes	*Agriculture*
Domestic	All residential service	*Residential*
GS-1, GS-2	General service whose monthly maximum demand is expected to exceed 20 kW (GS-1) or between 200 kW and 500 kW (GS-2)	*Small Commercial (GS-1) and Moderate to Large Commercial (GS-2)*
TOU-8	General service whose monthly maximum demand exceeds 500 kW	*Industrial*
Street Lighting, TC-1	Lighting of streets, highways and publicly-owned and publicly-operated parking lots where SCE owns and maintains the equipment (Street Lighting); Traffic signal systems and some thoroughfare lighting (TC-1)	*Street Lighting and Traffic Control*

Source: SCE 2009.

Automobile oil and gasoline consumption rates were based on the baseline traffic model produced for *Plan Santa Barbara*. This model was for 2008 traffic, but was assumed to be similar enough to 2007 traffic to be interchangeable. This model generated Vehicle Miles Traveled (VMT) for trips inside the City, commute trips to and from the City, and trips to and from the City for non-commute reasons. This VMT data was combined with the statewide fleet-wide fuel economy and vehicle mix described in the Caltrans MVSTAFF report (Caltrans 2008) and fuel consumption was calculated for diesel and gasoline. Future consumption under *Plan Santa Barbara* or alternatives was based on the *Plan Santa Barbara* traffic model's projected VMT and the Caltrans MVSTAFF report's predicted fleetwide fuel economy and vehicle mix for the year 2030.

Aircraft oil and gasoline consumption rates were based on the total jet fuel and aviation gas consumption within the County, which were reported in a County Board of Supervisors white paper (Santa Barbara

County 2008). Of this total aircraft fuel consumption, a rough approximation was made that 50% of this consumption is by or for City residents. This generates a conservative estimate of City energy consumption. Future aircraft oil and gasoline consumption rates were projected based on the current per capita consumption rate and the projected population increase under *Plan Santa Barbara* and alternatives.

Transportation

Existing Transportation Fuel Consumption	Gasoline	Diesel	VMT
Internal City Trips	15,639,162	1,177,141	312,346,015
Commute Trips	16,120,403	1,213,364	321,957,372
Other Non-Internal Trips	37,461,438	2,819,678	748,181,444
Total	69,221,002	5,210,183	
		Total	1,382,484,832

From State MVSTAFF Report	
Percent Diesel	0.07
Percent Gasoline	0.93
Fleet Mileage	18.574

City Trip Generation (from F&P)	Annual VMT	Corrected Annual VMT	Annual Gallons Gasoline	Annual Gallons Diesel
Plan Santa Barbara (-12.5% to account for loss of Sphere)	1,875,714,139	1,641,249,872	82,177,365	6,185,393
No Project (-12.5% for Sphere)	1,899,948,217	1,662,454,690	83,239,090	6,265,308
Lower Growth (-16.7% for Sphere)	1,767,672,927	1,472,471,548	73,726,636	5,549,317
Additional Housing (-9.0% for Sphere)	1,537,266,401	1,398,912,425	70,043,532	5,272,094

	Internal	Commute	Internal Non Commute
Plan SB VMT	337,746,597	387,843,782	1,150,123,759
Plan SB VMT - 12.5% to account for loss of sphere	295,528,273	339,363,310	1,006,358,289

Aviation Fuel Consumption	Existing Cons (gal)	Per Capita
Aircraft Gasoline	273,149	3.024738387
Jet-A	4,343,573	48.09892033
	Projected AG	Projected Jet A
Plan SB	293,439	4,666,221
No Project	293,439	4,666,221
Lower Growth	287,668	4,574,448
Additional Housing	305,235	4,853,806

Plan SB Transportation Fuel Consumption	Gasoline	Diesel
Internal City Trips	14,797,098	1,113,760
Commute Trips	16,991,918	1,278,962
Other Non-Internal Trips	50,388,350	3,792,671
Total	82,177,365	6,185,393

Sphere of Influence Growth	
Electricity (kWh/year)	
Single Family	386,412
Multi Family and Second Units	1,484,730
Commercial	2,993,794
Industrial	0
Natural Gas (MCF/year)	
Single Family	2,600
Multi Family and Second Units	10,004
Commercial	9,674
Industrial	0
Gasoline (gal/year)	11,739,624
Diesel (gal/year)	883,628
Av Gas (gal/year)	2,930
Jet A (gal/year)	46,609

	SOI Assumptions	
Residential	12.8 %= S.F.	52
	87.2%= M.F.	351
Commercial (sf)		178,202
	967 population growth (2.4/du)	

Barrels of Oil Consumed

Gallons of Jet A per barrel	4.07	Percent Diesel	0.07
Gallons of Gas per barrel	18.56	Percent Gasoline	0.93
Gallons of diesel per barrel	10.31	Fleet Mileage	18.574

Vehicle Fuel				
	Corrected Annual VMT	Projected Gasoline	Projected Diesel	Barrels from Diesel
Plan Santa Barbara (-12.5% to account for loss of Sphere)	1,641,249,871.59	82,177,365	6,185,393	599,941
No Project (-12.5% for Sphere)	1,662,454,689.54	83,239,090	6,265,308	607,692
Lower Growth (-16.7% for Sphere)	1,472,471,548.31	73,726,636	5,549,317	538,246
Additional Housing (-9.0% for Sphere)	1,398,912,425.19	70,043,532	5,272,094	511,357

Aircraft Fuel			
	Projected AvGas (gallons	Projected Jet A (gallons per year)	Barrels from Jet A
Plan Santa Barbara (-12.5% to account for loss of Sphere)	20,290	322,648	79,275
No Project (-12.5% for Sphere)	20,290	322,648	79,275
Lower Growth (-16.7% for Sphere)	14,519	230,875	56,726
Additional Housing (-9.0% for Sphere)	32,086	510,233	125,364

	Gasoline + AvGas	Barrels from Gasoline + Avgas	**Difference from Existing**
Plan Santa Barbara (-12.5% to account for loss of Sphere)	82,197,655	4,428,753	**684,456**
No Project (-12.5% for Sphere)	83,259,380	4,485,958	**741,661**
Lower Growth (-16.7% for Sphere)	73,741,155	3,973,123	**228,826**
Additional Housing (-9.0% for Sphere)	70,075,618	3,775,626	**31,329**
Total Existing Gasoline Consumption	69,221,002		
Total Existing AvGas Consumption	273,149		
Barrels from Existing Gasoline and AvGas Consumption	3,744,297		

APPENDIX K

GLOBAL CLIMATE CHANGE

APPENDIX K: GLOBAL CLIMATE CHANGE

The focus of the inventory of community greenhouse gas emissions is on activities that directly produce greenhouse gas emissions, or on the direct consumption of energy (which indirectly produced greenhouse gases). It is these types of local activities that can most effectively be addressed by community-level emission reduction strategies, and advance progress toward the most measurable reduction targets. Specifically, this inventory addresses:

- Transportation GHG emissions
  - Automobile and truck petroleum combustion within the City and by commuters
  - Aircraft fuel (Jet A and aviation gasoline) combustion by aircraft flying into and out of Santa Barbara Airport
- Residential, Commercial and Industrial energy consumption
  - Electricity consumption (indirect GHG emissions)
  - Natural gas consumption (direct GHG emissions)
  - Construction vehicle petroleum combustion
- Water, waste and wastewater GHG emissions
  - Wastewater treatment (direct GHG emissions [primarily methane])
  - Solid waste decomposition (direct GHG emissions [primarily methane])
  - Energy consumption for State Water Project water pumping (indirect GHG emissions from electricity consumption])

The methodology used for this inventory does not currently include energy embedded in consumer goods imported from outside the community (e.g., automobiles, most consumer products, most of the City's food, etc.), nor does it include the potential for capture and storage of carbon by living plants (called biomass sequestration). Wood burning, while a significant contributor to particulate emissions, is considered to be essentially carbon neutral and is not considered here[1]. As is the case for the rest of southern California, wood burned for heating fuel in Santa Barbara is typically sourced from industrial softwood reforestation projects and orchards in northern California and Oregon. The CO_2 coefficient for burning such "fuelwood" is generally considered to be zero. Carbon released from burning wood cycles in and out of the atmosphere very quickly when viewed on the geologic time-scale of the carbon contained in fossil fuel. It is generally thought that the equivalent amount of carbon released by burning is re-sequestered in growing plant material, assuming that the ability of vegetation to perform this task is remaining stable (City of Eugene 2008)[2].

The year 2007 was selected as the existing environmental setting as this is the most recent year for which comprehensive data were available, and provides a snapshot of the current emissions setting. Emissions from the year 2004 were calculated and compared to 2007 to ensure that baseline data was not anomalous; the comparison revealed no anomaly in 2007 data and the 2004 analysis was not carried forward.

[1] Worldwide, wildfires release an amount of carbon dioxide into the atmosphere equal to 50 percent of that from combustion of fossil fuels (Bowman et al 2009).

[2] Though there is ongoing debate about the sequestration ability given the changing nature of forest and vegetation, for this inventory we have accepted the assumption. in the CACP software model of a net zero GHG impact of wood burning.

Greenhouse Gas Analysis Data Sources and Assumptions

Modeling Software

This analysis utilized the program CACP 2009 version 2.1, which is available to member Cities from ICLEI-Local Governments for Sustainability. This software package applies standard coefficients derived from Federal and State agencies to estimate CO_2 equivalents (CO_2e) from all major greenhouse gases, with the exception of water vapor.

Population

City populations for 2004 and 2007 were taken from estimates prepared by the California Department of Finance. The 1990 population was obtained from U.S. Census. Populations for the year 2030 were based on projected residential development under *Plan Santa Barbara* and alternatives and the existing number of persons per residence.

Electricity Consumption and GHG Emissions

Although the emissions from electricity generation do not occur within the City, the City's electricity consumption results in GHG emissions at the generation site which would not have otherwise occurred. Existing and future energy consumption within the City was calculated in several different ways, depending on the availability of data. For electricity and natural gas consumption, total consumption was available for the years 1990 and 2007, and consumption by sector was available for 2007. This data was sourced from Southern California Edison. Electrical consumption was broken down in a way which required conversion into residential, commercial and industrial sectors. This conversion is displayed in Table K-1. The additional electricity and that would occur in the City as a result of development under *Plan Santa Barbara* policies or alternatives was based on the projected development and existing per unit (residential) or per square foot (commercial and industrial) consumption rates. Because the energy efficiency of future construction is expected to be greater than current construction, use of these rates produces a conservative estimate of future energy consumption.

Table K-1. Conversion of SCE Rate Classes into Sectors for Plan Santa Barbara Analysis

SCE Rate Class	SCE Description of Rate Class	Assigned *Plan Santa Barbara* Sector
AG TOU	Where 70% or more of demand is for agricultural purposes	*Agriculture*
Domestic	All residential service	*Residential*
GS-1, GS-2	General service whose monthly maximum demand is expected to exceed 20 kW (GS-1) or between 200 kW and 500 kW (GS-2)	*Small Commercial (GS-1) and Moderate to Large Commercial (GS-2)*
TOU-8	General service whose monthly maximum demand exceeds 500 kW	*Industrial*
Street Lighting, TC-1	Lighting of streets, highways and publicly-owned and publicly-operated parking lots where SCE owns and maintains the equipment (Street Lighting); Traffic signal systems and some thoroughfare lighting (TC-1)	*Street Lighting and Traffic Control*

Source: SCE 2009

1990 electricity consumption was only available as a total for the City and was broken into sectors based on historic change in usage for each sector as identified by the City in the Development Trends Report. Industrial sector electricity consumption includes consumption for agriculture and agricultural water pumping.

2007 GHG emission coefficients were based on SCE-specific factors which are included in the CACP 2009 software, and which were reported by SCE. SCE-specific factors were not available for 1990; therefore, California Grid Average coefficients were used for this year. California Grid Average coefficients are currently higher than SCE-specific coefficients, so it is possible that the use of these coefficients may inflate the 1990 values for GHG emission from electrical consumption. However, in 1990 it is assumed that most renewable sources had not yet come online and that SCE's coal-fired Mohave Generation Station in Nevada was contributing a significant amount of power to SCE's grid. Therefore, it is expected that SCE's coefficients from 1990 would be much closer to the California Grid Average than they are currently.

Natural Gas Consumption and GHG Emissions

Natural gas consumption data were obtained from Southern California Gas for Years 2000-2007, (broken down into residential, commercial and industrial sectors). Values for 1990 were "backcasted" from the available data, assuming constant rates of change. Future consumption rates under *Plan Santa Barbara* and alternatives were based on the projected number and types of development (i.e., number of single family units, number of multiple family units). These calculations assumed that the per unit consumption rates for these different types of units would remain the same as existing; since efficiency is likely to improve by the year 2030 this results in a conservative estimate.

Transportation Fuels Consumption and GHG Emissions

Automobile oil and gasoline consumption rates were based on the baseline traffic model produced for *Plan Santa Barbara*. This model was for 2008 traffic, but was assumed to be similar enough to 2007 traffic to be interchangeable. This model generated Vehicle Miles Traveled (VMT) for trips inside the City, commute trips to and from the City, and trips to and from the City for non-commute reasons. This traffic model accounts for the effects of proposed *Plan Santa Barbara* policies to reduce trip generation and VMT, but does not take into account the potential effect on commute trips from potential changes in provision of affordable housing or the overall jobs/housing balance in the City. The model includes trips generated by projected development in the City's sphere of influence, which slightly inflates the GHG emissions.

This VMT data was combined with the statewide fleet-wide fuel economy and vehicle mix described in the Caltrans MVSTAFF report (Caltrans 2008) and fuel consumption was calculated for diesel and gasoline. Future consumption under *Plan Santa Barbara* or alternatives was based on the *Plan Santa Barbara* traffic model's projected VMT and the Caltrans MVSTAFF report's predicted fleetwide fuel economy and vehicle mix for the year 2030.

Aircraft fuel consumption for 2007 was taken from the Board of Supervisors packet for August 26, 2008, which obtained 2005 data from the UC Santa Barbara Economic Forecast Project's Annual Economic Outlook for Santa Barbara County. 2007 consumption rates were assumed to be substantially the same as 2007 and were used without alteration. Because the original data was county-wide, consumption by or for City residents and those visiting the City were estimated to be 50% of county-wide aircraft fuel consumption. Because this fuel consumption represents all fuel taken on at Santa Barbara Airport, it includes fuel that is burned outside Santa Barbara airspace. This generates a conservative estimate of City energy consumption. Future aircraft oil and gasoline consumption rates were projected based on the current per capita consumption rate and the projected population increase under *Plan Santa Barbara* and alternatives.

Based on California Air Resources Board Guidance, 1990 values for transportation GHG emissions were considered to be 15% lower than 2007 values. A lack of reliable data prevented the 1990 analysis from being as detailed as that performed for 2007.

Landfill Gas Emissions

Total landfill deposits at Tajiguas Landfill and those exported to other regional landfills were obtained from California Integrated Waste Management Board's (CIWMB's) Disposal Reporting System (http://www.ciwmb.ca.gov/LGCentral/DRS/). Waste stream characterization for 1990 was unavailable so data were used from FY 1997/1998 (County of Santa Barbara 2001). This most likely overestimates the amount of waste diversion that was occurring in 1990, but provides a conservative estimate of GHG emissions as compared to 2007.

Projection of GHG emissions from landfill decomposition assumes that waste diversion in 2030 would remain the same as currently exists (approximately 70 percent diversion, per City staff), and that per capita solid waste generation rates would also remain the same as at present. Future solid waste disposal quantities are based off projected population growth and the existing per capita solid waste generation rate, which accounts for both residential and non-residential growth. Calculations of decomposition emissions utilize the factors in the CACP 2009 software package.

The calculated emissions are only for the waste generated that year; decomposition emissions from waste that was disposed of in prior years (including those from the former Las Positas landfill) are not included. This GHG analysis does not account for combustion of landfill gases associated with the methane fuel cell at Tajiguas Landfill, thus providing a conservative estimate of GHG emissions. The waste stream and total waste disposed was input into the CACP software, which uses standard emission factors for different waste types to generate a total GHG emission value. Emissions for the year 2030 under *Plan Santa Barbara* and alternatives assumed that per capita waste generation and the waste stream characterization would be the same as existing; any increase in GHG emissions is related to increased population.

Emissions from Energy Used in Water Pumping

Because the energy used to pump water within the City and treat wastewater at El Estero Wastewater Treatment Plant are included in the City electricity and natural gas figures, only energy used to transport water to the City boundaries are included in this calculation. Specifically, the GHG emissions from the energy used to transport the City's share of State Water Project water were calculated. Emissions of GHG related to pumping of SWP water to Lake Cachuma were calculated by determining the amount of electricity required to deliver the water from its source in the Delta, approximately 3,000 kWh per acre-foot. The per capita usage of SWP water is assumed to remain the same as existing, which in 2007 was 0.00699 AFY per person. The electricity mix used is that for SCE, although other electricity providers provide the majority of the electricity for pumping.

GHG emissions from water pumping in future years was calculated based on a consistent per capita usage rate and the population projections developed for *Plan Santa Barbara*.

Wastewater Treatment GHG Emissions

The methane produced from sewage biosolids during treatment was calculated for the year 1990. In 2005 the City installed a fuel cell that uses methane from wastewater treatment to generate electricity rather than flaring the methane. Therefore, 2007 emissions assume total capture of methane from wastewater treatment at El Estero Wastewater Treatment Plant; thus, no GHG emissions are reported from wastewater treatment for that year. The amount of methane produced in 1990 was taken from a City press release that was produced for the dedication of the methane fuel cell.

Construction GHG Emissions

Construction emissions calculated using URBEMIS 2007 Version 9.2.4 based on the annual rate of development from 1990-2007 as identified in the Development Trends Report (City of Santa Barbara 2008). Refer to the Air Quality Appendix for a description of how Construction GHG emissions were calculated.

Community Greenhouse Gas Emissions in 2030
Plan Santa Barbara
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential Sector						
Electricity	58,388	2,003	5,281	58,754	18.5	621,473
Natural Gas	85,779	323	16,166	85,999	27.1	1,466,586
Subtotal	144,166	2,326	21,447	144,752	45.6	2,088,059
Commercial Sector						
Electricity	86,678	2,974	7,839	87,222	27.5	922,596
Natural Gas	52,334	197	9,863	52,468	16.5	894,767
Subtotal	139,012	3,171	17,702	139,689	44.0	1,817,363
Industrial Sector						
Electricity	31,857	1,093	2,881	32,057	10.1	339,087
Natural Gas	732	3	28	733	0.2	12,513
Subtotal	32,589	1,096	2,909	32,790	10.3	351,599
Total	315,767	6,593	42,058	317,231	100.0	4,257,021

Community Greenhouse Gas Emissions in 2007
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential Sector						
Electricity	54,213	1,860	4,903	54,553	6.2	577,036
Natural Gas	80,500	303	15,172	80,707	9.2	1,376,344
Subtotal	134,713	2,163	20,075	135,259	15.4	1,953,380
Commercial Sector						
Electricity	76,982	2,641	6,962	77,464	8.8	819,388
Natural Gas	46,459	175	8,756	46,578	5.3	794,325
Subtotal	123,441	2,816	15,718	124,042	14.1	1,613,713
Industrial Sector						
Electricity	29,436	1,010	2,662	29,620	3.4	313,314
Natural Gas	639	2	24	640	0.1	10,924
Subtotal	30,075	1,012	2,686	30,260	3.4	324,238
Transportation Sector						
Diesel	86,724	512	527	86,809	9.9	1,075,530
Gasoline	443,127	57,948	49,198	452,626	51.4	5,671,533
OFF ROAD Aviation Gasoline	3,127	83	5,292	3,195	0.4	42,354
OFF ROAD Jet Fuel	47,654	3,087	2,689	48,160	5.5	561,162
Subtotal	580,632	61,630	57,706	590,791	67.1	7,350,579
Total	868,861	67,622	96,185	880,353	100.0	11,241,910

Community Greenhouse Gas Emissions in 2030
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation Sector						
Diesel	197,105	1,164	1,198	197,298	17.1	2,444,443
Gasoline	936,507	131,703	111,816	958,095	82.9	11,986,246
Subtotal	1,133,613	132,867	113,015	1,155,394	100.0	14,430,689
Total	1,133,613	132,867	113,015	1,155,394	100.0	14,430,689

Community Greenhouse Gas Emissions in 2030
No Project Alternative
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential Sector						
Electricity	58,388	2,003	5,281	58,754	18.4	621,473
Natural Gas	85,779	323	16,166	85,999	26.9	1,466,586
Subtotal	144,166	2,326	21,447	144,752	45.3	2,088,059
Commercial Sector						
Electricity	88,250	3,027	7,981	88,803	27.8	939,321
Natural Gas	53,293	201	10,044	53,429	16.7	911,164
Subtotal	141,542	3,228	18,025	142,232	44.5	1,850,485
Industrial Sector						
Electricity	31,857	1,093	2,881	32,057	10.0	339,087
Natural Gas	732	3	28	733	0.2	12,513
Subtotal	32,589	1,096	2,909	32,790	10.3	351,599
Total	318,298	6,650	42,381	319,774	100.0	4,290,144

Community Greenhouse Gas Emissions in 2030
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation Sector						
Diesel	199,652	1,179	1,214	199,848	17.1	2,476,025
Gasoline	948,607	133,404	113,261	970,474	82.9	12,141,107
Subtotal	1,148,259	134,584	114,475	1,170,321	100.0	14,617,132
Total	1,148,259	134,584	114,475	1,170,321	100.0	14,617,132

Community Greenhouse Gas Emissions in 2030
Lower Growth Alternative
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential Sector						
Electricity	57,181	1,962	5,172	57,539	18.9	608,630
Natural Gas	84,253	318	15,879	84,469	27.7	1,440,506
Subtotal	141,434	2,279	21,050	142,009	46.6	2,049,136
Commercial Sector						
Electricity	81,830	2,807	7,401	82,343	27.0	870,992
Natural Gas	49,399	186	9,310	49,526	16.3	844,598
Subtotal	131,229	2,993	16,711	131,869	43.3	1,715,590
Industrial Sector						
Electricity	29,837	1,024	2,699	30,024	9.9	317,585
Natural Gas	685	3	26	686	0.2	11,718
Subtotal	30,523	1,026	2,724	30,710	10.1	329,303
Total	303,186	6,299	40,486	304,588	100.0	4,094,029

Community Greenhouse Gas Emissions in 2030
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation Sector						
Diesel	185,752	1,097	1,129	185,934	17.1	2,303,643
Gasoline	882,564	124,117	105,376	902,909	82.9	11,295,838
Subtotal	1,068,317	125,214	106,505	1,088,843	100.0	13,599,481
Total	1,068,317	125,214	106,505	1,088,843	100.0	13,599,481

Community Greenhouse Gas Emissions in 2030

Additional Housing Alternative

Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Residential Sector						
Electricity	60,579	2,078	5,479	60,959	19.5	644,802
Natural Gas	88,550	334	16,689	88,777	28.4	1,513,976
Subtotal	149,130	2,412	22,168	149,736	47.9	2,158,778
Commercial Sector						
Electricity	81,830	2,807	7,401	82,343	26.4	870,992
Natural Gas	49,399	186	9,310	49,526	15.9	844,598
Subtotal	131,229	2,993	16,711	131,869	42.2	1,715,590
Industrial Sector						
Electricity	29,837	1,024	2,699	30,024	9.6	317,585
Natural Gas	685	3	26	686	0.2	11,718
Subtotal	30,523	1,026	2,724	30,710	9.8	329,303
Total	310,882	6,432	41,603	312,316	100.0	4,203,671

Community Greenhouse Gas Emissions in 2030
Additional Housing
Report by Source

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MMBtu)
Transportation Sector						
Diesel	161,540	954	982	161,699	17.1	2,003,376
Gasoline	767,527	107,939	91,641	785,220	82.9	9,823,487
Subtotal	929,067	108,893	92,623	946,918	100.0	11,826,863
Total	929,067	108,893	92,623	946,918	100.0	11,826,863

APPENDIX L

POPULATION GROWTH AND JOBS/HOUSING BALANCE

Table L-1. Employment Induced by Non-Residential Growth Under *Plan Santa Barbara*

Annual Wage	Service	Retail	Office	Industrial	Institutional	Hotel	Total
Less than $20,000	923	192	29	23	37	91	1,295
$20,000-$29,999	145	292	391	70	126	14	1,038
$30,000-$39,999	66	65	143	49	133	20	476
$40,000-$59,999	41	9	199	34	101	8	392
$60,000-$79,999	0	3	220	12	75	1	311
$80,000-$99,999	7	10	156	22	352	3	550
$100,000 or more	0	2	42	15	44	0	103
No data available	0	0	12	26	26	0	64
Total	**1,182**	**573**	**1,193**	**252**	**894**	**137**	**4,231**

Source: City of Santa Barbara 2009e.

Table L-2.Employment Induced by Non-Residential Growth Under the No Project Alternative

Future Use	Building Area Per Employee	Pending, Approved, and Permitted Projects	Build-out Under No Project Alternative Policies	Gross New Employment
Service Commercial	300 s.f.	129,045	232,043	1,204
Retail	500 s.f.	-10,860	371,946	722
Office	250 s.f.	26,903	326,095	1,412
Industrial	800 s.f.	35,994	193,825	287
Institutional	500 s.f.	206,551	162,738	739
Hotel	1,800 s.f.	63,519	86,708	83
Total	**--**	**764,928**	**1,373,354**	**4,447**

Source: City of Santa Barbara 2009e.

Table L-3.Employment Induced by Non-Residential Growth Under the Lower Growth Alternative

Future Use	Building Area Per Employee	Pending, Approved, and Permitted Projects	Build-out Under XX Policies	Gross New Employment
Service Commercial	300 s.f.	129,045	20,549	499
Retail	500 s.f.	-10,860	33,096	44
Office	250 s.f.	26,903	37,905	259
Industrial	800 s.f.	35,994	17,592	67
Institutional	500 s.f.	206,551	13,620	440
Hotel	1,800 s.f.	63,519	9,281	40
Total	**--**	**764,928**	**121,713**	**1,349**

Source: City of Santa Barbara 2009e.

Table L-4.Employment Induced by Non-Residential Growth Under the Improved Jobs-Housing Balance Alternative

Future Use	Building Area Per Employee	Pending, Approved, and Permitted Projects	Build-out Under Plan Santa Barbara Policies	Gross New Employment
Service Commercial	300 s.f.	129,045	20,549	499
Retail	500 s.f.	-10,860	34,032	46
Office	250 s.f.	26,903	28,696	222
Industrial	800 s.f.	35,994	19,362	69
Institutional	500 s.f.	206,551	14,106	441
Hotel	1,800 s.f.	63,519	6,650	39
Total	**--**	**764,928**	**123,395**	**1,316**

Source: City of Santa Barbara 2009e.

Table L-5. Affordable Rent and Purchase Prices for All Income Categories

Income Category	Annual Income[1]	Maximum Affordable Rent Payment[2]	Estimated Maximum Affordable Purchase Price[3]
Very Low (< 50%4)	< $35,200	$880	$105,600
Low (51 - 80%)	$56,300	$1,407	$168,900
Lower-Moderate- (80-100%)	$70,400	$1,760	$211,200
Upper Moderate (100-120%)	$84,500	$2,112	$253,500
Middle Median (120-150%)	$105,600	$2,640	$316,800
Median Household Income	$70,400	$1,760	$211,200

[1]Based on U.S. Department of Housing and Urban Development income limits for a four-person household, Santa Barbara County, April 2009.
[2]Calculated as 30% of income divided by 12 months.
[3] Based on percentage of County Median Income.
Source: City of Santa Barbara 2009.

Table L-6 South Coast Condominium Average Sale Price, 2008-2009

Area	Average Sale Price[1]		Percent Change
	2008	2009	
Carpinteria-Summerland	$513,045	$404,958	-21%
Montecito	$2,465,000	$679,000	-72%
Santa Barbara, East of State Street	$825,806	$657,809	-20%
Santa Barbara, West of State Street	$733,361	$588,879	-19%
Goleta South	$569,109	$458,292	-19%
Goleta North	$507,940	$371,350	-26%

[1] Based on a sample of condominiums sold year-over-year in April 2008-2009.
Source: City of Santa Barbara 2008c.

Table L-7 Employment Wages Projected from Non-Residential Growth Under *Plan Santa Barbara*

Annual Wage	Total	Percent	Income Category
Less than $20,000	1,530	30.4	Very low
$20,000-$29,999	1,225	24.4	Very low
$30,000-$39,999	562	11.2	Very low, Low
$40,000-$59,999	463	9.2	Low, Low-moderate
$60,000-$79,999	367	7.2	Low-moderate, Upper-moderate
$80,000-$99,999	650	13.0	Upper-moderate, Middle-median
$100,000 or more	121	2.4	Middle-median, High
No data available	112	2.2	-
Total	**5,030**	**100**	

Source: City of Santa Barbara 2009e.