APPENDIX

C

TRAFFIC SAFETY AND IMPACT ASSESSMENT

(CEQA EXEMPTION)

TRAFFIC AND SAFETY IMPACT ASSESSMENT

SUMMARY

Fehr & Peers studied anticipated changes to traffic patterns and safety conditions that could occur as the proposed projects in the Santa Barbara Bicycle Master Plan (BMP) are implemented. First, we examined the ten-year collision record for bicyclists in the city limit. All of the proposed projects have the potential to improve safety for non-motorized travelers, and some projects include safety benefits for motorized travelers.

Next, changes in travel patterns were examined using the Santa Barbara citywide traffic model. The assessment procedures and results are described in section 1. Based on results of the citywide traffic modeling, we also studied 10 intersections in greater detail. These findings are described in section 2. The third and final section provides a CEQA AB 417 Exemption Assessment (per Section 21080.20).

Two scenarios were modeled:

- **Scenario 1:** Does **not** include the removal of one travel lane in each direction on State Street between Calle Palo Colorado (westbound)/De la Vina Street (eastbound) and Constance Avenue.
- **Scenario 2:** Includes the removal of one travel lane in each direction on State Street between Calle Palo Colorado (westbound)/De la Vina Street (eastbound) and Constance Avenue. The model assumes signal controlled intersections.

Key Findings: *The Traffic and Safety Impact Assessment conducted for the proposed BMP concluded that the project would likely have Beneficial Impacts relating to safety for pedestrians and bicyclists. The Safety Assessment indicates implementation of the SBBMP would potentially reduce the number of all collisions and fatalities involving pedestrians or bicyclists and improve safety for all road users in the City of Santa Barbara. The Traffic Assessment of the BMP shows that potential vehicular traffic flow changes are non-existent for most projects and where present, the assessment outlines ways to minimize changes to vehicular flow.*

1. CITYWIDE TRAFFIC MODEL

Fehr & Peers coded select bikeway projects from the Community Driven Bikeway Network into the City of Santa Barbara citywide travel demand forecasting model. The model is designed to assess shifts in auto travel patterns that may result from reconfigurations to the city's road network. The travel model assigns vehicles to the roadway network based on the vehicular capacity (number of lanes and travel speeds).

The travel model can only evaluate certain roadway changes, such as the number of travel lanes or the direction of travel on a street (e.g., two-way to one-way conversions). Therefore, projects like bike-friendly streets, enhancement to Class II bike lanes, shared lanes, parking removals, etc. that do not alter the configuration of a street were not included and will have negligible auto travel impacts. Fehr & Peers ran the model for the base year (2008) and future year (2030) scenarios.

The projects that were included in the model as well as model results are described below. The overview and estimates of vehicle diversion provided are based on travel demands during the PM peak hour. Traffic congestion is generally at its worst during the PM peak period, so we selected this time window to assess potential "worst case" conditions.

Two scenarios were modeled: one without the removal of one travel lane in each direction (Scenario 1) one with lane removal (Scenario 2) and on State Street between Calle Palo Colorado (westbound)/De la Vina Street (eastbound) and Constance Avenue. The following bicycle projects were included in both Scenario 1 and Scenario 2:

1) **De la Vina Street (North)**: Removal of one southbound travel lane between Constance Avenue and Padre Street
   - 2008: Travel demand on De La Vina increases by ~30 peak hour vehicles due to Bath and Castillo couplet extension (with or without State Street improvements).
   - 2030: Travel demand on De La Vina increases by ~120 PM peak hour vehicles due to Bath and Castillo couplet extension (with or without State Street improvements).

2) **Bath Street/Castillo Street Couplet**: Removal of one southbound travel lane on Bath Street and one northbound travel lane on Castillo Street between Mission Street and Pueblo Street (while the project, as proposed, would only extend as far as Los Olivos Street, the additional one-block segment between Los Olivos Street and Pueblo Street was included to account for possible design flexibility in the future)

- 2008 With State Street Improvement:
  i) Vehicle demand on NB Castillo shifts to:
    - Bath (~120 peak hour)
  ii) Vehicle demand on SB Bath shifts to:
    - Castillo (~140 peak hour)
    - De La Vina (~30 peak hour)

- 2008 Without State Street Improvement: These results are similar to the vehicle shifts above, except State Street also experiences slight increase in travel demand (<20 vehicles). Part of this shift occurs because of demand from the State Street improvements to the north.

- 2030 With and Without State Street Improvement:
  i) Vehicle demand on NB Castillo shifts to:
    - Bath (~180 PM peak hour)
    - US-101 (~90 PM peak hour)
  ii) Vehicle demand on SB Bath shifts to:
    - Castillo (~130 peak hour)
    - De La Vina (~220 PM peak hour)

3) **Cabrillo Boulevard**: Removal of one westbound travel lane between Milpas Street and Los Patos Way/Channel Drive (Road Diet)
   - 2008 & 2030: Travel demand and travel delay do not change.

4) **De la Vina Street (South)**: Removal of one southbound travel lane between Carrillo Street and Haley Street (Road Diet)
   - 2008: Travel demand decreases between Carrillo and Canon Perdido with a diversion of ~75 trips to nearby roads in the PM peak hour. The southern portion of the road originally had about half the volume north of Canon Perdido, and while the model indicates there is only minor rerouting of vehicles on this portion, sufficient capacity exists for no diversions to occur.

   - 2030: Travel demand decreases between Carrillo and Canon Perdido with a diversion of ~120 trips to Chapala in the PM peak hour. Under Base 2030 conditions, the southern portion of De La Vina had a small portion of the volume north of De La Guerra, and there is only minor rerouting of vehicles on this portion (<20 vehicles per hour).

5) **Cliff Drive**: Removal of one eastbound travel lane between Mesa Lane and Meigs Road
   - 2008: Travel demand shifts slightly with lane removals (< 20 vehicles per hour).
   - 2030: Travel demand shifts are also minor (<20 vehicles).

The following project was incorporated **for Scenario 2 only**:

6) **State Street (optional)**: Removal of one travel lane in each direction between Calle Palo Colorado (westbound)/De la Vina Street (eastbound) and Constance Avenue
   - 2008: Two-way traffic ranges between 1,000 and 1,500 vehicles in the PM peak hour. ~90 cars are diverted to surrounding roads, but no single road experiences more than a 35 vehicle change.
   - 2030: Two-way traffic ranges between 1,500 and 1,800 vehicles in the PM peak hour.
     - ~170 northbound cars in the PM peak hour are diverted to De La Vina (along two-way section north of Constance)
     - ~60 northbound cars in the PM peak hour are diverted to Las Positas
     - ~60 northbound cars in the PM peak hour are diverted to Foothill
     - ~20 southbound cars in the PM peak hour are diverted to De La Vina

2. INTERSECTION ASSESSMENT

ASSESSMENT APPROACH

We selected ten intersections for level of service (LOS) intersection assessment based on the forecasted shifts in vehicle flows resulting from the proposed bicycle projects and intersection lane geometry reconfigurations as part of a bicycle project (see Citywide Traffic Model discussion above). These 10 locations are consistent with intersections studied in the 2011 General Plan - Plan Santa Barbara for comparison purposes.

The intersections studied are:

1. De la Vina Street & State Street
2. Alamar Avenue & State Street
3. Las Positas Road & State Street
4. Mission Street & De la Vina Street

5. Mission Street & Bath Street
6. Mission Street & Castillo Street
7. Mission Street & State Street
8. Carrillo Street & De la Vina Street
9. Carrillo Street & Chapala Street
10. Meigs Road & Cliff Drive

The Existing and Future level of service (LOS) for the 10 study intersections was based on the results contained in the transportation study for the 2011 Plan Santa Barbara. The existing assessment was based on 2008 traffic counts. Future Cumulative forecasts reflect full implementation of Plan Santa Barbara and the Bicycle Master Plan.

ASSESSMENT RESULTS

Scenario 1 and Scenario 2 LOS reflects the traffic volume shifts forecasted through the model runs for both existing and future conditions. **Figures 1 through 6** (attached) show the intersection geometries for each study intersection as well as intersection turning movement volumes.

Table 1 (attached) displays a summary of the LOS results for Existing and Existing plus Project for Scenarios 1 and 2. Under Existing plus Project conditions, Scenario 1 would result in an impact at one intersection and Scenario 2 would result in impacts at two intersections. The impacts are as follows:

<u>Scenario 1:</u>

10. Meigs Road & Cliff Drive (PM peak hour) – Existing LOS B, plus project: LOS D

<u>Scenario 2:</u>

2. Alamar Avenue & State Street (PM peak hour) – Existing LOS A, plus project: LOS D
10. Meigs Road & Cliff Drive (PM peak hour) – Existing LOS B, plus project: LOS D

Table 2 (attached) displays a summary of the LOS results for Future and Future plus Project for Scenarios 1 and 2. Under Future plus Project conditions, Scenario 1 would impact one intersection and Scenario 2 would impact three intersections. The peak hour impacts are as follows:

Scenario 1:

10. Meigs Road & Cliff Drive – from LOS B to LOS C (AM peak hour) and from LOS C to LOS D (PM peak hour)

Scenario 2:

1. De La Vina Street & State Street – from LOS B to LOS C (PM peak hour)
2. Alamar Avenue & State Street – from LOS B to LOS D (PM peak hour)
10. Meigs Road & Cliff Drive – from LOS B to LOS C (AM peak hour) and from LOS C to LOS D (PM peak hour)

3. CEQA EXEMPTION ASSESSMENT (AB 417)

The California Environmental Quality Act (CEQA) requires cities to assess traffic and safety impacts that may result from the implementation of a Bicycle Transportation Plan (Sections 21080.20). As part of this assessment, cities are to include measures in the project to minimize potential vehicular traffic impacts and bicycle or pedestrian safety impacts. The following discussion summarizes potential traffic and safety impacts as well as mitigations such that the Santa Barbara Bicycle Master Plan qualifies as statutorily exempt from CEQA, a finding of no significant impacts. Each section of the Public Resources Code and CEQA Guidelines Section are included for reference.

Public Resources Code section 21080.20. Bicycle Transportation Plans prepared pursuant to Section 891.2 of the Streets and Highways Code for an urbanized area for restriping of streets and highways, bicycle parking and storage, signal timing to improve street and highway intersection operations, and related signage for bicycles, pedestrians, and vehicles. The City has conducted noticed public hearings on the plan on December 10, 2015 before the Planning Commission and on December 10, 2015 before the Transportation & Circulation Committee, and on May 5, 2016 before the Planning Commission. The City has also prepared an assessment of any traffic and safety impacts of the project, including measures to mitigate potential vehicular traffic impacts and bicycle and pedestrian safety impacts which demonstrates the existence of no negative vehicular, bicycle or pedestrian impacts.

Public Resources Code section 21080.37. Minor alterations to an existing roadway when the project is carried out 1) by a city or county with a population of less than 100,000 persons to improve public safety, 2) the project does not cross a bay, estuary, lake, pond, river, slough, or a perennial, intermittent, or ephemeral stream, lake, or estuarine-marine shoreline, 3) the project involves negligible or no expansion of an existing use beyond that existing at the time of the lead agency's determination, 4) the roadway is not a state roadway, and 5) the site of the project does not contain wetlands or riparian areas and does not have significant value as a wildlife habitat, and the project does not harm any species protected by the federal Endangered Species Act of 1973, the Native Plant Protection Act, or the California Endangered Species Act, and the project does not cause the destruction or removal of any species protected by a local ordinance. None of the possible roadway alterations would involve any substantial expansion of existing use. While Micheltorena crosses a previously channelized flood control channel, no alterations to the roadway will occur in any area over or adjacent to a bay, estuary, lake, pond, river, slough, or a perennial, intermittent, or ephemeral stream, lake, or estuarine-marine shoreline. Appendix C of the Bicycle Master Plan fully analyzes the safety improvements and demonstrates the lack of use expansion.

<u>CEQA Guidelines Section 15301(c).</u> Class 1 consists of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized below are not intended to be all inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use. Examples include but are not limited to: (c) Existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities (this includes road grading for the purpose of public safety).

<u>CEQA Guidelines section 15304(h).</u> Class 4 consists of minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes. Examples include, but are not limited to: (h) The creation of bicycle lanes on existing rights-of-way.

PEDESTRIAN & BICYCLE IMPACTS & MITIGATIONS

The proposed BMP has no safety impacts to pedestrians or bicyclists. In fact, the SBBMP has the potential to significantly reduce collisions and fatalities for pedestrians and bicyclists and improve safety for all road users in the City of Santa Barbara. Therefore, no mitigation measures are proposed.

TRAFFIC AND SAFETY ASSESSMENT FOR BMP PROJECTS

SECTION 1, PROJECT ASSESSMENT BY CATEGORY

An assessment of the potential safety and vehicular traffic impacts follows below for all BMP projects by the following categories:

1. New Class I bikeways;
2. New or enhanced Class II bike lanes;
3. New shared lane markings and signage for Class III routes;
4. Bicycle Boulevards;
5. Intersection enhancements and signal detection for bicycle safety; and
6. One-way couplet extensions.

1. New Class I Bikeways

Class I bikeways (bike paths) provide a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with cross flows by motorists minimized. Due to minimized cyclist/motorist conflict points, these facilities provide maximize safety for users available in a bike facility.

The only potential traffic impacts will occur at locations where the bike path crosses a roadway. At some crossing points, a change in intersection control may be necessary to maximize user safety. Any change in intersection control will have to be designed to meet the City's Traffic Management Strategy.

<u>Conclusion:</u> No safety measures, other than those incorporated into design by existing standards and/or regulations, are needed for bike path projects. Any change in intersection control at bike path crossing points will be designed to meet the City's Traffic Management Strategy in order to avoid or minimize any possible safety impacts.

2. New or Enhanced Class II Bike Lanes

Class II bikeways (bike lanes) provide restricted right-of-way designated for the exclusive use or semi-exclusive use by cyclists. Bike lanes are typically used where insufficient right of way or physical conditions exist to accommodate a bike path. Several bike lane projects are included in the BMP to improve connectivity between other bicycle facilities and destinations.

In general, bike lanes enhance cyclist safety by providing separation from vehicular traffic. Bike lanes are a recognized safety improvement countermeasure in the Caltrans *Local Roadway Safety Manual*. By providing space for cyclists to travel alongside the vehicular travelled way, movements are more predictable for both cyclists and motorists. Several treatments consistent with the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* are available to further enhance bike lane user safety including painted buffers (where adequate space is available), and painted green lanes to enhance the delineation between vehicle lane and bike lane.

Bike lane projects included in the BMP will be achieved by adding striping where there is sufficient road width, reducing vehicular travel lanes, or by removing on-street parking as a result of restriping.

- Bike lane projects installed by restriping where existing street widths permit will generally improve safety for both motorists and cyclists by providing separate spaces for each to travel. This separation also increases traffic flow by moving cyclist out of the travel lane.
- Bike lane restriping projects that result in parking removal will generally improve safety for both motorists and cyclists. Nearly one-third of collisions in Santa Barbara involve parked vehicles. This is due to the narrow travelled ways created by on-street parking. By removing parking, motorists have more room to maneuver. Other safety issues involving parked vehicles include doors opening into travel paths, and reduced sight lines at intersecting roadways and driveways. The bike lane projects that involve parking removal also improve traffic flow. Slower cyclists are removed from the vehicular travel way, and the vehicular saturation flow rates are generally improved by providing a wider vehicle travel way and by removing parking maneuvers from the traffic stream.
- Bike lane projects that involve removing a vehicle lane will generally improve safety by providing separation between vehicles and cyclists. Bike lane projects that involve vehicle travel lane removal have been analyzed for system vehicle capacity and traffic diversion to other roads using the City's traffic model. Any resulting traffic diversions were quantified and mitigations have been suggested for intersections where the level of service could drop below the City's established traffic threshold.

Conclusion: No safety or traffic minimization measures, other than those incorporated into design by standards and /or regulations, are needed for bike path projects. Any change in intersection control at bike path crossing points will be designed to meet the City's Traffic Management Strategy in order to avoid or minimize any possible safety impacts.

3. New Shared Lane Markings and Signage for Class III Routes

Class III bikeways (bike routes) provide cyclists right-of-way on-street designated by signs or pavement markings, where cyclists and motorists share the same space. While cyclists are permitted to use all city streets, the use of signs and pavement markings can be used to enhance cyclist route-finding, and to close gaps in the bike network where Class I and Class II facilities are not practical or possible.

Bike routes are generally designated on lower traffic volume streets, which improves separation between the majority of vehicle traffic and cyclists. Safety is further enhanced by use of signs and pavement markings to raise driver awareness of the bike route. Traffic flow is generally not affected because the bike routes are on low volume streets.

Conclusion: No safety or traffic flow mitigation measures, other than those incorporated into design by existing standards and /or regulations, are needed for 2016 Bicycle Master Plan projects that create new shared lane markings and signage for Class III routes.

4. Bicycle Boulevards

Bicycle boulevards are a type of Class III bike route. Like traditional Class III bike routes, they are used as a shared roadway for motorists and cyclists. Bike boulevards are low volume streets, which reduce vehicle/cyclist conflicts, thus improving safety. On bicycle boulevards, traffic control generally favors the bicycle through movement to improve travel time for cyclists. To prevent the route from becoming a higher speed through route for vehicle traffic, diverters can be installed along the route to discourage through traffic while preserving local access. These diverters involve no expansion of vehicle use.

The 2016 Bicycle Master Plan includes three (potentially four) bicycle boulevard projects. Cacique Street (currently in the design phase), Alisos Street, Chino Street and potentially Sola Street. In all cases, these are lower volume residential roadways that have average daily traffic volumes (ADT) between 500 and 3,000 vehicles per day.

Conclusion: No safety or traffic flow mitigation measures, other than those incorporated into design by existing standards and /or regulations, are needed for the Bike Boulevard Projects included in the 2016 Bicycle Master Plan.

5. Intersection Enhancements and Signal Detection for Bicycle Safety

Intersection enhancements can include a number of countermeasures to improve traffic and bike flow, and traffic and bike safety, including:

- Enhanced traffic signal detection. This allows the traffic signal to detect the presence of a cyclists on a side street. Enhanced detection can also improve traffic signal safety and efficiency.

- Improved pavement delineation. This enhances driver and cyclists positioning approaching the intersection, and can better define driver and cyclist paths of travel through the intersection to improve safety.
- Change in intersection traffic control. Intersection traffic control can be evaluated on a site specific basis to select the most appropriate form of traffic control that maximizes safety and efficiency for all uses. Examples of changes include all-way stops, traffic signal timing, and roundabouts.

Conclusion: No safety or traffic flow mitigation is needed for the intersection enhancements and signal detection projects within the 2016 Bicycle Master Plan.

6. One-Way Couplet Extensions

One way couplets are primarily used in Santa Barbara to improve roadway efficiency. Traffic signals are more easily coordinated on one-way streets to provide better vehicle progression. The use of one way streets can also provide space for Class II bike lanes. By converting two, two-way streets into one-way streets with single vehicle lanes, enough space is created for Class II bike lanes. The safety benefits are outlined in #2, above.

Potential effects on traffic flow include increasing more circuitous routes and peak directional traffic concentrated onto one street. The 2016 Bicycle Master Plan includes an extension of the Bath Street/Castillo Street one-way couplet system. Expected traffic volume changes are quantified in this Appendix, none of which are expected to cause a degradation of intersection level of service below the City's threshold, but rather will improve traffic flow. Any changes to vehicular traffic flow will be negligible.

Conclusion: No safety or traffic flow mitigation is needed for the one-way couplet extension included in the 2016 Bicycle Master Plan.

SECTION 2, MICHELTORENA STREET GREEN LANE PROJECT, EAST-WEST CONNECTION

One project in the Draft BMP proposes street restriping along four blocks of Micheltorena Street in order to install Class II green bike lanes. Below is a summary of project description and various options for the Micheltorena Street Green Lane project. The purpose of providing bike lanes on Micheltorena Street is to establish a bicycle facility connection from the Westside to State Street. This project would be consistent with comments heard from the community during the BMP public hearing process:

- ✓ Enhance safety for all road users.
- ✓ Improve connections across Highway 101.
- ✓ Close gaps in the network.
- ✓ Create strong east/west connections.
- ✓ Provide high quality bicycle facilities that encourage cyclists of all skill levels to ride on certain corridors.

Currently, there is no dedicated bicycle facility that connects the Westside to downtown. Of the existing Highway 101 crossings, none, in their current form, provide this connectivity:

- ✓ Ortega Street: good connectivity to lower Westside; poor connectivity to Westside.
- ✓ Carrillo Street: does not have bike lanes.
- ✓ Anapamu Street: poorly configured and steep bridge approaches.
- ✓ Micheltorena Street: bike lanes exist on the crossing, but no connecting bike lanes.
- ✓ Mission Street: bike lanes exist on the crossing, but no connecting bike lanes. Not a direct route from many areas of Westside.

Potential Configurations

Potential design options have been examined. There are several configurations that are technically feasible, with various levels of cost and benefit. From a traffic perspective, the most challenging aspect of the project involves maintenance of the left turn lanes on Micheltorena Street. Micheltorena Street is not wide enough to accommodate one through lane in each direction, a left turn lane, and bike lanes. In order to accommodate all of these lanes, the roadway approaches to each intersection would have to flare out about two to three feet within the existing right of way. The first (and most expensive) alternative would be to flare each of the six intersection approaches that have left turn lanes on Micheltorena Street. Other alternatives include widening only the busiest left turn lane locations, and prohibiting left turns at the least busy locations during the peak hours.

Also described is a Sola Street Bike Boulevard (BB) facility. A Sola Street BB facility would require parking removal in the 300W block of Micheltorena (Castillo to Bath) or on portions of Castillo Street to create contra flow lanes, an intersection widening at San Andres, and a peak hour left turn prohibition at Castillo Street to be comparable to the Micheltorena Street alternatives. Sola could become a bike boulevard between Castillo and State or between Castillo and Laguna Street. The alternatives and differences are described in the table below, and illustrated in Figures 1 through 4, attached.

Alt.	Intersection Widening	Left Turn Lanes Provided	Left Turn Prohibitions	Green bike lanes
1b	Three (highest left turn volumes) • San Andres • Bath • State	Three (highest left turn volumes) • San Andres • Bath • State	Three (lowest left turn volumes) • Castillo • De La Vina • Chapala	Continuous both directions San Andres to State.
1c	Six (all) • San Andres • Castillo • Bath • De La Vina • Chapala • State	Six (all) • San Andres • Castillo • Bath • De La Vina • Chapala • State	None	Continuous both directions San Andres to State.
1a	None	Three (highest left turn volumes) • San Andres • Bath • State	Three (lowest left turn volumes) • Castillo • De La Vina • Chapala	Mixture of exclusive and shared lanes. Shared lanes at locations where left turn lanes are maintained (not widened).
Sola	One • Micheltorena And San Andres	Five • San Andres • Bath • De La Vina • Chapala • State	One (lowest left turn volume) • Castillo	Continuous both directions from San Andres to Bath (on Micheltorena). Mixtures of exclusive and shared to State via Sola.

Traffic Flow and Intersection Capacity

Traffic flow will operate more efficiently at all locations where parking is removed to accommodate restriping because parallel parking conflicts are eliminated. On street parking reduces the flow rate on street because of parking maneuvers, and because 7-8 feet of parking lanes narrow the travel way. The impact of parking maneuvers generally increases closer to State Street as parking turnover is higher. In terms of potential parking removal of 85 spaces on Micheltorena Street, vehicular impacts have been assessed as relates to vehicles circling the block to find available parking. The assessment found that while vacancy rates per block varied between 13% and 57%, sufficient available parking existed in the neighborhood to absorb parking demand with the removal of 85spaces with negligible impact to traffic flow. Staff also was able to develop a plan to replace up to 77 of the 85 spaces within two blocks of the Micheltorena corridor. Staff also tallied over 1,400 on street spaces within 2 blocks of the Micheltorena Corridor, such that removal of 0.5% (net 8 spaces, 85-77) will have no effect upon cruising for parking spaces or block circling. Vacancy information taken at various times of the day via field surveys is provided here:

Total available parking spaces within two blocks of Micheltorena Street: 393 spaces between 10:00am and 12:00pm, 356 spaces between 1:30 and 3:00pm, and 318 spaces between 7:30pm and 9:00pm. Total parking spaces within one block of Micheltorena: 237 spaces between 10:00am and 12:00pm, 179 spaces between 1:30 and 3:00pm, and 182 spaces between 7:30pm and 9:00pm.

Based on the Highway Capacity Manual, the presence of on-street parking can reduce the flow rate by approximately 10% due to parking maneuvers, and 3% due to the narrowed travel way. On-street parking is typically 7-8 feet wide and standard bike lanes are 5-6 feet, thus allowing more room in the vehicle travel lanes and less side friction. Additionally, as a result of the roadway drainage configuration and dips on the Micheltorena cross streets, speeds are not anticipated to change measurably on the corridor. Each alternative also will have a varied effect on intersection level of service along Micheltorena Street. The differences are due to presence of left turn lanes, and diversion of traffic due to peak hour left turn prohibitions.

Peak hour left turn prohibitions for westbound Micheltorena Street at Castillo Street and De La Vina Street will likely have little impact on the street system. These left turn movements are relatively light, and those drivers that wish to travel south on Castillo Street or De La Vina Street will spread out across the grid street system. A peak hour left turn prohibition for eastbound Micheltorena Street at Chapala Street will likely result of most drivers turning left at State Street instead. The proportion of peak hour left turning vehicles that would be prohibited compared to overall daily traffic volumes. Since the neighborhood is laid out in a square grid configuration, many options exist for rerouting of traffic with no impact on delay. For example, travelers who are accustomed to using Micheltorena in the westbound direction in the peak hour to connect to parallel streets have multiple alternative routes.

VEHICULAR TRAFFIC MITIGATIONS

Based on the segment- and intersection-level changes studied using the city-wide traffic model, the following intersections could experience vehicle LOS impacts with the implementation of associated SBBMP projects (study intersection numbers are shown for reference to Tables 1 and 2):

- 1. De la Vina Street & State Street: Impact in Future conditions under Scenario 2
- 2. Alamar Avenue & State Street: Impact in Existing and Future conditions under Scenario 2
- 10. Meigs Road & Cliff Drive: Impact in Existing and Future conditions under both scenarios

The following recommendations are proposed improve traffic flow at the above intersections where traffic impacts are foreseen. Note that, for the basis of comparison, the modeling efforts assume no changes in mode split (i.e. percent of people driving, walking, biking, and riding transit) between the existing and future conditions. If the SBBMP mode split goals are achieved and more Santa Barbarans ride bicycles, fewer vehicle trips would occur and a commensurate reduction in vehicular impacts would also occur. Further, the traffic modeling assumes that all intersections that are signalized in the current year remain signalized in 2030. Implementation of roundabouts alongside bikeway projects, as discussed below, has the potential to improve vehicular flow and mitigate potential impacts since roundabouts generally reduce vehicular delay.

The following three intersection adjustments were formulated to improve vehicular flow.

1. De la Vina Street & State Street

The PM peak hour impact under Future plus Project conditions for Scenario 2 is primarily driven by the high number of vehicles in the westbound direction and the lane reduction associated with the bicycle lane. This intersection is on the western end of the bike lane improvement and associated vehicle lane reduction along State Street for Scenario 2. This impact could be removed, or mitigated, if the westbound bikeway along State Street ended before the intersection with a transition to two westbound lanes at the intersection. While this is a potential design consideration, it was not included in the LOS assessment shown in **Tables 1 or 2**.

It is important to note that, even though there would be an impact at this location, the intersection still performs at LOS C under Scenario 2. LOS C is often considered an acceptable performance level.

A roundabout should also be considered at this intersection, which, in conjunction with an additional roundabout at State Street & Alamar Avenue, would help to improve traffic flow and mitigate the impacts of the bikeway project. Additional roundabouts along State Street between De La Vina Street and Constance Avenue should also be considered to further enhance safety and efficiency.

2. Alamar Street & State Street

The intersection design should allow for a westbound left-turn lane, a through lane, and a right-turn lane. The westbound right-turn lane would be converted from a through lane in the westbound direction approaching the intersection. The existing ROW is 65 feet, which is wide enough to accommodate this lane geometry at the intersection plus a bicycle lane in each direction. The LOS assessment shown in **Tables 1 and 2** includes this design consideration for Scenario 1 and Scenario 2.

A roundabout should also be considered at this intersection, which, in conjunction with an additional roundabout at State Street & De La Vina Street, could help to improve traffic flow and mitigate the impacts of the bikeway project. Additional roundabouts along State Street between De La Vina Street and Constance Avenue should be considered to further enhance safety and efficiency.

10. Meigs Road & Cliff Drive

A roundabout at this intersection would help to improve traffic flow and mitigate the impacts of the bikeway project. Additional roundabouts along Cliff Drive between Hendry's Beach and Castillo Street might also be considered to further enhance safety and efficiency.

Further study is needed at the locations mentioned above to determine the most appropriate form of traffic control. Given the growing body of knowledge regarding roundabout traffic performance, roundabouts should be a considered alternative for any intersection change.

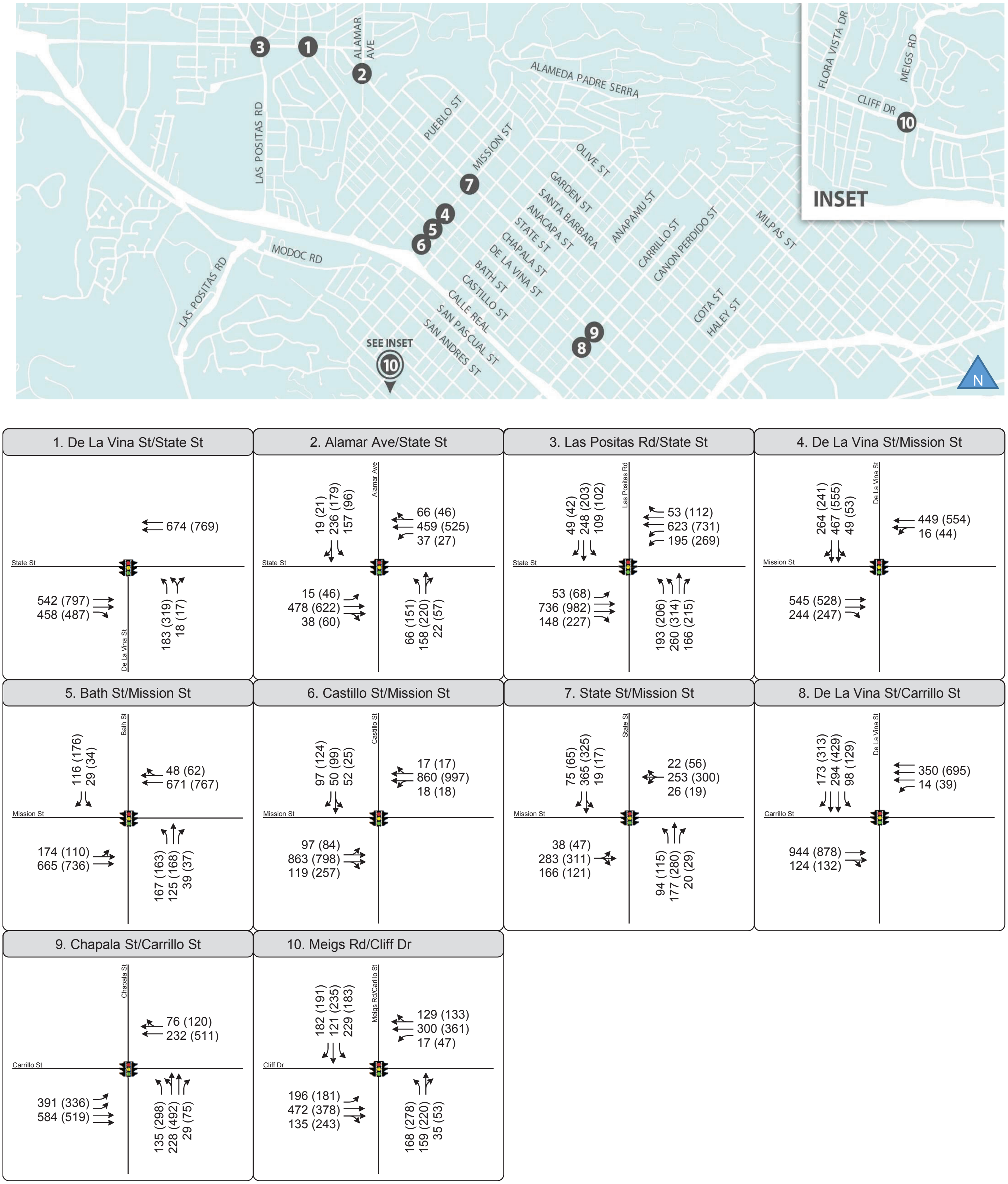


Figure 1

Peak Hour Traffic Volumes and Lane Configurations - Existing (2008)

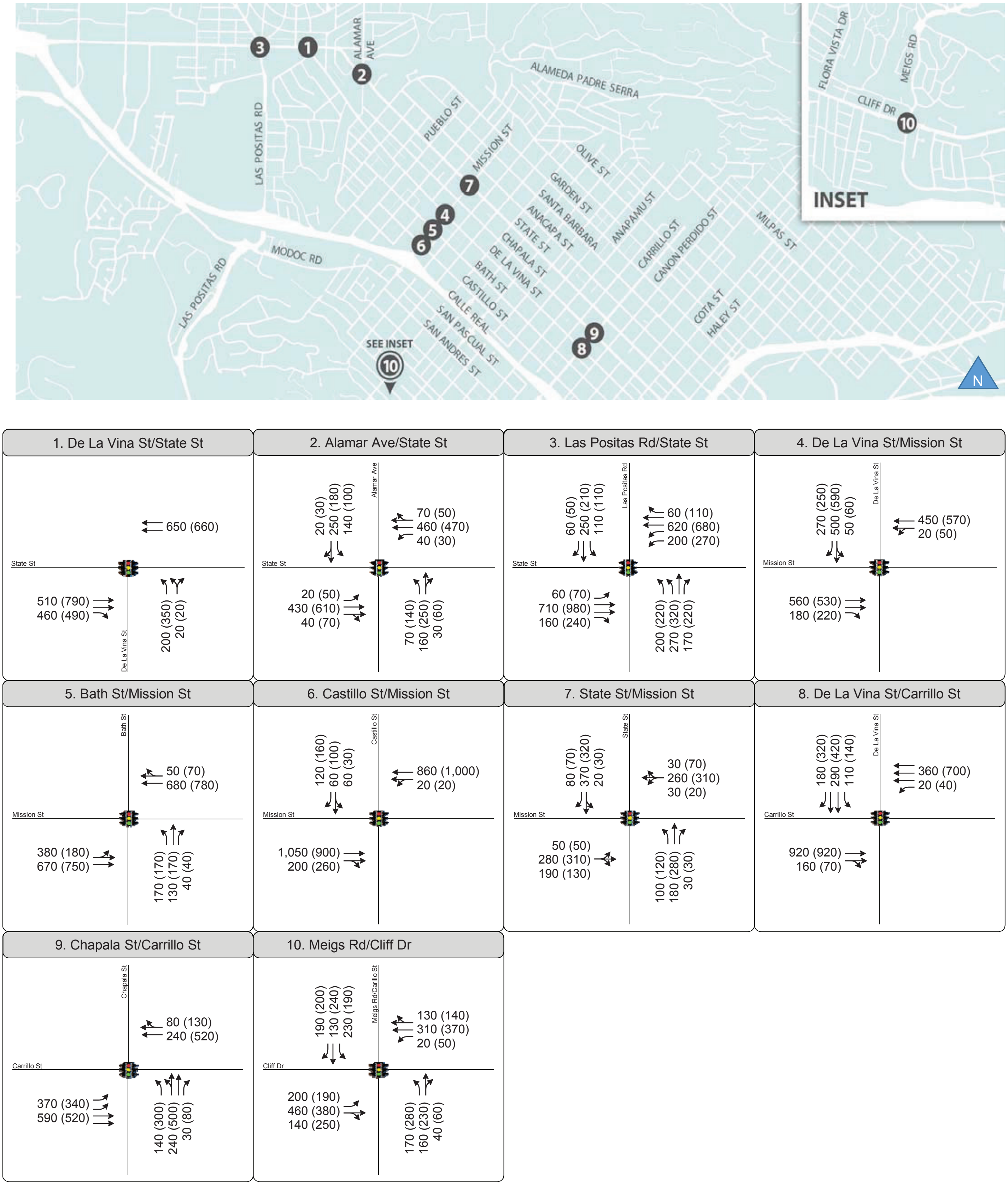
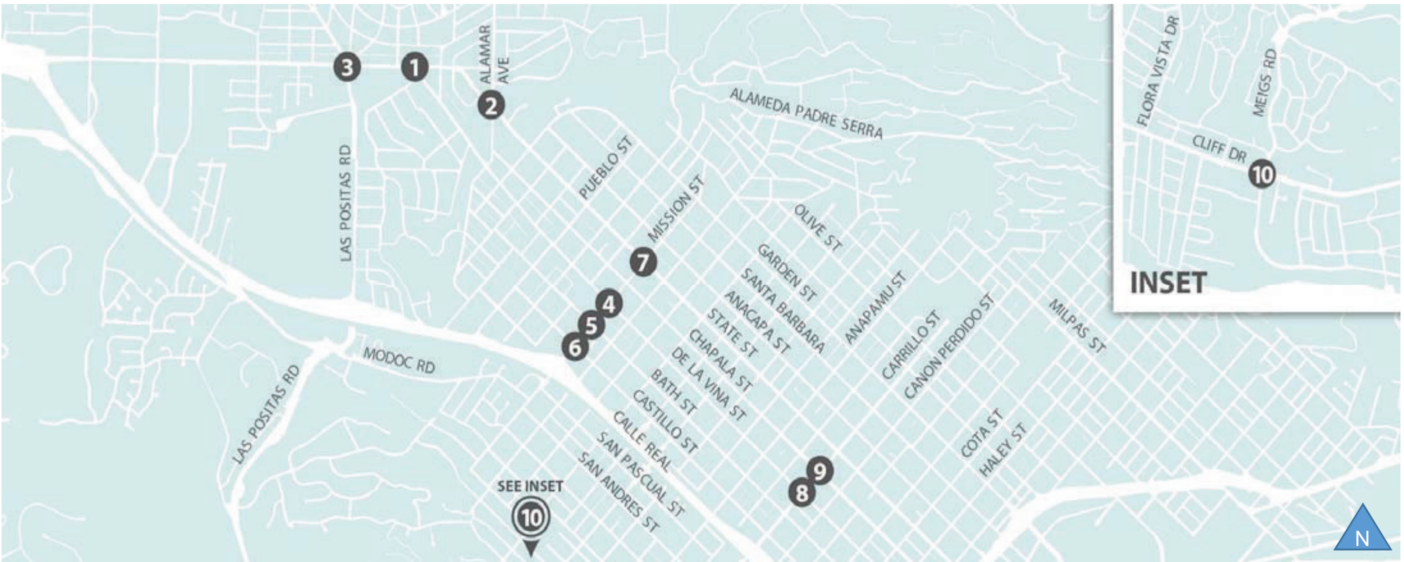


Figure 2

Peak Hour Traffic Volumes and Lane Configurations - Existing (2008) With Scenario 1



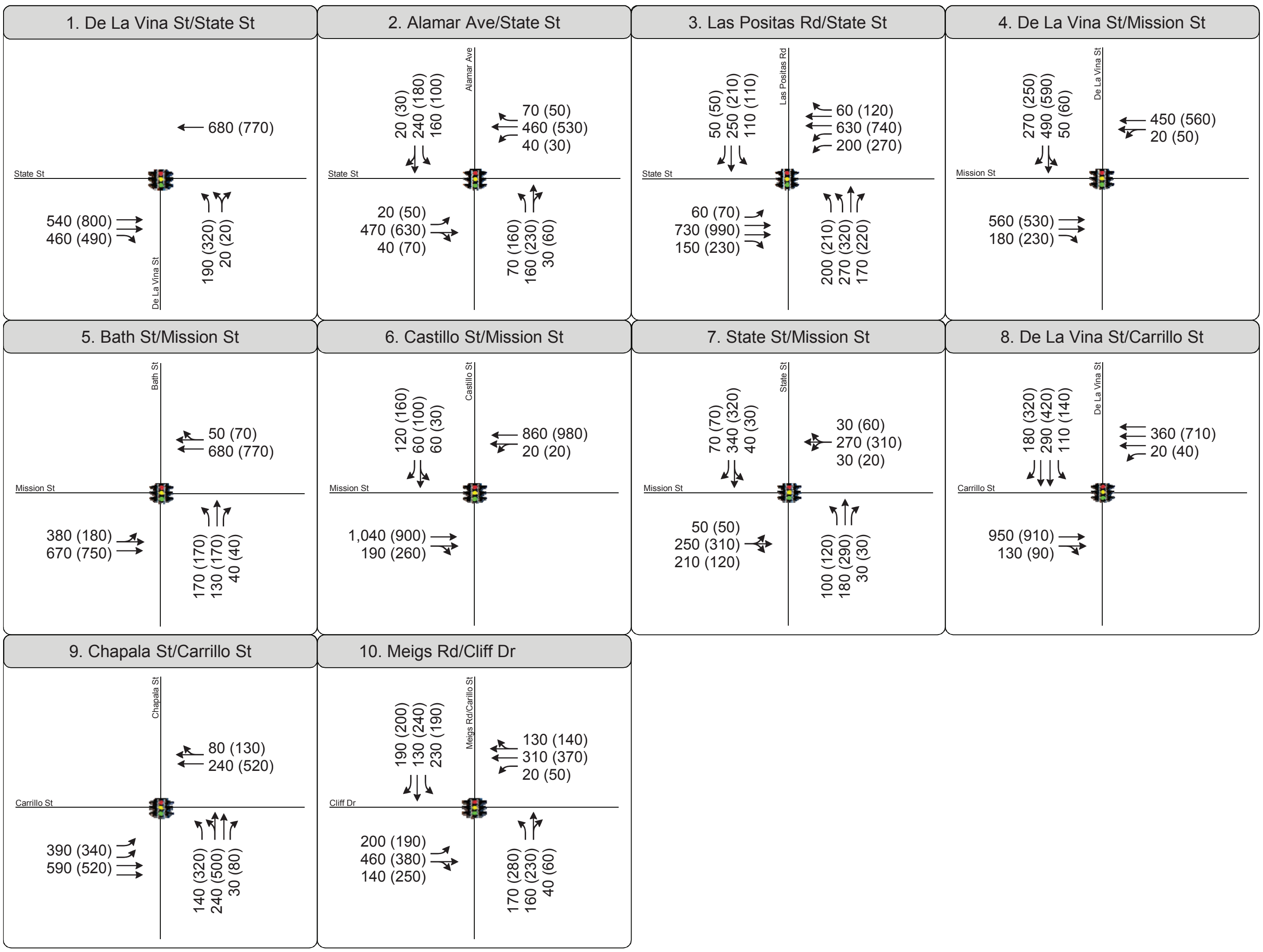
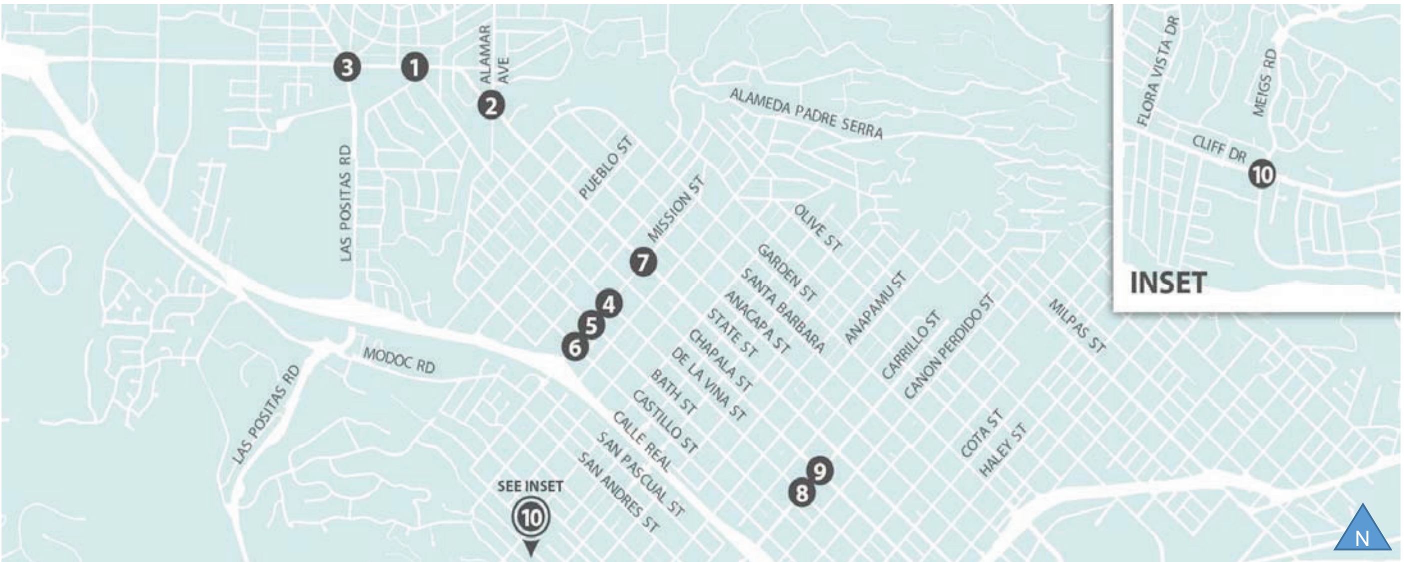


Figure 3

Peak Hour Traffic Volumes and Lane Configurations - Existing (2008) With Scenario 2



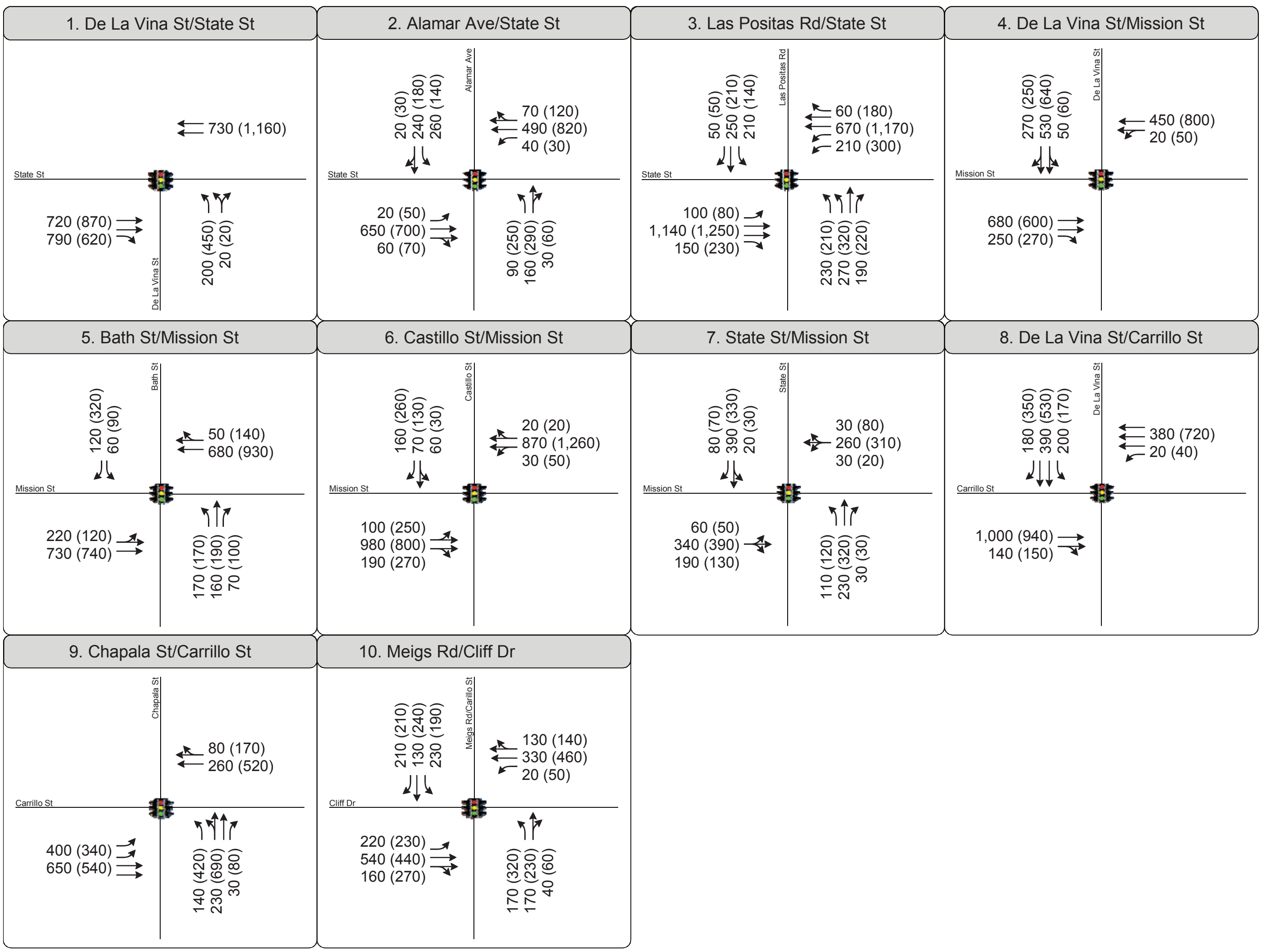


Figure 4

Peak Hour Traffic Volumes and Lane Configurations - Future (2030) Without Project

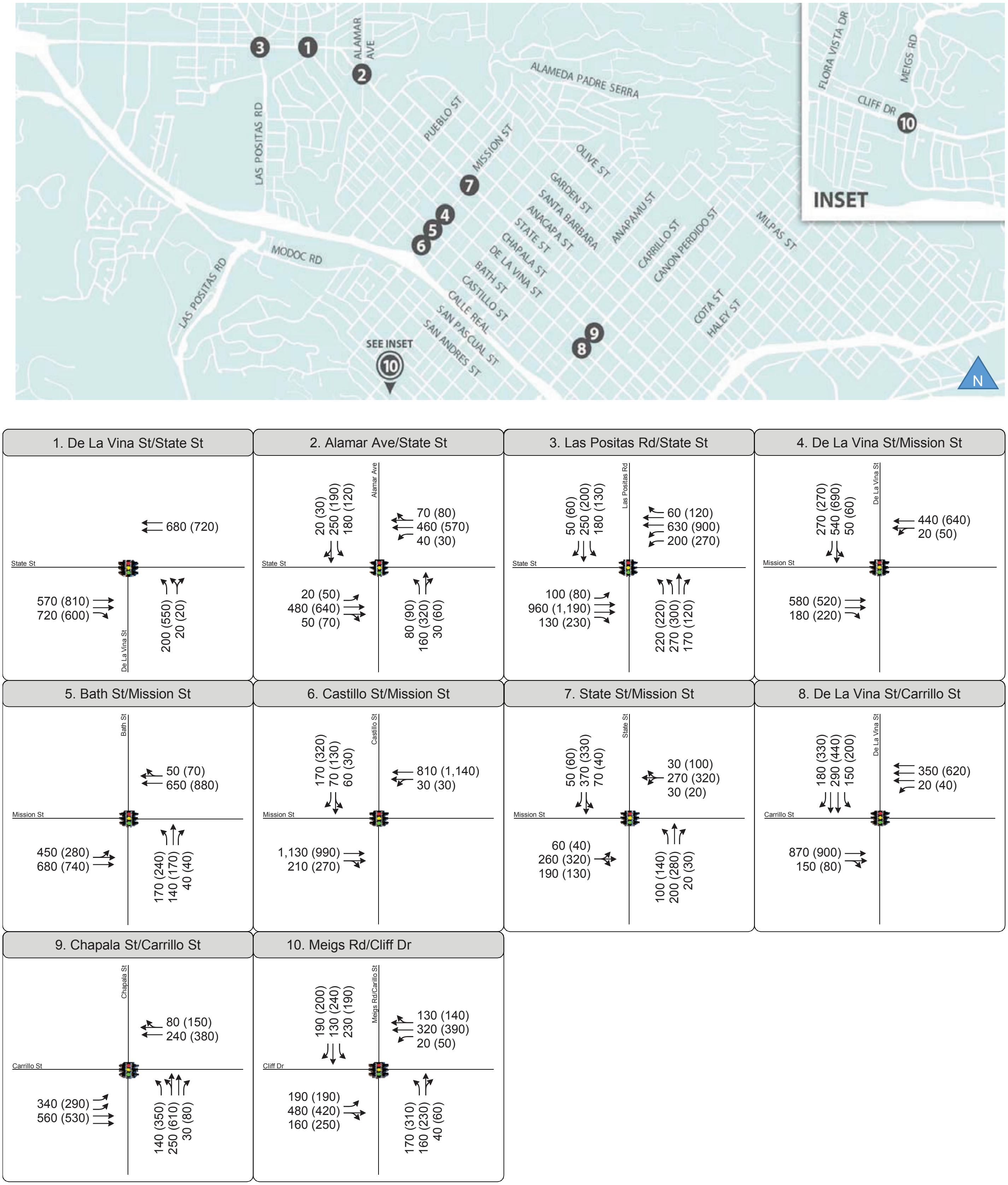


Figure 5

Peak Hour Traffic Volumes and Lane Configurations - Future (2030) With Scenario 1

A

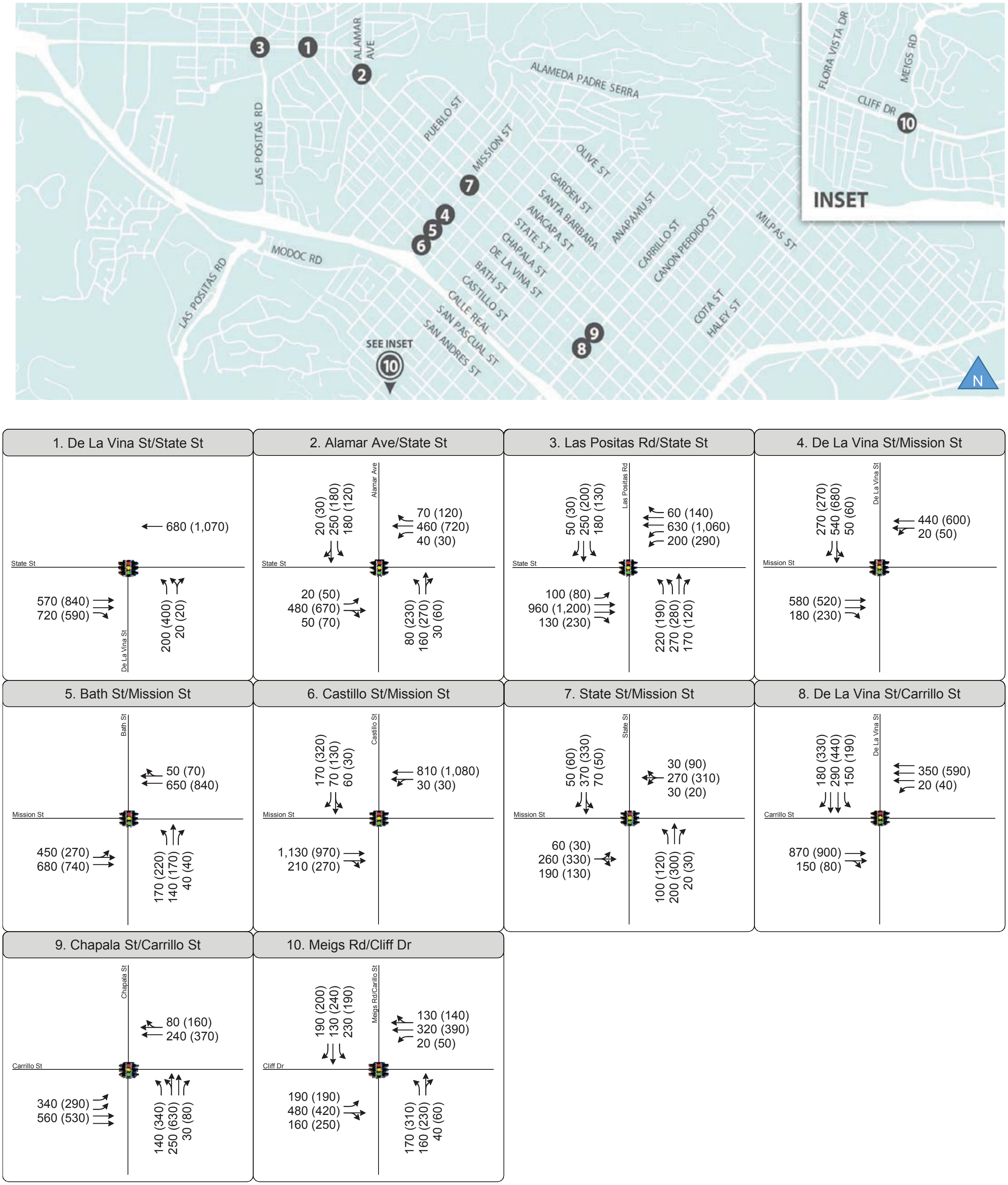


Figure 6

Peak Hour Traffic Volumes and Lane Configurations - Future (2030) With Scenario 2

TABLE 1

SANTA BARBARA MASTER BICYCLE PLAN

EXISTING AND EXISTING PLUS PROJECT INTERSECTION LOS

Intersection	Peak Period	Existing		Existing plus Project (Scenario 1)		Change in V/C	Significant Impact?*	Existing plus Project (Scenario 2)		Change in V/C	Significant Impact?*
		V/C	LOS	V/C	LOS			V/C	LOS		
1. De la Vina St & State St	AM	0.47	A	0.47	A	0.005	No	0.59	A	0.127	No
	PM	0.54	A	0.54	A	0.004	No	0.66	B	0.123	No
2. Alamar Ave & State St [a]	AM	0.50	A	0.50	A	0.008	No	0.63	B	0.137	No
	PM	0.56	A	0.58	A	0.019	No	0.80	D	0.238	**Yes**
3. Las Positas Rd & State St	AM	0.64	B	0.64	B	0.007	No	0.64	B	0.001	No
	PM	0.77	C	0.78	C	0.011	No	0.78	C	0.008	No
4. De la Vina St & Mission St [b]	AM	0.52	A	0.45	A	-0.073	No	0.45	A	-0.070	No
	PM	0.56	A	0.49	A	-0.067	No	0.49	A	-0.064	No
5. Bath St & Mission St	AM	0.56	A	0.61	B	0.053	No	0.61	B	0.053	No
	PM	0.61	B	0.59	A	-0.012	No	0.60	A	-0.009	No
6. Castillo St & Mission St	AM	0.51	A	0.63	B	0.116	No	0.64	B	0.123	No
	PM	0.55	A	0.66	B	0.110	No	0.66	B	0.110	No
7. State St & Mission St	AM	0.72	C	0.74	C	0.020	No	0.75	C	0.032	No
	PM	0.70	B	0.71	C	0.010	No	0.71	C	0.016	No
8. De la Vina St & Carrillo St	AM	0.55	A	0.56	A	0.013	No	0.56	A	0.013	No
	PM	0.64	B	0.64	B	0.002	No	0.63	B	-0.002	No
9. Chapala St & Carrillo St	AM	0.45	A	0.45	A	0.009	No	0.44	A	-0.001	No
	PM	0.64	B	0.65	B	0.018	No	0.64	B	0.009	No
10. Meigs Rd & Cliff Dr	AM	0.62	B	0.76	C	0.136	No	0.76	C	0.136	No
	PM	0.69	B	0.85	D	0.162	**Yes**	0.85	D	0.162	**Yes**

Note: Intersections operating at LOS E or F are noted in **Bold.**
*For signalized intersections, target LOS is C, with a V/C of <=0.77.
[a] Design includes a westbound left, through, and right-turn lane.
[b] Design includes a southbound shared left-through lane, a through lane, and a right-turn lane.

TABLE 2

SANTA BARBARA MASTER BICYCLE PLAN

CUMULATIVE AND CUMULATIVE PLUS PROJECT INTERSECTION LOS

Intersection	Peak Period	Cumulative		Cumulative plus Project (Scenario 1)		Change in V/C	Significant Impact?*	Cumulative plus Project (Scenario 2)		Change in V/C	Significant Impact?*
		V/C	LOS	V/C	LOS			V/C	LOS		
1. De la Vina St & State St	AM	0.59	A	0.64	B	0.048	No	0.64	B	0.048	No
	PM	0.63	B	0.63	B	0.000	No	0.77	C	0.140	**Yes**
2. Alamar Ave & State St [a]	AM	0.57	A	0.52	A	-0.043	No	0.69	B	0.122	No
	PM	0.68	B	0.68	B	0.000	No	0.88	D	0.201	**Yes**
3. Las Positas Rd & State St	AM	0.76	C	0.76	C	-0.003	No	0.76	C	-0.003	No
	PM	0.87	D	0.84	D	-0.025	No	0.85	D	-0.023	No
4. De la Vina St & Mission St [b]	AM	0.54	A	0.45	A	-0.084	No	0.45	A	-0.084	No
	PM	0.61	B	0.54	A	-0.068	No	0.55	A	-0.055	No
5. Bath St & Mission St	AM	0.57	A	0.61	B	0.037	No	0.61	B	0.037	No
	PM	0.70	C	0.73	C	0.023	No	0.75	C	0.047	No
6. Castillo St & Mission St	AM	0.55	A	0.67	B	0.116	No	0.67	B	0.116	No
	PM	0.73	C	0.73	C	0.003	No	0.74	C	0.010	No
7. State St & Mission St	AM	0.76	C	0.77	C	0.006	No	0.77	C	0.006	No
	PM	0.74	C	0.73	C	-0.006	No	0.74	C	0.000	No
8. De la Vina St & Carrillo St	AM	0.57	A	0.55	A	-0.025	No	0.55	A	-0.025	No
	PM	0.65	B	0.64	B	-0.010	No	0.64	B	-0.010	No
9. Chapala St & Carrillo St	AM	0.46	A	0.44	A	-0.023	No	0.44	A	-0.023	No
	PM	0.70	B	0.63	B	-0.067	No	0.63	B	-0.070	No
10. Meigs Rd St & Cliff Dr	AM	0.64	B	0.78	C	0.147	**Yes**	0.78	C	0.147	**Yes**
	PM	0.73	C	0.89	D	0.165	**Yes**	0.89	D	0.165	**Yes**

Note: Intersections operating at LOS E or F are noted in **Bold.**
*For signalized intersections, target LOS is C, with a V/C of <=0.77.
[a] Design includes a westbound left, through, and right-turn lane.
[b] Design includes a southbound shared left-through lane, a through lane, and a right-turn lane.