A COMPARATIVE ANALYSIS
OF

THREE STORY BUILDINGS

for
DOWNTOWN SANTA BARBARA
WITH RESPECT TO

SIZE, MASS, BULK AND SCALE

By
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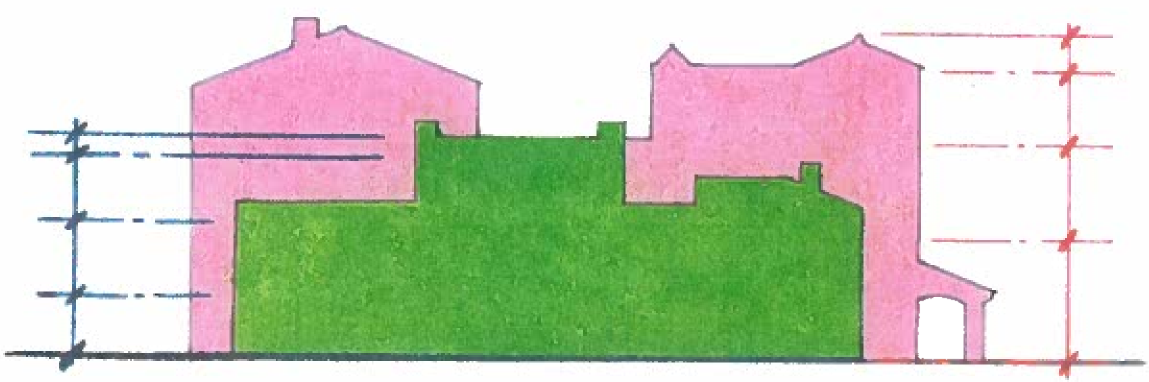
2005



Acknowledgement

The buildings compared in this study were all designed by Santa Barbara architects, except the Bothin Building. Drawings were generously provided to me, and without them this study would not have been possible.

Eight buildings are compared for height, length, elevations, perspective (photographic), floor to floor heights and scale of architectural elements. Those drawings provided, which were not dimensioned, have been scaled.

The architects of the buildings are as follows:

1. 727 Garden Street	Edwards & Pitman
2. 801 Garden Street	Berkus Design Studio
3. 2323 DeLaVina Street	Sharpe, Mahan & Associates
4. The Bothin Building	Lionel Pries ('25-26)& Cernal Arch.
5. 1123 Chapala Street	Sharpe, Mahan & Associates
6. 1111 Chapala Street	Lenvik & Minor
7. 1021 Anacapa Street	Cernal Architects, Inc.
8. Chapala Lofts, Chapala & Gutierrez	Berkus Design Studio

The section of the Cathedral of Florence is from A History of Architecture on the Comparative Method, by Sir Bannister Fletcher.

Introduction

The purpose of this study is to understand what elements contribute to the height and size of 3 story buildings and to define and understand the meaning of *size, mass, bulk and scale.* Furthermore, this study will generate visual and comparative tools which the reviewing boards and commissions can use to evaluate proposed new designs. These tools will include Setback Evaluation Analysis, Vertical Envelope Analysis, Elevation Area Analysis and Perspective Analysis, and will be discussed in greater length starting on page 30.

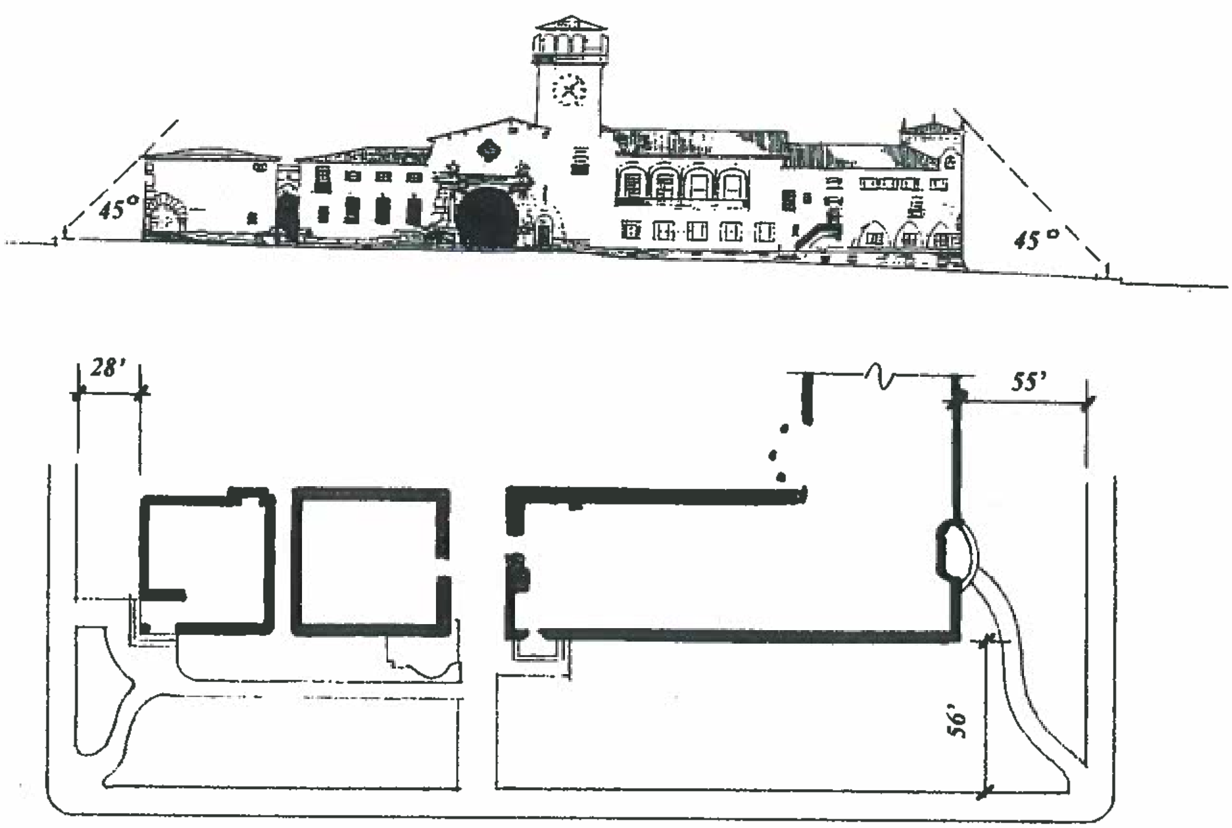
Because of land costs and a shortage of building area, it is believed that 3 story structures will be increasingly popular, and therefore it is important to establish some methods of comparison. The *size, mass, bulk and scale* of buildings is determined by the architect, but what elements cause them to be as they are and how are they interrelated? It is believed that an understanding of how these elements work will assist the design reviewers in evaluating the architectural proposals before them.

In measuring the eight buildings in this study some dimensions are scaled and some finished floor elevations or sidewalk elevations are averaged. It is not the purpose of this report to judge each building exactly, but rather to establish a general spectrum from small to large, and to try to understand what makes that happen. Heights of ridges, etc. given are for the elevation shown. Other parts of the building could be higher but are not considered in this study.

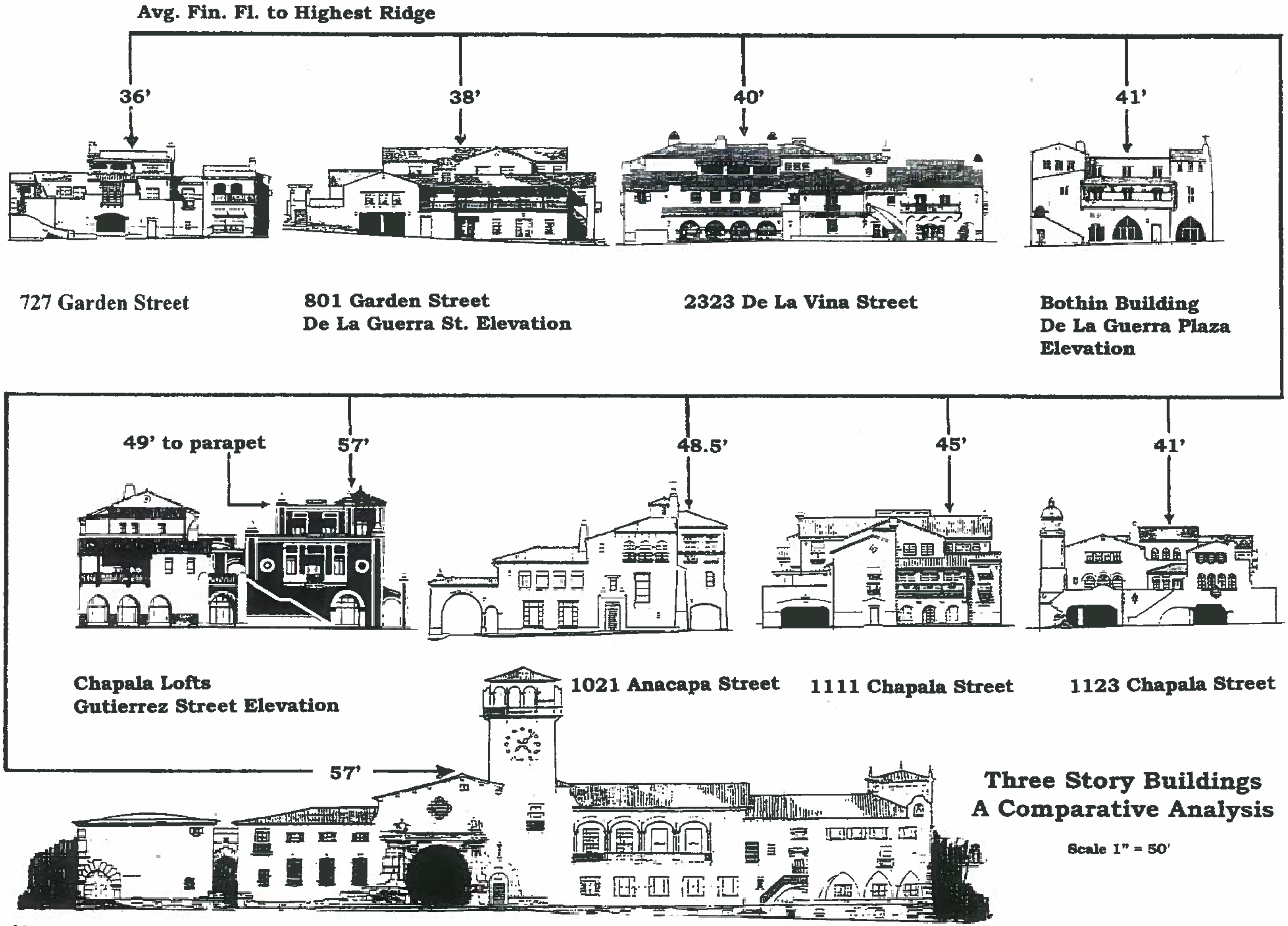
Size

The eight buildings listed previously are shown in elevation at 1/32 scale on pages 5 through 8, to form a spectrum of *size*. They are also shown on page 3 at 1"=50' and compared to the Courthouse. They are organized in ascending order of their ridge heights from 36' to 57' and the Courthouse highest ridge which is also 57'. They are all 3 story buildings, but the highest ridge varies by 21' from the lowest ridge, a difference of 158%. Why is there such a difference in their heights? That question is what this study attempts to explore.

The apparent size of a building can be greatly mitigated by providing yard setbacks, as is amply demonstrated by the Santa Barbara Courthouse. Its apparent length and height are successfully reduced by its generous setbacks as shown below. Notice how a viewer's line of sight never exceeds 45 degrees. This view of the Courthouse is successful because of its setback from the property line, but its façade is essentially vertical. Another successful approach is step-backs in the building façade. As shown on page 14 a series of step-backs in the architectural elements function to reduce the building's size as seen from the street.



ANACAPA STREET



Three Story Buildings
A Comparative Analysis

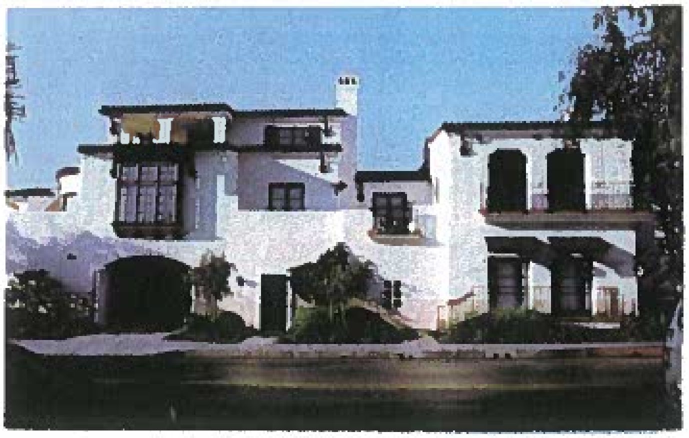
Fig. 1

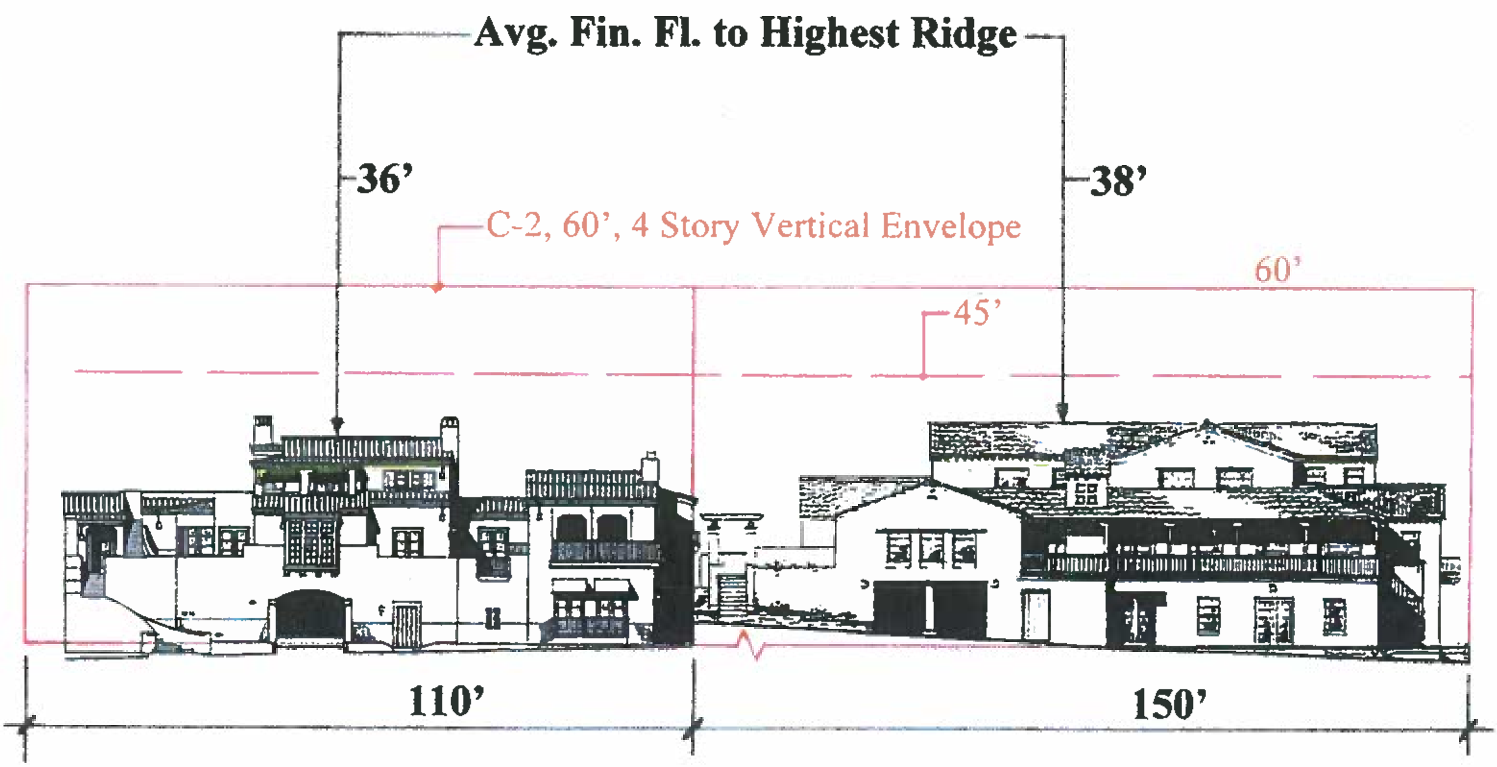
On pages 5 through 8 these eight elevations are shown at approx. 1"= 32' scale. The average finished first floor to the highest ridge is given as well as the length of the buildable envelope facing the sidewalk. Where the finished floors vary and their elevations are complex, the average sidewalk elevation was scaled. Some buildings are broken up in an attempt to shorten their visual length, such as 2323 DeLaVina and some buildings are divided into two distinct architectural styles, such as the Chapala Lofts, shown on pages 13 and 18 respectively. These two examples demonstrate that visual length, as well as actual length, is important when evaluating size.

Generally, it must be recognized that length is site specific. There is no correlation between ascending heights and corresponding lengths of buildings. However, length does contribute to *mass and bulk* as will be discussed later.

Pages 5 through 8 also give the fl. to fl. dimensions of the 1st and 2nd floors and their total height, as well as the highest plate and the highest ridge, and also the EAR calculation described below. Also shown in yellow is the height of the major eave, which usually is similar to the highest plate. It should be observed that the buildings with parking on the 1st floor have the lowest 1st fl. to fl. heights which contributes to their being at the low end of the spectrum. Commercial use seems to result in more height than office use. Residential use cannot be evaluated in this study because only two of the samples have residential use and they position themselves at opposite ends of the spectrum. However, fl. to fl. height of residential space is very discretionary so these two examples demonstrate the degree of discretion that the architect has in determining the final height of a building with residential function.

Also illustrated on pages 5 through 8 are the areas of the Vertical Building Envelopes shown by the red lines. The ratio of the area of the elevation to the area of the Vertical Building Envelope is the Elevation Area Ratio (EAR). Expressed as a percentage it represents the degree to which the building façade fills up its buildable space. The EAR percentage is a tool which will be discussed later starting on page 30. The dashed line represents the 45' high envelope which is the maximum height for 3 story buildings in the C-O and R-3 zones. Although 3 story buildings can legally be 60' tall in the C-2 zone the eight examples shown in this study vary from 36' to 57', which illustrates the wide variation above and below the 45' mark. When a 3 story building exceeds 45' (in the C-2 zone) it should be carefully considered by the reviewing boards and commissions for its qualities of neighborhood compatibility and human scale.





727 Garden Street

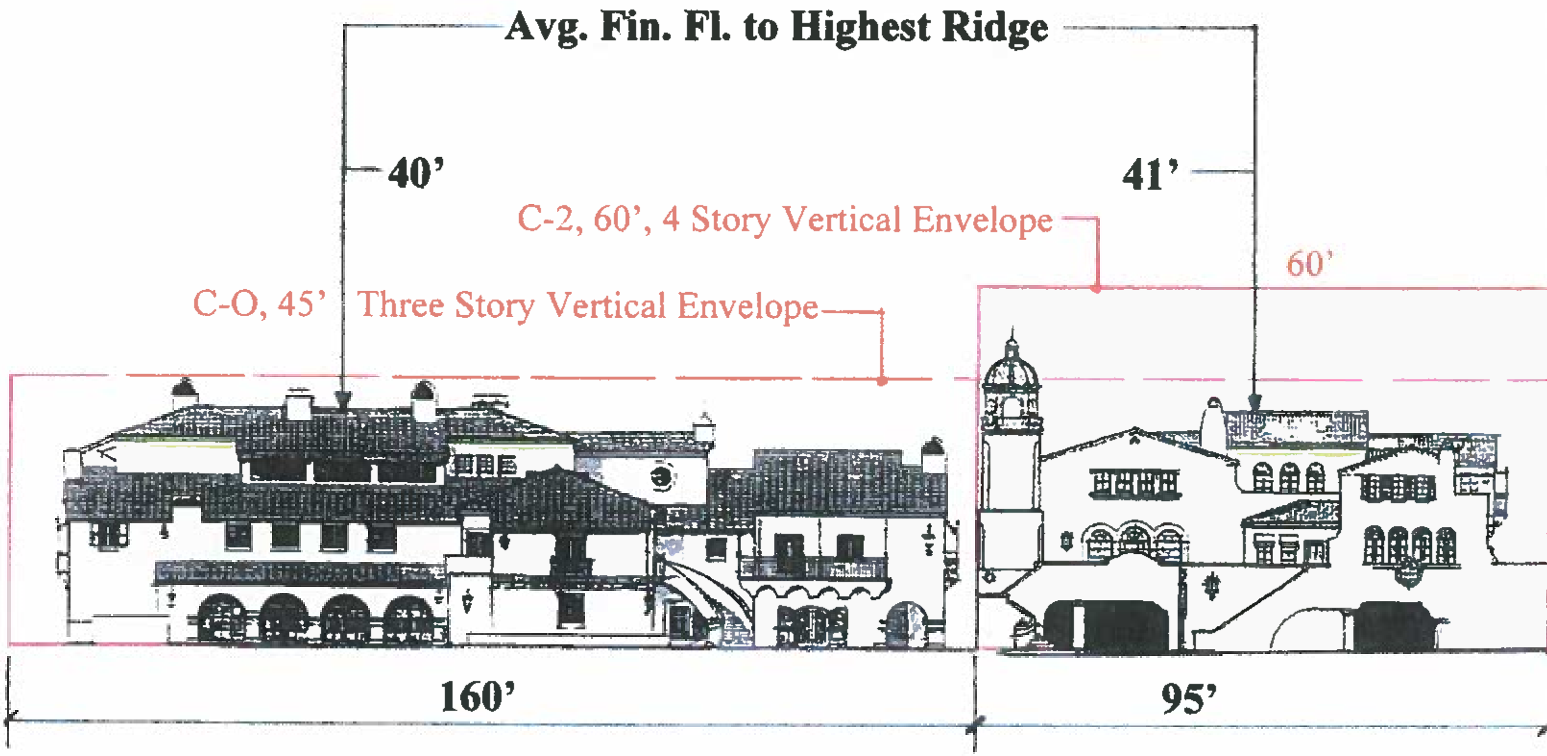
1st fl to fl=12.5'
2nd fl to fl=11'
Highest Plate=31'
Highest Ridge=36'
Façade area=3060 sf
EAR=3060/(60X110)=0.46

801 Garden Street

1st fl to fl=12.5'
2nd fl to fl=11.5'
Highest Plate=32'
Highest Ridge=38'
Façade area=3011 sf
EAR=3011/(60x150)=0.33

Three Story Buildings
A Comparative Analysis

Scale 1"=32'



2323 De La Vina Street

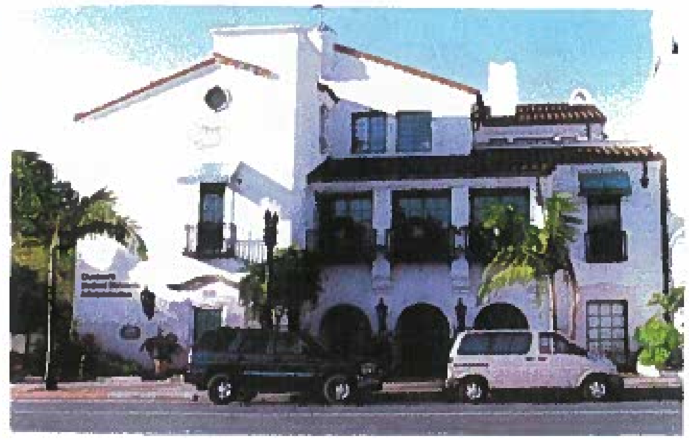
1st fl to fl=12'
2nd fl to fl=12'
Highest Plate=33'
Highest Ridge=40'
Façade area=5149 sf
EAR=5149/(60X160)=0.54
(adj. for C-O,5149/(45x160)=0.71)

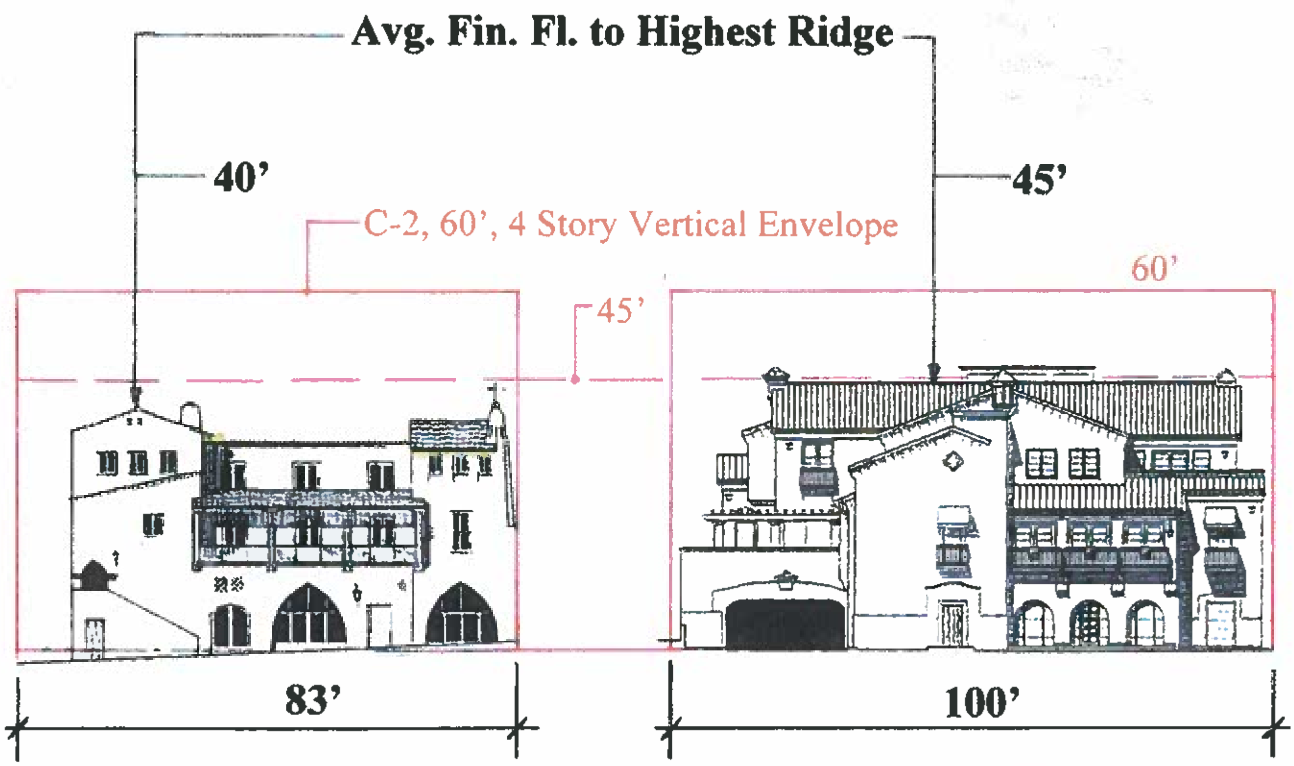
1123 Chapala Street

1st fl to fl=11.5'
2nd fl to fl=12'
Highest Plate=34'
Highest Ridge=41'
Façade area=3293 sf
EAR=3293/(60x95)=0.58

Three Story Buildings
A Comparative Analysis

Scale 1"=32'

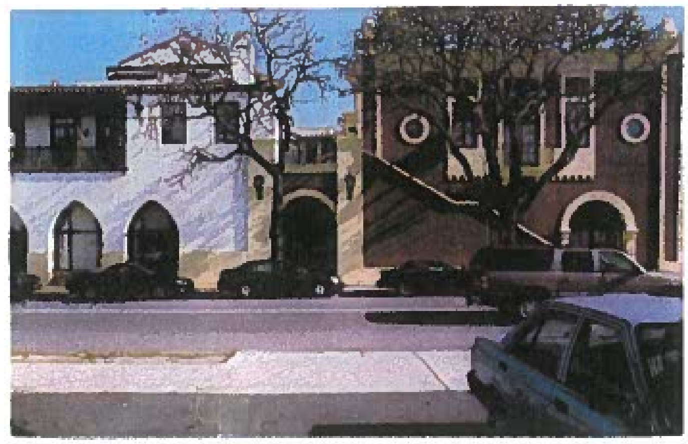


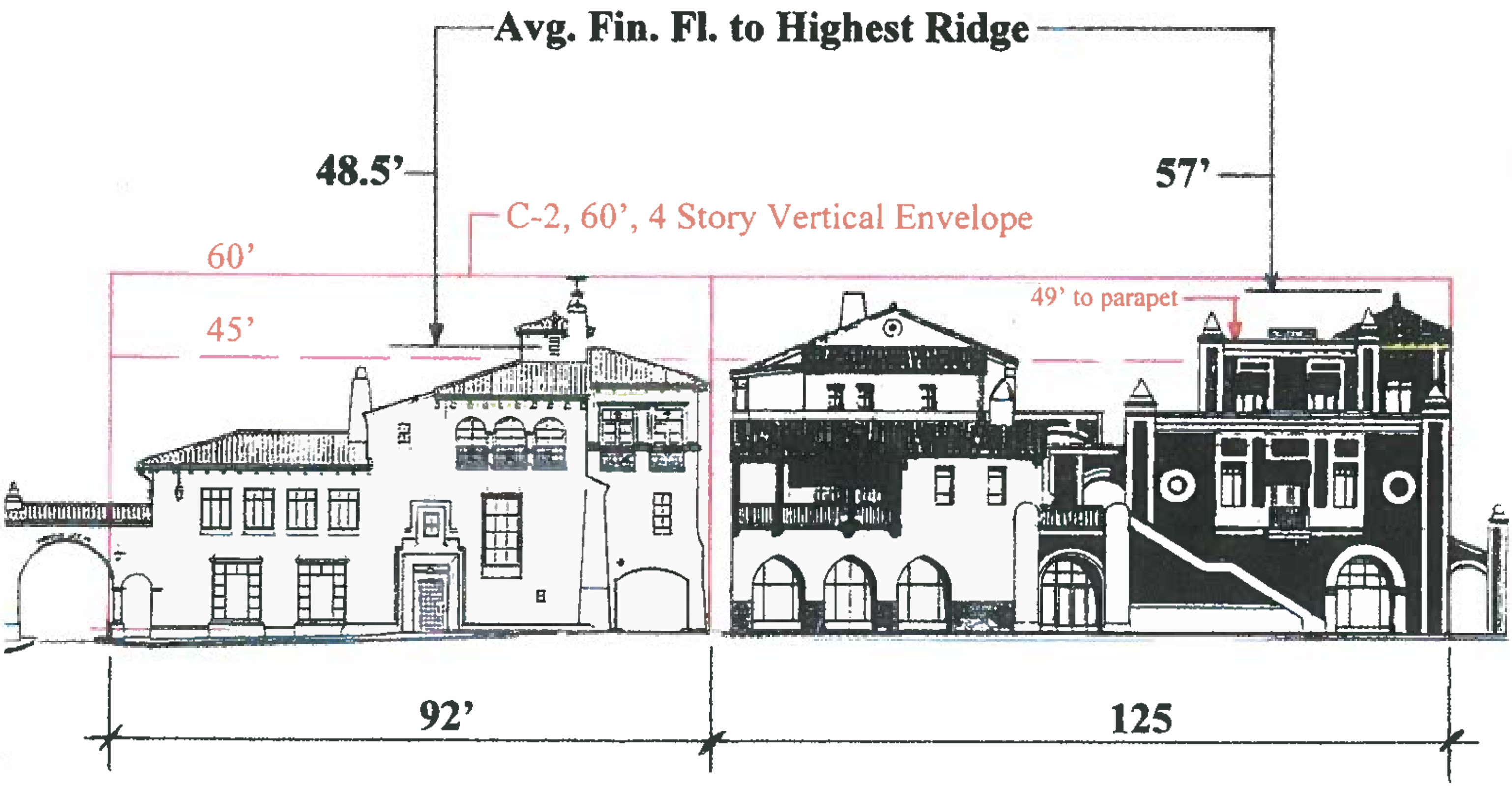


Bothin Building, 1926 (De La Guerra Plaza Elevation)	**1123 Chapala Street**
1^{st} fl to fl=10′	1^{st} fl to fl=13.5′
2^{nd} fl to fl=15′	2^{nd} fl to fl=13.5′
Highest Plate=32′	Highest Plate=36′
Highest Ridge=41′	Highest Ridge=45′
Façade area=2599 sf	Façade area=4073 sf
EAR=2599/(60X83)=0.52	EAR=4073/(60x100)=0.68

Three Story Buildings
A Comparative Analysis

Scale 1″=32′





2323 De La Vina Street

1st fl to fl=14'
2nd fl to fl=14'
Highest Plate=40'
Highest Ridge=48.5'
Façade area=3624 sf
EAR=3624/(60X92)=0.59

1123 Chapala Street

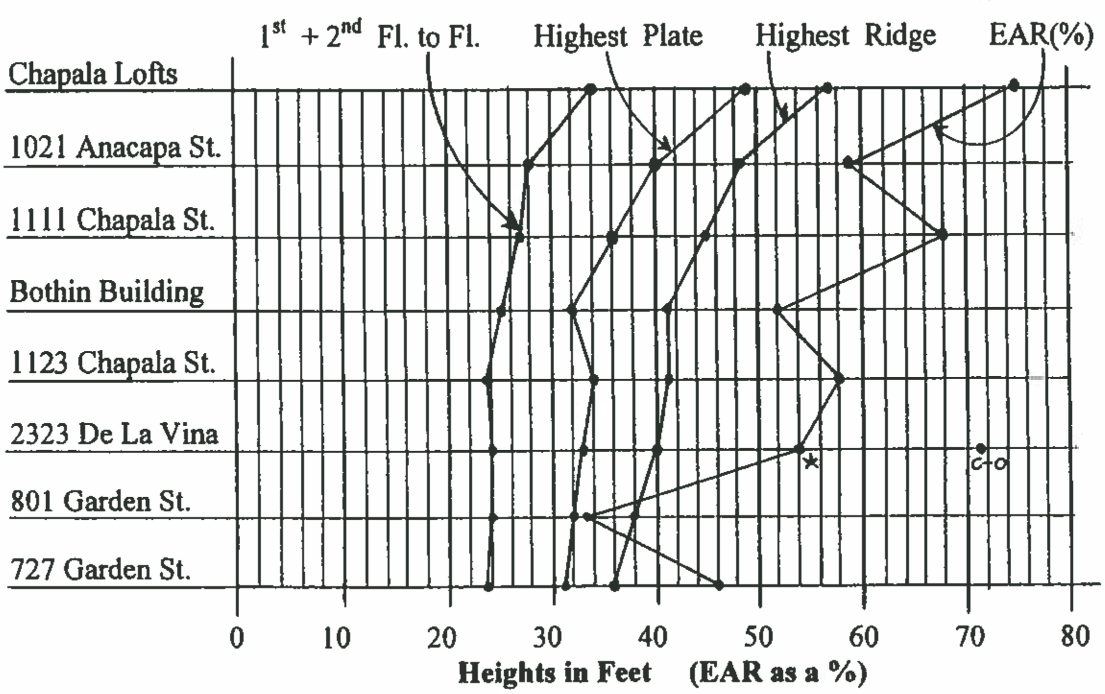
1st fl to fl=18'
2nd fl to fl=16'
Highest Plate=49'
Highest Ridge=57'
Façade area=5666 sf
EAR=5666/(60x125)=0.76

Three Story Buildings
A Comparative Analysis

Scale 1"=32'

On pages 5 through 8 the major eave is shown in yellow. In the elevation drawings on these pages the highest ridge dominates. But in actuality as shown on pages 11 through 18 the major eave may often appear to be the highest element, and in some instances a major gable, such as seen at 1123 Chapala Street on page 14, essentially obscures the highest ridge. Models and perspective drawings as discussed beginning on page 30 are better at evaluating apparent height, rather than elevations, which only show measured heights.

Graph 1 below shows the relationship between 1st and 2nd fl. to fl. heights, highest plate and highest ridge. The correlation between the fl. to fl. heights and the plate and ridge heights demonstrates how these dimensions are related. However, it should be observed that the designer has considerable discretion in the result of the final heights. Notice how the first four lowest fl. to fl. totals are all about the same; 23.5'; 24' and 23.5'. However, the highest plate and ridge for those four examples increase from 31' through 36' to 34' through 41', respectively. Decisions on the height of the 3rd floor plate and the pitch of the roof matter dramatically. Also The EAR is given for each building. If a proposed new 3 story building's EAR and dimensions are inserted into the graph, the reviewing boards and commissions will understand where it fits in the spectrum of small to large. It is not suggested that small is good and large is bad, because variety is important, but the decision makers should know how a building compares with similar buildings and how it relates in terms of compatibility with its neighbors.



Graph 1

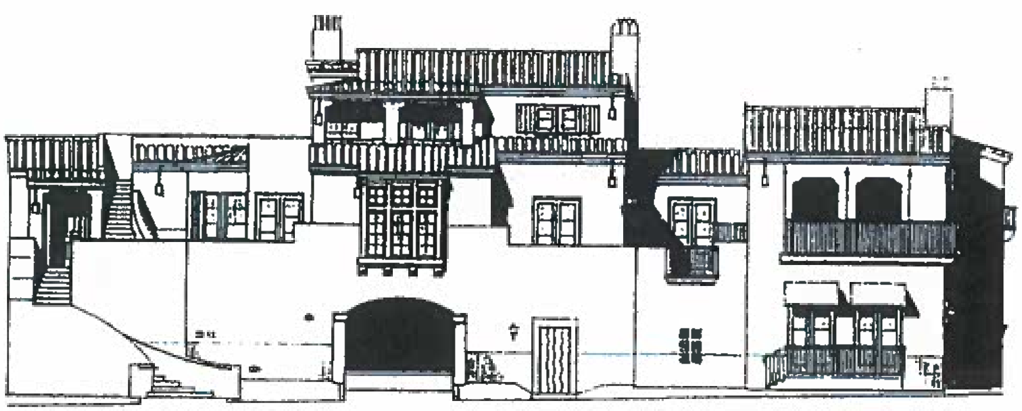
Fl. to Fl., Plate Hights, Ridge Hights and EAR%

* EAR adjusted for a C-2 Zone

On page 14 the elevation of 1123 Chapala is color coded to display the step-backs from the property line of the different elements of the elevation. One should take note that the highest ridge of 41' is on a section of building that sets back 28'. A visual tool such as color coding will help the reviewers better perceive the various step-backs of an elevation drawing.

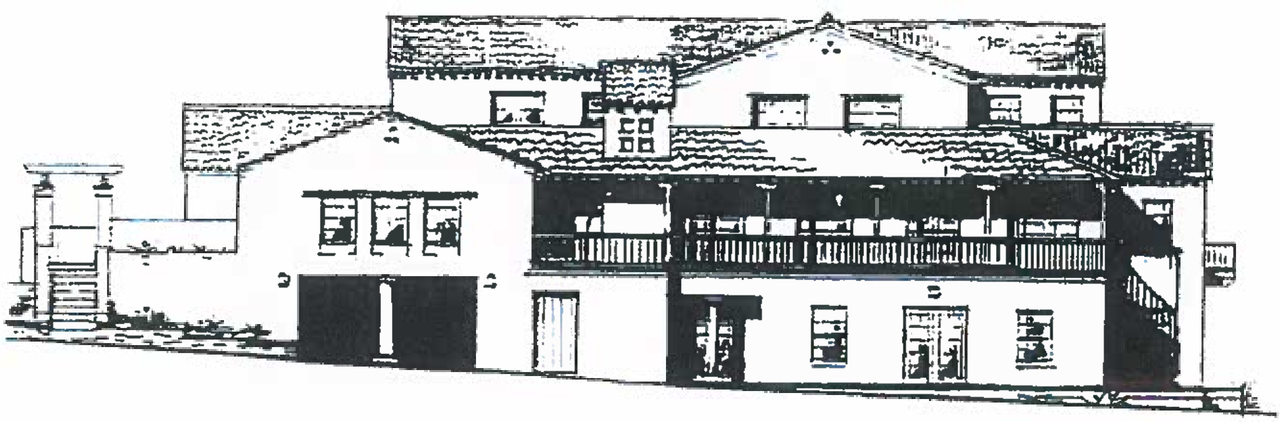
In conclusion, *size* is defined by plate and ridge heights, which are driven by fl. to fl. totals that range widely based on function and discretion. *Size* is also a function of length and this dimension is more site specific, but it can be altered visually by breakup or sectioning with different styles. *Size,* as determined by an EAR is another tool to be used. Step- backs are very effective in reducing the apparent *size* of a building, and providing open balconies on the third story at the corners will give the design a two and three story look. So it is clear that a building cannot properly be evaluated by quantitative analysis alone. It must also be reviewed as a three dimensional piece of architecture and compared with like buildings so that it is understood where it fits into the spectrum of *size* ,and how its fl. to fl., plate and ridge heights compare in Graph 1. Finally, the building needs to be compatible in its neighborhood.

The highest ridge and the three story mass is effectively blocked by the two story mass on the corner. This building is a beautiful example of a two and three story composition.



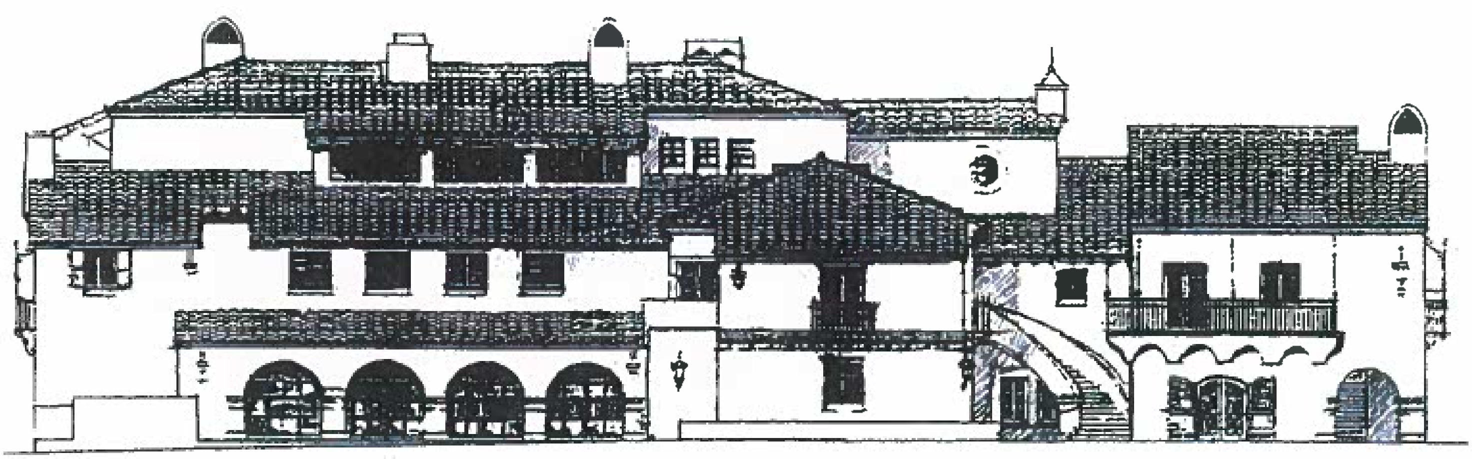
727 Garden
Garden Street Elevation
Scale 1"=20'

The long ridge is screened by the double gables and the trees help to soften the composition. The step-back at the corner and the Monterey Style balcony help to give this design human scale.

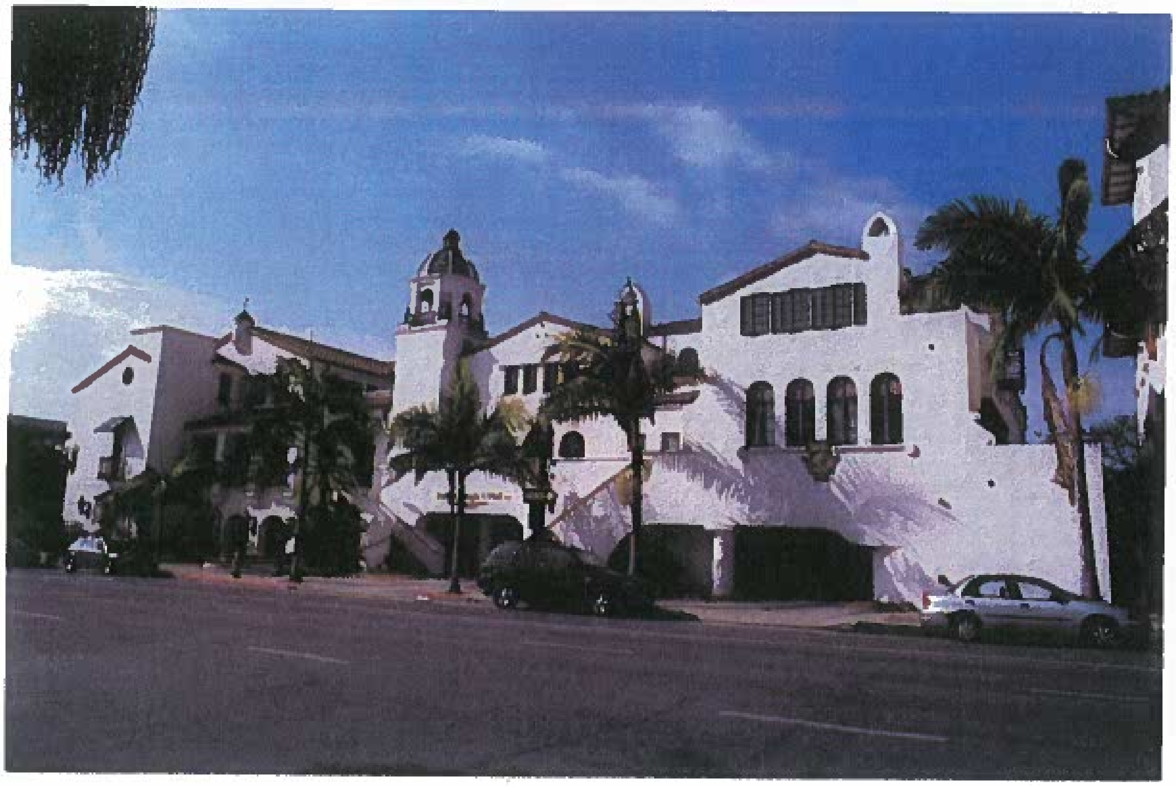


801 Garden
De La Guerra Street Elevation
Scale 1"=20'

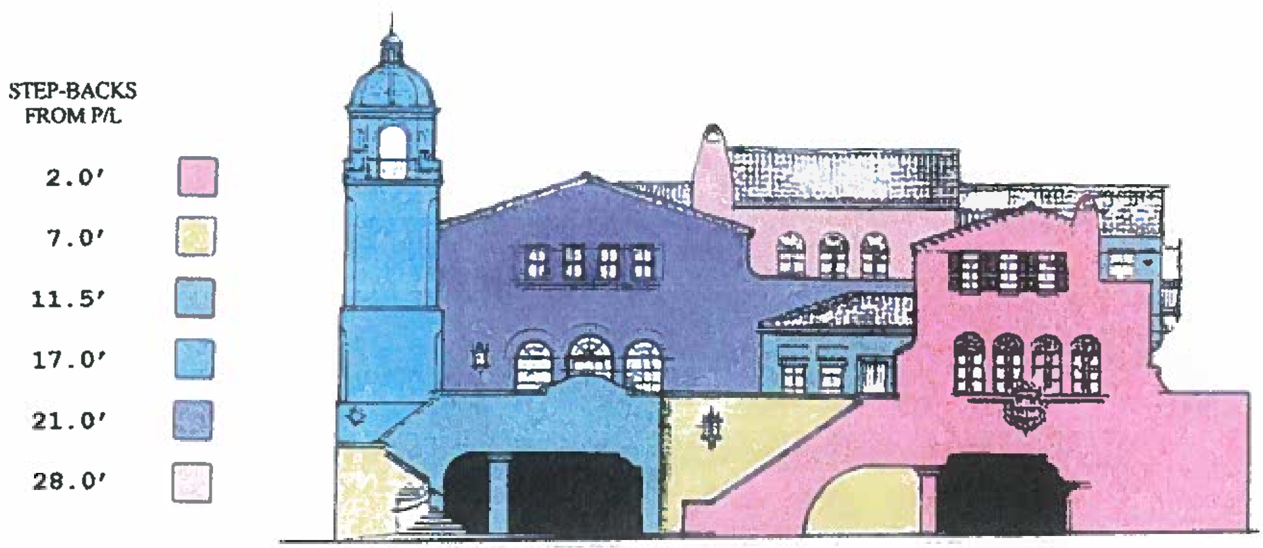
The three story element is screened by the two story element and the trees help to break up the masses. This building is almost a half of a block long, but the two story element on the corner is set back 28' from the De La Vina sidewalk, and separated from the main three story mass by a 16' wide patio which visually separates the two elements of the building.



2323 De La Vina
De La Vina Street Elevation
Scale 1"=20'



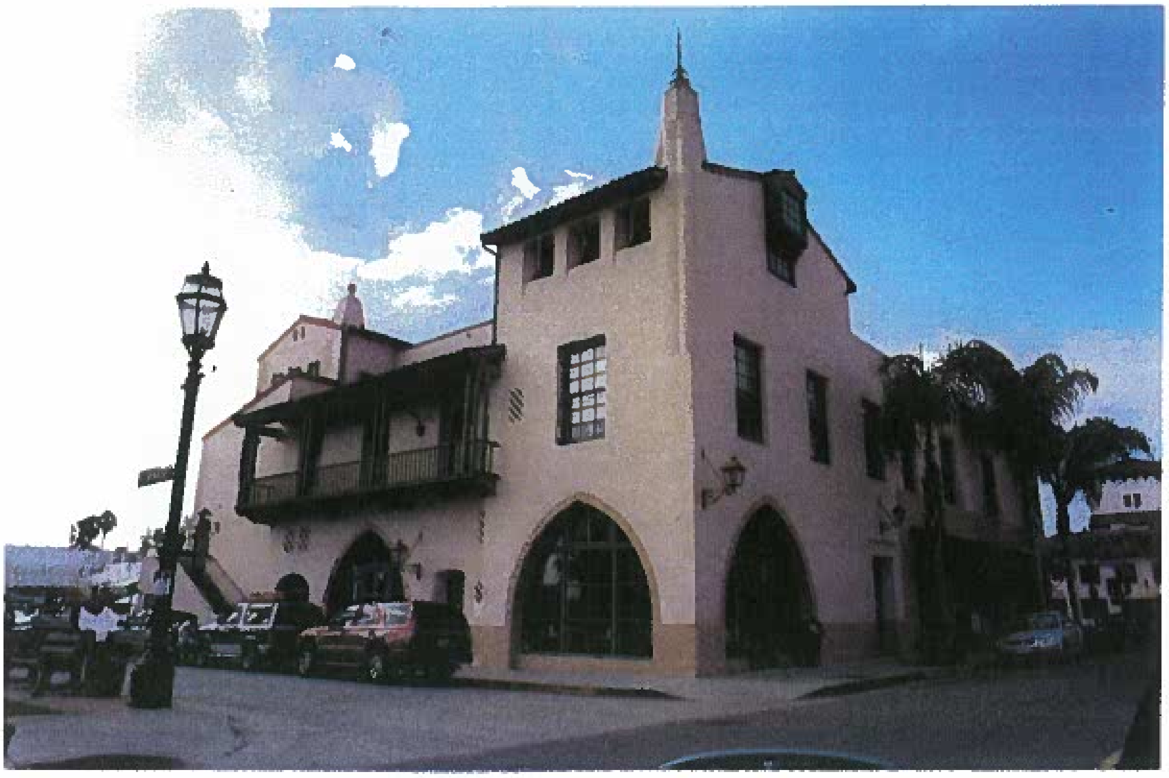
The highest ridge is screened by the lower three story gabled element. Notice how the three story gable in the photo appears much larger than it does in the elevation drawing. The stepped corner balconies help to soften the three story element shown in red.



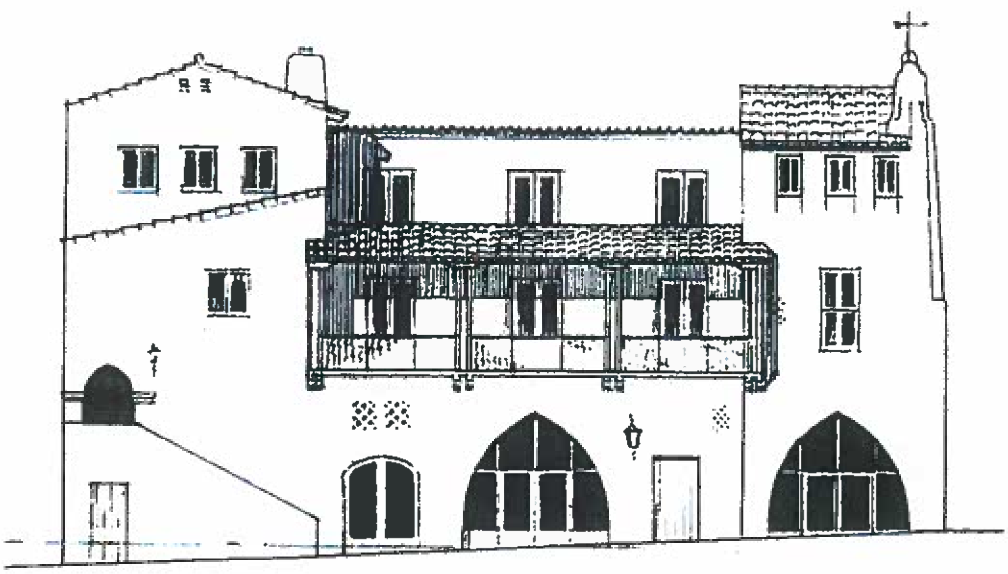
1123 Chapala

Chapala Street Elevation

Scale 1"=20'

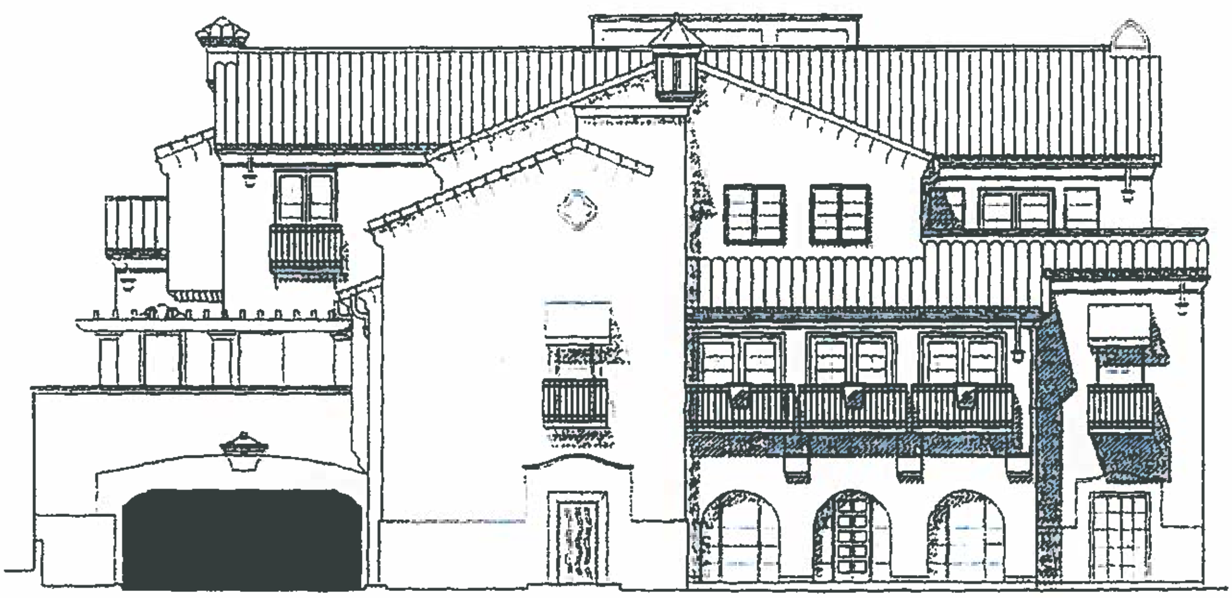


There is some photographic distortion, but the three story mass looms. Once again, however, the major eave rather than the highest ridge dominates. The elevation demonstrates a pleasing composition, and the Monterey Style balcony works well to break up the massing. This building benefits by borrowing open space from De La Guerra Plaza



Bothin Building 1926
De La Guerra Plaza Elevation
Scale 1"=20'

Notice how the elevator tower is the highest mass in the photo, but hardly noticeable in the elevation drawing. The highest ridge is barely apparent as it is screened by the forward elements. This building is a good example of how elevation drawings are less reliable than perspectives and models.



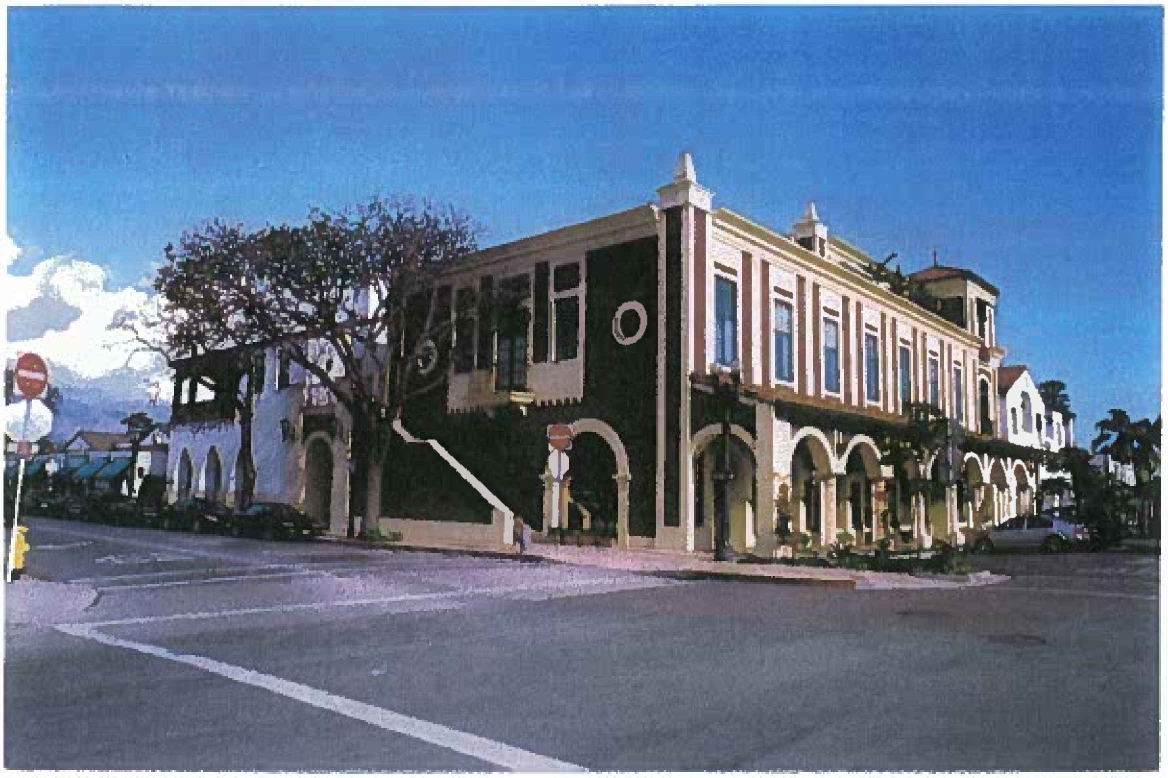
1111 Chapala
Chapala Street Elevation
Scale 1"=20'

The highest ridge is screened by the highest plate and major eave. Stepped masses are more effective from across the street and down Anacapa, looking up street. So this massing works better for the pedestrian than the driver. If the porch on the third story were not roofed over the massing of this three story element would be less imposing.

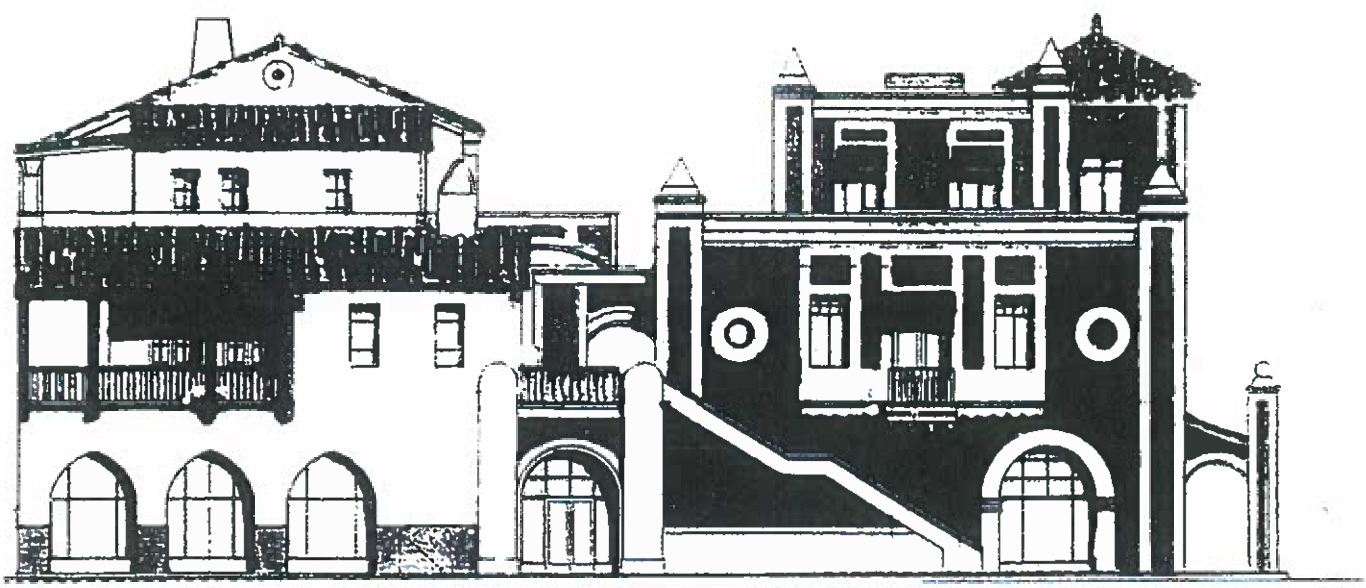
1021 Anacapa

Anacapa Street Elevation

Scale 1"=20'



The highest ridge is less important with flat roofs, where highest plate or parapet govern. Trees help, and the total mass is broken up with two different architectural styles. The arcade, which is built over the public sidewalk helps to reduce the apparent height of the façade.



Chapala Lofts
Gutierrez Street Elevation
Scale 1"=20'

Mass and Bulk

In considering the architectural qualities of mass and bulk it will be helpful to try to define these two terms more clearly.

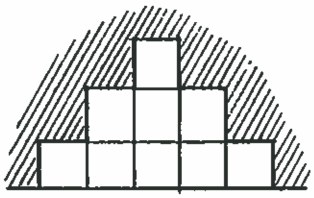


Fig. A

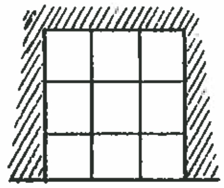


Fig. B

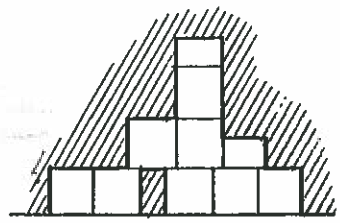


Fig. C

Mass is a quantitative term and represents the amount of something. For example, the area of the 9 squares in Figures A, B and C, or the length and height of the elements of a building elevation represent its *mass*. The analytical eye will observe that the *mass* (area) of Figure A, B and C are the same.

Bulk, on the other hand is the qualitative term and represents the composition of the *mass*. For example, the 9 squares in Figure B appear bulkier than Figure A even though Figure A is wider, and bulkier than Figure C even though Figure C is both higher and wider than Figure B. Using our Courthouse, a similar example is shown in Fig. 2 and Fig. 3 below. Assume that the *mass* (area) of the tower approximately equals that which it would take to fill in the grand archway. The *mass* of Fig. 2 would be equal to the *mass* of Fig. 3. However, the *mass* of Fig. 2 seems to possess a less bulky composition. Whether the *mass* of the Courthouse is too great or not is not the issue. The issue is that the composition shown in Fig. 2 is more acceptable than Fig. 3 because it appears less *bulky*. Although the Courthouse is a massive building, it is graced with beautiful composition and generous setbacks.

If a building's functions require a *mass* equaling the dimensional heights illustrated in the upper portions of the curves shown in Graph 1 on page 9, it will be important for the design review boards and commissions to carefully consider the composition of that *mass* and the appropriateness of ample setbacks.

Fig. 2

Fig. 3

A Comparative Analysis of Bulk
The Courthouse w. and w/o. the Grand Arch and Tower

Scale

In architectural design, *scale* is the proportions of a building or its parts, with reference to a definite unit of measure.[1] For the architecture of Santa Barbara and especially the Pueblo Viejo the definite unit of measure is the height of a human being. This is why we use the term "human scale."

Of course, there are exceptions to this in our city because architecture has a number of function and ideals to express. For example, the grand archway of our Courthouse expresses with its grand scale the power of "government of the people". And the grand scale of the Arlington Theater expresses the glamour and influence of the 1920 movie industry with a building that proclaims "the sky's the limit". But generally, Santa Barbara is a city of buildings whose *scale* is decidedly human and possessed of great charm, as is best exemplified by our El Paseo.

The problem is that the architectural elements of a building such as doors, windows, archways, towers, etc. must be properly proportional to fit the architecture as a whole. And, as a building gets bigger, so must its elements. When this happens they tend to lose their human scale.

Look at the proportions of the windows and arches of the Cathedral of Florence on page 21 in comparison with the windows and arches of our Courthouse. Even though we recognize the Courthouse as one of our largest buildings, its elements seem small by comparison. Because buildings in Santa Barbara are getting larger, we must be concerned about which existing buildings we accept as standards for comparing *size, mass, bulk and scale.* If our goal is to retain the human scale in our architecture we must struggle to reduce the *size* of larger buildings. *Size* determines *mass.* Composition determines *bulk.* Architecture with a given *mass* must be composed of elements that are to scale with that *size* and *mass.* Whether or not those elements are human in *scale* will be dependent on the *size* and *mass* of the elements that compose the architecture.

Following, on pages 22 through 29, are vignettes of our eight SCALE STUDY examples with an average height man shown. One can compare his height (5'-8") with the size of the architectural elements which the building possesses.

In conclusion, it can be seen from these pages that there is a reasonable range of *size* (ie.fl. to fl., plate and ridge heights) which accommodate door and window sizes (and corresponding other architectural elements) which are closely related to the human height, and thus will be human in scale. But, buildings of greater *size* and corresponding *mass* and *scale* require elements of greater size. These greater sizes depart proportionately from human scale, and consequently from the charm and character that has epitomized the architecture of Santa Barbara, which we all admire and seek to sustain.

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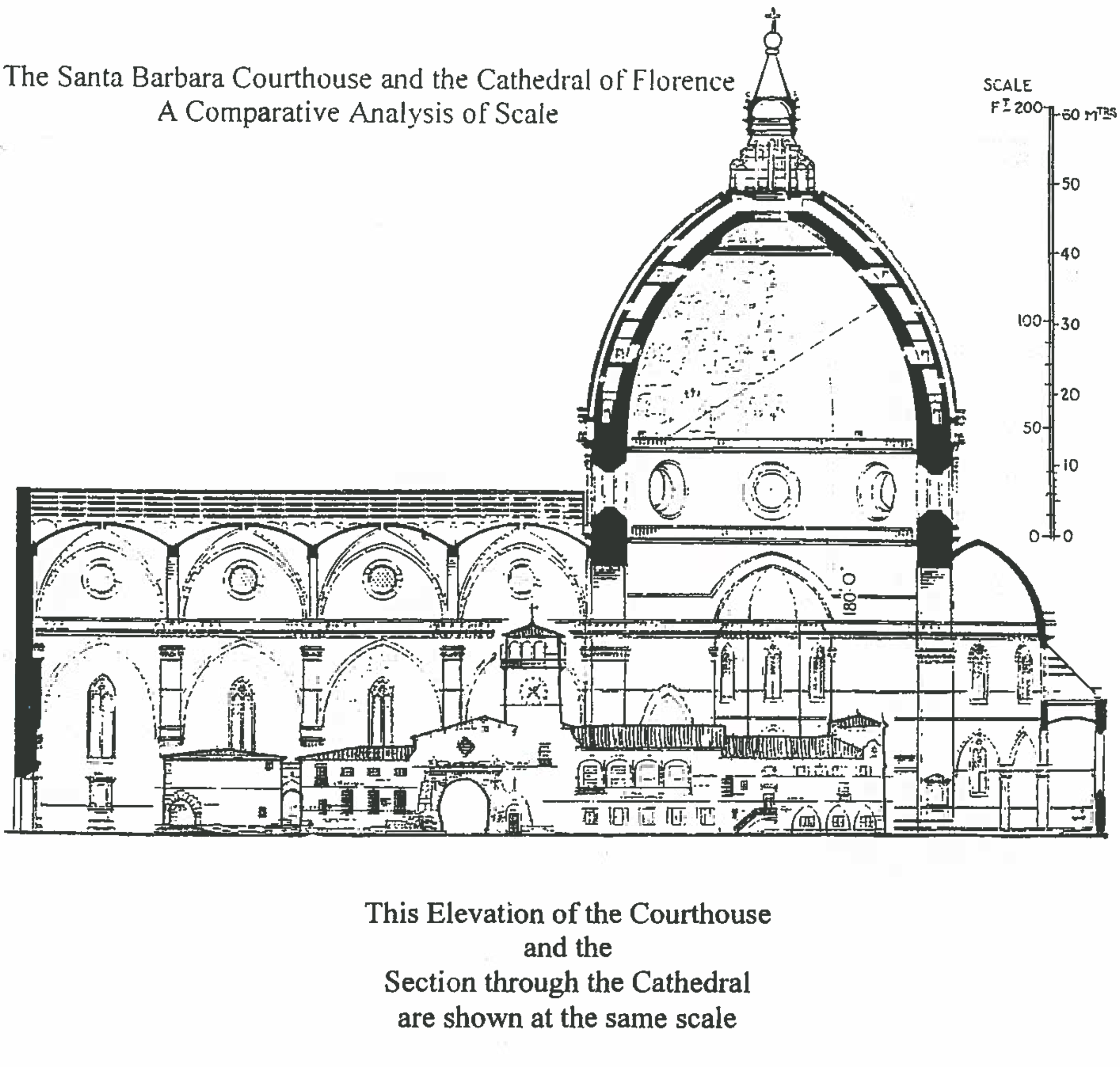
[1] Paraphrased from Sturgis' Dictionary of Architecture.

The Santa Barbara Courthouse and the Cathedral of Florence
A Comparative Analysis of Scale



This Elevation of the Courthouse
and the
Section through the Cathedral
are shown at the same scale

Scale Study

5'-8" man compared with 7' high door at grade and
8' high french doors at the upper balcony.

727 Garden Street
1/8"=1'-0"

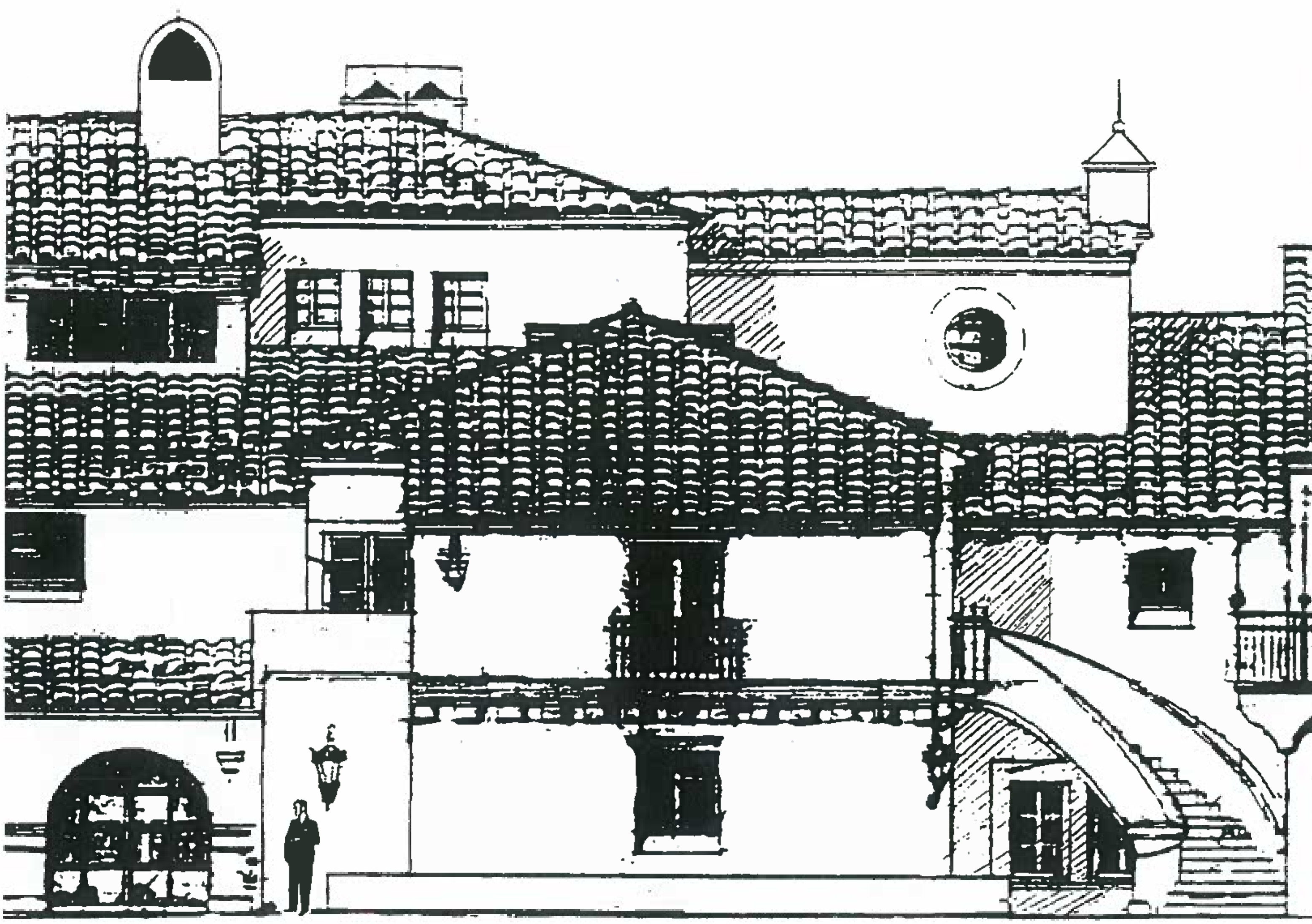
Scale Study

5'-8" man compared with 8' high doors on the terrace
and the 9'-6" high balcony above.

801 Garden Street
De LA Guerra St. Elevation
1/8"=1'-0"

Scale Study

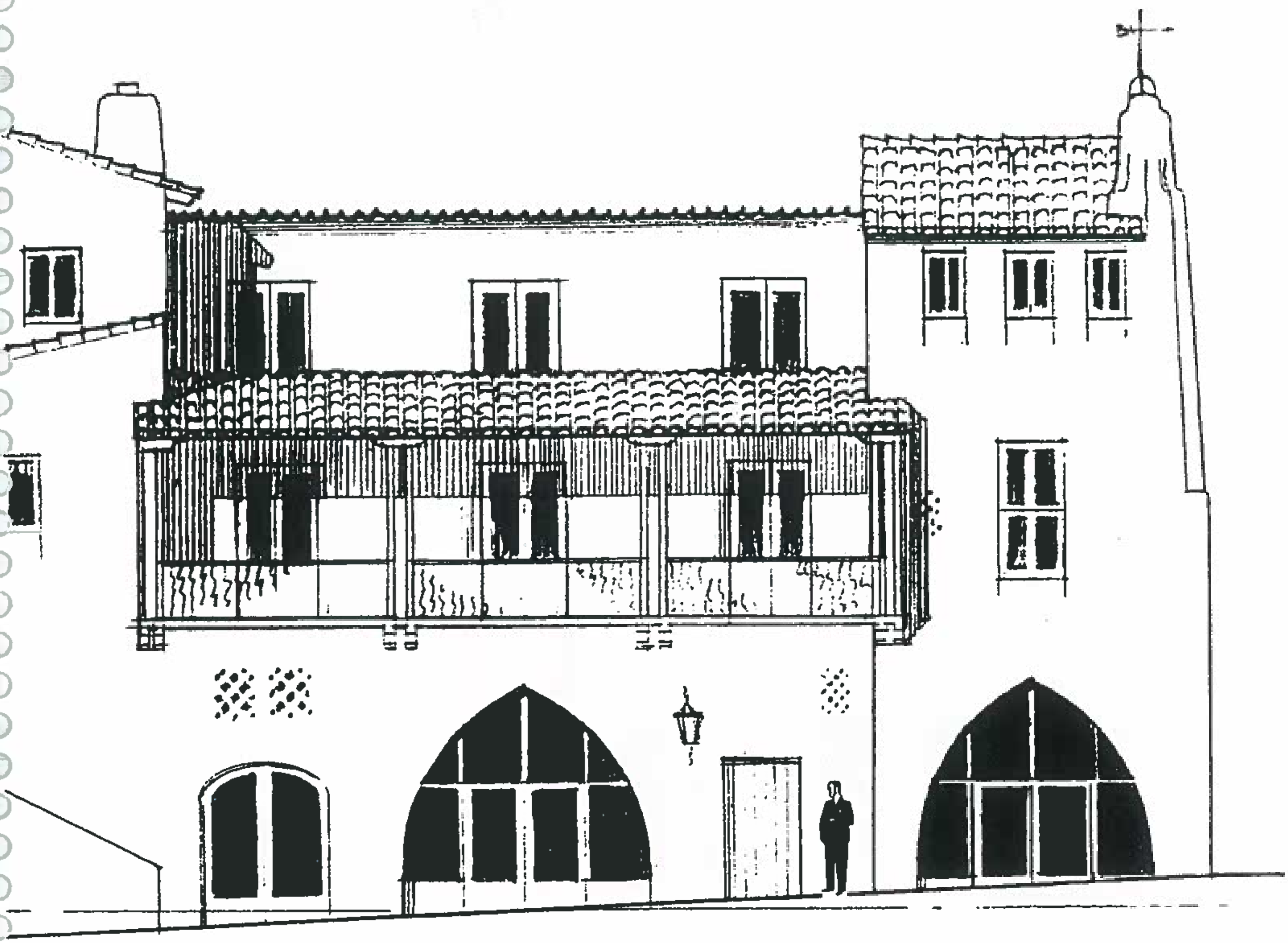
5'-8" man compared with 8'-6" high arch
and 7' high french doors at the balcony above



2323 De La Vina Street
1/8"=1'-0"

Scale Study

5'-8" man compared with 7' high door
at grade and the 11' high arches

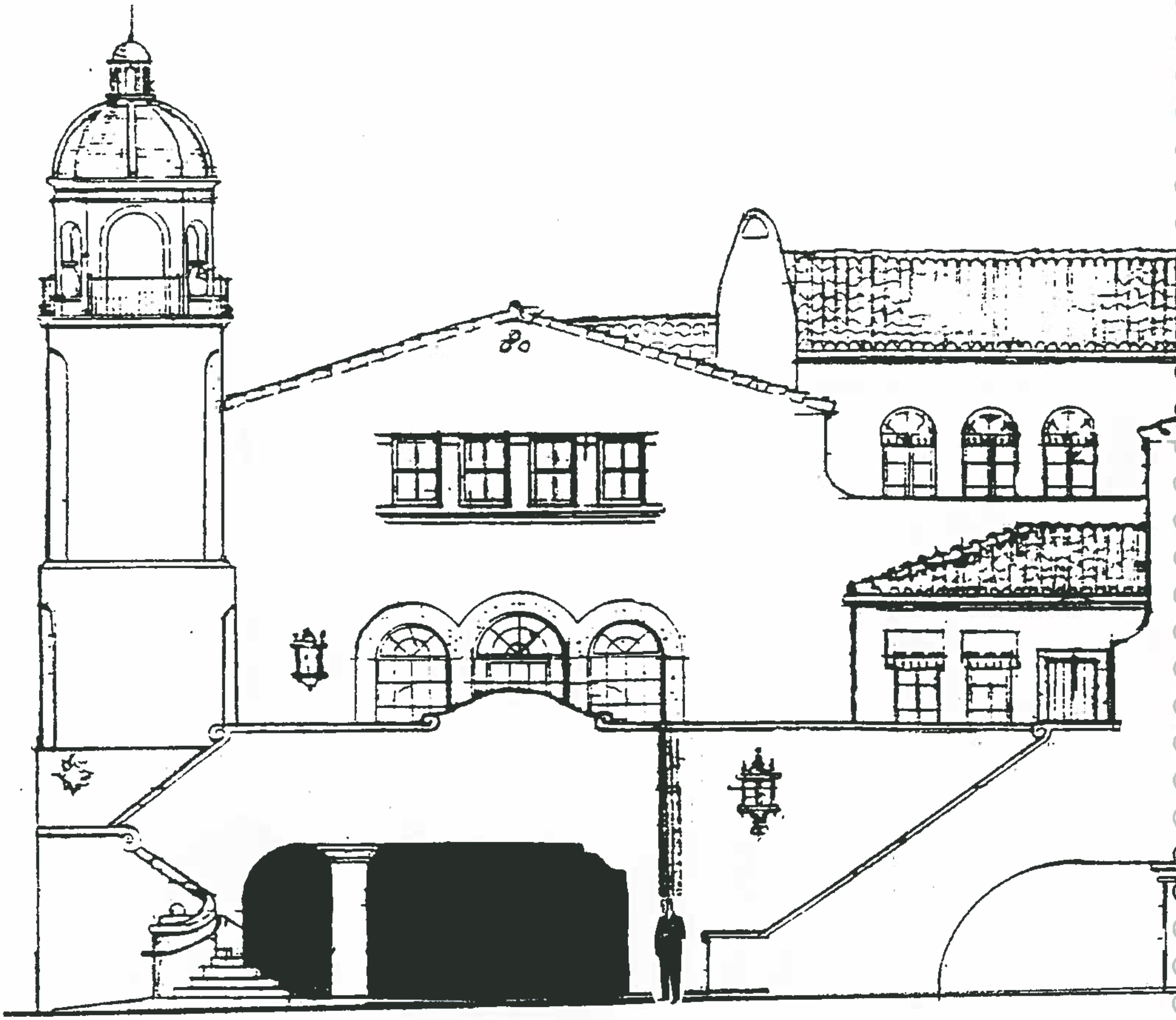


Bothin Building 1926
De La Guerra Plaza Elevation

1/8"=1'-0"

Scale Study

5'-8" man compares with 8'-6" high garage opening and the 10' high tri-arches above.

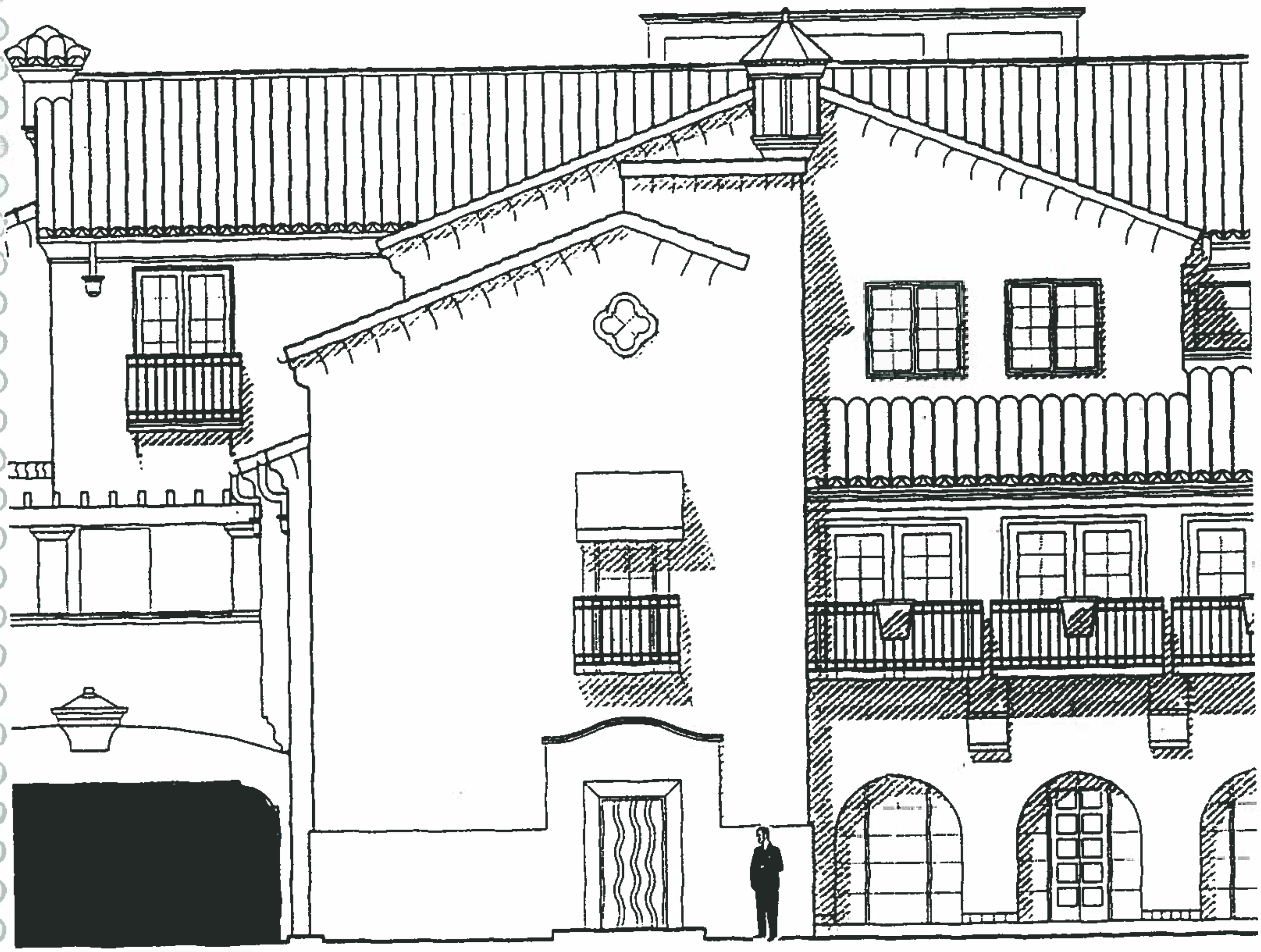


1123 Chapala Street

1/8"=1'-0"

Scale Study

5'-8" man compared with a 7' high "river of life" door
and the 8' arches.



1111 Chapala Street
1/8"=1'-0"

Scale Study

5'-8" man compared with the 9' high main]
entry door and the 12' high window above.

1021 Anacapa Street
18/"=1'-0"

Scale Study

5'-8" man compared with the 13'-6"
archway flanked by 22' high pilasters

Chapala Lofts
Gutierrez Street Elevation
1/8"=1'-0"

Mountain View Blockage

Views of the mountains can be blocked by one story buildings, depending on the location of the observer. However, views of the mountains may not be blocked by a two story building as shown in photo, fig. 4 below.

This view is seen from the east side of Anacapa across from the city hall and looking north toward Presidio Ave.

The two story Presidio Ave. building is very modest, having an approximate upper plate height of 22 ft. and a ridge of approximately 26 ft. Both of these dimensions are much smaller than those of the 8 buildings which we have examined in this study.

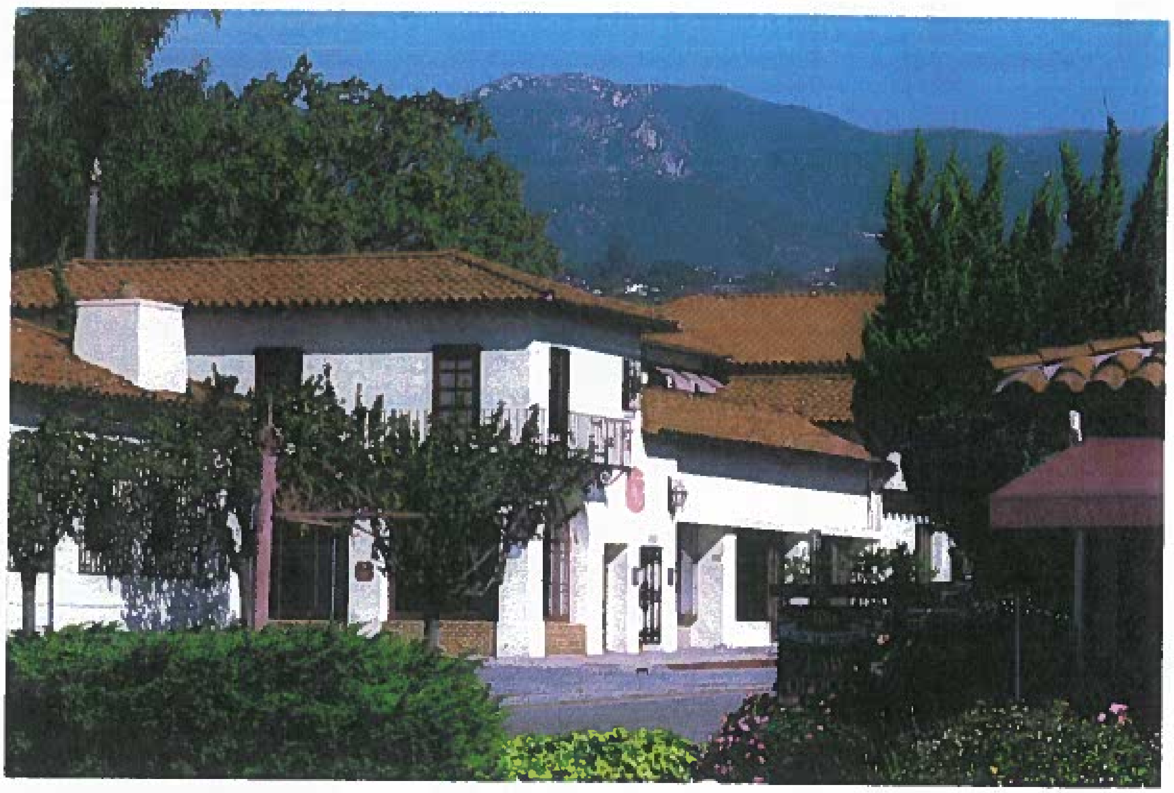


Fig. 4

Shown in fig. 5 is an exact drawing of the previous photo, enlarged to a scale of 1"=10'. A scale has been placed at the corner of this 2 story building so that the heights of other buildings in this study can be compared.

For the comparison I have chosen 727 Garden shown on page 11 and the Chapala Lofts shown on page 18. Both of these buildings are 2 story at their foremost corner, the former having its second story plate height at 30' and the latter having a second story plate height of 37'. Both are marked on the scale and it can be observed that 727 Garden would obscure about half of the existing mountain view and Chapala Lofts would obscure most of the existing mountain view. The other six buildings in this study would fall somewhere in between.

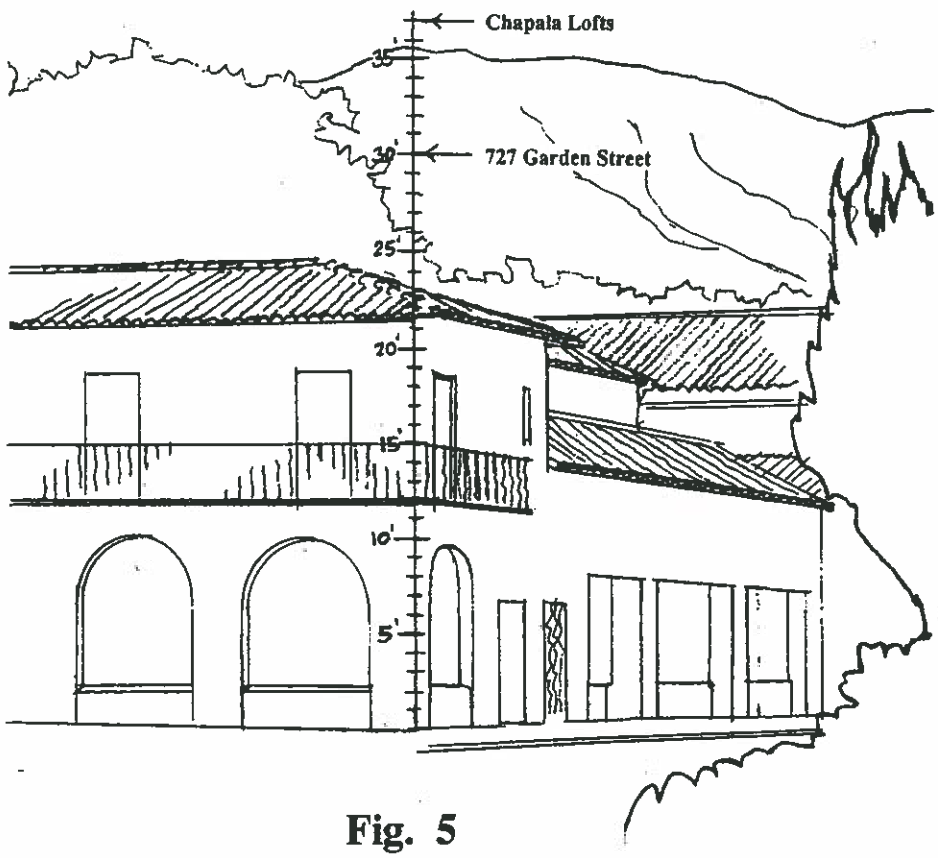


Fig. 5

In conclusion, it is granted that the Presidio Ave. building is unusually low and probably obsolete by today's design standards. But, giving it 3 extra feet in height for new duct work, etc. it still would protect most of the views. It seems that a greater effort should be expended by our architects and design reviewers to minimize the height of buildings where significant mountain views would be impacted.

Tools

1. **Graph Analysis**

A graph similar to Graph 1. shown on page 9 will be helpful in assisting the design reviewers and the public in evaluating the size of the proposed building in relationship to other existing buildings and to its vertical envelope. The proposed design's fl. to fl., plate and ridge heights and its EAR should be calculated and inserted into the graph, so that they can be compared with the existing statistics from this study, or statistics from neighboring buildings.

2. **Step-back Evaluation Analysis**

Color coding elevations similar to the one shown on page 14 will be helpful in assisting design reviewers and the public in evaluating the architectural offsets and step-backs of the proposed project. The purpose of this analysis is to better understand the degree to which the elements of the design are stepped back from one another. These step-backs are not readily apparent in a typical elevation drawing. The *bulk* of a building is greatly mitigated by adequate architectural step-backs, as viewed from the public street. This analysis tool is especially important when evaluating larger buildings, where *size, bulk, mass* and *scale* are issues of concern.

3. **Vertical Envelope Analysis**

The Vertical Envelope is defined as the area resulting from multiplying the height from average finished grade to the height limit (45 or 60 feet depending on the zone) and the length of the site on which the architectural elevation is drawn, as shown on pages 5 through 8. The area of the building elevation is calculated and divided by the Vertical Envelope area. This calculation produces a ratio or percentage of the buildings area to the Vertical Envelope area. This quantity is known as the Elevation Area Ratio (EAR), and one below 0.40 is low while one above 0.60 is high.

The purpose of calculating an EAR is to better understand to what degree a design is filling up its buildable space. It is recognized that excessive *bulk* occurs when a design tends to fill its available Vertical Envelope. It should be noted that the 45' height limit was intended for three story buildings, and the 60' height limit was intended for four story buildings. When a three story building in the 60' height zone exceeds a 45' height, concern by the design reviewers is warranted. The reasons for this additional height should be carefully analyzed and understood, in relation to *size, bulk* and compatibility to the neighboring buildings.

The EARs for the eight buildings examined in this study are shown on pages 5 through 8. The calculations of the façade areas do not include the areas of chimneys, towers and other architectural amenities, and were scaled from the 1/32" drawings.

4. **Perspective Analysis and Streetscape Elevations**

As demonstrated by the photographs with their respective drawn elevations, shown on pages 11 through 18, the photographs are much more telling and truthful in representing readily visible composition of a proposed project. Of course, photographs cannot be taken of a building that has not yet been built. But, models can be photographed or perspectives can be drawn, both of which are superior to elevation drawings, which do not represent a building as we actually see it.

Photos of models and perspective drawings are tools necessary so that the design reviewers can visually experience the building accurately. These pictures should illustrate the building as it would be seen as viewed from eye level and across the street. If people and autos are shown in the photos or renderings they should be in scale with the building, so as not to distort the true *size, bulk* and *scale* of the building being represented. The *size* of a building will appear smaller when oversized cars and people are placed in front of it.

It is also a very helpful tool to provide a streetscape elevation, in which the proposed project is shown in elevation between its neighboring buildings. Furthermore, it is helpful to see these streetscape elevations with and without trees.

In conclusion, the four tools described above and the definitions and analysis used in this report should be helpful in assisting design reviewers and the public in better visualizing and evaluating proposed architecture. It should also help architects and their clients by providing a review process that is clearly defined and equally administered for all.

Glossary

Bulk The qualitative readily visible composition and perceived shape of the structure's volume, ie. the design of its architectural composition, shape and scale, including setbacks and stepbacks.

Elements 1. Portions of a building which appear separated from other portions of the same building. 2. The elements of a facade, ie. the doors, windows, arches, details, etc.

Elevation The flat scale drawing of the facade of a building.

Finish Floor The plane of the floor or average of floor planes from which a vertical measurement is taken.

Floor to Floor A vertical measurement of the distance from one floor to the next floor above.

Highest Plate 1. The top of a wall or parapet shown in an elevation drawing. 2.The top of the wall on which the lower portion of a sloping roof rests.

Highest Ridge The highest horizontal edge of a roof shown on an elevation drawing or seen in perspective.

Human Scale The aspect of architecture in which its elements are in proportion to the height of an average human. (See **Scale**)

Major Eave The highest eave shown on an elevation drawing or seen in perspective.

Mass The quantitative characteristics of a building, ie. the measure of its height, length, openness and solidity. (See **Volume**)

Massing The arrangement of the elements that make up a structure's bulk, including openness and solidity.

Neighborhood Compatibility See the Architectural Board of Review's Guidelines and the Single Family Residential Design Guidelines.

Perspective A picture or drawing of a building that shows it as it appears to the eye.

Pitch The slope of a roof as expressed by the ratio of the vertical height in feet to 12' of horizontal length, ie. 4 to 12, 8 to 12, etc.

Scale The proportions of a building or its elements, with reference to a definite unit of measure. (See **Human Scale**)

Size The length and height of a building, or elements of a building, measured from its elevation, and excluding towers, chimneys and other architectural appendages.

Stepbacks The varying distances of the different elements of a structure's facade, measured from the property line.

Vertical Building Envelope The vertical height set by the Zoning Ordinance, nominally, 45' for three story buildings and 60' for four story buildings times the width of the site.

Volume A structure's quantitative measurement of height, width and depth.