**CITY OF MANHATTAN BEACH**
**DEPARTMENT OF COMMUNITY DEVELOPMENT**

**TO:** Parking and Public Improvements Commission

**FROM:** Richard Thompson, Director of Community Development

**BY:** Nhung Madrid, Management Analyst

**DATE:** February 23, 2012

**SUBJECT:** Aviation Boulevard Bicycle Lane Preliminary Engineering Study

## RECOMMENDATION:

Staff recommends that the Commission accept and discuss the presentation by Nelson/Nygaard for the Aviation Boulevard Bicycle Lane Preliminary Engineering study.

## BACKGROUND/DISCUSSION:

The provision of bicycle lanes on Aviation Boulevard is a project of the Vitality City initiative. The initiative aims to make the beach cities more walkable, bike-friendly, healthy, and socially engaged, with an overall goal of improving citizens' health in the region. This study has been jointly funded by Healthways/Beach Cities Health District and by the Cities of Redondo Beach, Hermosa Beach, and Manhattan Beach's City Council. Nelson/Nygaard will be presenting the preliminary study to the appropriate Commissions and City Council for all three cities over the next few weeks.

Bicycle lanes on Aviation Boulevard and Marine Avenue were identified as a future need in the South Bay Bicycle Master Plan in 2011. This report presents the findings of the Aviation Boulevard Bicycle Lane Preliminary Engineering Study. Michael Moule with Nelson/Nygaard will be in attendance at tonight's meeting to present the preliminary engineering study and to respond to the Commission's questions and/or concerns. This item will then be brought back to the Commission at the next meeting on March 23, 2012 for further discussion. This will allow staff to perform the proper outreach, review and evaluate the bike lane and impacts it will have on the corridor and surrounding area, and provide comments before it will be presented to the City Council.

Exhibit A: Aviation Boulevard Bicycle Lane Preliminary Engineering Study dated February 2012


Healthways / Beach Cities Health District

# AVIATION BOULEVARD BICYCLE LANE PRELIMINARY ENGINEERING STUDY

## Draft Report

**February 2012**

NELSON NYGAARD

## Table of Contents

# INTRODUCTION AND BACKGROUND

This report presents the findings of the Aviation Boulevard Bicycle Lane Preliminary Engineering Study. The project boundaries include Aviation Boulevard from Pacific Coast Highway (PCH) to Rosecrans Avenue as well as Marine Avenue from Aviation Boulevard to the Redondo Beach Metro Green Line station. The provision of bike lanes on Aviation Boulevard is a project of the Vitality City initiative. This initiative aims to make the beach cities more walkable, bike-friendly, healthy, and socially engaged, with an overall goal of improving citizens' health in the region.

Bicycle lanes on Aviation Boulevard and Marine Avenue were identified as a future need in the South Bay Bicycle Master Plan in 2011. Segments of Aviation Boulevard and Marine Avenue were included in the prioritized project lists in the South Bay Bicycle Plan for Hermosa Beach, Redondo Beach, Manhattan Beach, and El Segundo. The segments of Aviation Boulevard and Marine Avenue included within this study did not score high in the plan's prioritized project list for each of these cities. This is primarily due to the fact that the prioritization criteria are weighted heavily towards projects that provide connections to existing bicycle facilities. In addition, Aviation Boulevard runs along the edge of each of these cities, thus it ranks lower when evaluated for its connectivity within each individual city.

Vitality City urban planning advisor Dan Burden has conducted public involvement workshops and other events in the beach cities area. Bicycle lanes on Aviation Boulevard and Marine Avenue were strongly recommended as a result of these workshops. The recommendations provided a new perspective on the potential benefits of a bicycle facility on Aviation Boulevard and Marine Avenue. Instead of focusing on connectivity to existing facilities, the recommendations emphasize development of highly-visible bicycle facilities along major roadway corridors within the beach cities. This will create a bicycle "spine" that will serve as an important bicycling connection within the cities, with improvements focused on the neighborhoods currently poorly served by bicycle facilities. Aviation Boulevard is one of only a few streets that provide a continuous north-south connection. North of Marine Avenue the closest parallel streets to Aviation Boulevard are one mile to the west (Sepulveda Boulevard) and one mile to the east (Inglewood Avenue).

# 1 EXISTING CONDITIONS

Nelson\Nygaard staff collected a significant amount of background data on Aviation Boulevard and Marine Avenue. This information includes planning reports, project plans for past construction projects, signal timing information, traffic counts, and crash data. In addition, Nelson\Nygaard staff spent two days on the project corridor in January 2012, measuring street and lane widths and other geometry, observing signal timing and operations, identifying parking supply and usage, and observing other factors that impact the feasibility and functionality of bicycle lanes on Aviation Boulevard and Marine Avenue.

## LANE WIDTHS AND STREET GEOMETRY

The existing street and lane widths vary significantly throughout the corridor in order to accommodate varying traffic volumes, turning movements, and the presence or lack of on-street parking.

### Aviation Boulevard – Pacific Coast Highway to Manhattan Beach Blvd

From PCH to Warfield Avenue (One block south of Manhattan Beach Boulevard), the curb-to-curb width is fairly consistent at 64 feet, with two through lanes in each direction. The width of the inside lanes and the center turn lanes are each typically 10 to 11 feet. The outside lane width varies significantly. It appears that there are several areas in this portion of the corridor where on-street parking was formerly allowed but currently is not, resulting in a very wide outside lane. In areas where parking is allowed, there are no markings delineating parking stalls or a parking lane, so when vehicles are not parked along the curb the effect is of a very wide outside lane. The lane configurations vary somewhat, primarily based on whether on street parking is present on none, one, or both sides of the road:

- Segments with <u>no parking</u> on either side typically have two through lanes in each direction, plus a center turn lane. Some of these segments have short raised medians. As discussed in the Design Alternatives chapter, bike lanes on these segments can be created by simply restriping the roadway with narrower travel lanes.
- Segments with <u>parking on one side</u> typically have two through lanes in each direction, plus a center turn lane. In order to add bike lanes on these segments, it will be necessary to remove the on-street parking, the center turn lane, or other travel lanes.
- Segments with <u>parking on both sides</u> typically have two through lanes in each direction with no center turn lane. Bike lanes can be added in these segments either by using minimum widths for all features or removing parking in areas where it is underutilized.

The block of Aviation Boulevard between Warfield Avenue and Manhattan Beach Boulevard varies in width from 64 feet at Warfield to 80 feet at Manhattan Beach Boulevard, as this is where the roadway transitions from a 4-lane road to a 6-lane road.

### Aviation Boulevard – Manhattan Beach Boulevard to Rosecrans Avenue

Between Manhattan Beach Boulevard and Rosecrans Avenue, Aviation Boulevard has three through lanes in each direction, with right turn lanes at some intersections, and a painted median that transitions to become one or two left turn lanes at intersections and driveways. The curb-to-curb width varies from 78 feet to 101 feet at midblock locations; 84 feet is the predominant width. The roadway is often wider (up to 111 feet) on intersection approaches to accommodate turn lanes. Lanes in this area are typically 10 or 11 feet wide.

### Marine Avenue – Aviation Boulevard to Redondo Beach Avenue

Marine Avenue has a curb-to-curb width of 64 feet from Aviation Boulevard to the Redondo Beach Metro Green Line station, with 2 through lanes in each direction and a striped median or left turn lane. The travel lanes are typically 10 or 11 feet wide.

## PARKING SUPPLY AND OCCUPANCY

In order to develop a preliminary design for a bicycle facility with minimal impact on the most valued parking areas, it is necessary to determine:

- How much parking is present throughout the corridor
- Where parking is located
- How heavily the parking is used
- To what degree the nearby land uses rely solely upon the on-street parking supply

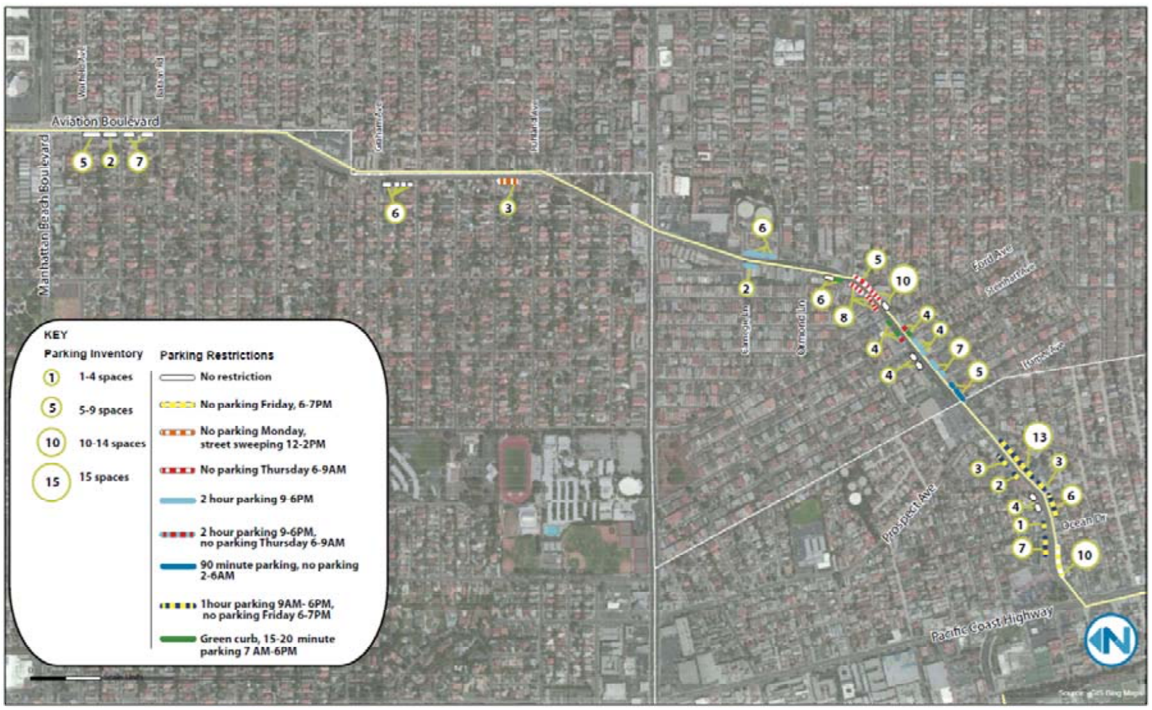
While much of the corridor has off-street parking lot alternatives and the side roads have additional supply, the actual supply and occupancy of alternative parking was not observed in this study. It should be further noted that the occupancy observations here were not conducted during the peak season. It is recommended that a full parking study be conducted during the peak summer months.

### Parking Inventory

In the southern portion— between PCH and Manhattan Beach Boulevard— there are dispersed pockets of on-street parking serving both residential and commercial uses. In the northern portion of the Aviation Boulevard corridor— between Manhattan Beach Boulevard and Rosecrans Avenue— on-street parking is fully prohibited and there is a vast amount of off-street parking. The parking supply was determined by measuring the length of the curb for the areas where parking was allowed. An average of 20 feet per parallel space is the default value used to calculate on-street parking supply. Using this metric, a total of 126 existing on-street parking spaces were documented. The largest concentration of on-street parking on a single block is located between Ormond Lane / Grant Avenue and Ford Avenue with 25 spaces or nearly 20% of the corridor's on-street supply.

There are large portions of the corridor where parking is outright prohibited, in particular the area between Manhattan Beach Boulevard and Rosecrans Avenue. In the areas where parking is allowed, there are no paid parking locations. Much of the on-street parking in the corridor does not have explicit restrictions on its regular use. In the few areas where parking is restricted (but not prohibited), the regulations determining the appropriate use range from two hour to 15 minute time limits. The most common time restrictions allow either two hour or 90 minute visits. There were also time periods where parking is prohibited such as street cleaning restrictions in some locations not allowing parking between 12:00 pm and 2:00 pm on Mondays. There are also some time-restricted areas where parking is prohibited, for instance, between 6:00 and 7:00 pm on Fridays, or 6:00 am to 9:00 am on Thursdays.

Figure 1 Parking Inventory and Regulations Map




## Parking Occupancy

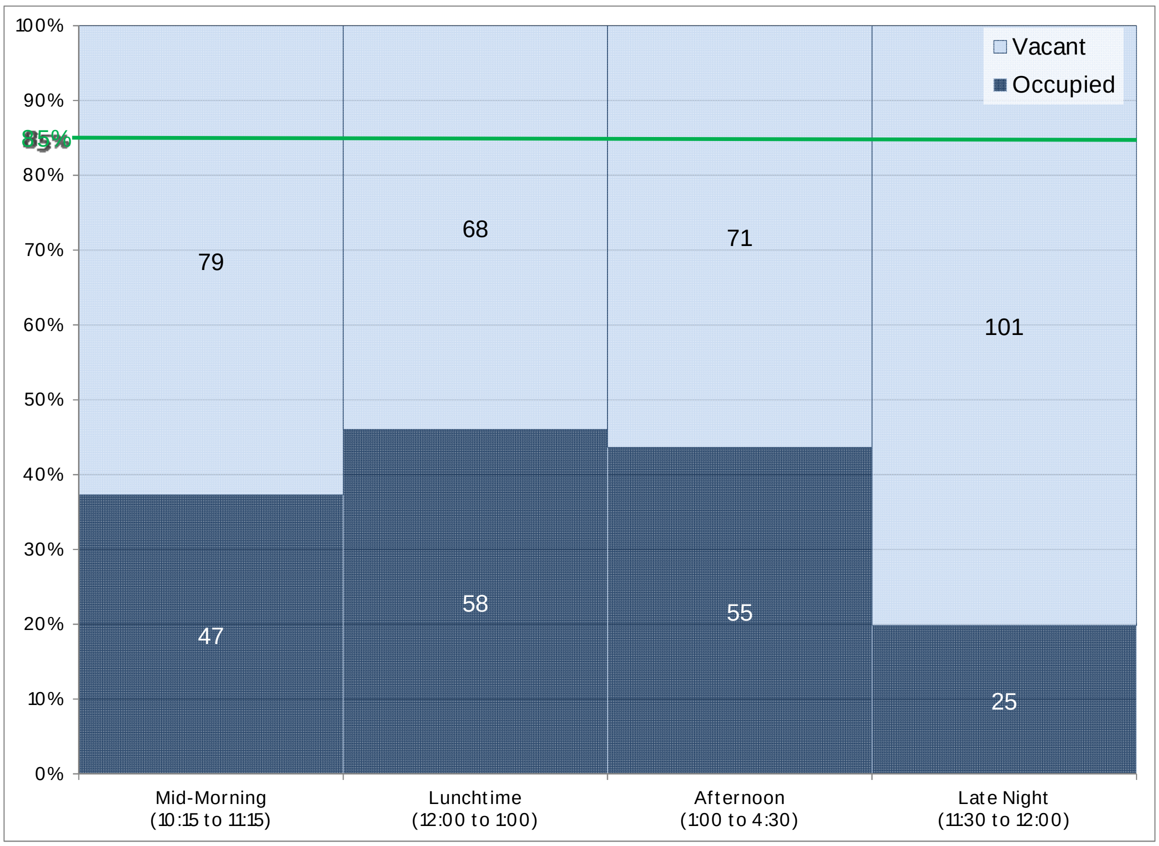
The utilization of parking in the corridor was observed during several time periods to document use in a variety of scenarios. The observations captured the following time periods:

- Mid-morning (10:15 am to 11:15 am) on Monday, February 6th;
- Lunchtime (Noon to 1 pm) on Wednesday, January 25th;
- Afternoon (1 pm to 4:30 pm) on Tuesday January 24th; and
- Late night (11:30 pm to midnight) on Tuesday, January 24th, and.

During these observation periods, a single sweep of the corridor was conducted and every vehicle parked on-street was counted. It may be beneficial to conduct a more thorough analysis of the parking supply and demand, including the off-street and side street supply, throughout the corridor during the peak season.

Evaluating by block face isolates parking in relationship to the land uses on the same side of the street, which is particularly important for wide streets with four or more lanes. As a general rule of thumb, ideal conditions are when on-street parking block faces are 85% occupied. At that point, the utilization of the spaces is maximized while still allowing for ease in finding a space. Anything above 85% will be perceived as an area lacking an adequate parking supply and anything significantly below 85% will be perceived as having an excessive vacant parking supply. In most commercial districts throughout the country, the heaviest use of parking, the peak demand, occurs around lunchtime and the lowest use, or least demand, occurs overnight when most customers and employees are at home. This proves true for Aviation Boulevard's on-street parking, which has 58 spaces (44%) occupied at lunchtime and only 25 spaces (20%) occupied overnight.

Figure 2 Aviation Boulevard On-Street Parking Utilization Profile




During the observations, 18 of the 21 block faces had no vehicles parked during at least one observation period. Two of the block faces between Ford Avenue and Ormond Lane / Grant Avenue account for the heaviest demand and the most concentrated supply. This block area has 25 spaces, constituting 20% of the corridor's supply. Demand here is high at all times of the day, ranging from 80% to 88% occupancy. This section is also the only section of Aviation Boulevard that is heavily parked late at night, with 21 of the 25 vehicles parked at night on the corridor parked in this area. It should be noted that the late night count occurred at about midnight, when the nearby bars were still open; it is likely that there would be fewer vehicles in this area throughout the night.

## Parking Removal

Every effort will be made to minimize the impact on the on-street parking supply when considering the design of bicycle lanes in the study area. Nonetheless, in some places parking removal must be considered. As described below, in places where parking is considered essential for commercial viability and there are no good alternatives available off-street or on side streets, numerous design options are proposed with varying degrees of parking removal, ranging from complete removal to complete preservation of parking.

The Ford Avenue to Ormond Lane / Grant Avenue block area will not have any parking removed because this parking is considered absolutely essential to the neighborhood and demand here already exceeds supply. The PCH to Prospect Avenue section has a number of optional cross sections, including one that removes all parking. However, the preferred design maintains most of these 46 spaces because many businesses in this section do not have off-street alternatives.

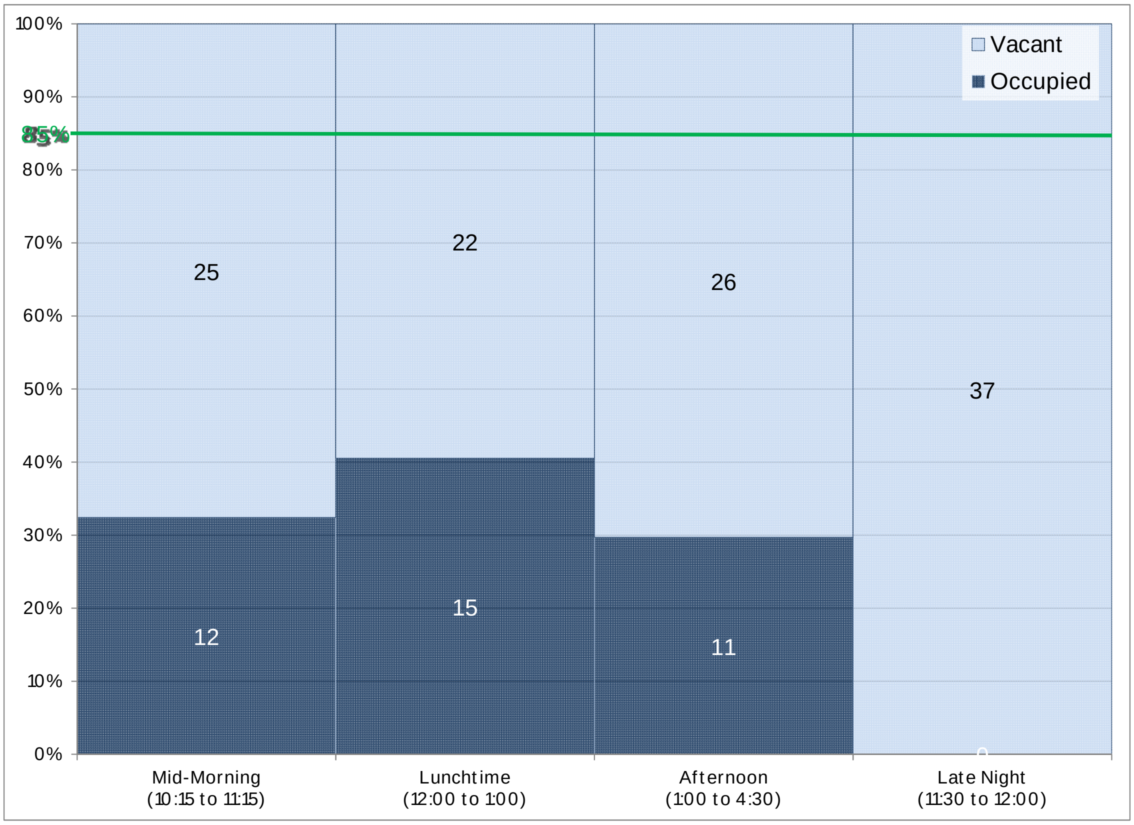
Assuming the preferred cross sections are selected for construction, the introduction of a bicycle facility on Aviation Boulevard will involve the removal of an estimated 38 parking spaces as shown in Figure 3. Areas where removal of parking is certainly recommended are described in more detail below except for the Corona Street to Prospect Avenue section – this is not included because the single space recommended for removal was not observed independent of the other spaces sharing its block face. During the observations described above, these areas only had a peak demand of 12 spaces (as illustrated in Figure 4), which should be easy to absorb in the off-street parking lots or on side streets.

Figure 3 Summary of On-Street Parking Spaces Considered for Removal

| Street Segment | On-Street Spaces Recommended for Removal | Possible Spaces Recommended for Removal* |
|---|---|---|
| Corona Street to Prospect Avenue | 1 | 7 |
| Harper Avenue to Steinhart Ave | 20 | 0 |
| Ormond Lane to Carnegie Lane | 8 | 0 |
| Ruhland Avenue to Graham Avenue | 9 | 0 |
| Bataan Road (9th Street) to Warfield Avenue (11th Street) | 0 | 9 |
| **Total** | **38** | **16** |

*Only removed if 2nd alternative used – see discussion in the Design Alternatives chapter

Figure 4 Parking Utilization Profile for Parking Considered for Removal

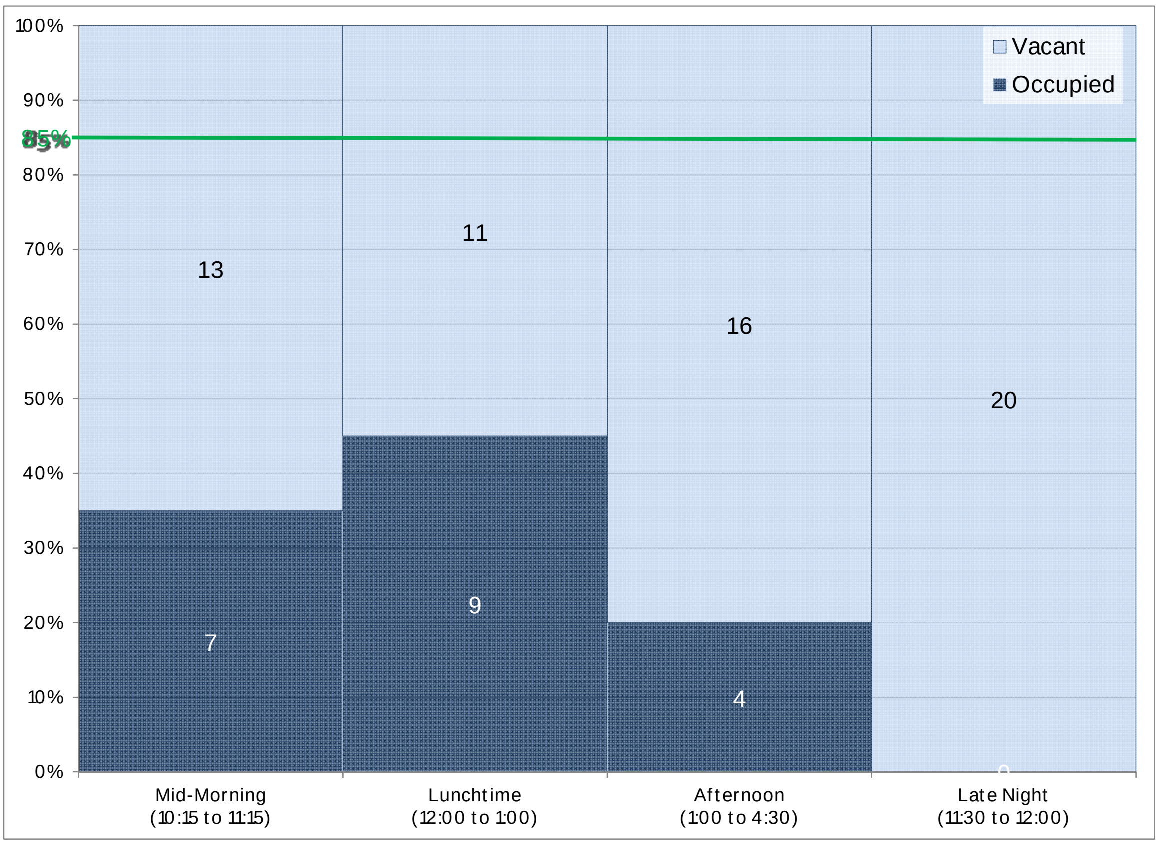


## Areas Recommended for Parking Removal

### Harper Avenue to Steinhart Avenue

There are 20 on-street spaces in this area that are not heavily used. The businesses along this stretch generally have off-street parking options and in the case that a business does not have dedicated off-street parking, there is parking available on the cross streets. During the parking occupancy observation periods, the peak demand for parking was only 7 spaces, as can be seen in Figure 5 below.

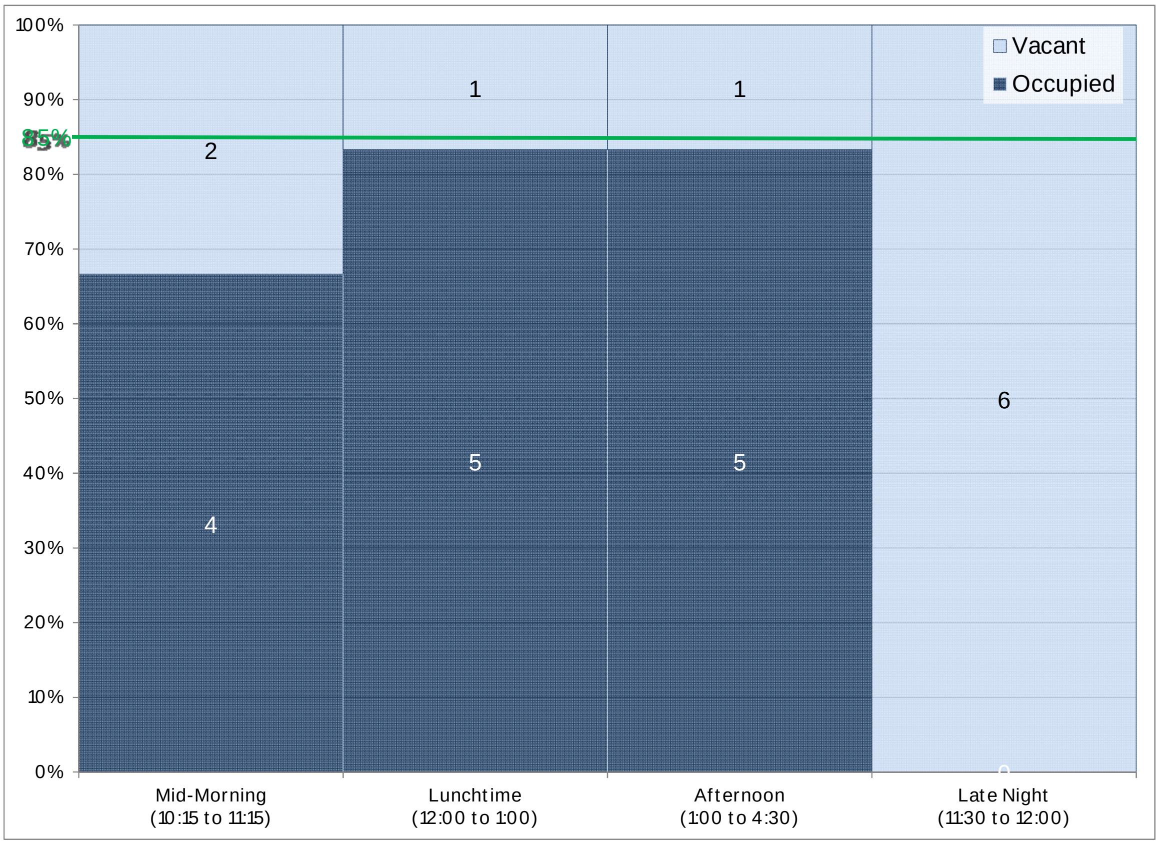
Figure 5 Harper Avenue to Steinhart Avenue: Parking Utilization Profile



### Ormond Lane to Carnegie Lane

There are six legal on-street parking spaces on the east side of the road in this segment (there is also illegal parking occurring at some driveways that are unused due to a closed business, and some businesses are parking in front of their driveways). Additional side street parking could be accommodated by moving the parking on Rockefeller Lane from the south side to the north side, where there are significantly fewer driveways. Most businesses in the area have off-street parking and appear to be using the on-street parking for convenience. Nonetheless, during the occupancy observations, this area did not have more than five vehicles parked at one time. Figure 6 provides a summary of parking utilization in this area.

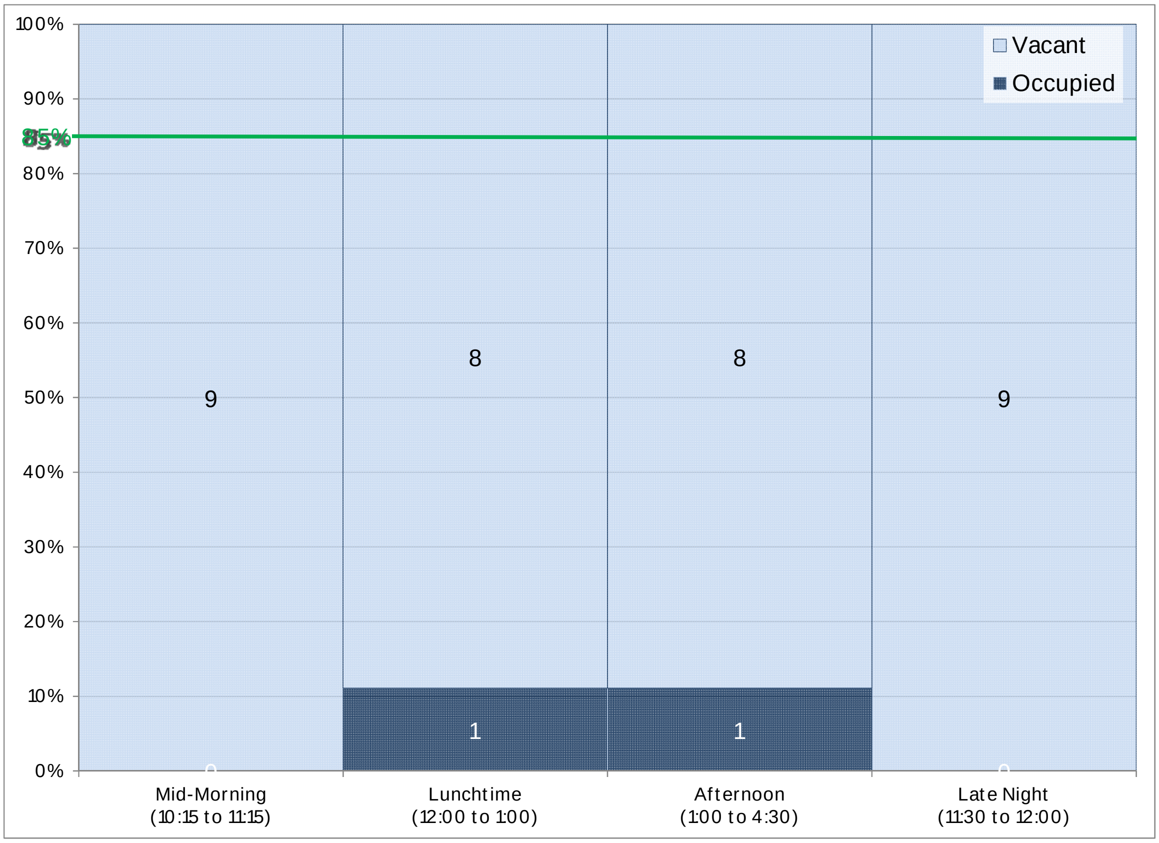
Figure 6 Ormond Lane to Carnegie Lane: Parking Utilization Profile



## Ruhland Avenue to Graham Avenue

There are a total of nine parking spaces in front of residences along this stretch. Residents should be able to easily find parking on cross streets, which appear to have adequate parking availability. During the observation of parking occupancy, this area only had one vehicle parked. This parking utilization is shown in Figure 7 below.

Figure 7 Ruhland Avenue to Graham Avenue: Parking Utilization Profile



## TRAFFIC SIGNALS

Nelson\Nygaard staff reviewed the signalized intersections on the project corridor to identify any signal timing elements or equipment that may need to be upgraded in order to enhance service for bicyclists. At many of the intersections, Aviation Boulevard and Marine Avenue are considered the major street, so the signals are set to recall to green along these streets, and there are no detection devices included. Where these streets cross other high-volume streets, loop detectors are typically installed to detect traffic to put in a call for a green signal and to provide enhanced operations of the signals. Loop detector changes will need to be made in order to be able to adequate detect cyclists at these intersections.

In addition, the largest intersections are so wide that the minimum green time and yellow/all red clearance intervals are likely too short to provide enough time for bicyclists to clear the intersections.

Recommendations for signalized intersections improvements can be found in the Design Alternatives chapter of this document.

## UTILITY CONFLICTS

For most of the project study area, bike lanes can be easily installed primarily through restriping, without any reconstruction. Thus the primary concern of the design is protecting cyclists from manhole covers, utility vaults, and drainage grates currently within the roadway surface. Theroad surface issues within the project corridor are as follows:

- Manhole covers above grade on Aviation Boulevard southbound at Ocean Drive.
- On the west side of Aviation Boulevard, just south of Warfield Avenue, there is a drainage grate that extends out from the curb about three feet, and the original grate openings are aligned with the direction of travel on the roadway. The grate has been modified with metal straps welded onto the original grate in order to make the grate more bicycle friendly (see Figure 8). However, the openings and edges of this grate are still somewhat hazardous to bicyclists. When bike lanes are added to Aviation, this grate should be replaced with one that can be more easily traversed by cyclists who inadvertently ride over it.

Figure 8 Existing drainage grate on Aviation Boulevard at Warfield Avenue

- At the NE corner of the intersection of Aviation Boulevard and Marine Avenue, there is a metal vault cover in the roadway in the location of the proposed northbound bike lane. The cover is flush with the roadway, but should have a non-slip coating added to its surface to make the surface less slippery to cyclists when wet.

Between Marine Avenue and 33rd Avenue, the existing curb-to-curb width of 78 feet (for about 750 feet of length) does not allow enough room for bicycle lanes to be added to the existing roadway. To provide bike lanes in this segment, the road will need to be widened, or a one-way northbound bike facility will need to be placed on the east side of the road. In order to widen the street or provide a bike facility here, the following utilities may need to be relocated:

- A large utility box just north of the main driveway for the Fusion townhomes
- Four light poles
- Two fire hydrants
- One power pole (on the southeast corner of the intersection of Aviation Boulevard and 33rd Street

# MOTOR VEHICLE AND BICYCLE VOLUMES

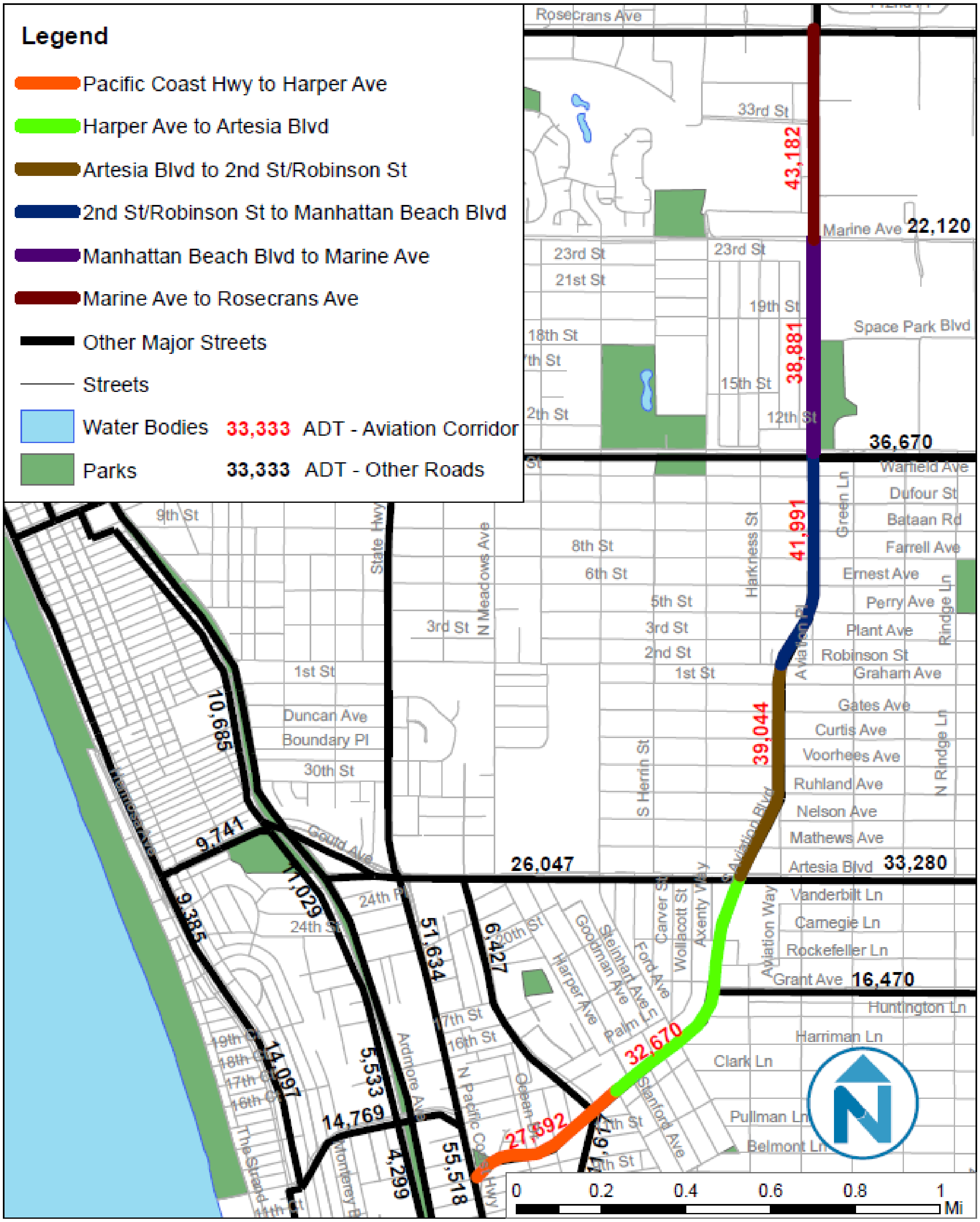
## Motor Vehicle Traffic

Aviation Boulevard serves as a major north-south connection for the beach cities carrying a large volume of vehicles on the average day. Volumes vary from around 25,000 daily vehicles in the south to a little over 40,000 in the north.

Figure 9 Aviation Boulevard Corridor Average Daily Traffic

- PCH to Harper – 27,692 (2005)
- Harper to Artesia – 32,670 (2007)
- Artesia to Robinson/2nd – 39,044 (2009) – 37,090 (2007)
- Robinson/2nd to Manhattan Beach Blvd – 41,991 (2009) – 40,120 (2007)
- Manhattan Beach to Marine – 38,881 (2009) - 36,370 (2007)
- Marine to Rosecrans – 43,182 (2009)

Figure 10 Map of Aviation Boulevard Corridor Average Daily Traffic




Data Sources: Southern California Association of Governments (SCAG), California State Highway Patrol

## Bicycle Volumes

Unfortunately there are no known sources of bicycle volume data for the Aviation Boulevard corridor so there is no quantitative data to report, although, during the field visits, a substantial number of bicyclists were observed using the corridor to get to their destination. Given the vehicle traffic volumes and lack of formal bicycle facilities, there were a surprising number of bicyclists of varying degrees of confidence. Confident and experienced bicyclists were observed riding in lane with vehicle flow, operating as traffic. Many cyclists were observed riding on sidewalks along the corridor, oftentimes against traffic. These behaviors are known to be unsafe and correctable at least in part by the installation of bicycle lanes.

Figure 11 Aviation Boulevard Bicyclists

# CRASH DATA

Nelson\Nygaard staff obtained all available crash data from the Caltrans SWITRS database and also from the cities when available. Review of these data identified 16 crashes between bicyclists and motor vehicles and 13 crashes between pedestrians and motor vehicles along Aviation Boulevard. These crashes are mapped on Figure 12.

The following observations are based on a detailed review of the crashes between bicyclists and motor vehicles:

- Eight of the 16 bicycle crashes occurred when the bicyclists were riding against traffic, usually on the sidewalk. There were often other contributing factors including motorists failing to yield and bicyclists failing to yield. However, it is well-documented that riding against traffic is one of the most dangerous behaviors by bicyclists. Installation of bike lanes, including directional arrows as part of the bike lane markings, generally reduces the incidence of wrong-way riding. In this way, bicycle lanes on Aviation Boulevard can be viewed as a countermeasure to improve bicycle safety.
- At least 4 of the remaining crashes occurred when bicyclists were riding on the sidewalk with traffic. Statistics show that sidewalk riding is generally less safe than riding on the road, due to the fact that bicyclists are unexpected by motorists on sidewalks, especially when riding at any significant speed. Again, bike lanes on Aviation Boulevard may encourage bicyclists to travel on the roadway, thus serving as a countermeasure to reduce this type of crash.
- Three of the crashes occurred at night. All three of these crashes occurred at the north end of the corridor, between Marine Avenue and Rosecrans Avenue. This is the area where speeds are the highest, and lighting is probably more important than otherwise.
- Ten of the 16 bicycle crashes occurred in the areas of Redondo Beach and Hermosa Beach between Harper Avenue and Carnegie Lane. This is the area where the land use density and composition are likely to generate the most bicycle traffic.
- Many of the bicycle/vehicle and pedestrian/vehicle crashes were hit-and-run crashes.

The most important observation from the bicycle crash data is that 75% of the crashes involved sidewalk bicycling and/or wrong way bicycling, both behaviors that are usually reduced when bike lanes are installed.

Ten of the 13 pedestrian/vehicle crashes occurred in the areas of Redondo Beach and Hermosa Beach between Pacific Coast Highway and Grant Avenue. This is the area where the land use density and composition are likely to generate significant pedestrian activity, including pedestrian crossings. Most of these crashes occurred when pedestrians were crossing Aviation Boulevard.

Nelson\Nygaard staff briefly reviewed crashes between two motor vehicles as well. There were several crashes that occurred between moving motor vehicles and parked vehicles. In addition, there were many crashes that involved left turn movements. These crash types may be reduced by the small amount of parking removal of parking and addition of left turn lanes as recommended in the design alternatives section. Where parking remains on the corridor, the proposed bike lane will act as a buffer between moving motor vehicles and parked vehicles, also likely reducing the incidence of crashes with parked vehicles.

Figure 12 Crashes involving Bicyclists and Pedestrians on Aviation Boulevard (2006-2010)


Data Sources: Southern California Association of Governments (SCAG), California State Highway Patrol

# 2 MEETINGS AND PUBLIC INVOLVEMENT

## TECHNICAL STAFF MEETINGS

### Kick-Off Meeting

The first meeting held for this project was a conference call on January 17, 2012 between representatives from Hermosa Beach, Manhattan Beach, Redondo Beach, Healthways, and the Nelson\Nygaard consultant team. This meeting was primarily concerned with the logistics involved in coordinating the data collection, communication, and meeting scheduling necessary for completion of this preliminary feasibility study and conceptual design.

### Technical Staff Meeting

On January 25, 2012, following a day of field work, the consultant team, representatives from the communities, and Beach Cities Health District convened an internal technical meeting to discuss the findings from the previous day and issues observed during the field work and to identify any issues that may have been overlooked. The group discussed initial impressions and design concepts the team developed during field work. The upcoming public workshop and a meeting with Dan Burden were discussed to establish a strategy to maximize the value of the public input process.

### Technical Staff Meeting with Dan Burden

A meeting was held with Dan Burden on February 6, 2012, two days prior to the public workshop to discuss the design proposals under consideration and to garner input from Mr. Burden on these designs. This also allowed the team to finalize the strategy for the upcoming public workshop.

# PUBLIC WORKSHOP

The preliminary designs were brought before the public at an interactive public workshop on February 8, 2012. This workshop was open to all interested parties and approximately 63 community members participated in an open discussion of ideas about bicycle facilities on Aviation Boulevard.

## Origins/Destinations and Routes

As participants arrived at the workshop, they were asked to identify places they travel to along Aviation Boulevard, routes they travel, and to help identify ideas for traversing the hill west of PCH. While the destinations and origins of participants are spread across the corridor, the majority are north of Prospect Avenue. Only four of the origins / destinations are located directly on Aviation Boulevard.

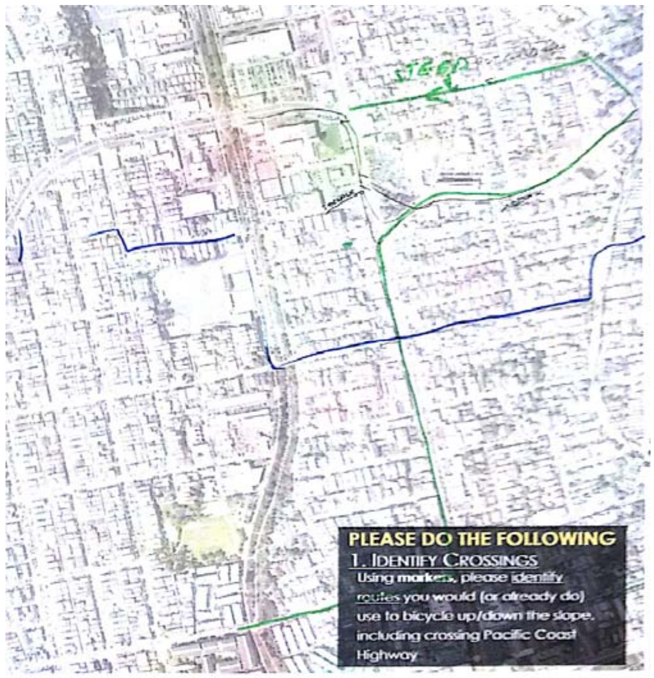
Three north-south routes were identified, including Aviation Boulevard, although only one person identified the entire corridor as his route. Interestingly, the majority of the participants identified routes that run perpendicular to Aviation Boulevard, only interacting with the corridor to cross from one side to the other. Figure 13 provides a summary of routes designated by participants during the design workshop.

Figure 13 Origins/Destinations and Routes Exercise Map

## Traversing the Pacific Coast Highway

Due to the abrupt elevation change just west of PCH, and the physical barrier of the highway itself, participants were asked to share how they would travel between Aviation Boulevard and points west of PCH. Figure 9 shows where participants indicated potential crossings locations of the PCH bluff.

Figure 14 Traversing Pacific Coast Highway Bluff




## Prioritizing Concerns

After 30 minutes of informal interaction, the meeting kicked off with an introduction to the current study, followed by a presentation of the benefits of bicycle facilities, the preliminary design concepts, and the issues to be addressed. Before breaking out into smaller groups, participants were asked to share their key concerns, which were recorded on easel pads. The results were placed on the wall and all participants were invited to use sticky dots to vote for the issues they valued most.

Figure 15 Issues Prioritized According to Votes

1. Pacific Coast Highway and Aviation Boulevard intersection (12)
2. Transition from Prospect Avenue to Ocean Drive to Pacific Coast Highway (12)
3. Need for bicycle detection at signals (11)
4. Slow traffic (11)
5. Extension north to Imperial Boulevard (10)
6. Narrowing lanes (10)
7. Grant Avenue bike lane full connectivity (9)
8. Concerns with rush hour traffic and parking (9)
9. Bike safety and driver awareness at intersections (8)

10. Ocean Drive to Pacific Coast Highway is pushing cyclists onto a danger street (8)
11. Impact of increased traffic volumes (6)
12. East-west bicycle access route (6)
13. Manhattan Beach sections (5)
14. Roundabout at Prospect/Aviation intersection (4)
15. Access from feeder streets - Ruhland (2)
16. Left turns by cyclists (2)
17. Ralph's to Prospect (1)
18. Prospect to Ford & Rockefeller to Carnegie (1)
19. Above grade manhole covers at Ocean (1)
20. Redondo Avenue to Douglas (N-S alt) (1)
21. Power poles and other obstructions (0)

## Interactive Group Discussions

The participants worked with others at their table to discuss ideas and/or concerns and note specifics on provided maps or note cards. At the end of this exercise, each table summarized the top 3 issues brought up during the discussion to be shared with the rest of the participants. These top issues were then brought before the entire workshop for closing discussions.

Many of the same issues were further discussed during the breakout sessions. The following are the top issues identified by each of the participant tables.

Figure 16 Top Concerns from Group Discussions

1. Parking occupancy needs to be observed during peak traffic hours and peak season (June)
2. Need to have safe connection from Grant Avenue to Pacific Coast Highway
3. Lack of southbound left-turn lanes at Ford Avenue cause unsafe backups
4. At rush hour, vehicles use the right-turn lane at Manhattan Beach Boulevard
5. Left-turns heading southbound on Aviation from Bataan, Farrell, and Ernest, near the curve are dangerous for bicyclists and lacking lighting
6. Create a connection from the Grant Avenue bicycle facility to the Aviation facility
7. Slow down traffic between Prospect and Pacific Coast Highway
8. Concerns over parking removal below Prospect
9. Consider terminating the bicycle facility at Prospect
10. Northbound left-turn from Aviation to 12th Street is dangerous, add a median
11. Add safe crossings between Manhattan Beach Boulevard and Artesia Boulevard
12. Add a sidewalk on the west side of Aviation north of 33rd Street
13. Better connection to bike lanes on Grant
14. Acquire vacant lot at the corner of Owosso Avenue and concert into public parking
15. Must connect Aviation facility to Pier Avenue and the strands
16. Business on the southeast corner of Aviation/Prospect has a lot but parks cars on street
17. Southbound vehicles using the right-turn lane at Manhattan Beach Boulevard to jump ahead of traffic
18. Need to restripe Marine Boulevard to connect the station bicycle facility to Aviation

# 3 DESIGN ALTERNATIVES

## INTRODUCTION

Based on the evaluation of the existing conditions and all available data, Nelson\Nygaard developed design alternatives for the provision of bicycle lanes on Aviation Boulevard (between Pacific Coast Highway and Rosecrans Avenue) and on Marine Avenue (between Aviation Boulevard and Redondo Beach Avenue). The analysis took into consideration the following:

- Minimizing the amount of reconstruction by focusing the bike lane installation on restriping the existing street geometry including lane widths, roadway curvature, medians, etc.
- Variable travel lane widths of 10, 11, or 12 feet: In order to minimize any roadway widening or reconstruction, the design alternatives generally recommend travel lanes of 10 feet or 11 feet.
- Safety for all users, including comfort and perceived safety. For all users, anything that discourages excessive vehicle speeds will improve safety. Other specific safety features considered as as follows:
  - For bicyclists, safety can be improved by encouraging cyclists to ride in the same direction as other traffic, and by providing physical separation from overtaking vehicular traffic.
  - Pedestrians will also benefit from the additional buffer from high-speed motor vehicle traffic provided by bike lanes.
  - For motorists, safety benefits of the project include travel lanes of appropriate width, better delineation of space including separation from parked vehicles, and the presence of turn lanes wherever feasible.
- Removal of on-street parking at specific locations: In order to minimize the effects on businesses and residents, parking removal has been minimized as much as possible. Besides the obvious benefit to business owners and patrons, on-street parking has other benefits including providing a buffer to pedestrians on the sidewalk and changing the character of the street. On the other hand, on-street parking can be a contributing factor to crashes, for example when motorists or bicyclists run into parked vehicles. A review of the crash history on the corridor identified several crashes between moving vehicles and parked vehicles.
- Maintaining motor vehicle capacity as much as possible: Some recommendations may have slight capacity reductions, but the design alternatives were carefully developed in order to minimize any impacts to capacity since Aviation Boulevard is an important regional connection.
- Reconfigured turn lanes in order to provide enough width to install bike lanes: Existing left turn lanes (including two-way left turn lanes) have been retained, except where left turn movements are recommended to be prohibited. Wherever possible, left turn lanes are proposed where they do not exist today for safety and capacity benefits. In most cases,

left turn lanes are designed to be 12 feet wide, which will allow for future installation of raised medians between intersections that transition to a 2-foot wide concrete traffic separator next to a 10-foot wide left turn lane on each intersection approach. Raised medians are recommended as a long-term enhancement to Aviation Boulevard (and Marine Avenue), since they provide significant safety benefits for all road users, and improve the streetscape and landscape.

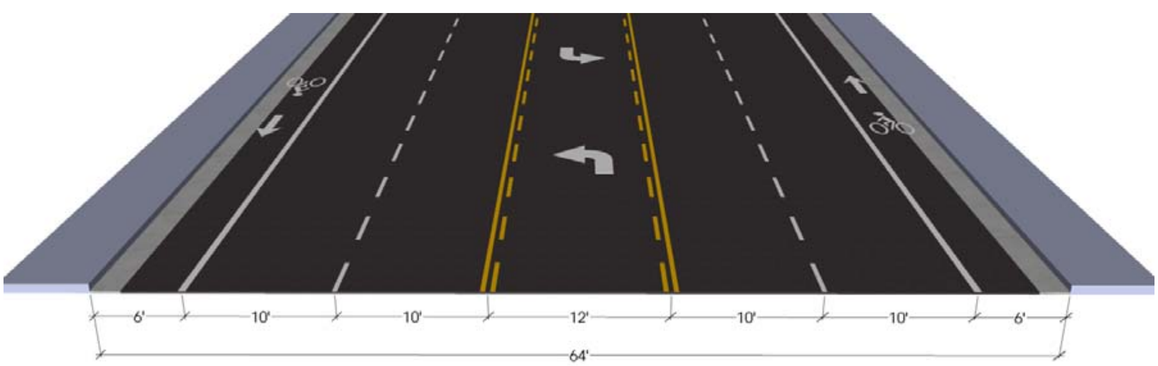
- Narrowed painted medians on long segments without cross streets or driveways, to allow for wider bike lanes or a buffer between the bike lane and the travel lane.
- At locations with existing raised medians, reconstruction of the medians is sometimes necessary in order to provide sufficient width for bike lanes.

This design alternatives discussion separates the corridor into three major roadway segments with similar conditions and function. Each of these segments is divided into shorter segments, so that the recommended design for each segment can be discussed with some specificity. For each segment of roadway, recommended cross sections are shown graphically with a discussion of the reconfiguration necessary to make each cross section feasible. All cross sections are shown with dimensions from west to east (or from north to south). For Aviation Boulevard, the cross sections are shown as if the corridor were being viewed starting at Pacific Coast Highway and heading north (or east) toward Rosecrans Avenue. For Marine Avenue, the cross sections are shown as if the corridor is being viewed starting at Aviation Boulevard and heading east toward Redondo Beach Avenue.

## AVIATION BOULEVARD – PACIFIC COAST HIGHWAY TO MANHATTAN BEACH BOULEVARD

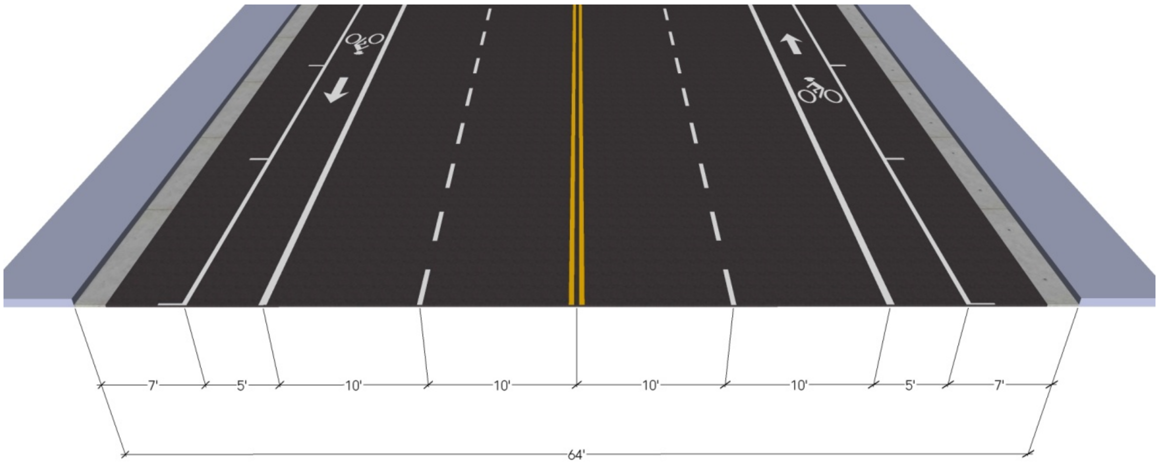
When considering bicycle lanes on this section of roadway, the predominate existing width of 64 feet allows for several options, depending on whether center turn lanes and parking are to be retained. As discussed above under parking supply and removal, there are a few portions of this two miles of roadway where existing parking is recommended to be removed. In order to install bicycle lanes and retain the center turn lane, there not be parking on either side of the roadway. Cross section 64-1, shown below, illustrates the most common cross section that is recommended for this major segment of roadway.

Figure 17 Cross section 64-1 – Most common cross section from PCH to Manhattan Beach Blvd.




In areas where parking demand is moderate to high, it is recommended that parking remains on both sides of the roadway, without a center turn lane. Using the minimum dimensions for all features, it is possible to include 4 travel lanes, both bike lanes, and parking on both sides as shown in Cross section 64-2 below. This cross section is not ideal since these minimum dimensions result in a bike lane that is largely within the parking lane door opening zone, but this is the only feasible option in this area given the need to balance the various goals. Wherever parking remains in place, future consideration should be given to installation of curb extensions at intersections to offset and protect the on-street parking.

Figure 18 Cross section 64-2 – Areas with high parking demand – uses minimum dimensions



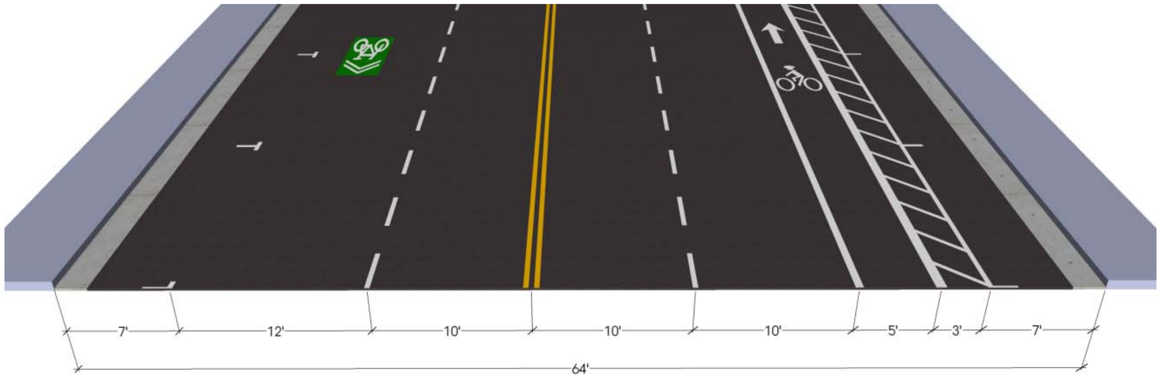

Additional cross sections are proposed for more specific segments of the roadway, as described below.

## Pacific Coast Highway to Bonnie Brae Street

Parking in this area is moderately used, with heavy usage at specific locations during some times of the day. There are a few businesses (for example, a surf shop, a diner, and a nursery) that have little available off-street parking and might experience challenges if parking is removed. The recommended design for this area retains parking, but changes the configuration of the travel lanes. This segment of roadway is relatively steep, with a steady 6% grade, resulting in high bicycling speeds downhill and slow bicycling speeds uphill. With fast downhill speeds, the typical Cross section 64-2 with minimum dimensions is not recommended. The recommended design is to eliminate the downhill bike lane and provide shared lane markings downhill, with a buffered bike lane uphill.

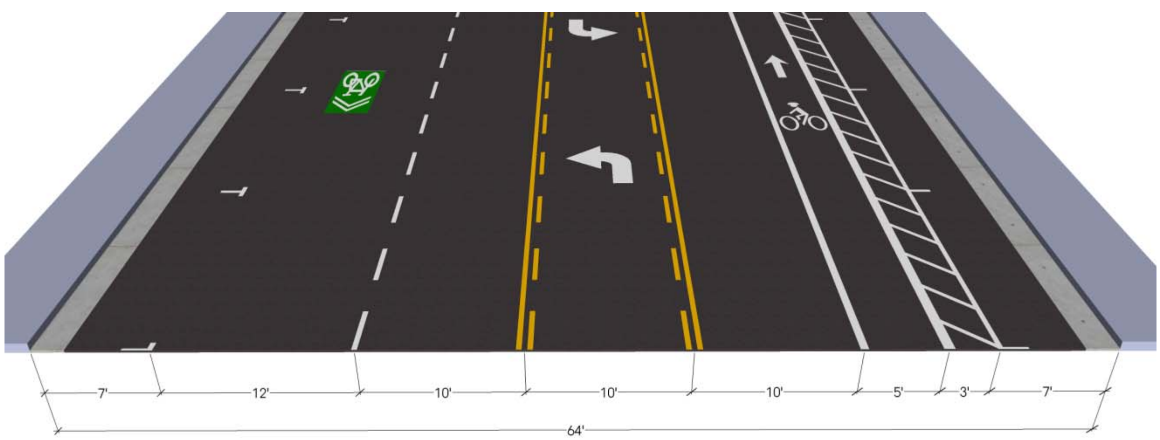
There are two configuration options for the remaining roadway space. First the roadway can be marked with two through lanes in each direction and no center turn lane as shown in Cross section 64-6a. For much of this corridor, the design will operate roughly as it does today. However, this design removes the left turn lanes at Ocean Drive, which will have a negative effect on vehicle capacity.

Figure 19 Cross section 64-6a – Shared lane markings downhill, buffered bike lane uphill, 4 lanes




An alternative design is to remove one northbound through lane in this segment. Only one lane feeds Aviation Boulevard from PCH and two lanes are not necessary to serve the existing traffic volume, except where signalized intersections take away too much of the green signal time for northbound traffic. At Ocean Drive, the signal timing appears provides significantly more green signal time to Aviation Boulevard than Ocean Drive; thus this intersection may operate favorably with only one northbound lane. The advantage of this option is that it provides a left turn lane for both directions, not just at Ocean Drive, but throughout the segment, which will likely improve safety for all users. Cross section 64-6 includes two southbound lanes with shared lane markings in the outside lane, a center turn lane and one northbound lane with a buffered bike lane.

Figure 20 Cross section 64-6 – Preferred alternative – shared lane markings downhill, buffered bike lane uphill, two southbound travel lanes, one northbound travel lane

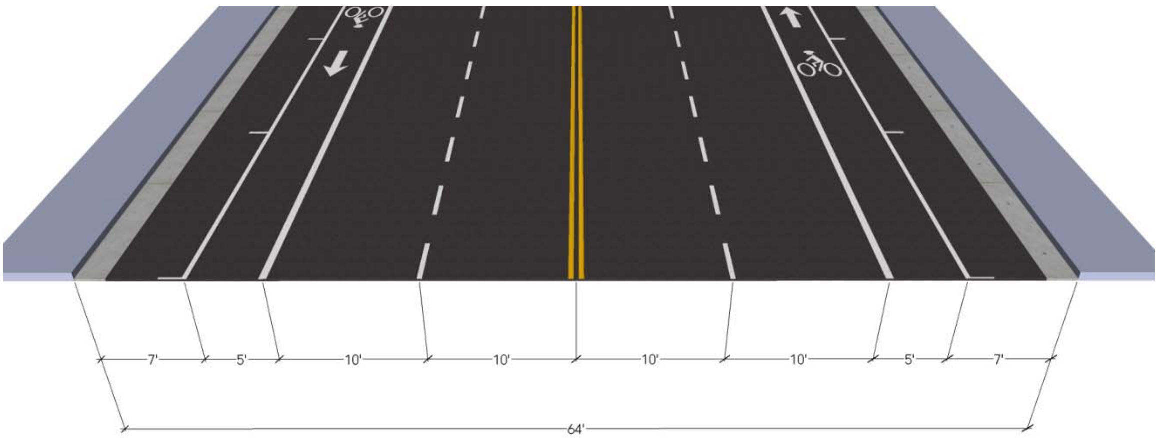



Traffic analysis at the intersection of Aviation Boulevard and Ocean Avenue should be performed in order to determine the effect on capacity and level of service, and to see which option operates most favorably. Cross section 64-6 is preferred due to its inclusion of a center turn lane to enhance safety. To provide more emphasis, the shared lane markings could be enhanced with a "super-sharrow" green treatment, similar to an example on 2nd Street in the city of Long Beach.

## Bonnie Brae Street to Prospect Avenue

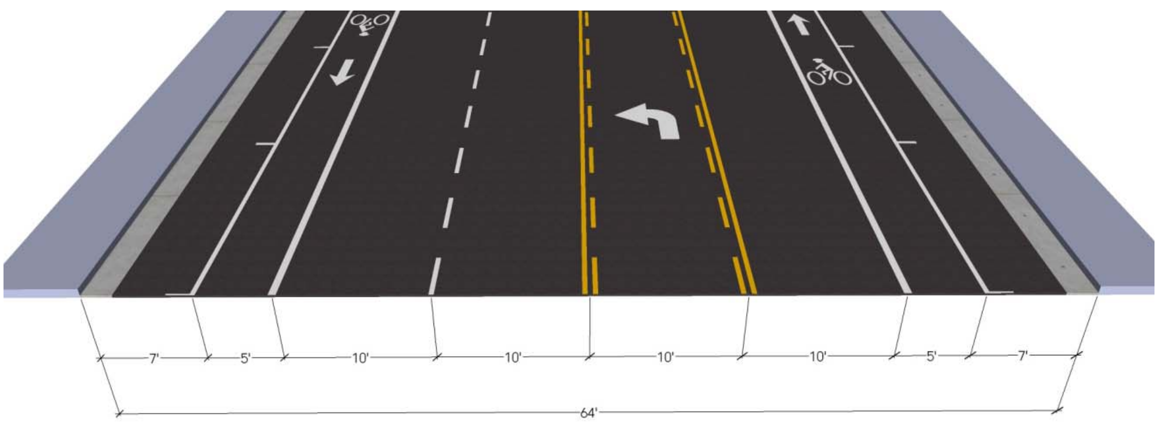
This segment is similar to the previous segment, although parking demand is lower and there is more off-street parking available. There are still several businesses that may struggle if parking is removed, so the recommended design for this segment retains the current on-street parking. The grades on this segment are only 2% to 3%, and Prospect Avenue is at the top of the hill, so cyclists will not have had much opportunity to build up significant speed. Therefore, a four-lane cross section with minimum dimensions is recommended. There are two options for the segment, and the chosen design should be coordinated with the previous segment. The first option is Cross section 64-2 with two lanes in each direction.

Figure 21 Cross section 64-2




The second option is similar, but has two southbound lanes and one northbound lane, with a center turn lane.

Figure 22 Cross section 64-2a – Preferred alternative with one travel lane northbound

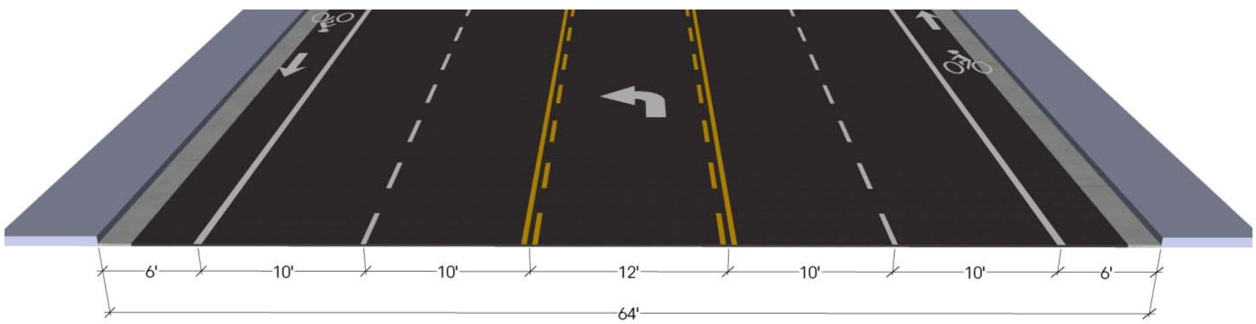



The intersection of Aviation Boulevard and Prospect Avenue is a busy signalized intersection, so the presence of left turn lanes is critical, and removing the 2nd northbound lane will likely have a significant negative effect on delay. The recommended design is to transition back to Cross section 64-1 at least 10 feet southwest of the intersection. This will require the removal of at least one parking space. The design with one parking space will result in relatively short storage lengths for the left turn lane and two through lanes northbound on Aviation Boulevard at Prospect Avenue. Once a traffic analysis is performed at this intersection, it may be found that longer storage lanes are desirable. All parking (a total of 8 spaces) can be removed on both sides between Corona Street and Prospect Avenue to provide longer storage lanes at the signalized intersection. The church parking lot at Corona Street may be a potential site for parking in this vicinity to make up for any loss of parking on the street.

## Prospect Avenue to Steinhart Avenue

Parking is not heavily utilized in this area and businesses generally have off-street parking. Additionally, there is parking available on the cross streets. Removal of 20 parking spaces in this segment is recommended to provide room for Cross section 64-1. In addition to providing bike lanes on this segment, this cross section will allow for left turn lanes at two additional streets and several driveways, which should improve safety for all users.

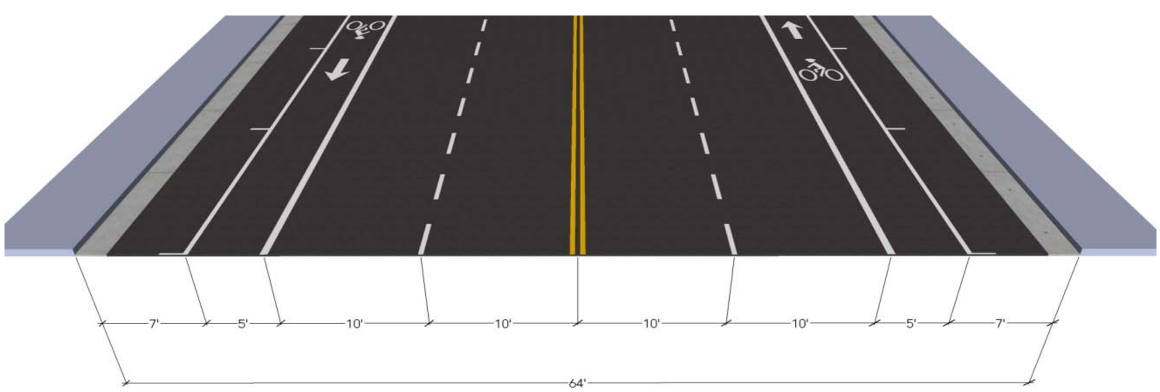
Figure 23 Cross section 64-1




## Steinhart Ave to Ormond Lane

Parking on this segment is in high demand due to several businesses that have little or no off-street parking. This area has the highest consistent parking demand of any segment of the entire corridor. Cross section 64-2 is the best option for this section. This area is relatively flat, and bicyclists approaching from the north will have just climbed a hill, so bicycling speeds are not anticipated to be high in the area; this helps mitigate the use of minimum dimensions at this location.

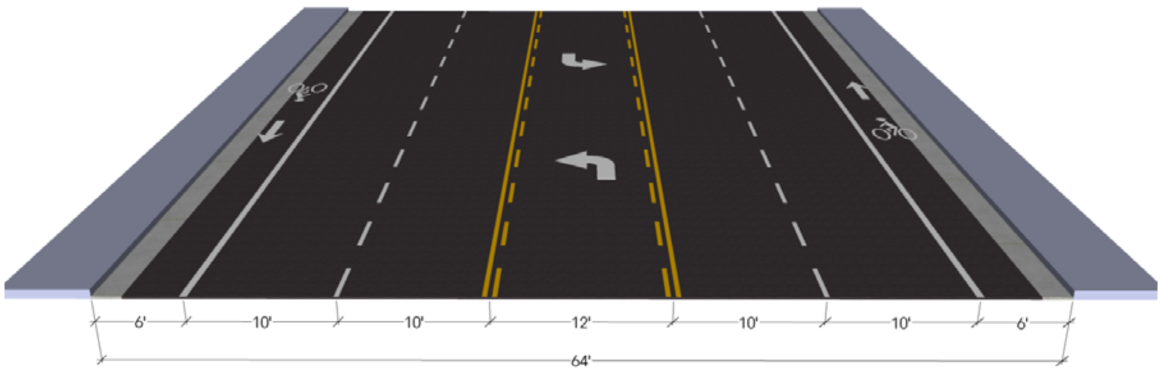
Figure 24 Cross section 64-2



## Ormond Lane to Carnegie Lane

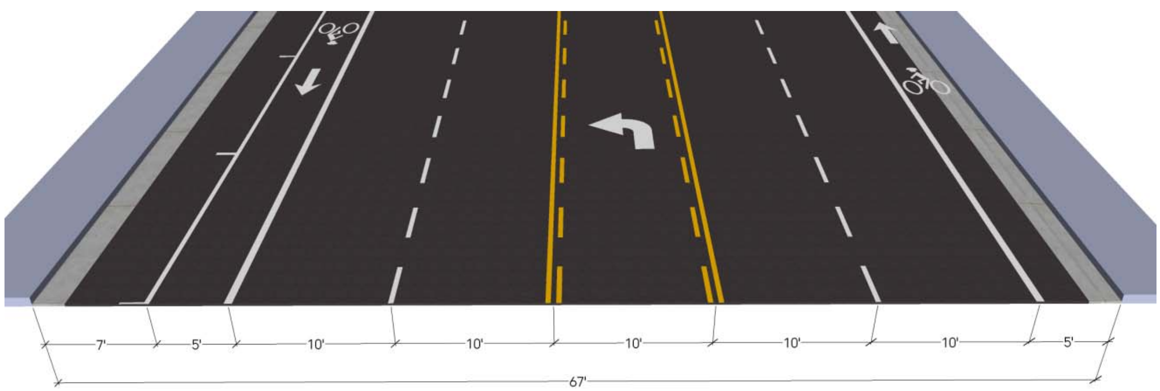
There are eight legal parking spaces in this area, which are used relatively frequently. Parking also occurs at some driveways. Most businesses in the area have off-street parking but appear to be using the street for convenience. There is also parking available nearby on side streets. The recommended design includes parking removal to enable the use of Cross section 64-2.

Figure 25 Cross section 64-2




Immediately south of Carnegie Lane, there is a short segment of roadway that is 67 feet wide. At this location, two of the existing parking spaces can be retained by narrowing the center turn lane to 10 feet and the bike lanes to five feet as shown in Cross section 67-1.

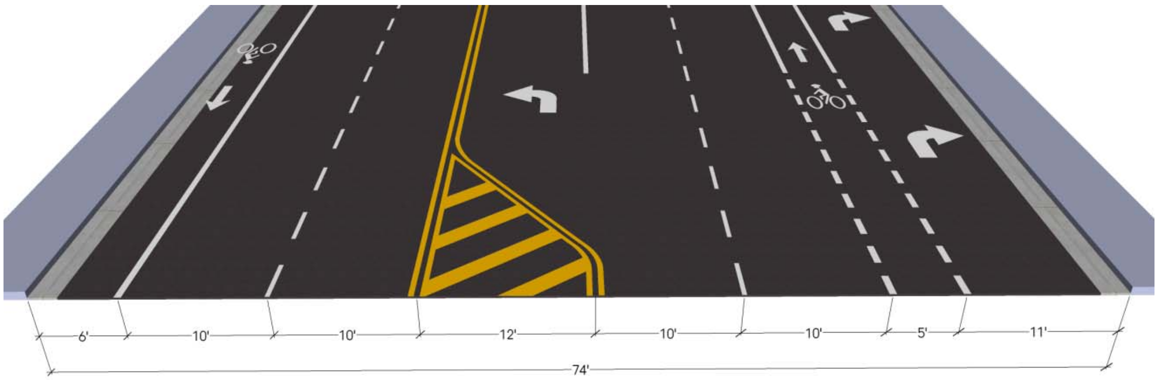
Figure 26 Cross section 67-1 – Retains two parking spaces in wide area south of Carnegie Lane



## Carnegie Lane to Mathews Avenue

This segment can be easily restriped to include bike lanes with Cross section 64-1. The cities of Manhattan Beach and Redondo Beach will soon be adding northbound and southbound right turn lanes on Aviation Boulevard at Artesia Boulevard. These plans add 10 feet for the right turn lane, which will allow bike lanes to be marked as shown in Cross section 74-1.

Figure 27 Cross section 74-1 – Planned widening for a northbound right turn lane on Aviation Boulevard at Artesia Boulevard

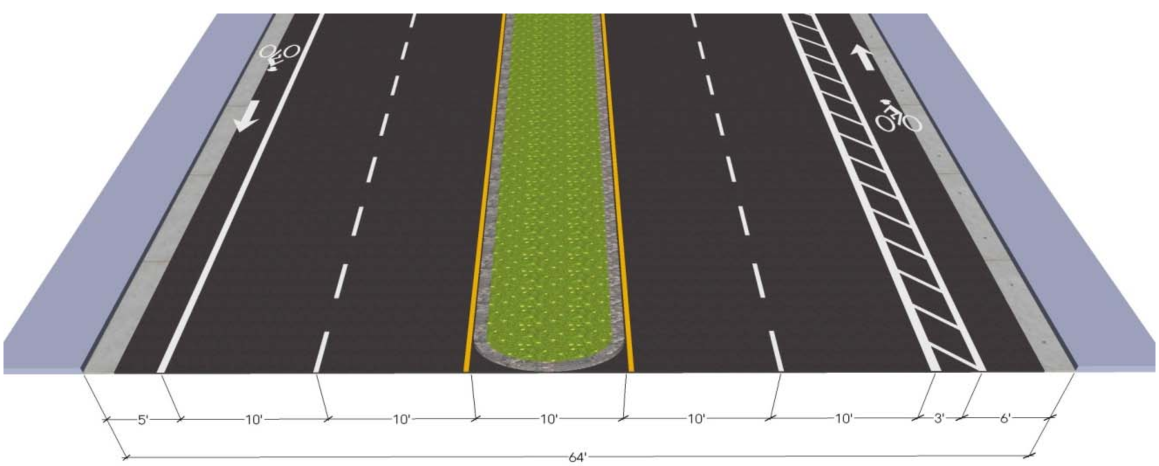



## Mathews Avenue to Ruhland Avenue

This segment of Aviation has two existing 10-foot wide raised medians that are not placed in the center of the roadway, resulting in 25 feet on the west side and 29 feet on the east side. There are two options for this area:

- Use common Cross section 64-1 and remove and replace the medians
- In order to eliminate the expense associated with median replacement, it is possible to use minimum dimensions on the 25-foot side to achieve bike lanes without removing the existing raised medians. For the 29-foot width on the east side, the recommended design includes consistent travel lane widths of 10 feet, with a short section of buffered bike lane, improving the comfort and perceived safety for cyclists in this area, as shown in cross section 64-1B.

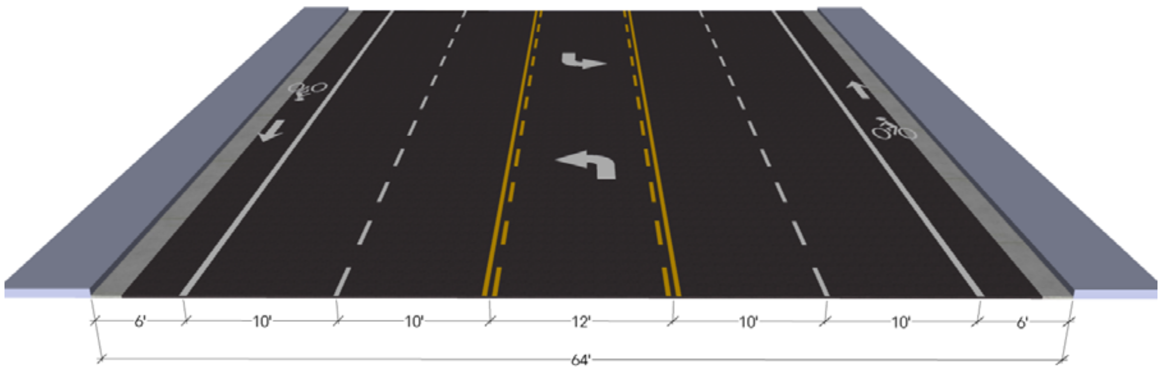
Figure 28 Cross section 64-1B – Solution for existing raised medians



## Ruhland Avenue to Graham Avenue

There are nine parking spaces in front of residences in this segment. These spaces are rarely used, in part because residents have off-street parking areas in order to avoid parking on this busy street. The recommended design removes these parking spaces and uses common Cross section 64-1. Residents can easily park around the corner on the side streets, which have adequate parking availability.

Figure 29 Cross section 64-1




## Graham Avenue (1st Street) to Ernest Avenue (6th Street)

The recommended design includes Cross section 64-1 and removes the right turn lane at the small shopping center north of Robinson. Motorists can be encouraged to merge into the bike lane before turning into the apartment complex by using a dotted line for the bike lane on the approach to the driveway, similar to how bike lanes are dotted approaching intersections.

## Ernest Ave (6th Street) to Bataan Road (9th Street)

This segment of Aviation Boulevard has two existing 10 foot wide raised medians that are not placed in the center of the roadway, resulting in 31 feet on west side of the medians, and 23 feet on east side of medians. In order to install bike lanes, medians must be removed or replaced so that Cross section 64-1 can be used.

## Bataan Road (9th Street) to Warfield Avenue (11th Street)

This segment has 14 parking spaces on the west side of Aviation Boulevard, which are somewhat frequently. Businesses in this area may be negatively impacted by parking removal, especially close to Warfield, where the businesses front the street. These businesses have limited parking in the rear of the building. Bike lanes can be added here by using a combination of two options:

- Preserve parking by removing the center turn lane and adding a narrow raised median to eliminate left turns (Cross section 64-4).
- Remove parking on at least a portion of the west side of the road and use common Cross section 64-1.

Figure 30 Cross Section 64-4 – Narrow raised median to retain parking on one side of the road

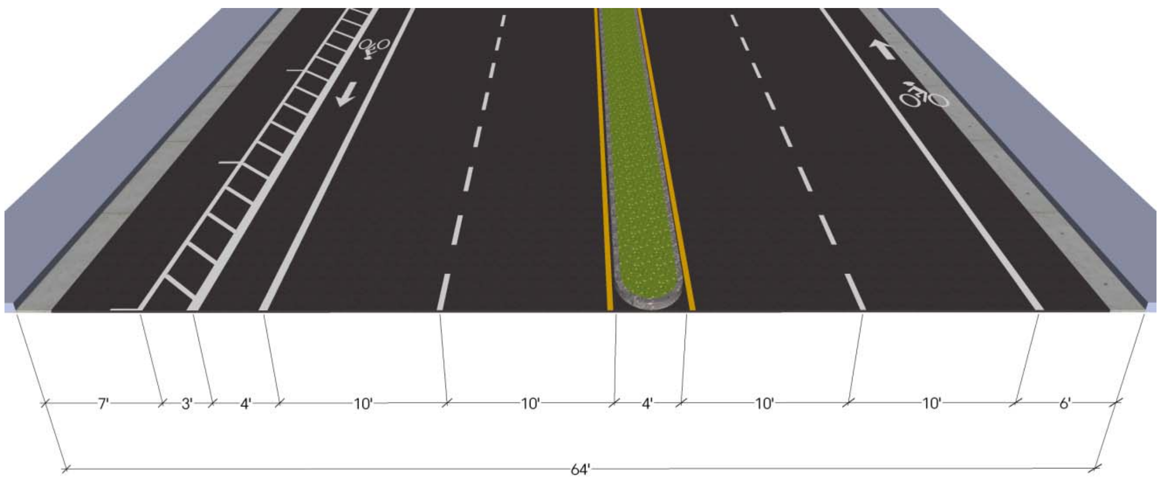
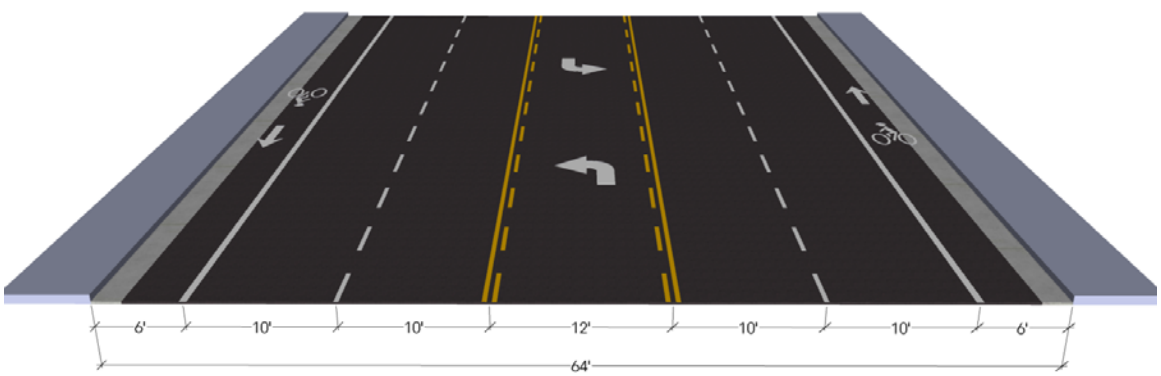



Figure 31 Cross section 64-1



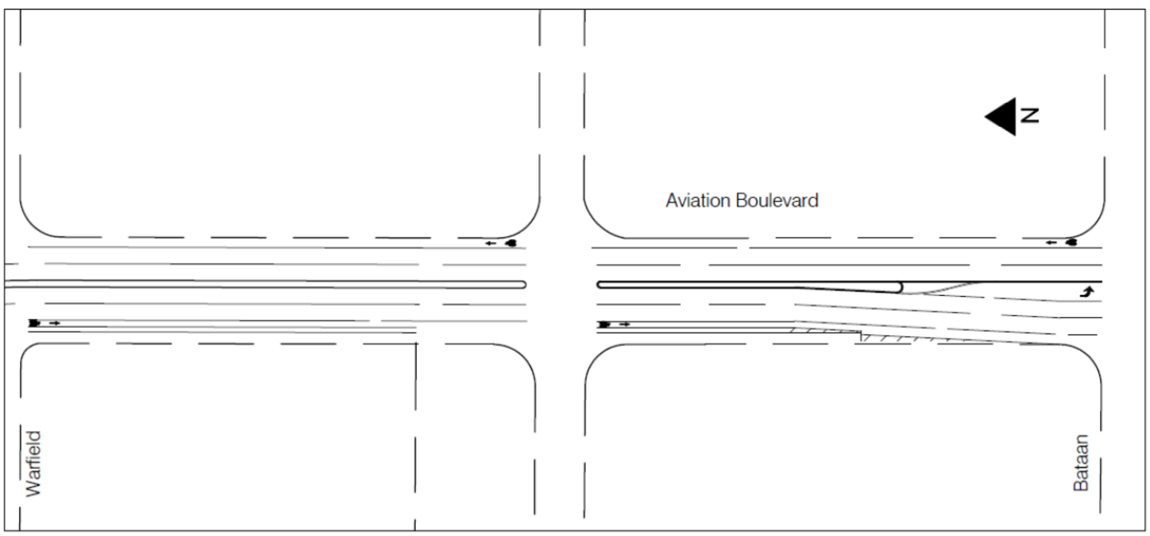

There are two recommended strategies to apply the above two options to these two blocks. The first strategy is to use Cross section 64-1 at Bataan Road (9th Street), and Cross section 64-4 at a point about 140 feet north of Bataan Road (9th Street) to Warfield Avenue (11th Street). This retains all 14 parking spaces in these two blocks, and allows all turning movements at Bataan Road (9th Street). The raised median can be opened to allow eastbound and westbound left turn movements at Dufour Street (10th Street), but without left turn lanes northbound and southbound left turn movements would need to be prohibited at this intersection. In addition, the median would prevent left turn movements to and from private driveways for all of the block between Dufour Street (10th Street) and Warfield Street (11th Street), and most of the block between Bataan Road (9th Street) and Dufour Street (10th Street). This option is detailed in plan view below in Figure 32.

The cities of Redondo Beach and Manhattan Beach would likely need to conduct public processes to make final decisions about restricting left turn movements at Dufour Street (10th Street) and at nearby driveways.

In order to retain the existing left turn movements, the transition between Cross section 64-1 and Cross section 64-2 could be moved one block north. This would eliminate seven parking spaces in the block between Bataan Road (9th Street) and Dufour Street (10th Street) and two spaces just north of Dufour Street (10th Street). The five spaces just south of Warfield Avenue (11th Street) directly in front of the businesses that front the street would be retained.

The city of Manhattan Beach may need to conduct a public process regarding the removal of parking in this area.

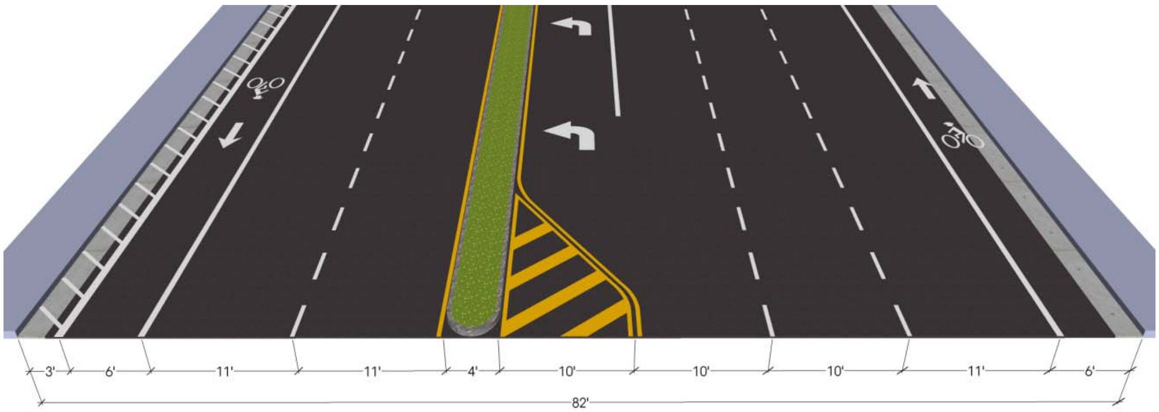
Figure 32 Plan View of Bataan Street (9th Street) to Warfield Street (11th Street)



## Warfield Avenue (11th Street) to Manhattan Beach Boulevard

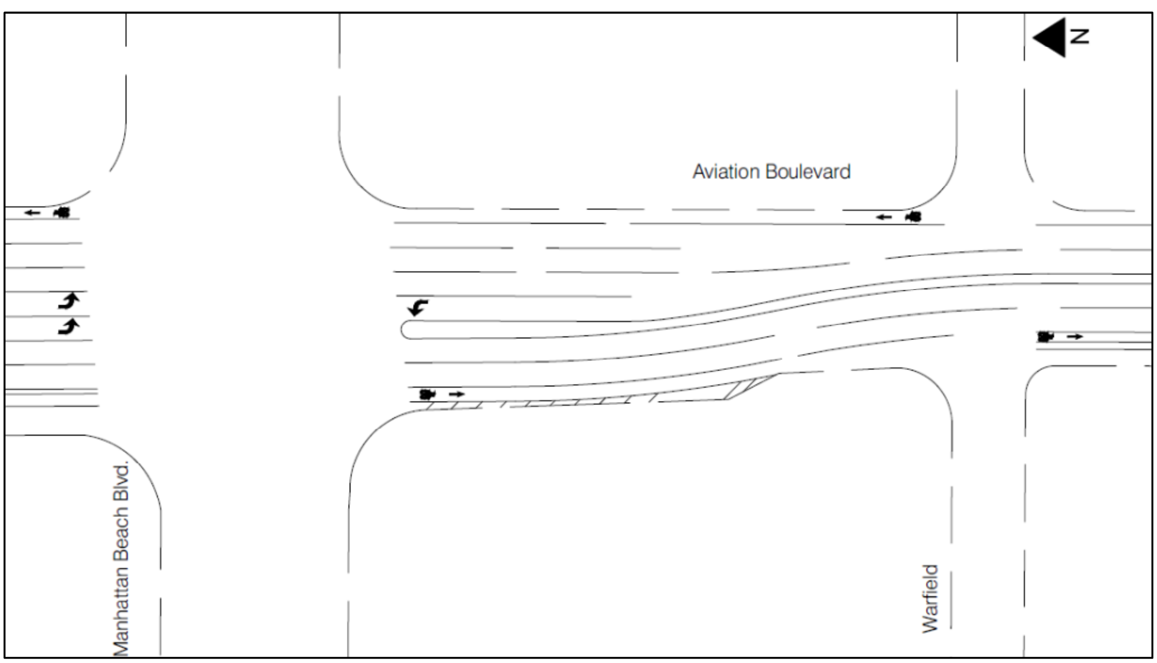
The existing width of this segment is 82 feet just south of Manhattan Beach Boulevard, with a four foot wide raised concrete median, 34 feet west of the median and 44 feet east of the median. This can be restriped to add bike lanes but the four foot wide concrete median will need to be relocated slightly, as shown in Cross section 82-1.

Figure 33 Cross section 82-1 – South leg of intersection of Aviation Blvd. and Man. Beach Blvd.




Cross section 82-1 will transition to Cross section 64-4 at Warfield Avenue (11th Street) with a set of reversing curves designed with a 550-foot radius for the 40 mph posted speed. A plan view of this design is shown below. This proposed design retains all of the existing travel lanes and improves vehicular capacity by providing slightly longer storage lengths for the left turn lane and right-most through lane on the northbound approach of Aviation Boulevard to Manhattan Beach Boulevard.

Figure 34 Plan View of Warfield Avenue (11th Street) to Manhattan Beach Boulevard



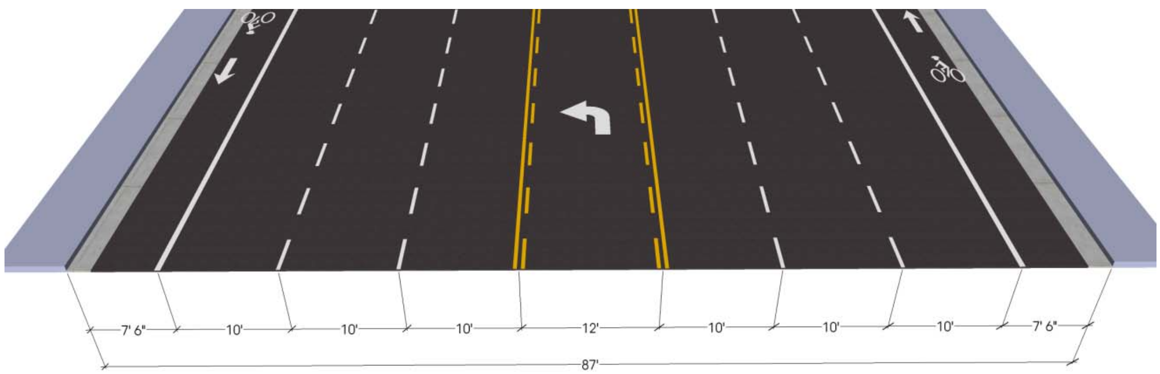
# AVIATION BOULEVARD – MANHATTAN BEACH BOULEVARD TO ROSECRANS AVENUE

This one mile long segment generally has three through lanes in each direction with widths varying from 78 feet to 111 feet. With one exception discussed in more detail below, bicycle lanes can be added here by restriping the existing lanes, including narrowing travel lanes, and reconfiguring left and right turn lanes. Detailed recommendations for each sub-segment are described below.

## Manhattan Beach Boulevard to Space Park Drive

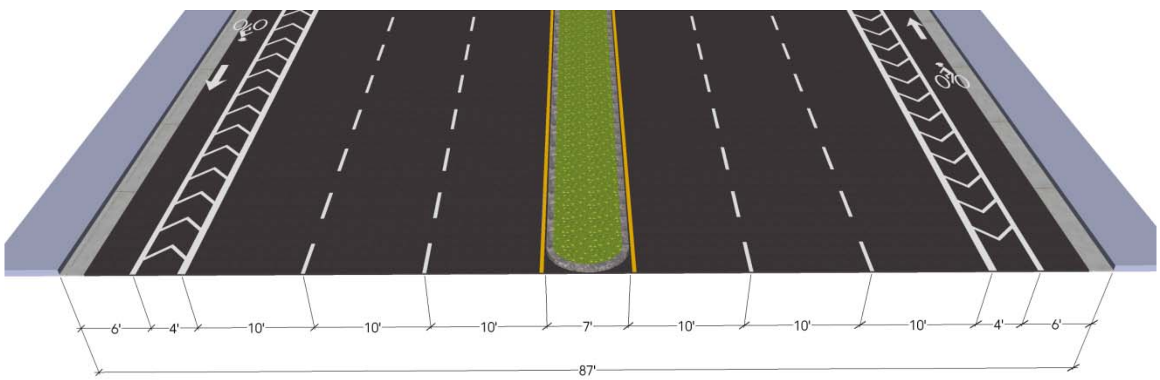
The existing width at this segment is 87 feet in general, with 94 feet at Manhattan Beach Boulevard, and a slightly narrower width (84 feet to 85 feet) between Manhattan Beach Boulevard and 12th Street. These roadway widths can be easily restriped for bike lanes as shown in Cross section 87-1 below, with slightly narrowed bike lanes at the location where the road narrows to 84 feet.

Figure 35 Cross section 87-1




There is a long segment of this road segment where there are no turning movements. In these areas, the wide painted median could be narrowed or replaced with a narrow raised median in order to provide a buffer between the bike lanes and the travel lanes. This modification will improve the comfort and perceived safety for cyclists in this area, as shown in Cross section 87-2.

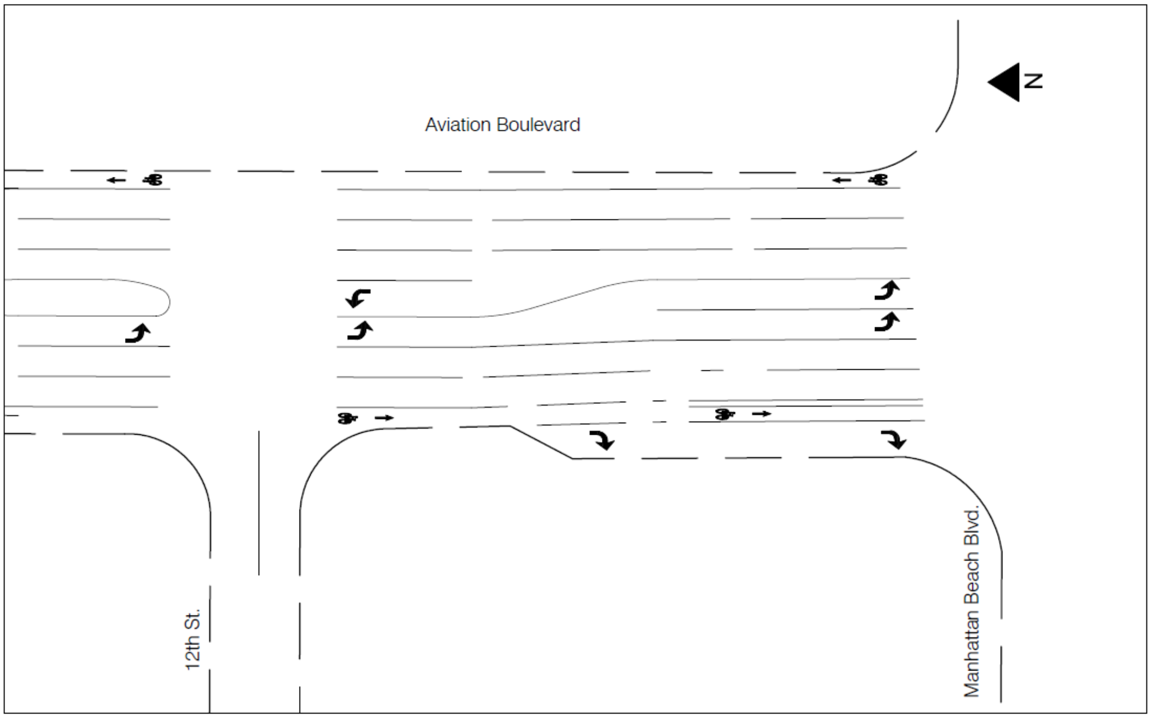
Figure 36 Cross section 87-2 – Bike lane buffers improve comfort for bicyclists and pedestrians (median can also be painted and not raised)



In the existing conditions, there are side-by-side left turn lanes (one in each direction) immediately south of 12th Street. This eight lane cross section leaves insufficient room for bike lanes. In order to resolve this issue, a change to the southbound lane drop at Manhattan Beach Boulevard is proposed. Currently the right-most through lane becomes a right turn lane at Manhattan Beach Boulevard. In the proposed design, the left-most through lane would become a left turn lane. A traffic analysis of this intersection is recommended to see how this change will affect capacity and level of service. This new design results in several potential benefits and concerns:

- Potential benefits of changing the lane drop at Manhattan Beach Boulevard:
  - Provide room to mark bike lanes.
  - Eliminate the problem of transitioning the bike lane from the right side of the rightmost through lane to the left side of this same lane as it becomes a right turn lane. There is a standard bike lane design for this, but it requires bicyclists who want to continue straight to make a somewhat challenging merge across a lane of traffic.
  - Make the lane transitions work better, since the extra space for the right turn lane develops on the west side of the roadway, precisely where the right turn lane needs to be added.
  - Provide easier access to the southbound left turn lanes at Manhattan Beach Boulevard, since these lanes would have a dedicated approach lane. This may improve the capacity for southbound left turn and through movements.
  - May improve safety by eliminating a “multiple threat” crash scenario for motorists who are making a northbound left turn from Aviation Boulevard to 12th Street. Currently, the most of the southbound lanes are frequently congested with traffic backing up from Manhattan Beach Boulevard through the intersection of 12th Street. But the right-most lane is less congested since there are fewer drivers making the right turn and right turns can be made on red. As a driver turns left onto 12th street in the “Keep Clear” gap in the other southbound lanes, there is the potential that the vehicle will be struck by an oncoming vehicle traveling at a fairly high speed approaching the right turn lane at Manhattan Beach Boulevard.
- Possible concerns about changing the lane drop at Manhattan Beach Boulevard:
  - This change will make the access to the southbound right turn lane more difficult, which may reduce the capacity of southbound right turn and through movements.
  - Drivers may be encouraged to cut through the neighborhood to make right turns onto Manhattan Beach Boulevard, by turning right onto 12th Street, left onto Harkness Street, and then right onto Manhattan Beach Boulevard.

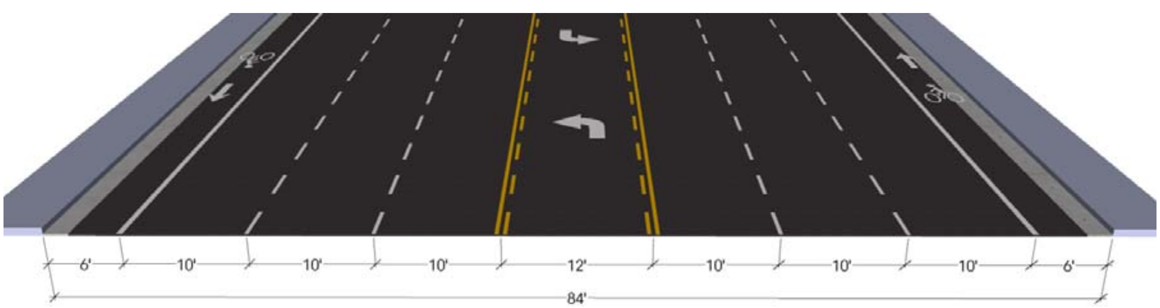
Figure 37 Plan View of Manhattan Beach Boulevard to 12th Street




## Space Park Drive to Marine Avenue

The existing width is 84 feet throughout this segment, which can be restriped for bike lanes as shown in Cross section 84-1.

Figure 38 Cross section 84-1




There are currently side-by-side left turn lanes between Space Park Drive and 19th Street, resulting in an eight-lane cross section that does not leave adequate space for bike lanes. To provide bike lanes, the proposed design is to remove the northbound left turn lane for 19th Street and to install a continuous raised median or curb across the entrance to 19th Street, eliminating all left turns at this location. Signs already prohibit northbound left turn movements between 3 PM and 7 PM and prohibit eastbound left turn movements between 11 AM and 7 PM. In the proposed design, northbound left turns at 19th Street will require continuing north to a designated U-turn location midblock. With the proposed design, eastbound left turns from 19th Street will require making a right turn and a U-turn at Space Park Drive. This requires making a change to allow U-turns here, which are currently banned although there is sufficient room to allow these turns. Alternatively, drivers from this neighborhood can access northbound Aviation Boulevard by making a right turn from Redondo Avenue or Harkness Street to Marine Avenue, and then making a left turn onto Aviation Boulevard.

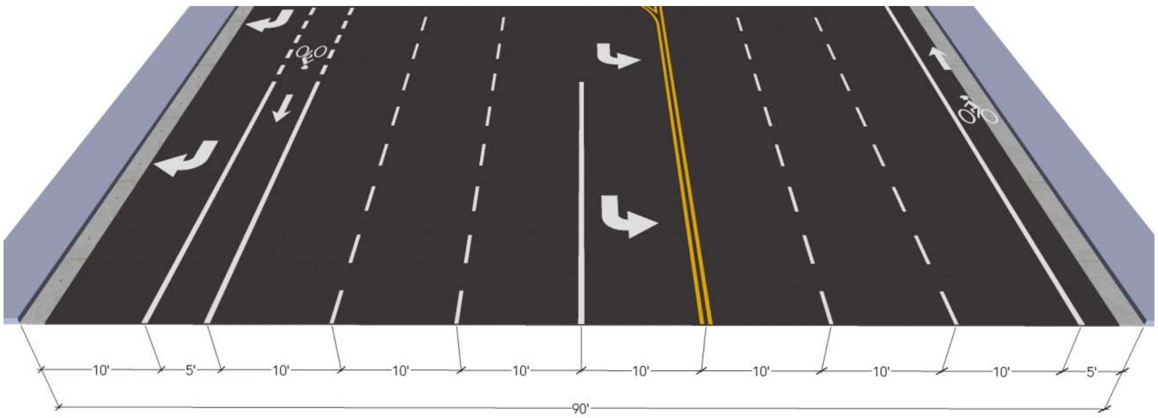
## Aviation Boulevard – Marine Avenue to 33rd Avenue

The existing cross section in this area varies from 90 feet just north of Marine Avenue, to 84 feet in the middle of this segment, to 78 feet at the north end just south of 33rd Avenue.

For the 90-foot wide segment at Marine Avenue two possible cross sections are proposed.

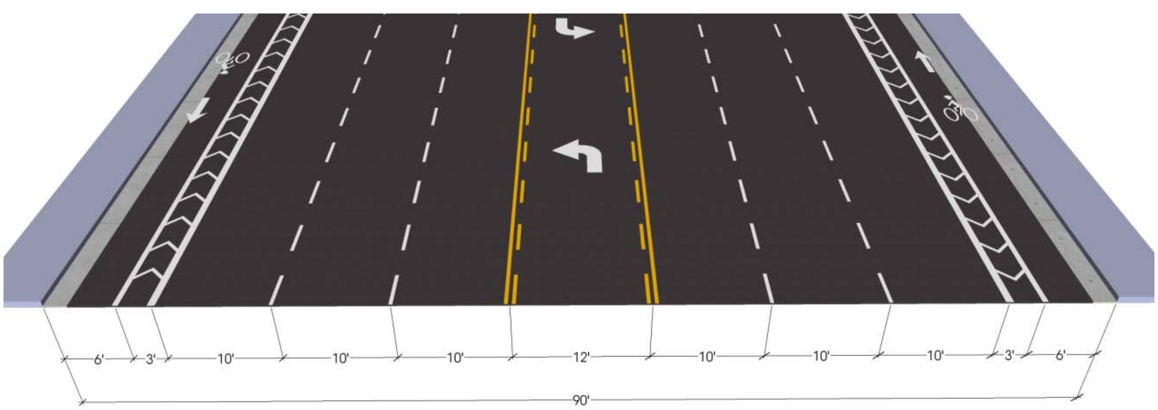
- Cross section 90-2 includes a southbound right turn lane at Marine Avenue, but uses minimum dimensions for all travel lanes and bike lanes. The right turn lane ends up being partially in the gutter.

Figure 39 Cross section 90-2 – Immediately north of Marine Ave., with dedicated right turn lane



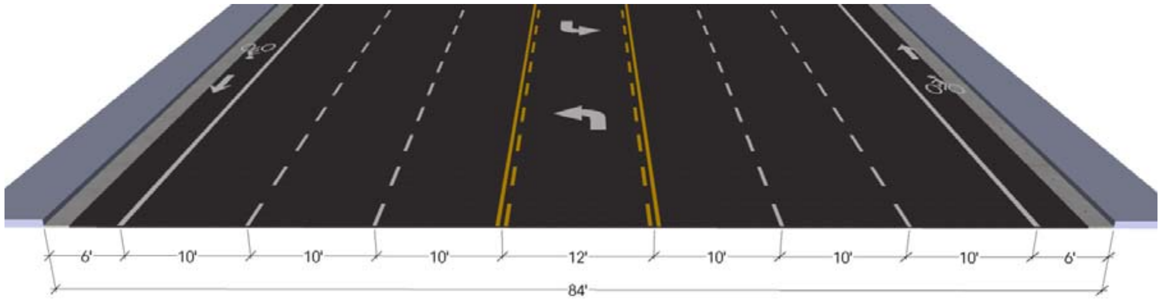

- Cross section 90-1 eliminates the dedicated right turn lane and provides buffered bike lanes. At Marine Avenue the buffered bike lane would become a de-facto right turn lane, with a 200 feet of dotted bike lane line to encourage motorists to merge into the bike lane before turning. This cross section is preferred but a traffic analysis should be conducted to see what the effect will be of converting the dedicated right turn lane into a de-facto right turn lane.

Figure 40 Cross section 90-2 – Immediately north of Marine Avenue, with buffered bike lanes



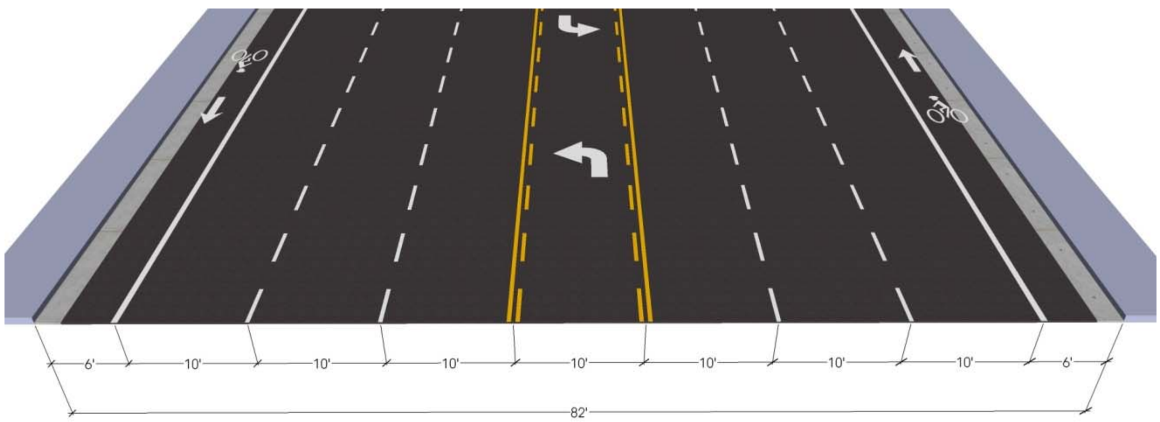
For the 84-foot wide portion Cross section 64-1 is recommended.

Figure 41 Cross section 84-1



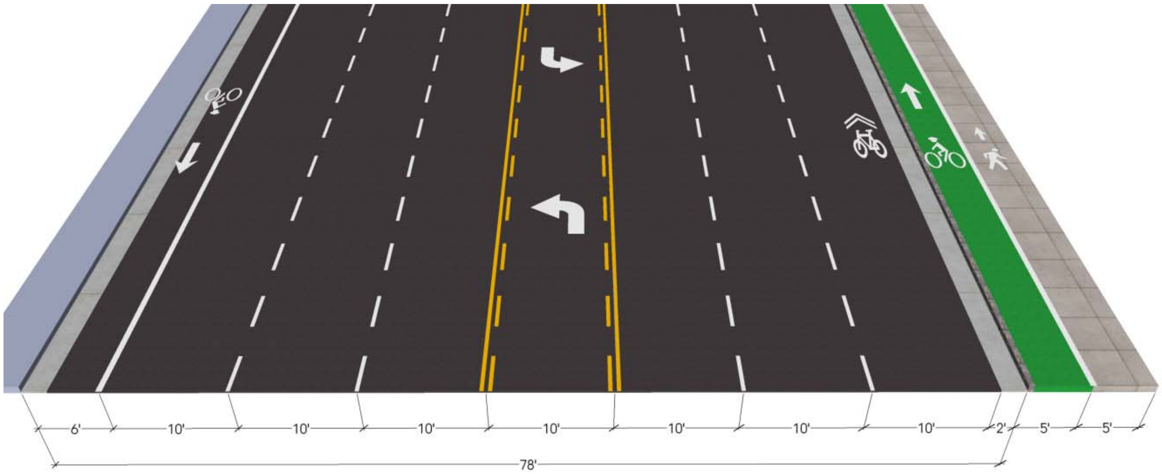

Approximately 750 feet of roadway in this section is 78 feet wide, which is too narrow to add bike lanes without removing travel lanes. At a minimum, this would need to be widened to 80 feet to achieve 10 foot wide travel lanes and 5 foot wide bike lanes. However, the recommended width is at least 82 feet to provide more width at the outside edge of the roadway to improve interactions between bicyclists and large vehicles in the outside through lanes as shown in Cross section 82-2.

Figure 42 Cross section 82-2 – Widening of 78 Feet to 82 Feet




Another possibility in this area is to leave the existing roadway as is, but to provide a one-way cycle track on the east side for northbound bicyclists, as shown in Cross section 78-1. The recommendation includes shared lane markings in the rightmost northbound travel lane. As an alternative requiring no physical reconstruction with significantly less cost but a less desirable bicycle facility, signs could be placed to that allow bicyclists to choose to use the existing sidewalk along with shared lane markings in the travel lane.

Figure 43 Cross section 78-1 – One-Way Cycle Track for Northbound Cyclists




## 33rd Avenue to Rosecrans Avenue

The roadway width in this segment is primarily 101 feet, but varies from 92 feet at the narrowest point (at the driveway between Western FCU and Springhill Suites) to 111 feet (at Rosecrans Avenue). Bike lanes are achievable through this segment by restriping the existing width to remove the fourth southbound lane that becomes a right turn lane at 33rd Avenue. This lane would merge into the other lanes south of Rosecrans Avenue, and a separate right turn lane would develop at 33rd Avenue, where there the road widens to accommodate a right turn lane. This design eliminates the need to have the bike lane transition from the right side of the right-most through lane to the left side of this same lane as it becomes a right turn lane. It also allows for buffered bike lanes through this segment. It will result in a slight reduction in capacity, which will likely only be an issue during the morning peak hours as employees arrive at Northrop Grumman.

Figure 44 Cross section 101-4 – Immediately north of 33rd Avenue

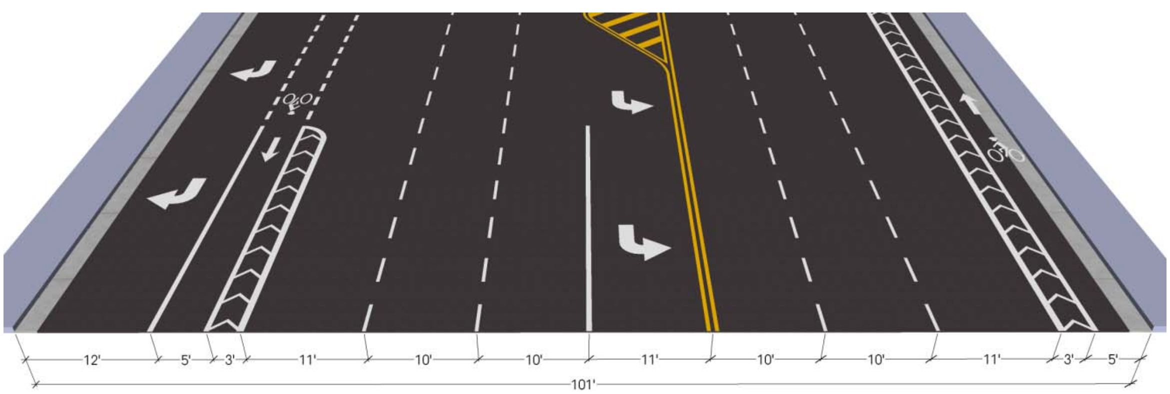


Figure 45 Cross section 92-1a – Driveway between Springhill Suites & Western Fed. Credit Union

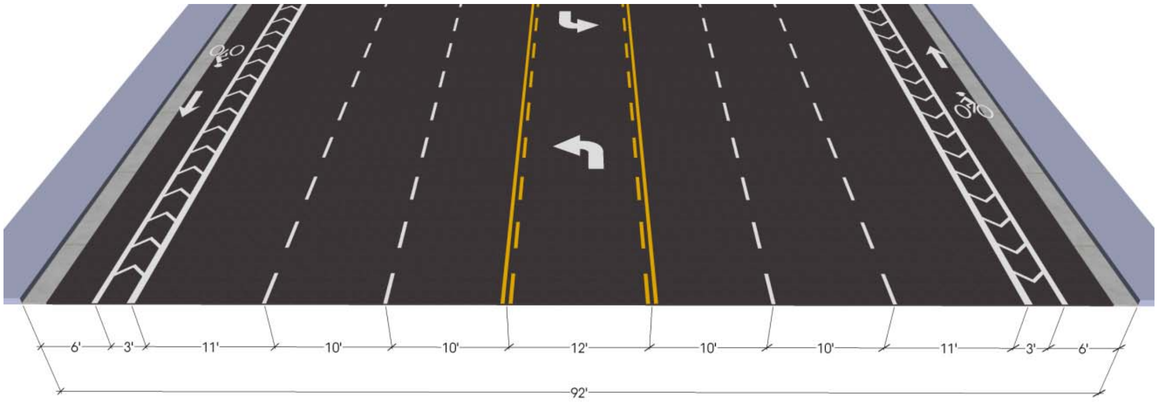



Figure 46 Cross section 101-3 – At Skyone Federal Credit Union

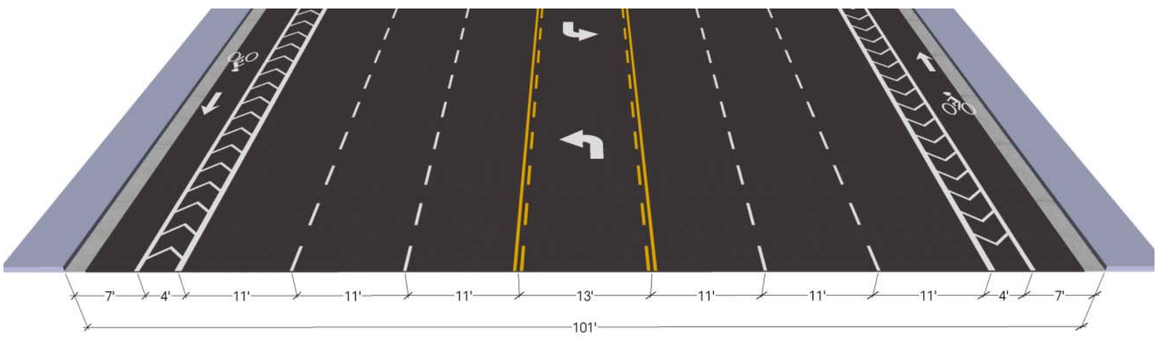
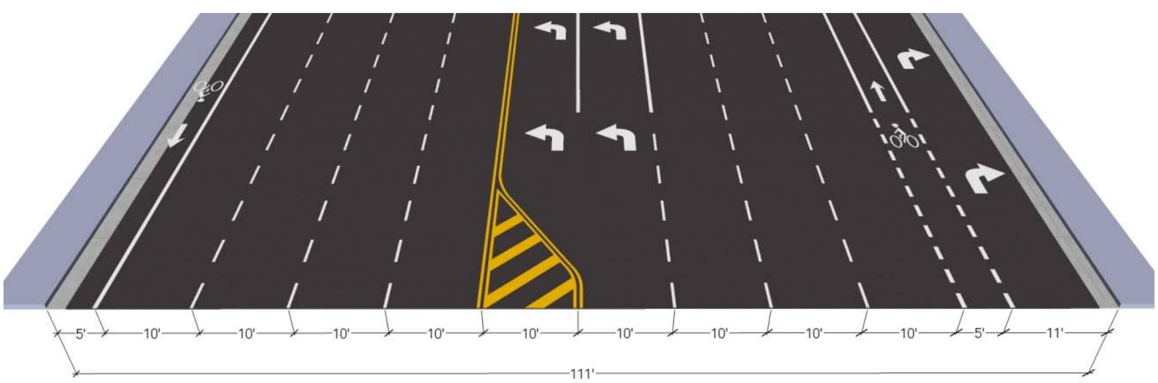


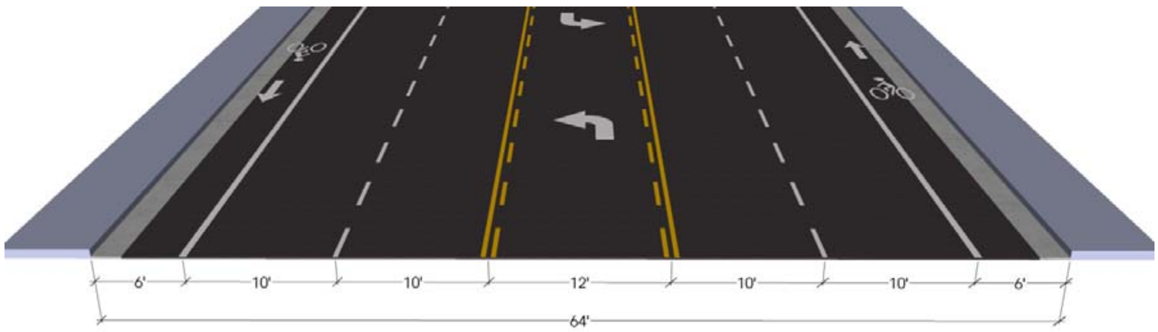

Figure 47 Section 111-1 – Immediately south of Rosecrans Avenue



## MARINE AVENUE – AVIATION BOULEVARD TO REDONDO BEACH AVENUE

Marine Avenue has a consistent cross section of 64 feet, which can be restriped to provide bike lanes by using cross section 64-1.

Figure 48 Cross section 64-1 – Marine Avenue from Aviation to Redondo Beach Avenue



# TRAFFIC SIGNAL IMPROVEMENTS TO ACCOMMODATE BICYCLISTS

Several changes are recommended in order to better accommodate bicyclists at the existing signalized intersections. The biggest necessary change is in detecting traffic at intersections, including both motor vehicles and bicycles. The following general loop detector changes will need to be made:

- All loop detectors in bicycle lanes and quadrupole loops
- Presence loop detectors should be placed in bike lanes at the limit line for any through movements on Aviation Boulevard and Marine Avenue. The most sensitive spot on this loop detector should be marked with the Bicycle Detector Pavement Marking.
- Where there is a right turn only lane with loop detectors, the loop detector closest to the limit line should be replaced with a quadrupole loop that will adequately detect bicyclists using this lane. The most sensitive spot on this loop detector should be marked with the Bicycle Detector Pavement Marking.
- Where there is no right turn only lane on an approach, the loop detector closest to the limit line in the rightmost through lane should be replaced with a quadrupole loop that will adequately detect bicyclists using this lane. This is due to the fact that some cyclists choose to merge out of the bike lane at intersections in order to place themselves where they can reduce the potential for right-hook type crashes with motor vehicles. The most sensitive spot on this loop detector should be marked with the Bicycle Detector Pavement Marking.
- The loop detector closest to the limit line in the rightmost left turn lane should be replaced with a quadrupole loop that will adequately detect bicyclists using the left turn lane. The most sensitive spot on this loop detector should be marked with the Bicycle Detector Pavement Marking.
- Where there are advance loop detectors placed for motor vehicles, advance loop detectors should be placed in bike lanes, approximately 50 to 100 feet back from the intersection. When a cyclists rides over this loop, signal timing should be adjusted for bicyclists approaching a green signal, to allow cyclists traveling at an approximate speed of 10 mph to enter the intersection before the signal turns from green to yellow, and to clear the intersection before the end of the all red interval.
- Loop detectors for motor vehicles will likely need to be replaced wherever travel lanes are shifted by more than approximately 2 feet as needed to install bike lanes at the intersections.

Signal timing adjustments are recommended for through movements on Aviation Boulevard and Marine Avenue, as well left turn movements from or to these streets. The sum of the minimum green interval plus the yellow interval, plus the red clearance interval should be sufficient to allow a cyclist to clear all conflicting lanes at a speed of 10 mph, per the recommendations in paragraph 14 of Section 4D.105 of the California Manual on Uniform Traffic Control Devices.

# 4 ENVIRONMENTAL ANALYSIS

The California Environmental Quality Act (CEQA) requires analysis of potential environmental impacts for projects requiring discretionary approval by public agencies. Therefore, the improvements identified in this Feasibility Study could be subject to CEQA, if discretionary approval is required prior to construction.

Based on the findings of the Feasibility Study described in this document:

- Bicycle lanes can be accommodated on most segments of Aviation Boulevard without altering motor vehicle travel lanes or on-street parking.
- However, some segments of Aviation Boulevard will require alterations to existing travel lanes or parking in order to accommodate on-street parking.

Therefore, the proposed “Project” for environmental review purposes would consist of the following elements:

- Installation of Class II bicycle lanes on a three-mile segment of Aviation Boulevard between Rosecrans Avenue and Pacific Coast Highway.
- Alterations to motor vehicle travel lanes in order to accommodate bicycle lanes on some segments of Aviation Boulevard, including:
  - Changes to motor vehicle travel lane configurations at up to eight signalized intersections.
- Removal of 38 to 54 on-street parking spaces on approximately 0.4 miles of Aviation Boulevard
  - Remaining on-street parking supply would consist of approximately 72 to 88 on-street parking spaces on Aviation Boulevard.

## CEQA EXEMPTIONS

The California Environmental Quality Act (CEQA) requires analysis of potential environmental impacts for projects requiring discretionary approval by public agencies, except for specific types of projects that are exempt from CEQA by statute or category.

Categorical exemptions are described in CEQA Section 15300 for categories of projects that are unlikely to result in significant effects on the environment. Relevant examples of categorical exceptions include:

- CEQA Section 15301. Existing Facilities (Class 1 Categorical Exemption): 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 key consideration is whether the project involves negligible or no expansion of an existing use. alterations to existing facilities (Class 1 categorical exemption), including:

   - CEQA Section 15301 (c). Existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities (this includes road grading for the purpose of public safety).
- CEQA Section 15304. Minor alterations to land (Class 4 categorical exemption): 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., including:
   - CEQA Section 15304 (h). The creation of bicycle lanes on existing rights-of-way.
- CEQA Section 15300.2. Exceptions to Categorical Exemptions:
   - (c) Significant Effect. A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.
- In determining whether or not a project is exempt from CEQA, the lead agency must determine whether a project may have a significant effect on the environment.
   - A significant effect is not just any effect, but rather a "substantial, or potentially substantial, adverse change in the environment" (California Public Resources Code Section 21068). Beneficial effects are not considered significant.
   - If it can be seen with certainty that there will be no significant effect on the environment, then the exemption will apply.
   - However, if there is substantial evidence in light of the whole record that a project may have a significant effect on the environment, the lead agency must prepare an environmental impact report (California Public Resources Code, Section 21080 (d)).

## CEQA FINDINGS & RECOMMENDATIONS

Based on the information described above:

- Although CEQA provides an exemption for "installation of bicycle lanes on existing rights-of-way", the exception does not apply if adverse traffic impacts results (such as where alterations to motor travel lanes or on-street parking would be necessary to accommodate bicycle lanes).
- Preparation of a Traffic Impact Analysis is recommended to determine if significant traffic impacts could result from proposed motor vehicle travel-lane modifications at approximately eight intersections.
- Removal of on-street parking spaces is not considered a significant effect based on CEQA precedent, except to the extent that secondary effects on traffic circulation could occur. In this case: the potential removal of between 38 and 54 on-street parking spaces is unlikely to result in adverse traffic effects, given current parking occupancy. Nonetheless, a peak season comprehensive parking supply and occupancy study of both on- and off-street parking facilities within the corridor during the week and on the weekend is recommended to verify the preliminary findings described in this report.

*Estimated Cost of Traffic Study: $20,000*

*Estimated Cost of Parking Study: $15,000*

# 5 COST ESTIMATE

The following preliminary cost estimate was developed based primarily on the median prices observed in recent bids received by the beach cities, and where the costs of specific features were not available, unit costs were taken from other sources in the greater Los Angeles area.

Figure 49 Preliminary Cost Estimate for Aviation Boulevard Bicycle Facility

| Item Description | Quantity | Units | Unit Price | Cost |
|---|---|---|---|---|
| Bike symbols | 74 | Each | $130.00 | $9,620 |
| Bicycle Detector Markings | 47 | Each | $70.00 | $3,290 |
| Loop detectors | 122 | Each | $450.00 | $54,900 |
| Bike Loop Detectors | 44 | Each | $600.00 | $26,400 |
| Concrete median | 1,000 | Square Foot | $4.25 | $4,250 |
| Concrete curb & gutter | 280 | Linear Foot | $36.50 | $10,220 |
| Pavement widening | 750 | Linear Foot | $50.00 | $37,500 |
| Sandblasting | 68,120 | Linear Foot | $1.50 | $102,180 |
| Stripe - 4" | 79,163 | Linear Foot | $0.88 | $69,664 |
| Stripe - 6" | 25,345 | Linear Foot | $1.32 | $33,455 |
| Stripe - 8" | 746 | Linear Foot | $1.76 | $1,313 |
| Drainage grates | 1 | Each | $300.00 | $300 |
| Adjust manholes | 10 | Each | $350.00 | $3,500 |
| Move utilities | 1 | Lump Sum | $26,000.00 | $26,000 |
| Signs | 26 | Each | $275.00 | $7,150 |
| Replace Vault Cover | 1 | Each | $1,000.00 | $1,000 |
| ***Subtotal*** | | | | ***$353,242*** |
| Contingency (25%) | | | | $88,310 |
| Engineering (30%) | | | | $105,973 |
| Temporary Traffic Control (10%) | | | | $35,324 |
| **Total** | | | | **$582,849** |

Most line items in the cost estimate occur throughout the corridor. For each of the segments discussed in this report, the cost of removing existing markings and adding the recommended new markings was analyzed. For both removal and painting, the most important factors are the number of stripes and the length of painted sections. In addition, details such as adding bicycle lane symbols, bicycle signs, adjusting loop detectors at intersections, and adjusting or moving utilities were included.

A limited number of features occur only in a few places along the corridor. Existing medians have mostly been accommodated, except the two between Ernest Avenue and Bataan Road and the divider between Warfield Avenue and Manhattan Beach Boulevard that need to be relocated in order for bicycle lanes to be accommodated. In addition, a limited number of utilities would need to be relocated or modified, as discussed in the Utility Conflicts section.

The two greatest estimated expenses are sandblasting to remove existing markings, and placement of the new markings, both costing approximately $100,000. The other major expense is replacing loop detectors, costing about $80,000.