PEDESTRIAN CROSSING STUDY OF BALBOA PENINSULA

in the

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PREPARED BY

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EXECUTIVE SUMMARY

The City of Newport Beach has retained a transportation safety consultant to conduct a comprehensive and independent review of thirty-eight uncontrolled crosswalks along the Balboa Peninsula. The findings of the study effort suggest that despite the relatively high activity levels of both residents and visitors, all those motorists, bicyclists, and pedestrians in the constrained Peninsula environment generally interact in a safe and efficient manner. This contention is supported by the relatively few reported collisions that have occurred over the past five years considering the high vehicular volumes and large number of pedestrians and bicyclists. In general, the consultant found that the existing signing and striping for the crosswalks are visible and in good condition. A review of project records revealed that the City has completed many infrastructure and safety improvements on the Peninsula over the last ten years including enhanced signing and striping, boardwalk improvements, new LED street lighting, and the widening of Newport Boulevard to provide new bike lanes, raised medians, and a pedestrian signal at Newport Boulevard and 23rd Street. The City has also been responsive to community requests by conducting safety investigations and regularly reviewing traffic controls and crosswalk conditions, particularly around Newport Elementary School. This Pedestrian Crossing Study continues to build on the City's public safety efforts by comprehensively reviewing traffic conditions on the Balboa Peninsula and outlining recommendations designed to further enhance bicycle and pedestrian safety.

INTRODUCTION

The City of Newport Beach retained Albert Grover & Associates (AGA) to provide professional traffic engineering services for the Balboa Peninsula Pedestrian Crossing Study project. AGA was retained specifically to assist the City in analyzing the various controlled (signalized and all-way stop locations) and uncontrolled crosswalk locations on the Balboa Peninsula and to recommend a comprehensive approach to improve pedestrian safety and walkability. The City's goals for this project were to determine if existing pedestrian crossings were adequate and to determine if modifications to crossings and traffic controls were needed to enhance pedestrian safety while minimizing impacts to adjacent residents and businesses, bicyclists, and traffic flow. At the same time, the City is keenly aware of the scenic nature of Balboa, the significant number of visitors and tourists drawn to the area, the numerous public facilities and recreation areas, miles of public beaches, high density housing, and high demand parking. These important environmental and social factors were taken into consideration when developing crosswalk and traffic control modifications where right-of-way and parking is at a premium. This study focused on implementing common sense traffic control measure, coupled with pedestrian's duty of care, to improve safety and efficiency by balancing typical traffic control "guidelines" found in books and standards with the constrained street environment found in beachfront communities. The general study area is illustrated on Figure 1 – Vicinity Map on the following page.

PROJECT SETTING

The City of Newport Beach is a seaside City with a total area of 53 square miles consisting of 23.8 square miles of land and 29.2 square miles of water. The City is comprised of a number of communities including Newport Harbor, Corona del Mar, Balboa Island, Balboa Peninsula, Lido Peninsula, Newport Coast, San Joaquin Hills, Santa Ana Heights, and West Newport. The City is bordered on the west by Huntington Beach and the Santa Ana River; on the north by Costa Mesa, John Wayne Airport, Irvine, and University of California Irvine; and on the east by Crystal Cove State Park. According to the U.S. Census Bureau, the permanent

population of the City was 85,287 during the 2010 census and is currently estimated at 87,500. Those population numbers dramatically increase during the summer months with an influx of part time residents, visitors, and tourists to this very popular beach community.

Of all the communities that are a part of the City, Balboa Peninsula (commonly called Balboa) is arguably the most popular tourist destination. It is comprised of high density housing, retail businesses, numerous restaurants, and has direct access to miles of public beach and the harbor. The area experiences large seasonal fluctuations of visitors which create a high demand on the roadway facilities, parking, and pedestrian/bicycle facilities. As a peninsula, Balboa is surrounded by water on three sides with only limited roadway access via Newport Boulevard and Balboa Boulevard. Both boulevards are often congested with vehicles, bicyclists, and pedestrians during the summer months and on weekends and holidays throughout the year.

The Balboa Peninsula is a popular place for both residents and visitors with the primary attractions being concentrated around the Newport Pier and the Balboa Pier. The Newport Pier area (approximately 19th Street to 26th Street) provides access to the beach, a variety of shops, restaurants, and has several large parking areas. The Balboa Pier (approximately located between Adams Street and Main Street) area is popular for beach access, retail shops, restaurants, a children's activity area, and water sport rentals. This area is also home to a number of public boating activities including deep sea fishing, whale watching, and passenger ferries to Catalina Island or to cross the harbor to Balboa Island.

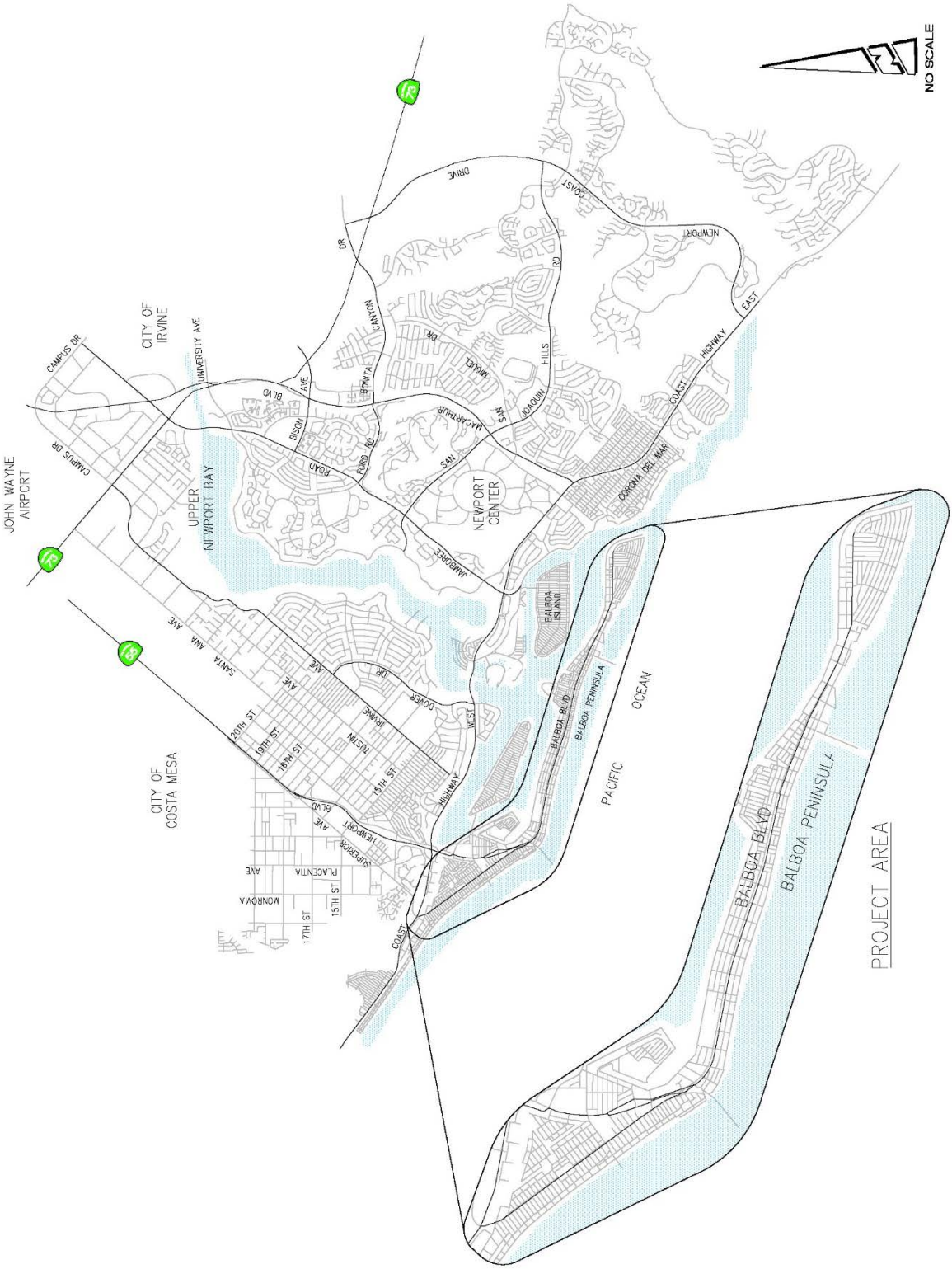


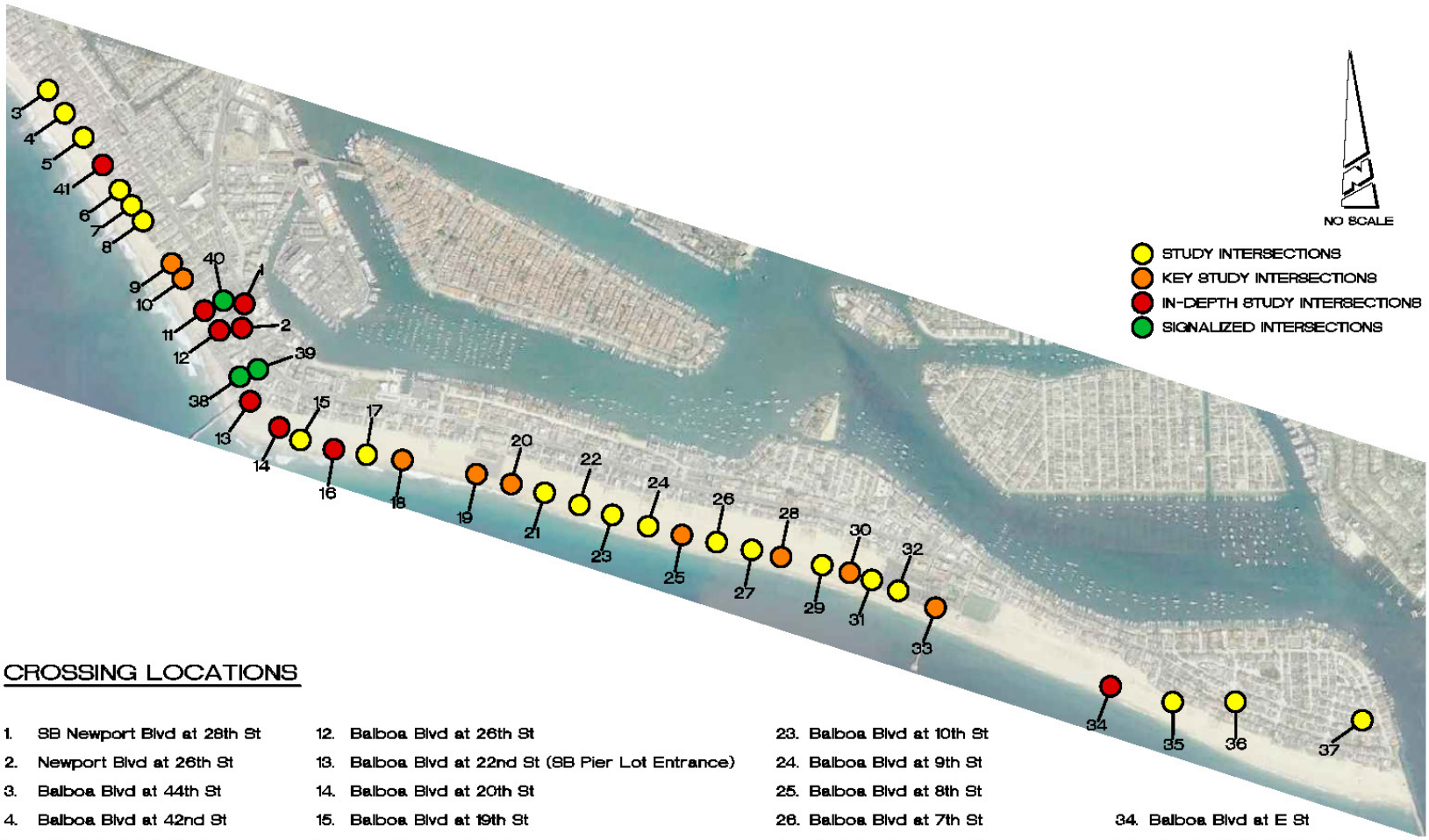
Figure 1: Vicinity Map

PROJECT STUDY AREA

The project study area is essentially comprised of both Newport Boulevard and Balboa Boulevard as they traverse the Balboa Peninsula. The study area is depicted in Figure 2 – Study Area on the following page. Vehicle circulation in the study area is controlled by traffic signals, stop signs, and pairings of one-way streets. Parking on the Balboa Peninsula is provided by a combination of on-street parking (both free and metered depending on the location) and paid parking lots operated by both public and private entities. Considering the high parking demand and close proximity of housing and businesses to the beach areas, the Balboa Peninsula also experiences high pedestrian activities, especially during weekends, holidays and summer months. To accommodate this brisk pedestrian activity, there are a total of forty-nine marked crosswalks on the entire peninsula at a combination of controlled and uncontrolled intersections between the two streets of Newport Boulevard and Balboa Boulevard.

PROJECT STUDY FOCUS

Within the project study area there are forty-one intersections containing both controlled and uncontrolled crosswalks. All forty-one intersections along with their accompanying traffic controls are identified in Table 1 – Crosswalk Type and Location. The study effort focused on reviewing traffic controls, pedestrian and bicycle activity, and collision records for the thirty-eight unsignalized intersections with crosswalks across Balboa Boulevard or Newport Boulevard within the study area. During the summer months, engineering field observations and pedestrian crossing data was gathered for the thirty-eight study intersections. In consultation with City staff it was decided to select eighteen, or approximately half of the total study intersections, for further study through the gathering of follow-up pedestrian and bicycle crossing data in the winter. Those eighteen key study intersections were generally selected based on a number of factors including location, surrounding land use, collision history and activity levels. Of the eighteen key intersections half were chosen, generally based on high activity levels, to document motorist right-of-way violations of pedestrian crossings.



CROSSING LOCATIONS

1. SB Newport Blvd at 28th St
2. Newport Blvd at 26th St
3. Balboa Blvd at 44th St
4. Balboa Blvd at 42nd St
5. Balboa Blvd at 40th St
6. Balboa Blvd at 36th St
7. Balboa Blvd at 35th St
8. Balboa Blvd at 34th St
9. Balboa Blvd at 31st St
10. Balboa Blvd at 30th St
11. Balboa Blvd at 28th St
12. Balboa Blvd at 26th St
13. Balboa Blvd at 22nd St (SB Pier Lot Entrance)
14. Balboa Blvd at 20th St
15. Balboa Blvd at 19th St
16. Balboa Blvd at 18th St
17. Balboa Blvd at 17th St
18. Balboa Blvd at 16th St
19. Balboa Blvd at 14th St (School Xing)
20. Balboa Blvd at 13th St (School Xing)
21. Balboa Blvd at 12th St
22. Balboa Blvd at 11th St
23. Balboa Blvd at 10th St
24. Balboa Blvd at 9th St
25. Balboa Blvd at 8th St
26. Balboa Blvd at 7th St
27. Balboa Blvd at 6th St
28. Balboa Blvd at Island Ave
29. Balboa Blvd at Medina Wy
30. Balboa Blvd at Coronado St
31. Balboa Blvd at N/O Cypress St
32. Balboa Blvd at Adams St
33. Balboa Blvd at Washington St
34. Balboa Blvd at E St
35. Balboa Blvd at G St/Miramar Dr
36. Balboa Blvd at I St
37. Balboa Blvd at N/O Serrano Ave
38. Balboa Blvd at 23rd St
39. Newport Blvd at 23rd St
40. NB Newport Blvd at 28th St
41. Balboa Blvd at 38th St

Figure 2: Study Area

Table 1
Crosswalk Type and Location

Location Number	Street	Cross Street	Type of Crosswalk	Legs	Type of Control	Type of Intersection	Cross Street Direction	Notes
1	SB Newport Boulevard	28th Street	marked	N, E	2-way STOP EB/WB	cross	2-way	
2	Newport Boulevard	26th Street	marked	N, W	2-way STOP EB/WB	cross	2-way	
3	Balboa Boulevard	44th Street	marked	S	1-way STOP EB	cross	1-way EB	
4	Balboa Boulevard	42nd Street	marked	S	1-way STOP EB	cross	1-way EB	
5	Balboa Boulevard	40th Street	marked	S	1-way STOP EB	cross	1-way EB	
6	Balboa Boulevard	36th Street	marked	N	1-way STOP WB	cross	1-way WB	38th St. Park
7	Balboa Boulevard	35th Street	marked	S	1-way STOP EB	cross	1-way EB	
8	Balboa Boulevard	34th Street	marked	N	1-way STOP WB	cross	1-way WB	
9	Balboa Boulevard	31st Street	marked	S	1-way STOP EB	T	2-way	
10	Balboa Boulevard	30th Street	marked	S, E	2-way STOP EB/WB	cross	2-way	
11	Balboa Boulevard	28th Street	marked	N	2-way STOP EB/WB	cross	2-way	
12	Balboa Boulevard	26th Street	marked	S	2-way STOP EB/WB	cross	2-way	
13	Balboa Boulevard	22nd Street	marked	S, W		T	1-way WB	Pier lot entrance
14	Balboa Boulevard	20th Street	marked	S	2-way STOP EB/WB	cross	2-way	
15	Balboa Boulevard	19th Street	marked	N	1-way STOP WB	cross	1-way WB	
16	Balboa Boulevard	18th Street	marked	N, E	2-way STOP EB/WB	cross	2-way	Marina Park
17	Balboa Boulevard	17th Street	marked	N	1-way STOP EB	T	2-way	Marina Park
18	Balboa Boulevard	16th Street	marked	N, S, E	2-way STOP EB/WB	cross	2-way	Marina Park entrance
19	Balboa Boulevard	14th Street	marked	S	2-way STOP EB/WB	cross	1 way e/o Balboa 2-way w/o Balboa	school crossing yellow beacon
20	Balboa Boulevard	13th Street	marked	S	1-way STOP EB	cross	1-way e/o Balboa 2-way w/o Balboa	school crossing
21	Balboa Boulevard	12th Street	marked	S	2-way STOP EB/WB	cross	1-way e/o Balboa 2-way w/o Balboa	
22	Balboa Boulevard	11th Street	marked	S	1-way STOP EB	cross	1-way e/o Balboa 2-way w/o Balboa	
23	Balboa Boulevard	10th Street	marked	S	2-way STOP EB/WB	cross	1-way e/o Balboa 2-way w/o Balboa	
24	Balboa Boulevard	9th Street	marked	S	1-way STOP EB	cross	1-way e/o Balboa 2-way w/o Balboa	
25	Balboa Boulevard	8th Street	marked	S	2-way STOP EB/WB	cross	2-way	near Yacht Club

Table 1
Crosswalk Type and Location
(continued)

26	Balboa Boulevard	7th Street	marked	S	1-way STOP EB	cross	1-way e/o Balboa 2-way w/o Balboa	
27	Balboa Boulevard	6th Street	marked	S	2-way STOP EB/WB	cross	1 way e/o Balboa 2-way w/o Balboa	
28	Balboa Boulevard	Island Avenue	marked	s/o east leg	2-way STOP EB/WB	offset	2-way	library, fire station
29	Balboa Boulevard	Medina Way	marked	S	2-way STOP EB/WB	cross	1-way e/o Balboa 2-way w/o Balboa	
30	Balboa Boulevard	Coronado Street	marked	S	1-way STOP EB	cross	1-way e/o Balboa 2-way w/o Balboa	
31	Balboa Boulevard	alley w/o Cypress	marked	S	none	cross	2-way	
32	Balboa Boulevard	Adams Street	marked	S	none	cross	1-way east side 1-way WB	
33	Balboa Boulevard	Washington Street	marked	N, S, E, W	1-way STOP EB	cross	1-way EB	
34	Balboa Boulevard	E Street	marked	N	2-way STOP EB/WB	cross	2-way	End of ocean front bike trail
35	Balboa Boulevard	G Street-Miramar Drive, Ocean	marked	n/o G St-Miramar	2-way STOP EB Ocean/WB G St	offset	2-way G St, Ocean 1-way Miramar Dr	
36	Balboa Boulevard	I Street	marked	S	2-way STOP EB/WB	offset	2-way	
37	Balboa Boulevard	n/o Serrano Avenue	marked			ped xing		beach pier entrance
38	Balboa Boulevard	23rd Street	marked	S, E, W	signal	T	1-way	WB uncontrolled
39	Newport Boulevard	23rd Street	marked	N	signal	ped xing		
40	NB Newport Boulevard	28th Street	marked	N, S, E, W	signal	cross	2-way	
41	Balboa Boulevard	38th Street	marked	S	4-way STOP	cross	2-way e/o Balboa 1-way w/o Balboa	red beacon NB/SB 38th St. Park

OBJECTIVES AND SCOPE

Pedestrian studies can vary based on a variety of factors including location, roadway configuration, traffic controls, traffic patterns, pedestrian and bicycle activity, surrounding land use, and seasonal variations in visitors and tourism. Furthermore, each crossing point is unique; therefore, detailed field reviews of each location and traffic operations at various times of the day is necessary. One cannot approach a comprehensive pedestrian safety review on the Balboa Peninsula as merely a routine engineering task of gathering data, completing standardized forms, and comparing the location to engineering standards. In order to review locations in a cost effective, efficient, and context sensitive manner, it takes a unique hands-on approach by recognized experts that are not only technically proficient, but well versed in constrained beachfront community traffic control and human behavior.

This project has unique challenges that require the intelligent application of traffic control strategies and measures to enhance walkability without negatively impacting access, traffic flow, parking and aesthetics. The Balboa Peninsula poses unique traffic management challenges related to its almost four mile length, limited right-of-way, population density, watercraft facilities, businesses, schools, parks, beaches, and its many tourist attractions. In consideration of its regional role as a destination for so many residents, visitors, and tourists it is important to consider all roadway users, residents, businesses, and visitors when reviewing and proposing potential traffic control changes and enhancements at crosswalks and other crossing locations.

The scope of work for the project was essentially divided into three major elements of work or tasks which are outlined below.

Task 1: Data Collection

The first element of work was to conduct summertime detailed field reviews and to collect relevant data on pedestrian crossings. The field review consisted of evaluating traffic controls at crosswalks consisting of, but not limited to, striping, marking, signing, lighting, visibility and compliance with current traffic engineering standards. Engineers reviewing traffic controls and traffic operations carefully considered the needs of all roadway users, residents, businesses, and visitors. To aid in the gathering of pedestrian data, temporary video cameras were installed at intersections to record pedestrian crossing activity.

Task 2: Collision Analysis

The second element of work included a 5-year review of the collision history analysis to determine collision frequency and patterns of collisions that could be correctable through improved traffic controls or other operational strategies.

Task 3: Engineering Evaluations

The third element of work was to conduct in-depth crosswalk evaluations at key intersections to determine if traffic control changes could be made at those locations to enhance pedestrian and bicycle safety. Engineers considered a comprehensive “traffic control toolbox” of ideas and strategies for potential improvements that included, but were not limited to, bulb-outs, flashing beacons, in-pavement lighted crosswalks, improved lighting, international style crosswalk markings, high visibility signage, stop signs, traffic signals, and parking removal to improve sight distance. Ultimately, the findings and recommendations from the study effort have been combined with the data collected and analysis conducted into this study report.

METHODOLOGY

In order to provide a complete picture of crossing activity on the Balboa Peninsula, intersections with controlled and uncontrolled crossings were reviewed during the summer season to reflect peak pedestrian and bicycle activity. However, since we also wanted to compare seasonal variations in pedestrian and bicycle activity, it was determined that counting pedestrian and bicyclist activity on the same mid-week day in both the summer and winter, when school is in session, would provide the most appropriate comparison.

Summer season pedestrian and bicycle crossing counts were collected on Thursday, August 11, 2016, using temporary video cameras installed at each of the thirty-eight study intersections. The gathering of video documentation provides AGA engineers with a superior understanding of pedestrian and motorist behavior more than can be ascertained from numerical data alone. The video allows engineers to witness motorist behavior and safety concerns expressed by the community directly rather than relying on eye witness accounts during limited time periods. The video also permits the quantitative analysis of the number of crossings over time by location.

An understanding of the potential factors contributing to pedestrian traffic collisions at crossings helps to understand the nature of the collisions. This study reviewed approximately five years (January 1, 2012 – November 29, 2016) of collision history. A comprehensive review of traffic collision reports involving pedestrians and bicyclists was completed.

Based on the data gathered from the initial counts, a review of the accident history, and consultation with City staff, eighteen key intersections representing the most utilized locations with higher collision history crossings were selected for further study. A second set of video data was then collected at those eighteen key intersections during the winter season while schools were in session. This second round of video data was collected on Thursday, January 26, 2017.

A series of field reviews by AGA engineers were completed during the summer and fall seasons, on weekdays and weekends, and various times of day in order to get a “feel” for the environment and street activity levels. A nighttime review of the existing street and safety lighting was also conducted. After our initial nighttime street light review (Summer 2016), the City upgraded all luminaires from high pressure sodium (HPS) to light emitting diodes (LED) fixtures. This lighting upgrade dramatically improved visibility of the roadway and the crosswalk areas for motorists, bicyclists, and pedestrians.

Traffic control inventories were conducted for each of the thirty-eight intersections to document the crossings, signage, markings, and red zones. Special attention was afforded to the Newport Elementary School area and school crosswalks during the non-summer period, since this is when school is in session.

A literature review was also completed, which was comprised of the City’s 1989 Traffic Analysis Report prepared by Austin-Foust Associates, NCHRP Report 562 “Improving Pedestrian Safety at Unsignalized Crossings”, ITE’s “Unsignalized Intersection Improvement Guide (UIIG), the 2015 County of Los Angeles Department of Public Works Marked Crosswalk Evaluation, and other related publications.

ANALYSIS

Field Review

In August of 2016, an engineering field review was conducted at all thirty-eight study intersections with both controlled and uncontrolled crosswalks. That review included inventorying traffic controls and lighting, reviewing signing and striping, reviewing the location of crosswalks and their visibility, observing traffic and pedestrian activity, and determining substantial compliance with current traffic engineering standards per the 2014 California Manual of Traffic Control Devices. A review was conducted of characteristics that could be a factor in determining the most appropriate traffic controls based on traffic and physical characteristics at each location. Such characteristics included, but were not limited to, proximity to schools, presence of bus stops, location of residential and business driveways, on-street parking activities/restrictions, driver behavior and adequacy of travel and turning lanes, traffic congestion, pedestrian routes/patterns, ADA access, and the percentage and type of larger vehicles traversing the area.

The engineering field review revealed that the study intersections are generally closely spaced, pedestrian sidewalks are narrow, there are multiple alleys and private driveways, and on-street parking is in significant demand. In such an active and constrained street environment, traffic control options can be limited. In order to obtain reasonable and calmed motorist behavior, it is important that traffic controls are relevant, visible, and consistent. Some improvements can actually lead to motorists simply "tuning out" the traffic controls, or worse, being distracted by them and not focusing on pedestrians and bicyclists. In such cases, simple yet practical traffic controls can actually enhance traffic safety through the decluttering of the street environment so that pedestrians and bicyclists in the right-of-way can be clearly seen by approaching motorists and safe decisions can be made.

This study will focus on assessing the traffic flow, pedestrian and bicycle activity, physical environment, and collision data to "right-match" the recommended traffic controls at each intersection to provide a balanced approach to pedestrian and bicycle safety.

Data Collection – Summer

Bicycle and pedestrian data was collected at each of the thirty-eight study intersections to determine the total number of pedestrians and bicyclists utilizing the marked crosswalks. Data collection sheets are included in Appendix A. The data gathering effort was completed for a 24-hour period on Thursday, August 11, 2016 using temporarily installed video cameras. The secondary purpose of the video observations at each location was to be able to determine the number of drivers that "did not yield" to pedestrians or bicyclists legally within the crosswalk. In collaboration with City staff, the total hours of data to be post processed and tabulated per location was finalized. Based on the analysis of the video, field observations, and consultation with City staff a list of eighteen key intersections were determined for further in-depth follow-up study in the winter. The selection of those eighteen intersections was generally based on the volume of pedestrian and bicycle activity combined with field observations and collision history. As shown on the following page, Table 2 – Key Study Intersections lists the intersections that were chosen for further in-depth follow-up study.

Table 2
Key Study Intersections

- Southbound Newport Boulevard at 28th Street
- Newport Boulevard at 26th Street
- Balboa Boulevard at 31st Street
- Balboa Boulevard at 30th Street
- Balboa Boulevard at 28th Street
- Balboa Boulevard at 26th Street
- Balboa Boulevard at 22nd Street
- Balboa Boulevard at 20th Street
- Balboa Boulevard at 18th Street
- Balboa Boulevard at 16th Street
- Balboa Boulevard at 14th Street
- Balboa Boulevard at 13th Street
- Balboa Boulevard at 8th Street
- Balboa Boulevard at Island Avenue
- Balboa Boulevard at Coronado Street
- Balboa Boulevard at Washington Street
- Balboa Boulevard at E Street
- Balboa Boulevard at 38th Street

Data Collection – Winter

Bicycle and pedestrian data was collected at the eighteen key study intersections to determine the total number of pedestrians and bicyclists utilizing the marked crosswalks. Data collection sheets are included in Appendix B. The data gathering effort was completed for a 24-hour period on Thursday, January 26, 2017 using temporarily installed video cameras. The secondary purpose of the video observations at these locations was to be able to determine the number of drivers that "did not yield" to pedestrians or bicyclists legally within the crosswalk.

Summer & Winter Data Comparisons

Bicycle and pedestrian data collected at the eighteen key study intersections in both the summer and winter is summarized in Table 3 – Seasonal Comparison on page 11. The bicycle and pedestrian volumes are the sums of all bicycles and pedestrians observed on all legs of the intersection, regardless of whether a crosswalk was marked or not. This table shows that over three times more pedestrians and nearly three times more bikes utilized the location in the summer versus in the winter on the same day of the week and the same 16-hour time period.

Motorist Violations

A review of all reported right-of-way violations was conducted at nine locations in terms of vehicles that did not yield right-of-way to pedestrians to determine the frequency and patterns of potential pedestrian and bicycle involved crashes. The selection of those nine locations was generally based on the volume of pedestrian and bicycle activity combined with field observations and collision history. The number of drivers that "did not yield" to pedestrians or bicyclists legally within the crosswalk was collected for the summer and winter time periods. Table 4 – Summary of Motorist Right-of-Way Violations - Summer summarizes the summer results, and Table 5 – Summary of Motorist Right-of-Way Violations - Winter summarizes the winter results (see page 12). Violations by vehicles varied from intersection to intersection with the highest violations occurring at Balboa/28th (11.8%) during the summer and at Southbound Newport/28th (4.6%) during the winter. Although the violation percentages were found to be low for most of the observed intersections, violations during the summer observation period were found to be almost two times higher than during the winter observation period.

Table 3
Seasonal Comparison
Pedestrian and Bicycle Activity (7am-11pm)

Location Number	Intersection Name	Summer Volumes (August)		Winter Volumes (January)	
		Pedestrian	Bicycle	Pedestrian	Bicycle
1	SB Newport/28th	912	216	319	74
2	Newport/26th	2,083	431	602	124
9	Balboa/31st	1,621	702	574	140
10	Balboa/30th	1,867	510	707	126
11	Balboa/28th	2,134	376	653	87
12	Balboa/26th	2,146	388	507	81
13	Balboa/22nd	3,248	360	1,017	67
14	Balboa/20th	2,329	410	676	130
16	Balboa/18th	1,614	314	396	109
18	Balboa/16th	799	251	261	83
19	Balboa/14th	634	180	513	57
20	Balboa/13th	835	163	648	53
25	Balboa/8th	438	166	120	52
28	Balboa/Island	1,038	249	271	78
30	Balboa/Coronado	961	132	202	49
33	Balboa/Washington	4,370	481	1,191	108
34	Balboa/E St.	748	1,380	219	390
41	Balboa/38th	757	334	268	97
TOTAL:		28,534	7,043	9,144	1,905

*Pedestrian and Bicycle Volumes between 7am and 11pm

Table 4
Summary of Motorist Right-of-Way Violations - Summer

Location Number	Intersection Name	No. of Peds/Bikes Vehicles Did Not Yield For	Total Crossings*	Percentage of R.O.W. Violations/ Total Crossings
1	SB Newport/28th	120	1128	10.6%
2	Newport/26th	76	2514	3.0%
11	Balboa/28th	296	2510	11.8%
12	Balboa/26th	196	2534	7.7%
13	Balboa/22nd	6	3608	0.2%
14	Balboa/20th	140	2739	5.1%
16	Balboa/16th	17	1050	1.6%
34	Balboa/E St.	13	2128	0.6%
41	Balboa/38th	45	1091	4.1%

* Total of Pedestrians and Bicyclists

Table 5
Summary of Motorist Right-of-Way Violations - Winter

Location Number	Intersection Name	No. of Peds/Bikes Vehicles Did Not Yield For	Total Crossings*	Percentage of R.O.W. Violations/ Total Crossings
1	SB Newport/28th	18	393	4.6%
2	Newport/26th	24	726	3.3%
11	Balboa/28th	27	740	3.6%
12	Balboa/26th	25	588	4.3%
13	Balboa/22nd	0	1084	0.0%
14	Balboa/20th	22	806	2.7%
16	Balboa/16th	5	344	1.5%
34	Balboa/E St.	7	609	1.1%
41	Balboa/38th	5	365	1.4%

* Total of Pedestrians and Bicyclists

Collision History

A review of reported collisions from January 1, 2012 to November 29, 2016 (approximately 5 years) was conducted with a primary focus on pedestrian and bicycle collisions. Table 6 – Collision History provides a summary of collision history by type for the eighteen key study intersections.

Based on the number of collisions reported at the eighteen key intersections listed in Table 6, there were a total of 104 reported collisions. The most prevalent type of collision was a single vehicle collision with a parked car or fixed object on the side of the road. Also, out of the total number of collisions, 23 (21%) involved "Driving Under the Influence" (DUI). There were relatively few reported collisions involving vehicles striking pedestrians (7 total, 2 of which were DUI) or bicyclists (19 total, of which 3 were DUI and 6 the cyclist was at fault).

Table 6
Collision History – Jan 1, 2012 to Nov 29, 2016

Location Number	Intersection Name	Pedestrian Collision	Bicycle Collision	Total Bike / Ped Collisions	Total Vehicle Collisions
1	SB Newport/28th	1	2	3	16
2	Newport/26th	1	2	3	11
9	Balboa/31st	0	2	2	0
10	Balboa/30th	1	1	2	6
11	Balboa/28th	1	2	3	6
12	Balboa/26th	1	3	4	6
13	Balboa/22nd	0	0	0	0
14	Balboa/20th	1	0	1	8
16	Balboa/18th	0	0	0	1
18	Balboa/16th	0	2	2	4
19	Balboa/14th	0	0	0	0
20	Balboa/13th	0	0	0	2
25	Balboa/8th	0	0	0	1
28	Balboa/Island	0	1	1	5
30	Balboa/Coronado	1	0	1	0
33	Balboa/Washington	0	0	0	4
34	Balboa/E St.	0	2	2	1
41	Balboa/38th	0	2	2	7
TOTAL:		7	19	26	78

RECOMMENDATIONS

This section outlines a series of recommended traffic control upgrades for both uncontrolled and controlled intersections. These recommendations are based on multiple field observations both during the summer and winter months, review of video surveillance, pedestrian and bicycle activity, and a review of almost five years of collision reports. The 2014 California Manual on Uniform Traffic Control Devices was used as a guide in the development of the recommendations. The recommendations are divided into two categories; general recommendations pertaining to multiple intersections/locations and specific recommendations pertaining to particular intersections.

In consideration of the street environment within the study area, we do not recommend the widespread implementation of traffic controls such as flashing beacons or in-pavement flashing crosswalks. Such devices can significantly interrupt and stop traffic flow on the Peninsula, as the flashing lights are activated and re-activated by pedestrians and bicyclists crossing the street. This continual re-activation may not provide sufficient gaps for traffic to progress, thus creating bottlenecks and significant traffic congestion getting on to and off the peninsula. This is particularly damaging during summer months. In 2009, the City installed in-pavement flashing lights on Newport Boulevard at 23rd Street. Because of the high volume of pedestrians and the constant flashing, traffic flow was negatively impacted through the McFadden area and further down the peninsula. In 2011, the City removed the in-pavement flashing crosswalk at this location. To accommodate the high pedestrian activity at this unique location, it was replaced by a full pedestrian signal.

The following Pedestrian Improvements were studied in detail for consideration:

High-Visibility Crosswalk Striping

A re-striping of the existing crosswalks using continental type striping will increase the visibility of the crossing locations. Studies have shown that this type of marking increases motorist yielding and decreases the number of vehicle/pedestrian collisions (Figure 3 on page 15).

Pedestrian Caution Signs

Advance caution signage alerts the motorist to the upcoming crosswalk. When used with other pedestrian solutions, such as upgraded crosswalk striping, awareness of pedestrians is enhanced (Figure 4 on page 15).

Curb Extensions (Bulb-Outs)

Bulb-outs are protrusions of the sidewalk into the roadway. Bulb-outs narrow the physical distance of the roadway that pedestrians must cross. They allow for better visibility of pedestrians by motorists, and conversely, allow pedestrians to view oncoming traffic more clearly and without obstruction.

In-roadway Flashing Lights

These devices are intended to call extra attention to pedestrians in crosswalks where signage or other design treatments are deemed insufficient. The City has one intersection on Coast Highway with in-roadway flashing lights. Based on experience, they are not recommended on the Peninsula because of negative impacts to traffic flow, high cost of installation, and on-going maintenance issues.

Figure 3
Typical Recommended Intersection Upgrades

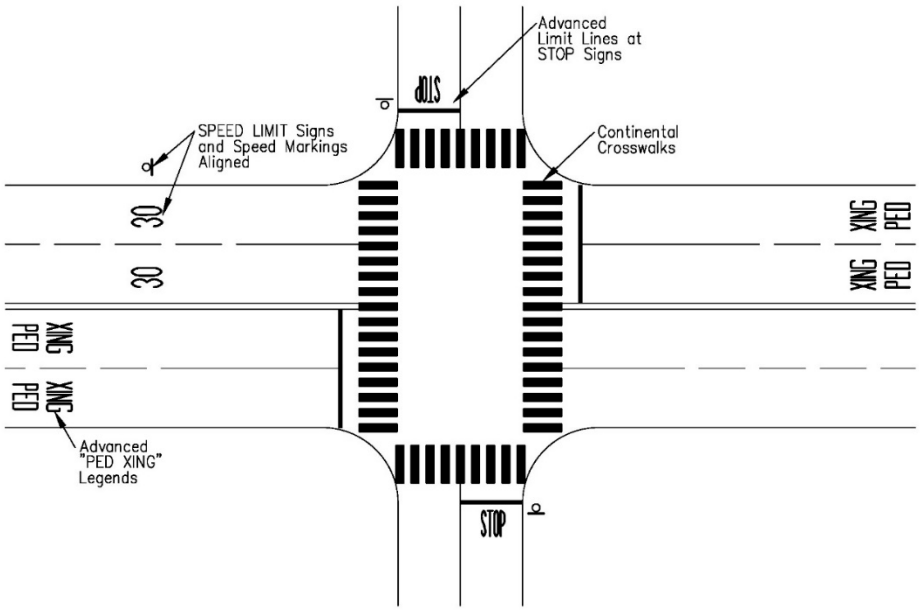
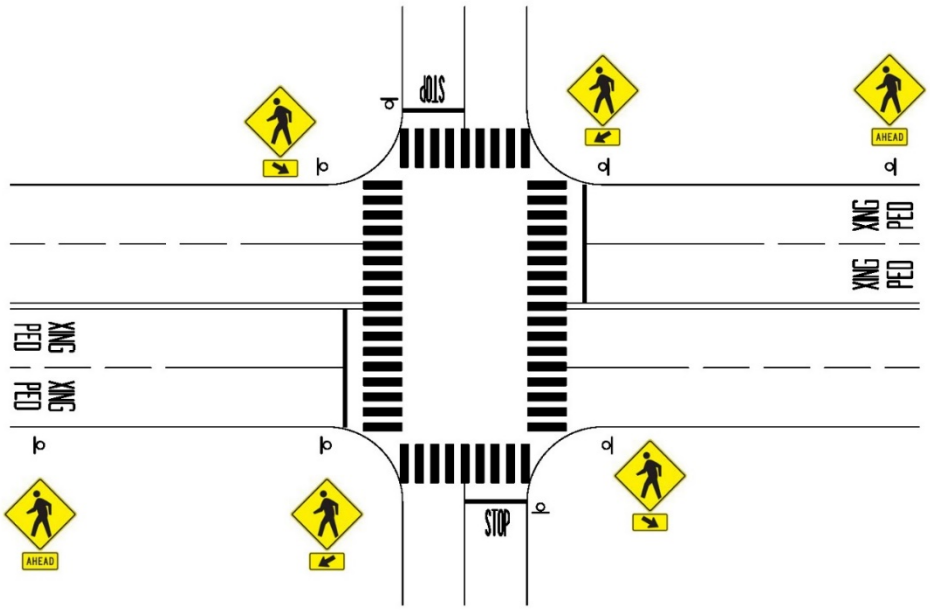


Figure 4
Typical Intersection Pedestrian Warning Signs



Flashing Beacons

These devices can be used to provide supplementary warning of an uncontrolled crosswalk where traffic or physical conditions do not justify a full signal, but collision history and higher motorist violation rates indicate the possibility of a need. Newer rapid flashing beacon units are solar-powered and activated by the person walking. Too often, flashing beacons are installed when the public assumes there is a problem. It is of the upmost importance that flashing beacon installations be held to a minimum to maintain a high degree of respect for the installations that are truly warranted. Overuse can reduce their effectiveness.

Roadway Safety Lighting

Improved street lighting helps pedestrians see oncoming traffic more clearly and allows motorists to identify pedestrians crossing the roadway. Since the summer of 2016, the City has upgraded all luminaires from high pressure sodium (HPS) to light emitting diodes (LED) fixtures. This lighting upgrade has dramatically improved visibility of the roadway and the crosswalk for motorists, bicyclists and pedestrians.

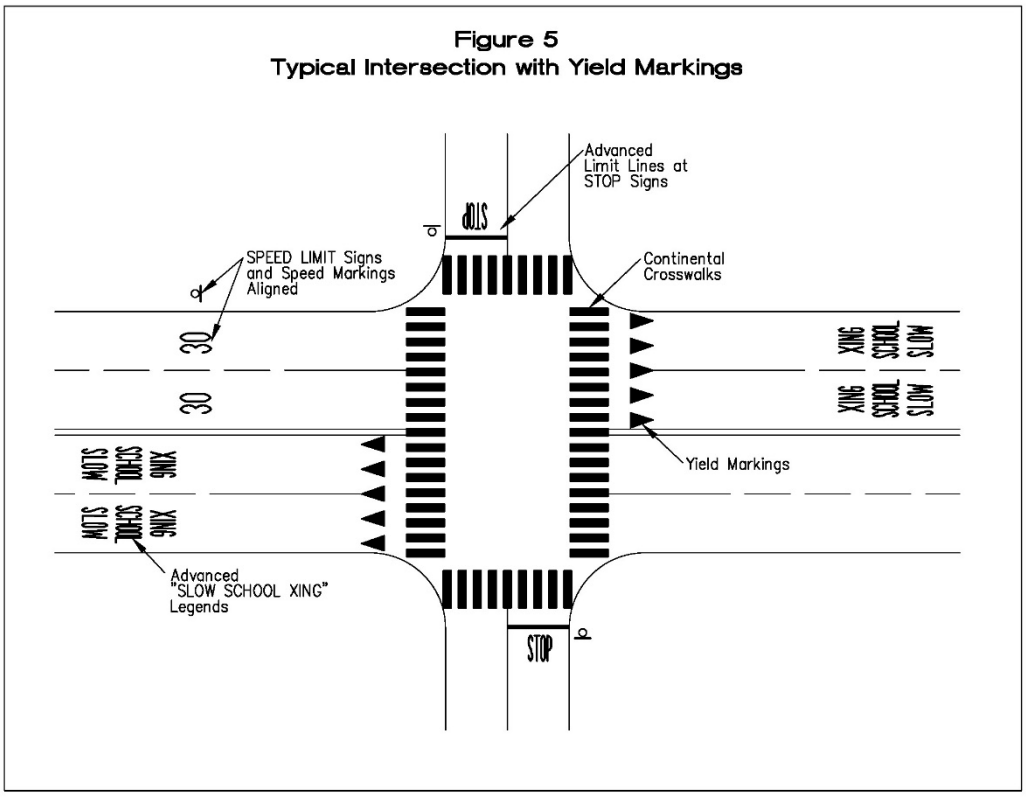
Sight Clearance Areas

Sight clearance areas, also known as red curb areas, provide short no parking zones on approaches to crosswalks to improve sight lines between pedestrians, cyclists and motorists. On-street parking is necessary in the community and a requirement of the California Coastal Commission. The amount of red curb should be implemented on a case-by-case basis with the intent to preserve parking and improve visibility.

Yield Markings on Pavement (Shark Teeth)

Optional rows of white triangles (i.e. "shark teeth") placed across approach lanes to indicate the point at which vehicles must yield to pedestrians (Figure 5). This type of marking is proposed at the crosswalks adjacent to Newport Elementary School and at "E" Street as an additional pavement message.

Figure 5
Typical Intersection with Yield Markings



General Recommendations - For Installation at Multiple Intersections

1. Use "Continental Ladders" with alternating two foot wide stripes for all crosswalks. Install advance limit lines to crosswalks at both STOP controlled and signalized intersections.
2. Maintain low height landscaping on all raised medians noses for line-of-sight at crosswalks.
3. Where needed, upgrade yellow pedestrian signs to a higher grade of retro-reflectivity, and school pedestrian signs to fluorescent yellow-green.
4. Install "Ped Xing" legends at all crosswalks per below:
    - Install "Ped Xing" legends for the crosswalks that are block-to-block:
        - Southbound at 36th Street
        - Northbound at 34th Street
        - Southbound at 31st Street
        - Northbound at 30th Street
        - Southbound at 20th Street
        - Northbound at 16th Street
        - Southbound at 12th Street
        - Northbound/Southbound at 6th Street
        - Northbound at Adams Street
    - Install "Ped Xing" legends at the crosswalks that are spaced further apart:
        - Northbound/southbound at 44th Street
        - Northbound/southbound at 42nd Street
        - Northbound/southbound at 40th Street
        - Northbound/southbound at 28th Street
        - Northbound/southbound at 26th Street
    - Maintain existing "Ped Xing" legends in both directions at Washington Street, E Street, G Street, I Street, and at the crosswalk north of Serrano Avenue.
5. Review speed limit sign and legend locations and relocate as needed to better align signs and markings.
6. Consider installing specialized "Expect High Pedestrian/Bicycle Activity" message signs to alert motorists entering the Peninsula of the high likelihood of encountering bicyclists and pedestrians crossing the street. It is suggested that one such sign could be installed on Balboa Boulevard east of Pacific Coast Highway and a second sign could be installed east of the traffic signal at Balboa Boulevard and 21st Street.

Specific Intersection Recommendations - In addition to General Recommendations

#1 Southbound Newport Boulevard at 28th Street

Project: Remove adjacent parking spot on both sides of the crosswalk and install crosswalks on the south and west sides. Install pedestrian warning signs. Install bulb-outs for the north crosswalk and a street light on the northeast corner (Figure 6 on page 19).

#2 Southbound Newport Boulevard at 26th Street

Project: Remove two parking spots on approach to both sides of Newport Boulevard crosswalk. Install pedestrian warning signs. Install bulb-outs on west/east side and a street light on the northwest corner. Install southbound through arrows on the pavement north of the crosswalk (Figure 7 on page 19).

#3 Balboa Boulevard at 44th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both Balboa Boulevard directions. Remove existing "Pedestrians Next 3 Miles" sign.

#4 Balboa Boulevard at 42nd Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both Balboa Boulevard directions.

#5 Balboa Boulevard at 40th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both Balboa Boulevard directions. Remove existing southbound pedestrian warning sign.

#8 Balboa Boulevard at 34st Street (and signage at 33rd Street)

Project: Remove existing "Pedestrians Next 2.5 Miles" sign for southbound Balboa Boulevard at 33rd Street. Remove existing pedestrian warning sign for northbound Balboa Boulevard at 33rd Street. Install southbound "Signal Ahead" sign and pavement markings south of 34th Street.

#10 Balboa Boulevard at 30th Street

Project: Install pedestrian warning signs in sidewalk area for both northbound and southbound Balboa Boulevard.

#11 Balboa Boulevard at 28th Street

Project: Install Rectangular Rapid Flashing Beacons (RRFB), including all appropriate signage for northbound and southbound Balboa Blvd. Install a crosswalk on the east leg. Install a new street light on east side and bulb-outs on east and west side (Figure 8 on page 20).

This recommendation is based on the relatively high number of motorist right-of-way violations in the summer (296 or 11.8% of the total crossings). It is anticipated that the RRFB installation on Balboa Boulevard (northwest of the McFadden area) will not impact traffic flow on or off the peninsula.

Figure 6
Recommendations at SB Newport Blvd and 28th St

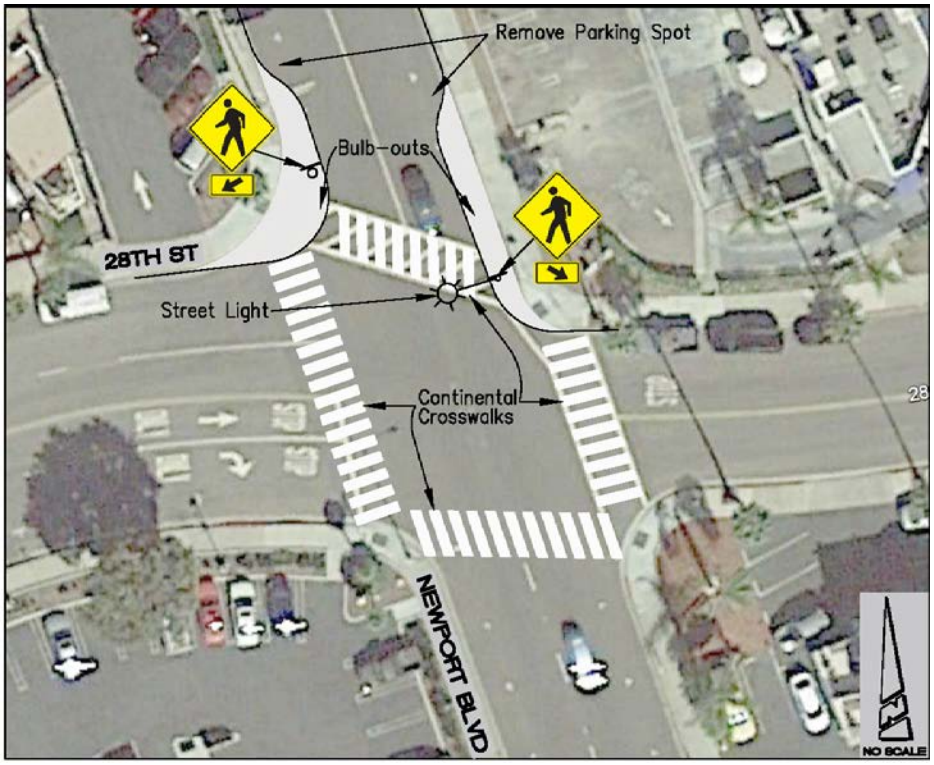


Figure 7
Recommendations at SB Newport Blvd and 26th St

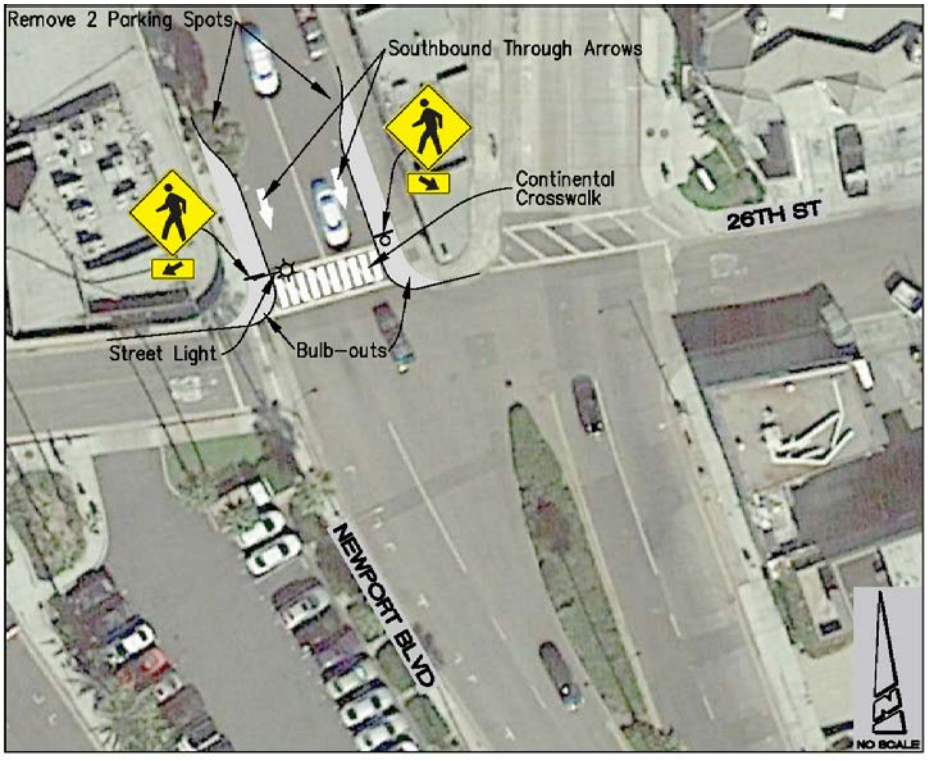


Figure 8
Recommendations at Balboa Blvd and 28th St

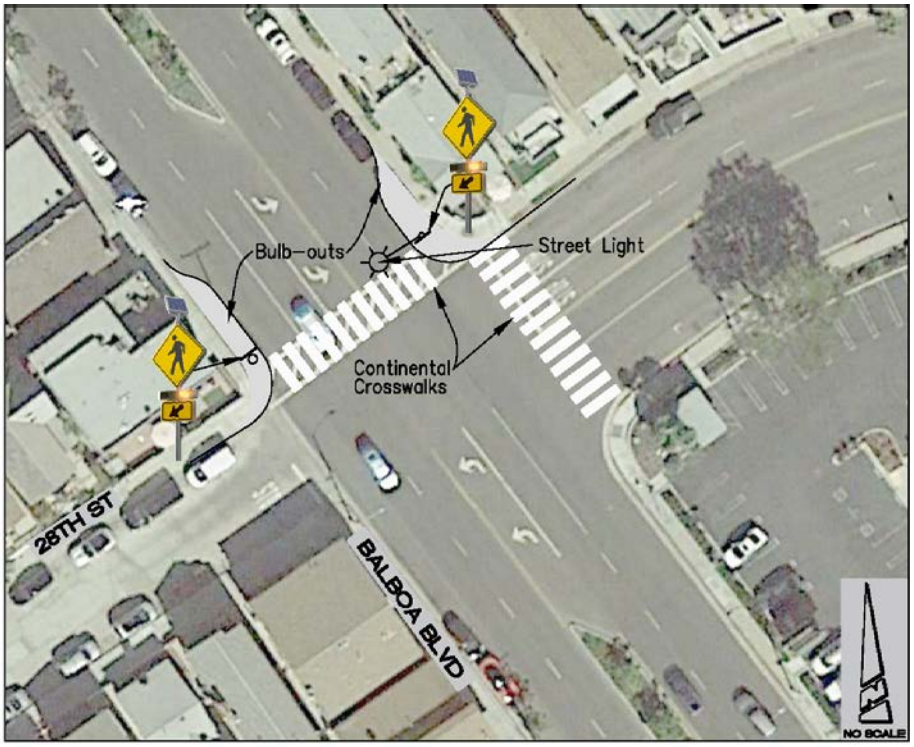
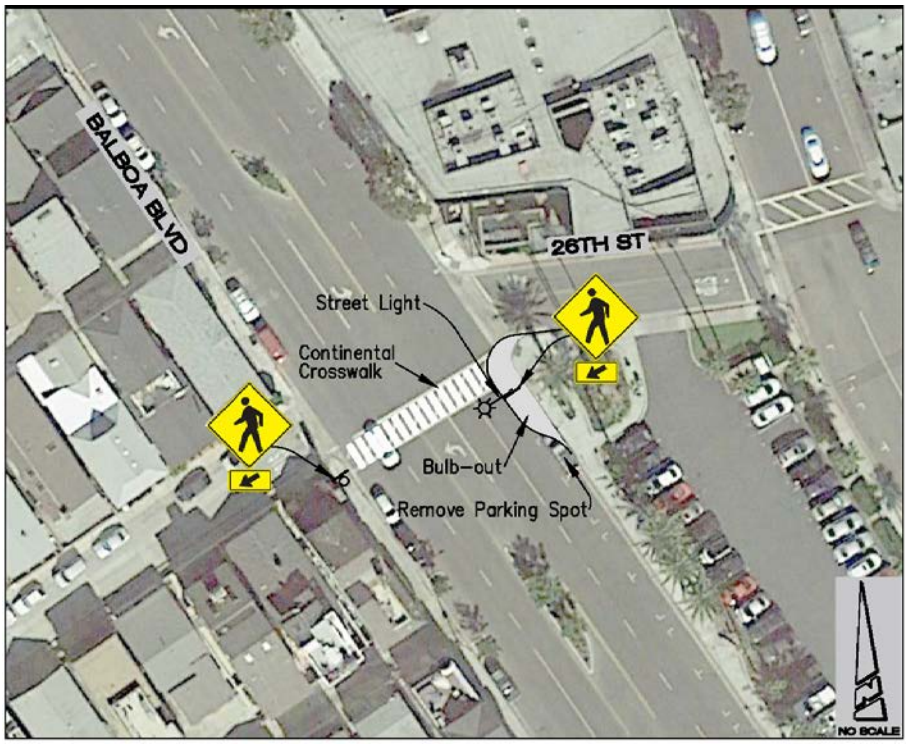


Figure 9
Recommendations at Balboa Blvd and 26th St



#12 Balboa Boulevard at 26th Street

Project: Install northbound and southbound pedestrian warning signs. Remove the first parking spot on the east side, south of 26th Street. Install a new street light on southeast corner and a bulb-out on eastside (Figure 9 on page 20).

#13 Balboa Boulevard at 22nd Street

Project: Install one southbound pedestrian warning sign.

#14 Balboa Boulevard at 20th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#15 Balboa Boulevard at 19th Street

Project: Relocate crosswalk from north leg to south leg. Install double (back-to-back) pedestrian warning signs in the median facing both direction on Balboa Boulevard.

#16 Balboa Boulevard at 18th Street

Project: Relocate existing crosswalk from the north leg to the south leg. Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard. Relocate street light from north leg to south leg.

#17 Balboa Boulevard at 17th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#18 Balboa Boulevard at 16th Street

Project: Remove south leg crosswalk. Install crosswalk striping on west leg. Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

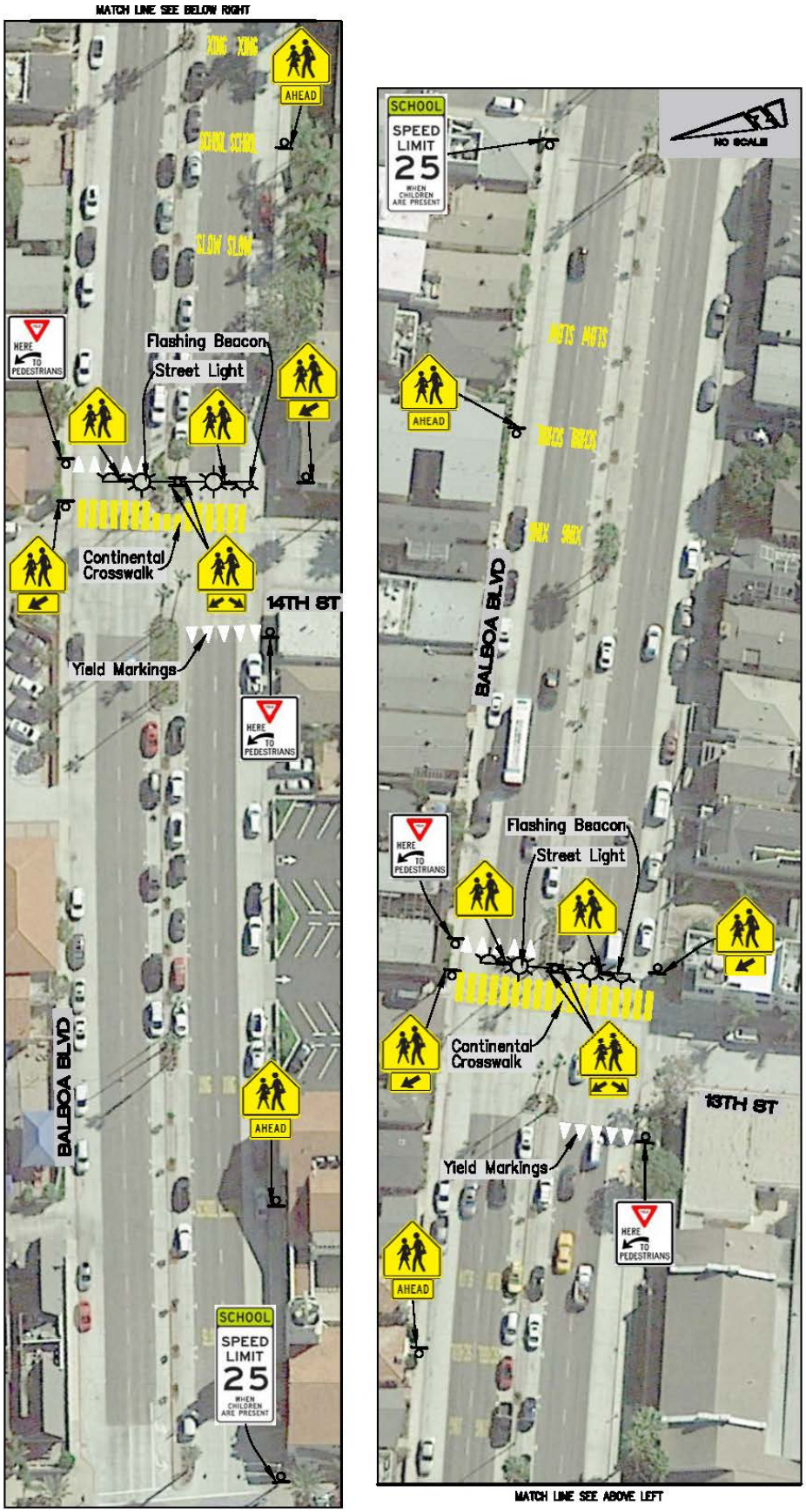
#19 Balboa Boulevard at 14th Street

Project: Install new "School Xing" for northbound/southbound with School Crossing Ahead signs. Install "25 mph When Children Are Present". Install new street light and double mast-arm pole in median. Install an overhead School Crossing sign with flashing beacons. Install School Crossing and downward arrow signs on curb sides of crosswalk and in the median for both northbound and southbound. Install "shark teeth" advance markings and "Yield Here to Pedestrians" signs (Figure 10).

#20 Balboa Boulevard at 13th Street

Project: Install new "School Xing" for northbound/southbound with School Crossing Ahead signs. Install "25 mph When Children Are Present". Install new street light and double mast-arm pole in median. Install an overhead School Crossing sign with flashing beacons. Install School Crossing and downward arrow signs on curb sides of crosswalk and in the median for both northbound and southbound. Install "shark teeth" advance markings and "Yield Here to Pedestrians" signs (Figure 10 on page 22).

Figure 10
Recommendations for Balboa Blvd at 13th St and 14th St



#21 Balboa Boulevard at 12th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#22 Balboa Boulevard at 11th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#23 Balboa Boulevard at 10th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#24 Balboa Boulevard at 9th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#25 Balboa Boulevard at 8th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#26 Balboa Boulevard at 7th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#27 Balboa Boulevard at 6th Street

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard.

#28 Balboa Boulevard at Island Avenue

Project: Install double (back-to-back) pedestrian warning signs in the median facing both directions on Balboa Boulevard. Install pedestrian access ramp on west side.

#29 Balboa Boulevard at Medina Way

Project: Install pedestrian warning signs in sidewalk area for both northbound and southbound Balboa Boulevard.

#30 Balboa Boulevard at Coronado Street

Project: Install pedestrian warning signs in sidewalk area for both northbound and southbound Balboa Boulevard.

#31 Balboa Boulevard north of Cypress Street

Project: Install pedestrian warning signs in sidewalk area for both northbound and southbound Balboa Boulevard.

#32 Balboa Boulevard at Adams Street

Project: Relocate crosswalk from the south leg to the north leg. Install pedestrian warning signs in the sidewalk area for both northbound and southbound Balboa Boulevard.

#33 Balboa Boulevard at Washington Street

Project: Maintain existing northbound/southbound "Ped Xing" legend. Install "Ped Xing" with down arrow sign on both approaches since intersection is between two traffic signals.

#34 Balboa Boulevard at E Street

Project: Relocate "Ped Xing" legend closer to crosswalk (both directions). Install pedestrian warning signs for northbound and southbound Balboa Boulevard. Install "shark teeth" advance markings and "Yield Here to Pedestrians" signs. Consider "No Bikes on Sidewalk" signs.

#35 Balboa Boulevard at G Street/Miramar Drive

Project: Move existing pedestrian warning sign for northbound and southbound for consistency. Move closer to crosswalk with down arrow. Refresh crosswalk markings.

#36 Balboa Boulevard at I Street

Project: Move southbound pedestrian warning sign to street light at corner and install an associated down arrow. Refresh markings.

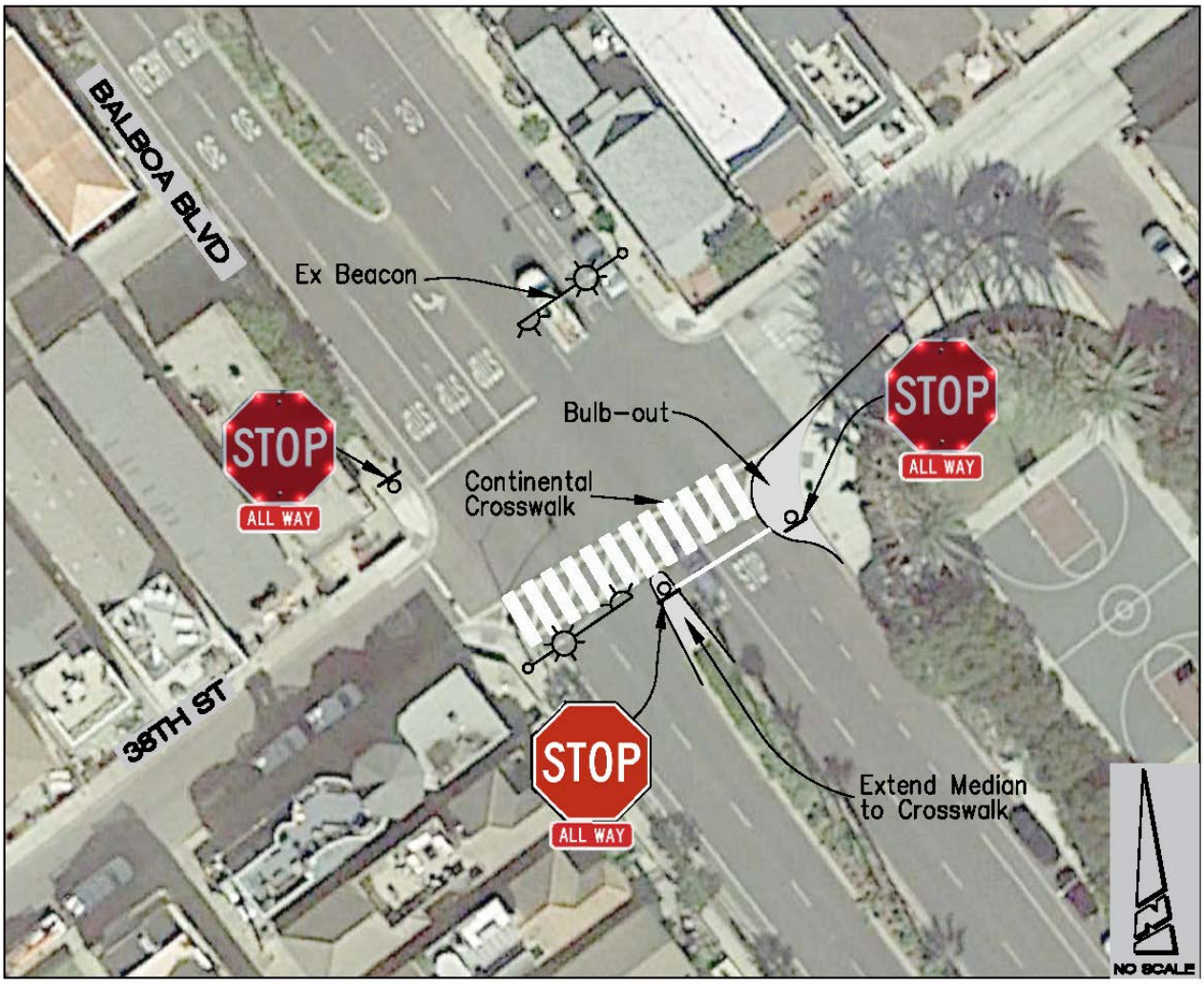
#37 Balboa Boulevard north of Serrano Avenue

Project: Install double (back-to-back) pedestrian warning signs so they are visible through the curve.

#41 Balboa Boulevard at 38th Street (*4-Way STOP Controlled*)

Project: Install LED edge lit "STOP" signs at the limit line for northbound and southbound vehicles (LED edge lit "STOP" signs installed 7/26/2017). Install a bulb-out on the southeast corner. Extend the median on the south leg up to the crosswalk and provide an additional "STOP" sign in the median (Figure 11 on page 25).

Figure 11
Recommendations at Balboa Blvd and 38th St



CONCLUSION

The findings of the study effort suggest that despite the relatively high activity levels of both residents and visitors, all those motorists, bicyclists, and pedestrians in the constrained Peninsula environment generally interact in a safe and efficient manner. This contention is supported by the relatively few reported collisions that have occurred over the past five years considering the high vehicular volumes and large number of pedestrians and bicyclists.

It may not be feasible or even desirable to implement all of the improvement strategies outlined in this document; however, it is important to implement enhancements systematically, and consistently throughout the Balboa Peninsula. This continuity and uniformity of traffic control devices will ensure that motorists, bicyclist, and pedestrians have a general understanding of what to expect. This can be accomplished by systematically implementing the general recommendations contained within this study document. All installations should be designed and installed per the latest California Manual on Uniform Traffic Control Devices.

This report also outlines specific recommendations at each of the 38 locations originally reviewed. For some of the recommendations that include physical improvements such as bulb-outs, street lights, and curb ramps, additional engineering review and design may be necessary. Furthermore, physical improvements may be costly and thus the City may need to implement these improvements over time due to budgetary concerns. It is suggested that the City consider, as a priority, the pursuit of the recommended improvements at the Balboa/13th and Balboa/14th school crossings and at the Balboa/38th all-way stop.

In order to be successful, strategies to improve driver awareness and safety along a corridor should include the "Three E's" of traffic management: Engineering, Education, and Enforcement. The Three E's approach to traffic management can be compared to a three-legged stool. If one leg is missing or ignored, the stool is weakened and can't support its intended purpose. However, with three strong legs a stool can support loads well above what any one leg can support on its own. Likewise implementing traffic engineering actions, educating the public about expected motorist behavior, and providing enforcement to penalize violators can have dramatic positive results.

We believe that with the implementation of the engineering recommendations outlined in this document together with the recently completed projects by the City (installation of LED streetlights) will provide noticeable improvements along the corridors. We also recommend an increased police presence to cite willful law breakers and dangerous behavior, and to help educate the public on safe behavior.