AGENDA OF A REGULAR MEETING OF THE NATIONAL CITY TRAFFIC SAFETY COMMITTEE

WEDNESDAY, JULY 10, 2024 AT 1:00 P.M.

CITY HALL
LARGE CONFERENCE ROOM
1243 NATIONAL CITY BOULEVARD
NATIONAL CITY, CA 91950

* CALL TO ORDER

* PLEDGE OF ALLEGIANCE

* ROLL CALL

* APPROVAL OF THE MEETING MINUTES FROM MAY 8, 2024

PUBLIC ORAL COMMUNICATION (Three-Minute Time Limit)
Note: Pursuant to State Law, items requiring Committee action must be brought back on a subsequent Committee agenda unless they are of a demonstrated emergency or urgent nature.

GENERAL INFORMATION

Upon request, this agenda can be made available in appropriate alternative formats to persons with a disability in compliance with the American with Disabilities Act. Please contact the City Clerk's Office at (619) 336-4228 to request a disability-related modification or accommodation. Notification 24-hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

OLD BUSINESS

1. ITEM NO. 2024-02

   REQUEST FOR INSTALLATION OF 19 FEET OF RED CURB IN FRONT OF THE RESIDENCE AT 2130 E 12TH STREET

   BY: RESIDENT

NEW BUSINESS

1. ITEM NO. 2024-03

   REQUEST TO IMPROVE PEDESTRIAN SAFETY AT UNCONTROLLED CROSSWALKS AT THE INTERSECTIONS OF E. 8TH STREET AT A AVENUE, B AVENUE, AND C AVENUE

   BY: ZACHARY GOMEZ

2. ITEM NO. 2024-04

   ADOPTING THE LOCAL ROAD SAFETY PLAN (LRSP) WHICH ASSESSES AND IDENTIFIES LOCATIONS AND SAFETY NEEDS TO IMPROVE LOCAL ROAD SAFETY WITHIN THE CITY

   BY: STAFF

FUTURE ITEMS

STAFF REPORTS

COMMITTEE MEMBER COMMENTS

ADJOURNMENT

GENERAL INFORMATION

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MINUTES of a REGULAR MEETING
of the NATIONAL CITY TRAFFIC
SAFETY COMMITTEE
WEDNESDAY, MAY 08, 2024 at 1:00 P.M.

I CALL TO ORDER

Committee Member Cynthia Fuller Quinonez called the meeting of the Traffic Safety Committee to order at 1:09 p.m. on Wednesday, May 08, 2024, in the Second Floor Large Conference Room at City Hall, 1243 National City Blvd. National City, CA 91950.

II PLEDGE OF ALLEGIANCE

III ROLL CALL

Committee Members Present: Cynthia Fuller Quinonez, Kelly Piper, Rafael Cotero

Committee Members Absent: None

Officials Present: Luca Zappiello – Associate Civil Engineer; Ricardo Rodriguez – Assistant Civil Engineer, Evelyn Nunez- Executive Secretary.

IV APPROVAL OF THE MINUTES FROM November 8, 2023

Motion by Piper, 2nd by Cotero to approve the Minutes from the meeting of November 8, 2023

Carried by vote 3-0

V PUBLIC ORAL COMMUNICATION: (Three-Minute Time Limit)

NONE

OLD BUSINESS

NONE

VI NEW BUSINESS

1. ITEM NO. 2024-01

REQUEST FOR INSTALLATION OF A BLUE CURB DISABLED PERSONS PARKING SPACE WITH SIGNAGE IN FRONT OF THE RESIDENCE AT 3626 CHERRY BLOSSOM ST

BY: KYOKO BENBOW

Resident was not present to speak on behalf of this item.

Ricardo Rodriguez, Assistant Civil Engineer, provided the staff report for this item.

Committee Members discussed the item. There was no public opposition to this item.

Action: Motion by Piper, 2nd by Cotero, to approve staff recommendation for installation of a blue curb disabled persons parking space with signage in front of the residence at 3626 Cherry Blossom St.

Carried by unanimous vote, 3-0.

2. ITEM NO. 2024-02

REQUEST FOR INSTALLATION OF 38 FEET OF RED CURB IN FRONT OF THE RESIDENCE AT 2130 E 12TH STREET

BY: RESIDENT OWNER

Resident was not present to speak on behalf of this item.

Ricardo Rodriguez, Assistant Civil Engineer, provided the staff report for this item.

Committee Members discussed the item. There was no public opposition to this item.

Action: Motion by Piper, 2nd by Cotero to carry over this agenda item 2024-02 to next meeting. To reach out to resident and confirm if he wants if he wants to a blue or red curb. Then decision will be made for 2130 E. 12th Street.

Carried by unanimous vote, 3-0

VII OLD BUSINESS

NONE

IX FUTURE ITEMS

- Division St. to be further discussed.

X STAFF REPORTS

1. Evaluation of the pedestrian enhancements for E. 8th Street and A Avenue and E. 8th Street and B Avenue.

XI COMMITTEE MEMBER COMMENTS

- Per Piper recommended, we send a letter to City of San Diego for Division St and request traffic accident data.
- Per Fuller Quinonez added to the comment above to add roundabout and cameras to decrease speed.

XII ADJOURNMENT 2:01 P.M.

Action: Motion by Piper, 2nd by Fuller Quinonez to adjourn to the next regularly scheduled Traffic Safety Committee meeting on June 12, 2024 at 1:00 p.m. in the Second Floor Large Conference Room at City Hall, 1243 National City Blvd, National City, CA 91950

Carried by unanimous vote, 3-0

NATIONAL CITY TRAFFIC SAFETY COMMITTEE
AGENDA REPORT FOR JULY 10, 2024

ITEM NO. 2024-02

ITEM TITLE: **REQUEST FOR INSTALLATION OF 19 FEET OF RED CURB IN FRONT OF THE RESIDENCE AT 2130 E 12TH STREET**

PREPARED BY: Ricardo Rodriguez, Assistant Engineer – Civil Engineering & Public Works Department

DISCUSSION:

A resident has expressed concern with visibility at the intersection of E 12th Street and Grove Street, and requested the installation of red curb to improve visibility for the vehicles turning onto E 12th Street from Grove Street. The anonymous request was submitted via the SeeClickFix website and was discussed by the Traffic Safety Committee (TSC) during the meeting in May. As a result of the discussion during the meeting, TSC members directed staff to check the traffic collision history at this intersection and follow up with the resident at 2130 E 12th Street regarding a possible request for a blue curb. It should be noted that, prior to the TSC meeting in May, the resident at 2130 E 12th Street mentioned they were interested in requesting a blue curb in front of their residence, however, as of June 26, 2024, a request from this residence has not been received.

In addition to the direction provided, the TSC asked to have the original request modified. The original request was for the installation of 38 feet of red curb, which would impact on-street parking by removing parking for two vehicles. Now with the modification, the request is for 19 feet of red curb, reducing the impact by removing parking for only one vehicle.

Prior to the TSC meeting in May, staff performed a site evaluation and determined that E 12th Street is a 2-lane residential roadway with available parking on both sides of the street and a speed limit of 25 mph. Also, there is red curb on E 12th Street, east of Grove Street, which is why the request is only for one side of the intersection. It is also worth mentioning that E 12th Street, west of Grove Street, is part of a Class III bike route that continues to the north on Paradise Drive and south on Grove Street. A Class III bike route is a street shared with vehicles that is designated for bicycle travel with signage.

Staff visited the site a second time, after the TSC meeting in May, and did not see a lack of available on-street parking. During the second site visit, staff contacted the resident at 2130 E 12th Street and personally delivered a blue curb request form.

Following up on the direction from the TSC, staff requested a traffic collision history report for the intersection of E 12th St and Grove St. The report shows that there has only been one reported collision in the last four years. The collision was categorized as a hit and run with no injuries or fatalities.

STAFF RECOMMENDATION:

Based on the evaluation of existing conditions, staff recommends the installation of 19 feet of red curb “No Parking” on the south side of E 12th Street, west of Grove Street, in front of the residence at 2130 E 12th Street, to improve visibility for vehicles turning onto E 12th Street. This will result in the loss of one (1) on-street parking spaces.

EXHIBITS:

1. Public Request
2. Public Notice
3. Location Map
4. Photos

2024-02

R #5315 Traffic Signal Issue, 21

https://cw.nationalcityca.gov/Cityworks/WorkManagement/RequestEdit.aspx?RequestId=5315

works

Search...

GONZALEZ, WILLIAM

Service Request | Work Order | Inspection | GIS Search | Projects | Analytics | Reports

st | Email | Print | Save | New | Close

Service Request

iption: Traffic Signal Issue

est Id: 5315

egory:

Priority: Medium

tatus: New

ed By: Cwadmin, Cwadmin

Date: 03/29/2023 5:32 PM

ation:

Date:

gency:

WO Needed:

nit To: GONZALEZ, WILLIAM

Date: 03/30/2023 11:04 AM

Name:

Prj. Comp. Date:

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Date:

ason:

Canceled By:

ed By:

Date:

nents: Add Comment

Sort ▲

03/29/2023 5:32 PM

Incident Information

Address: 2100-2134 E 12th St

City:

State:

Location:

Details: Traffic Signal Issue
Need a red curb as 12th St east to west vehicle traffic is unable to be seen when vehicle is parked there. One must pull out halfway into oncoming traffic to see.

X: -13,033,695.87162490 Y: 3,852,709.70052226

Callers

	Last Name	First Name	M.I.	Call Time	Caller Type	Comments
☐	UNKNOWN			3/29/2023 5:32:04 PM		

New Request From Caller

Related Work Activities

a.gov/Cityworks/Inbox/InboxPage.aspx?NodeKey=2

here to search

68°F Partly cloudy

July 2, 2024

RESIDENT/PROPERTY OWNER

Subject: TRAFFIC SAFETY COMMITTEE (TSC) ITEM NO. 2024-02

REQUEST FOR INSTALLATION OF 19 FEET OF RED CURB IN FRONT OF THE RESIDENCE AT 2130 E 12TH STREET.

Dear Sir/Madame:

The City of National City would like to invite you to our next public Traffic Safety Committee Meeting scheduled for **Wednesday, July 10, 2024, at 1:00 P.M.** in the 2nd Floor Large Conference Room of the Civic Center Building, 1243 National City Boulevard, to discuss the above-referenced item.

The City Hall is ADA compliant. Please note that there are two disabled persons parking spaces in front of City Hall on the east side of National City that provide direct access on the 2nd Floor of City Hall via a pedestrian bridge.

If you have any questions, comments, and/or concerns, please contact the Engineering Department at 619-336-4380 and reference Traffic Safety Committee Item Number 2024-02.

Sincerely,

Stephen Manganiello
Director of Public Works/City Engineer

SM:rr

Enclosure: Location Map

2024-02

Exhibit A: Location Map with Recommended Enhancements (TSC Item: 2024-02)

Location of proposed red curb “No Parking” on E 12th Street (Looking West)

Location of proposed red curb “No Parking” on E 12th Street (Looking South)

NATIONAL CITY TRAFFIC SAFETY COMMITTEE
AGENDA REPORT FOR JULY 10, 2024

ITEM NO. 2024-03

ITEM TITLE: **REQUEST TO IMPROVE PEDESTRIAN SAFETY AT UNCONTROLLED CROSSWALKS AT THE INTERSECTIONS OF E. 8th STREET AT A AVENUE, B AVENUE, AND C AVENUE.**

PREPARED BY: Luca Zappiello, Associate Engineer – Civil Engineering & Public Works Department

DISCUSSION:

In November 2023, Zachary Gomez, resident at the apartment complex located on 8th Street and B Avenue expressed safety concerns, stating that there is heavy vehicle traffic along 8th Street. The new apartment complex with retail shops on 8th Street and B Avenue and new shops and restaurants along 8th Street has increased pedestrian crossings across the road. Mr. Gomez stated that crossing the road has become very difficult due to drivers' speed and drivers not paying attention to the pedestrian crossing.

In 2015, the City completed the 8th St. Corridor Smart Growth Revitalization project, which narrowed the cross-section of 8th Street, between National City Blvd and Highland Avenue from two lanes in each direction to one lane with a center turn lane. The implementation of the project reduced the speed limits along this section of 8th Street from 30 mph to 25 mph. In addition, the 8th St. Corridor Smart Growth Revitalization project also created a pedestrian-friendly promenade to encourage more pedestrian activity by widening the sidewalks, installing new landscaping, improving the lighting of street furniture, and installing a curb extension at the intersection of 8th Street at A, B and C Avenues to reduce vehicle speeds and pedestrian crossing distances.

To determine the type of countermeasures that can be implemented at these intersections, staff reviewed the most recent guide of the Federal Highway Administration (FHA) called “Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations,” which identifies with a matrix the suggested countermeasures based on the roadway configuration, posted speed limit and Annual Average Daily Traffic (AADT) (see attached exhibit A). 8th Street, between National City Blvd and Highland Avenue, is a 25 mph road with a 2-lane roadway with no raised median at the intersection and an AADT that exceeds 15,000. Based on this information, the matrix recommends the installation of the following countermeasures:

- High-visibility crosswalk.
- Adequate lighting.
- Parking restrictions on the approaches.
- In-street pedestrian crossing signs.
- Curb extensions.
- Pedestrian refuge islands.
- Rectangular Rapid-Flashing Bacon (RRFB).
- The Pedestrian Hybrid Beacon (PHB).

Based on the recommendations provided by the guide, 8th Street at A, B, and C Avenues already have high-visibility crosswalks, adequate lighting, parking restrictions on the approaches, and curb extensions. In addition, the other treatments that can be implemented are the installation of

additional signage and the installation of RRFBs. The Pedestrian refuge islands cannot be installed at the intersection since this will prohibit vehicles from turning left.

Staff also reviewed the traffic collision history for this location, which confirmed there was one reported accident at the intersection of 8th Street and B Avenue related to a pedestrian-vehicle accident within the past six and half years. See the attached traffic collision summary table.

If the Traffic Safety Committee and City Council will approve this item, staff will apply for the Highway Safety Improvement Program (HSIP) Cycle 12 grant funding to finance this project.

STAFF RECOMMENDATION:

Based on the FHA guidelines above described, staff recommend installing the following enhancements (see attached location map):

- Install pedestrian warning signage on the northwest and southwest sides of 8th Street and A Avenue.
- Install RRFBs on the northeast and southeast sides of 8th Street and A Avenue.
- Install a pedestrian warning sign on the northwest and southwest sides of 8th Street and B Avenue.
- Install a RRFBs on the northeast and southeast sides of 8th Street and B Avenue.
- Install a pedestrian warning sign on the northwest and southwest sides of 8th Street and C Avenue.
- Install a RRFBs on the northeast and southeast sides of 8th Street and C Avenue.

EXHIBITS:

1. Public Request
2. Public Notice
3. Table 1 of the FHA guide
4. Location Map
5. Photos
6. U.S. Department of Transportation - RRFB
7. Accident history (1/1/2019 – 6/24/2024)

PUBLIC REQUEST FORM

Contact Information

Name: Zachary Gomez

Address: 8th Street and B Avenue

Phone: _____ **Email:** _____

Request Information

Location: intersection of 8th Street at A, B and C Avenues

Request: Request pedestrian crossing enhancements on 8th street at A, B, and C Avenues "because it is dangerous crossing the street" given drivers not paying attention and speeding.

Attachments: ☐ Yes ☑ No **Description:** _____

Internal Use Only:

Request Received By: Luca Zappiello **Date:** November 2023

Received via: ☐ Counter/In-Person ☐ Telephone ☑ Email ☐ Fax ☐ **Referral:** _____

Assigned To: Luca Zappiello

Notes: _____

June 27, 2024

RESIDENT/PROPERTY OWNER

Subject: TRAFFIC SAFETY COMMITTEE (TSC) ITEM NO. 2024-03

REQUEST TO IMPROVE PEDESTRIAN SAFETY AT UNCONTROLLED CROSSWALKS AT THE INTERSECTIONS OF E. 8th STREET AT A AVENUE, B AVENUE, AND C AVENUE.

Dear Sir/Madame:

The City of National City would like to invite you to our next public Traffic Safety Committee Meeting scheduled for **Wednesday, July 10, 2024, at 1:00 P.M.** in the 2nd Floor Large Conference Room of the Civic Center Building, 1243 National City Boulevard, to discuss the above-referenced item.

The City Hall is ADA compliant. Please note that there are two disabled persons parking spaces in front of City Hall on the east side of National City that provide direct access on the 2nd Floor of City Hall via a pedestrian bridge.

If you have any questions, comments, and/or concerns, please contact the Engineering Department at 619-336-4380 and reference Traffic Safety Committee Item Number 2024-03.

Sincerely,

Stephen Manganiello
Director of Public Works/City Engineer

SM:lz

Enclosure: Location Map

2024-03

Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing.

For multi-lane roadway crossings with vehicle AADTs exceeding 10,000, a marked crosswalk alone is typically insufficient (Zegeer, 2005). Under such conditions, more substantial crossing improvements (such as the refuge island, PHB, and RRFB) are also needed to prevent an increase in pedestrian crash potential.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5 7 9	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

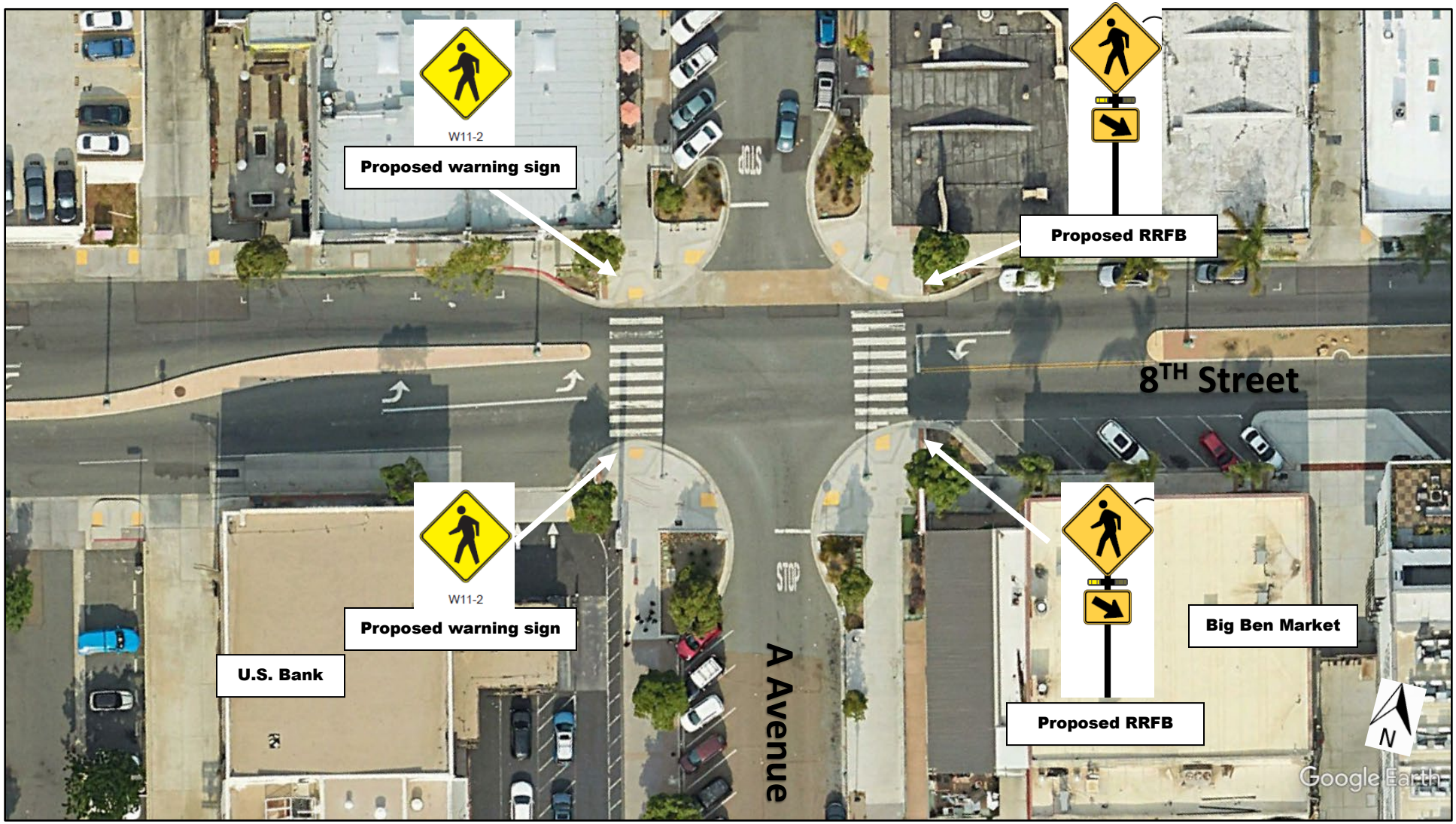
1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

**Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.*

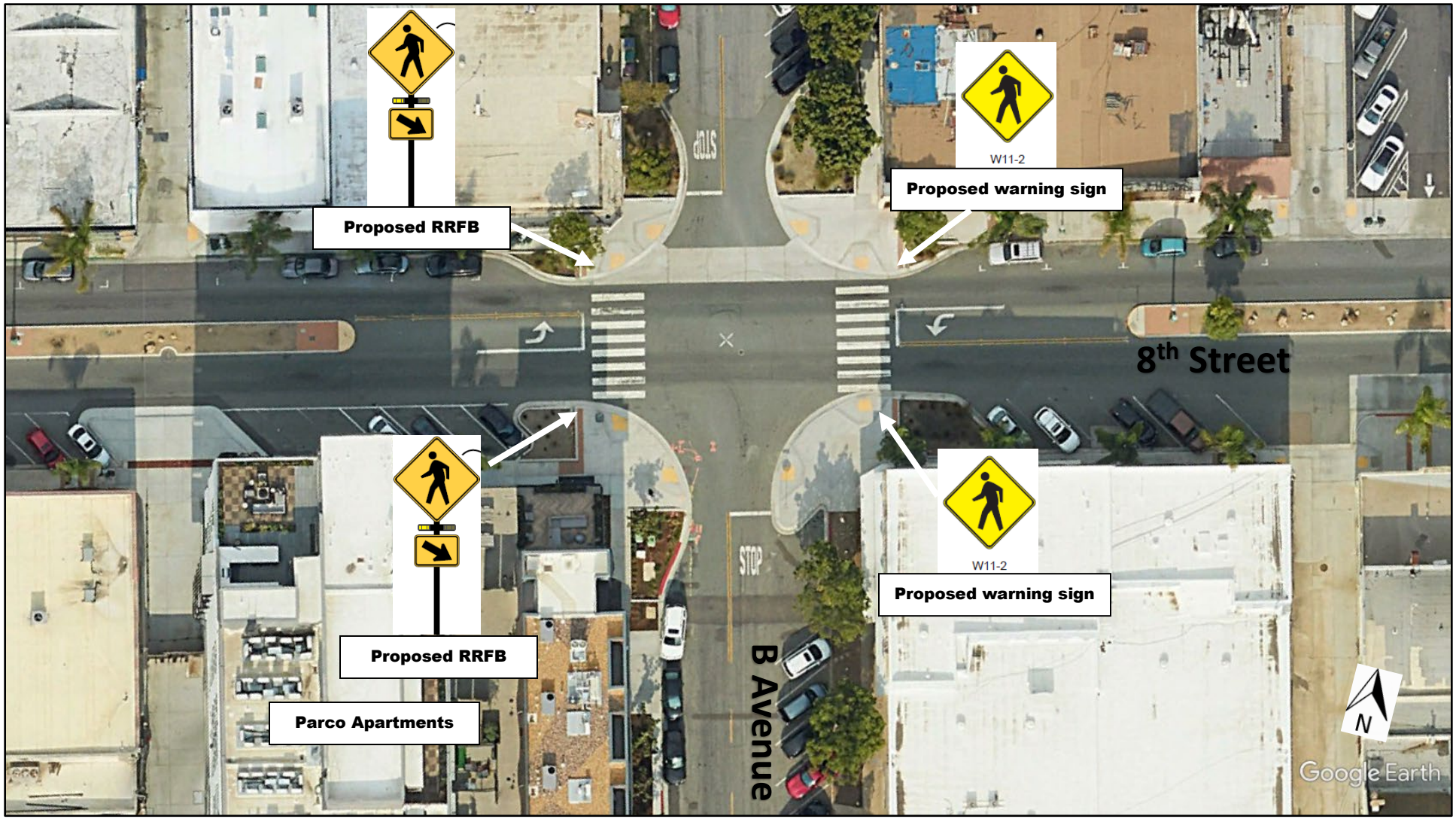
***It should be noted that the PHB and RRFB are not both installed at the same crossing location.*

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

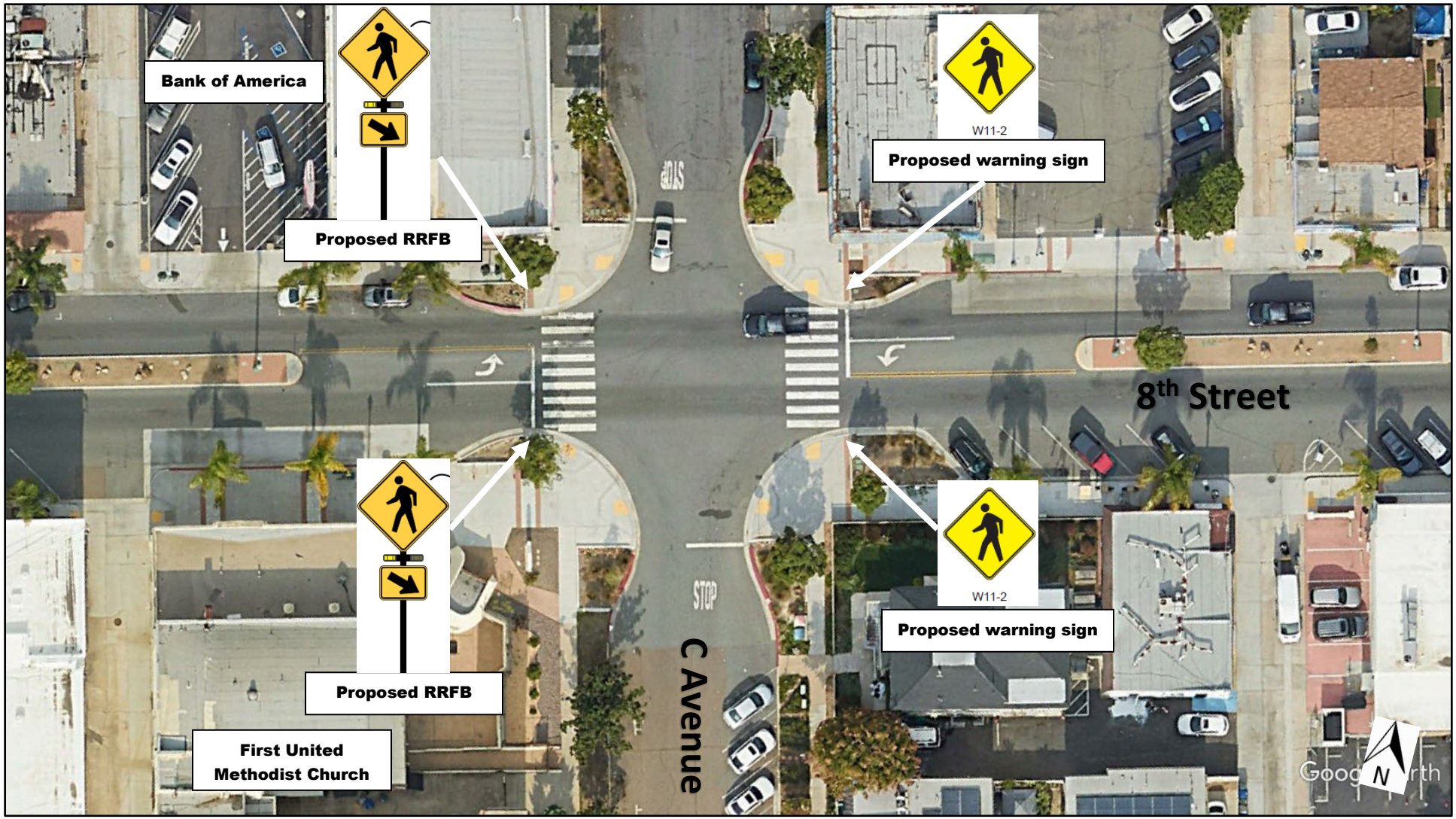
Exhibit A: Location Map with Recommended Enhancements (TSC Item: 2024-03)



Intersection of 8th Street and A Avenue



Intersection of 8th Street and B Avenue



Intersection of 8th Street and C Avenue

Location of proposed RRFB and warning sign for eastbound traffic at 8th Street and A Ave (looking east)

Location of proposed RRFB and warning sign for westbound traffic at 8th Street and A Ave (looking west)

Location of proposed RRFB and warning sign for eastbound traffic at 8th Street and A Ave (looking east)

Location of proposed RRFB and warning sign for westbound traffic at 8th Street and A Ave (looking west)

Location of proposed RRFB and warning sign for eastbound traffic at 8th Street and A Ave (looking east)

Location of proposed RRFB and warning sign for westbound traffic at 8th Street and A Ave (looking west)

U.S. Department of Transportation
Federal Highway Administration

Rectangular Rapid Flashing Beacons (RRFB)

A marked crosswalk or pedestrian warning sign can improve safety for pedestrians crossing the road, but at times may not be sufficient for drivers to visibly locate crossing locations and yield to pedestrians. To enhance pedestrian conspicuity and increase driver awareness at uncontrolled, marked crosswalks, transportation agencies can install a pedestrian actuated Rectangular Rapid Flashing Beacon (RRFB) to accompany a pedestrian warning sign. RRFBs consist of two, rectangular- shaped yellow indications, each with a light-emitting diode (LED)-array-based light source.[1] RRFBs flash with an alternating high frequency when activated to enhance conspicuity of pedestrians at the crossing to drivers.

For more information on using RRFBs, see the Interim Approval in the *Manual on Uniform Traffic Control Devices (MUTCD)*.[1]

Safety Benefits:

RRFBs can reduce crashes up to:

47%

for pedestrian crashes.[4]

RRFBs can increase motorist yielding rates up to:

98%

(varies by speed limit, number of lanes, crossing distance, and time of day).[3]

RRFBs used at a trail crossing.
Source: LJB

Applications

The RRFB is applicable to many types of pedestrian crossings but is particularly effective at multilane crossings with speed limits less than 40 miles per hour.[2] Research suggests RRFBs can result in motorist yielding rates as high at 98 percent at marked crosswalks, but varies depending on the location, posted speed limit, pedestrian crossing distance, one- versus two-way road, and the number of travel lanes.[3] RRFBs can also accompany school or trail crossing warning signs.

RRFBs are placed on both sides of a crosswalk below the pedestrian crossing sign and above the diagonal downward arrow plaque pointing at the crossing.[1] The flashing pattern can be activated with pushbuttons or passive (e.g., video or infrared) pedestrian detection, and should be unlit when not activated.

Considerations

Agencies should:[2]

- Install RRFBs in the median rather than the far-side of the roadway if there is a pedestrian refuge or other type of median.
- Use solar-power panels to eliminate the need for a power source.
- Reserve the use of RRFBs for locations with significant pedestrian safety issues, as over-use of RRFB treatments may diminish their effectiveness.

Agencies shall not:[2]

- Use RRFBs without the presence of a pedestrian, school or trail crossing warning sign.
- Use RRFBs for crosswalks across approaches controlled by YIELD signs, STOP signs, traffic control signals, or pedestrian hybrid beacons, except for the approach or egress from a roundabout.

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/techSheet_RRFB_2018.pdf.

FHWA-SA-21-053

1 *MUTCD* Interim Approval 21 - RRFBs at Crosswalks.
2 "Rectangular Rapid Flash Beacon" in PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System. FHWA, (2013).
3 Fitzpatrick et al. "Will You Stop for Me? Roadway Design and Traffic Control Device Influences on Drivers Yielding to Pedestrians in a Crosswalk with a Rectangular Rapid-Flashing Beacon." Report No. TTI-CTS-0010. Texas A&M Transportation Institute, (2016).
4 (CMF ID: 9024) NCHRP Research Report 841 Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, (2017).

TRAFFIC COLLISION SUMMARY ON 8TH STREET BETWEEN NATIONAL CITY BLVD AND HIGHLAND AVENUE (1/1/2019 - 6/24/2024)										
E 8th Street and A Avenue										
ADDRESS	ACTIVITY #	DATE & TIME	HIT & RUN LEVEL	PEDESTRIAN RELATED	HIT & RUN FLAG	INJURY FLAG	# INJURED	# KILLED	VIOLATION SECTION	VIOLATION DESCRIPTION
E08TH STREET & A AVENUE	2100880	2/14/2021, 5:29 PM	FELONY	N	Y	Y	1	0	VC 21801A	RIGHT-OF-WAY:MAKING LEFT OR U-TURN (I)
100 E 08TH STREET	2200322	1/19/2022, 5:08 PM		N	N	N	0	0	VC 22107	TURNS:UNSAFE TURN AND/OR NO TURN SIGNAL (I)
108 E 08TH STREET	2220216	5/29/2022, 3:00 PM	MISDEMEANOR	N	Y	N	0	0	VC 20002(A)	HIT AND RUN:PROP DAMAGE (M)
100 E 08TH STREET	2219934	5/25/2022, 9:26 AM		N	N	Y	1	0	VC 22107	TURNS:UNSAFE TURN AND/OR NO TURN SIGNAL (I)
100 E 08TH STREET	2308929	4/11/2023, 1:56 PM	MISDEMEANOR	N	Y	N	0	0	VC 22450(A)	FAILED TO STOP FOR STOP SIGN (I)
E08TH STREET & A AVENUE	2306618	3/16/2023, 8:13 PM	MISDEMEANOR	N	Y	N	0	0	VC 21651(A)1	DRIVE OVER, UPON, OR ACROSS DIVIDING SECTION OF HIGHWAY (I)
800 A AVENUE	1904374	8/16/2019, 6:55 PM	MISDEMEANOR	N	Y	N	0	0	VC 22107	TURNS:UNSAFE TURN AND/OR NO TURN SIGNAL (I)

E 8th Street and B Avenue										
ADDRESS	ACTIVITY #	DATE & TIME	HIT & RUN LEVEL	PEDESTRIAN RELATED	HIT & RUN FLAG	INJURY FLAG	# INJURED	# KILLED	VIOLATION SECTION	VIOLATION DESCRIPTION
200 E 08TH STREET	2105950	10/21/2021, 4:26 PM		N	N	Y	1	0	VC 22350	UNSAFE SPEED (BASIC SPEED LAW) (I)
200 E 08TH STREET	2106359	11/13/2021, 7:28 PM		N	N	N	0	0	VC 23152A	DUI ALCOHOL (M)
215 E 08TH STREET	2106376	11/14/2021, 6:10 PM		Y	N	Y	1	0	VC 21954A	RIGHT-OF-WAY:PED NOT IN CROSSWALK YIELD TO VEHS (I)
226 E 08TH STREET	2405551	2/28/2024, 9:23 PM		N	N	Y	1	0	VC 21755	PASSING: UNSAFE PASSING ON RIGHT OR ON SHOULDER (I)
E08TH STREET & B AVENUE	2231425	9/27/2022, 9:04 PM	MISDEMEANOR	N	Y	N	0	0	VC 21750	PASSING:UNSAFE PASSING:SAME DIRECTION (I)

E 8th Street and C Avenue
No reported accidents

NATIONAL CITY TRAFFIC SAFETY COMMITTEE
AGENDA REPORT FOR JULY 10, 2024

ITEM NO. 2024-04

ITEM TITLE: **ADOPTING THE LOCAL ROAD SAFETY PLAN (LRSP) WHICH ASSESSES AND IDENTIFIES LOCATIONS AND SAFETY NEEDS TO IMPROVE LOCAL ROAD SAFETY WITHIN THE CITY.**

PREPARED BY: Luca Zappiello, Associate Engineer – Civil
Engineering & Public Works Department

DISCUSSION:
Federal regulations require that each State have a Strategic Highway Safety Plan (SHSP). While the SHSP is used as a statewide approach for improving roadway safety, a Local Roadway Safety Plan (LRSP) allows local road owners to address unique highway safety needs in their jurisdictions while contributing to the success of the SHSP.

The attached LRSP analyzes all of the reported crashes that occurred on local City roadways for five years between January 1, 2013, and December 31, 2017. Based on the collision data analysis, the LRSP ranked the intersections and roadway segments. The intersection and roadway segment with the highest crash were further evaluated to determine contributing factors to the high-crash activity. Crash activity was compared to roadway characteristics such as volume, cross-sections, speed limits, intersection control, and other features that might impact safety outcomes. For each unsafe condition identified in the report, the LRSP identified a series of recommendations or countermeasures, such as:

- Improve signal hardware.
- Install pedestrian crossing.
- Install signals and/or lights.
- Improve sight distance to intersections.
- Install raised medians.
- Improve signal timings.

The LRSP provides an essential tool for developing and prioritizing future road safety improvement projects. An approved LRSP will enable the City to apply for the federal Highway Safety Improvement Program (HSIP) and other grants, such as Safe Streets and Roads for All (SS4A).

The Traffic Safety Committee will take on the role of LRSP oversight. This role will include the following responsibilities:

- Monitoring progress on implementing the projects identified in the LRSP, including a report of project status, funding, or completion.
- Monitoring crash data, including crash rates, changes over time, or before-and-after analyses of safety project implementation sites.
- Reporting key findings to the City Council.

STAFF RECOMMENDATION:

Staff recommends adopting the Local Road Safety Plan (LRSP) which assesses and identifies locations and safety needs to improve local road safety within the City.

EXHIBITS:

1. LRSP - February 2021
2. LRSP – Addendum April 2024

2024-04

City of National City

Systemic Safety Analysis Report Program (SSARP) / Local Roadway Safety Plan (LRSP)

February 2021

Prepared For:
City of National City
1243 National City Boulevard
National City, CA 91950

Submitted By:
Chen Ryan Associates, Inc.
3900 Fifth Avenue, Suite 310
San Diego, CA 92103

Engineers Seal

By signing and stamping this Systemic Safety Analysis Report, the engineer is attesting to this report's technical information and engineering data upon which local agency's recommendations, conclusions, and decisions are made.

Statement of Protection of Data from Discovery and Admissions

Section 148 of Title 23, United States Code [23 U.S.C. §145(h) (4)]:

REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION – Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.

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Executive Summary

The City of National City undertook a Citywide Systemic Safety Analysis Report Program (SSARP) / Local Roadway Safety Plan (LRSP) as a means to identify both citywide and site-specific safety issues facing pedestrians, bicyclists, and vehicles. The project examined the most recent 5-years of collision data available from the Statewide Integrated Traffic Records System (SWITRS), January 1, 2013 – December 31, 2017.

This project was funded through a Caltrans Systemic Safety Analysis Report Program grant and prepared in accordance with the SSARP guidelines. During the project, Caltrans initiated the Local Roadway Safety Plan program as a replacement of the SSARP. Some of the main differences between the two programs include stakeholder involvement and the identification of vision statement(s) and goal(s) to support the vision. These topics were incorporated into this project to ensure eligibility for future Highway Safety Improvement Program (HSIP) grant cycles.

Project Vision and Goals

The vision of National City SSARP/LRSP is to improve multimodal safety across National City by reducing fatal and severe injuries through traditional and innovative infrastructure, striping, and operational enhancements, and coordination with entities responsible for carrying out enforcement and education strategies.

The following goals are intended to support the vision:

- Secure grant funding to implement the countermeasures and roadway enhancements identified through this project and other efforts.
- Continue to coordinate with local law enforcement related to behavioral safety issues, such as speeding and driving under the influence.
- Continue to coordinate with non-profits, school districts, and other organizations to educate the public on safe behaviors related to mobility, such as safe walking and bicycling.

Project Approach

The collision records were reviewed and refined to develop a collision database of injury records occurring on City of National City roadways (excluding those on freeways, freeway ramps, property damage only collisions, and records that could not be geocoded). The total number of records in the final database was 977.

Safety issues were identified through three analyses efforts, 1) systemic collision matrices to look at citywide collisions holistically, 2) an assessment of high collision corridors based on high frequency collision intersections and segments, and 3) a focused review of collisions occurring on neighborhood streets – defined as two-lane roadways with a speed limit of 25 mph. From these issues, a series of recommendations or countermeasures were identified.

Systemic Collision Matrices & Citywide Recommendations

Separate matrices were prepared for collisions occurring within the intersection footprint and those along segments. These two groupings were further refined to display matrix sets consisting of all injury collisions and those resulting in a severe injury or fatality. Recommendations were developed to address the citywide findings, intended to be implemented across similar environments throughout the City.

The all injury intersection matrix featured 606 collisions, while 45 collisions were included within the severe injury or fatality intersection matrix. The intersection collision matrix incorporated behaviors (crash types and reported violations) as rows and roadway environments (intersection control and number of though-lanes) as columns. Table ES-1 displays the resulting intersection matrix for all injuries, while Table ES-2 focuses on the severe and fatal injury collisions.

The key issues identified with the systemic intersection matrix and resulting recommendations are presented in Table ES-3. The Caltrans Local Roadway Safety Manual (LRSM) countermeasure ID for the recommendation is also provided for each countermeasure, where relevant.

The all injury segment matrix consisted of 371 collision records. The severe and fatal injury segment matrix included 35 records. Similar to the intersection matrix, the segment matrix drew from behaviors (crash types and reported violations) as rows and roadway environments (posted speed limit and number of lanes) as columns. Table ES-4 displays the resulting segment matrix for all injuries. Table ES-5 shows the severe and fatal injury segment matrix.

The key issues identified with the systemic segment matrices and resulting recommendations are presented in Table ES-6.

Table ES-1 Intersection Matrix – All Injury Collisions

Row Labels	AWSC		Side Street Stop					Signalized									No Control	Roundabout	Yield	Grand Total
	2+2	4+2	2+2	3+2	4+2	4+4	5+2	2+2	3+2	3+3	4+2	4+3	4+4	5+2	5+3	5+4	2+2	2+2	2+2	
Broadside	2	2	41	6	44	3		10	3	1	50	10	34	8	4	13	3	2	7	243
Failure to yield/stop at limit line	1	1	29	3	17	1		8	2		34	6	16	6	3	11	3	2	3	146
Failure to yield/stop when making left turn			4	2	10	2		1	1		5		7							32
Unsafe turn			4	1	11			1		1	6		3							27
DUI		1			4						2	2	2	2		1				14
Other			1		1						2		3		1				1	9
Not Stated	1		1								1	1	2						1	7
Unsafe speed			2		1							1							2	6
Traffic Control Violation													1			1				2
Pedestrian-Vehicle	2	1	17	5	22			4	2	3	22	6	15	3		1	1		1	105
Failure to yield/stop at limit line	2	1	6	2	8			2	2	2	10	2	8	2					1	48
Pedestrian at-fault			7	1	8			2			8	2	4	1		1				34
Other					3						2						1			6
Not Stated				1	1							1	2							5
Unsafe turn										1	1	1	1							4
DUI			2	1							1									4
Unsafe speed			2		2															4
Rear End	3		4	4	21			3	1		19	3	13	4		1	1			77
Head-On			7	4	7		1	1			21	6	11	2			1		1	62
Bicycle-Vehicle	2	1	10		11			2	2		7	3	6			1		1	1	47
Hit Object			10	1	9			1		1	8	1	1	2	1		1			36
Sideswipe	1	1	2	1	4			1		2	3	2	2	1		2			1	23
Overturned				1	1						1	1				1				5
Not Stated			1								1		1						1	4
Bicycle: Hit Object					1															1
Pedestrian-Bicycle					1															1
Bicycle: Overturned					1															1
Other					1															1
Grand Total	10	5	92	22	123	3	1	22	8	7	132	32	83	20	5	19	7	3	12	606

Table ES-2 Intersection Matrix – Severe/Fatal Injury Collisions

	AWSC	Side Street Stop			Signalized							No Control	Grand Total
Row Labels	**2+2**	**2+2**	**3+2**	**4+2**	**2+2**	**3+3**	**4+2**	**4+3**	**4+4**	**5+2**	**5+4**	**2+2**	
Pedestrian-Vehicle		**6**	**1**	**6**		**2**	**3**	**1**	**2**				**21**
Failure to yield/stop at limit line		1		3		2	1		1				8
Pedestrian at-fault		1	1	1			1	1	1				6
DUI		2					1						3
Unsafe speed		2		1									3
Other				1									1
Broadside		**1**		**1**			**1**	**1**	**2**	**1**	**1**	**1**	**9**
Failure to yield/stop at limit line								1	1		1	1	4
Unsafe turn		1					1						2
DUI									1	1			2
Unsafe speed				1									1
Hit Object		**3**		**2**			**1**						**6**
Bicycle-Vehicle	**1**	**4**											**5**
Head-On		**1**			**1**		**1**						**3**
Overturned											**1**		**1**
Grand Total	**1**	**15**	**1**	**9**	**1**	**2**	**6**	**2**	**4**	**1**	**2**	**1**	**45**

Table ES-3 Systemic Intersection Issues and Recommended Countermeasures

Issue	Recommended Countermeasure[1]
Broadside Collisions	
Issue #1: Broadside collisions resulting from failure to yield or failure to stop at the limit line at signalized intersections, where: • 4-lane intersects with 2-lane • 4-lane intersects with 4-lane	Improve visibility of signal heads and intersections through the following: • S2 Improve signal hardware – one signal head per through lane on overhead mast arm (CRF 15%) • S18PB Install pedestrian crossing (continental crosswalks) (CRF 25% B&P) • S20PB Install advance stop bar before crosswalk (CRF 15% B&P)
Issue #2: Broadside collisions resulting from failure to yield or failure to stop at the limit line at side street stop-controlled intersections, where: • 2-lane intersects with 2-lane • 4-lane intersects with 2-lane	• NS2 Convert to all-way stop control (CRF 50%) • NS3 Install signals (CRF 30%) • NS6 Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs (CRF 15%) • NS11 Improve sight distance to intersection (clear sight triangles) (CRF 20%)
Issue #3: Broadside collisions resulting from failure to yield or failure to stop at the limit line when making left-turn at signalized intersections, where: • 4-lane intersects with 4-lane	• S6 Install left-turn lane and add turn phase (signal has no left-turn lane or phase before) (CRF 55%) • S7 Provide protected left turn phase (left-turn lane already exists) (CRF 30%)
Pedestrian Collisions	
Issue #1: Pedestrian collisions resulting from failure to yield to pedestrian in the crosswalk or failure to stop at the limit line at signalized intersections where: • 4-lane intersects with 2-lane • 4-lane intersects with 4-lane	• S6 Provide protected left turn phase • S20 Install pedestrian crossing (continental crosswalks) (CRF 25% B&P), consider: o Curb extensions o Pedestrian signage o NO RIGHT ON RED turn restrictions • S21 Install advance stop bar before crosswalk (CRF 15% B&P) • S22 Modify signal phasing to implement a Leading Pedestrian Interval (LPI) (CRF 60% B&P)
Issue #2: Pedestrian collisions resulting from pedestrian at-fault violations at signalized intersections	Encourage pedestrians to cross when they have the right-of-way and at legal crossing locations: • S19 Install pedestrian countdown signal heads (CRF 25% P&B • S20 Install pedestrian crossing (continental crosswalks) (CRF 25% B&P) • S21 Install advance stop bar before crosswalk (CRF 15% B&P) • S22 Modify signal phasing to implement a Leading Pedestrian Interval (LPI) (CRF 60% B&P)

Note: [1] Countermeasure ID and Crash Reduction Factor (CRF) obtained from Caltrans' Local Roadway Safety Manual, Version 1.5 (April 2020)

Table ES-4 Segment Matrix – All Injury Collisions

Row Labels	25 mph	30 mph				35 mph				40 mph			45 mph		50 mph	Grand Total
	2-Ln	2-Ln	3-Ln	4-Ln	5-Ln	2-Ln	3-Ln	4-Ln	5-Ln	3-Ln	4-Ln	5-Ln	4-Ln	5-Ln	4-Ln	
Rear End	10	4		5		7	9	39	6		6	1	4	1		92
Unsafe speed	2	4		2		1	4	17	4		4		2	1		41
Following too closely	1			1		1	2	12	2		2		1			22
Unsafe turn	2			2		3	1	2				1	1			12
DUI	4					2	1	5								12
Other	1						1	2								4
Not Stated								1								1
Broadside	3	5	1	6		10	6	47	2	1	3		4			88
Failure to yield/stop at limit line		3	1	1		2	5	24	2		1		3			42
Unsafe turn	1			3		4		11								19
Failure to yield/stop when making left turn	1	2		1		2	1	5		1	1					14
DUI								4			1					5
Not Stated						1		1					1			3
Other						1		1								2
Traffic Control Violation								1								1
Riding/driving on sidewalk				1												1
Following too closely	1															1
Pedestrian-Vehicle	17	3		5	1	6	6	20	1				1			60
Pedestrian at-fault	9	2		4	1	5	5	10					1			37
Failure to yield/stop at limit line	1							7								8
Other	3	1				1		1								6
Not Stated	2			1				2	1							6
Unsafe turn	1						1									2
Unsafe speed	1															1
Sideswipe	3	4		1		4	1	12	1		7		1	1		35
Hit Object	3	3	1	1		7	2	11			1		1	1		31
Bicycle-Vehicle	5	2		2		5	1	11	1						1	28
Head-On	1	1		1		6	2	7			3					21
Overturned	1			2				1	1						1	6
Bicycle: Hit Object	1						1				2					4
Not Stated	1				1	1										3
Bicycle: Overturned		1														1
Pedestrian-Bicycle	1															1
Other													1			1
Grand Total	46	23	2	23	2	46	28	148	12	1	22	1	12	3	2	371

Table ES-5 Segment Matrix – Severe/Fatal Injury Collisions

	25 mph	30 mph		35 mph				40 mph	45 mph	Grand Total
Row Labels	**2-Ln**	**2-Ln**	**4-Ln**	**2-Ln**	**3-Ln**	**4-Ln**	**5-Ln**	**4-Ln**	**5-Ln**	
Pedestrian-Vehicle	**2**	**1**	**1**	**1**	**1**	**7**	**1**			**14**
Pedestrian at-fault	1	1	1	1	1	7				12
Not Stated							1			1
Other	1									1
Hit Object				1		1		1	1	4
Head-On			1		1			2		4
Broadside				1	1	1				3
Rear End	1			1		1				3
Bicycle-Vehicle	1				1					2
Bicycle: Hit Object					1			1		2
Pedestrian-Bicycle	1									1
Overturned			1							1
Not Stated	1									1
Grand Total	**6**	**1**	**3**	**4**	**5**	**10**	**1**	**4**	**1**	**35**

Table ES-6 Systemic Segment Issues and Recommended Countermeasures

Issue	Recommended Countermeasure[1]
Rear End Collisions	
Rear end collisions resulting from unsafe speeds along 4-lane roadways.	• R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • R22 Install/upgrade signs with new fluorescent sheeting (CRF 15%) • R26 Install dynamic/variable speed warning signs (CRF 30%) • S10 or NS9 Install flashing beacons as advance warning (CRF 30%)
Broadside Collisions	
Broadside collisions resulting from failure to yield	• R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • NS15 Create directional median openings to allow (and restrict) left-turns and U-turns (CRF 50%)
Pedestrian Collisions	
Pedestrian collisions resulting from pedestrian at-fault violations at mid-block locations	Emphasize safe, legal crossing locations through the provision of continental crosswalks • R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • R35PB Install/upgrade pedestrian crossing (with enhanced safety features) (CRF 30%) • R37PB Install Rectangular Rapid Flashing Beacon (RRFB) (CRF 35%) • NS23PB Install Pedestrian signal (including Pedestrian Hybrid Beacon) (CRF 55%)

Note: [1] Countermeasure ID and Crash Reduction Factor (CRF) obtained from Caltrans' Local Roadway Safety Manual, Version 1.5 (April 2020)

High Collision Corridors & Recommendations

Collision frequencies were determined at intersections and along segments to identify high frequency collision locations, with a focus on those resulting in a severe or fatal injury. Figure ES-1 identifies intersections and segments that experienced severe or fatal injury collisions, and any intersections or segments with more than five reported collisions, regardless of injury severity. The figure also depicts the following seven high collision corridors that were focused on to identify issues and countermeasures:

- Euclid Avenue, from Beta Street to 18th Street
- Highland Avenue, from Division Street to SR-54 EB Ramps
- Plaza Boulevard / Paradise Valley Road, from Coolidge Avenue to E Plaza Boulevard
- 8th Street, from Harbor Drive to Paradise Valley Road/Plaza Boulevard
- 16th Street, from Wilson Avenue to Rachel Avenue
- 18th Street, from Wilson Avenue to Rachel Avenue
- 30th Street / Sweetwater Road, from Hoover Avenue to Plaza Bonita Center Way

Table ES-7 summarizes the issues and corresponding countermeasures identified for each corridor.

City of National City Systemic Safety Analysis Report Program

CHEN RYAN

Figure ES-1
High Collision Corridors

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
Highland Avenue, from Division Street to SR-54 EB Ramps	
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / Plaza Boulevard • Highland Avenue / 30th Street
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Highland Avenue / 3rd Street
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersections at: • Highland Avenue / 18th Street (southbound approach) • Highland Avenue / Plaza Boulevard (all approaches – restrict during school arrival/dismissal)
S17PB Install pedestrian countdown signal heads	Existing signalized intersection crossing legs at: • Highland Avenue / 18th Street • Highland Avenue / 24th Street • Highland Avenue / SR-54 WB Ramps
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 4th Street (east and west legs) • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / 18th Street • Highland Avenue / 21st Street • Highland Avenue / 24th Street • Highland Avenue / 30th Street • Highland Avenue / SR-54 WB Ramps

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
S20PB Install advance stop bar before crosswalk	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / Walmart Driveway (north and south legs) • Highland Avenue / 21st Street • Highland Avenue / 24th Street • Highland Avenue / SR-54 WB Ramps
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Existing signalized intersection crossing legs at: • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / 18th Street • Highland Avenue / 24th Street • Highland Avenue / 30th Street
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (provide advance yield markings on NB/SB approaches)	Northbound and Southbound approaches at: • Highland Avenue / 3rd Street • Highland Avenue / 5th Street • Highland Avenue / 6th Street • Highland Avenue / 13th Street • Highland Avenue / 14th Street
R8 Install raised median (provide turn pockets at intersections and major driveways; requires on-street parking removal)	Install along the following segment: • Highland Avenue, from 16th Street to SR-54 WB Ramps
Extend left-turn pocket (non-LRSM countermeasure)	Install at the following location: • Highland Avenue southbound left-turn pocket onto EB SR-54
Euclid Avenue, from Beta Street to 18th Street	

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 8th Street • Euclid Avenue / 16th Street • Euclid Avenue / 18th Street
S7 Provide protected left-turn phase (left-turn lane already exists)	All approaches at the intersection of: • Euclid Avenue / 4th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections: • Euclid Avenue / 4th Street • Euclid Avenue / 8th Street • Euclid Avenue / 16th Street • Euclid Avenue / 18th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Euclid Avenue / 8th Street
R14 Road diet (reduce travel lanes from 4 to 2 through lanes and a two-way left-turn lane and bike lanes)	Install along the following segment: • Euclid Avenue, from Division Street to 4th Street *** *project implemented during SSARP development* ***
Plaza Boulevard / Paradise Valley Road, from Coolidge Avenue to E Plaza Boulevard	
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / Plaza Boulevard • 8th Street / Plaza Boulevard / Paradise Valley Road
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Highland Avenue / Plaza Boulevard • 8th Street / Plaza Boulevard / Paradise Valley Road
S3 Improve signal timing (provide NO RIGHT ON RED signage during school arrival/dismissal periods)	Signalized intersection at: • Highland Avenue / Plaza Boulevard (all approaches – restrict during school arrival/dismissal)

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide marked crosswalks with advance yield/stop markings and curb extensions at the following intersections: • B Avenue / Plaza Boulevard • C Avenue / Plaza Boulevard • D Avenue / Plaza Boulevard • E Avenue / Plaza Boulevard
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segment: • Plaza Boulevard, from Euclid Avenue to the mid-block crossing to the east
R14 Road Diet (reduce travel lanes from four lanes to two through lanes and a two-way left-turn lane; maintain on-street parking)	Install along the following segment: • Plaza Boulevard, from National City Boulevard to Highland Avenue (General Plan buildout ADT = 17,600 – 19,900; designated as a Community Corridor)
8th Street, from Harbor Drive to Plaza Boulevard / Paradise Valley Road	
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersection at: • 8th Street / Plaza Boulevard / Paradise Valley Road
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 8th Street • 8th Street / Plaza Boulevard / Paradise Valley Road
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersection at: • National City Boulevard / 8th Street

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections: • Highland Avenue / 8th Street • Harbison Avenue / 8th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersections: • Highland Avenue / 8th Street • Harbison Avenue / 8th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersections: • National City Boulevard / 8th Street • Highland Avenue / 8th Street
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide high visibility marked crosswalks with advance yield/stop markings at the following location: • T Avenue / 8th Street (north and east legs) Provide curb extensions at the following location: • T Avenue / 8th Street (east leg)
NS22PB Install Rectangular Rapid Flashing Beacon (RRFB)	Install at the following location: • T Avenue / 8th Street (east leg)
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segments: • 8th Street, from Highland Avenue to K Avenue • 8th Street, from Palm Avenue to Rachael Avenue
16th Street, from Wilson Avenue to Rachel Avenue	
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 16th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersection: • D Avenue / 16th Street • Euclid Avenue / 16th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • D Avenue / 16th Street

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • D Avenue / 16th Street
Install curb extensions (non-LRSM countermeasure at signalized intersections)	At the northwest and southeast corners of: • D Avenue / 16th Street
18th Street, from Wilson Avenue to Rachel Avenue	
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersection at: • National City Boulevard / 18th Street ((northbound and southbound approaches)
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • National City Boulevard / 18th Street • Euclid Avenue / 18th Street
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersection at: • Highland Avenue / 18th Street (southbound approach)
S17PB Install pedestrian countdown signal heads	Existing signalized intersection crossing legs at: • Highland Avenue / 18th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 18th Street • L Avenue / 18th Street • Euclid Avenue / 18th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Highland Avenue / 18th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • Highland Avenue / 18th Street

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide high visibility marked crosswalks with advance yield/stop markings at the following locations: • J Avenue / 18th Street • K Avenue / 18th Street (south and east legs) Provide curb extensions at the following locations: • J Avenue / 18th Street • K Avenue / 18th Street (south and east legs)
R01 Add segment lighting	Install/enhance along the following segment: • 18th Street, from J Avenue to L Avenue
Install curb extensions (non-LRSM countermeasure at signalized intersections)	At the intersection of: • L Avenue / 18th Street
30th Street / Sweetwater Road, from Hoover Avenue to Plaza Bonita Center Way	
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / 30th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 30th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Existing signalized intersection crossing legs at: • Highland Avenue / 30th Street
NS06 Install/upgrade larger or additional stop signs or other intersection warning regulatory signs	Provide DO NOT CROSS pedestrian signage at the following locations: • I Avenue / 30th Street (east and west legs to prevent pedestrians from crossing 30th Street) Provide NO LEFT TURN signage at the following location: • Sweetwater Square Driveway exit / 30th Street
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segment: • 30th Street, from Highland Avenue to J Avenue
R26 Install dynamic/variable speed warning signs	Install along the following segment: • 30th Street / Sweetwater Road, from Stockman Street / Plaza Bonita Road to Plaza Bonita Center Way

Table ES-7 High Collision Corridor Countermeasure Summary Table

Recommended Countermeasures[1]	Location(s)
R33PB Install separated bike lanes	Install along the following segment: • 30th Street, from Hoover Street to 2nd Avenue

Note: [1] Countermeasure ID and title obtained from Caltrans' Local Roadway Safety Manual, Version 1.5 (April 2020)

Neighborhood Countermeasures

An additional focus was placed on reviewing collisions occurring along two-lane roadways with a posted speed limit of 25 miles per hour, in response to community member concerns related to safety within residential neighborhoods.

A total of 103 collisions were identified within these environments, including 57 collisions within the intersection footprint and 46 collisions along segments. Table ES-8 provides a toolbox of neighborhood countermeasures to be considered within these environments. The Caltrans LRSM countermeasure name and ID are provided, where relevant.

Table ES-8 Countermeasures for Neighborhood Streets

Type	Countermeasure	Notes
Lighting	NS01 / R01 Add intersection/segment lighting	Providing a permanent source of power and maintenance considerations should be considered.
Control	NS02 Convert to all-way STOP control (from two-way or Yield control)	Requires warrant analysis.
Control	NS03 Install signals	Requires warrant analysis.
Control	NS04 Convert intersection to roundabout (from all way stop) NS05 Convert intersection to roundabout (from stop or yield control on minor road)	May require acquisition of additional right-of-way. Requires warrant analysis.
Operation / Warning	NS06 Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	Can be used to enhance visibility of stop signs, yield signs, or to warn drivers to anticipate pedestrians/bicyclists.
Operation / Warning	NS07 Upgrade intersection pavement markings	Improves intersection visibility to approaching motorists. Typical applications include “Stop Ahead” markings, centerlines and stop bars.
Operation / Warning	NS08 Install flashing beacons at stop-controlled intersections	Flashing beacons help reinforce driver awareness of stop signs. Most effective along segments with long stretches between intersections and locations where night-time visibility is an issue. Solar may be a source of power.
Operation / Warning	NS09 Install flashing beacons as advance warning	Flashing beacons help alert drivers to anticipate an upcoming control and mitigate crashes related to intersection regulatory sign violations.
Operation / Warning	NS11 Improve sight distance to intersection (clear sight triangles)	Adequate sight distance is an important factor to unsignalized intersection safety. Removing or modifying landscaping or fixed objects and prohibiting parking right at the intersection are examples of methods to improve sight distance. May result in loss of on-street parking. Some objects or landscaping may be located on private property, requiring coordination with the property owner.
Operation / Warning	R22 Install/upgrade signs with new fluorescent sheeting (regulatory or warning)	Fluorescent yellow sheeting or other retroreflective material improves driver awareness of roadway signage.
Geometric Modifications	NS13 Install splitter-islands on the minor road approaches	Limits vehicular access to right-in and/or right-out.
Geometric Modifications	Install speed cushions / humps (non-LRSM countermeasure)	Helps encourage slower driver speeds. Speed cushions are intended to be spaced so as not to interfere with the larger wheelbases of emergency response vehicles. Most effective when multiple devices are deployed.
Pedestrian and Bike	NS20PB Install pedestrian crossing at uncontrolled locations (signs and markings only)	Additional safety enhancements to improve visibility of the crossing location and reduce vehicle speeds should be considered. Curb ramps and/or sidewalk modifications may be required.

Table ES-8 Countermeasures for Neighborhood Streets

Type	Countermeasure	Notes
Pedestrian and Bike	NS21PB/R35PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Measures to improve visibility of a pedestrian crossing and/or shorten the crossing distance can enhance safety. Examples include advance stop/yield markings, curb extensions, additional signage, and in road flashing lights.
Pedestrian and Bike	NS22PB Install Rectangular Rapid Flashing Beacon (RRFB)	An RRFB can increase driver awareness of a crossing and increase the effectiveness of crossing treatments. Can be deployed at intersection and mid-block locations.
Pedestrian and Bike	R32PB Install bike lanes	Bike lanes provide a dedicated space for bicyclists, helping to facilitate predictable behaviors. Painted buffers can add additional separation between bicyclists and parked and/or moving vehicles. Implementation may require on-street parking removal.
Pedestrian and Bike	R34PB Install sidewalk/pathway (to avoid walking along roadway)	Providing sidewalks along both sides of the street can greatly reduce pedestrian-involved collisions. Curb ramps, crosswalks, lighting, and other features should be considered.
Pedestrian and Bike	R36PB Install raised pedestrian crossing	Suitable for lower speed roadways. Should be used in combination with additional signs and markings.

Prioritized Safety Projects

The high collision corridor countermeasures (Table ES-7) were examined to identify high priority projects to pursue grant funding for. The following factors were reviewed and considered:

- Severe/fatal injury collisions
- High frequency collision intersections and segments
- Future planned improvements
- Project location and surrounding land uses

Consistent with HSIP grant requirements a total of three countermeasures were selected for grouping into a project, including:

- S17PB: Install pedestrian countdown signal heads
- S20PB: Install advance stop bar before crosswalk (Bicycle Box)
- S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

Instead of limiting countermeasures to individual high collision corridors, a systemic approach was utilized, selecting eight intersections across multiple corridors. This process was intended to maximize the Benefit/Cost ratio (BCR) for the project and address locations with the greatest potential safety challenges. The locations were then grouped by countermeasure type. Four final countermeasure groups were identified:

Countermeasure Group 1: S17PB & S21PB

Location:

- Harbison Avenue / E Plaza Boulevard

Countermeasure Group 2: S20PB & S21PB

Locations:

- Harbison Avenue / E 8th Street
- E Plaza Boulevard / Highland Avenue
- Highland Avenue / E 8th Street

Countermeasure Group 3: S20PB

Location:

- Highland Avenue / E 21st Street

Countermeasure Group 4: S21PB

Locations:

- Highland Avenue / E 18th Street
- National City Boulevard / E 8th Street
- Highland Avenue / E 30th Street

The total project cost was estimated to be $427,500, with a resulting BCR of 42.66.

1. Introduction

The City of National City undertook a Citywide Systemic Safety Analysis Report Program (SSARP) / Local Roadway Safety Plan (LRSP) as a means to identify both citywide and site-specific safety issues facing pedestrians, bicyclists, and vehicles. The project examined the most recent 5-years of collision data available from the Statewide Integrated Traffic Records System (SWITRS), January 1, 2013 – December 31, 2017.

This project was funded through a Caltrans Systemic Safety Analysis Report Program grant and prepared in accordance with the SSARP guidelines. During the project, Caltrans initiated the Local Roadway Safety Plan program as a replacement of the SSARP. Some of the main differences between the two programs include stakeholder involvement and the identification of vision statement(s) and goal(s) to support the vision. These topics were incorporated into this project to ensure eligibility for future Highway Safety Improvement Program (HSIP) grant cycles.

Project Vision and Goals

The vision of National City SSARP/LRSP is to improve multimodal safety across National City by reducing fatal and severe injuries through traditional and innovative infrastructure, striping, and operational enhancements, and coordination with entities responsible for carrying out enforcement and education strategies.

The following goals are intended to support the vision:

- Secure grant funding to implement the countermeasures and roadway enhancements identified through this project and other efforts.
- Continue to coordinate with local law enforcement related to behavioral safety issues, such as speeding and driving under the influence.
- Continue to coordinate with non-profits, school districts, and other organizations to educate the public on safe behaviors related to mobility, such as safe walking and bicycling.

Stakeholder Coordination

The City of National City staff maintain close working relationship with law enforcement (City of National City Police Department) and educational (National School District, Sweetwater Unified High School District) entities. Through these relationships, issues and strategies are shared, working towards the common goal of improved safety.

For over a decade, the City of National City has partnered with the National School District, Sweetwater Unified High School District, principals, parents, volunteers and community organizations on various Safe Routes to School Program initiatives. These relationships have been instrumental in securing grant funding for safety infrastructure enhancements for children walking and bicycling to school, as well as education, encouragement, and training campaigns. In

the past, the National City Safe Routes to School Program Task Force has partnered with the National City Police Department to identify high priority locations for school zone traffic enforcement. Additional examples include establishing a Parent Safety Patrol program to train expert observers to watch over pedestrian and driver behavior, participation in the Walk to School events, and hosting of events to celebrate the completion of safety enhancement projects.

Fostering these relationships has become a critical part of the City's approach to safety, resulting in lasting positive impacts on the community. Coordinating with these stakeholders will remain a key strategy moving forward.

Report Organization

This report documents the data and analysis techniques utilized, key findings and resulting recommendations. Following this introductory section, the report is organized into the following chapters:

Chapter 2. Safety Data Utilized – Summarizes the collision data utilized and process used to build the final collision database. The process used to categorize a record as an intersection or segment record is described. Finally, the sources of vehicular count data and process used to develop daily estimates of vehicles entering the intersection are described.

Chapter 3. Data Analysis Techniques – Outlines each of the techniques employed to analyze the data, develop the project approach and propose recommendations.

Chapter 4. Highest Occurring Crash Types & Citywide Recommendations – Describes the findings and recommended countermeasures resulting from a Citywide analysis of the leading crash types, as well as countermeasures to consider within residential neighborhoods which are addressed in response to community member concerns.

Chapter 5. High-Collision Corridors and Intersections & Recommended Countermeasures – Documents the high-collision corridor and intersection findings, the key issues identified along each corridor, and recommended countermeasures.

Chapter 6. Prioritized Project Scope & Crash Reduction Factors – Identifies the high priority project, project scope, crash reduction factors, and resulting Benefit/Cost ratio.

2. Safety Data Utilized

Collision Database

Collision data was obtained for the City of National City from the Statewide Integrated Traffic Records System (SWITRS) for the most recent completed 5-year period, January 1, 2013 - December 31, 2017. The raw data for the City of National City SWITRS contained a total 3,286 collision records over the 5-year request period. These records were reviewed and refined to develop a collision database of injury records occurring on City of National City roadways.

All collision records resulting in property damage only (PDO) were removed from the study population, reducing the total number of records to 1,676 over the 5-year period. Eliminating all collision records listing freeways as primary roadways reduced the total number of records to 1,006. Of the 1,006 collision records, 98% were successfully geocoded, reducing the study population of collision records to 982.

During the process of reviewing and assigning location types to the geocoded collisions, an additional 5 records were removed from the analysis due to inaccurate geocodes (and without sufficient locational information to correct the mistaken location). These records either occurred outside of the city limits despite being included in the National City dataset or their geocoded location occurred off of the roadway, thereby eliminating any possibility to assign roadway characteristics to the records accurately. This reduced the total number of records in the final database to 977.

Categorization

The categorization process involved referencing the distance offset from the nearest cross-street as well as reviewing the geocoded collision records against satellite imagery. Records falling within the limits of the intersection (using stop bar or crosswalk as limits) were categorized as intersection collisions. All remaining records were considered segment collisions.

Table 2-1 and Figure 2-1 displays the categorization results for each mode and severe/fatal injury collisions

Table 2-1 Collisions by Location and Mode

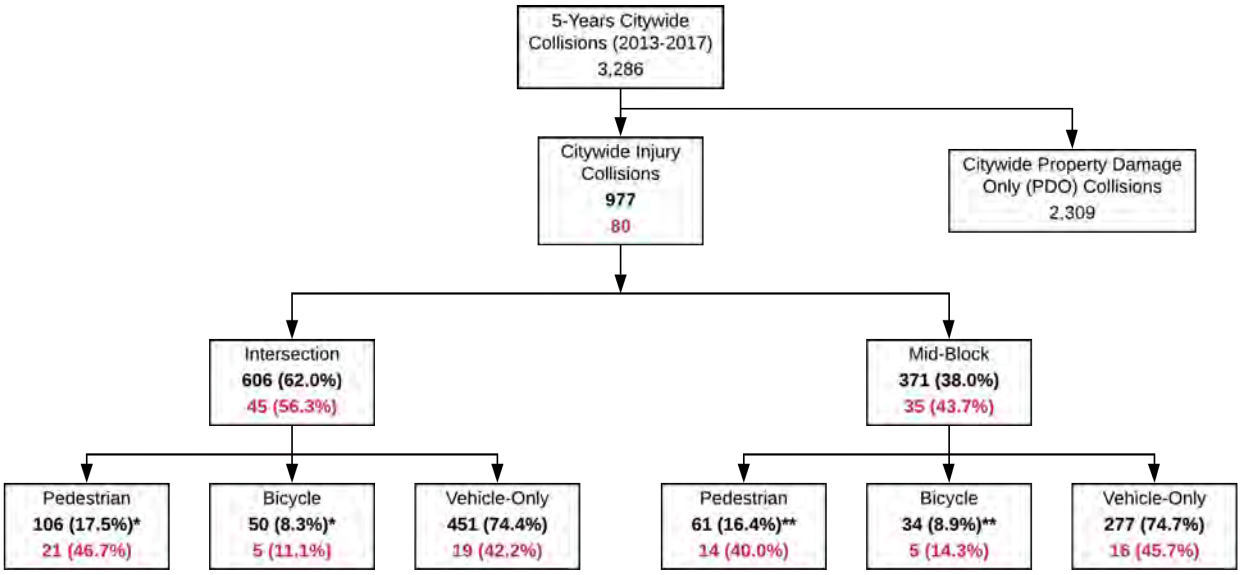
	All Modes		Vehicular Only		Pedestrian		Bicycle	
	All Injury	Severe / Fatal	All Injury	Severe / Fatal	All Injury	Severe / Fatal	All Injury	Severe / Fatal
Intersection	606[1]	45	451	19	106	21	50	5
Segment	371[2]	35	277	16	61	14	34	5
Total	977[1,2]	80	728	35	167	35	84	10

Source: SWITRS (2018)

Notes:

1. One (1) intersection collision involved a pedestrian and a bicycle (no vehicles). This collision was recorded under All Injury for each mode individually but counted once for All Modes. This collision did not result in a severe or fatal injury.
2. One (1) segment collision involved a pedestrian and a bicycle (no vehicles). This collision was recorded under All Injury for each mode individually but counted once for All Modes. This collision resulted in a fatal injury (to the bicyclist), and was counted under the Severe/Fatal bicycle total and Severe/Fatal total for All Modes.

Figure 2-1 Collisions by Location and Mode



Black: All Injury Collisions
Red: Severe/Fatal Collisions
% is calculated based on the total of the previous row

* One intersection collision involved a pedestrian and a bicyclist. This collision was recorded under All Injury for both modes individually but counted once for All Modes. This collision did not result in a severe or fatal injury.

** One mid-block collision involved a pedestrian and a bicyclist. This collision was recorded under All Injury for both modes individually but counted once for All Modes. This collision resulted in a fatal injury to the bicyclist and was counted under the Severe/Fatal bicycle total and Severe/Fatal total for All Modes.

3. Data Analysis Techniques

The following techniques were used to analyze the five-years of collision data and develop recommendations: 1) systemic collisions matrices, 2) focused review of collisions within low-speed, low-volume neighborhood streets, 3) identification of high collision frequency intersections and segments, 4) focused analyses on high collision corridors, and 5) a best practices and document review of currently adopted planning documents and information to identify currently planned improvements. Each of these approaches is further described in this section.

Systemic Collision Matrices

Severe and fatal collisions across the City were the focus of the systemic collision matrices. Separate matrices were prepared for collisions occurring within the intersection footprint and those along segments. This approach enabled collisions occurring in similar roadway environments to be viewed holistically and better understand potential citywide trends related to roadway safety.

The findings were used to propose countermeasures that can be implemented citywide. The formation of the systemic collision matrices, key findings and resulting recommendations are presented in Chapter 4 Highest Occurring Crash Types & Citywide Recommendations.

Neighborhood Countermeasures

A focus was placed on reviewing collisions occurring along two-lane roadways with a posted speed limit of 25 miles per hour with the intent of recommending enhancements for consideration. This effort was in response to community member concerns related to safety within residential neighborhoods.

Collisions along two-lane roadways with a posted speed limit of 25 miles per hour were identified and mapped citywide, indicating concentrations in some areas of the City. A toolbox of countermeasures appropriate within these environments was recommended.

High Collision Frequency Intersections and Segments

Collision frequencies were determined at individual intersection and segment locations. Frequencies were looked at in terms of vehicular only, pedestrian-involved, bicycle-involved, all modes combined, as well as severe/fatal injury frequency. The high collision frequency analysis results are provided in Chapter 5 High-Collision Corridors and Intersections & Recommended Countermeasures. The findings from this exercise were used to assemble high collision corridors to identify site-specific issues and recommend countermeasures.

Focused Corridor Analyses

Using the high collision frequency results, seven corridors were assembled to identify issues that may exist in adjacent areas and determine the potential for corridor-wide recommendations. The seven corridors encompass 11 high collision frequency segments and 30 high collision frequency intersections. The analysis results, issues identified, and recommended countermeasures are presented in Chapter 5 High-Collision Corridors and Intersections & Recommended Countermeasures.

Best Practices and Document Review

One of the initial steps undertaken as part of this project was to review documents that guide systemic safety analysis efforts and relevant planning documents from the City of National City. The guiding documents were used to inform the overall analysis approach, resulting in the decision to identify high frequency collision intersections and segments by mode, and develop a citywide collision matrix to better understand the roadway environments where different crash types are occurring.

The City of National City documents reviewed consist of two documents types, 1) current documents related to the development of systemic safety analysis and report preparation; and 2) existing City of National City efforts including documents containing safety related policies, practices, and currently planned improvements. The following documents were included in the review:

Systemic Safety Analysis Summary

- FHWA Systemic Safety Project Selection Tool (2013)
- Caltrans Systemic Safety Analysis Report Program Guidelines (2016)
- Caltrans Local Roadway Safety Manual – Version 1.3 (2016)
- Caltrans Pedestrian Safety Improvement Program (2014)
- Caltrans California Strategic Highway Safety Plan (2015)

City of National City Review

- Highway Safety Improvement Program (HSIP) Grant Applications (2018)
- Five Year Capital Improvement Program – FY 2019-2023 (2015)
- General Plan Circulation Element (2012)
- National City SMART Foundation (2014)
- Bicycle Master Plan (2011)

The Best Practices and Document Review is provided as Appendix A.

4. Highest Occurring Crash Types & Citywide Recommendations

An analysis was undertaken to identify citywide collision trends for pedestrians, bicyclists, and driver-only collisions. This effort examined characteristics attributed to collision records such as party-at-fault, cause, violation code, party action or movement, lighting conditions, time of day, and age. Roadway location – intersection or midblock – and intersection control type were also reviewed. These results informed the development of systemic collision matrices, used to better understand the behaviors and environments in which severe and fatal injury collisions occurred. The matrix findings informed the development of citywide recommendations for consideration.

This chapter presents some of the findings from the citywide collision trend analysis, followed by the matrices and citywide recommendations. The complete collision trend analysis is provided as Appendix B.

Pedestrian Collisions

Figure 4-1 and Table 4-1 display injury severity by roadway location for the 167 pedestrian-involved collisions. A total of 36 collisions resulted in a severe injury or fatal situation, accounting for 22% of pedestrian-involved collisions, the highest rate of any of the three modes, an indication of the vulnerability of pedestrians compared to other users.

Pedestrian-involved collisions were most reported within intersections (63%, 106/167), including 56 records at signalized intersections, 48 at stop-controlled intersections, and 2 records at intersections with other control types. Of the 36 severe injury/fatal collisions, 21 were reported within an intersection, however, 73% (8/11) of the fatal pedestrian collisions occurred at mid-block locations. This may be attributed to the higher vehicle speeds inherent at these locations.

Figure 4-1 Pedestrian Collision Injury Severity by Roadway Location

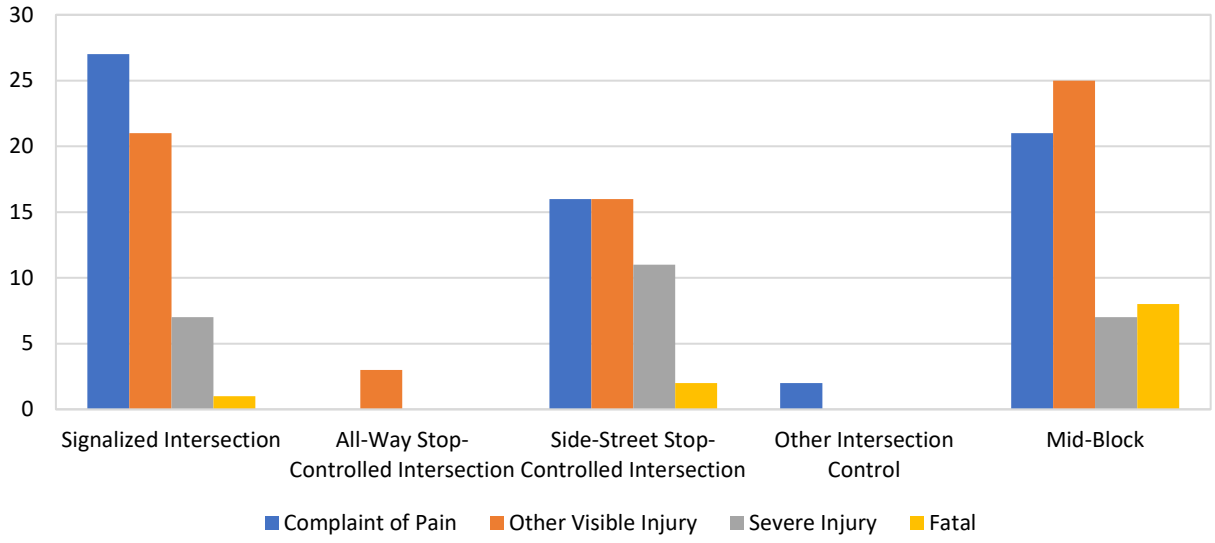


Table 4-1 Pedestrian Collision Injury Severity by Roadway Location

Severity	Signalized Intersection	All-Way Stop-Controlled Intersection	Side-Street Stop-Controlled Intersection	Other Intersection Control	Mid-Block	TOTAL
Complaint of Pain	27	-	16	2	21	66
Other Visible Injury	21	3	16	-	25	65
Severe Injury	7	-	11	-	7	25
Fatal	1	-	2	-	8	11
TOTAL	56	3	45	2	61	167

Figure 4-2 displays the party-at-fault by roadway location for pedestrian involved collisions where fault was assigned. No fault was assigned for 29 of the records, including 16 at intersections and 13 at mid-block locations. Drivers were more frequently assigned fault for collisions occurring at intersections (62% or 56/90 collisions where fault was assigned), while pedestrians were the leading party-at-fault for collisions reported at mid-block locations (73%, 35/48 collisions where fault was assigned). A bicyclist was assigned fault for one collision reported at a side-street stop-controlled intersection.

Figure 4-2 Pedestrian Collision Party-at-Fault by Roadway Location

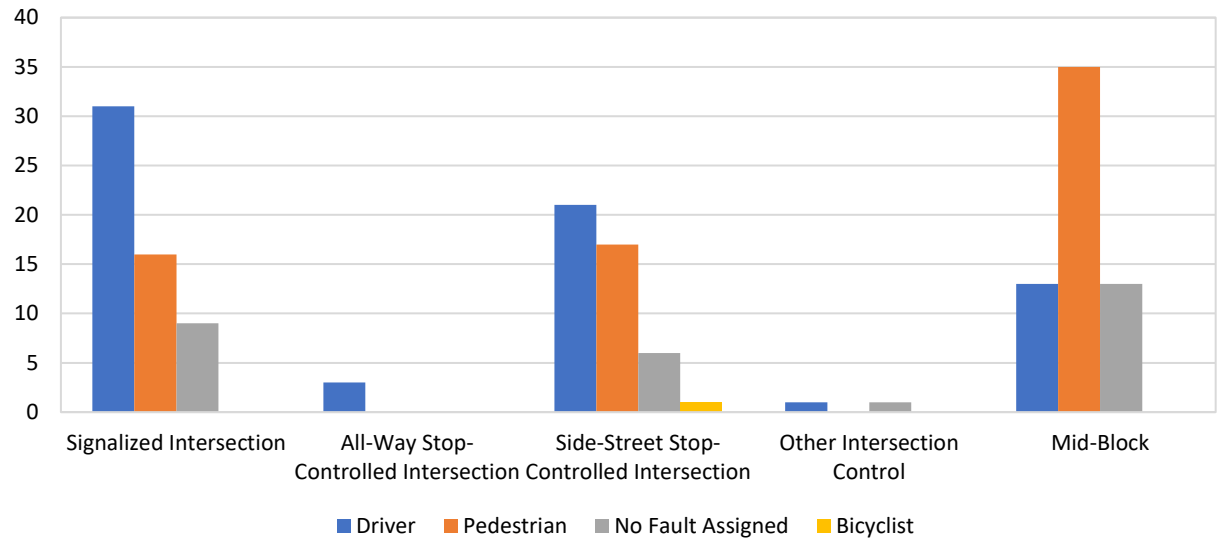


Table 4-3 presents violation codes by level of injury severity for all pedestrian-involved collisions. The most frequent violation code for all injury collisions was 21950(a), vehicles failing to yield to pedestrians within a crosswalk, was assigned to 38 of the 167 records. Violation code 21954(a), pedestrian failure to yield upon roadway outside of crosswalk, was the second leading violation code overall (30 collisions), although attributed to the greatest number severe injury or fatal collisions (9 collisions). Codes 21950(a) and 21955 – pedestrian not crossing at the crosswalk – were each assigned to five severe/fatal collisions, the second highest among severe/fatal collision records.

Table 4-2 Pedestrian Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	Fatal	TOTAL
21950(a)	The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection, except as otherwise provided.	17	16	5	-	38
21954(a)	Every pedestrian upon a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles upon the roadway so near as to constitute an immediate hazard.	8	13	6	3	30
21950(b)	No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard.	13	8	3	1	25
-	Not Stated/Unknown	6	7	-	1	14
21955	Between adjacent intersections controlled by traffic control signal devices or by police officers, pedestrians shall not cross the roadway at any place except in a crosswalk.	3	1	3	2	9
21453(a)	A driver facing a steady circular red signal alone shall stop at a marked limit line, but if none, before entering the crosswalk on the near side of the intersection or, if none, then before entering the intersection, and shall remain stopped until an indication to proceed is shown, except as provided in subdivision (b).	2	5	-	-	7
22107	No person shall turn a vehicle from a direct course or move right or left upon a roadway until such movement can be made with reasonable safety…	5	1	-	-	6
22350	Unsafe speed for prevailing conditions.	1	1	2	2	6
21456(b)	"Don't walk" or "wait" or "upraised hand," pedestrian crossing against.	3	1	-	1	5
22106	No person shall start a vehicle stopped, standing, or parked on a highway, nor shall any person back a vehicle on a highway until such movement can be made with reasonable safety.	3	1	-	-	4
21461.5	Pedestrian, failure to obey any sign or signal.	-	2	1	-	3
21950	Crosswalks, failure to yield to pedestrians within.	2	-	-	-	2
22450(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop at a limit line, if marked, otherwise before entering the crosswalk on the near side of the intersection.	-	1	1	-	2
23152(a)	It is unlawful for a person who is under the influence of any alcoholic beverage to drive a vehicle.	-	-	2	-	2
23153(a)	Driving a vehicle under the influence of alcohol and causing injury or death to another.	-	1	-	1	2

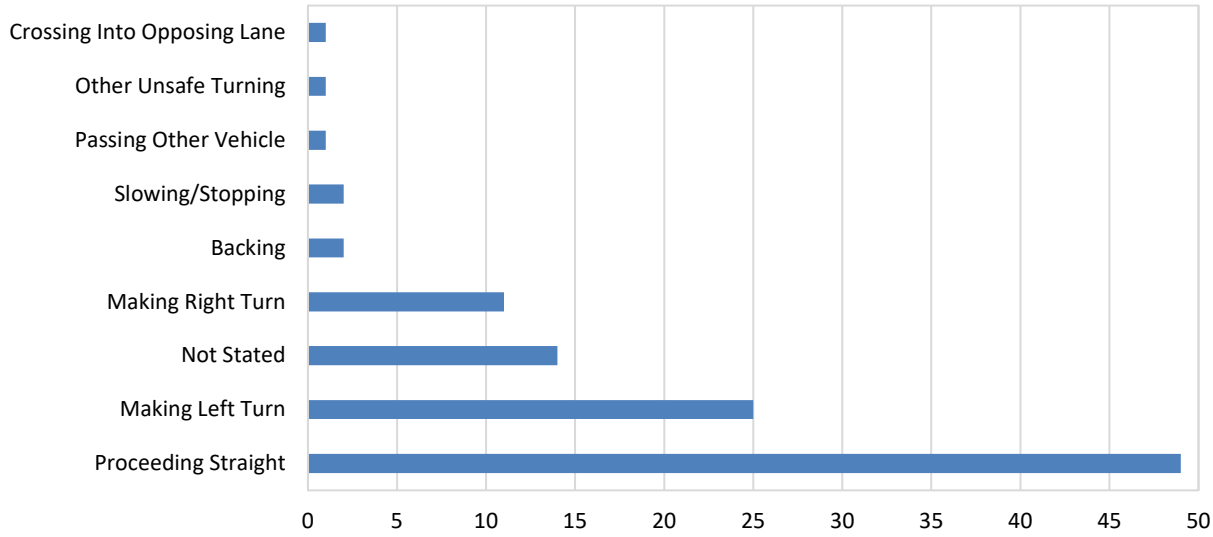
Table 4-2 Pedestrian Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	Fatal	TOTAL
21651	Divided highways, driving over, upon or across dividing section; left or semicircular U-turn except through marked opening.	-	-	1	-	1
21952	Sidewalk, failure to yield to pedestrian on.	-	1	-	-	1
20001(a)	Hit-run, injury or death, immediate report of fatal.	1	-	-	-	1
21451(b)	Green arrow, shall enter intersection only to make movement indicated.	-	1	-	-	1
21453(d)	Pedestrian facing circular red or red arrow, shall not enter roadway.	-	1	-	-	1
21456(a)	"Walk" pedestrian failure to yield right-of-way to vehicles already in crosswalk.	1	-	-	-	1
21654(b)	Slower vehicle, in left lane(s).	-	1	-	-	1
21802(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop as required by Section 22450. The driver shall then yield the right-of-way to any vehicles which have approached from another highway, or which are approaching so closely as to constitute an immediate hazard, and shall continue to yield the right-of-way to those vehicles until he or she can proceed with reasonable safety.	-	1	-	-	1
21804(a)	The driver of any vehicle about to enter or cross a highway from any public or private property, or from an alley, shall yield the right-of-way to all traffic, as defined in Section 620, approaching on the highway close enough to constitute an immediate hazard, and shall continue to yield the right-of-way to that traffic until he or she can proceed with reasonable safety.	1	-	-	-	1
21950(c)	Failure to exercise due care and reduce speed of the vehicle for pedestrians.	-	-	1	-	1
22450(b)	Stop sign at railroad crossing, stop at a limit line, first track or entrance to railroad grade crossing.	-	1	-	-	1
23104(a)	Reckless driving, causing bodily injury.	-	1	-	-	1
	TOTAL	66	65	25	11	167

Figure 4-3 displays the driver movement preceding the 106 pedestrian collisions that occurred within intersections. Nearly half of the driver movements were reported as Proceeding Straight (46%, 49/106), followed by the driver Making a Left Turn (34%, 36/106). Nearly half of the signalized intersections collisions where the driver was found to be at-fault the driver was Making a Left Turn (48%, 15/31).

During all three fatalities within intersections, the driver was Proceeding Straight. Of the 10 severe injuries at intersections, the driver was Proceeding Straight half of the time (50%, 5/10), and making a turn preceding four collisions (3 left, 1 right).

Figure 4-3 Pedestrian Intersection Collisions by Driver Movement



Bicycle Collisions

Figure 4-4 and Table 4-3 display bicycle collision injury severity by roadway location. Approximately 60% (49/82) of bicycle-involved collisions were reported within intersections, largely at side street stop-controlled (23) and signalized (21) intersections.

Other Visible Injury was the most frequent level of injury severity reported (48%, 39/82), followed by Complaint of Pain (41%, 34/82). Nine severe injuries were reported, primarily at side-street stop-controlled intersections (44%, 4/9) and mid-block locations (44%, 4/9). No bicycle fatalities were reported during the five-year study period.

Figure 4-4 Bicycle Collision Injury Severity by Roadway Location

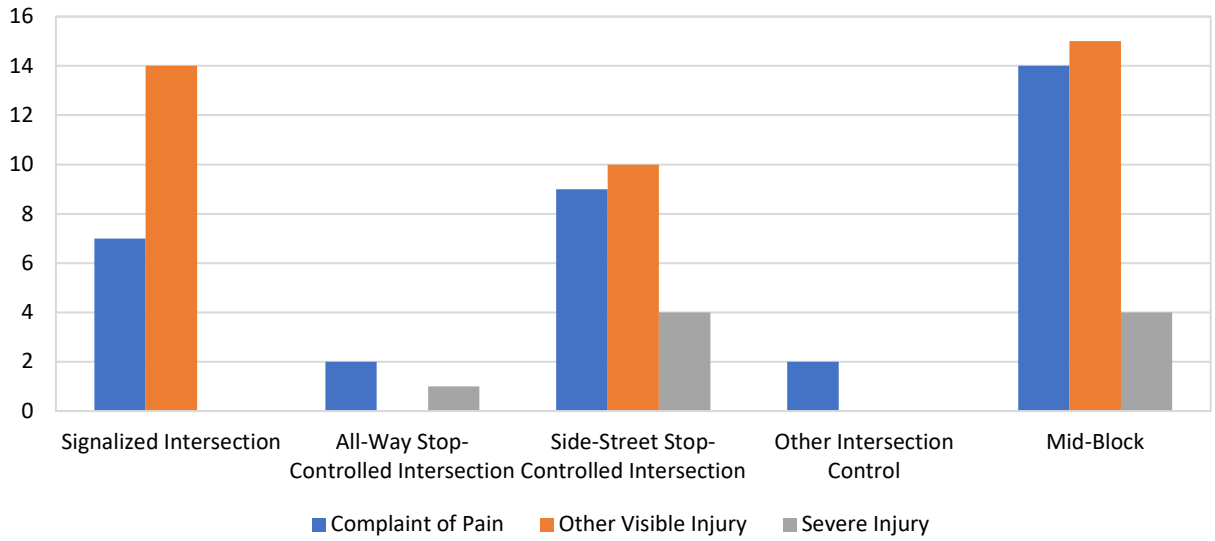


Table 4-3 Bicycle Collision Injury Severity by Roadway Location

Severity	Signalized Intersection	All-Way Stop-Controlled Intersection	Side Street Stop-Controlled Intersection	Other Intersection Control	Mid-Block	TOTAL
Complaint of Pain	7	2	9	2	14	34
Other Visible Injury	14	-	10	-	15	39
Severe Injury	-	1	4	-	4	9
TOTAL	21	3	23	2	33	82

Figure 4-5 displays the party-at-fault by roadway location for bicycle collisions. Bicyclists were overwhelmingly reported as the party-at-fault at side-street stop-controlled intersections (78%, 18/23) and mid-block locations (70%, 23/33). These two locations were also where the majority of severe injuries were reported.

Figure 4-5 Bicycle Collision Party at Fault by Roadway Location

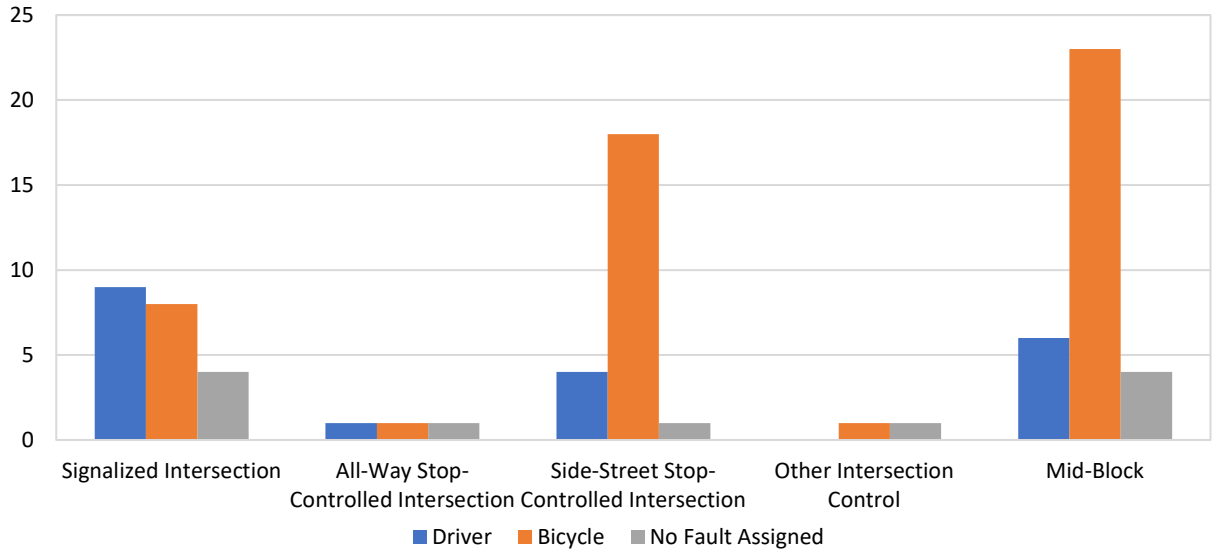


Table 4-4 presents violation codes by injury severity. The most frequently reported violation code was 21650.1, "Bicycle on roadway or shoulder required to be operated in same direction as motor vehicles", assigned to 12% (10/82) of the records, including one severe injury. The second leading violation was failure to yield to traffic with the right-of-way, 21804(a), reported for 10% (8/82) of the records, including one severe injury.

Two violation codes were reported for two severe injury collisions each, include 22350, unsafe speeds, and 22450(a), failure to stop at the limit line.

Table 4-4 Bicycle Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	TOTAL
21650.1	A bicycle operated on a roadway, or the shoulder of a highway, shall be operated in the same direction as vehicles are required to be driven upon the roadway.	5	4	1	10
21804(a)	The driver of any vehicle about to enter or cross a highway from any public or private property, or from an alley, shall yield the right-of-way to all traffic, as defined in Section 620, approaching on the highway close enough to constitute an immediate hazard, and shall continue to yield the right-of-way to that traffic until he or she can proceed with reasonable safety.	2	5	1	8
22107(a)	A driver having yielded as prescribed in subdivision 21802(a) may proceed to enter the intersection, and the drivers of all other approaching vehicles shall yield the right-of-way to the vehicle entering or crossing the intersection.	3	4	-	7
21202(a)	Any person operating a bicycle upon a roadway at a speed less than the normal speed of traffic moving in the same direction at that time shall ride as close as practicable to the right-hand curb or edge of the roadway…	4	3	-	7
--	Not Stated	1	4	1	6
21453(a)	A driver facing a steady circular red signal alone shall stop at a marked limit line, but if none, before entering the crosswalk on the near side of the intersection or, if none, then before entering the intersection, and shall remain stopped until an indication to proceed is shown, except as provided in subdivision (b).	1	4	-	5
21650	Right half of roadway, failure to drive on.	1	3	-	4
21663	Driving on sidewalk, except when permitted.	3	1	-	4
22350	Unsafe speed for prevailing conditions.	1	1	2	4
21802(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop as required by Section 22450. The driver shall then yield the right-of-way to any vehicles which have approached from another highway, or which are approaching so closely as to constitute an immediate hazard, and shall continue to yield the right-of-way to those vehicles until he or she can proceed with reasonable safety.	1	2	1	4
21801(a)	The driver of a vehicle intending to turn to the left or to complete a U-turn upon a highway, or to turn left into public or private property, or an alley, shall yield the right-of-way to all vehicles approaching from the opposite direction which are close enough to constitute a hazard at any time during the turning movement, and shall continue to yield the right-of-way to the approaching vehicles until the left turn or U-turn can be made with reasonable safety.	2	1	-	3

Table 4-4 Bicycle Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	TOTAL
22450(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop at a limit line, if marked, otherwise before entering the crosswalk on the near side of the intersection.	1	-	2	3
21800(a)	Uncontrolled intersection, yield to first vehicle within.	2	-	-	2
21950(a)	The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection, except as otherwise provided.	1	1	-	2
21200.5	Riding a bicycle while under the influence of alcohol, drugs, or both.	-	1	-	1
21703	The driver of a motor vehicle shall not follow another vehicle more closely than is reasonable and prudent, having due regard for the speed of such vehicle and the traffic upon, and the condition of, the roadway.	-	1	-	1
21750	The driver of a vehicle overtaking another vehicle proceeding in the same direction shall pass to the left at a safe distance without interfering with the safe operation of the overtaken vehicle, subject to the limitations and exceptions set forth in this article.	-	1	-	1
20001(a)	Hit-run, injury or death, immediate report of fatal.	-	1	-	1
21201(c)	Bicycle: rider unable to support in an upright position with at least one foot on the ground.	-	-	1	1
21204(b)	Bicyclist, permitting passenger on other than a permanent seat; minor passenger not retained in seat.	-	1	-	1
21208(b)	Bicyclist shall not leave bike lane until reasonably safe.	1	-	-	1
21651(a)	Divided highways, driving over, upon or across dividing section; left or semicircular U-turn except through marked opening.	1	-	-	1
21651(b)	Driving the wrong way on a divided highway.	1	-	-	1
21803(b)	Failure to yield, by vehicle not a hazard.	1	-	-	1
21950(b)	No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard.	-	1	-	1
21954(a)	Every pedestrian upon a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles upon the roadway so near as to constitute an immediate hazard.	1	-	-	1
22100(a)	Both the approach for a right-hand turn and a right-hand turn shall be made as close as practicable to the right-hand curb or edge of the roadway…	1	-	-	1
	TOTAL	34	39	9	82

Table 4-5 displays the driver and bicyclist movements preceding each collision. The most frequent combination of movements occurred when both the bicyclist and driver were Proceeding Straight (28%, 23/82). Of records where both parties were Proceeding Straight, the two parties were reported as travelling in perpendicular directions in 20 collisions (likely indicating intersection or driveway locations) and travelling in the same direction preceding three of the collisions.

The second and third most frequent combinations also occurred while the bicyclist was Proceeding Straight and the driver was making a turning movement, Making a Left Turn (12%, 9/82) or Making a Right Turn (11%, 9/82).

Table 4-5 Bicycle-Vehicle Collisions by Bicycle and Driver Movements

Bicycle Movement \ Driver Movement	Proceeding Straight	Making Right Turn	Making Left Turn	Slowing/Stopping	Entering Traffic	Parked	Merging	Other	Not Stated	TOTAL
Stopped	1									1
Proceeding Straight	23	9	10	1	3	2	2	1	8	59
Making Right Turn	3									3
Making Left Turn			1							1
Changing Lanes	1									1
Entering Traffic	1									1
Other Unsafe Turning						1				1
Traveling Wrong Way	3	1				1				5
Not Stated	1		2						7	10
TOTAL	33	10	13	1	3	4	2	1	15	82

Vehicular Collisions

Figure 4-6 and Table 4-6 display vehicular collision injury severity by roadway location. Consistent with the other modes, the majority of vehicular collisions were reported within intersections (62%, 452/728), predominantly occurring at signalized intersections (35%, 252/728), followed by side-street stop-controlled intersections (24%, 173/728).

Over half of collisions resulting in a severe/fatal injury were reported at an intersection, including 3 of 5 fatal collisions and 17 of the 30 severe injury collisions.

Vehicular collisions had the lowest rate of collisions resulting in a severe/fatal injury (5%, 35/728) of any of the three modes. Pedestrians experienced the highest rate (22%, 36/167), followed by bicycle collisions (11%, 9/82).

Figure 4-6 Injury Severity by Roadway Location – Vehicular Collisions

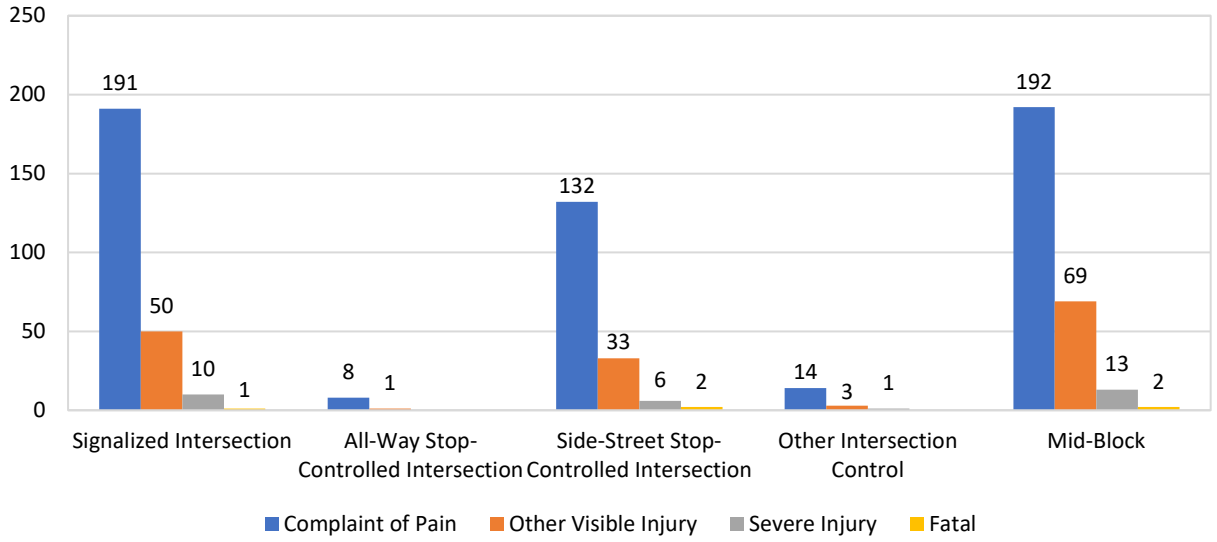


Table 4-6 Injury Severity by Roadway Location – Vehicular Collisions

Severity	Signalized Intersection	All-Way Stop-Controlled Intersection	Side-Street Stop-Controlled Intersection	Other Intersection Control	Mid-Block	TOTAL
Complaint of Pain	191	8	132	14	192	537
Other Visible Injury	50	1	33	3	69	156
Severe Injury	10	-	6	1	13	30
Fatal	1	-	2	-	2	5
TOTAL	252	9	173	18	276	728

Table 4-7 displays the collision crash type by roadway location. Broadside collisions were the most common vehicular crash type overall (45%, 331/728), and the most frequent crash type at intersection locations (54%, 244/452). Rear-end was the second-leading crash type at

intersections and the leading crash type at mid-block locations, accounting for one-third (34%, 93/276) of mid-block collisions.

Table 4-7 Crash Type by Roadway Location

Collision Type	Signalized Intersection	All-Way Stop-Controlled Intersection	Side-Street Stop-Controlled Intersection	Other Intersection Control	Mid-Block	TOTAL
Broadside	134	4	94	12	87	331
Rear End	44	3	29	1	92	169
Head-On	41	-	19	2	21	83
Hit Object	15	-	20	1	31	67
Sideswipe	13	2	7	1	35	58
Overturned	3	-	2	-	6	11
Other/Not Stated	2	-	2	1	4	9
Total	252	9	173	18	276	728

Table 4-8 present vehicular collision crash types by injury severity. Broadside collisions were the leading crash type overall and the leading crash type reported for severe/fatal injury collisions (34%, 12/35). Of the 176 broadside collisions, only 4% (12) resulted in a severe injury or fatal collision. Hit Object collisions were the second most common crash type to result in a severe injury or fatal collision, with two fatalities and eight severe injuries. The rate of Hit Object collisions resulting in a severe injury or fatal collision was greater than Broadside collisions at 15% (10/67).

Table 4-8 Vehicular Collision Crash Type by Injury Severity

Collision Type	Complaint of Pain	Other Visible Injury	Severe Injury	Fatal	TOTAL
Broadside	252	67	11	1	331
Rear End	140	26	2	1	169
Head-On	56	20	7	-	83
Hit Object	35	22	8	2	67
Sideswipe	44	14	-	-	58
Overturned	4	5	1	1	11
Other/Not Stated	6	2	1	-	9
Total	537	156	30	5	728

Table 4-9 presents violation codes by injury severity for the top 15 violations (6 of more collisions). The top 15 violation codes account for 85% (618/728) of all injury collisions. Violation code 22350, unsafe speed for prevailing conditions, was the most frequently cited violation code for all vehicular collisions (16%, 118/728), and accounted for 23% (8/35) severe injury/fatal injuries, including three of the five fatal. Violation code 22107, unsafe left or right movement, was the second most frequently cited violation code (15%, 112/728), and was the leading cause for severe/fatal injury collisions (26%, 9/35).

Table 4-9 Vehicular Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	Fatal	TOTAL
22350	Unsafe speed for prevailing conditions.	93	17	5	3	118
22107	No person shall turn a vehicle from a direct course or move right or left upon a roadway until such movement can be made with reasonable safety…	78	25	8	1	112
21453(a)	A driver facing a steady circular red signal alone shall stop at a marked limit line, but if none, before entering the crosswalk on the near side of the intersection or, if none, then before entering the intersection, and shall remain stopped until an indication to proceed is shown, except as provided in subdivision (b).	79	21	3	-	103
21801(a)	The driver of a vehicle intending to turn to the left or to complete a U-turn upon a highway, or to turn left into public or private property, or an alley, shall yield the right-of-way to all vehicles approaching from the opposite direction which are close enough to constitute a hazard at any time during the turning movement, and shall continue to yield the right-of-way to the approaching vehicles until the left turn or U-turn can be made with reasonable safety.	44	16	1	-	61
21703	The driver of a motor vehicle shall not follow another vehicle more closely than is reasonable and prudent, having due regard for the speed of such vehicle and the traffic upon, and the condition of, the roadway.	35	6	-	-	41
21804(a)	The driver of any vehicle about to enter or cross a highway from any public or private property, or from an alley, shall yield the right-of-way to all traffic, as defined in Section 620, approaching on the highway close enough to constitute an immediate hazard, and shall continue to yield the right-of-way to that traffic until he or she can proceed with reasonable safety.	24	11	2	-	37
23152(a)	It is unlawful for a person who is under the influence of any alcoholic beverage to drive a vehicle.	24	10	2	-	36
21802(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop as required by Section 22450. The driver shall then yield the right-of-way to any vehicles which have approached from another highway, or which are approaching so closely as to constitute an immediate hazard, and shall continue to yield the right-of-way to those vehicles until he or she can proceed with reasonable safety.	25	9	1	-	35
23153(a)	Driving a vehicle under the influence of alcohol and causing injury or death to another.	11	8	1	-	20

Table 4-9 Vehicular Collision Violation Code by Injury Severity

Violation Code & Definition[1]		Complaint of Pain	Other Visible Injury	Severe Injury	Fatal	TOTAL
21453(b)	Except when a sign is in place prohibiting a turn, a driver, after stopping as required by subdivision (a), facing a steady circular red signal, may turn right, or turn left from a one-way street onto a one-way street. A river making that turn shall yield the right-of-way to pedestrians lawfully within an adjacent crosswalk and to any vehicle that has approached or is approaching so closely as to constitute an immediate hazard to the driver, and shall continue to yield the right-of-way to that vehicle until the driver can proceed with reasonable safety.	9	1	2	1	13
22450(a)	The driver of any vehicle approaching a stop sign at the entrance to, or within, an intersection shall stop at a limit line, if marked, otherwise before entering the crosswalk on the near side of the intersection.	10	1	-	-	11
21803(a)	Yield signs, yield until reasonably safe	9	1	-	-	10
22106	No person shall start a vehicle stopped, standing, or parked on a highway, nor shall any person back a vehicle on a highway until such movement can be made with reasonable safety.	8	1	-	-	9
21801(b)	Failure to yield, turning vehicle having yielded (lane by lane).	5	1	-	-	6
21804(b)	Public or private property, yield to approaching traffic so close as to constitute an immediate hazard.	5	1	-	-	6
	TOTAL	537	156	30	5	728

Systemic Collision Matrices

The collision trend information presented in the previous sections was used to establish systemic collision matrices, with the intent of identifying characteristics related to behaviors and roadway environments where collisions were most prevalent. The matrices were constructed using behaviors (crash types and violations) as the rows, and roadway characteristics (intersection control, number of lanes, posted speed limit) as the columns.

Separate matrices were prepared for collisions occurring within the intersection footprint and those along segments. These two groupings were further refined to display matrix sets consisting of all injury collisions and those resulting in a severe injury or fatality. Recommendations were developed to address the citywide findings, intended to be implemented across similar environments.

Table 4-10 displays the intersection matrix for the 606 injury collisions that occurred within an intersection, regardless of mode. As shown, the leading two crash types were broadside (243 collisions) followed by pedestrian-vehicle (105 collisions).

Broadside injury collisions were most frequently reported at the following intersection types:

- Signalized intersections where four-lane and two-lane roadways intersect (50 collisions)
- Side street stop-controlled intersections where four-lane and two-lane roadways intersect (44 collisions)
- Side street stop-controlled intersections where two two-lane roadways intersect (41 collisions)

Pedestrian injury collisions were most frequently reported at the following intersection types:

- Signalized intersections where four-lane and two-lane roadways intersect (22 collisions)
- Side street stop-controlled intersections where four-lane and two-lane roadways intersect (22 collisions)
- Side street stop-controlled intersections where two two-lane roadways intersect (17 collisions)

The leading two crash types were further expanded using violation code groupings to better understand the behaviors leading to the collision. Drivers failing to yield or stop at the limit line was the most frequent violation for both crash types.

Table 4-11 isolates intersection collisions resulting in a severe or fatal injury, for a total of 45 records. Pedestrian collisions were the most common severe/fatal injury crash type at intersections (21 collisions), followed by broadside crash types (9 collisions).

The key issues identified with the systemic intersection matrix and resulting recommendations are presented in Table 4-12. The Caltrans LRSM countermeasure ID for the recommendation is also provided for each countermeasure.

Table 4-10 Intersection Matrix – All Injury Collisions

	AWSC		Side Street Stop					Signalized									No Control	Roundabout	Yield	Grand Total
Row Labels	2+2	4+2	2+2	3+2	4+2	4+4	5+2	2+2	3+2	3+3	4+2	4+3	4+4	5+2	5+3	5+4	2+2	2+2	2+2	
Broadside	2	2	41	6	44	3		10	3	1	50	10	34	8	4	13	3	2	7	243
Failure to yield/stop at limit line	1	1	29	3	17	1		8	2		34	6	16	6	3	11	3	2	3	146
Failure to yield/stop when making left turn			4	2	10	2		1	1		5		7							32
Unsafe turn			4	1	11			1		1	6		3							27
DUI		1			4						2	2	2	2		1				14
Other			1		1						2		3		1				1	9
Not Stated	1		1								1	1	2						1	7
Unsafe speed			2		1							1							2	6
Traffic Control Violation													1			1				2
Pedestrian-Vehicle	2	1	17	5	22			4	2	3	22	6	15	3		1	1		1	105
Failure to yield/stop at limit line	2	1	6	2	8			2	2	2	10	2	8	2					1	48
Pedestrian at-fault			7	1	8			2			8	2	4	1		1				34
Other					3						2						1			6
Not Stated				1	1							1	2							5
Unsafe turn										1	1	1	1							4
DUI			2	1							1									4
Unsafe speed			2		2															4
Rear End	3		4	4	21			3	1		19	3	13	4		1	1			77
Head-On			7	4	7		1	1			21	6	11	2			1		1	62
Bicycle-Vehicle	2	1	10		11			2	2		7	3	6			1		1	1	47
Hit Object			10	1	9			1		1	8	1	1	2	1		1			36
Sideswipe	1	1	2	1	4			1		2	3	2	2	1		2			1	23
Overturned				1	1						1	1				1				5
Not Stated			1								1		1						1	4
Bicycle: Hit Object					1															1
Pedestrian-Bicycle					1															1
Bicycle: Overturned					1															1
Other					1															1
Grand Total	10	5	92	22	123	3	1	22	8	7	132	32	83	20	5	19	7	3	12	606

Table 4-11 Intersection Matrix – Severe/Fatal Injury Collisions

	AWSC	Side Street Stop			Signalized							No Control	Grand Total
Row Labels	**2+2**	**2+2**	**3+2**	**4+2**	**2+2**	**3+3**	**4+2**	**4+3**	**4+4**	**5+2**	**5+4**	**2+2**	
Pedestrian-Vehicle		**6**	**1**	**6**		**2**	**3**	**1**	**2**				**21**
Failure to yield/stop at limit line		1		3		2	1		1				8
Pedestrian at-fault		1	1	1			1	1	1				6
DUI		2					1						3
Unsafe speed		2		1									3
Other				1									1
Broadside		**1**		**1**			**1**	**1**	**2**	**1**	**1**	**1**	**9**
Failure to yield/stop at limit line								1	1		1	1	4
Unsafe turn		1					1						2
DUI									1	1			2
Unsafe speed				1									1
Hit Object		**3**		**2**			**1**						**6**
Bicycle-Vehicle	**1**	**4**											**5**
Head-On		**1**			**1**		**1**						**3**
Overturned											**1**		**1**
Grand Total	**1**	**15**	**1**	**9**	**1**	**2**	**6**	**2**	**4**	**1**	**2**	**1**	**45**

Table 4-12 Systemic Intersection Issues and Recommended Countermeasures

Issue	Recommended Countermeasure[1]
Broadside Collisions	
Issue #1: Broadside collisions resulting from failure to yield or failure to stop at the limit line at signalized intersections, where: • 4-lane intersects with 2-lane • 4-lane intersects with 4-lane	Improve visibility of signal heads and intersections through the following: • S2 Improve signal hardware – one signal head per through lane on overhead mast arm (CRF 15%) • S18PB Install pedestrian crossing (continental crosswalks) (CRF 25% B&P) • S20PB Install advance stop bar before crosswalk (CRF 15% B&P)
Issue #2: Broadside collisions resulting from failure to yield or failure to stop at the limit line at side street stop-controlled intersections, where: • 2-lane intersects with 2-lane • 4-lane intersects with 2-lane	• NS2 Convert to all-way stop control (CRF 50%) • NS3 Install signals (CRF 30%) • NS6 Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs (CRF 15%) • NS11 Improve sight distance to intersection (clear sight triangles) (CRF 20%)
Issue #3: Broadside collisions resulting from failure to yield or failure to stop at the limit line when making left-turn at signalized intersections, where: • 4-lane intersects with 4-lane	• S6 Install left-turn lane and add turn phase (signal has no left-turn lane or phase before) (CRF 55%) • S7 Provide protected left turn phase (left-turn lane already exists) (CRF 30%)
Pedestrian Collisions	
Issue #1: Pedestrian collisions resulting from failure to yield to pedestrian in the crosswalk or failure to stop at the limit line at signalized intersections where: • 4-lane intersects with 2-lane • 4-lane intersects with 4-lane	• S6 Provide protected left turn phase • S20 Install pedestrian crossing (continental crosswalks) (CRF 25% B&P), consider: o Curb extensions o Pedestrian signage o NO RIGHT ON RED turn restrictions • S21 Install advance stop bar before crosswalk (CRF 15% B&P) • S22 Modify signal phasing to implement a Leading Pedestrian Interval (LPI) (CRF 60% B&P)
Issue #2: Pedestrian collisions resulting from pedestrian at-fault violations at signalized intersections	Encourage pedestrians to cross when they have the right-of-way and at legal crossing locations: • S19 Install pedestrian countdown signal heads (CRF 25% P&B • S20 Install pedestrian crossing (continental crosswalks) (CRF 25% B&P) • S21 Install advance stop bar before crosswalk (CRF 15% B&P) • S22 Modify signal phasing to implement a Leading Pedestrian Interval (LPI) (CRF 60% B&P)

Note: [1] Countermeasure ID and Crash Reduction Factor (CRF) obtained from Caltrans' Local Roadway Safety Manual, Version 1.5 (April 2020)

Table 4-13 displays the matrix for the 371 segment or mid-block injury collisions. The leading two crash types reported along segments were rear end (92 collisions) and broadside (88 collisions).

Rear end collisions were most frequently reported along four-lane roadways with a posted speed limit of 35 miles per hour (39 collisions). The leading violations or behaviors attributed to rear end collisions within this environment includes unsafe speed (17 collisions) and following too closely (12 collisions).

Broadside collisions were also most frequently reported along four-lane roadways with a posted speed limit of 35 miles per hour (47 collisions). These collisions were most commonly associated with drivers failure to yield or stop at the limit line (24 collisions) and unsafe turning movements (11 collisions). These instances generally occurred at driveway locations.

Table 4-14 shows the severe and fatal injury segment matrix. Pedestrian-vehicle collisions were the leading crash type for severe/fatal injuries at mid-block locations, accounting for 14 of the 35 records. Pedestrian crashes most frequently occurred along four-lane roads with a posted speed limit of 35 miles per hour (7 collisions). The pedestrian records were further expanded by the party-at-fault, indicating the pedestrian was at-fault in most collisions, due to crossing outside of designating crossing locations.

The key issues identified with the systemic segment matrices and resulting recommendations are presented in Table 4-15. The Caltrans LRSM countermeasure ID for the recommendation is also provided for each countermeasure.

Table 4-13 Segment Matrix – All Injury Collisions

Row Labels	25 mph	30 mph				35 mph				40 mph			45 mph		50 mph	Grand Total
	2-Ln	2-Ln	3-Ln	4-Ln	5-Ln	2-Ln	3-Ln	4-Ln	5-Ln	3-Ln	4-Ln	5-Ln	4-Ln	5-Ln	4-Ln	
Rear End	10	4		5		7	9	39	6		6	1	4	1		92
Unsafe speed	2	4		2		1	4	17	4		4		2	1		41
Following too closely	1			1		1	2	12	2		2		1			22
Unsafe turn	2			2		3	1	2				1	1			12
DUI	4					2	1	5								12
Other	1						1	2								4
Not Stated								1								1
Broadside	3	5	1	6		10	6	47	2	1	3		4			88
Failure to yield/stop at limit line		3	1	1		2	5	24	2		1		3			42
Unsafe turn	1			3		4		11								19
Failure to yield/stop when making left turn	1	2		1		2	1	5		1	1					14
DUI								4			1					5
Not Stated						1		1					1			3
Other						1		1								2
Traffic Control Violation								1								1
Riding/driving on sidewalk				1												1
Following too closely	1															1
Pedestrian-Vehicle	17	3		5	1	6	6	20	1				1			60
Pedestrian at-fault	9	2		4	1	5	5	10					1			37
Failure to yield/stop at limit line	1							7								8
Other	3	1				1		1								6
Not Stated	2			1				2	1							6
Unsafe turn	1						1									2
Unsafe speed	1															1
Sideswipe	3	4		1		4	1	12	1		7		1	1		35
Hit Object	3	3	1	1		7	2	11			1		1	1		31
Bicycle-Vehicle	5	2		2		5	1	11	1						1	28
Head-On	1	1		1		6	2	7			3					21
Overturned	1			2				1	1						1	6
Bicycle: Hit Object	1						1				2					4
Not Stated	1				1	1										3
Bicycle: Overturned		1														1
Pedestrian-Bicycle	1															1
Other													1			1
Grand Total	46	23	2	23	2	46	28	148	12	1	22	1	12	3	2	371

Table 4-14 Segment Matrix – Severe/Fatal Injury Collisions

	25 mph	30 mph		35 mph				40 mph	45 mph	Grand Total
Row Labels	**2-Ln**	**2-Ln**	**4-Ln**	**2-Ln**	**3-Ln**	**4-Ln**	**5-Ln**	**4-Ln**	**5-Ln**	
Pedestrian-Vehicle	2	1	1	1	1	7	1			14
Pedestrian at-fault	1	1	1	1	1	7				12
Not Stated							1			1
Other	1									1
Hit Object				1		1		1	1	4
Head-On			1		1			2		4
Broadside				1	1	1				3
Rear End	1			1		1				3
Bicycle-Vehicle	1				1					2
Bicycle: Hit Object					1			1		2
Pedestrian-Bicycle	1									1
Overturned			1							1
Not Stated	1									1
Grand Total	6	1	3	4	5	10	1	4	1	35

Table 4-15 Systemic Segment Issues and Recommended Countermeasures

Issue	Recommended Countermeasure[1]
Rear End Collisions	
Rear end collisions resulting from unsafe speeds along 4-lane roadways.	• R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • R22 Install/upgrade signs with new fluorescent sheeting (CRF 15%) • R26 Install dynamic/variable speed warning signs (CRF 30%) • S10 or NS9 Install flashing beacons as advance warning (CRF 30%)
Broadside Collisions	
Broadside collisions resulting from failure to yield	• R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • NS15 Create directional median openings to allow (and restrict) left-turns and U-turns (CRF 50%)
Pedestrian Collisions	
Pedestrian collisions resulting from pedestrian at-fault violations at mid-block locations	Emphasize safe, legal crossing locations through the provision of continental crosswalks • R8 Install raised median (CRF 25%) • R14 Road diet (CRF 30%) • R35PB Install/upgrade pedestrian crossing (with enhanced safety features) (CRF 30%) • R37PB Install Rectangular Rapid Flashing Beacon (RRFB) (CRF 35%) • NS23PB Install Pedestrian signal (including Pedestrian Hybrid Beacon) (CRF 55%)

Note: [1] Countermeasure ID and Crash Reduction Factor (CRF) obtained from Caltrans' Local Roadway Safety Manual, Version 1.5 (April 2020)

Neighborhood Countermeasures

An additional focus was placed on reviewing collisions occurring along two-lane roadways with a speed limit of 25 miles per hour, in response to community member concerns related to safety within residential neighborhoods.

A total of 103 collisions were identified within these environments, including 57 collisions within the intersection footprint and 46 collisions along segments. Figure 4-7 displays the collisions across the City.

As shown, these collisions are most concentrated in the northwest part of the City. Intersection sight distance was identified as a potential issue. On-street parking is permitted up to the intersection at many locations in the northwest part of the City. Parked vehicles may obstruct driver visibility, specifically at side-street stop-controlled intersections, potentially resulting in scenarios where stopped vehicles having limited visibility of approaching vehicles on the uncontrolled intersection leg.

Table 4-16 provides a toolbox of neighborhood countermeasures to be considered within low-speed, low-volume environments. The Caltrans LRSM countermeasure name and ID are provided, where applicable.

NS11: Improve sight distance at intersections (clear sight triangles), is one countermeasure that may be used to address intersection visibility issues. This countermeasure has potential to be implemented systemically at a low-cost. Additional countermeasures listed in Table 4-16 that address this issue include:

- NS02 Convert to all-way STOP control (from two-way or Yield control)
- NS03 Install signals
- NS04 Convert intersection to roundabout (from all way stop)
- NS05 Convert intersection to roundabout (from stop or yield control on minor road)

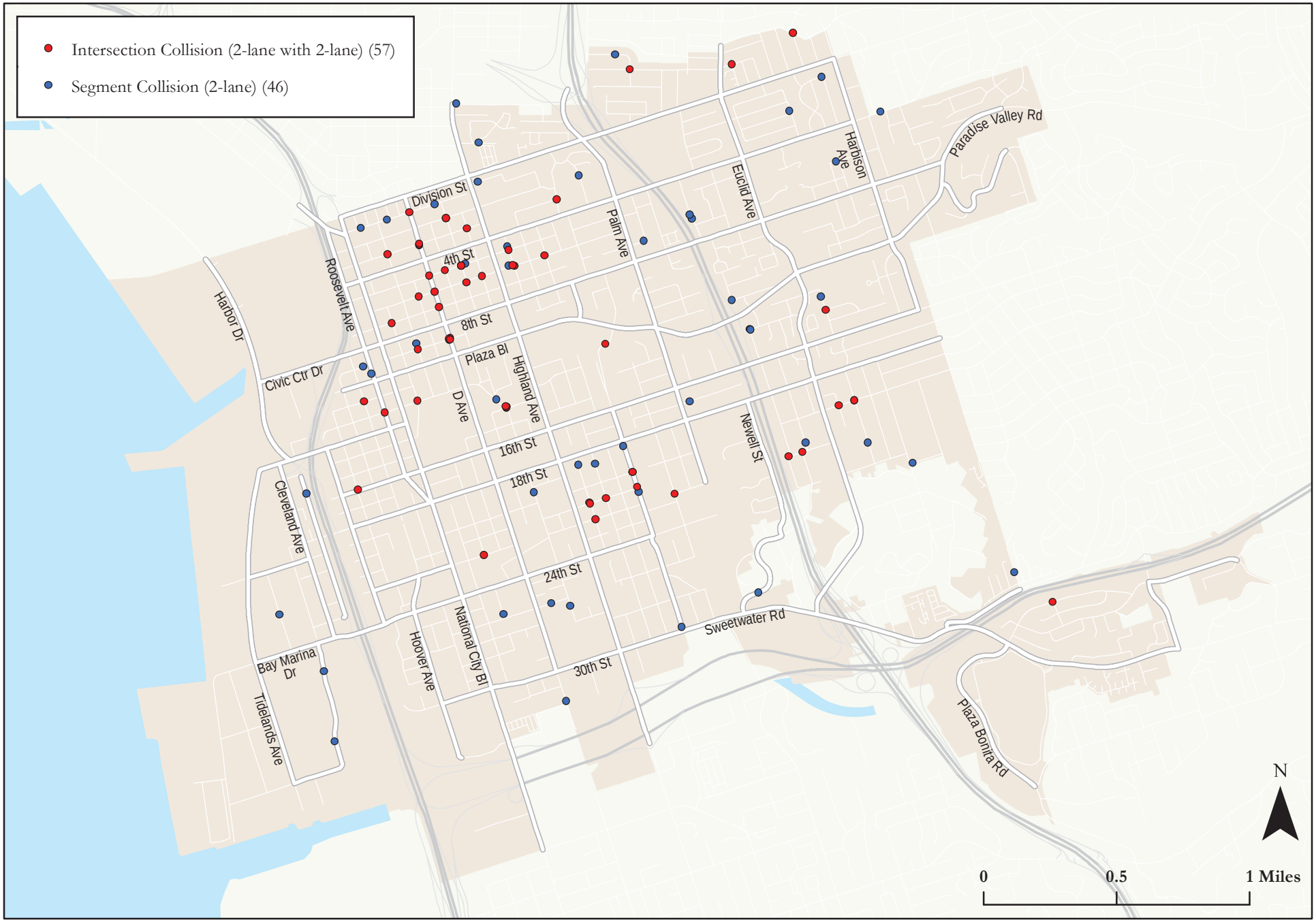


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Figure 4-7
Collisions on Two-Lane Roadways with 25mph Speed Limit

Table 4-16 Countermeasures for Neighborhood Streets

Type	Countermeasure	Notes
Lighting	NS01 / R01 Add intersection/segment lighting	Providing a permanent source of power and maintenance considerations should be considered.
Control	NS02 Convert to all-way STOP control (from two-way or Yield control)	Requires warrant analysis.
Control	NS03 Install signals	Requires warrant analysis.
Control	NS04 Convert intersection to roundabout (from all way stop) NS05 Convert intersection to roundabout (from stop or yield control on minor road)	May require acquisition of additional right-of-way. Requires warrant analysis.
Operation / Warning	NS06 Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	Can be used to enhance visibility of stop signs, yield signs, or to warn drivers to anticipate pedestrians/bicyclists.
Operation / Warning	NS07 Upgrade intersection pavement markings	Improves intersection visibility to approaching motorists. Typical applications include “Stop Ahead” markings, centerlines and stop bars.
Operation / Warning	NS08 Install flashing beacons at stop-controlled intersections	Flashing beacons help reinforce driver awareness of stop signs. Most effective along segments with long stretches between intersections and locations where night-time visibility is an issue. Solar may be a source of power.
Operation / Warning	NS09 Install flashing beacons as advance warning	Flashing beacons help alert drivers to anticipate an upcoming control and mitigate crashes related to intersection regulatory sign violations.
Operation / Warning	NS11 Improve sight distance to intersection (clear sight triangles)	Adequate sight distance is an important factor to unsignalized intersection safety. Prohibiting parking at the intersection and removing or modifying landscaping or fixed objects and are examples of methods to improve sight distance. Some objects or landscaping may be located on private property, requiring coordination with the property owner.
Operation / Warning	R22 Install/upgrade signs with new fluorescent sheeting (regulatory or warning)	Fluorescent yellow sheeting or other retroreflective material improves driver awareness of roadway signage.
Geometric Modifications	NS13 Install splitter-islands on the minor road approaches	Limits vehicular access to right-in and/or right-out.
Geometric Modifications	Install speed cushions / humps (non-LRSM countermeasure)	Helps encourage slower driver speeds. Speed cushions are intended to be spaced so as not to interfere with the larger wheelbases of emergency response vehicles. Most effective when multiple devices are deployed.
Pedestrian and Bike	NS20PB Install pedestrian crossing at uncontrolled locations (signs and markings only)	Additional safety enhancements to improve visibility of the crossing location and reduce vehicle speeds should be considered. Curb ramps and/or sidewalk modifications may be required.
Pedestrian and Bike	NS21PB/R35PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Measures to improve visibility of a pedestrian crossing and/or shorten the crossing distance can enhance safety. Examples include advance stop/yield markings, curb extensions, additional signage, and in road flashing lights.

Table 4-16 Countermeasures for Neighborhood Streets

Type	Countermeasure	Notes
Pedestrian and Bike	NS22PB Install Rectangular Rapid Flashing Beacon (RRFB)	An RRFB can increase driver awareness of a crossing and increase the effectiveness of crossing treatments. Can be deployed at intersection and mid-block locations.
Pedestrian and Bike	R32PB Install bike lanes	Bike lanes provide a dedicated space for bicyclists, helping to facilitate predictable behaviors. Painted buffers can add additional separation between bicyclists and parked and/or moving vehicles. Implementation may require on-street parking removal.
Pedestrian and Bike	R34PB Install sidewalk/pathway (to avoid walking along roadway)	Providing sidewalks along both sides of the street can greatly reduce pedestrian-involved collisions. Curb ramps, crosswalks, lighting, and other features should be considered.
Pedestrian and Bike	R36PB Install raised pedestrian crossing	Suitable for lower speed roadways. Should be used in combination with additional signs and markings.

5. High-Risk Corridors & Recommended Countermeasures

Collision frequency and severity was analyzed across the City for both intersections and mid-block locations. Those findings were then used to identify high-risk corridors. The collisions along each high-risk corridor were mapped against an aerial background while displaying the crash type and injury severity. This information was used to help identify potential safety issues and recommend countermeasures.

This chapter highlights the key analysis findings for intersections and segments, and the resulting high-risk corridors, as well as the corridor specific issues and countermeasures.

Intersection Collisions

Collision frequency was determined for severe or fatal injuries, by each mode individually, and for all modes combined. The 606 intersection collisions resulted in a total of 45 severe or fatal injury collisions when combining all modes. Figure 5-1 identifies the location of each of the 45 intersection collisions that resulted in a severe/fatal injury. The 45 collisions resulting in severe or fatal injury a were reported at 40 unique intersections. Table 5-1 identifies the six intersections where more than one severe or fatal injury was reported.

Table 5-1 Intersections by Severe/Fatal Injury Collision Frequency

North-South Street	East-West Street	Severe/ Fatal	Total	Auto	Ped	Bike
Highland Avenue	18th Street	2	20	11	8	1
Highland Avenue	Plaza Boulevard	2	19	17	1	1
Harbison Avenue	8th Street	2	7	4	3	0
Euclid Avenue	Division Street	2	7	6	1	0
Roosevelt Avenue	Main Street	2	5	5	0	0
F Street	14th Street	2	3	3	0	0

Over the study period, there were nine severe or fatal injury collisions occurring at intersections along Highland Avenue – including two intersection locations where two severe or fatal injury collisions were reported (at 18th Street and at Plaza Boulevard). Along 8th Street, a total of eight severe or fatal injury collisions occurred at seven unique intersections, including two at the intersection of Harbison Avenue and 8th Street.

Table 5-2 identifies the 25 intersections with the highest reported collision frequency for all levels of injury severity. Each of the leading 25 intersections experienced six or more reported collisions during the five-year study period. Figure 5-2 displays the high frequency collision intersections.

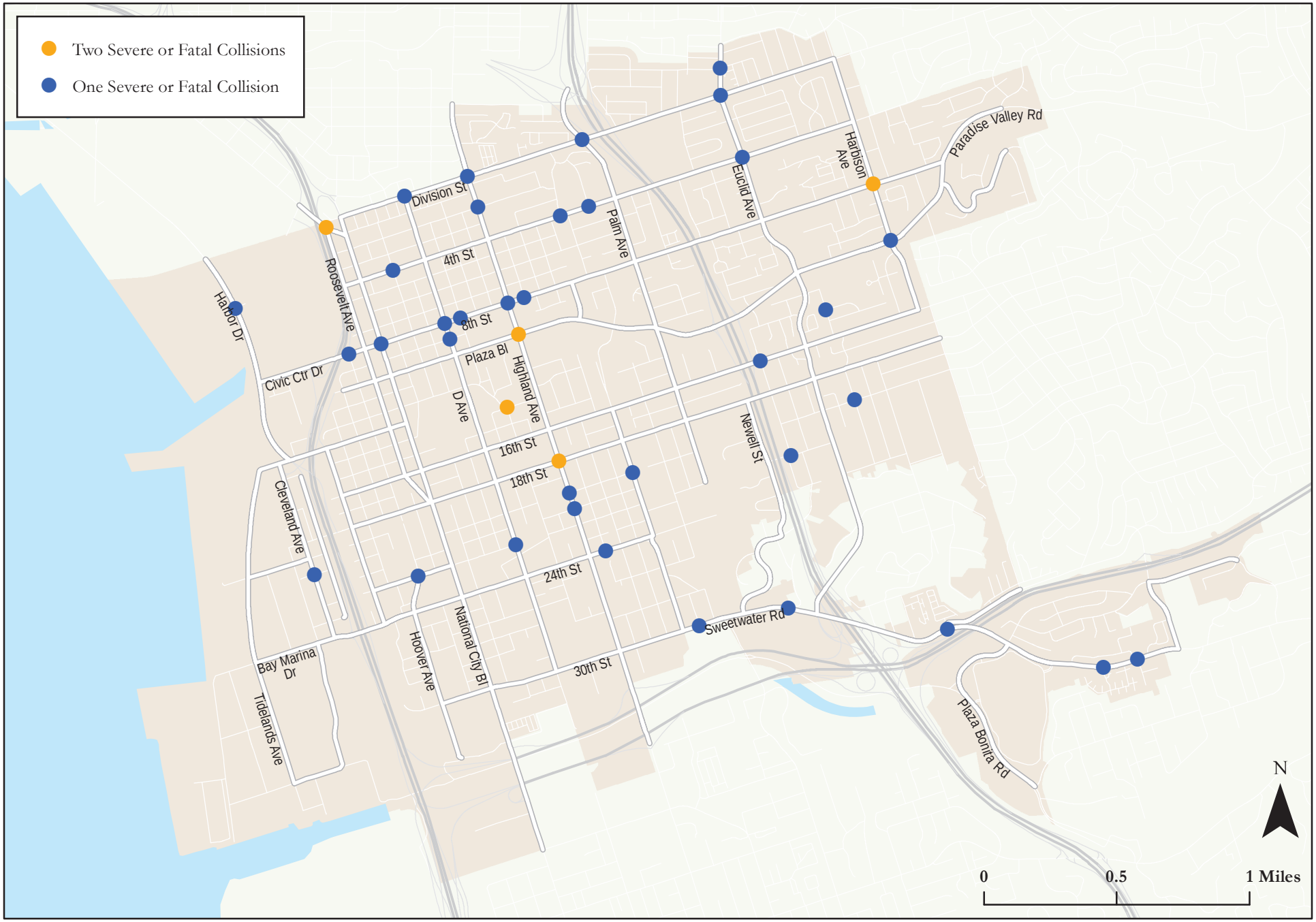

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Figure 5-1

Severe/Fatal Injury Collision Frequency at Intersections

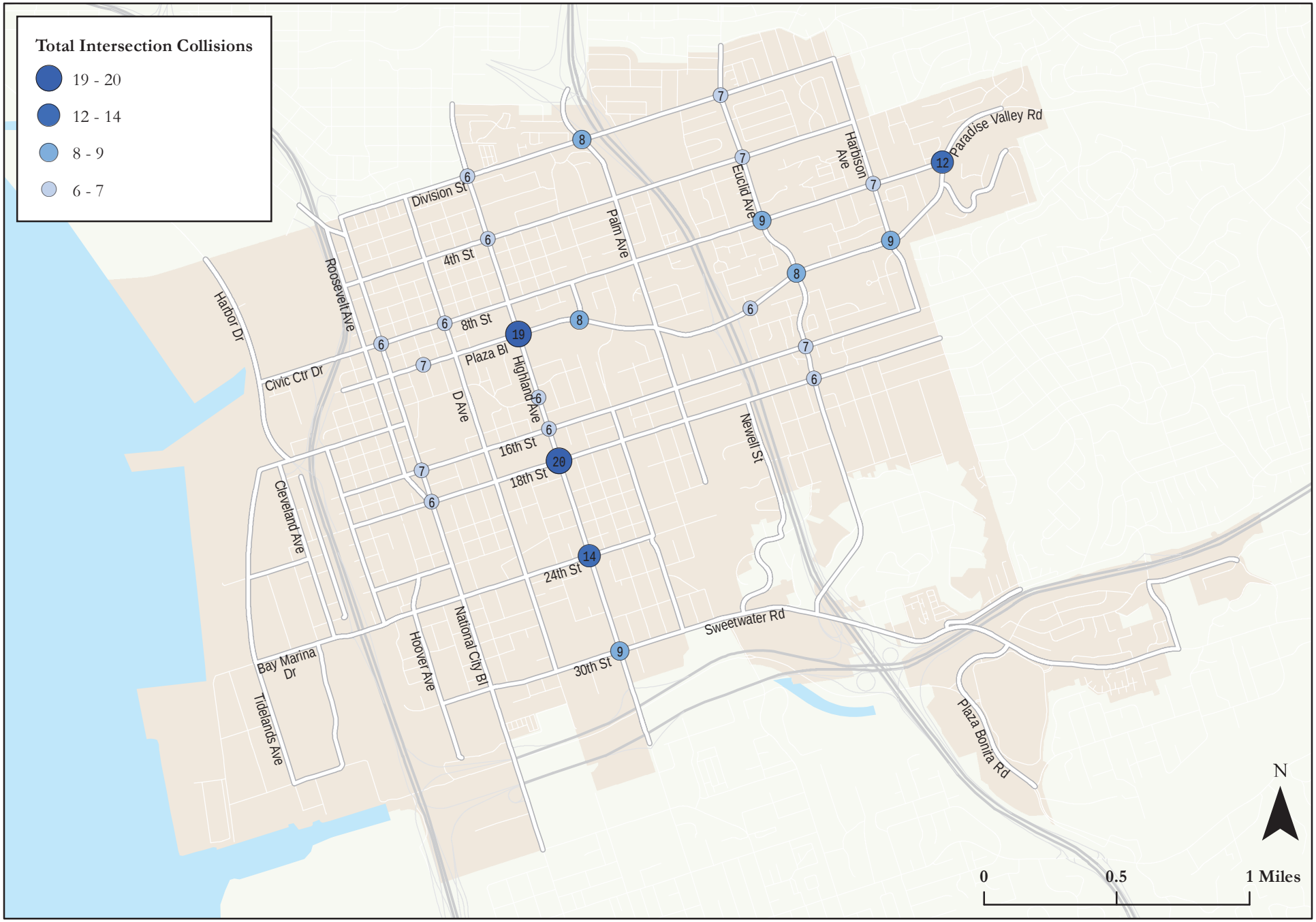

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Figure 5-2
High Frequency Collision Intersections

The 25 high frequency collision intersections account for almost 35% (212) of the 606 intersection collisions. Four of the high frequency collision intersections were found to each experience multiple severe/fatal injury collisions, and are also identified in Table 5-1, including:

- Highland Avenue / 18th Street
- Highland Avenue / Plaza Boulevard
- Harbison Avenue / 8th Street
- Euclid Avenue / Division Street

Table 5-2 Intersections by Collision Frequency (All Modes)

North-South Street	East-West Street	Total	Auto	Ped	Bike	Severe/ Fatal
Highland Avenue	18th Street	20	11	8	1	2
Highland Avenue	Plaza Boulevard	19	17	1	1	2
Highland Avenue	24th Street	14	9	4	1	0
Paradise Valley Road / Plaza Boulevard	8th Street	12	12	0	0	0
Harbison Avenue	Plaza Boulevard	9	7	2	0	1
Highland Avenue	30th Street	9	4	3	2	0
Euclid Avenue	8th Street	9	6	2	1	0
Palm Avenue	Division Street	8	8	0	0	1
L Avenue	Plaza Boulevard	8	7	1	0	0
Euclid Avenue	Plaza Boulevard	8	7	1	0	0
Harbison Avenue	8th Street	7	4	3	0	2
Euclid Avenue	Division Street	7	6	1	0	2
Euclid Avenue	4th Street	7	6	1	0	1
National City Boulevard	16th Street	7	7	0	0	1
B Avenue	Plaza Boulevard	7	6	1	0	0
Euclid Avenue	16th Street	7	6	0	1	0
National City Boulevard	8th Street	6	3	2	1	1
Highland Avenue	Division Street	6	4	1	1	1
D Avenue	8th Street	6	5	1	0	1
Highland Avenue	4th Street	6	3	3	0	0
Highland Avenue	14th Street	6	4	1	1	0
Highland Avenue	16th Street	6	5	1	0	0
Grove Street	Plaza Boulevard	6	5	1	0	0
National City Boulevard	18th Street	6	6	0	0	0
Euclid Avenue	18th Street	6	6	0	0	0

The following roadways include multiple high collision frequency intersections:

North-South

- Highland Avenue: 8 intersections
- Euclid Avenue: 6 intersections
- National City Boulevard: 3 intersections
- Harbison Avenue: 2 intersections

East-West

- Plaza Boulevard: 7 intersections
- 8th Street: 5 intersections
- Division Street: 3 intersections
- 16th Street: 3 intersections
- 18th Street: 3 intersections

Among these roadways, the high frequency collision intersections along Highland Avenue, Plaza Boulevard and Euclid Avenue were found to be near one another.

Segment Collisions

The initial step in determining segment or mid-block collision frequency involved segmenting roadways. Circulation Element roadways were split into smaller analysis segments at locations meeting any of the following conditions: 1) an intersection with another Circulation Element roadways, 2) roadway terminus, 3) city boundary, or 4) roadway cross-section change.

If a roadway meeting the criteria above resulted in a segment with a length of less than 0.10-miles, it was combined with an adjacent segment. Segments between freeway ramps were an exception to this, which were left intact due to the large volume changes outside of the ramps. This process created a total of 165 unique segments. 322 of the 371 total segment collisions were captured by the network of Circulation Element roadways. The remaining 49 segment collisions occurred on non-Circulation Element roadways, including seven severe or fatal injury collisions.

The 371 segment collisions resulted in a total of 35 severe or fatal injuries. Figure 5-3 displays the locations where severe or fatal injury collisions were reported along segments, along with the frequency of all collisions for those segments. Table 5-3 identifies the collision frequency along segments where a severe or fatal injury collision was reported, along with the frequency of all injury collisions and collisions by mode.

The following corridors experienced multiple severe or fatal injury collisions along segments:

- Plaza Boulevard/Paradise Valley Road (6 collisions)
- 8th Street (5 collisions)
- 30th Street/Sweetwater Road (3 collisions)
- Highland Avenue (3 collisions)
- Euclid Avenue (3 collisions)
- 16th Street (2 collisions)

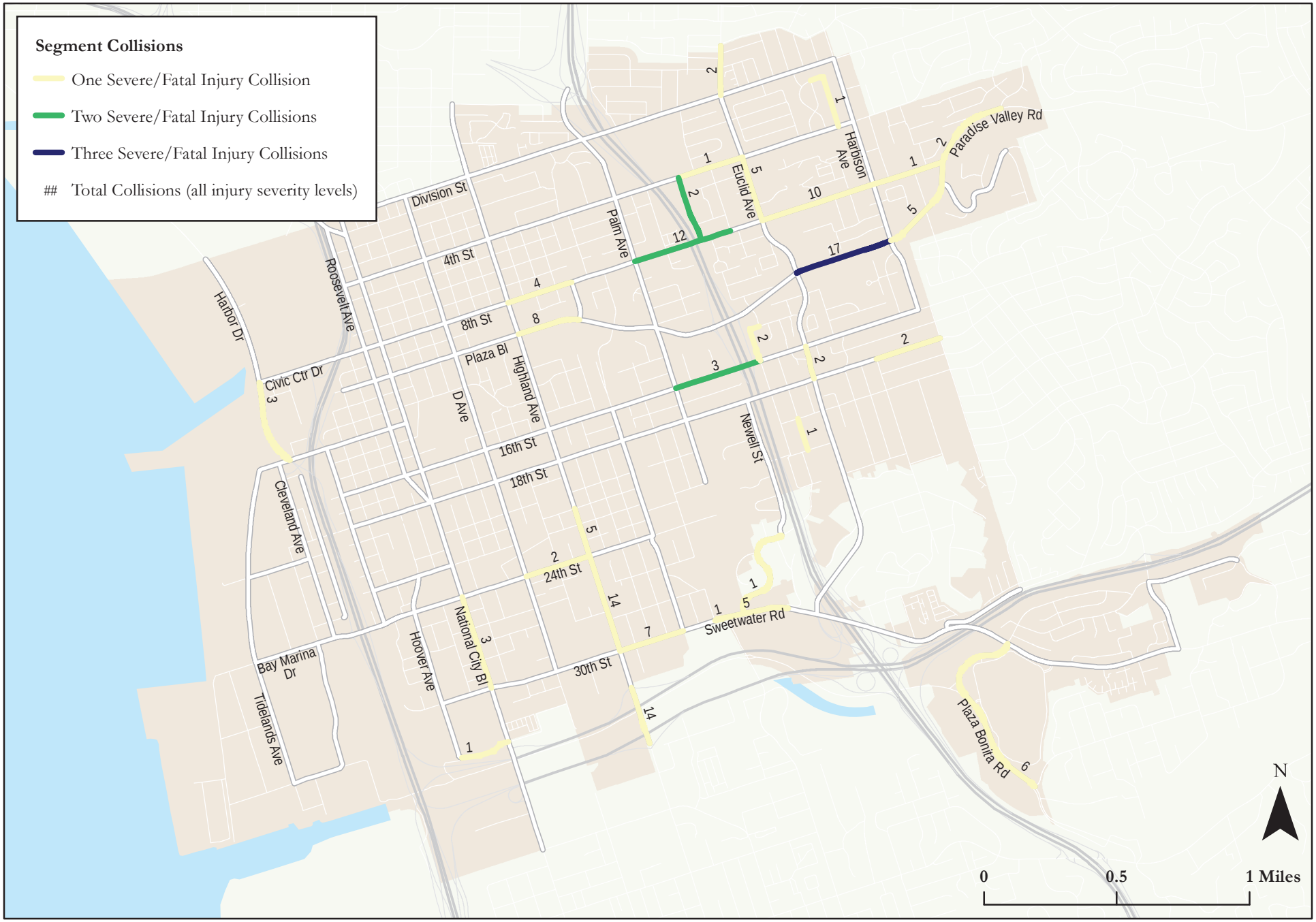

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Figure 5-3

Severe / Fatal Injury Collision Frequency along Segments

Four individual segments experienced multiple severe or fatal injury collisions, including:

- Plaza Boulevard, from Euclid Avenue to Harbison Avenue (3 severe/fatal collisions)
- 8th Street, from Palm Avenue to V Avenue (2 severe/fatal collisions)
- 16th Street, from Palm Avenue to Grove Street (2 severe/fatal collisions)
- T Avenue, from 4th Street to 8th Street (2 severe/fatal collisions)

Table 5-3 Segments by Severe/Fatal Collision Frequency (All Modes)

Segment	From	To	Severe / Fatal	Total	Auto	Ped	Bike
Plaza Boulevard	Euclid Avenue	Harbison Avenue	3	17	14	2	1
8th Street	Palm Avenue	V Avenue	2	12	8	3	1
16th Street	Palm Avenue	Grove Street	2	3	2	1	0
T Avenue	4th Street	8th Street	2	2	2	0	0
Highland Avenue	SR-54 WB Ramps	SR-54 EB Ramps	1	14	10	3	1
Highland Avenue	24th Street	30th Street	1	14	10	3	1
8th Street	Euclid Avenue	Harbison Avenue	1	10	9	1	0
Plaza Boulevard	Highland Avenue	L Avenue	1	8	6	1	1
30th Street	Highland Avenue	L Avenue	1	7	6	1	0
Plaza Bonita Road	Sweetwater Road	Bonita Mesa Road	1	6	6	0	0
Euclid Avenue	4th Street	8th Street	1	5	3	2	0
Sweetwater Road	2nd Avenue	Prospect Street	1	5	3	2	0
Highland Avenue	21st Street	24th Street	1	5	4	1	0
Plaza Boulevard	Harbison Avenue	8th Street	1	5	5	0	0
8th Street	Highland Avenue	L Avenue	1	4	3	1	0
Harbor Drive	8th Street	Civic Center Drive	1	3	1	0	2
National City Boulevard	24th Street	30th Street	1	3	3	0	0
24th Street	D Avenue	Highland Avenue	1	2	0	1	1
Euclid Avenue	16th Street	18th Street	1	2	1	1	0
18th Street	Granger Avenue	Rachael Avenue	1	2	1	1	0
Paradise Valley Road	8th Street	Plaza Boulevard	1	2	2	0	0
Euclid Avenue	Sololo Avenue	Division Street	1	2	2	0	0
Grove Street	14th Street	16th Street	1	2	0	2	0
Grove Street	Newell Street	Sweetwater Road	1[1]	1	0	1	1
4th Street	T Avenue	Euclid Avenue	1	1	0	1	0
8th Street	Harbison Avenue	Plaza Boulevard	1	1	0	0	1
Kenton Avenue	Belmont Avenue	4th Street	1	1	1	0	0
Prospect Street	20th Street	22nd Street	1	1	0	0	1
33rd Street	Hoover Avenue	National City Boulevard	1	1	1	0	0
Sweetwater Road	N Avenue	2nd Avenue	1	1	1	0	0

Note: [1] One segment collision which resulted in a severe injury or fatality involved a pedestrian and a bicycle (and no vehicle). This collision was reported under both the pedestrian and bicycle sub-categories.

Table 5-4 displays collision frequencies for the 12 segments with six or more collisions reported during the 5-year study period. These segments account for approximately one-third (122) of the 371 segment collisions. Additionally, the table identifies how many of each segments' collisions were vehicular only, pedestrian, bicycle, or resulted in a severe or fatal injury.

Table 5-4 Segments by Collision Frequency (All Modes)

Segment	From	To	Total	Auto	Ped	Bike	Severe / Fatal
Plaza Boulevard	Euclid Avenue	Harbison Avenue	17	14	2	1	3
Highland Avenue	SR-54 WB Ramps	SR-54 EB Ramps	14	10	3	1	1
Highland Avenue	24th Street	30th Street	14	10	3	1	1
Plaza Boulevard	I-805 SB Ramps	I-805 NB Ramps	14	13	0	1	0
8th Street	Palm Avenue	V Avenue	12	8	3	1	2
8th Street	Euclid Avenue	Harbison Avenue	10	9	1	0	1
Plaza Boulevard	Highland Avenue	L Avenue	8	6	1	1	1
Plaza Boulevard	I-805 SB Ramps	Euclid Avenue	8	8	0	0	0
30th Street	Highland Avenue	L Avenue	7	6	1	0	1
18th Street	Palm Avenue	Newell Street	6[1]	5	1	1	0
Plaza Bonita Road	Sweetwater Road	Bonita Mesa Road	6	6	0	0	1
Mile of Cars Way	I-5 SB Ramps	I-5 NB Ramps	6	6	0	0	0

Note: [1] One segment collision involved a pedestrian and a bicycle (and no vehicle). This collision was reported under both the pedestrian and bicycle sub-categories.

High Collision Corridors

Figure 5-4 identifies intersections and segments that experience severe or fatal injury collisions, and any intersections or segments with more than five reported collisions, regardless of injury severity. This information was used to identify seven corridors where high collision frequencies and/or severities were concentrated.

The resulting high collision corridors and extents include the following:

- Highland Avenue, from Division Street to SR-54 EB Ramps
- Euclid Avenue, from Beta Street to 18th Street
- Plaza Boulevard / Paradise Valley Road, from Coolidge Avenue to E Plaza Boulevard
- 8th Street, from Harbor Drive to Paradise Valley Road/Plaza Boulevard
- 16th Street, from Wilson Avenue to Rachel Avenue
- 18th Street, from Wilson Avenue to Rachel Avenue
- 30th Street / Sweetwater Road, from Hoover Avenue to Plaza Bonita Center Way

The analysis results, key issues and recommended countermeasures are discussed for each individual corridor throughout the remainder of this section.

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Figure 5-4
High Collision Corridors

Highland Avenue

Table 5-6 summarizes the recommended countermeasures along Highland Avenue. Collision locations, crash type, and level of injury severity for records along Highland Avenue are depicted in Figure 5-5. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

- Nine intersections that experienced a severe or fatal injury collision:
  - Broadside collision at Division Street / Highland Avenue (severe injury)
  - Pedestrian collision at 2nd Avenue / Highland Avenue (severe injury)
  - Pedestrian collision at 8th Street / Highland Avenue (severe injury)
  - Broadside collision at Plaza Boulevard / Highland Avenue (severe injury)
  - Overturned collision at Plaza Boulevard / Highland Avenue (severe injury)
  - Pedestrian collision at 18th Street / Highland Avenue (severe injury)
  - Pedestrian collision at 18th Street / Highland Avenue (severe injury)
  - Pedestrian collision at 20th Street / Highland Avenue (fatal injury)
  - Broadside collision at 21st Street / Highland Avenue (severe injury)
- Seven intersections with high collision frequency:
  - 18th Street / Highland Avenue (20 total collisions)
  - 24th Street / Highland Avenue (14 total collisions)
  - 30th Street / Highland Avenue (9 total collisions)
  - Division Street / Highland Avenue (6 total collisions)
  - 4th Street / Highland Avenue (6 total collisions)
  - 14th Street / Highland Avenue (6 total collisions)
  - 16th Street / Highland Avenue (6 total collisions)
- Three segments that experienced a severe/fatal injury collision:
  - Pedestrian collision between 21st Street and 24th Street (fatal injury)
  - Rear End collision between 24th Street and 30th Street (severe injury)
  - Pedestrian collision between SR-54 WB Ramps and National City Limits (fatal injury)
- Two segments with high collision frequency:
  - between 24th Street and 30th Street (15 total collisions)
  - between SR-54 WB Ramps and National City Limits (14 total collisions)

Table 5-6 Highland Avenue Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / Plaza Boulevard • Highland Avenue / 30th Street
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Highland Avenue / 3rd Street
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersections at: • Highland Avenue / 18th Street (southbound approach) • Highland Avenue / Plaza Boulevard (all approaches – restrict during school arrival/dismissal)
S17PB Install pedestrian countdown signal heads	Existing signalized intersection crossing legs at: • Highland Avenue / 18th Street • Highland Avenue / 24th Street • Highland Avenue / SR-54 WB Ramps
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 4th Street (east and west legs) • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / 18th Street • Highland Avenue / 21st Street • Highland Avenue / 24th Street • Highland Avenue / 30th Street • Highland Avenue / SR-54 WB Ramps

Table 5-6 Highland Avenue Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S20PB Install advance stop bar before crosswalk	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / Walmart Driveway (north and south legs) • Highland Avenue / 21st Street • Highland Avenue / 24th Street • Highland Avenue / SR-54 WB Ramps
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Existing signalized intersection crossing legs at: • Highland Avenue / 8th Street • Highland Avenue / Plaza Boulevard • Highland Avenue / 18th Street • Highland Avenue / 24th Street • Highland Avenue / 30th Street
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (provide advance yield markings on NB/SB approaches)	Northbound and Southbound approaches at: • Highland Avenue / 3rd Street • Highland Avenue / 5th Street • Highland Avenue / 6th Street • Highland Avenue / 13th Street • Highland Avenue / 14th Street
R8 Install raised median (provide turn pockets at intersections and major driveways; requires on-street parking removal)	Install along the following segment: • Highland Avenue, from 16th Street to SR-54 WB Ramps
Extend left-turn pocket (non-LRSM countermeasure)	Install at the following location: • Highland Avenue southbound left-turn pocket onto EB SR-54

Highland Avenue / 3rd Street intersection
- *Provide advanced yield markers on NB/SB approaches.*

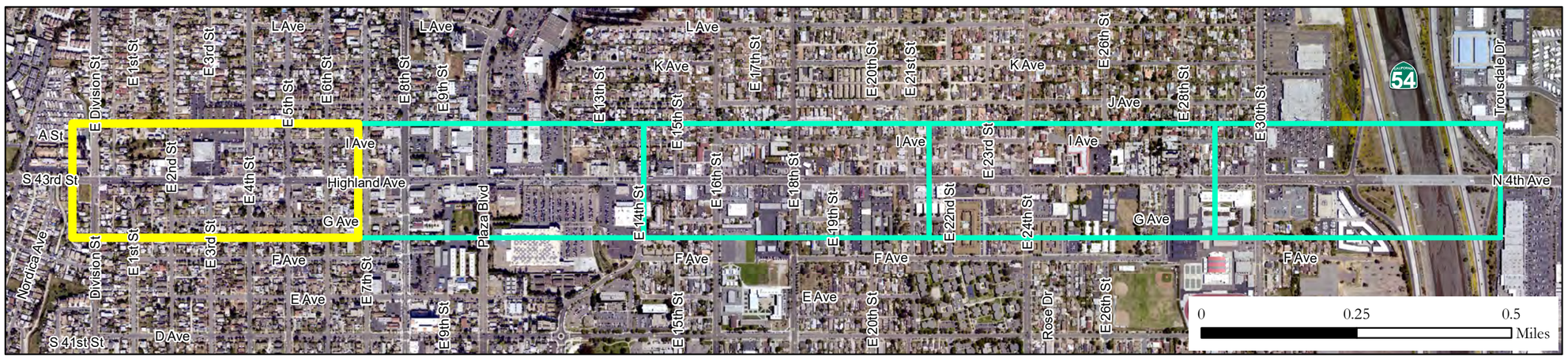
Highland Avenue / 4th Street intersection
- *Provide high visibility continental crosswalks on EB/WB approaches.*

Highland Avenue / 6th Street intersection
- *Provide advanced yield markers on NB/SB approaches.*

HSIP Cycle 8: Pedestrian countdown signal heads, enhance lighting

No collisions since road diet and crosswalk removal

One pedestrian collision occurred following improvements



Type of Collision
- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity
1. Fatal
2. Severe Injury
3. Other Visible Injury
4. Complaint of Pain

N

National City SSARP - Highland Avenue Corridor

Figure 5-5
Division Street (National City Limits) to E 6th Street

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Highland Avenue / 8th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide lead pedestrian intervals.*

Highland Avenue / Plaza Boulevard intersection
- *Provide signalhead for each through lane and left-turn lane (NB/SB approaches).*
- *Improve signal hardware: back-plates with retroreflective borders.*
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide lead pedestrian intervals.*

Highland Avenue / Walmart Driveway intersection
- *Provide advanced stop bar on south leg*

Highland Avenue / 13th Street intersection
- *Provide advanced yield marking on NB/SB approaches.*

Highland Avenue / 14th Street intersection
- *Provide advanced yield marking on NB/SB approaches.*

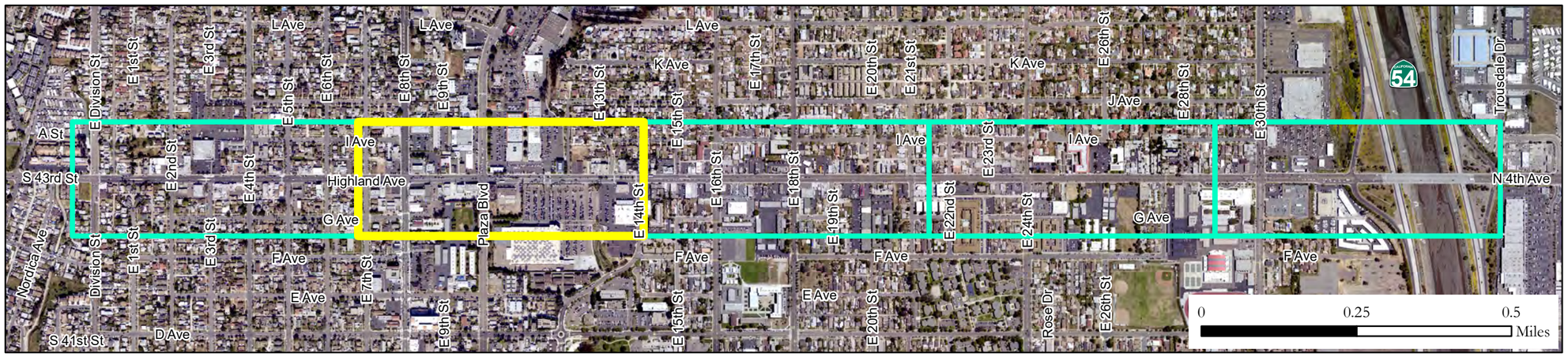
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption

HSIP Cycle 7: Install lighting
HSIP Cycle 8: Pedestrian countdown signal heads

All collisions occurred preceeding improvements

All collisions occurred preceeding improvements

All collisions occurred preceeding improvements



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Highland Avenue Corridor

Figure 5-5
E 7th Street to E 14th Street

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Highland Avenue / 18th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide pedestrian countdown signal heads with lead pedestrian intervals.*
- *Provide NO RIGHT ON RED signage on southbound approach.*

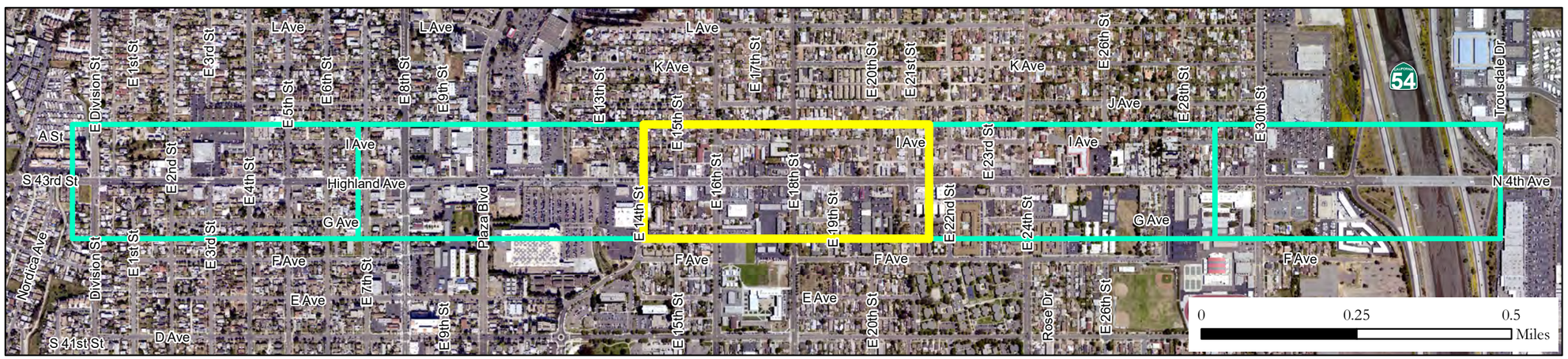
16th Street to SR-54 WB Ramps
- *Raised median with turn pockets.*

Highland Avenue / 21st Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Highland Avenue Corridor

Figure 5-5
E 15th Street to E 21st Street

CHEN RYAN

Highland Avenue / 24th Street intersection

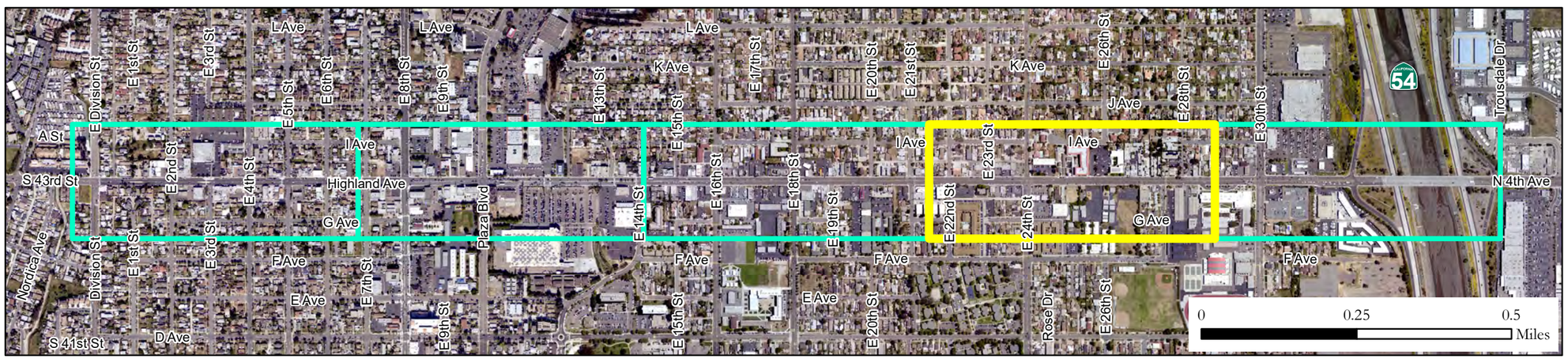
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide pedestrian countdown signal heads with lead pedestrian intervals.*

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption

16th Street to SR-54 WB Ramps

- *Raised median with turn pockets.*

HSIP Cycle 6: Signal installed.



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

National City SSARP - Highland Avenue Corridor

Figure 5-5
E 22nd Street to E 28th Street

CHEN RYAN

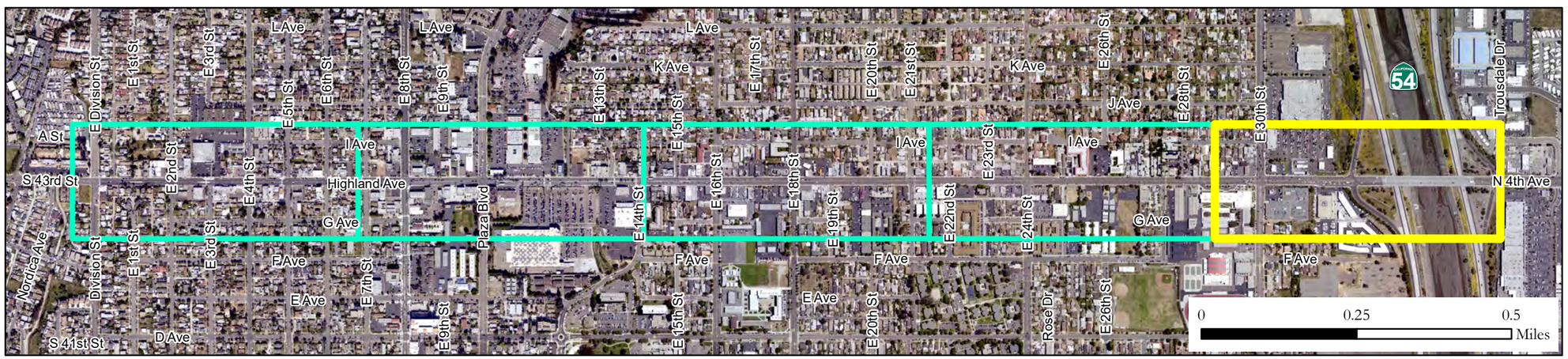
Highland Avenue / 30th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide signalhead for each through lane and left-turn lane on all approaches.*
- *Provide lead pedestrian intervals*

16th Street to SR-54 WB Ramps
- *Raised median with turn pockets.*

Highland Avenue / SR-54 WB Ramps intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide pedestrian countdown signal heads.*

Highland Avenue / SR-54 EB Ramps intersection
- *Extend Southbound Left Turn Pocket*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Install lighting
HSIP Cycle 9: Emergency vehicle preemption



Type of Collision
- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity
1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Highland Avenue Corridor

CHEN RYAN

Figure 5-5
E 30th Street to SR-54 (National City Limits)

Euclid Avenue

Table 5-7 summarizes the recommended countermeasures along Euclid Avenue. Collision locations, crash type, and level of injury severity for records along Euclid Avenue are depicted in Figure 5-6. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

- Three intersections that experienced a severe injury collision:
  - Pedestrian collision at Beta Street
  - Broadside collision at Division Street
  - Pedestrian collision at 4th Street
- Six intersections with high collision frequencies:
  - Euclid Avenue / 8th Street (9 total collisions)
  - Euclid Avenue / Plaza Boulevard (8 total collisions)
  - Euclid Avenue / Division Street (7 total collisions)
  - Euclid Avenue / 4th Street (7 total collisions)
  - Euclid Avenue / 16th Street (7 total collisions)
  - Euclid Avenue / 18th Street (6 total collisions)
- Three segments that experienced a severe injury collision:
  - Broadside collision between Beta Street and Division Street
  - Pedestrian collision between 7th Street and 8th Street
  - Pedestrian collision between 16th Street and 18th Street

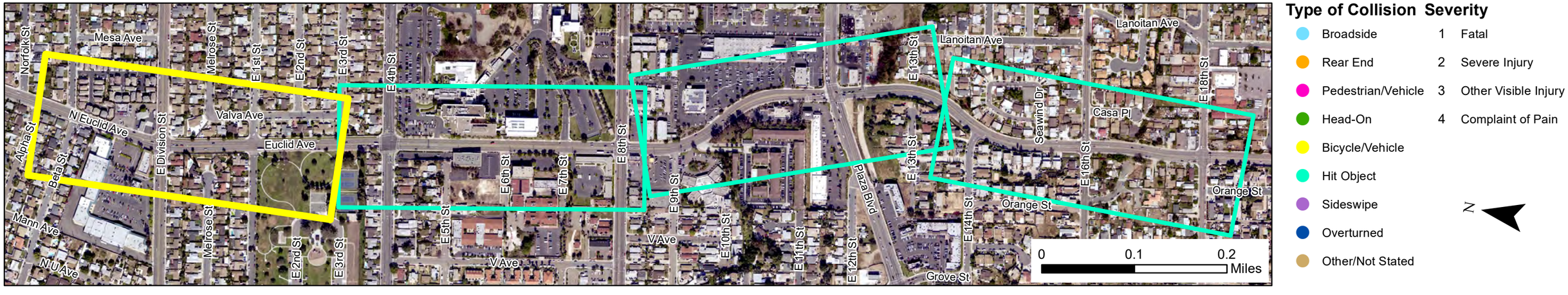
Table 5-7 Euclid Avenue Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 8th Street • Euclid Avenue / 16th Street • Euclid Avenue / 18th Street
S7 Provide protected left-turn phase (left-turn lane already exists)	All approaches at the intersection of: • Euclid Avenue / 4th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections: • Euclid Avenue / 4th Street • Euclid Avenue / 8th Street • Euclid Avenue / 16th Street • Euclid Avenue / 18th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Euclid Avenue / 8th Street
R14 Road diet (reduce travel lanes from 4 to 2 through lanes and a two-way left-turn lane and bike lanes)	Install along the following segment: • Euclid Avenue, from Division Street to 4th Street *** *project implemented during SSARP development* ***

Euclid Avenue / Beta Street intersection
No collisions since road diet and crosswalk relocation

Euclid Avenue, Beta Street to Division Street
No collisions since road diet and crosswalk installation

Road diet from 4th to Division Street (General Plan buildout ADT = 10,000)
- *1 lane in each direction + center left turn lane*
- *Buffered bike lanes*
- *Maintain parking along west side, adjacent to El Toyon Park*



Type of Collision

Broadside	
Rear End	
Pedestrian/Vehicle	
Head-On	
Bicycle/Vehicle	
Hit Object	
Sideswipe	
Overturned	
Other/Not Stated	

Severity

1	Fatal
2	Severe Injury
3	Other Visible Injury
4	Complaint of Pain

N

National City SSARP - Euclid Avenue Corridor

Figure 5-6
Beta Street to E 1st Street

CHEN RYAN

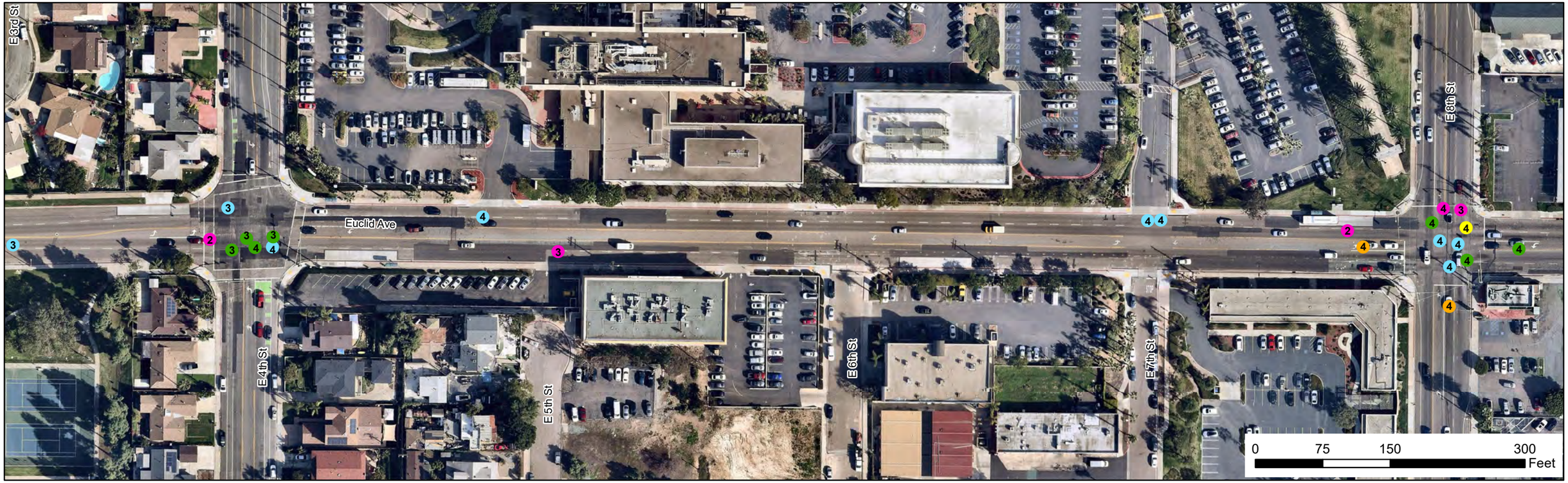
Euclid Avenue / 4th Street intersection
- *Provide high visibility continental crosswalks on all approaches*
- *Provide advanced stop bars*

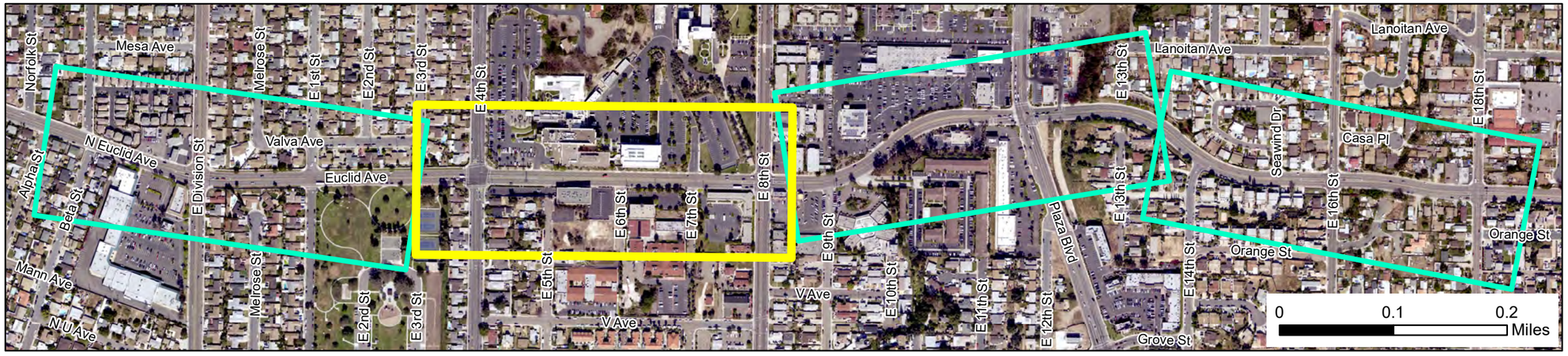
HSIP Cycle 8: Protected left-turn phase

Euclid Avenue / 8th Street intersection
- *Improve signal hardware: back-plates with retro-reflective borders*
- *Provide high visibility continental crosswalks on all approaches*
- *Provide advanced stop bars*

HSIP Cycle 6: Crosswalks
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Road diet continued





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

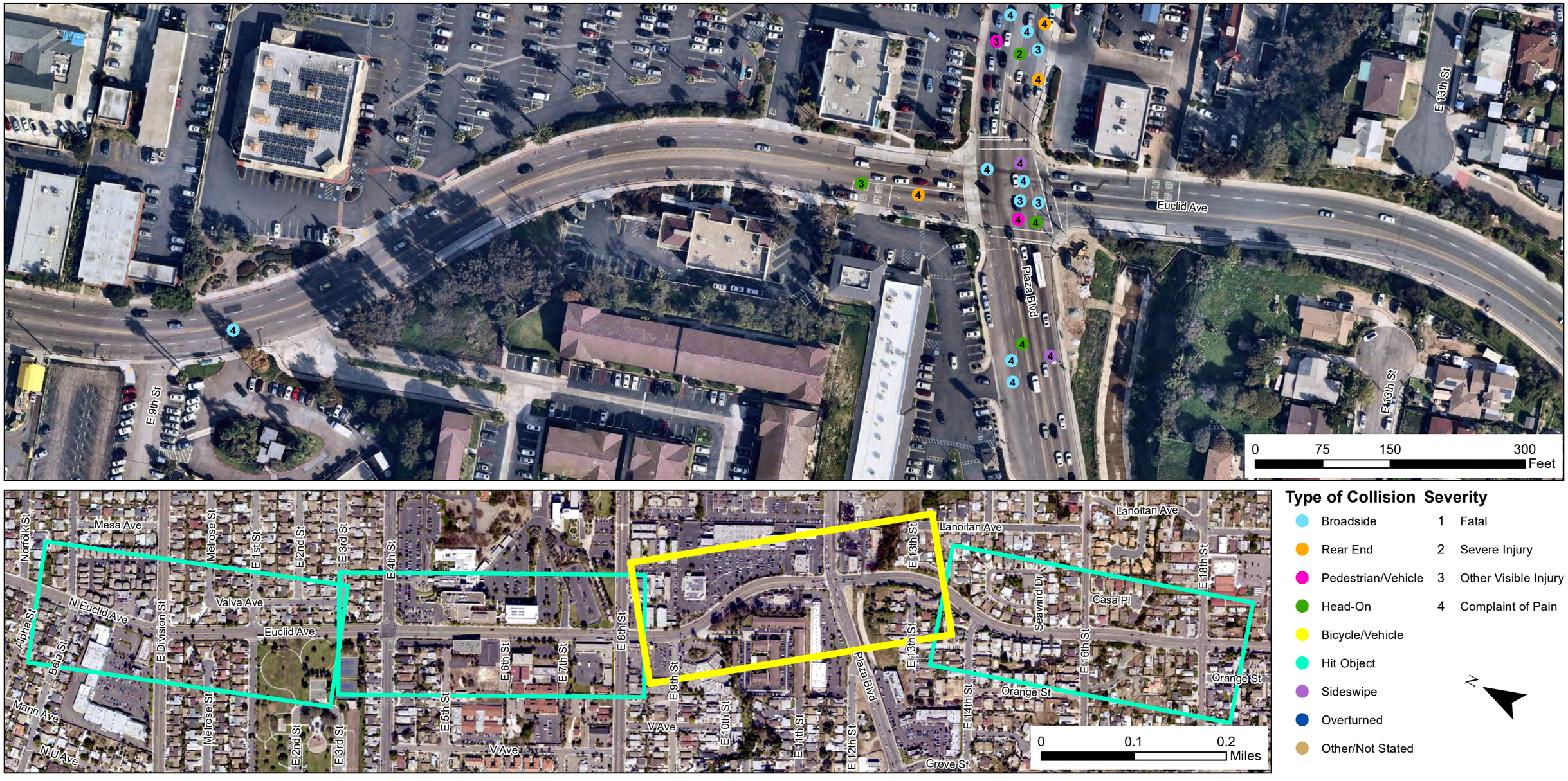
N

National City SSARP - Euclid Avenue Corridor

Figure 5-6
E 4th Street to E 8th Street

CHEN RYAN

Euclid Avenue / Plaza Boulevard intersection
HSIP Cycle 6: Crosswalk on north leg and signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

National City SSARP - Euclid Avenue Corridor

Figure 5-6
E 9th Street to E Plaza Boulevard

CHEN RYAN

Euclid Avenue / 16th Street intersection

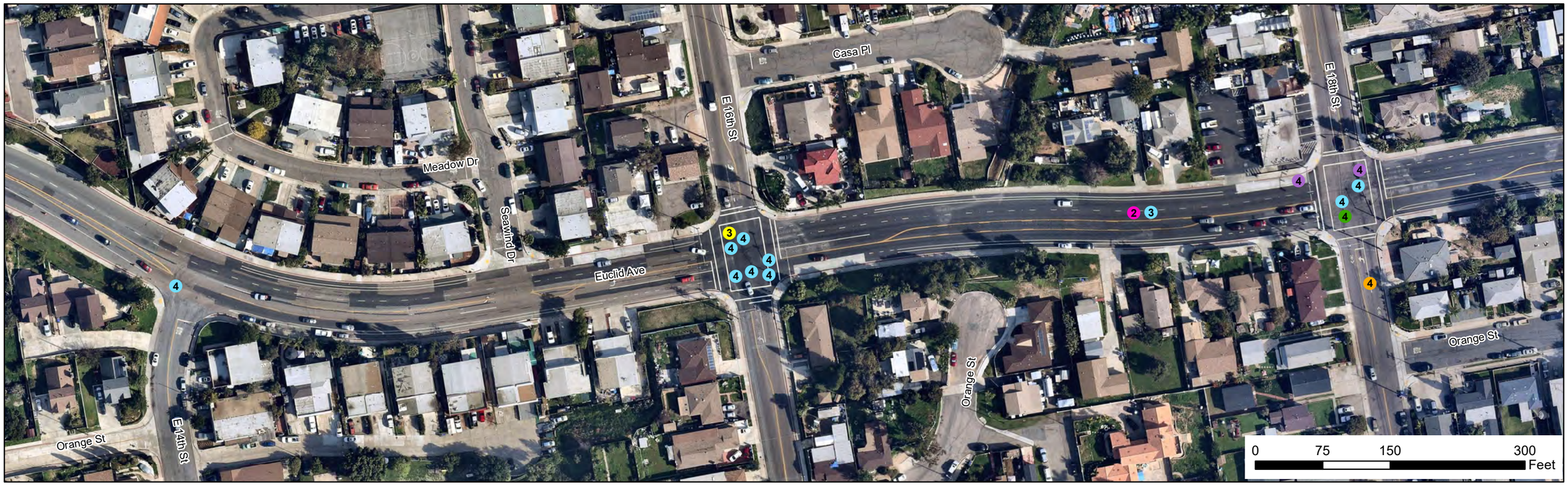
- *Improve signal hardware: back-plates with retroreflective borders*
- *Provide high visibility crosswalks*

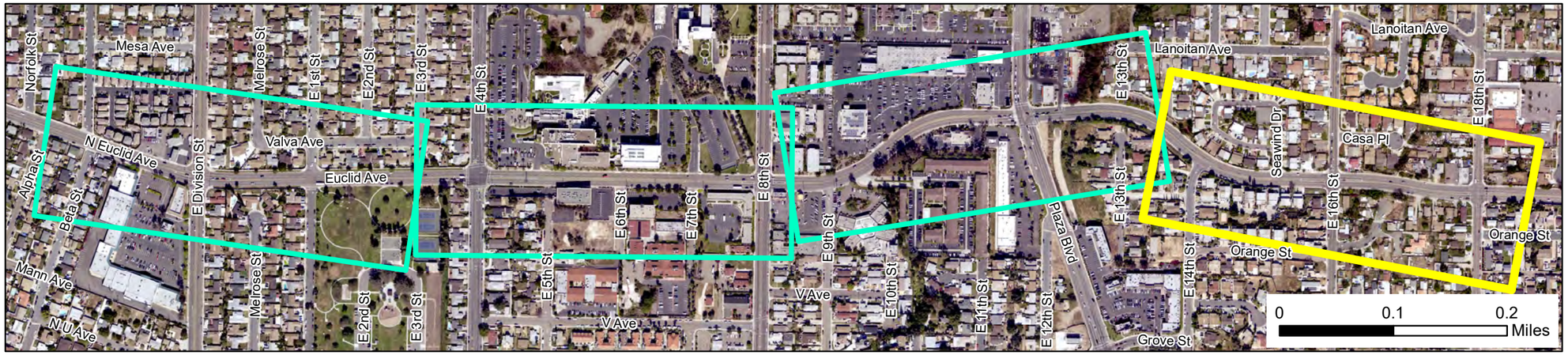
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Euclid Avenue / 18th Street intersection

- *Improve signal hardware: back-plates with retroreflective borders*
- *Provide high visibility crosswalks*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption





Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Euclid Avenue Corridor

Figure 5-6
E 14th Street to E 18th Street

CHEN RYAN

Plaza Boulevard / Paradise Valley Road

Table 5-8 summarizes the recommended countermeasures along Plaza Boulevard / Paradise Valley Road. Collision locations, crash type, and level of injury severity for records along Plaza Boulevard / Paradise Valley Road are depicted in Figure 5-7. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

- Two intersections that experienced a severe or fatal injury collision:
  - Pedestrian collision at Highland Avenue / Plaza Boulevard (fatal injury)
  - Overturned collision at Highland Avenue / Plaza Boulevard (severe injury)
  - Pedestrian collision at S. Harbison Avenue / Plaza Boulevard (severe injury)
- Seven intersections with high collision frequency:
  - Highland Avenue / Plaza Boulevard (19 total collisions)
  - 8th Street / Plaza Boulevard / Paradise Valley Road (12 total collisions)
  - S. Harbison Avenue / Plaza Boulevard (9 total collisions)
  - L Avenue / Plaza Boulevard (8 total collisions)
  - Euclid Avenue / Plaza Boulevard (8 total collisions)
  - B Avenue / Plaza Boulevard (7 total collisions)
  - Grove Street / Plaza Boulevard (6 total collisions)
- Four segments that experienced a severe/fatal injury collision:
  - Pedestrian collision between Highland Avenue and L Avenue (fatal injury)
  - Head-On collision between Euclid Avenue and S. Harbison Ave (severe injury)
  - Overturned collision between Euclid Avenue and S. Harbison Ave (fatal injury)
  - Pedestrian collision between Euclid Avenue and S. Harbison Ave (severe injury)
  - Head-On collision between S. Harbison Ave and 8th Street (severe injury)
  - Hit Object collision between 8th Street and Plaza Boulevard (severe injury)
- Four segments with high collision frequency:
  - between Euclid Avenue and S. Harbison Avenue (18 total collisions)
  - between I-805 SB Ramps and Grove Street (12 total collisions)
  - between Highland Avenue and L Avenue (8 total collisions)
  - between Grove Street and Euclid Avenue (8 total collisions)

Table 5-8 Plaza Boulevard / Paradise Valley Road Countermeasure Summary

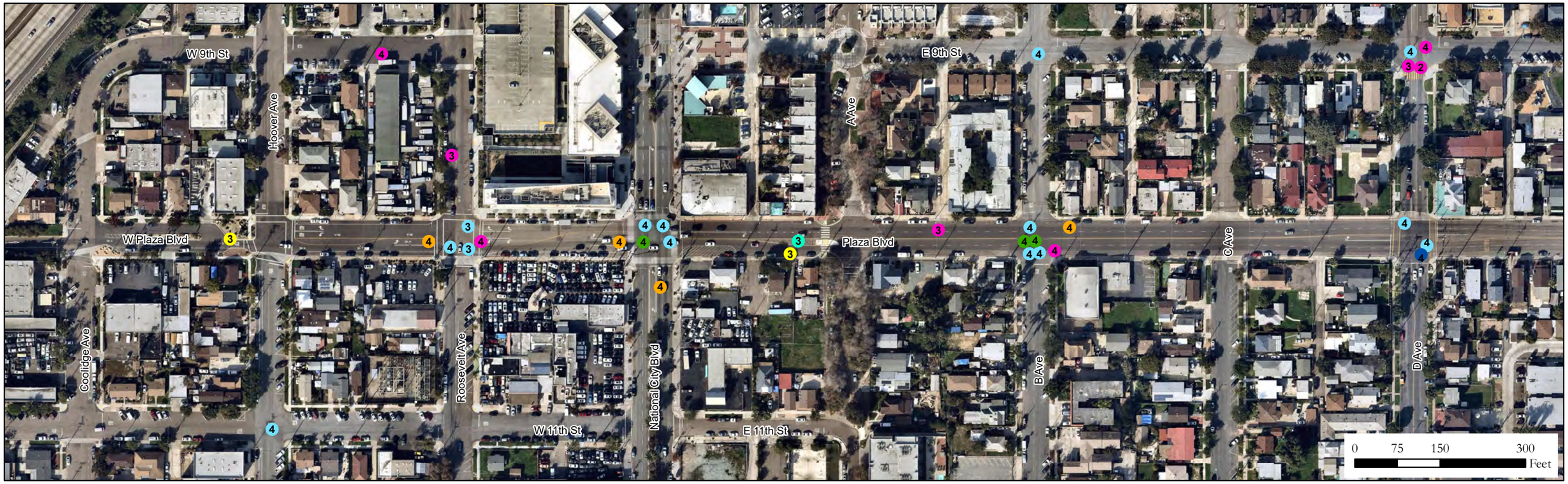
Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / Plaza Boulevard • 8th Street / Plaza Boulevard / Paradise Valley Road
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Highland Avenue / Plaza Boulevard • 8th Street / Plaza Boulevard / Paradise Valley Road
S3 Improve signal timing (provide NO RIGHT ON RED signage during school arrival/dismissal periods)	Signalized intersection at: • Highland Avenue / Plaza Boulevard (all approaches – restrict during school arrival/dismissal)
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • Highland Avenue / Plaza Boulevard
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide marked crosswalks with advance yield/stop markings and curb extensions at the following intersections: • B Avenue / Plaza Boulevard • C Avenue / Plaza Boulevard • D Avenue / Plaza Boulevard • E Avenue / Plaza Boulevard
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segment: • Plaza Boulevard, from Euclid Avenue to the mid-block crossing to the east
R14 Road Diet (reduce travel lanes from four lanes to two through lanes and a two-way left-turn lane; maintain on-street parking)	Install along the following segment: • Plaza Boulevard, from National City Boulevard to Highland Avenue (General Plan buildout ADT = 17,600 – 19,900; designated as a Community Corridor)

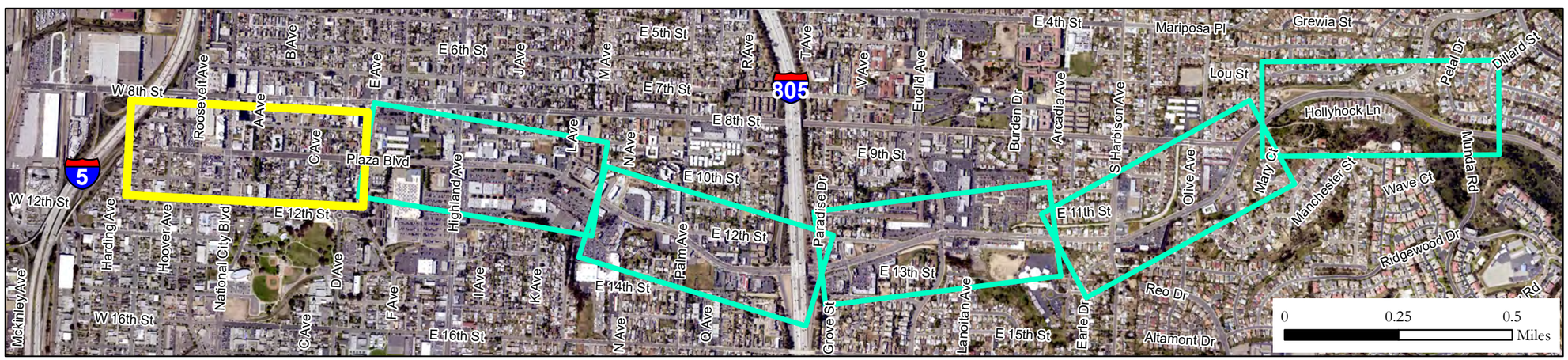
Plaza Boulevard / Roosevelt Avenue intersection
HSIP Cycle 8 & 9: pedestrian countdown signal heads, lighting, protected left-turn phasing and additional signal heads

Plaza Boulevard / National City Boulevard intersection
HSIP Cycle 7: lighting

Road diet from National City Boulevard to Highland Avenue
- *1 lane in each direction + center left turn lane*
- *Maintain on-street parking*
- *Curb extensions at intersections*

Plaza Boulevard / D Avenue intersection
HSIP Cycle 7: lighting





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

Figure 5-7
Coolidge Avenue to D Avenue

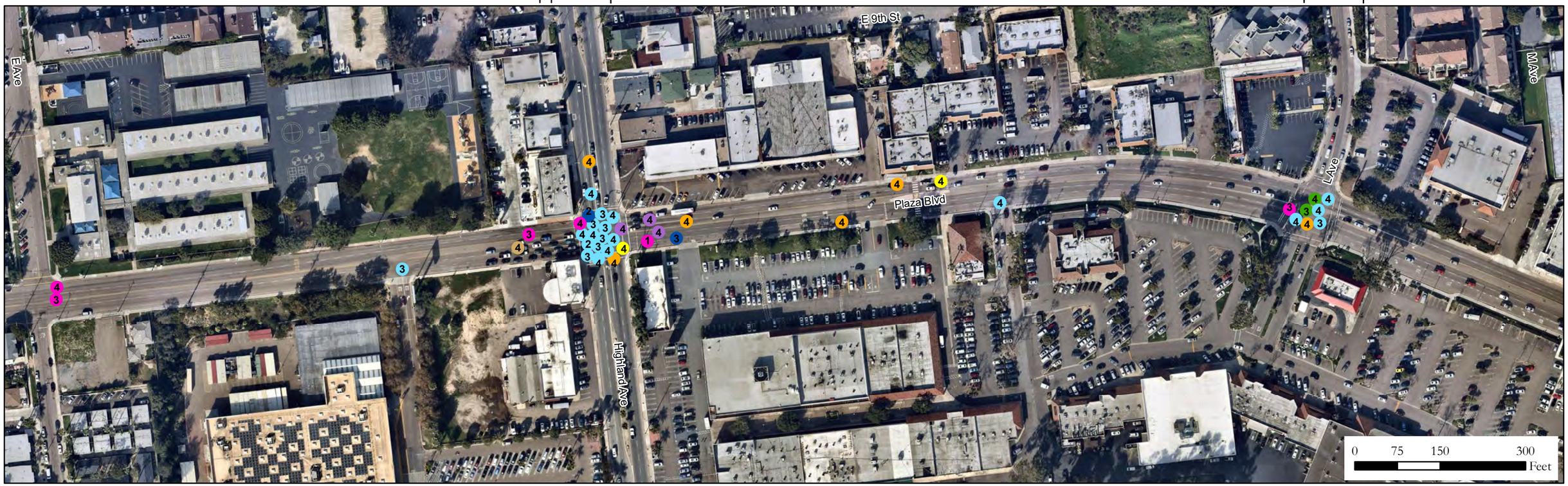
CHEN RYAN

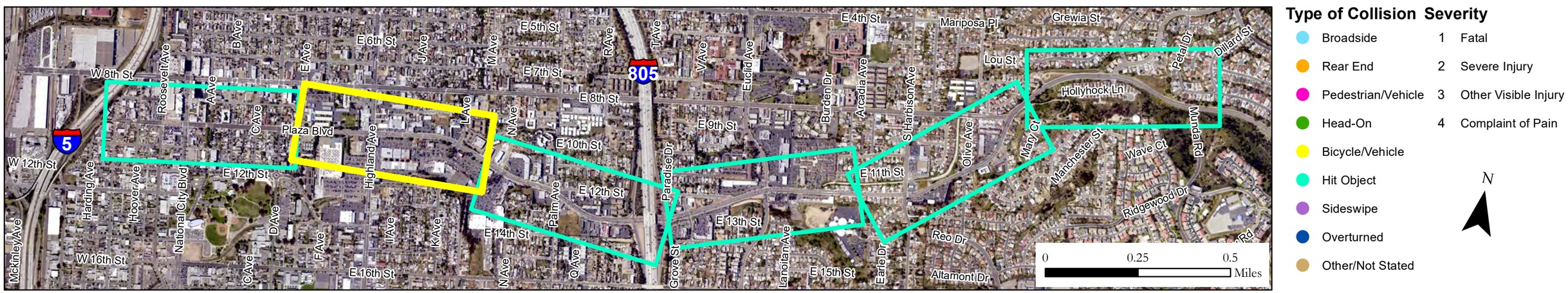
Road diet from National City Boulevard to Highland Avenue
- *1 lane in each direction + center left turn lane*
- *Maintain on-street parking*
- *Curb extensions at intersections*

Plaza Boulevard / Highland Avenue intersection
- *Provide signalhead for each through lane and left-turn lane (NB/SB approaches).*
- *Improve signal hardware: back-plates with retroreflective borders.*
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide lead pedestrian intervals.*
- *Provide NO RIGHT ON RED blank out signage during school arrival/dismissal.*

HSIP Cycle 7 & 8: Lighting & pedestrian countdown signal heads

Plaza Boulevard / L Avenue intersection
HSIP Cycle 7, 8 & 9: pedestrian countdown signal heads, lighting, protected left-turn phasing and additional signalheads





Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

Figure 5-7
E Avenue to L Avenue

CHEN RYAN

Plaza Boulevard / N Avenue intersection
HSIP Cycle 7, 8 & 9: pedestrian crossings, lighting, protected left-turn phasing and additional signal heads

Plaza Boulevard / Palm Avenue intersection
HSIP Cycle 7 & 8: pedestrian countdown signal heads, lighting

Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

Figure 5-7
N Avenue to Interstate 805 Northbound Ramps

CHEN RYAN

Plaza Boulevard / Grove Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption; protected left signal phasing

Plaza Boulevard / Euclid Avenue intersection
HSIP Cycle 6: Ladder crosswalk on north leg and signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption
-
Other collisions due to DUI, police evasion, unknown, three to failure to yield

Euclid Avenue to Midblock Crossing
- *Install raised median with turn pockets*

Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

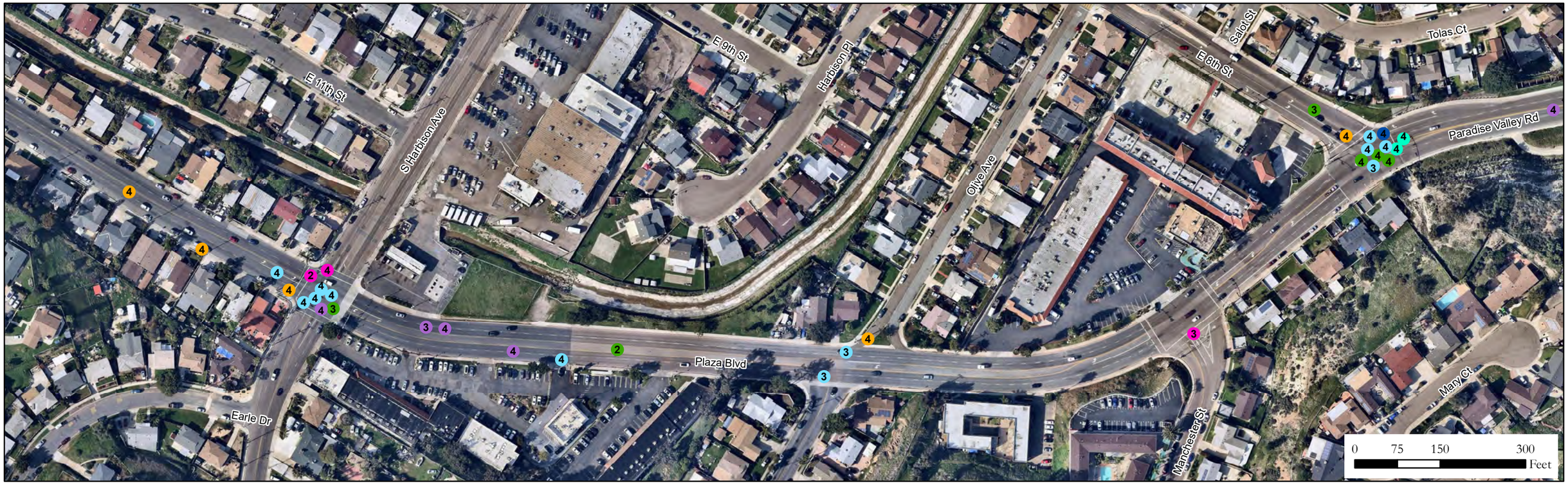
Figure 5-7
Grove Street to Midblock Crossing

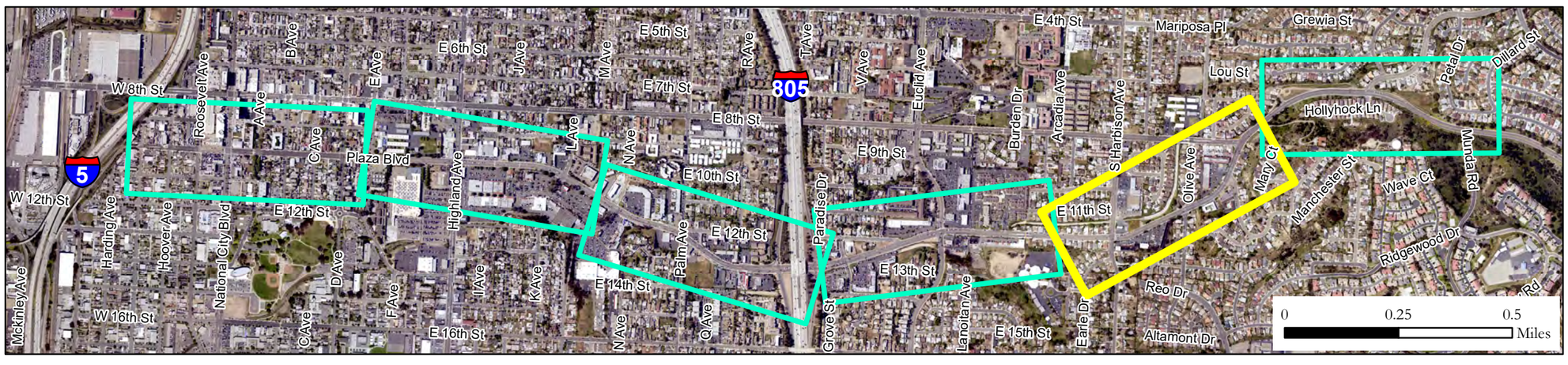
CHEN RYAN

Plaza Boulevard / Harbison Avenue intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalk on east leg
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Plaza Boulevard / Manchester Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads & safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Plaza Boulevard / Paradise Valley Road / 8th Street intersection
- *Provide signalhead for each through lane and left-turn lane (NB/SB approaches).*
- *Improve signal hardware: back-plates with retroreflective borders.*





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

Figure 5-7
Harbison Avenue to E 8th Street

CHEN RYAN

National City SSARP - Plaza Boulevard & Paradise Valley Road Corridor

Figure 5-7
3600 Block E 8th Street to E Plaza Boulevard (National City Limits)

CHEN RYAN

8th Street

Table 5-9 summarizes the recommended countermeasures along 8th Street. Collision locations, crash type, and level of injury severity for records along 8th Street are depicted in Figure 5-8. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

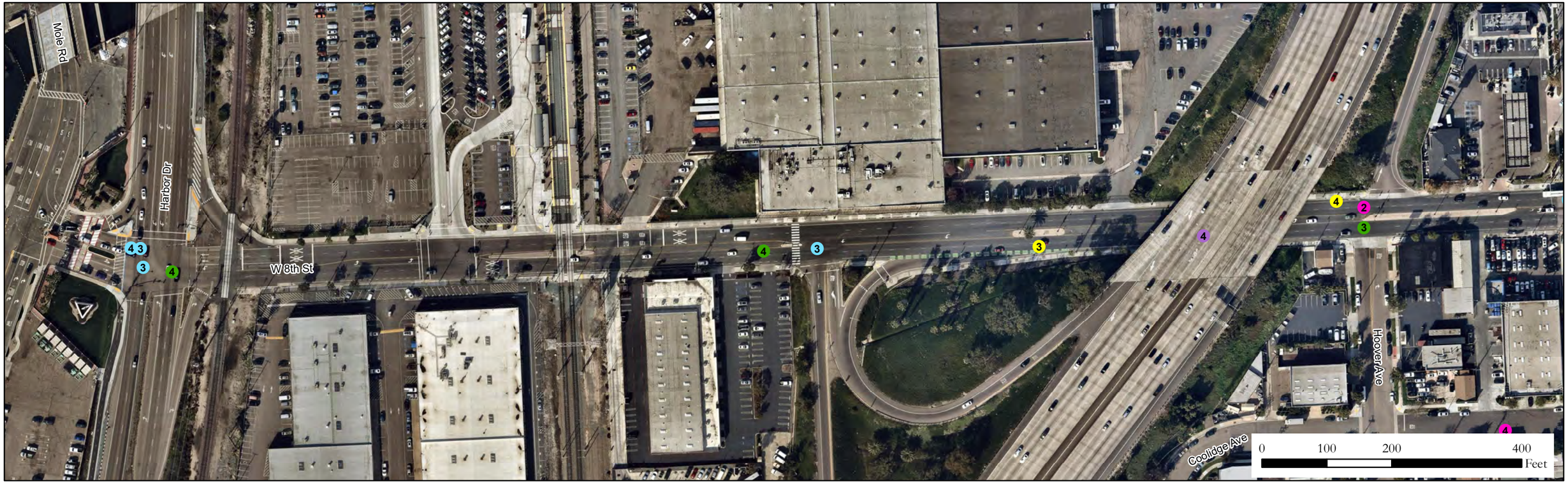
- Six intersections that experienced a severe or fatal injury collision:
  - Pedestrian collision at Hoover Avenue / 8th Street (severe injury)
  - Pedestrian collision at National City Boulevard / 8th Street (fatal injury)
  - Head-On collision at D Avenue / 8th Street (severe injury)
  - Pedestrian collision at E Avenue / 8th Street (fatal injury)
  - Pedestrian collision at Highland Avenue / 8th Street (severe injury)
  - Pedestrian collision at Harbison Avenue / 8th Street (severe injury)
  - Pedestrian collision at Harbison Avenue / 8th Street (severe injury)
- Six intersections with high collision frequency:
  - Plaza Boulevard / 8th Street (12 total collisions)
  - Euclid Avenue / 8th Street (11 total collisions)
  - Harbison Avenue / 8th Street (8 total collisions)
  - National City Boulevard / 8th Street (6 total collisions)
  - D Avenue / 8th Street (6 total collisions)
  - V Avenue / 8th Street (6 total collisions)
- Six segments that experienced a severe/fatal injury collision:
  - Pedestrian collision between Highland Avenue and I Avenue (severe injury)
  - Pedestrian collision between Highland Avenue and I Avenue (severe injury)
  - Broadside collision between T Avenue and Paradise Drive (severe injury)
  - Bicycle collision between Paradise Drive and V Avenue (severe injury)
  - Head-On collision between Euclid Avenue and Burden Drive (severe injury)
  - Bicycle collision between Harbison Avenue and Rachael Avenue (severe injury)
- One segment with high collision frequency:
  - between Euclid Avenue and Burden Drive (8 total collisions)

Table 5-9 8th Street Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersection at: • 8th Street / Plaza Boulevard / Paradise Valley Road
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 8th Street • 8th Street / Plaza Boulevard / Paradise Valley Road
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersection at: • National City Boulevard / 8th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections: • Highland Avenue / 8th Street • Harbison Avenue / 8th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersections: • Highland Avenue / 8th Street • Harbison Avenue / 8th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersections: • National City Boulevard / 8th Street • Highland Avenue / 8th Street
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide high visibility marked crosswalks with advance yield/stop markings at the following location: • T Avenue / 8th Street (north and east legs) Provide curb extensions at the following location: • T Avenue / 8th Street (east leg)
NS22PB Install Rectangular Rapid Flashing Beacon (RRFB)	Install at the following location: • T Avenue / 8th Street (east leg)
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segments: • 8th Street, from Highland Avenue to K Avenue • 8th Street, from Palm Avenue to Rachael Avenue

Harbor Drive / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads & safety lighting

Transit Center Driveway / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 8th Street Corridor

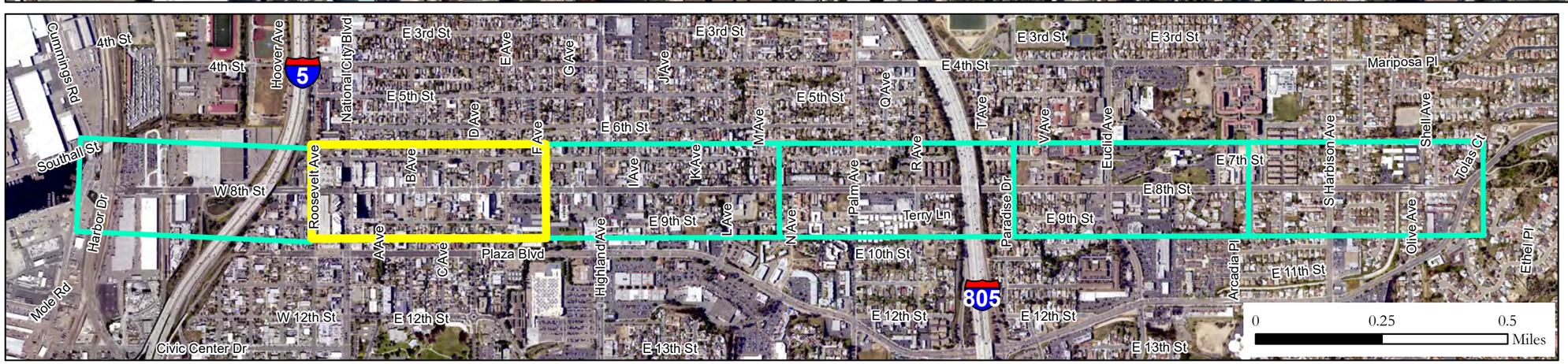
Figure 5-8
Harbor Drive to Hoover Avenue

National City Boulevard / 8th Street intersection
- *Provide lead pedestrian intervals.*
- *Provide NO RIGHT TURN ON RED blank out signage on southbound to westbound right.*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

D Avenue / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 9: Emergency vehicle preemption

E Avenue / 8th Street intersection
Collision occurred prior to median installation



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - 8th Street Corridor

Figure 5-8
Roosevelt Avenue to F Avenue

CHEN RYAN

Highland Avenue / 8th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide lead pedestrian intervals.*

HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption

Highland Avenue to K Avenue
- *Provide median with cutouts along extents.*

K Avenue / 8th Street intersection
Driver at fault (DUI)

M Avenue / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 9: Emergency vehicle preemption

Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 8th Street Corridor

Figure 5-8
G Avenue to M Avenue

CHEN RYAN

Palm Avenue / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 9: Emergency vehicle preemption

Palm Avenue to Rachael Avenue
- *Install raised median with cutouts along extent*

R Avenue / 8th Street intersection
HSIP Cycle 7: Safety lighting

T Avenue / 8th Street intersection
- *Provide high visibility crosswalk on the north and east leg advanced stop bars and yield markings.*
- *Provide curb bulb-outs.*
- *Provide rapid rectangular flashing beacons (RRFB) on the east leg crossing.*

Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 8th Street Corridor

Figure 5-8
N Avenue to Paradise Drive

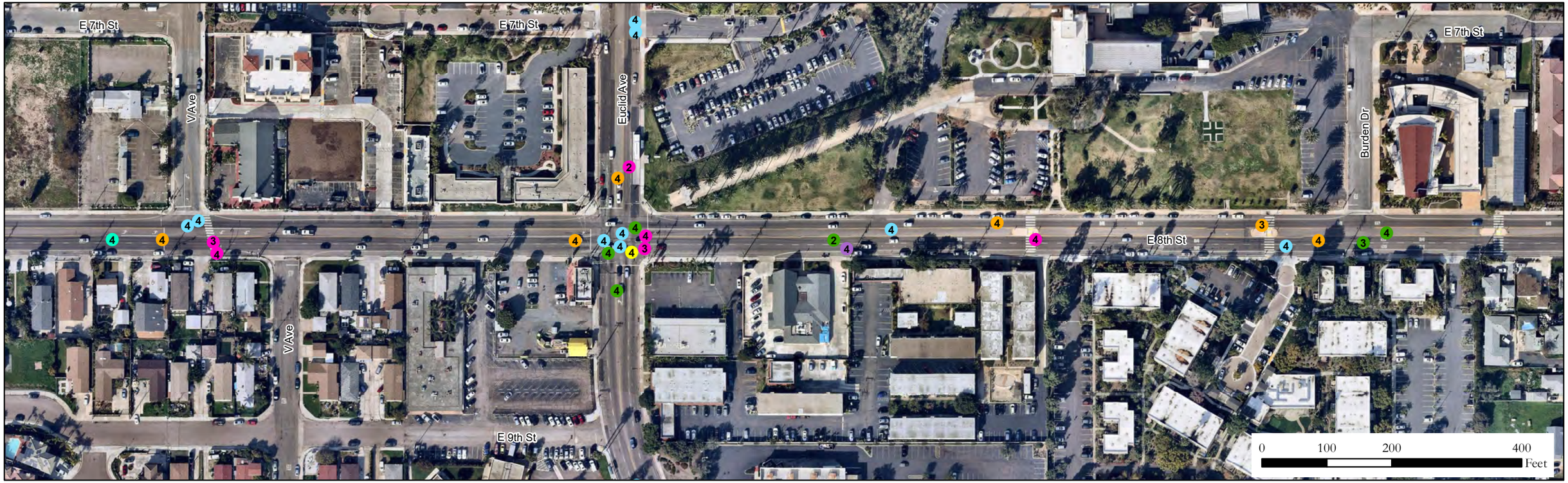
CHEN RYAN

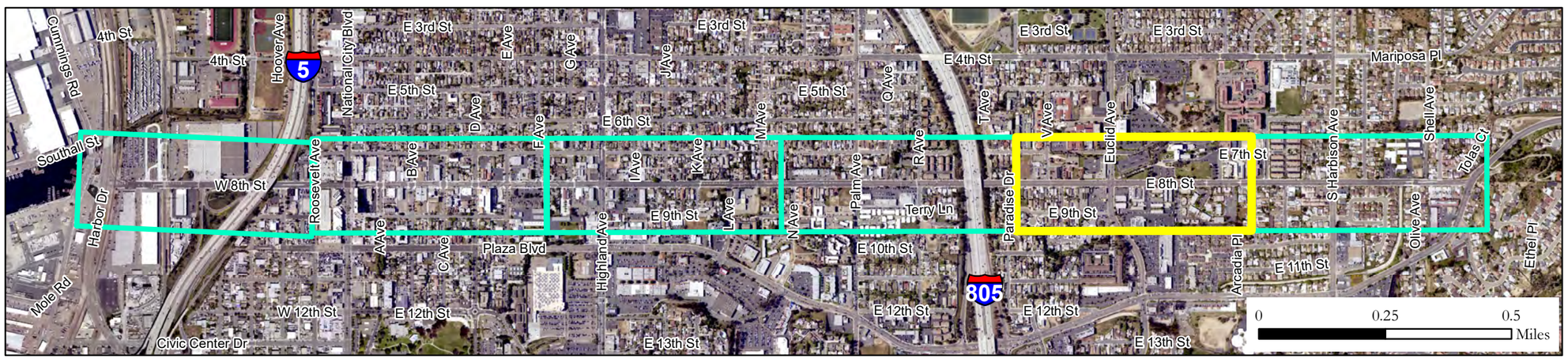
V Avenue / 8th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads & safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Euclid Avenue / 8th Street intersection
- *Improve signal hardware: back-plates with retro-reflective borders*
- *Provide high visibility continental crosswalks on all approaches*
- *Provide advanced stop bars*

HSIP Cycle 6: Crosswalks
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Palm Avenue to Rachael Avenue
- *Install raised median with cutouts along extent*





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 8th Street Corridor

Figure 5-8
V Avenue to Burden Drive

CHEN RYAN

Harbison Avenue / 8th Street intersection

- *Improve signal hardware: backplates with retroreflective borders*
- *Provide high visibility continental crosswalks on all approaches.*
- *Provide advanced stop bars.*

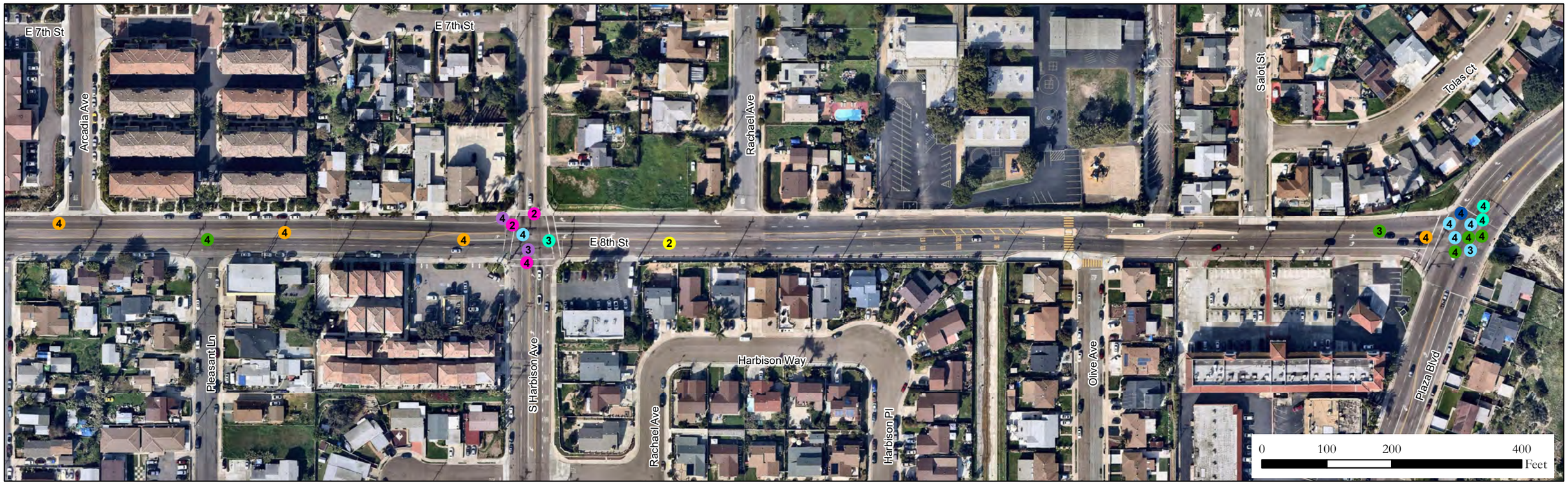
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Protected left-turn phase

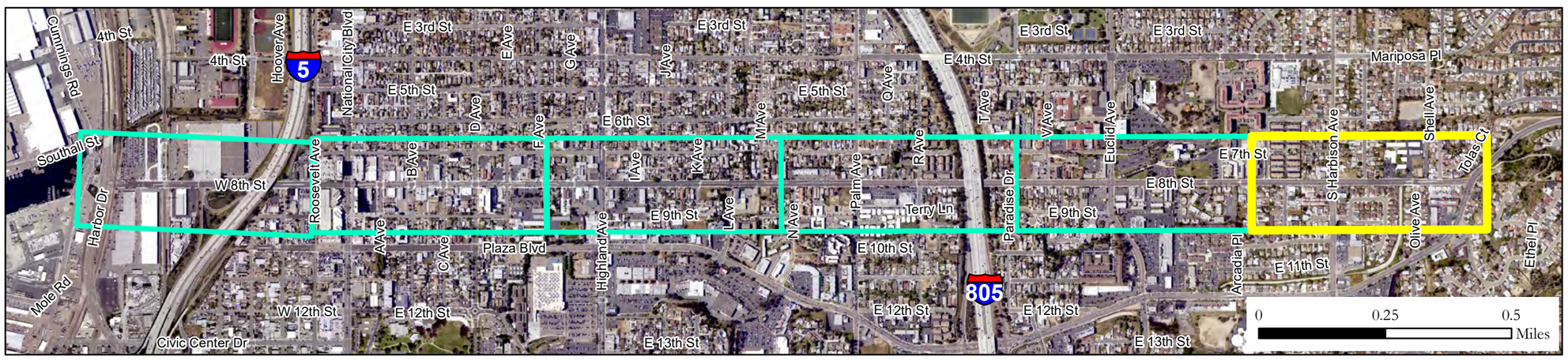
Palm Avenue to Rachael Avenue

- *Install raised median with cutouts along extent*

Plaza Boulevard / Paradise Valley Road / 8th Street intersection

- *Provide signal head for each through lane and left-turn lane (NB/SB approaches).*
- *Improve signal hardware: back-plates with retroreflective borders.*





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 8th Street Corridor

Figure 5-8
Arcadia Place to Plaza Boulevard/ Paradise Valley Road

CHEN RYAN

16th Street

Table 5-10 summarizes the recommended countermeasures along 16th Street. Collision locations, crash type, and level of injury severity for records along 16th Street are depicted in Figure 5-9. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

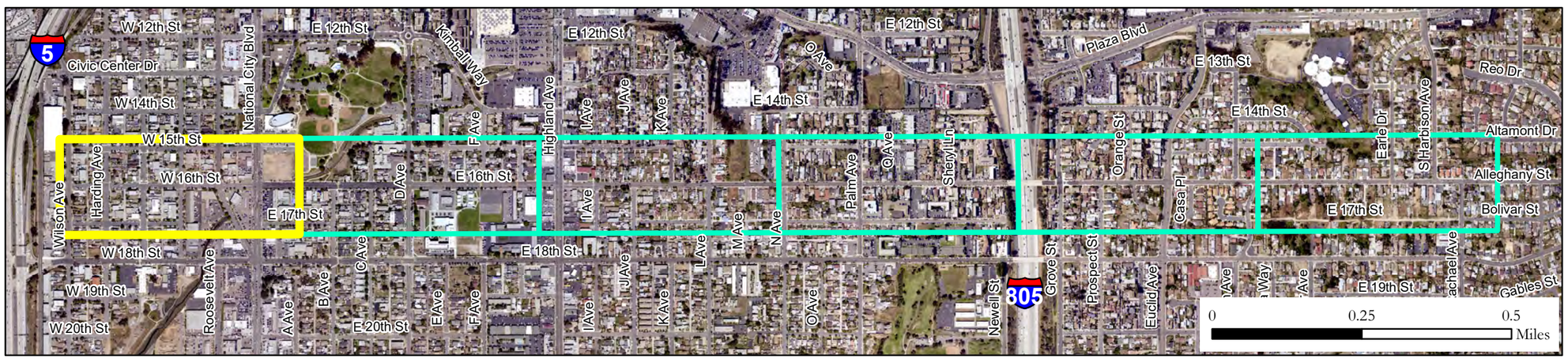
This roadway includes:

- One intersection that experienced a severe injury collision: pedestrian collision at Grove Street / 16th Street
- Three intersections with high collision frequencies:
    - National City Boulevard / 16th Street (7 total collisions)
    - Euclid Avenue / 16th Street (7 total collisions)
    - Highland Avenue /16th Street (6 total collisions)
- One segment that experienced multiple severe/fatal injury collisions: between Palm Avenue and Grove Street
    - Severe injury resulting from a broadside collision
    - Fatal injury resulting from rear end collision

Table 5-10 16th Street Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • Euclid Avenue / 16th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersection: • D Avenue / 16th Street • Euclid Avenue / 16th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • D Avenue / 16th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • D Avenue / 16th Street
Install curb extensions (non-LRSM countermeasure at signalized intersections)	At the northwest and southeast corners of: • D Avenue / 16th Street

National City Boulevard / 16th Street intersection
HSIP Cycle 6: Ladder crosswalks & signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Protected left-turn phase
HSIP Cycle 9: Emergency vehicle preemption



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 16th Street Corridor

Figure 5-9
Wilson Avenue to National City Boulevard

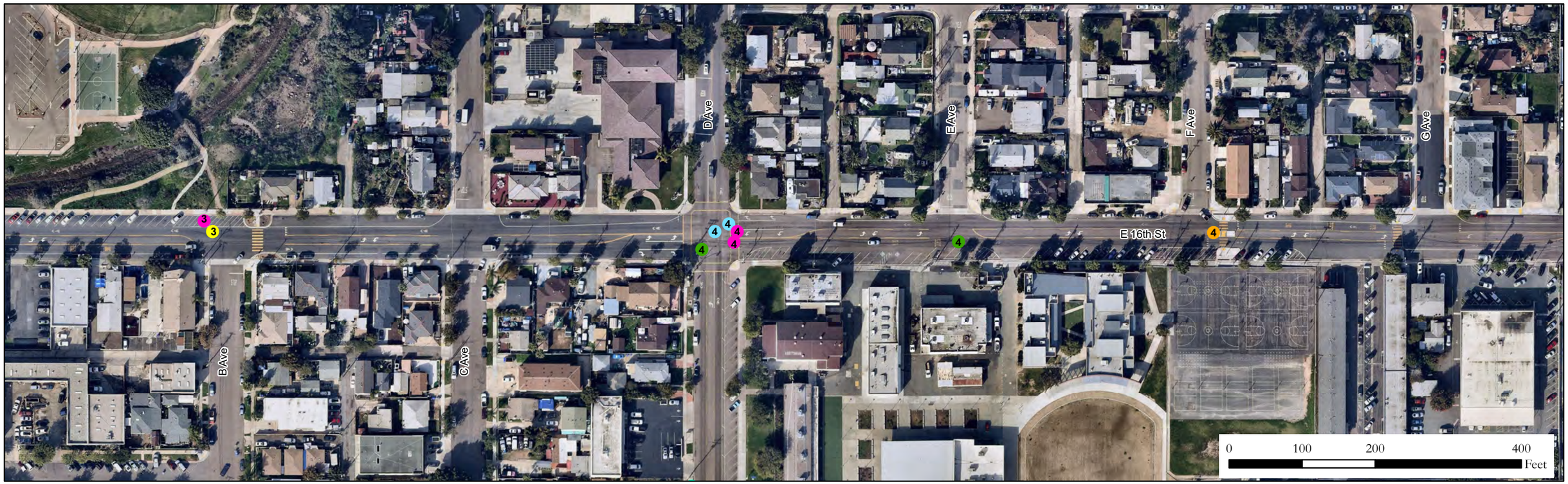
CHEN RYAN

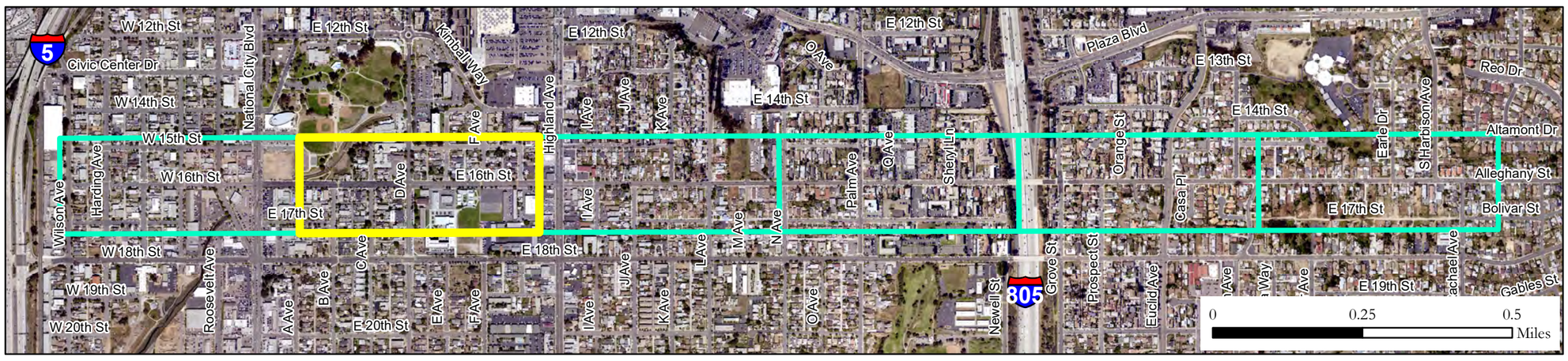
D Avenue / 16th Street intersection

- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide lead pedestrian intervals.*
- *Provide bulb-outs on NW and SE corners.*

HSIP Cycle 6: Ladder crosswalks
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Protected left-turn phase

G Avenue / 16th Street intersection
HSIP Cycle 7: Safety lighting





Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

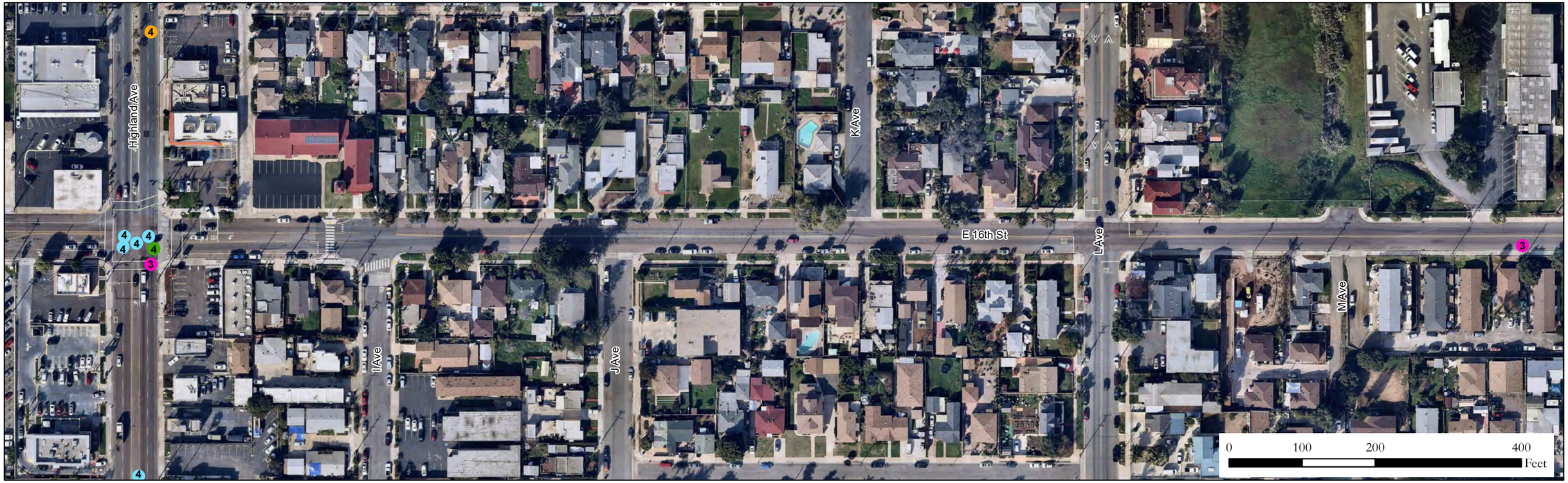
N

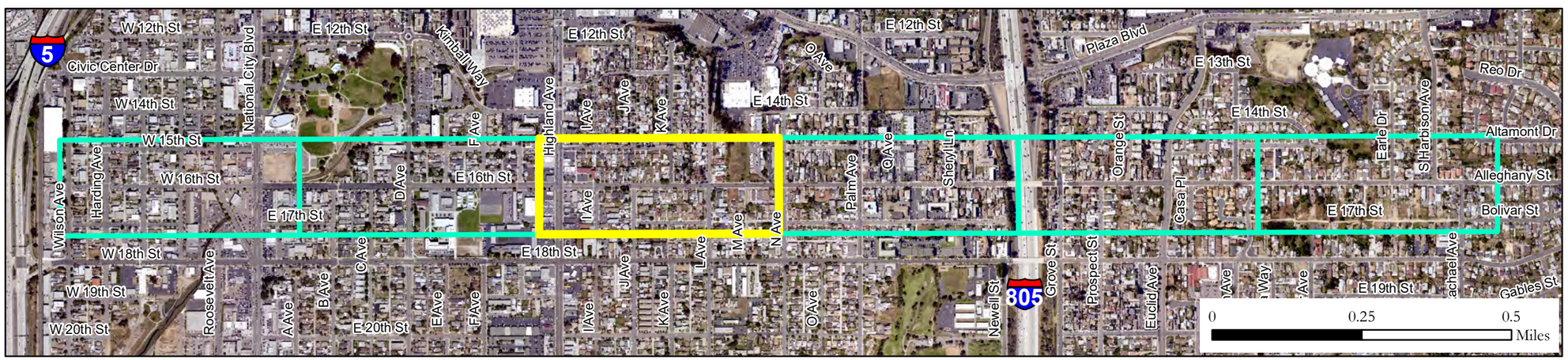
National City SSARP - 16th Street Corridor

Figure 5-9
B Avenue to G Avenue

CHEN RYAN

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption





Type of Collision Severity

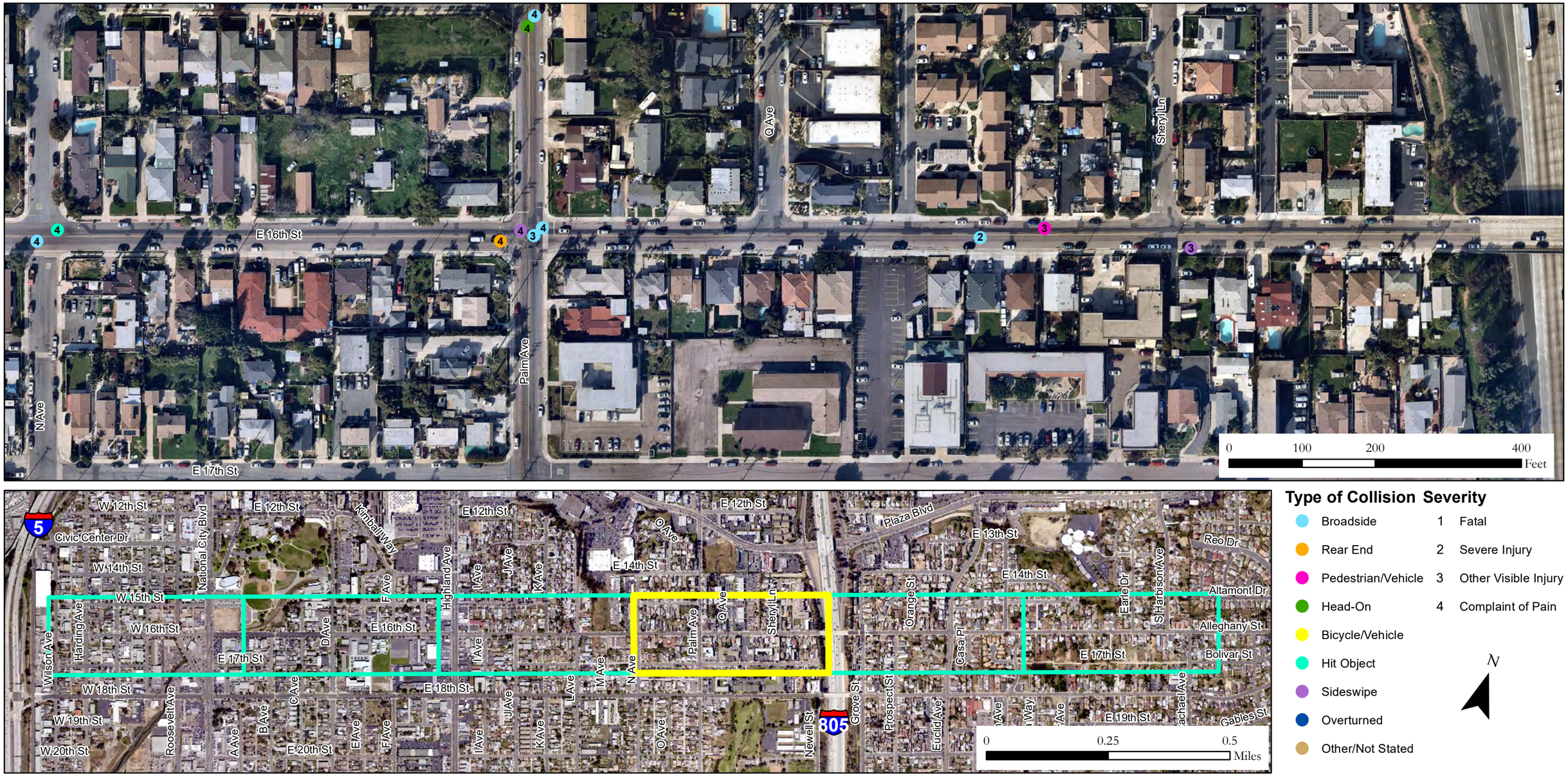
Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

National City SSARP - 16th Street Corridor

Figure 5-9
Highland Avenue to M Avenue

CHEN RYAN

Palm Avenue / 16th Street intersection
HSIP Cycle 7: Signal equipment upgrade
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Protected left-turn phase



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 16th Street Corridor

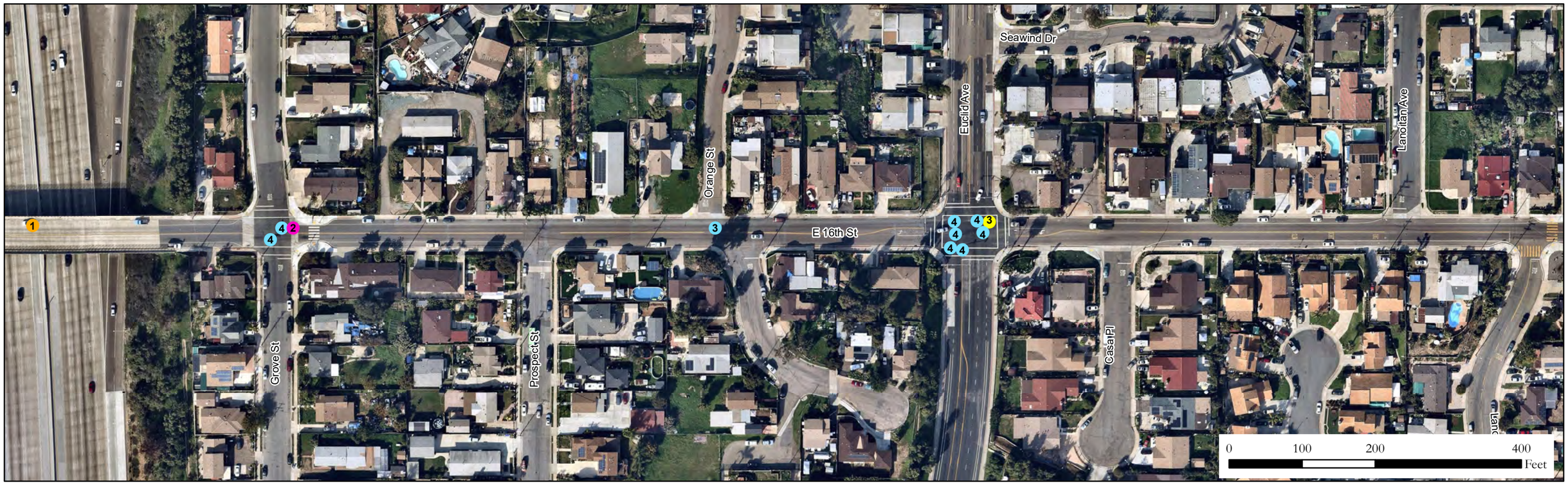
Figure 5-9
N Avenue to Interstate 805

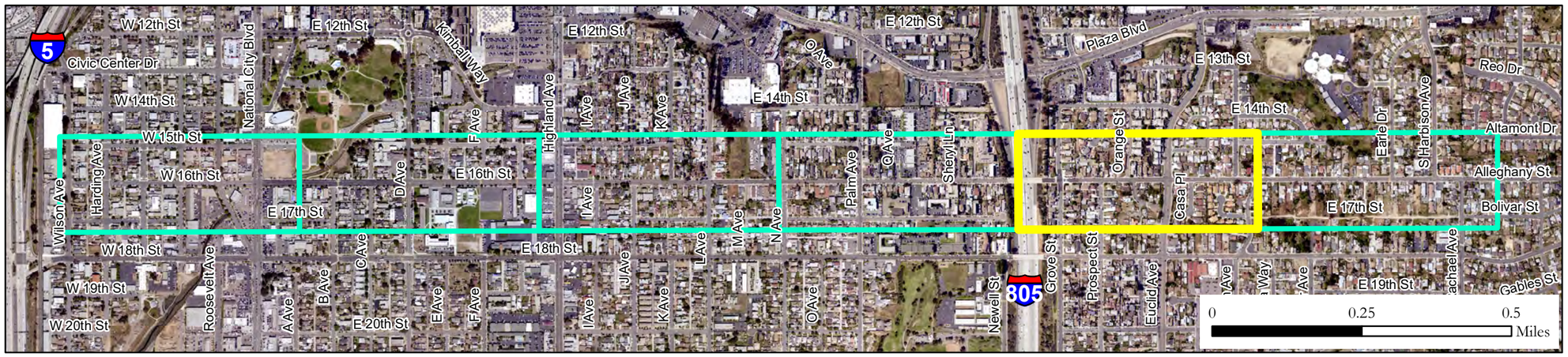
CHEN RYAN

Grove Street / 16th Street
No collisions since bulb-outs were implemented

Euclid Avenue / 16th Street intersection
- *Improve signal hardware: back-plates with retroreflective borders*
- *Provide high visibility crosswalks*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption





Type of Collision Severity

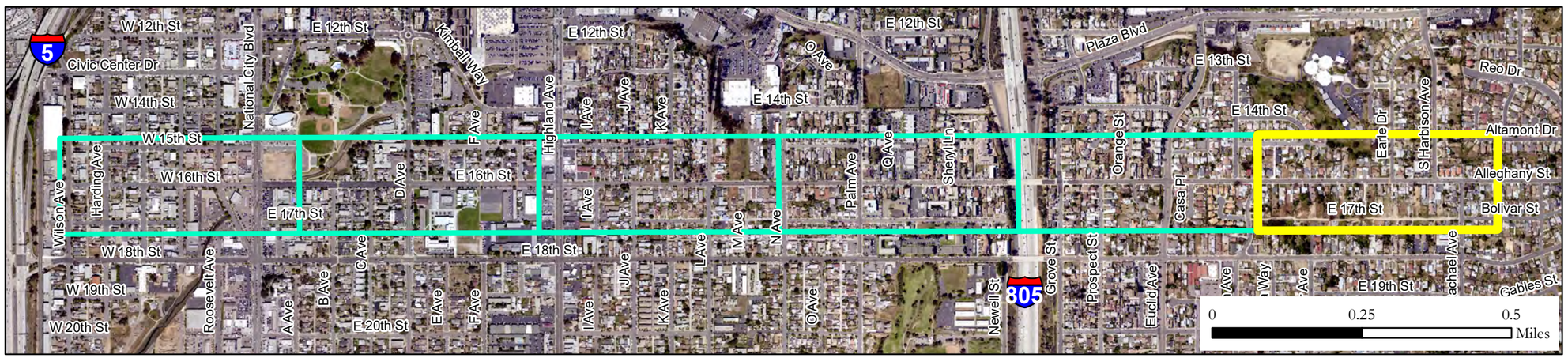
Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 16th Street Corridor

Figure 5-9
Interstate 805 to Lanoitan Avenue

CHEN RYAN



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - 16th Street Corridor

Figure 5-9
Lanoitan Avenue to National City Limits

CHEN RYAN

18th Street

Table 5-11 summarizes the recommended countermeasures along 18th Street. Collision locations, crash type, and level of injury severity for records along 18th Street are depicted in Figure 5-10. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

- One intersection that experienced multiple severe injury collisions: two pedestrian collisions at Highland Avenue / 18th Street (both severe injuries). A total of eight pedestrian collisions were reported at this intersection.
- Three intersections with high collision frequencies:
    - Highland Avenue / 18th Street (20 total collisions)
    - National City Boulevard / 18th Street (6 total collisions)
    - Euclid Avenue / 18th Street (6 total collisions)
- One segment that experienced a severe injury collision: pedestrian collision between Granger Avenue and Rachel Avenue (severe injury)
- One segment with high collision frequency: between Palm Avenue and Newell Street (6 total collisions)
- Three pedestrian collisions were reported at two adjacent side street stop-controlled intersections: two at J Avenue / 18th Street and one at K Avenue / 18th Street. Additional pedestrian involved collisions were reported at intersections to the east and west.
- Three bicycle involved collisions were reported between L Avenue and O Avenue

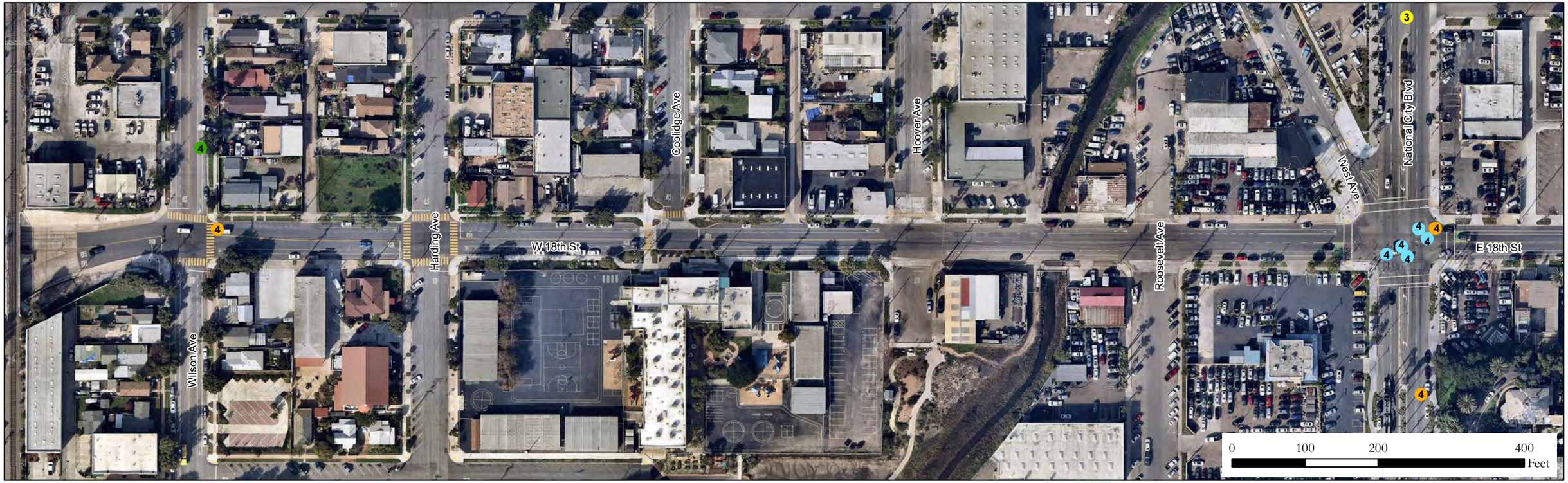
Table 5-11 18th Street Countermeasure Summary

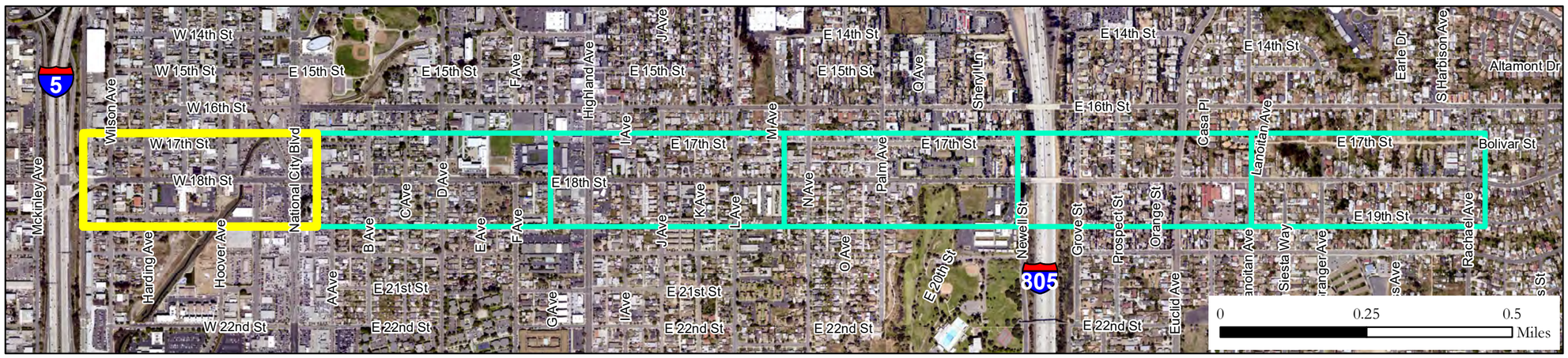
Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersection at: • National City Boulevard / 18th Street ((northbound and southbound approaches)
S2 Improve signal hardware (provide back-plates with retroreflective borders)	Signal heads at: • National City Boulevard / 18th Street • Euclid Avenue / 18th Street
S3 Improve signal timing (provide NO RIGHT ON RED signage)	Signalized intersection at: • Highland Avenue / 18th Street (southbound approach)
S17PB Install pedestrian countdown signal heads	Existing signalized intersection crossing legs at: • Highland Avenue / 18th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 18th Street • L Avenue / 18th Street • Euclid Avenue / 18th Street
S20PB Install advance stop bar before crosswalk	All legs of the following intersection: • Highland Avenue / 18th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	All legs of the following intersection: • Highland Avenue / 18th Street
NS21PB Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Provide high visibility marked crosswalks with advance yield/stop markings at the following locations: • J Avenue / 18th Street • K Avenue / 18th Street (south and east legs) Provide curb extensions at the following locations: • J Avenue / 18th Street • K Avenue / 18th Street (south and east legs)
R01 Add segment lighting	Install/enhance along the following segment: • 18th Street, from J Avenue to L Avenue
Install curb extensions (non-LRSM countermeasure at signalized intersections)	At the intersection of: • L Avenue / 18th Street

National City Boulevard / 18th Street intersection

- *Provide signalhead for each through lane (NB/SB approaches).*
- *Improve signal hardware: back-plates with retroreflective borders.*

HSIP Cycle 6: Signal equipment upgrade
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption





Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

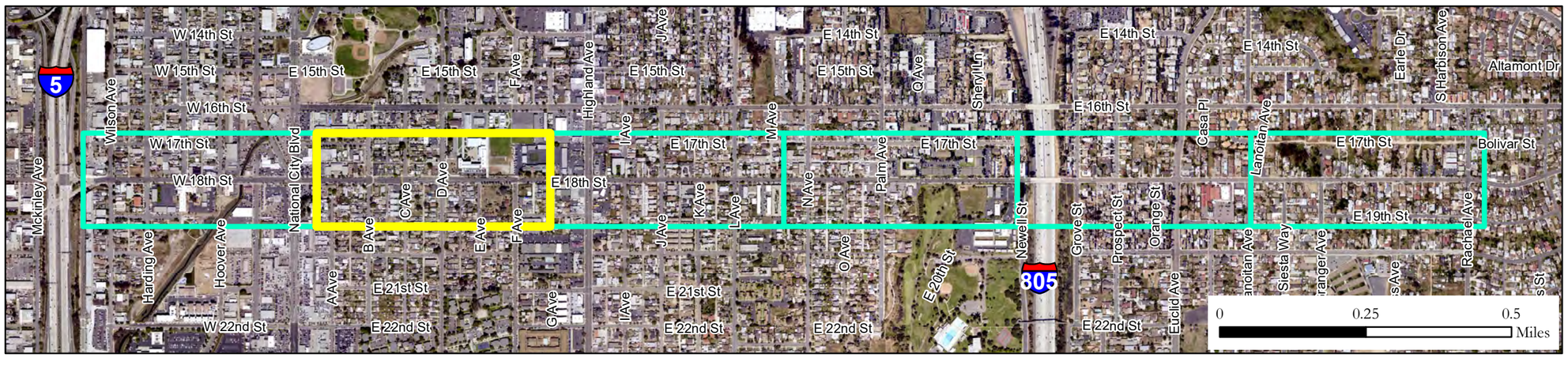
National City SSARP - 18th Street Corridor

CHEN RYAN

Figure 5-10
Wilson Avenue to National City Boulevard

D Avenue / 18th Street intersection
HSIP Cycle 6: Ladder crosswalks
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption & protected left-turn phase

F Avenue / 18th Street intersection
HSIP Cycle 7: Safety lighting



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 18th Street Corridor

Figure 5-10
B Avenue to F Avenue

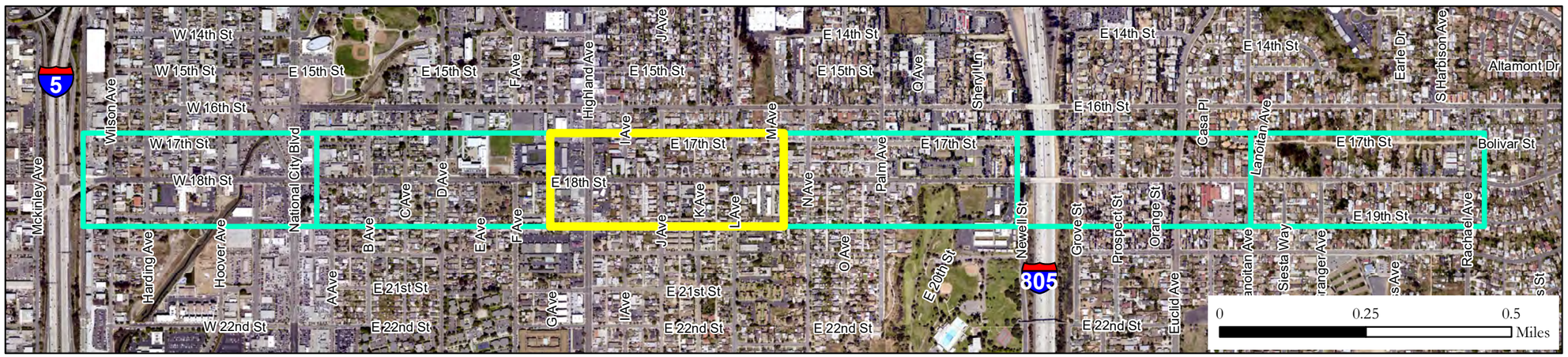
CHEN RYAN

Highland Avenue / 18th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide pedestrian countdown signal heads with lead pedestrian intervals.*
- *Provide NO RIGHT ON RED signage.*

HSIP Cycle 6: Protected left-turn phase and additional signal heads
HSIP Cycle 9: Emergency vehicle preemption

J Avenue to L Avenue
- *Provide high visibility continental crosswalks (all legs of J Avenue, south and east legs of K Avenue, all legs of L Avenue)*
- *Provide advanced stop bars and advanced yield markings at J and K Avenue*
- *Provide bulb-outs on corners at J Avenue, K Avenue and L Avenue*
- *Provide street lighting along roadway segment*

L Avenue / 18th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signalheads & safety lighting
HSIP Cycle 9: Emergency vehicle preemption & protected left-turn phase



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

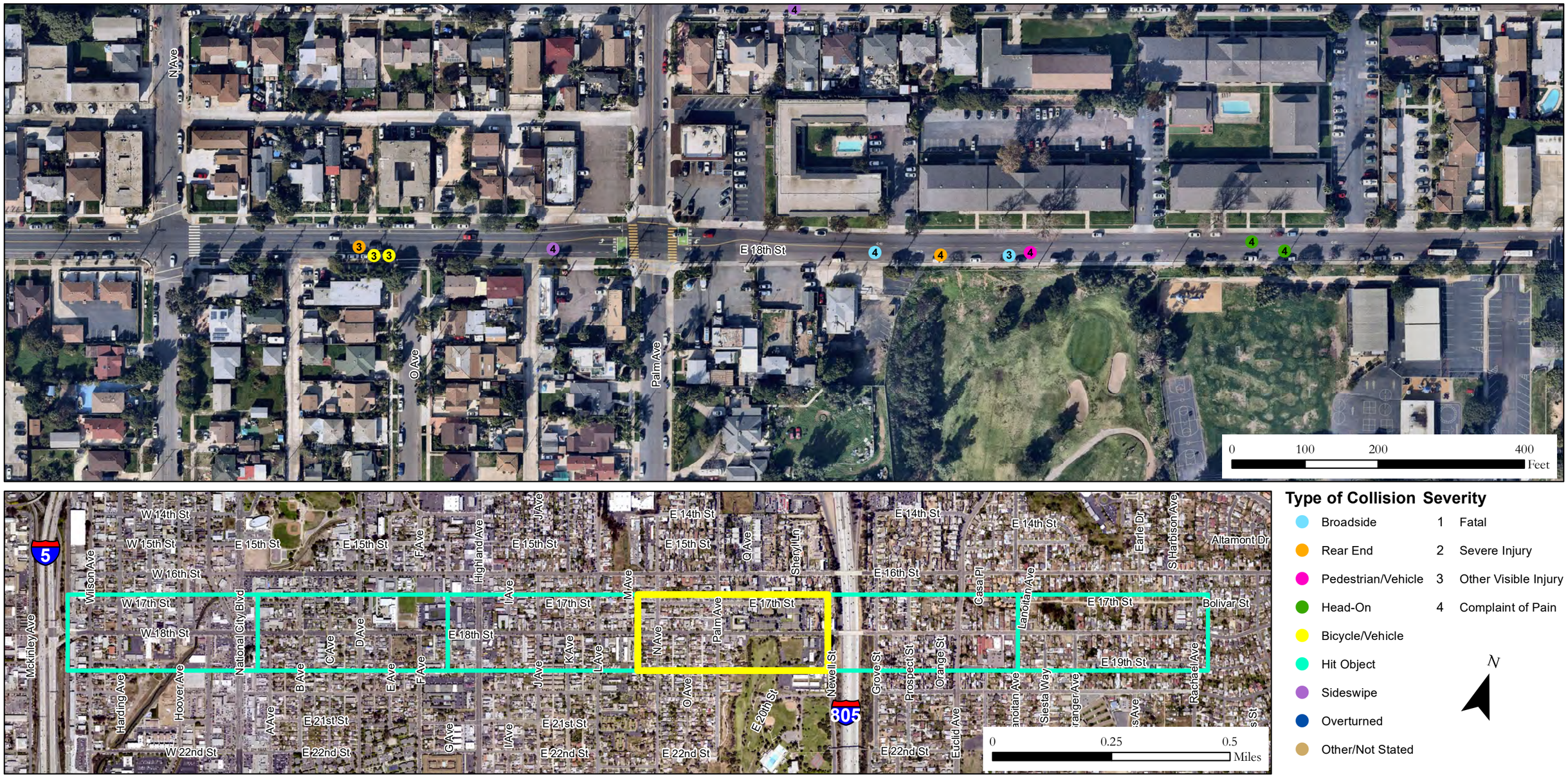
National City SSARP - 18th Street Corridor

Figure 5-10
G Avenue to L Avenue

CHEN RYAN

Between D Avenue and Palm Avenue
HSIP Cycle 6: Bike Lanes

Palm Avenue / 18th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Pedestrian countdown signal heads & safety lighting
HSIP Cycle 9: Emergency vehicle preemption & protected left-turn phase



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

National City SSARP - 18th Street Corridor

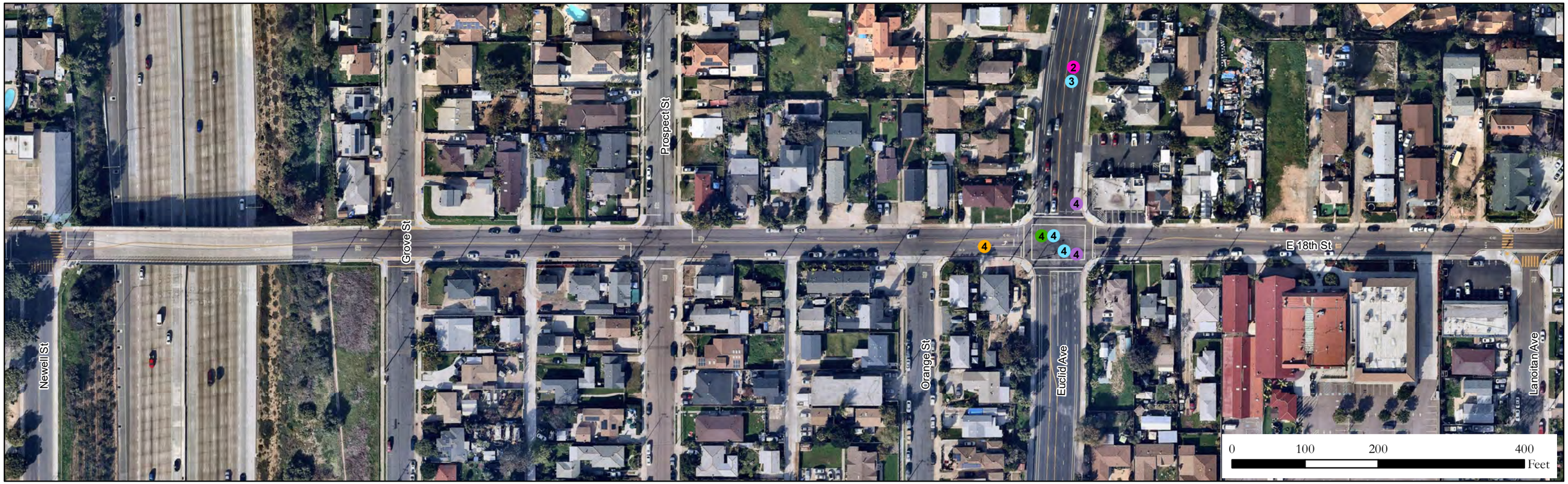
Figure 5-10
N Avenue to Newell Street

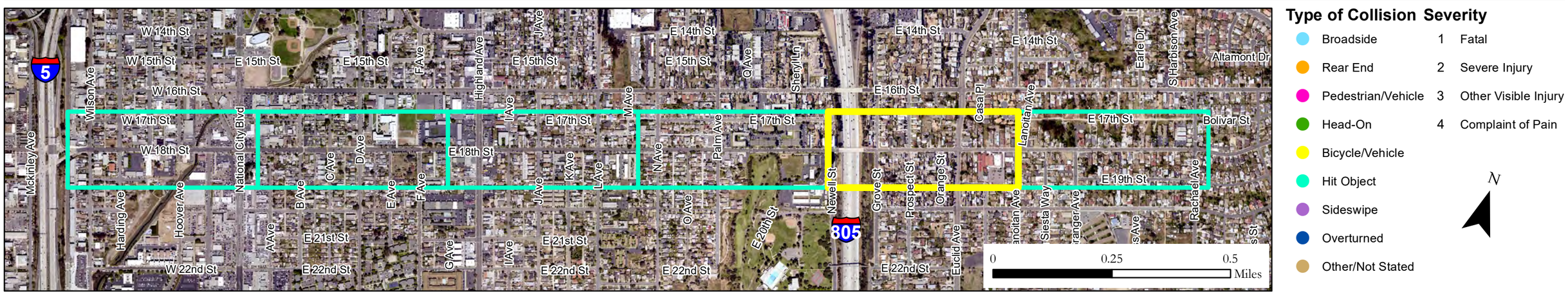
CHEN RYAN

Newell Street / 18th Street intersection
HSIP Cycle 7: Signal equipment upgrades
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Euclid Avenue / 18th Street intersection
- *Improve signal hardware: back-plates with retroreflective borders*
- *Provide high visibility crosswalks*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

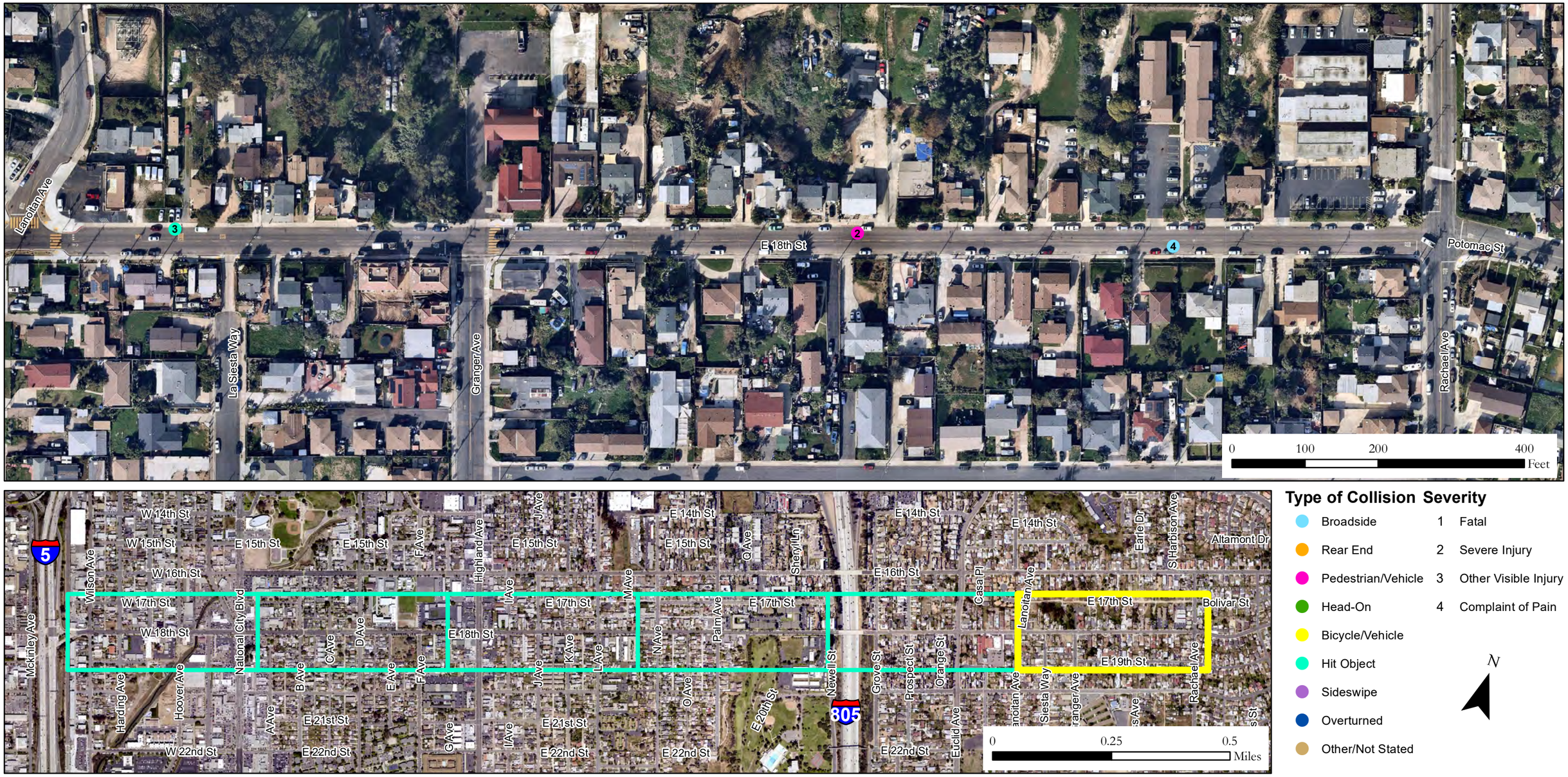




National City SSARP - 18th Street Corridor

CHEN RYAN

Figure 5-10
Newell Street to Lanoitan Avenue



National City SSARP - 18th Street Corridor

CHEN RYAN

Figure 5-10
Lanoitan Avenue to Rachael Avenue (National City Limits)

30th Street / Sweetwater Road

Table 5-12 summarizes the recommended countermeasures along 30th Street / Sweetwater Road. Collision locations, crash type, and level of injury severity for records along 30th Street / Sweetwater Road are depicted in Figure 5-11. The graphic also identifies the recommendations and any previous or underway efforts that may address potential safety issues. Site specific issues and the resulting countermeasures are documented in Appendix C.

This roadway includes:

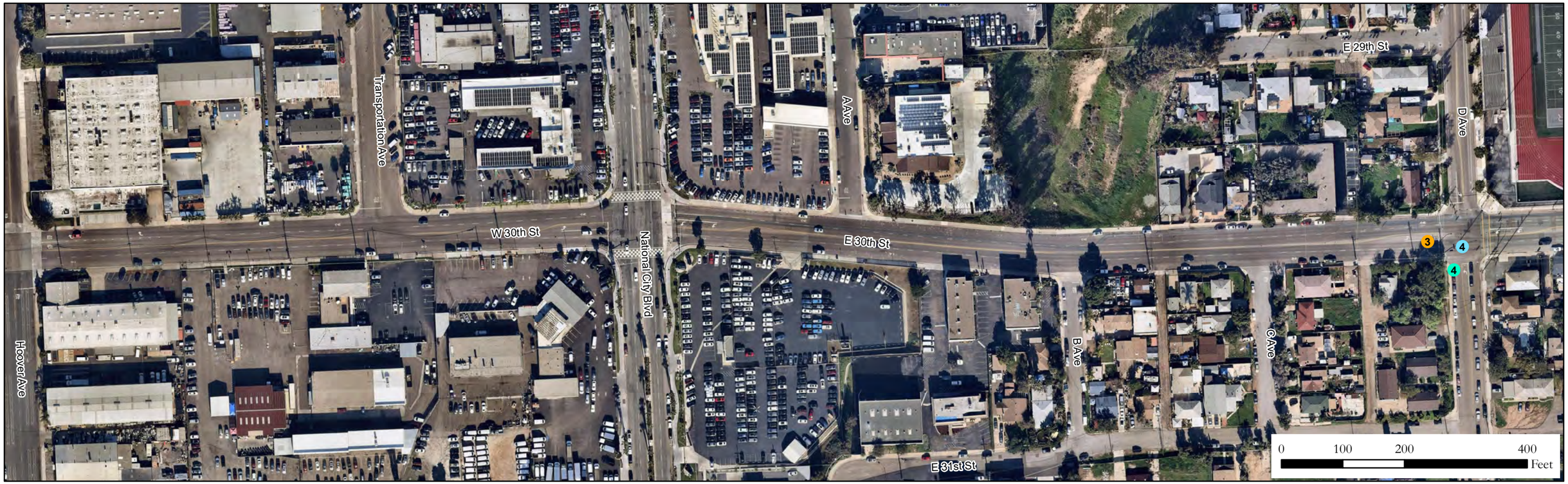
- Five intersections that experienced a severe or fatal injury collision:
    - Pedestrian collision at M Avenue / Shopping Center Driveway / 30th Street (severe injury)
    - Head-on collision at Prospect Street / Sweetwater Road (severe injury)
    - Broadside collision at Valley Road / Sweetwater Road (severe injury)
    - Pedestrian collision at Paseo De Paz / Sweetwater Road (severe injury)
    - Hit Object Collision at Calmoor Street / Sweetwater Road (fatal injury)
- One intersection with high collision frequency: 30th Street / Highland Avenue (9 total collisions)
- Two segments that experienced a severe/fatal injury collision:
    - Pedestrian collision between Highland Avenue and I Avenue (fatal injury)
    - Hit object collision between N Avenue and N 2nd Avenue (severe injury)
    - Pedestrian collision between N 2nd Avenue and Grove Street (fatal injury)
- One segment with high collision frequency: between Highland Avenue and L Avenue (7 total collisions)

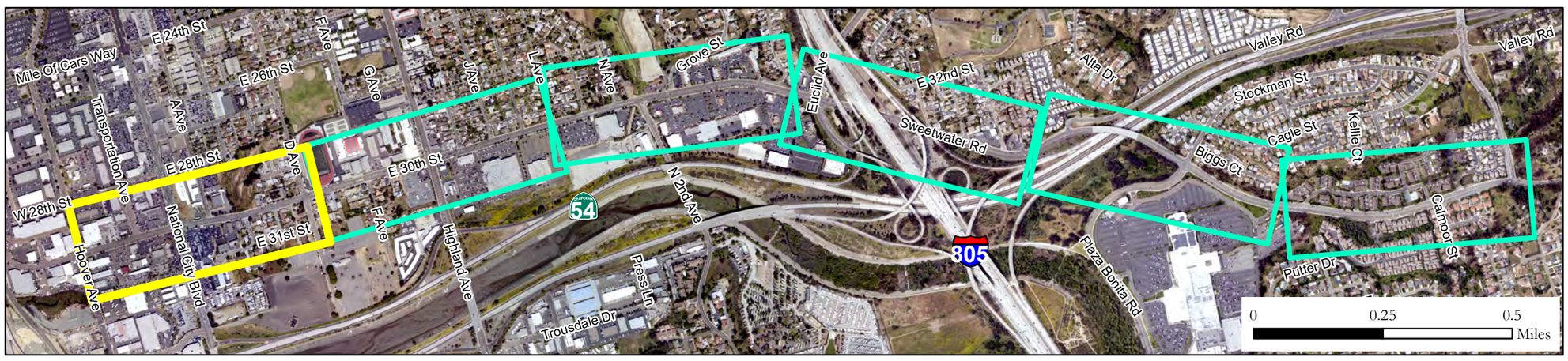
Table 5-12 30th Street / Sweetwater Road Countermeasure Summary

Recommended Countermeasures[1]	Location(s)
S2 Improve signal hardware (provide overhead mounted signal head for each through lane)	Signalized intersections at: • Highland Avenue / 30th Street
S18PB Install pedestrian crossing (high visibility continental crosswalks)	All legs of the following intersections (unless otherwise noted): • Highland Avenue / 30th Street
S21PB Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Existing signalized intersection crossing legs at: • Highland Avenue / 30th Street
NS06 Install/upgrade larger or additional stop signs or other intersection warning regulatory signs	Provide DO NOT CROSS pedestrian signage at the following locations: • I Avenue / 30th Street (east and west legs to prevent pedestrians from crossing 30th Street) Provide NO LEFT TURN signage at the following location: • Sweetwater Square Driveway exit / 30th Street
R8 Install raised median (provide turn pockets at intersections and major driveways)	Install along the following segment: • 30th Street, from Highland Avenue to J Avenue
R26 Install dynamic/variable speed warning signs	Install along the following segment: • 30th Street / Sweetwater Road, from Stockman Street / Plaza Bonita Road to Plaza Bonita Center Way
R33PB Install separated bike lanes	Install along the following segment: • 30th Street, from Hoover Street to 2nd Avenue

National City Boulevard / 30th Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

D Avenue / 30th Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads





Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - 30th Street & Sweetwater Road Corridor

CHEN RYAN

Figure 5-11
Hoover Avenue to D Avenue

F Avenue / 30th Street intersection
HSIP Cycle 7: Safety lighting

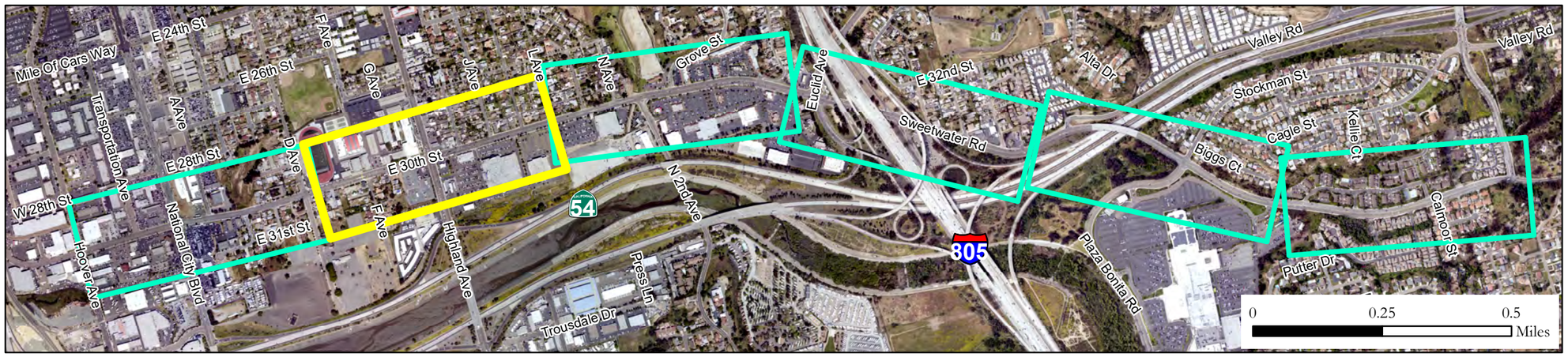
Highland Avenue / 30th Street intersection
- *Provide high visibility continental crosswalks with advanced stop bars.*
- *Provide signalhead for each through lane and left-turn lane on all approaches.*
- *Provide lead pedestrian intervals*

HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Install lighting
HSIP Cycle 9: Emergency vehicle preemption

Between Highland Avenue and J Avenue
- *Install raised median with turn pockets*
- *Provide DO NOT CROSS pedestrian signage at I Avenue intersection.*
- *Provide NO LEFT TURN R3-2 Sign at Sweetwater Square Driveway exit*

L Avenue / 30th Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Between Highland Avenue and 2nd Avenue
- *Provide bike lanes and prohibit on-street parking*



Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - 30th Street & Sweetwater Road Corridor

CHEN RYAN

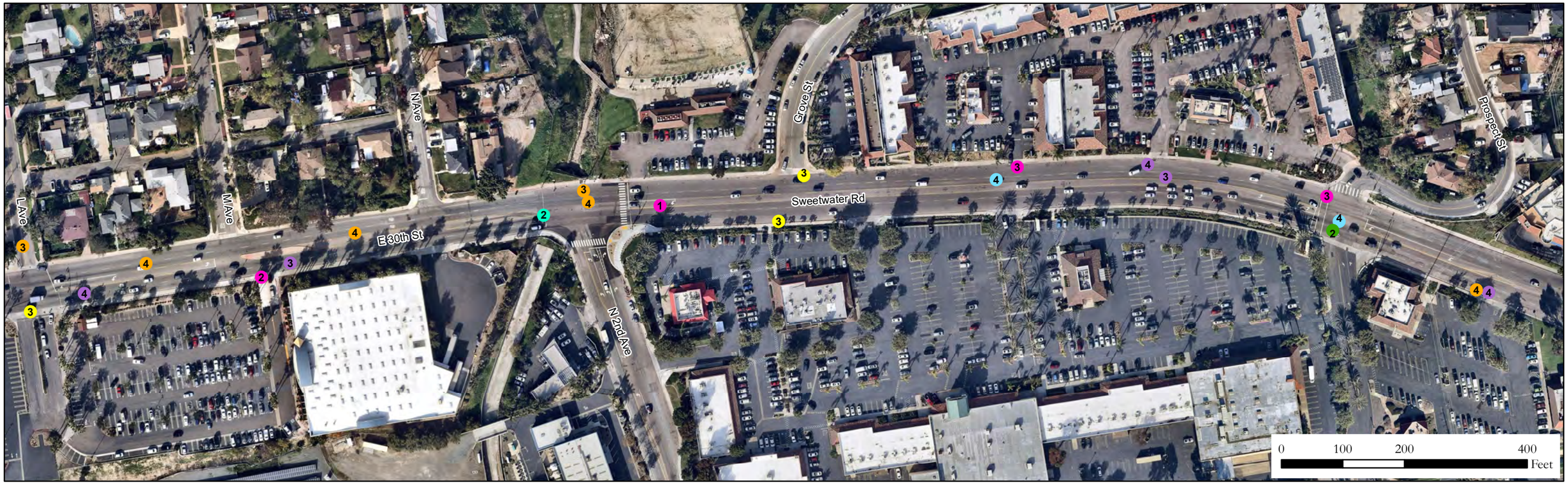
Figure 5-11
F Avenue to K Avenue

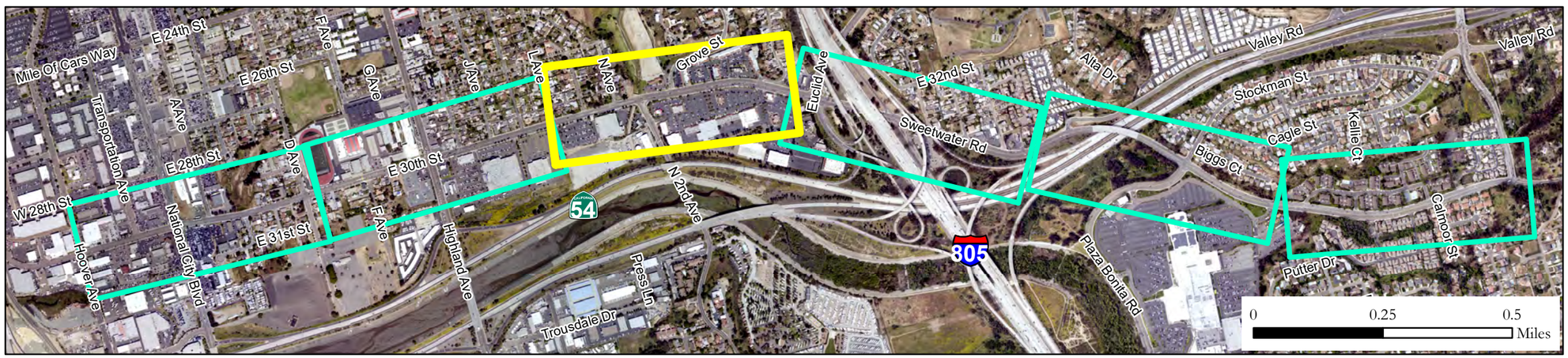
2nd Avenue / 30th Street intersection
HSIP Cycle 6: Pedestrian crossing and bulb-outs; signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Prospect Street / 30th Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption

Between Highland Avenue and 2nd Avenue
- *Provide bike lanes and prohibit on-street parking*

Between 2nd Avenue and Plaza Bonita Road / Stockman Street
- *Provide protected bike lanes and prohibit on-street parking*





Type of Collision

- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity

1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

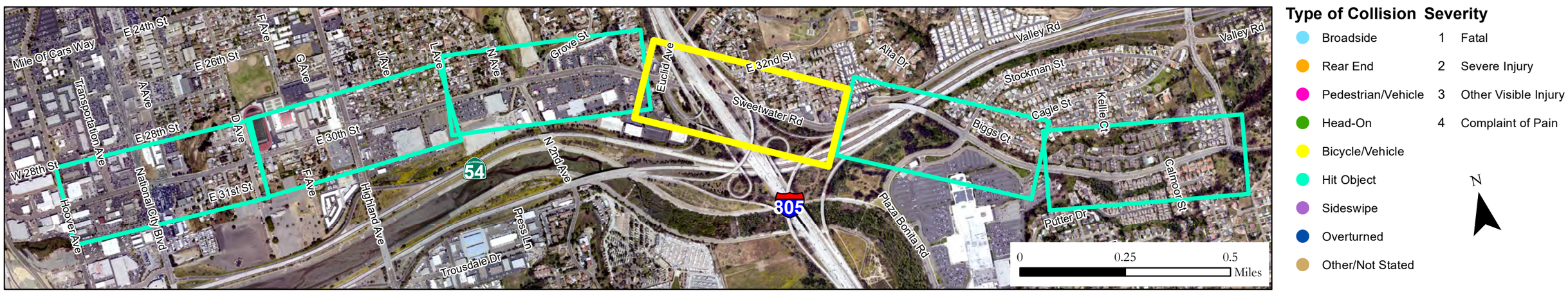
National City SSARP - 30th Street & Sweetwater Road Corridor

Figure 5-11
L Avenue to Prospect Street

CHEN RYAN

Between 2nd Avenue and Plaza Bonita Road / Stockman Street

- *Provide protected bike lanes and prohibit on-street parking*



National City SSARP - 30th Street & Sweetwater Road Corridor

Figure 5-11
Euclid Avenue to Cypress Street

CHEN RYAN

Valley Road / 30th Street intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption

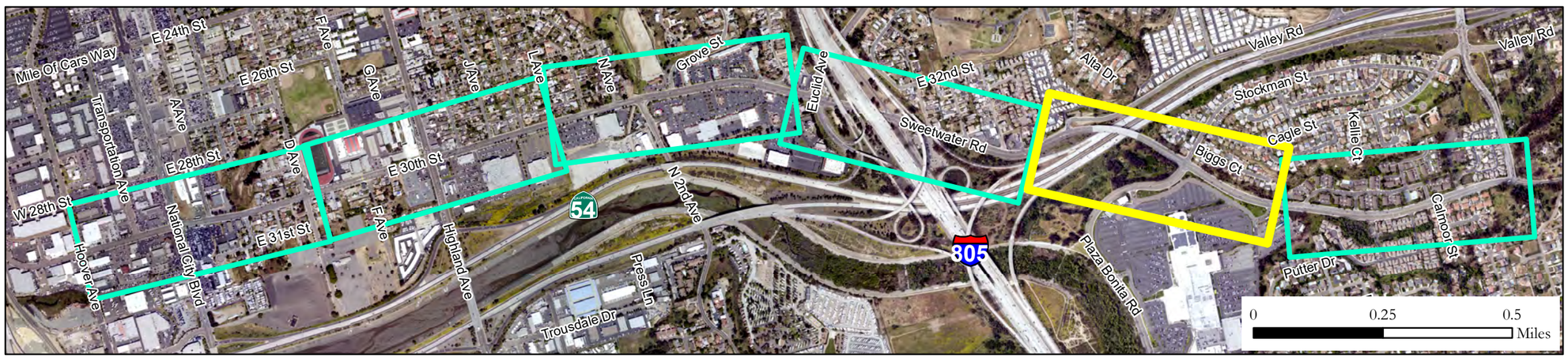
Between 2nd Avenue and Plaza Bonita Road / Stockman Street
- *Provide protected bike lanes and prohibit on-street parking*

Stockman Street / Plaza Bonita Road / Sweetwater Road intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption

Between Plaza Bonita Road and Plaza Bonita Centerway
- *Provide dynamic/variable speed limit signs*

HSIP Cycle 8: Install raised median with turn pockets

Ring Road / Sweetwater Road
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Crosswalks and pedestrian countdown signal heads
HSIP Cycle 8: Safety lighting
HSIP Cycle 9: Emergency vehicle preemption



Type of Collision
- Broadside
- Rear End
- Pedestrian/Vehicle
- Head-On
- Bicycle/Vehicle
- Hit Object
- Sideswipe
- Overturned
- Other/Not Stated

Severity
1 Fatal
2 Severe Injury
3 Other Visible Injury
4 Complaint of Pain

N

National City SSARP - 30th Street & Sweetwater Road Corridor

Figure 5-11
Valley Road to Ring Road

CHEN RYAN

Fairlomas Road / Sweetwater Road intersection
- *Prohibit eastbound left turning traffic from entering the driveway during the PM peak hour.*

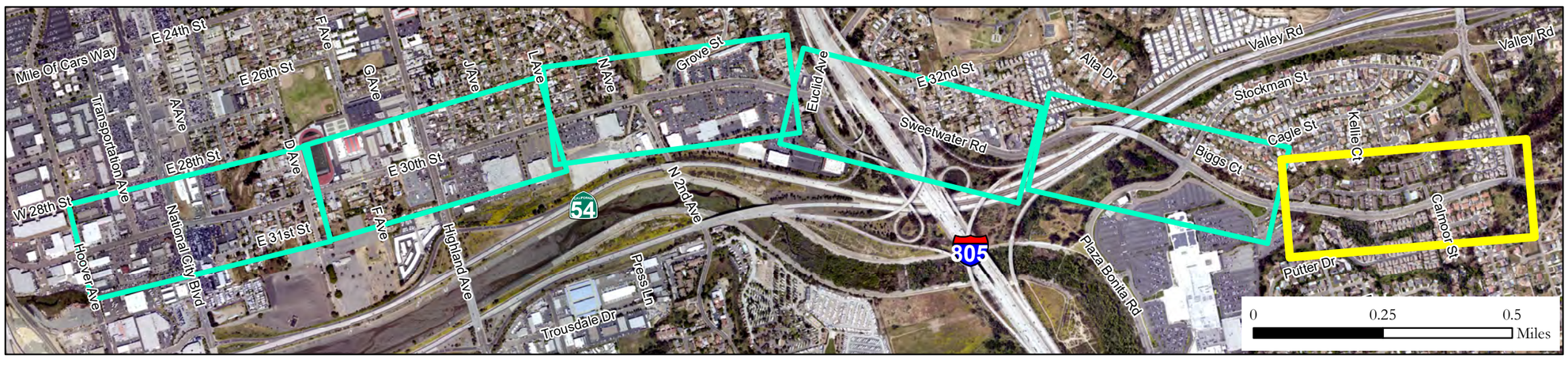
Fairlomas Road / Sweetwater Road intersection
- *Provide high visibility continental crosswalks with advanced stop bars on northbound approach.*

Between Plaza Bonita Road and Plaza Bonita Centerway
- *Provide dynamic/variable speed limit signs*

HSIP Cycle 8: Install raised median with turn pockets

Calmoor Street / Sweetwater Road intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads
HSIP Cycle 9: Emergency vehicle preemption

Plaza Bonita Center Way / Sweetwater Road intersection
HSIP Cycle 6: Signal equipment upgrades
HSIP Cycle 7: Safety lighting
HSIP Cycle 8: Pedestrian countdown signal heads



Type of Collision Severity

Broadside		1	Fatal
Rear End		2	Severe Injury
Pedestrian/Vehicle		3	Other Visible Injury
Head-On		4	Complaint of Pain
Bicycle/Vehicle			
Hit Object			
Sideswipe			
Overturned			
Other/Not Stated			

N

National City SSARP - 30th Street & Sweetwater Road Corridor

Figure 5-11
Ring Road to National City Limits

CHEN RYAN

6. Prioritized Safety Project Scope & Crash Reduction Factors

The high collision corridor countermeasures presented in the previous chapter were reviewed to identify high priority projects to pursue grant funding for. The following factors were reviewed and considered:

- Severe/fatal injury collisions
- High frequency collision intersections and segments
- Future planned improvements
- Project location and surrounding land uses

Consistent with HSIP grant requirements a total of three countermeasures were selected for grouping into a project, including:

- S17PB: Install pedestrian countdown signal heads
- S20PB: Install advance stop bar before crosswalk (Bicycle Box)
- S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

S17PB Install pedestrian countdown signal heads

Countermeasure S17PB consists of installing pedestrian countdown signal heads, which contain a timer display and countdown the number of seconds left to finish crossing the street. They can reassure pedestrians of the time remaining to safely cross. These signals have been shown to encourage more pedestrians to use the pushbutton rather than jaywalk. The Crass Reduction Factor for this countermeasure is 25% for pedestrian and bicycle crashes.

S20PB: Install advance stop bar before crosswalk (Bicycle Box)

Countermeasure S20PB provides the opportunity to enhance both pedestrian and bicycle safety by adding an advance stop bar before the marked crosswalk. This provides a buffer between the vehicles and the crossing pedestrians. This countermeasure may also be used to apply a bicycle box. The Crass Reduction Factor for this countermeasure is 15% for pedestrian and bicycle crashes.

S21PB: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

Countermeasure S21PB gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication. Lead Pedestrian Intervals (LPI) provide (1) increased visibility of crossing pedestrians; (2) reduced conflicts between pedestrians and vehicles; (3) increased likelihood of motorists yielding to pedestrians; and (4) enhanced safety for pedestrians who may be slower to start into the intersection. The Crass Reduction Factor for this countermeasure is 60% for pedestrian and bicycle crashes.

Instead of limiting countermeasures to individual high collision corridors, a systemic approach was utilized, selecting eight intersections across multiple corridors. This process was intended to

maximize the Benefit/Cost ratio (BCR) for the project and address locations with the greatest potential safety challenges. The locations were then grouped by countermeasure type. Four final countermeasure groups were identified:

Countermeasure Group 1

S17PB Install countdown signal heads & S21PB Modify signal phasing to implement LPI

Harbison Avenue / E Plaza Boulevard

- Signalized intersection.
- 2 eastbound lanes, 2 westbound lanes, and a center left turn lane without medians.
- 2 northbound lanes, 2 southbound lanes, and a center left turn lane without medians.
- Single-family residential and commercial use area.
- One severe and one non-severe vehicle/pedestrian collisions reported.

Figure 6-1 displays conceptual graphics of the Countermeasure Group 1 proposed improvements.

Countermeasure Group 2

S20PB Install advance stop bar before crosswalk & S21PB Modify signal phasing to implement LPI

Harbison Avenue / E 8th Street

- Signalized intersection.
- 2 eastbound lanes, 2 westbound lanes, and a center left turn lane without medians on the east leg. 2 eastbound lanes, one westbound lane, and a center left turn lane without medians on the west leg.
- One northbound lane, one southbound lane and a center left turn lane without medians on the north leg. 2 northbound lanes, 2 southbound lanes, and a center left turn lane without medians on the south leg.
- Single-family and multi-family residential and commercial use area.
- 2 severe and one non-severe vehicle/pedestrian collisions reported.

E Plaza Boulevard / Highland Avenue

- Signalized intersection.
- 2 eastbound lanes, 2 westbound lanes, and a center left turn lane without medians on the east leg. 2 eastbound lanes, one westbound lane, and a left turn lane without medians on the west leg.
- One northbound lane, one southbound lane and a center left turn lane without medians on the north leg. 2 northbound lanes, 2 southbound lanes, and a center left turn lane without medians on the south leg.
- Single-family and multi-family residential and commercial use area.
- One fatal and 2 non-severe collisions reported.

Highland Avenue / E 8th Street

- Signalized intersection.
- 2 eastbound lanes, 2 westbound lanes, and a center left turn lane without medians on the east leg. 2 eastbound lanes, one westbound lane, and a left turn lane without medians on the west leg.
- 2 northbound lanes, 2 southbound lanes and a center left turn lane without medians.
- Commercial use area.
- One severe and 2 non-severe collisions reported (one broadside and 2 vehicle/pedestrian).

Figure 6-2 displays conceptual graphics of the Countermeasure Group 2 proposed improvements.

Countermeasure Group 3

S20PB Install advance stop bar before crosswalk

Highland Avenue / E 21st Street

- Signalized intersection.
- One eastbound lane, one westbound lane, and a center left turn lane without medians.
- 2 northbound lanes, 2 southbound lanes and a center left turn lane without medians.
- Single-family and multi-family residential and commercial use area.
- One fatal and one non-severe collisions reported (one vehicle/pedestrian).

Figure 6-3 displays conceptual graphics of the Countermeasure Group 3 proposed improvements.

Countermeasure Group 4

S21PB Modify signal phasing to implement LPI

Highland Avenue / E 18th Street

- Signalized intersection.
- One eastbound lane, one westbound lane, a center left turn lane without medians, eastbound bike lane and westbound bike lane.
- 2 northbound lanes, 2 southbound lanes and a center left turn lane without medians.
- Commercial use area.
- 2 severe and 6 non-severe collisions reported (5 vehicle/pedestrian).

National City Boulevard / E 8th Street

- Signalized intersection.
- One eastbound lane, 2 westbound lanes, an eastbound right turn, a center left turn lane without medians.
- Eastbound bike lane and westbound bike lane on the west leg.

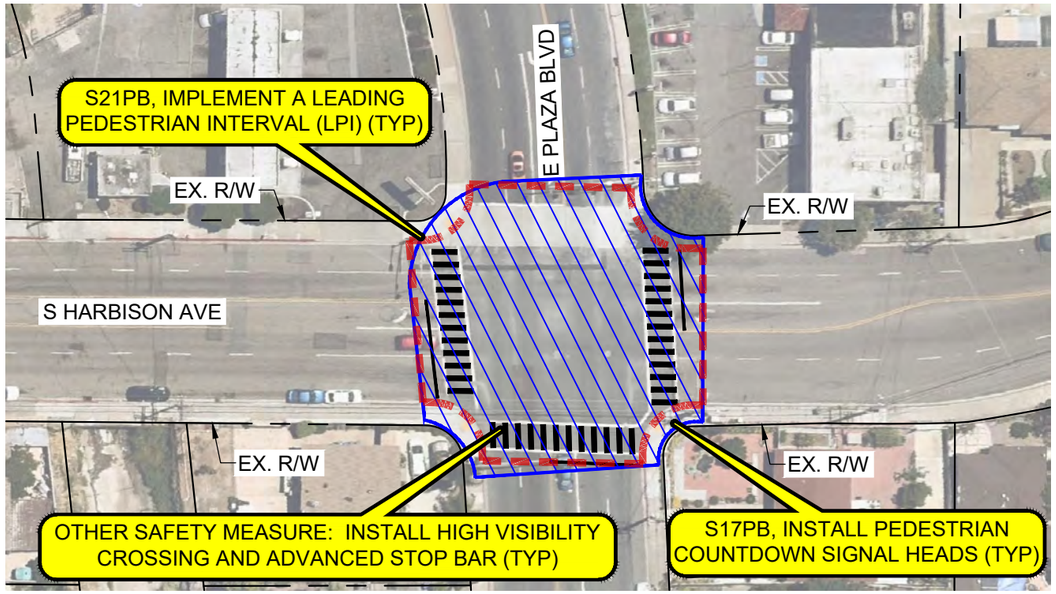
- 2 northbound lanes, 2 southbound lanes and a center left turn lane without medians.
- Commercial use area.
- One fatal and 1 non-severe vehicle-pedestrian collisions reported.

Highland Avenue / E 30th Street

- Signalized intersection.
- 2 eastbound lanes, 2 westbound lanes, a center left turn lane without medians on the west leg, and 2 center left turn lanes without medias on the east leg.
- 2 northbound lanes, 2 southbound lanes and a center left turn lane without medians.
- Educational and commercial use area. Sweetwater Union High School at the northwest corner of the intersection.
- 5 non-severe collisions reported (2 vehicle-pedestrian).

Figure 6-4 displays conceptual graphics of the Countermeasure Group 4 proposed improvements.

Taking these four groups into account, a benefit cost ratio (BCR) analysis of estimated project was undertaken using the HSIP Grant Cycle 10 HSIP Analyzer. The project cost is estimated at $427,500. Given the collision history and the Crash Reduction Factors for the three countermeasures, the project benefit is estimated at $18,238,920, for a collective Benefit/Cost ratio of 42.66. Appendix D provides the HSIP Analyzer.



LOCATION 1 COUNTERMEASURE GROUP 1: HARBISON AVE AND E PLAZA BLVD
COUNTERMEASURE S17PB & S21PB

LEGEND

INFLUENCE AREA

CONSTRUCTION AREA

CHEN RYAN ASSOCIATES
3900 Fifth Avenue, Ste 310 - San Diego, CA 92103

CALIFORNIA NATIONAL CITY 1887 INCORPORATED

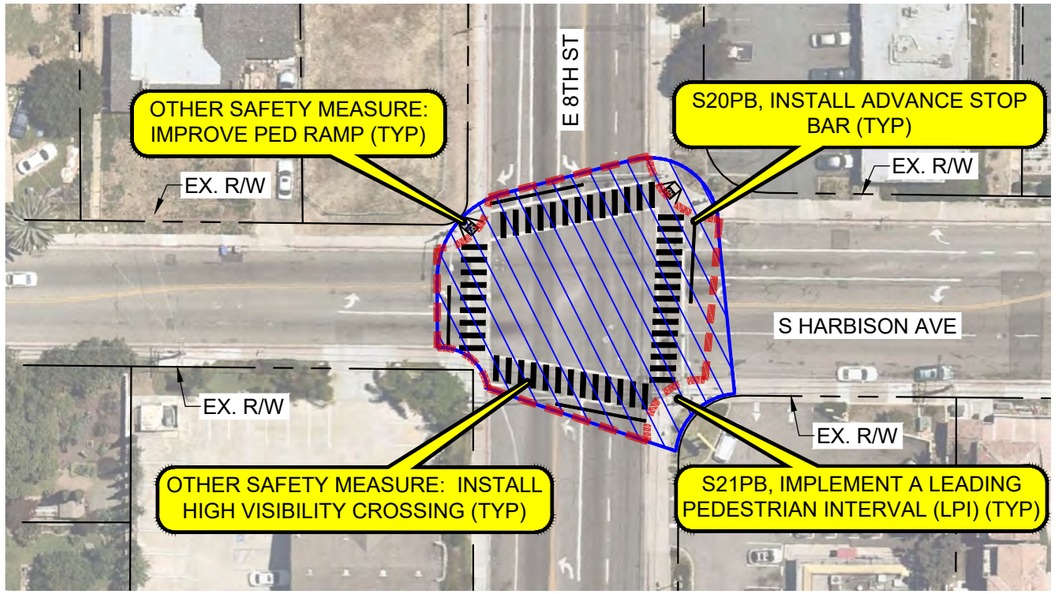
N

0' 60' 120'

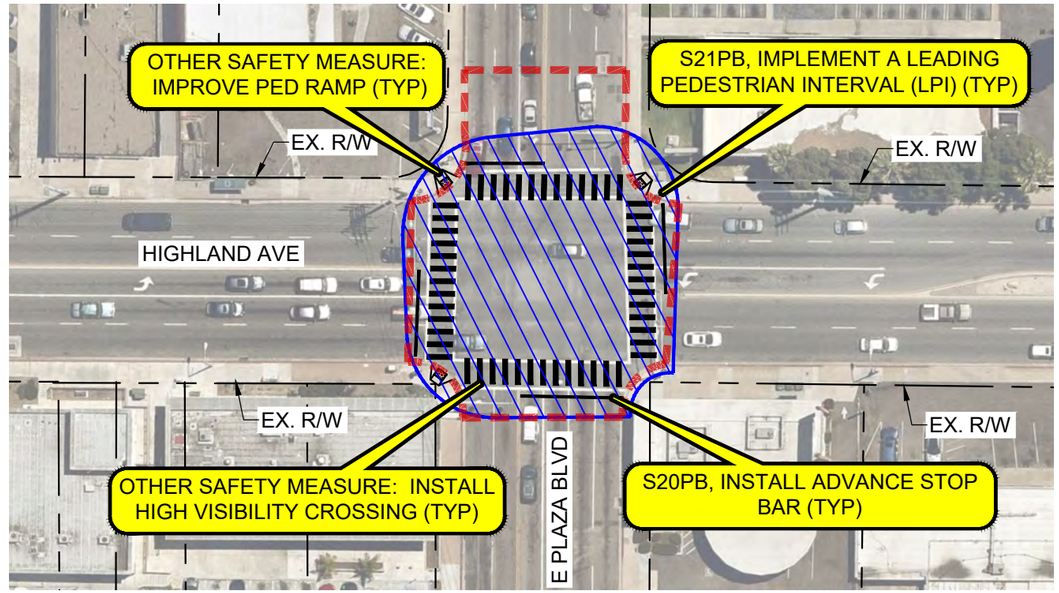
SCALE 1" = 60'

Figure 6-1
Conceptual Design of Proposed Improvements - Countermeasure Group 1

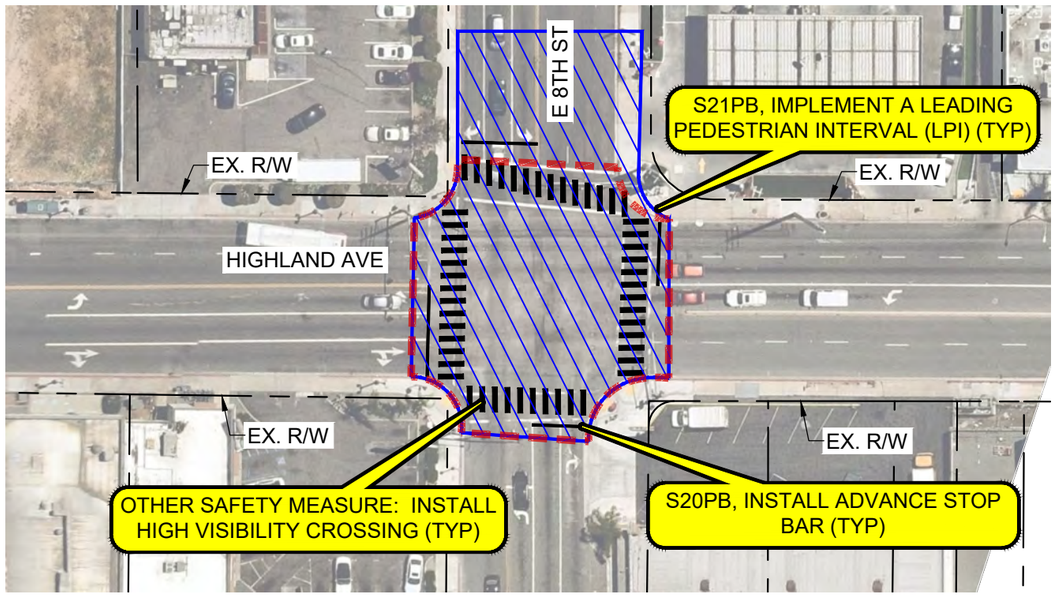
10/26/2020
Sheet 1 of 4



LOCATION 2 COUNTERMEASURE GROUP 2: HARBISON AVE AND E 8TH ST
COUNTERMEASURE S20PB & S21PB



LOCATION 3 COUNTERMEASURE GROUP 2: E PLAZA BLVD AND HIGHLAND AVE
COUNTERMEASURE S20PB & S21PB



LOCATION 4 COUNTERMEASURE GROUP 2: HIGHLAND AVE AND E 8TH ST
COUNTERMEASURE S20PB & S21PB

LEGEND

INFLUENCE AREA

CONSTRUCTION AREA

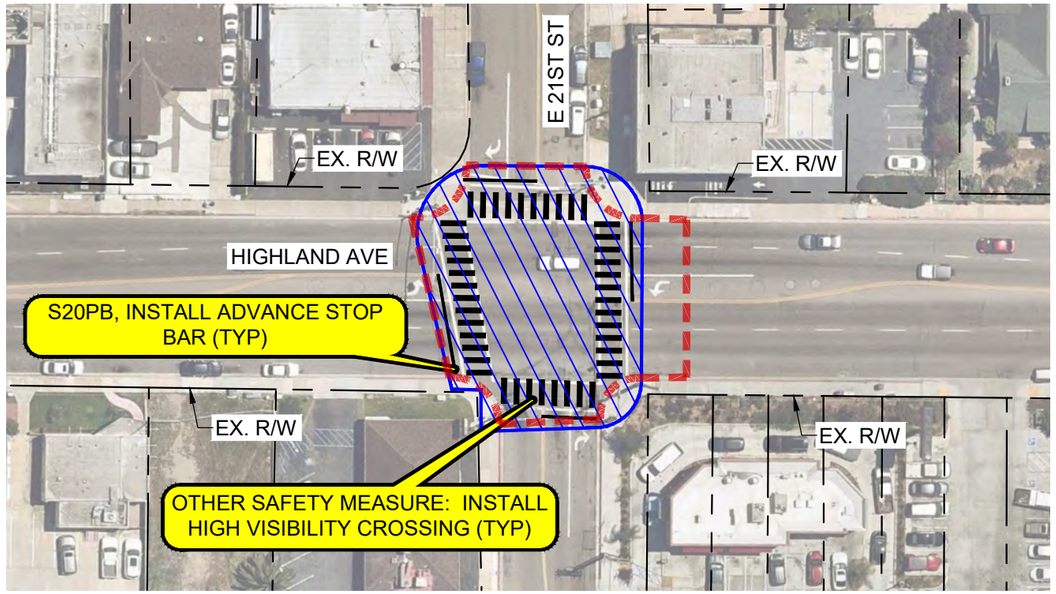
CHEN RYAN ASSOCIATES
3900 Fifth Avenue, Ste 310 - San Diego, CA 92103

CALIFORNIA NATIONAL CITY 1887 INCORPORATED

0' 60' 120'

SCALE 1" = 60'

Figure 6-2
Conceptual Design of Proposed Improvements - Countermeasure Group 2



LOCATION 5 COUNTERMEASURE GROUP 3: HIGHLAND AVE AND E 21ST ST
COUNTERMEASURE S20PB

LEGEND

INFLUENCE AREA

CONSTRUCTION AREA

CHEN RYAN ASSOCIATES
3900 Fifth Avenue, Ste 310 - San Diego, CA 92103

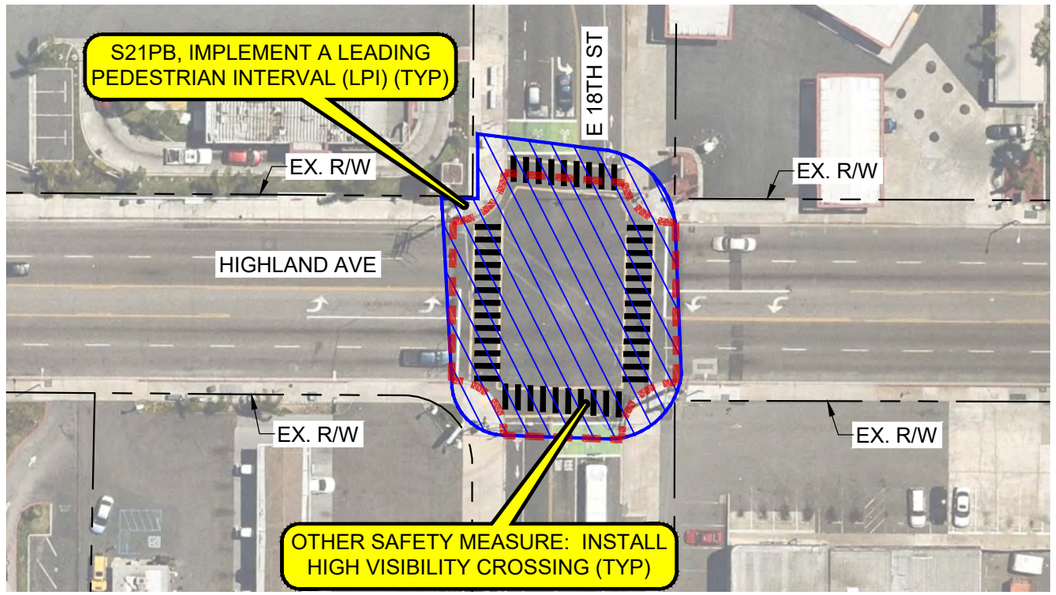
CALIFORNIA NATIONAL CITY 1887 INCORPORATED

N

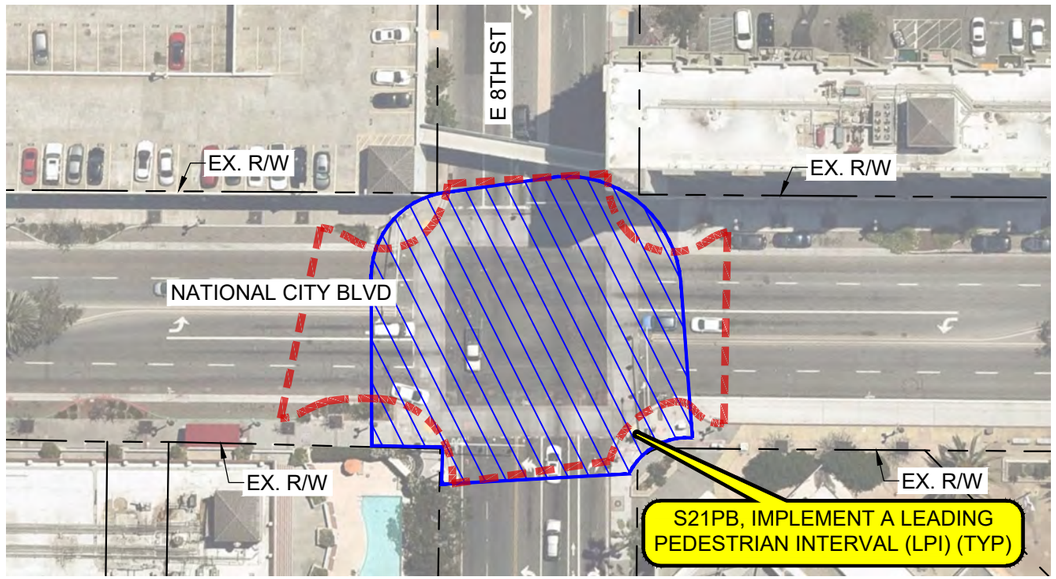
0' 60' 120'

SCALE 1" = 60'

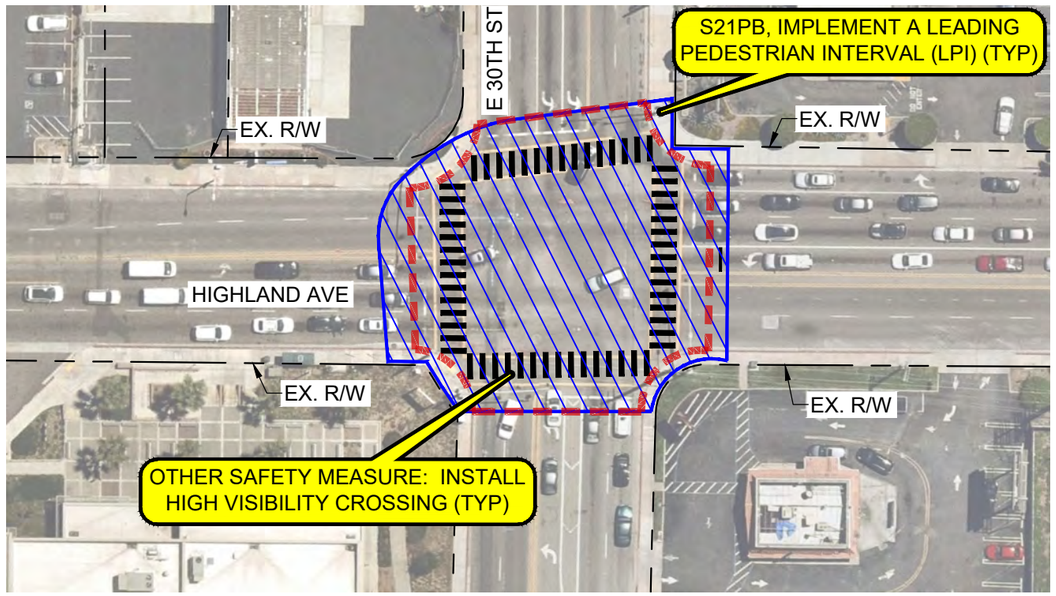
Figure 6-3
Conceptual Design of Proposed Improvements - Countermeasure Group 3



LOCATION 6 COUNTERMEASURE GROUP 4: HIGHLAND AVE AND E 18TH ST
COUNTERMEASURE S21PB



LOCATION 7 COUNTERMEASURE GROUP 4: NATIONAL CITY BLVD AND E 8TH ST
COUNTERMEASURE S21PB



LOCATION 8 COUNTERMEASURE GROUP 4: HIGHLAND AVE AND E 30TH ST
COUNTERMEASURE S21PB

LEGEND

INFLUENCE AREA

CONSTRUCTION AREA

CHEN RYAN ASSOCIATES
3900 Fifth Avenue, Ste 310 · San Diego, CA 92103

CALIFORNIA NATIONAL CITY 1887 INCORPORATED

N 0' 60' 120'

SCALE 1" = 60'

Figure 6-4
Conceptual Design of Proposed Improvements - Countermeasure Group 4

11/1/2020

Addendum to the City of National City Systemic Safety Analysis Report Program (SSARP) / Local Roadway Safety Plan (LRSP)

April 2024

Prepared For:

City of National City

Prepared By:

Kimley-Horn and Associates, Inc.

Table of Contents

1. Purpose of the Addendum

This Addendum amends the City of National City Systemic Safety Analysis Report Program (SSARP) / Local Roadway Safety Plan (LRSP) dated February 2021. Since the completion of the SSARP / LRSP, the City has determined the need for additional context to clarify the plan development process, improve accountability, recommend safety policy and process changes, and identify the process for ongoing monitoring and reporting. All other elements of the original document remain unchanged.

2. Community Outreach and Stakeholder Engagement

This section of the addendum provides an update on community outreach and engagement that was described in the Stakeholder Coordination subsection of Chapter 1: Introduction.

Through the process of developing the SSARP / LRSP, the City identified the need for more robust community outreach and engagement on the topic of safety. The City recently applied for and was awarded a Caltrans Sustainable Planning Grant to plan and implement Safe Routes to School projects within the City. The scope of work includes significant community outreach and engagement, including soliciting feedback about safety issues from the district superintendent, traffic operations staff, school principals, crossing guards, and the general public. The project is scheduled to begin in 2024 and is expected to be completed by 2027.

In addition to these upcoming outreach efforts, the City works closely with local law enforcement and school staff on an ongoing basis to identify safety issues. City Council commits between $100,000 and $200,000 annually from the General Fund to support outreach to all 10 elementary schools. Outreach activities include safety trainings, walk/bike to school events, neighborhood walk audits, and the development of educational brochures and videos on the City website.

3. Equity Considerations

This section of the addendum provides additional equity data for City staff to consider for project programming. The new equity data is intended to be used in conjunction with the prioritization factors and cost benefit analysis results that were described in Chapter 6: Prioritized Safety Project Scope & Crash Reduction Factors.

The analysis was conducted using the Climate and Economic Justice Screening Tool (CEJST), a tool used to score census tracts in the state of California on a system of metrics used to identify disadvantaged communities. The metrics used are indicators of burdens that disadvantaged communities face related to climate change, the environment, health, and economic opportunity.

Twelve (12) census tracts out of fourteen (14) are identified as disadvantaged communities in the City of National City, as shown in **Figure 1**.

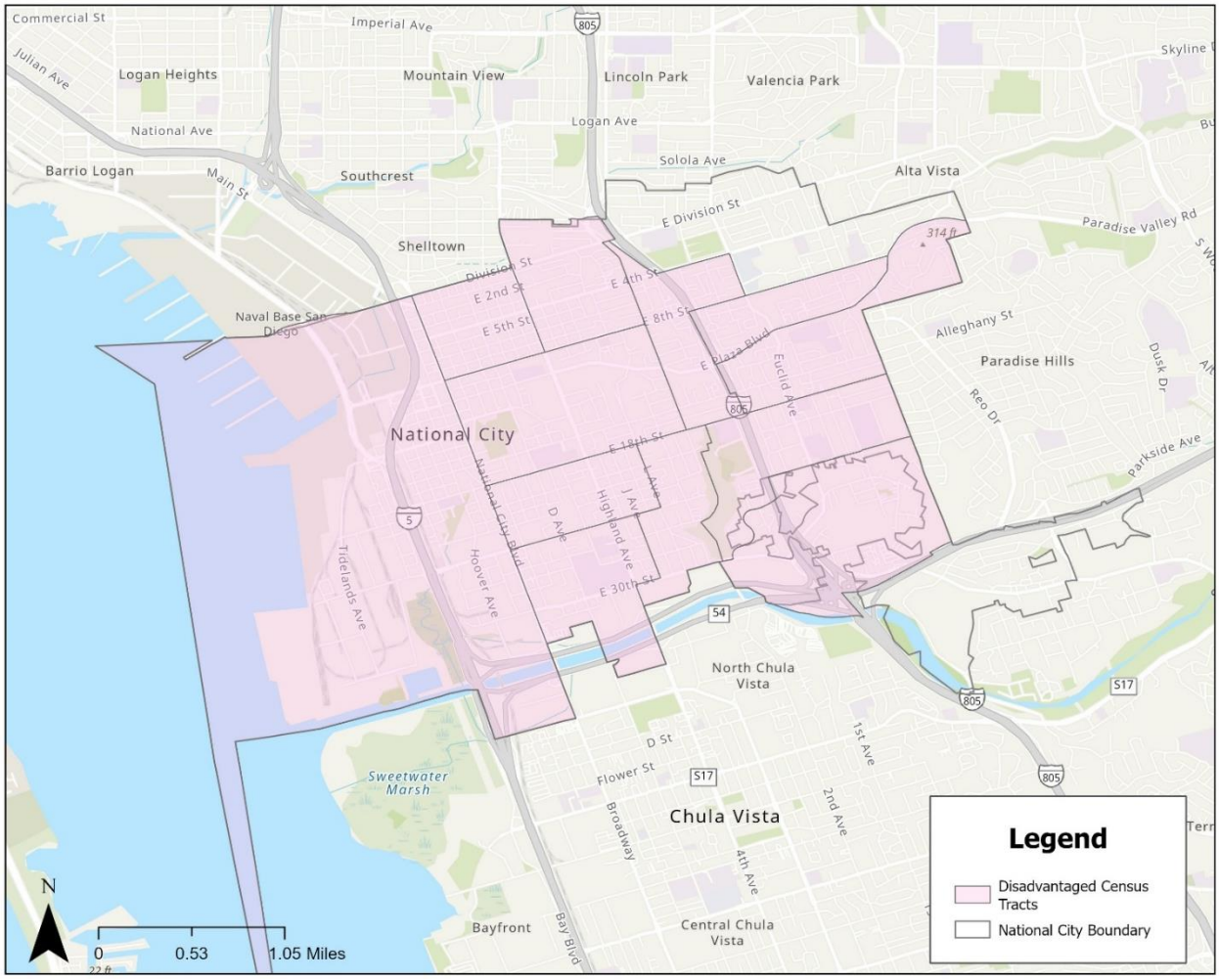


Figure 1: Climate and Economic Justice Census Tracts – Disadvantaged

Figure 2 shows the location of low-income census tracts. Eleven (11) out of fourteen (14) tracts are low-income.

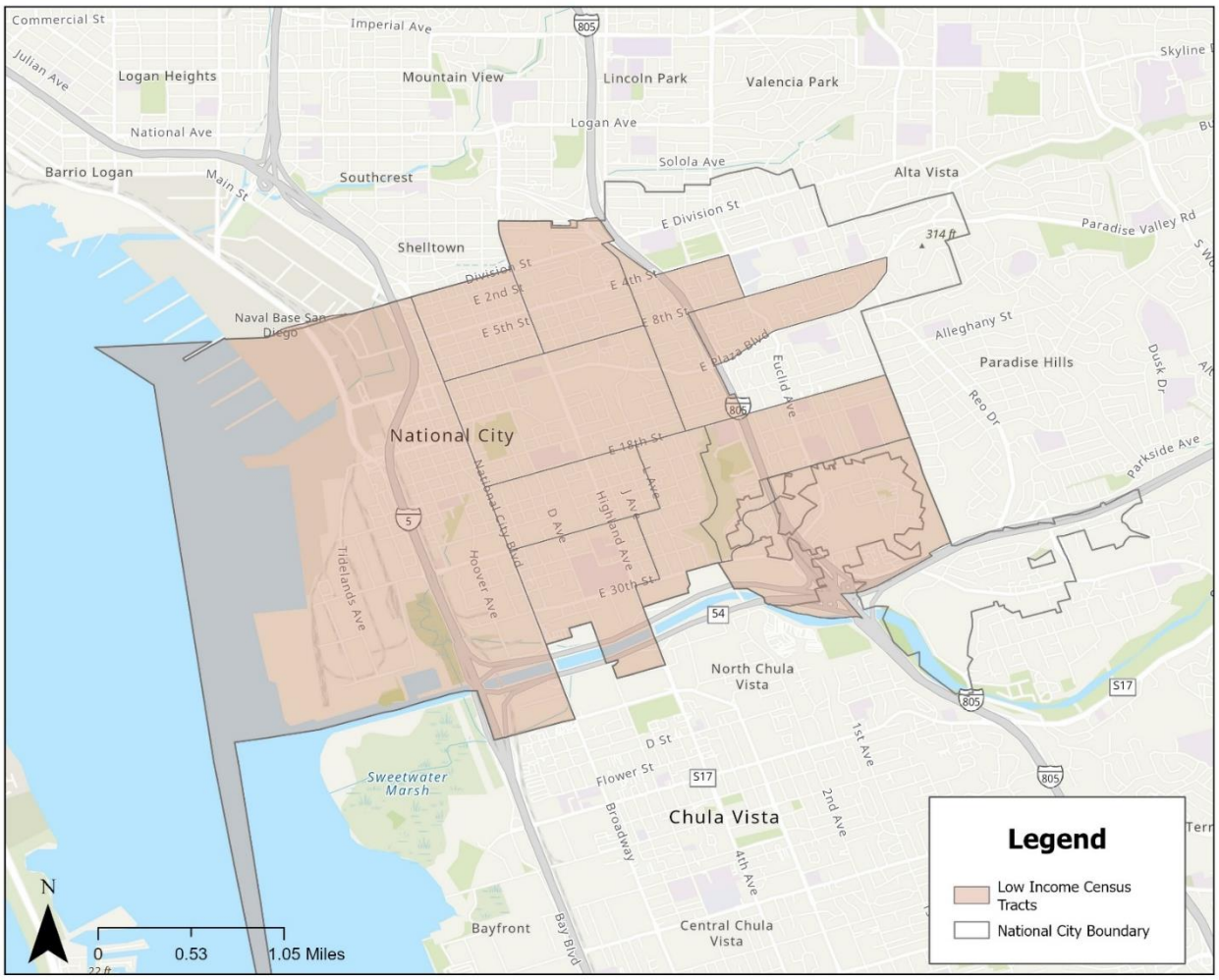


Figure 2: Climate and Economic Justice Census Tracts – Low Income

3.1 Race/Ethnicity

The population of National City is composed of 55,550, according to the US Census Bureau. **Table 1** list the population of National City by race/ethnicity. The City is predominately Hispanic or Latino (64.9%) followed by Asian (17.1%), and White (10.1%).

Table 1 - National City Population by Race/Ethnicity

Race/Ethnicity	Number of People by Race/Ethnicity	Percent of People by Race/Ethnicity
Hispanic or Latino	36,052.0	64.9%
Asian	9,499.1	17.1%
White	5,610.6	10.1%
Black or African American	2,444.2	4.4%
Other	1,944.3	3.5%

3.2 Climate and Economic Justice Screening Tool (CEJST)

3.2.1 Data

Equity analysis provides a tool to ensure specific needs are met in underserved communities. CEJST 2016-2021 data set was utilized to identify low-income census tracts, disadvantaged census tracts, and census tracts with threshold criteria exceeded. Census tracts with threshold criteria exceeded are for associated socioeconomic, environmental, climate, or other burdens. Each category was analyzed with REPLICA. REPLICA is a tool used to access traffic datasets for specific geographies. The available dataset represents the population and its travel pattern for National City.

REPLICA data for Spring 2023 was used to determine network link volumes derived from Replica's seasonal model which provides volume for a typical weekday. Metrics used in the network link volume include choice of mode, trip distance, trip purpose, and vehicle details. The dataset uses information about trips at the network link level. The volume data shows that the top five (5) roadway segments with the highest trip counts include: 8th Street, East Plaza Boulevard, Highland Avenue, Division Street, and Sweetwater Road.

3.2.2 Analysis

The analysis was conducted using REPLICA data and CEJST. Both datasets were used to compare roadway volume to low-income census tracts. CEJST census tracts with thresholds criteria exceeded contain roadways with high roadway volume that occurred in census tracts with 2-10 burdens as shown in **Figure 3.** Within the city, about 84% of the population is in low-income tracts.

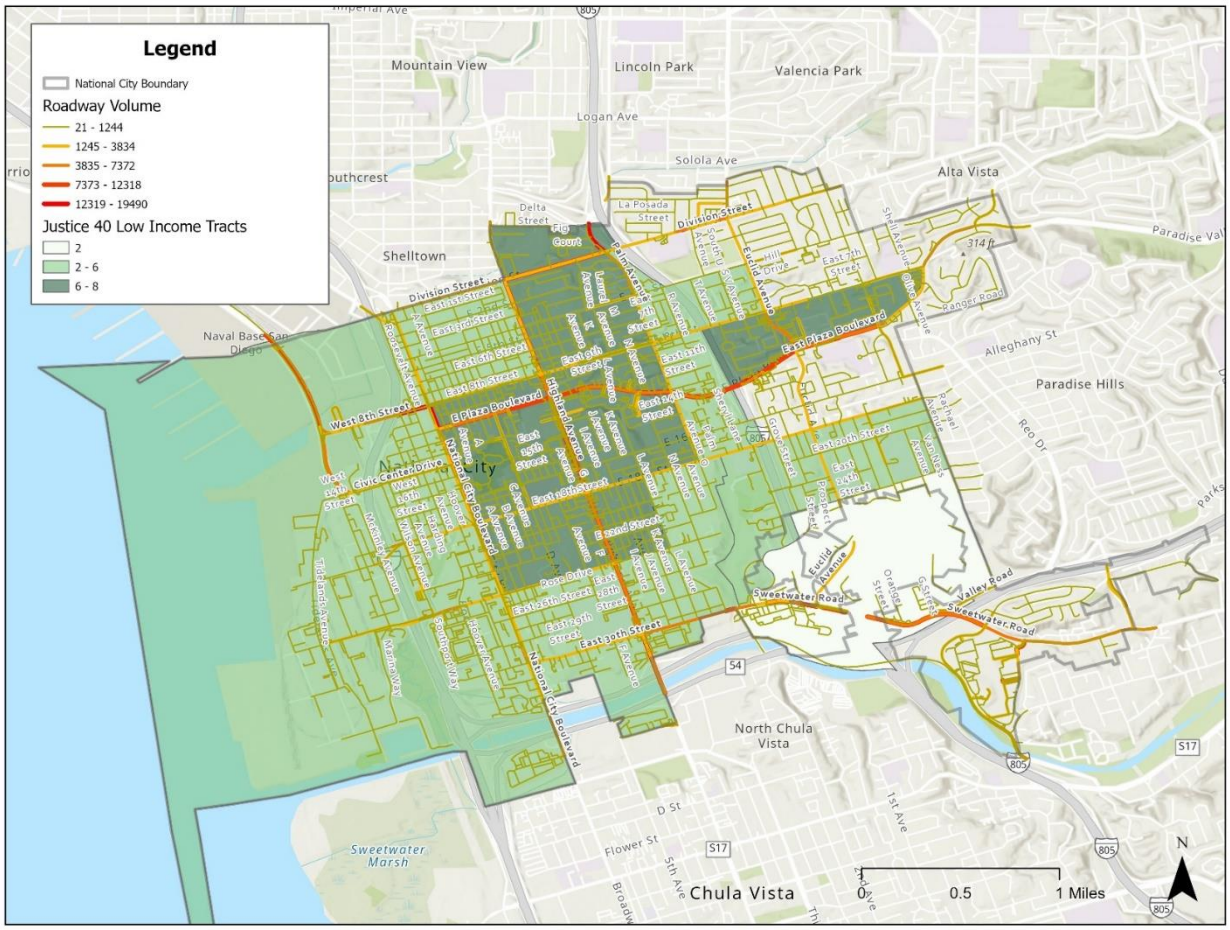


Figure 3: National City Climate and Economic Justice Census Tracts

Additional analysis was done for primary mode of travel in National City. **Table 2** provides a summary of the percentage of primary modes of travel in National City's roadway network. The highest recorded primary mode of transportation in National City is private auto at 63.3%, followed by auto passenger at 21.0% and walking at 11.8%.

Table 2 - Primary Mode

Primary Mode	Percentage
Private Auto	63.3 %
Auto Passenger	21.0 %
Walking	11.8 %
Biking	1.32 %
Public Transit	1.13 %
Other	1.11 %
Taxi/TNC	.33 %

Figure 4 indicates that most trips are between 2 miles to 16 miles. It is important to note the distance of these trips to see what other modes of travel people can adopt. By providing more connectivity throughout the city it can eliminate car trips, and implement trips for walking, biking, and transit.

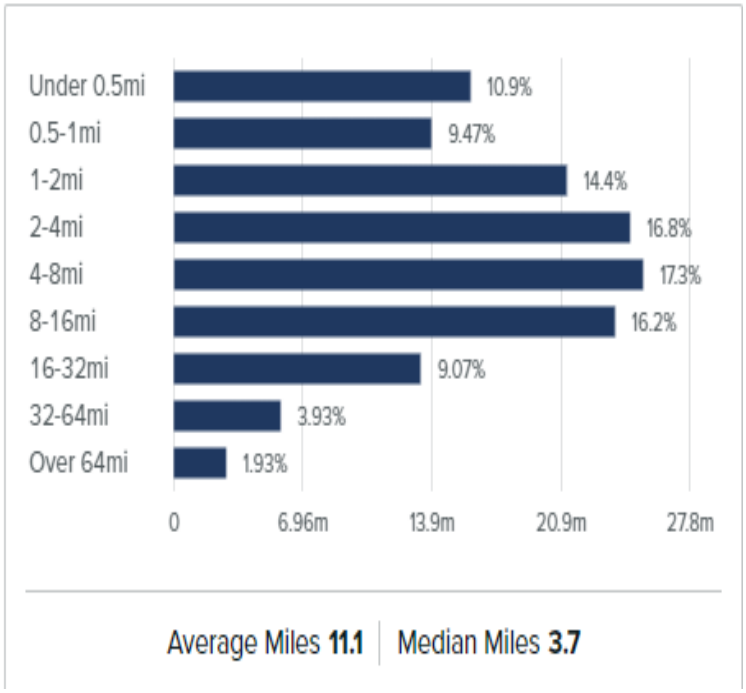


Figure 4: Trip Distance

3.2.3 Equitable Implementation

The Local Roadway Safety Plan identified seven High Collision Corridors:

- Euclid Avenue, from Beta Street to 18th Street
- Highland Avenue, from Division Street to SR-54 EB Ramps
- Plaza Boulevard / Paradise Valley Road, from Coolidge Avenue to E Plaza Boulevard
- 8th Street, from Harbor Drive to Paradise Valley Road / Plaza Boulevard
- 16th Street, from Wilson Avenue to Rachel Avenue
- 18th Street, from Wilson Avenue to Rachel Avenue
- 30th Street / Sweetwater Road, from Hoover Avenue to Plaza Bonita Center Way

Equitable implementation of safety countermeasures would prioritize high collision corridors within disadvantaged communities, low income communities, and environmental justice communities to improve safety and air quality for the most vulnerable populations. **Figure 5** shows the High Collision Corridors overlaid with disadvantaged communities. Each corridor is located at least partially within disadvantaged census tracts. All corridors except the Euclid Avenue and 30th Street corridors are located entirely within disadvantaged communities.

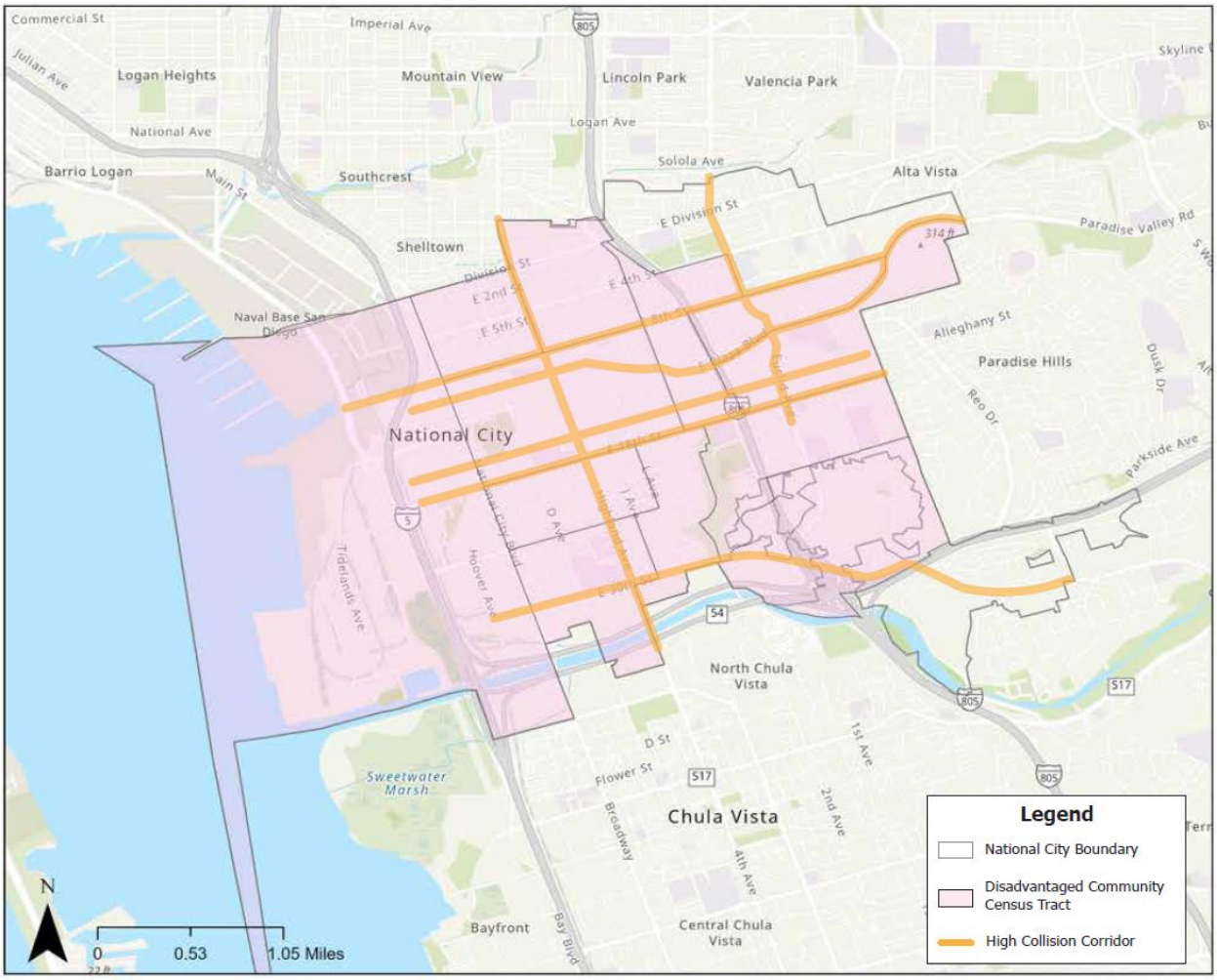
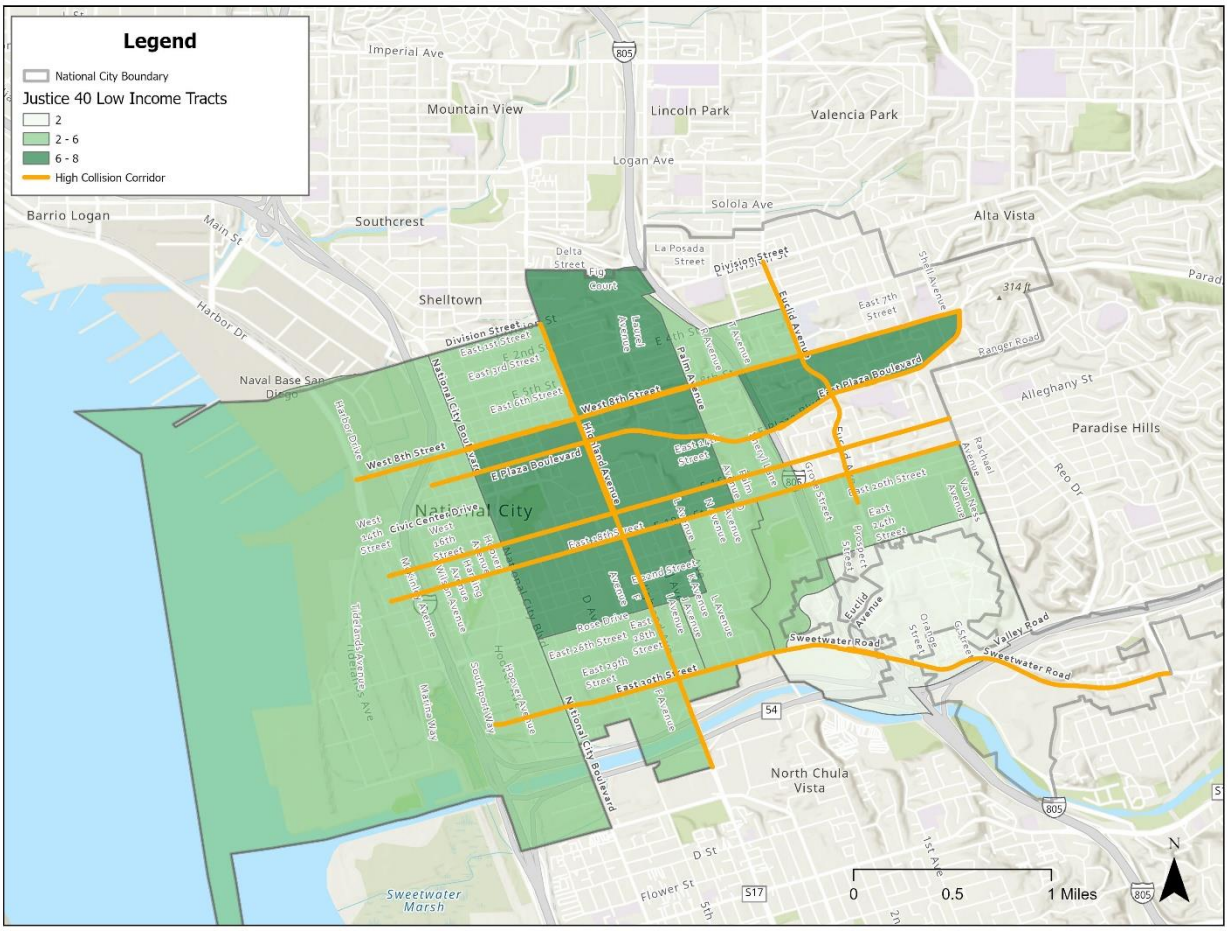


Figure 5: High Collision Corridors and Climate and Economic Justice Census Tracts

Figure 6 shows the High Collision Corridors overlaid with the Justice 40 low-income census tracts, meaning that the census tract is considered low income and has at least one more environmental, climate, or other socioeconomic burden. The 8th Street, Plaza Boulevard, Highland Avenue, 18th Street corridors are located entirely within Justice 40 low income tracts.



4. Policy and Process Changes

This section of the addendum builds upon Appendix A: Best Practices and Document Review, which provided a summary of current policies and planning documents related to safety, by providing specific recommendations to enhance internal work flows and procedural guidelines with current safety best practices.

Existing plans, policies, and projects that were recently completed, planned, or ongoing were compiled as part of the LRSP process to gain perspective on the existing efforts for transportation-related improvements within the City. High-level key points regarding transportation improvements and safety-related topics were identified to inform decision-making in the LRSP.

Table 3 outlines the relevant existing City plans, **Table 4** outlines the relevant proposed city projects, and **Table 5** outlines relevant existing and future City transportation projects, pedestrian projects, and traffic calming and safety projects found in the Capital Improvement Program (CIP) and their respective timeline.

Table 6 identifies existing policies that may impact the safety analysis process and identifies recommendations where the City could enhance or adopt non-infrastructure safety countermeasures.

Table 3- Review of Existing City Plans

Document Name	Summary/Goals
National City General Plan – Circulation Element (2011)	• The goal of the plan is to provide benefits and improve the environment through a wider range of mobility options, making transportation more inclusive and affordable; reduce greenhouse gas emissions and air pollution, increase activity on the street to support businesses and improve safety, and address public health by promoting physical activity. • The Circulation Element of the general plan focuses on the proposals and plans of connectivity for multiple modes of transportation including bikeways, average daily traffic, and future roadway growth and enhancements. The general plan acts as a document of collaboration between land use elements and circulation and setting standards and goals such as roadway improvements, increased number of travel modes, and improved quality of life.
City of National City Final Climate Action Plan (2011)	• This plan addresses the major sources of greenhouse (GHG) emissions in National City and outlines long-term strategy that the City and community can implement to achieve GHG emission reduction target. • The goals of this plan are to reduce its contribution to global climate change and support the State of California's emission reduction target. As well as tiering and streamlining of future development within National City under CEQA guidelines 15152 and 15183.5.
City of National City IntraConnect (2020)	• The purpose of Integrating Neighborhoods with Transportation Routes for All Connections (INTRAConnect) project is about connecting people who would like to live in a healthy and vibrant environment to areas of National City. • The INTRAConnect project expands upon SMART FOUNDATION (Safe Multi-modal accessible routes to school, work, shopping, parks, services, and transit) • The goal of the plan is to reduce VMT and associated GHG. The program has identified and suggested several TDM measures that can support car-lite and healthy transportation choices in National City.
National City Bicycle Master Plan	• The purpose of the plan is to provide a citywide system of interconnected bicycle corridors, support facilities, and a plan for a more bicycle-friendly city. • The goals of the plan are to provide a viable travel choice for users of all abilities, a safe and comprehensive local and regionally connected bikeway network, and environmental quality, public health, recreation, and mobility benefits.

Table 4- Current and Proposed Roadway Projects

Project Name	Plan/Funding	Project Description and Location	Status
Pedestrian and Bicycle Improvements	City of National City IntraConnect (2020)	F Avenue: E. 18th Street to E 24th Street	Proposed
Pedestrian Improvements	City of National City IntraConnect (2020)	S. Harbison Avenue: E. 5th Street to E. Plaza Blvd	Proposed
Traffic Calming and Pedestrian Improvements	City of National City IntraConnect (2020)	Plaza Boulevard: C Avenue to L Avenue	Proposed
Bicycle Improvements	National City Bicycle Master Plan	E. 18th Street: Wilson Avenue to Palm Avenue	Proposed
Bicycle Improvements	National City Bicycle Master Plan	D Avenue from E. 4th Street to 30th Street	Proposed
Gerald Ford School Community Trail Connector	National City Bicycle Master Plan	Fred Waring Dr to Miles Ave	Proposed

Table 5- Review of City Projects from National City

Project Name	Timeline	Roadway Improvements
National City Boulevard Inter-City Bike Connection	Completed	Buffered bike lanes along 33rd Street from Hoover Avenue to National City Boulevard and approximately 0.4 miles of Class II bike lanes along National City Blvd from 33rd Street to the southern city limit with Chula Vista.
Highland Avenue Bike Connection	Completed	Construct Class II Bicycle facilities, traffic calming, pavement markings, signing, signal modifications, lighting, and ADA curb ramps
Safe Routes to School Citywide	In-Process	Infrastructure improvements Citywide to enhance access and safety for children walking and biking to school.
Pedestrian Safety Enhancements (HSIP)	In-Process	Install pedestrian countdown signal heads, advance stop bar before crosswalk (Bicycle Box), and modify signal phasing to implement a Leading Pedestrian Interval (LPI).
8th Street and Roosevelt Avenue Active Transportation Corridor	In-Process	Enhance pedestrian and bicycle connections between Naval Base San Diego, the 8th Street Trolley Station and Downtown National City
El Toyon Las Palmas Shared Use Path	In-Process	Improve the multi-use path that runs parallel to I-805 between Beta St and E. 4th Street with lighting, improved crossings and new surface treatment.
El Toyon/Las Palmas – Bicycle Corridor ATPL – 5066(032)	Construction	Construct a bicycle corridor from Division Street to 22nd Street , E of I-805

Table 6- Summary of Safety Program and Policy Recommendations

Safety Topic	Initiatives/ Current Status	Recommendations for Enhancement
COMMITTEES / ROLES		
Does the City have an Active Transportation Coordinator?	The Director of Public Works / City Engineer has been serving this role, but there is no formal title.	The City could formally adopt this role into the job description for City Engineer.
Does the City have a Safety or Active Advisory Committee?	The City has a Traffic Safety Committee comprised of 5 volunteer residents (appointed by City Council) of the community and engineering department staff as liaison.	The role of the Traffic Safety Committee could be expanded to provide more oversight responsibility for the implementation of safety initiatives such as the Local Road Safety Plan. The committee could work with City Council and City Staff to provide informed recommendations for project advancements and reporting on plan progress.
Does the City have an Active Transportation Safety Education Program?	City provides safety information through their website and educational brochures. Coordination with elementary schools through neighborhood walk audits. Police department does occasional outreach as well. The City does not currently maintain a formal policy or documentation of these activities.	This program could be more formally documented and established as an ongoing line item in the City budget to ensure continuity.
POLICY / PLANS		
Does the City have a Complete Streets Plan?	The City's General Plan Circulation Element has a Complete Streets section.	The City has completed many of the easier complete street projects. Further expansion of the complete streets system will require compromises to parking or travel lanes. The City could include an initiative in upcoming planning efforts to provide outreach and education on the potential benefits of complete streets efforts that could outweigh the impact of lost / relocated parking or travel lanes.

Safety Topic	Initiatives/ Current Status	Recommendations for Enhancement
Does the City assess Traffic Impact Fees?	Transportation Development Impact Fee (TDIF)	The City can include potential roadway safety impacts in the nexus study for a new project to be included for impact fee funding
Does the City have a Safe Routes to School program?	Yes	The City can continue to implement safe routes to school projects and work with schools to monitor the system for additional needs after the existing identified projects are complete
Does the City implement Traffic Calming Policies?	The City utilizes best practices for traffic calming through CIP. Generally don't implement speed bumps, but may add speed cushions to address a need. Ad-hoc traffic calming requests would be presented to the TSC to approve or deny. There is no existing City guideline for implementation of traffic calming or systematic review of the need - it is all ad hoc. They typically reference guidelines published by neighboring municipalities or published federal guidance.	The City could formalize the best practices standards it currently uses for traffic calming decisions to better and more consistently justify improvements that are made or not made subsequent to neighborhood requests. The City may also consider developing its own Traffic Calming Policy and decision matrix.
Does the City regularly conduct Speed Surveys?	Yes	Monitor updated guidance on AB43 implementation to provide more flexibility to setting local speed limits.
Does the City utilize Warrants for Stop Signs and Signals?	Yes, they follow CA MUTCD warrant analysis	The City can continue to rely on the latest CA-MUTCD traffic control standards.
Does the City have Transportation Demand Management (TDM) or Vehicle Miles Travelled (VMT) Reduction policies?	Newly adopted Climate Action Plan (CAP) and also circulation element update would include references to VMT and compliance with SB 743. They use the SANTEC/ITE guidelines for VMT usage in TIAs. The city does not have formal requirements for TDM.	City could consider developing its own SB743 VMT analysis procedures and thresholds. The City could also include travel demand management strategies in its mitigation toolbox where appropriate.
Does the City perform regular Traffic Crash Monitoring?	No formal policy that requires a citywide systematic review on a yearly basis. The police department keeps crash records	The City could conduct annual or bi-annual screening of crash data to track changing patterns and trends and to monitor which safety

Safety Topic	Initiatives/ Current Status	Recommendations for Enhancement
	in a database and can provide statistics, mapping, and crash details as needed to respond to requests from residents.	improvements have been most successful.
Does the City have an Active Transportation Master Plan?	Yes, the IntraConnect Plan	The City can continue to implement the Active Transportation Plan and update when necessary.
Does the City have MUTCD-compliant Pedestrian Signal Timing?	Yes. City uses a consultant to review compliance and previously did a comprehensive review. Everything is currently MUTCD compliant.	The City can continue to monitor CA-MUTCD updated guidance on pedestrian timing and could consider leading pedestrian intervals where appropriate.
Does the City implement Crosswalks at high pedestrian locations?	Yes. They follow FHWA guidelines for crosswalk treatments based on lane configuration, speeds, etc	Continue to implement these improvements where feasible; The City could consider updating its crosswalk standard to high visibility. The City could also adopt standards for when crosswalks are not included on an intersection leg or when a mid-block crossing should be installed.
What is the City's Bicycle Policy	The bicycle policy can be found at National City (nationalcityca.gov) NC Bicycle Master Plan 07-26-23.pdf | National City (nationalcityca.gov)	The City can review its pedestrian and bicycle policies along with enforcement activities for balanced emphasis on safety and encouragement.
What types of transit does the City have?	A description of the local transit can be found at NC Transportation Element 2023-07-25.pdf | National City (nationalcityca.gov)	The City could work with local transit to review bus stop locations and first/last mile connectivity to optimize safe system accessibility and operations.
DATA COLLECTION / INVENTORY		
Does the City have an Inventory of Pedestrian Signs and Signals?	Yes	The city could continue to develop its GIS inventory process to keep track of existing infrastructure and maintenance.
Does the City have an Inventory of Active Transportation Routes?	Yes, it is included in the circulation element.	The City could update the map as new facilities are added and create a pedestrian and bicycle route map that is public facing to direct active transportation users to the best facilities.

Safety Topic	Initiatives/ Current Status	Recommendations for Enhancement
Does the City utilize Crossroads Database for collisions?	The City uses TIMS, SWITRS, and the police records department keeps a database that they pull from as needed.	The City could work with the Police department to get direct access to the database for internal planning and crash reviews
Does the City have Active Transportation Volume Counting?	ATP counts for all grant funded projects. CAP requires this for the future	The City could implement a requirement that traffic counts conducted for traffic studies include pedestrian and bicycle counts moving forward.
COORDINATION / FEEDBACK		
What ways can citizens give feedback about roadway safety?	The public can submit requests at City of National City | SeeClickFix | Submit a request	The City can continue to document requests received and track responses to aid in consistency over the longer term.
What types of Coordination with other City organization does your department perform?	The City departments routinely coordinate with school districts and the police department.	The City could consider an organizational review to identify how each department can have a role in safety with quarterly department head meetings to keep consistent city-wide safety priorities.
What types of Engagement with the School Districts does the City perform?	They interview crossing guards, walk audits, safe routes to school. Used to have a city funded Safe Routes to School program but now it is on a more as needed basis. Currently they have a grant so they are actively implementing right now. Engagement includes meeting with superintendent, operations staff, principals, to evaluate 4 schools. Needs are typically identified by parent complaints and crossing guard interviews.	The City can continue to establish relationships with local schools to gather input on safe routes to school.
What types of Law Enforcement/Emergency Service Engagement does the City perform?	Lots of coordination but needs to be documented and formalized	The City can continue to coordinate with law enforcement and fire department as key stakeholders.

5. Progress and Transparency

This section of the addendum identifies roles and responsibilities for ongoing implementation of the SSARP / LRSP, monitoring safety data, and reporting.

The City has a Transportation Safety Committee comprised of five volunteer residents appointed by City Council and engineering department staff as liaison. The Transportation Safety Committee will take on the role of SSARP / LRSP oversight. This role will include the following responsibilities:

- Monitoring progress on implementation of the projects identified in the SSARP / LRSP, including a report of project status, funding, or completion.
- Monitoring crash data, including crash rates, changes over time, or before-and-after analyses of safety project implementation sites.
- Reporting key findings to City Council.