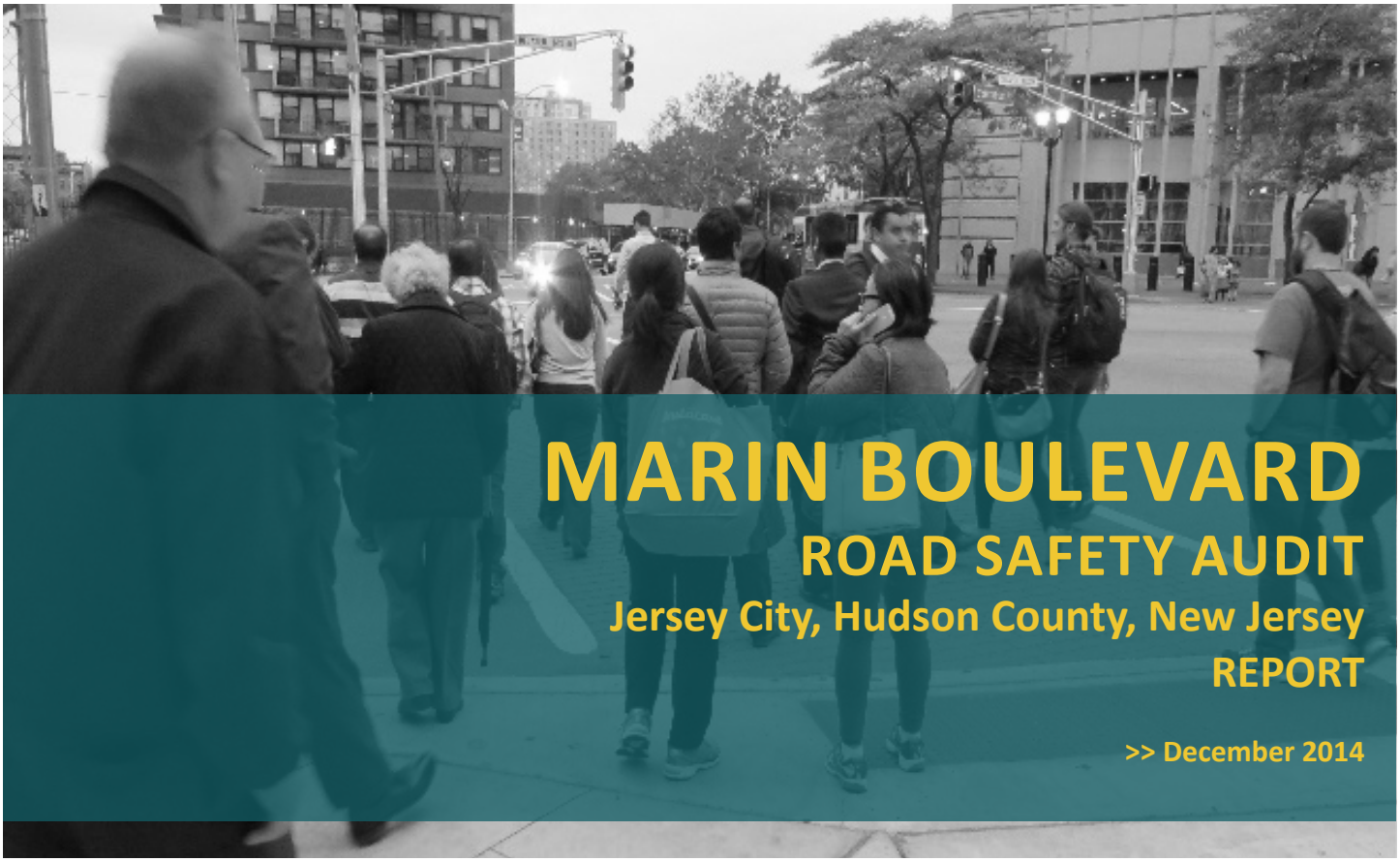

MARIN BOULEVARD
ROAD SAFETY AUDIT
Jersey City, Hudson County, New Jersey
REPORT

>> December 2014

RSA facilitated by the Transportation Safety Resource Center (TSRC) at the Rutgers Center for Advanced Infrastructure and Transportation (CAIT) in partnership with the North Jersey Transportation Planning Authority (NJTPA) and Jersey City, with funding provided by the Federal Highway Administration (FHWA) and the New Jersey Department of Transportation (NJDOT).

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What is a Road Safety Audit (RSA)?

CAIT's Transportation Safety Resource Center (TSRC) and New Jersey Local Technical Assistance Program (NJ LTAP) offer a statewide Road Safety Audit (RSA) service at no charge to New Jersey towns and counties. Interested parties can request an RSA conducted by a team of engineers, planners, and law-enforcement officers to help municipalities and counties make cost-effective safety improvements.

A multidisciplinary team of professionals offer assessments on roadway issues such as pedestrian and bicycle safety, intersection analyses, rural roads, human factors, speed management, and sign visibility and retroreflectivity standards.

RSAs include data-driven considerations and analysis of crashes. To determine the best safety solutions, RSA professionals perform incisive crash data evaluations on the target area using Plan4Safety, TSRC's award-winning crash database and software.

The RSA team provides a final report that includes short- and long-term countermeasure recommendations that fit within the requestor's budget. Furthermore, RSAs pay off. According to the Federal Highway Administration (FHWA), countermeasures applied after RSAs can reduce crashes by about 60 percent.

For more information, contact Senior Engineer Researcher Andy Kaplan at andy.kaplan@rutgers.edu.

Disclaimer

Road Safety Audit reports provided by the Center for Advanced Infrastructure and Transportation staff do not constitute an engineering report. The agency responsible for design and construction should consult a professional engineer licensed by the State of New Jersey in preparing the design and construction documents to implement any of the safety countermeasures in this report.

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the New Jersey Department of Transportation or the Rutgers Center for Advanced Infrastructure and Transportation. This report does not constitute a standard, specification, or regulation. This document is disseminated under the sponsorship of the Department of Transportation, University Transportation Centers Program, in the interest of information exchange. The U.S. government assumes no liability for the contents or use thereof.

The Jersey City Marin Boulevard Road Safety Audit (RSA) was conducted on November 5, 2014. The six intersections along Marin Boulevard were chosen for the RSA as a result of the North Jersey Transportation Planning Authority (NJTPA) network screening of crashes on county and municipal roadways. The network screening ranking was created utilizing the database in the Rutgers Transportation Safety Resource Center's (TSRC's) Plan4Safety software. The crashes were weighted according to severity. The ranking system determined the Sixth Street/Thomas Gangemi Drive intersection as the number one ranked intersection and the number 13 ranked pedestrian spot in Hudson County. The RSA process helped to identify safety issues, evaluate risks, and suggest countermeasures along this corridor. The result, detailed in this report, is a summary of the six intersections' safety history from 2010–2012 and a list of recommended improvements created by the RSA team.

Corridor Description: Marin Boulevard runs south to north for approximately two miles through downtown Jersey City, about a half mile inland from the Hudson River waterfront. The six RSA intersections are all located along Marin Boulevard. The southernmost intersection is located adjacent to City Hall and the northernmost intersection is a half-mile south of Interstate 78. The area has a dense, urban character with a variety of transportation needs. The area also bolsters significant bus, underground rail, foot, bicycle, and car traffic. Vehicle traffic counts vary greatly in northbound versus southbound traffic: 11,219 versus 5,869 respectively.

Crash Analysis: Crash analysis shows distinct trends. When compared to countywide trends, crashes at RSA intersections happen most frequently during evening peak hours (4:00 p.m. to 8:00 p.m.) and most frequently on Fridays. Crashes occurring in non-daylight or wet roadway conditions were also overrepresented. Overrepresented crash types include same direction, right angle, left-turn, and pedestrian crashes. Right angle crashes were particularly frequent at the intersections of Bay Street, Second Street, and Sixth Street/Thomas Gangemi Drive. The most severe crashes resulted in moderate injury and include two cyclist crashes, two right angle crashes, and one same-direction crash. The crashes occur with highest frequency at the Christopher Columbus Drive intersection and the Sixth Street/Thomas Gangemi Drive intersection, with annual averages of 11.3 crashes and 12.3 crashes, respectively, in the three-year dataset.

Main Issues:

- Montgomery Street—Left-turn pedestrian conflicts, geometric misalignment, bicycle lane connectivity
- Columbus Drive—Speeding/aggressive driving, wide pavement and geometric misalignment, pedestrian compliance with signals, pedestrian accommodations, vehicular lane use
- Bay Street and Second Street—Right angle crashes
- Sixth Street/Thomas Gangemi Drive—Pedestrian accommodations, left-turn crashes, speeding/aggressive driving (especially on south leg with reintroduction of second southbound lane), geometric misalignment

Recommendations: RSA team recommendations include realignment of intersections and centerlines, increased pedestrian accommodations (especially refuge islands), bicycle network connectivity, removal of one southbound lane between Sixth Street/Thomas Gangemi Drive and Second Street, and signalization at the Second Street and Bay Street intersections.

This report also includes design concepts, photo simulations, crash diagrams, and reference documents.

1.1 Site Selection

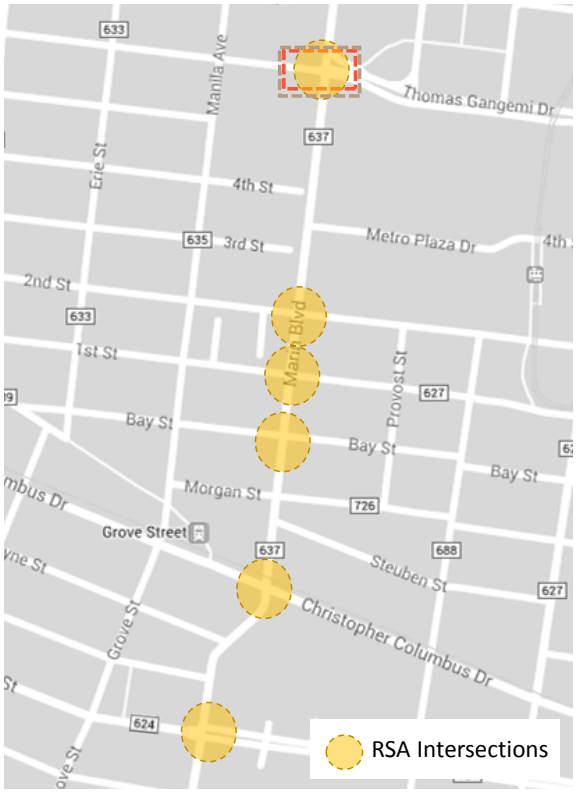


Figure 1 – Identified Priority High Crash Locations

Marin Boulevard was chosen as a result of network screenings that identified the intersection of Marin Boulevard and Sixth Street/Thomas Gangemi Drive as Hudson County's highest ranked intersection for crashes. In conversations with the intersection's roadway owner, Jersey City, and the NJTPA, five other intersections in the area were also chosen for review in the RSA process.

The six intersections in the audit are all located along Marin Boulevard (County Road 637) at the following streets, listed from south to north:

- Montgomery Street/County Road 624
- Christopher Columbus Drive
- Bay Street
- First Street/County Road 627
- Second Street
- Sixth Street/Thomas Gangemi Drive

Map Symbol	Network Screening Rankings		
	Ranking Item	NJTPA Ranking	Hudson County Ranking
	Intersection	14	1
	Pedestrian Spot	56	13

1.2 Traffic Volumes

Traffic volumes along Marin Boulevard vary greatly from intersection to intersection. The volumes also vary by direction traveled. Between Morgan Street and Bay Street (just north of Christopher Columbus Drive), a 2011 report recorded the northbound lanes at 11,219 vehicles per day. At the same location, less than half that volume (5,869 vehicles) traveled southbound. Traffic volumes were also recently impacted by the closure of the Pulaski Skyway, which diverted additional traffic onto local streets.

There is a significant amount of pedestrian and cyclist volume along the corridor. Pedestrian traffic is especially heavy near the Grove Street PATH station.

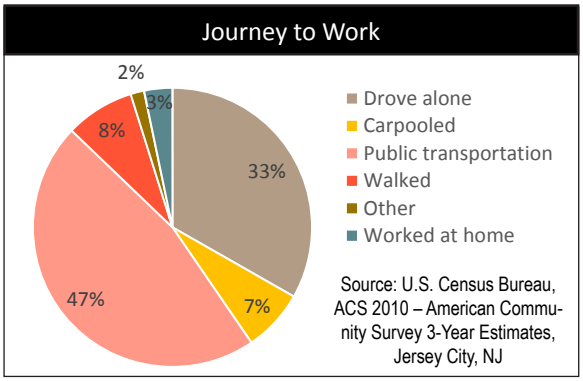
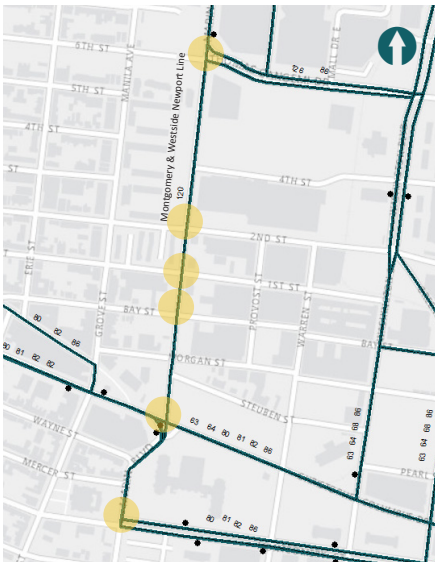


Figure 2 – Journey to Work

Figure 3 – Foot Traffic Near Grove Street Station

1.3 Transit Service

A high percentage of Jersey City workers commute via walking and/or public transit. One of Jersey City's transit hubs is the Grove Street PATH station plaza, located at the intersection of Christopher Columbus Drive and Marin Boulevard. This intersection is also a crossroads for multiple bus lines. NJ Transit routes intersecting with intersections in the study area are: 63, 64, 68, 80, 81, 82, 86, and 126. The eastbound approach of Christopher Columbus Boulevard and Marin Boulevard features a dedicated bus lane for left-turning buses to travel north and toward the Holland Tunnel.



The NJ Transit bus stops are also used by many jitney buses and the AC Bus Corporation, to carry passengers within Jersey City and beyond to surrounding communities. The AC Bus Corporation, in particular, runs frequent "Montgomery & West Side", "Newport", and "#4 Merritt Street" buses along Marin Boulevard. Other transit services in the area include the Harsimus Cove Hudson Bergen Light Rail station, a quarter mile east of the Second Street and Marin Boulevard intersection.

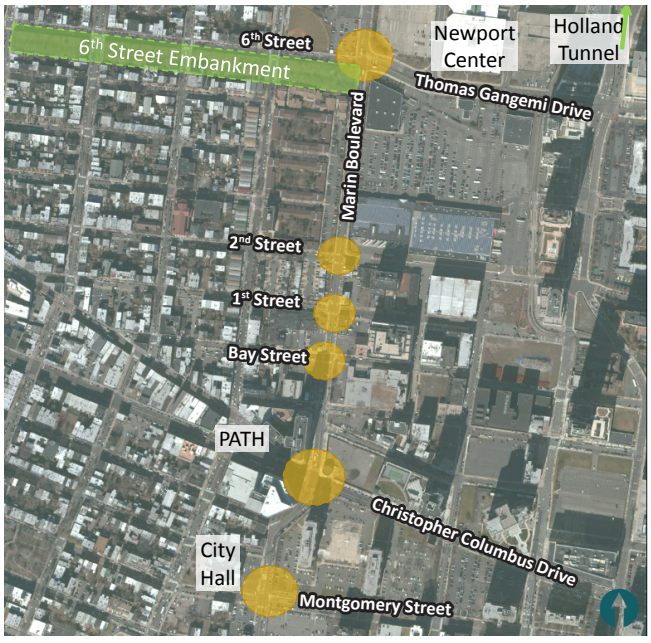
1.4 Area Characteristics

The area to the west of Marin Boulevard is primarily residential, with a few commercial parking lots from south of Bay Street to First Street. Along the eastern edge of Marin Boulevard are more commercial facilities including restaurants and small parking lots south of Second Street. North of Second Street are larger parking lots that serve a ShopRite and a BJ's immediately north of the intersection, and Newport Centre Mall to the northeast of the intersection of Sixth Street and Marin Boulevard. About a quarter mile beyond the northern end of the RSA area is Interstate 78 and a toll plaza for the Holland Tunnel.

There are several new residential buildings being constructed, renovated, or converted from warehouses in the area surrounding the RSA corridor. Most of the development along the corridor is concentrated south of the Second Street intersection.

In addition to residential and commercial uses, there are office buildings at the intersection with Christopher Columbus Drive, and City Hall offices at the intersection with Montgomery Street.

In terms of on-street infrastructure, there is an emerging bike network in Jersey City. One bike lane segment of the network terminates at the intersection of Montgomery Street and Marin Boulevard.



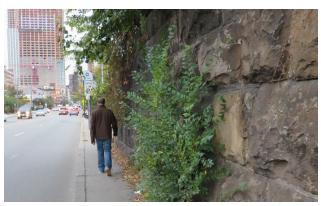


Figure 4 – Montgomery Street

Montgomery Street and Marin Boulevard

- Signalized
- Southbound approach: 49' curb to curb. One through/right-turn lane and one left-turn lane; northbound receiving lane is 25' wide and has undivided (floating) curbside parking. Hatched driveway entrance 50' behind stop bar on west side
- Westbound approach: 77' curb to curb with a 9' curbed median. One wide right-turn lane with one bike lane, one through/left-turn lane and curbside parking. Vehicle lanes are separated by a wedge that aligns westbound traffic with opposite receiving lane. Two receiving eastbound lanes, one bike lane between vehicle lanes, and curbside parking
- Northbound approach: One lane in each direction with floating curbside parking
- Eastbound approach: One lane in each direction with floating curbside parking; driveway entrance to parking lot 10' behind stop bar on south side

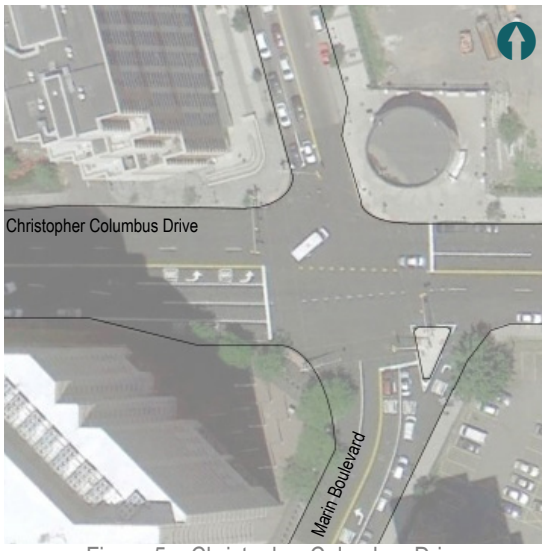


Figure 5 – Christopher Columbus Drive

Christopher Columbus Drive and Marin Boulevard

- Signalized
- Southbound approach: 38' curb to curb. One through/right-turn lane, one through/left-turn lane. One receiving lane that widens to permit curbside parking 40' from intersection
- Westbound approach: 60' curb to curb. One through/right-turn lane, one through/left-turn lane. Curbside floating parking lane. Two receiving lanes with floating curbside parking
- Northbound approach: 50' curb to curb, widening at the intersection and accommodating a triangular curbed refuge island. One left-turn lane, one through lane, and one right-turn lane
- Eastbound approach: 67' curb to curb, widening to 82' at intersection. One left-turn only bus lane, two through lanes (the rightmost of which doubles as right-turn lane). Right lane is bus-stop pull out. Two receiving lanes, with right lane being a 25' lane with floating curbside parking
- Dashed lane markings eastbound through intersection
- A pilot location for NJTPA StreetSmart pedestrian safety campaign

Figure 6 – Bay Street

Bay Street and Marin Boulevard

- Unsignalized, with STOP signs on east/west minor street
- Southbound approach: 40' curb to curb. One lane for through/right-turn/left-turn with curbside parking. One receiving lane with floating curbside parking. Depressed curb on west side for a 90' and 45' wide driveway entrance
- Westbound approach: 33' curb to curb. One lane for through/right-turn/left-turn with curbside parking. One receiving lane with floating curbside parking.
- Northbound approach: 40' curb to curb. One lane for through/right-turn/left-turn with curbside parking. One receiving lane with floating curbside parking.
- Eastbound approach: 30' curb to curb. One-way receiving lane with floating curbside parking on both sides of street

Figure 7 – First Street

First Street and Marin Boulevard

- Southbound approach: 48' curb to curb. One lane for through/left-turn with curbside parking. One receiving lane with floating curbside parking
- Westbound approach: 33' curb to curb. One receiving lane with floating curbside parking on both sides
- Northbound approach: 40' curb to curb. One lane for through/right-turn with curbside parking. One receiving lane
- Eastbound approach: 30' curb to curb. One-way left-turn/through/right-turn lane with floating curbside parking on both sides of street

Figure 8 – Second Street

Second Street and Marin Boulevard

- Southbound approach: 47' curb to curb. Two through lanes, the rightmost of which is also a right-turn lane. Two receiving lanes
- Westbound approach: 36' curb to curb. One right-turn lane, one through lane, and one left-turn lane. 56' driveway entrance for delivery trucks on north side 60' east of intersection
- Northbound approach: 47' curb to curb. One lane for through/right-turn/left-turn with floating curbside parking. One receiving lane with floating curbside parking
- Eastbound approach: 30' curb to curb. One receiving lane with floating curbside parking on both sides. Driveway entrance to parking lot 20' west of intersection on north side

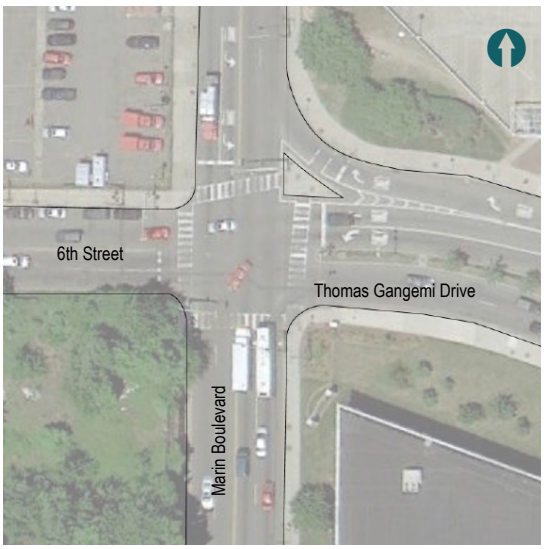


Figure 9 – Sixth Street/Thomas Gangemi Drive

Sixth Street/Thomas Gangemi Drive and Marin Boulevard

- Southbound approach: 48' curb to curb. One left-turn lane, one through/right-turn lane. Two receiving lanes. Lane from westbound approach merges into right lane after stopping at a STOP sign.
- Westbound approach: 75' curb to curb, widening at the intersection and accommodating a triangular curbed refuge island and a mid-street 8' wide curbed median. One left-turn lane, one through lane, and one right-turn lane
- Northbound approach: 48' curb to curb. One through/left-turn lane and one through/right-turn lane. Two receiving lanes
- Eastbound approach: 44' curb to curb. One through/left-turn lane and one through/right-turn lane. One receiving lane with floating curbside parking

2.1 Chronology

2011 and 2012 accounted for over 80% of crashes in the study area between 2010 and 2012. In terms of time of day, crashes in the RSA area were overrepresented in the afternoon to evening hours, especially during p.m. peak hours. April, June, July, September, and the period from November to January have a higher frequency of crashes than the Hudson County average.

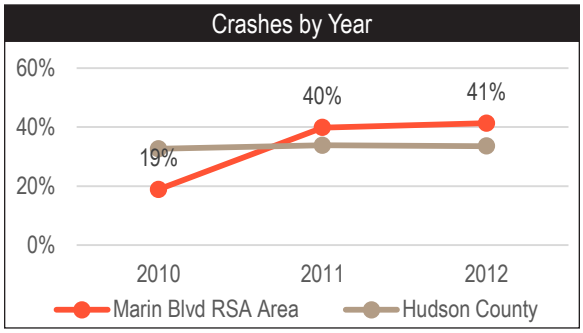


Figure 10 – Year (2010–2012)

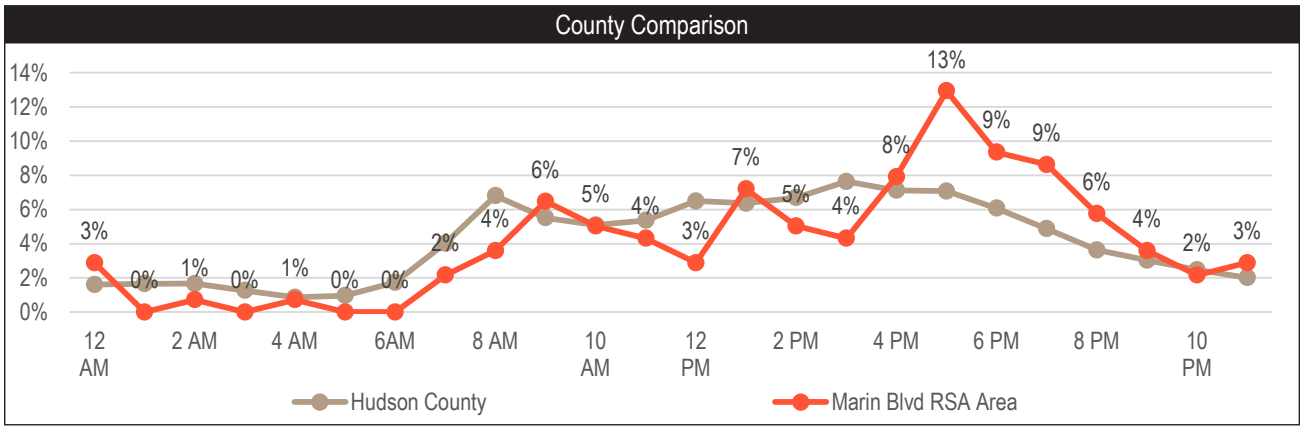


Figure 11 – Time of Day (2010–2012)

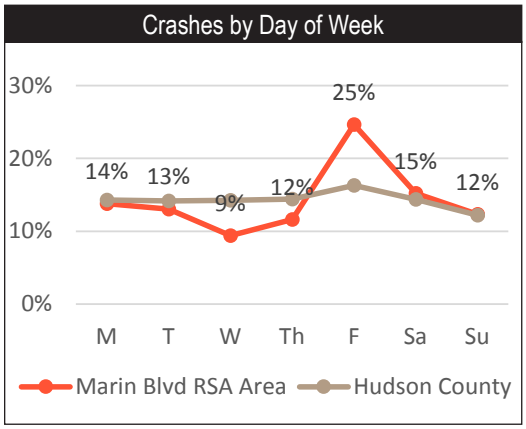


Figure 12 – Day of Week (2010–2012)

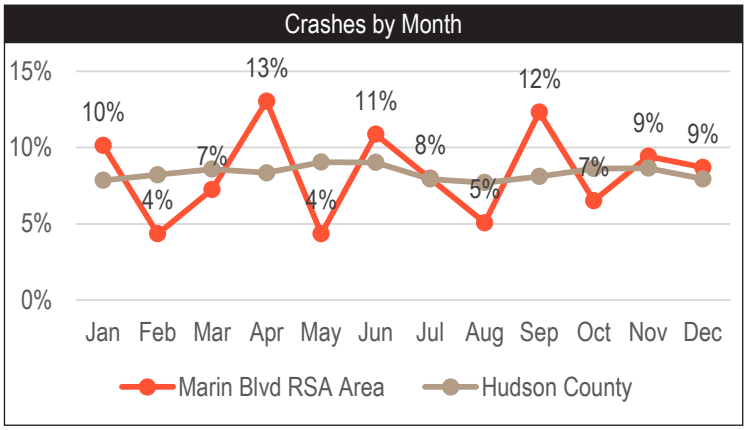


Figure 13 – Month (2010–2012)

2.2 Severity

Severity	Pedestrian/ Cyclist Crash	All Crashes
Moderate Injury	2	5
Pain	10	32
Property Damage Only (PDO)	-	101
Total	12	138

Figure 14 – Severity (2010–2012)

Forty percent of moderate injury crashes were bicyclist crashes. Pedestrian crashes accounted for thirty percent of all complaint-of-pain crashes. There were no fatal or incapacitating crashes in the RSA area.

2.3 Collision Type

When compared to county-wide data, the following crashes are overrepresented in the RSA area: same direction—rear end, same direction—side swipe, right-angle, left-turn, and pedestrian. Note that left-turn crashes are significantly overrepresented, accounting for four times as many crashes in the RSA area than the county average. In Figure 17, the overrepresented crash types are circled. The most severe crashes occurred in the following contexts: one same direction—rear end crash, two pedalcyclist (cyclist) crashes, and two right-angle crashes. As for pedestrian crashes, several involved left-turning vehicles striking pedestrians in the crosswalk. Other crash descriptions can be found in section 8.0 "Crash Diagrams."

Crash Type	Count in RSA Area	% In RSA Area	% In Hudson County
Same Direction - Rear End	32	23%	18%
Same Direction - Side Swipe	25	18%	16%
Right Angle	41	30%	15%
Opposite Direction - Head On/Angular	2	1%	1%
Struck Parked Vehicle	9	7%	28%
Left Turn / U Turn	12	9%	2%
Backing	3	2%	7%
Encroachment	1	1%	0%
Pedestrian	10	7%	5%
Pedalcyclist	2	1%	1%
Non-fixed Object	1	1%	0%
TOTAL	138	100%	100%

Figure 15 – Crash Type in RSA Area and County

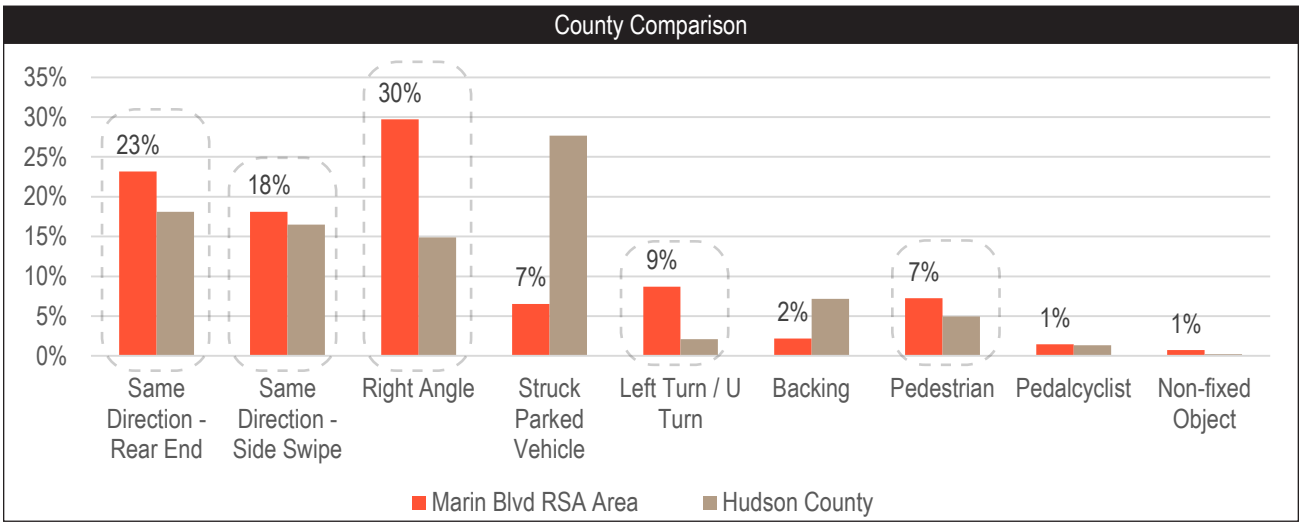


Figure 16 – Corridor Crashes Compared with Countywide Crash Patterns (2010–2012)

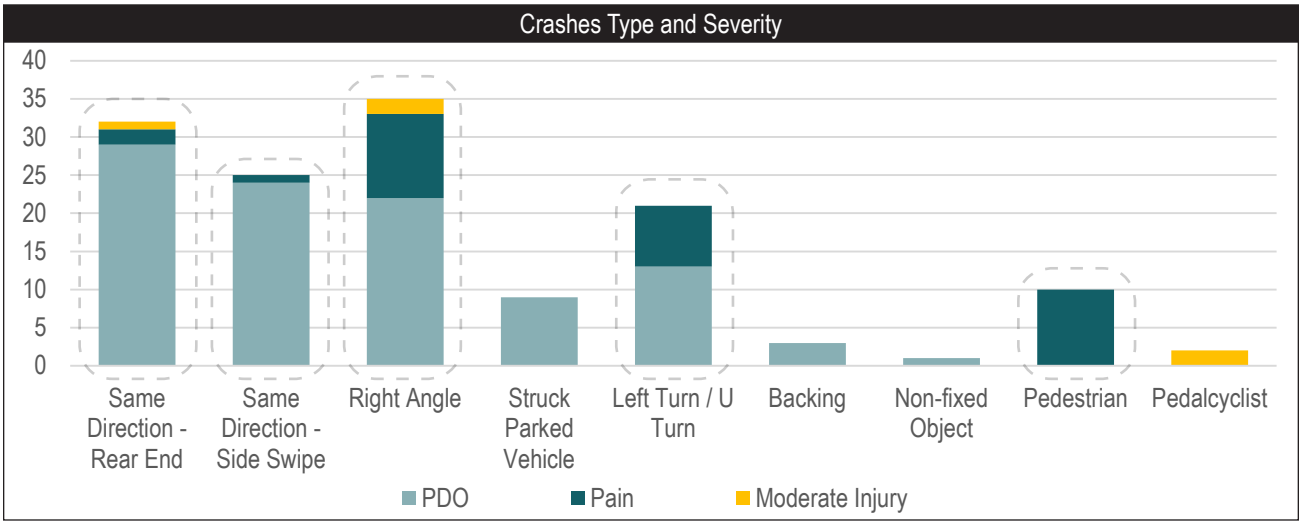


Figure 17 – Corridor Crashes by Type and Severity (2010–2012)

2.4 Roadway Surface and Lighting Conditions

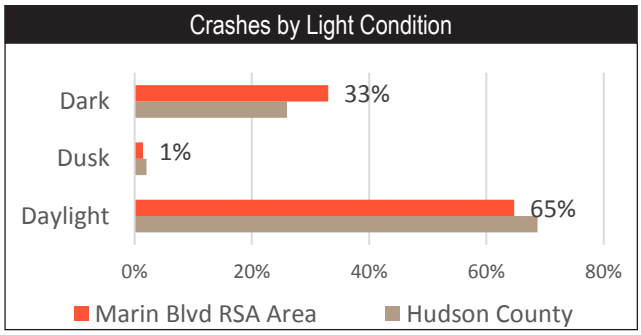


Figure 18 – Crashes by Light Condition (2010–2012)

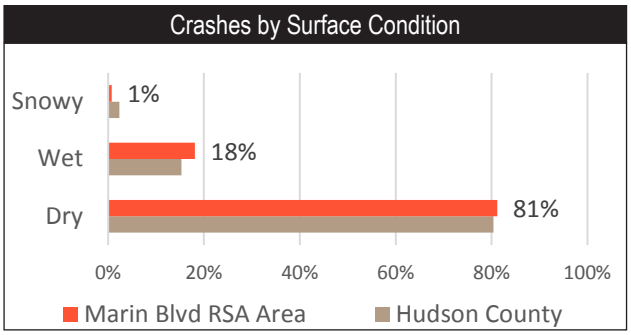


Figure 19 – Surface Condition (2010–2012)

Percentage-wise, there are more crashes in the RSA area at night (33 percent of RSA area crashes, compared to 26 percent of countywide crashes) than during the daytime, suggesting that lighting may be a factor in crashes. Wet roadway conditions may also be a contributing factor since there is a higher percentage of RSA area crashes occurring on wet roadway conditions (18 percent in RSA area, compared to 15 percent countywide).

2.5 Roadway Surface and Lighting Conditions

	Mont-gomery	Colum-bus	Bay	First	Second	Sixth	RSA Area
12:00 AM	1	-	-	-	1	2	**4**
1:00 AM	-	-	-	-	-	-	**-**
2:00 AM	-	-	-	1	-	-	**1**
3:00 AM	-	-	-	-	-	-	**-**
4:00 AM	-	-	-	-	-	1	**1**
5:00 AM	-	-	-	-	-	-	**-**
6:00 AM	-	-	-	-	-	-	**-**
7:00 AM	1	-	1	-	-	1	**3**
8:00 AM	-	4	-	-	1	-	**5**
9:00 AM	2	2	1	-	1	3	**9**
10:00 AM	1	1	-	1	1	3	**7**
11:00 AM	1	1	1	-	-	3	**6**
12:00 PM	1	2	-	1	-	4	**4**
1:00 PM	-	3	-	2	1	5	**10**
2:00 PM	1	-	1	-	-	2	**7**
3:00 PM	1	2	-	1	-	1	**6**
4:00 PM	2	2	-	2	3	3	**10**
5:00 PM	6	5	1	-	3	3	**18**
6:00 PM	1	2	1	-	6	3	**13**
7:00 PM	1	4	3	-	1	3	**12**
8:00 PM	-	4	1	1	1	1	**8**
9:00 PM	-	-	2	-	2	1	**5**
10:00 PM	1	-	-	-	1	1	**3**
11:00 PM	-	2	1	-	1	-	**4**
Total	**20**	**34**	**13**	**9**	**23**	**40**	**136**

Crash lighting conditions and time-of-day are related. The peak number of crashes for Montgomery Street, Columbus Drive, and Second Street all occurred during the five o'clock or six o'clock hours. The peak time for Sixth Street was during the one o'clock hour. Bay Street's peak time was during the seven o'clock hour. First Street, which had the lowest number of crashes, did not have any single peak hour.

>> 3.0 Intersection Analysis

3.1 Montgomery Street and Marin Boulevard

Average crashes per year: 6.7

Chronologically, crashes are slightly overrepresented on Thursdays, Fridays, and every day during the five o'clock hour. Non-daylight crashes are not overrepresented, indicating that lighting is likely not an issue. Wet roadways may be a factor, as forty percent of crashes occur in the rain.

In terms of severity, three crashes resulted in a complaint of pain. One complaint of pain occurred when a right-turning vehicle struck the pedestrian in the crosswalk. In 2008 and 2009, three other pedestrian crashes were classified as complaint-of-pain. Two of the crashes occurred when a left-turning vehicle entered Montgomery Street eastbound and struck a pedestrian in the crosswalk. Two of the four left-turn crashes also resulted in complaints of pain.

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Pain	1	3
Property Damage Only (PDO)	-	16
Total	1	19

Figure 20 – Crash Severity (2010–2012)

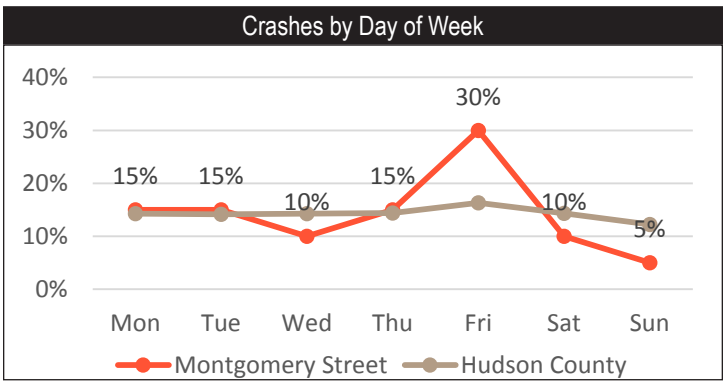


Figure 22 – Day of Week (2010–2012)

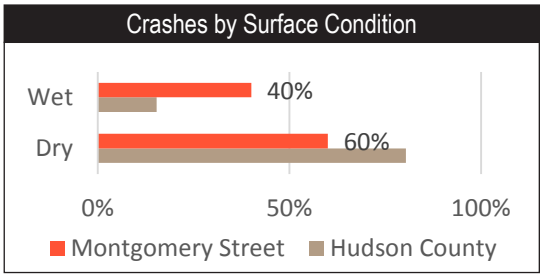


Figure 21 – Surface Condition (2010–2012)

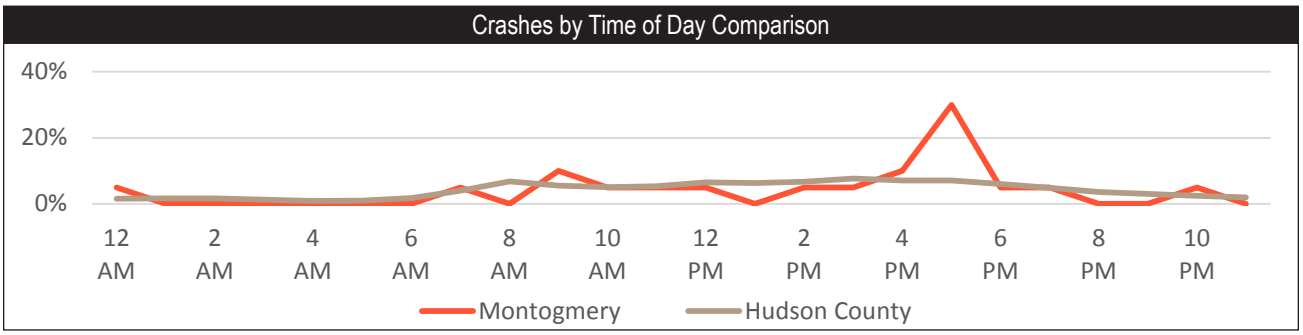


Figure 23 – Time of Day (2010–2012)

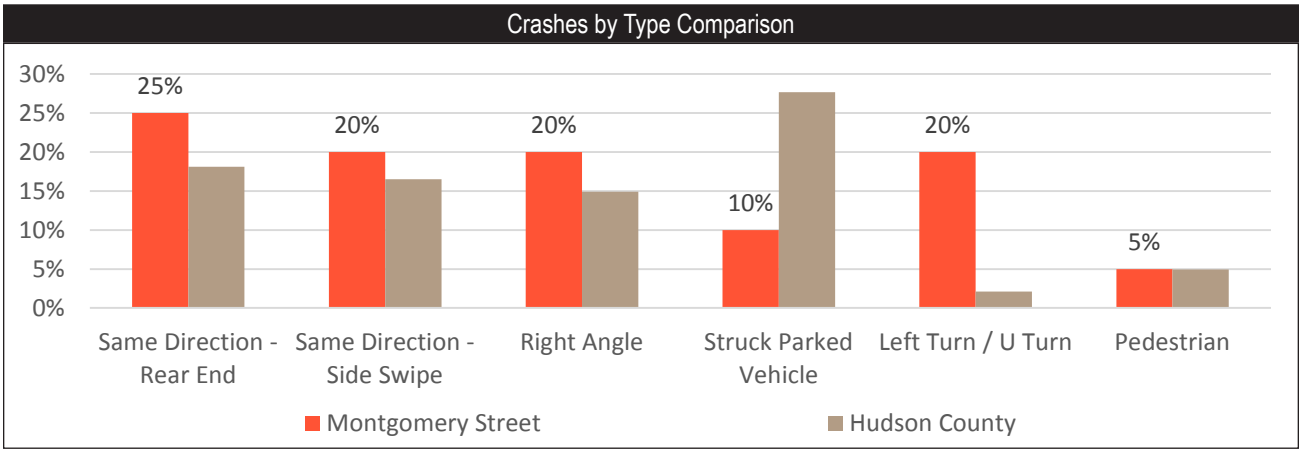


Figure 24 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

3.2 Christopher Columbus Drive and Marin Boulevard

Average crashes per year: 11.3

Crash frequency increased over the three-year study period. Compared with the rest of the RSA area, early-week crashes occurred more frequently. The overrepresentation of non-daylight crashes may indicate that there is a lighting issue. The number of crashes was higher from 8:00–9:00 a.m. and 7:00–9:00 p.m.

In terms of severity, one crash resulted in a moderate injury and five crashes, all of them pedestrian crashes, resulted in a complaint of pain. Two of the crashes occurred when a left-turning vehicle entering Columbus Drive eastbound struck the pedestrian in the crosswalk. Two others occurred when a right-turning vehicle struck a pedestrian in the crosswalk.

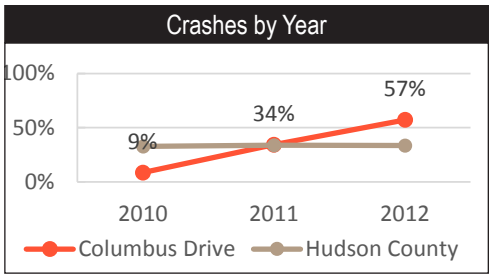


Figure 25 – Year (2010–2012)

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Moderate Injury	1	-
Pain	5	-
PDO	-	29
Total	6	29

Figure 26 – Severity (2010–2012)

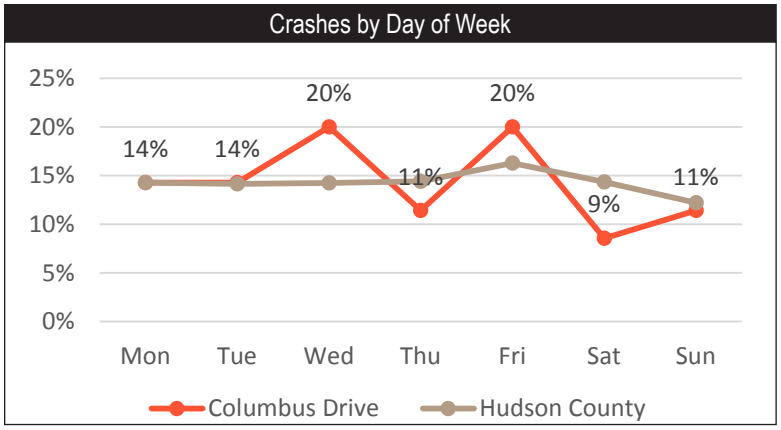


Figure 27 – Day of Week (2010–2012)

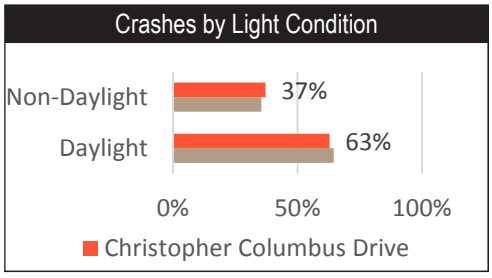


Figure 28 – Light Condition (2010–2012)

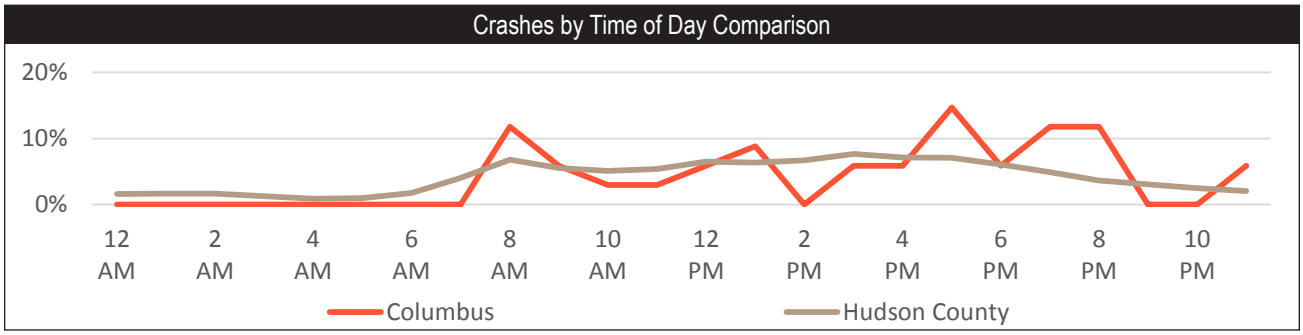


Figure 29 – Time of Day (2010–2012)

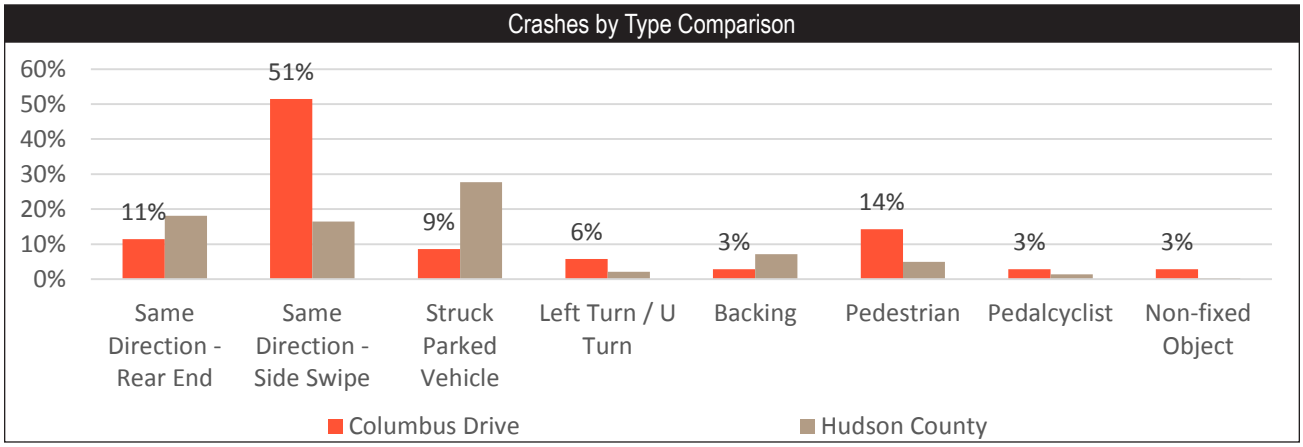


Figure 30 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

3.3 Bay Street and Marin Boulevard

Average crashes per year: 4.3

Crashes increased over the three-year study period. Compared with the rest of the RSA area, crashes on Thursday and Friday occurred more frequently. The overrepresentation of non-daylight crashes may indicate that there is a lighting issue. Crash times were consistently highest from 7:00 p.m.–10:00 p.m.

Two crashes resulted in moderate injury, one of which was a right angle crash and the other a rear-end crash. Right angle crashes were overrepresented, accounting for nearly a quarter of the RSA right-angle crashes. All eight right angle crashes occurred between a westbound vehicle and a southbound vehicle.

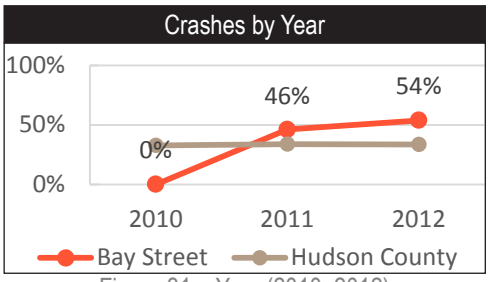


Figure 31 – Year (2010–2012)

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Moderate Injury	-	2
Pain	1	-
PDO	-	10
Total	1	12

Figure 32 – Severity (2010–2012)

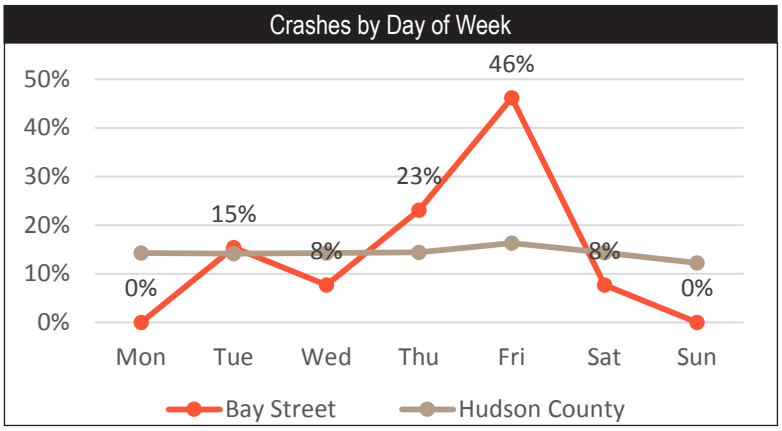


Figure 33 – Day of Week (2010–2012)

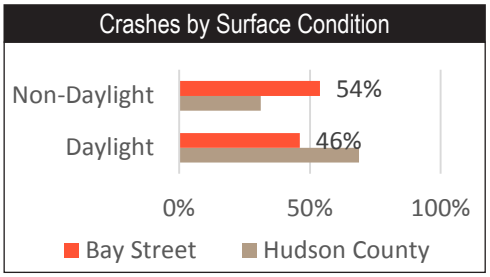


Figure 34 – Surface Condition (2010–2012)

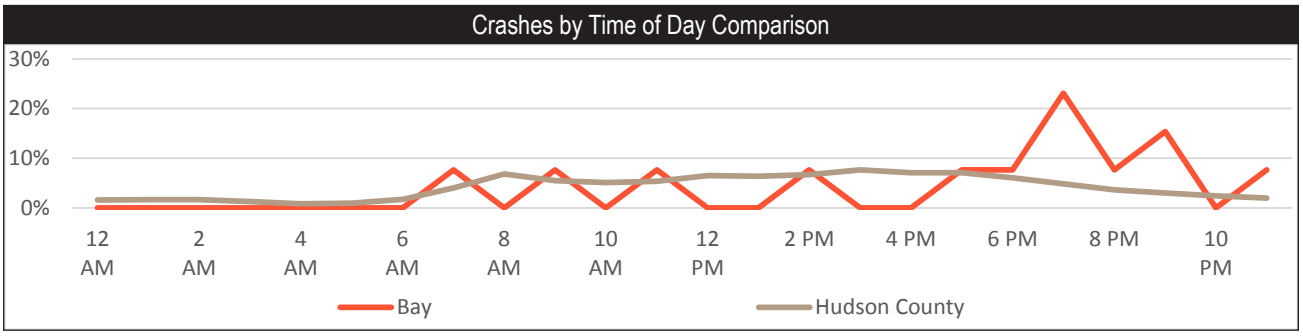


Figure 35 – Time of Day (2010–2012)

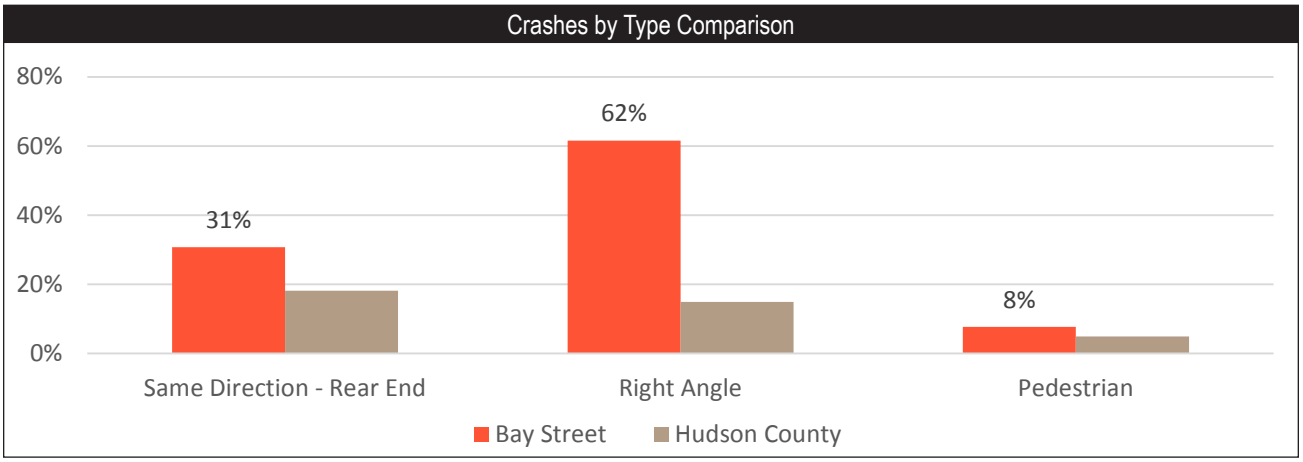


Figure 36 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

3.4 First Street and Marin Boulevard

Average crashes per year: 3.3

First Street experienced the lowest number of crashes in the RSA area—ten crashes over the three year study period, which makes it difficult to identify significant trends. Analysis reveals that crashes increased over the three year study period, and crashes by day of week occurred exclusively Friday to Monday.

Crashes occurring on wet roadway surfaces were proportionally overrepresented, as were crashes occurring from noon–2:00 p.m., and 3:00 p.m.–4:00 p.m.

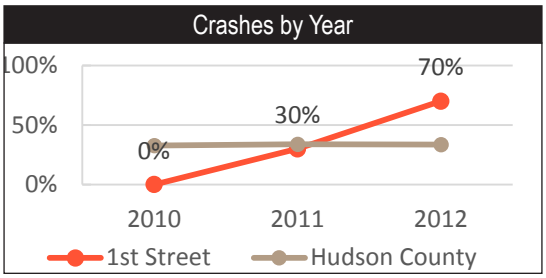


Figure 37 – Year (2010–2012)

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Moderate Injury	-	1
Pain	1	-
PDO	-	8
Total	1	9

Figure 38 – Severity (2010–2012)

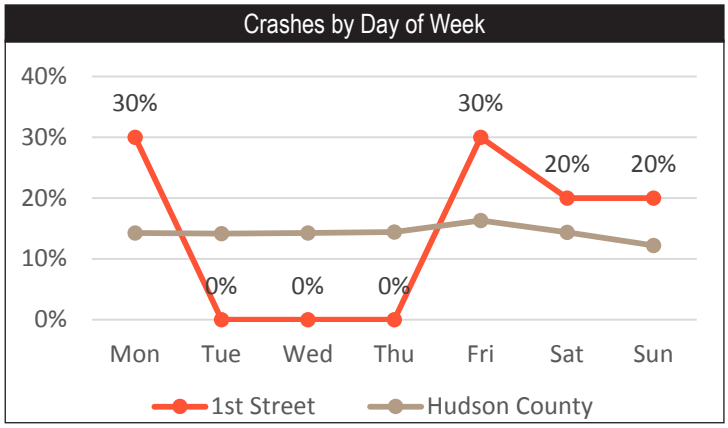


Figure 39 – Day of Week (2010–2012)

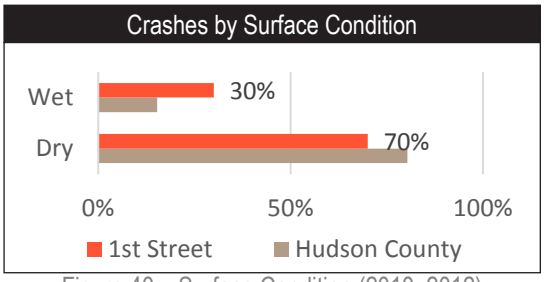


Figure 40 – Surface Condition (2010–2012)

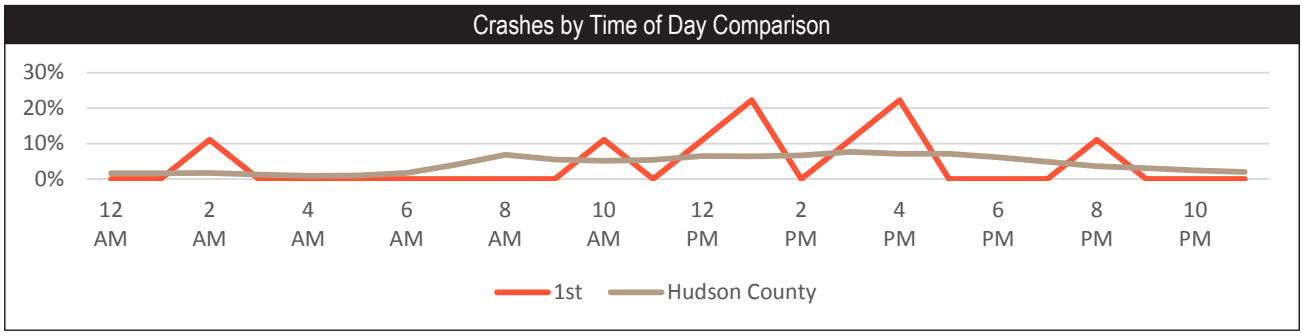


Figure 41 – Time of Day (2010–2012)

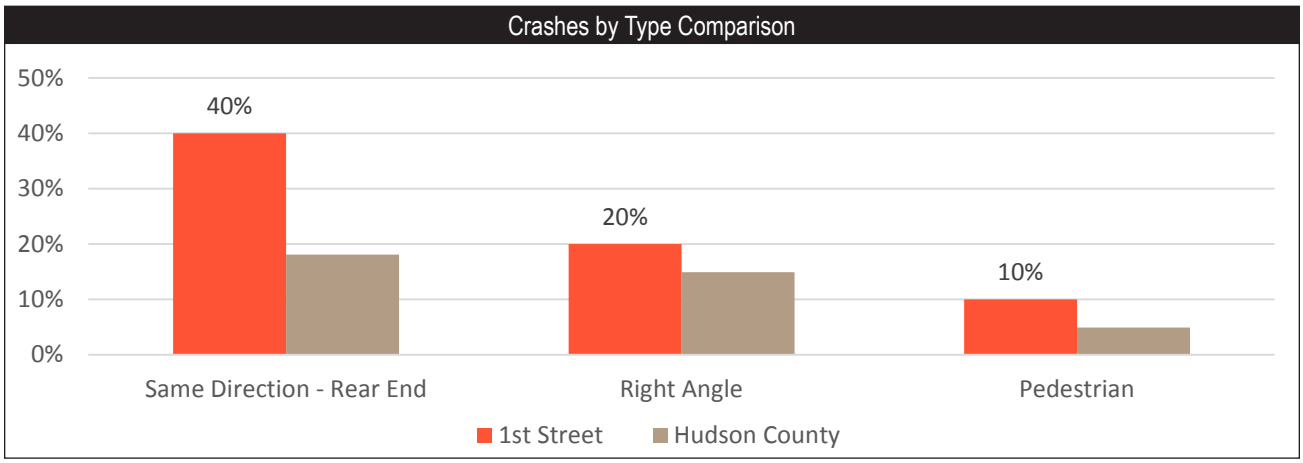


Figure 42 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

3.5 Second Street and Marin Boulevard

Average crashes per year: 7.7

Crashes by year did not deviate significantly from the total RSA area crash trends. Crashes were over-represented on weekends and from 4:00 p.m.–6:00 p.m.

Crashes occurred comparatively more during wet roadway conditions and during non-daylight hours, indicating a possible lighting issue.

Right angle crashes at Second Street accounted for nearly half of all RSA crashes. Seven of the 17 right-angle crashes resulted in complaints of pain.

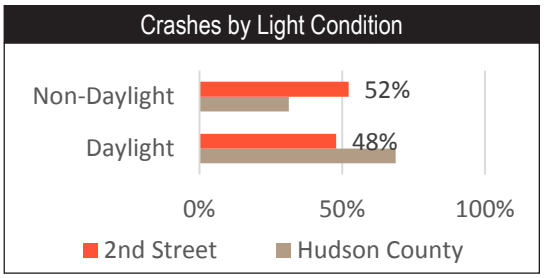


Figure 43 – Light Condition (2010–2012)

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Pain	-	9
PDO	-	14
Total	0	23

Figure 44 – Severity (2010–2012)

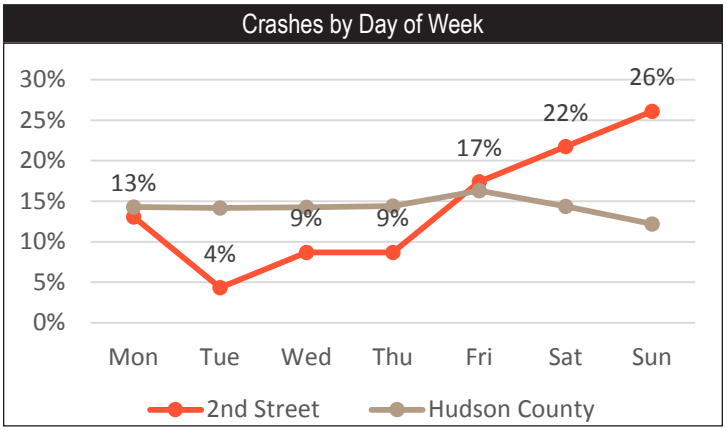


Figure 45 – Day of Week (2010–2012)

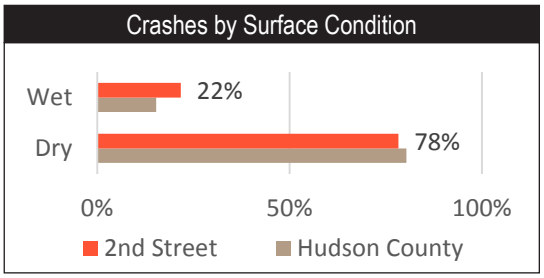


Figure 46 – Surface Condition (2010–2012)

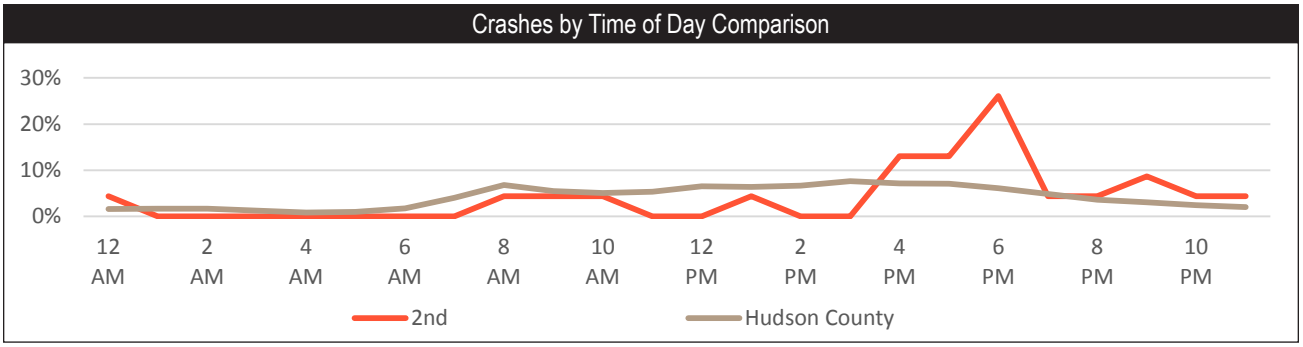


Figure 47 – Time of Day (2010–2012)

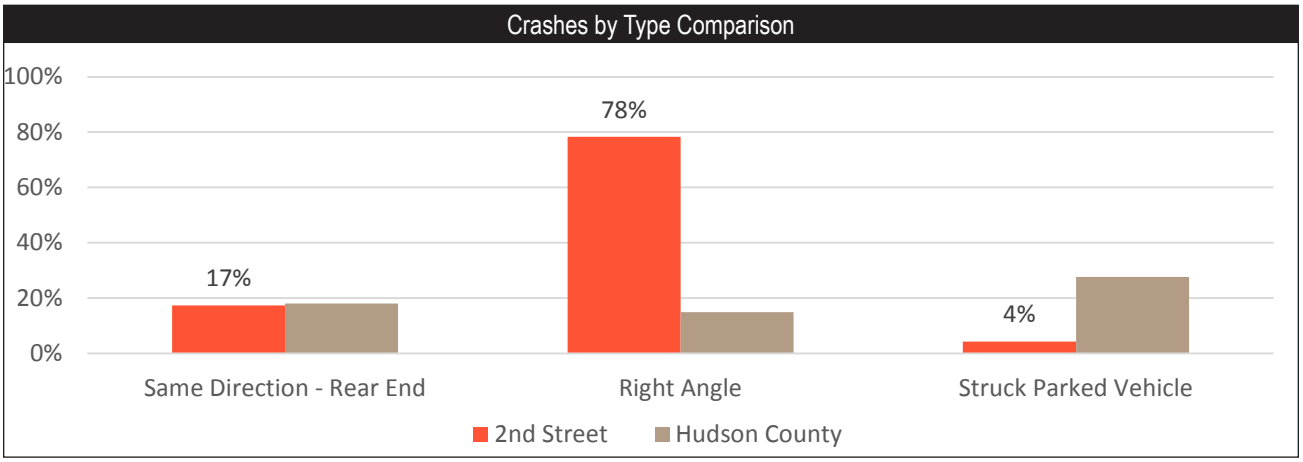


Figure 48 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

3.6 Sixth Street/Thomas Gangemi Drive and Marin Boulevard

Average crashes per year: 12.3

Sixth Street/Thomas Gangemi Drive had the highest volume of crashes in the RSA area, though the incidence of crashes slightly decreased over the three year study period. Crashes were overrepresented on Tuesdays and Saturdays, and during mid-day hours (9:00 a.m.–2:00 p.m.).

Wet roadways and non-daylight conditions were not overrepresented in the crash data.

There was one moderate injury crash (a cyclist crash) and twelve crashes that resulted in complaints of pain (two pedestrian crashes, five left-turn crashes, four right angle crashes, and one rear-end crash). Left-turn crashes were significantly overrepresented, accounting for 62 percent of all RSA area crashes.

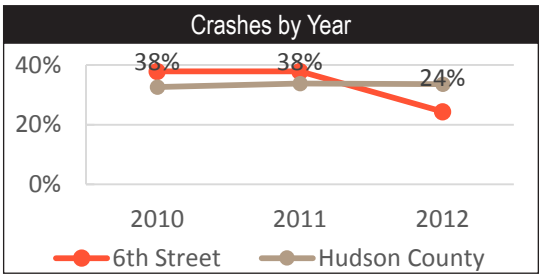


Figure 49 – Year (2010–2012)

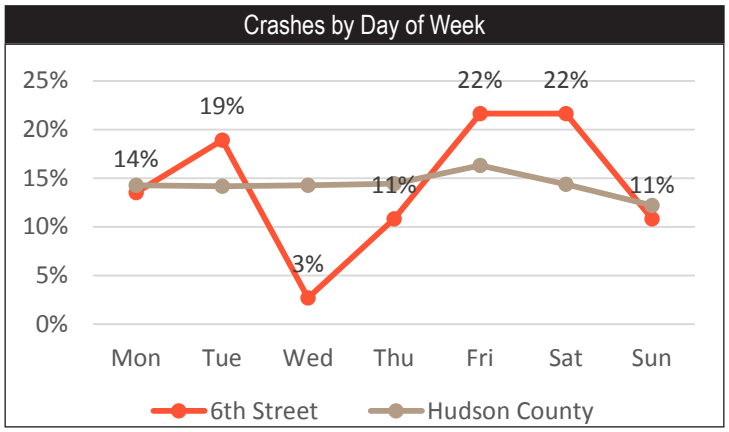


Figure 50 – Day of Week (2010–2012)

Severity	Pedestrian/ Cyclist Crash	Other Crashes
Moderate Injury	1	-
Pain	2	10
PDO	-	24
Total	3	34

Figure 51 – Severity (2010–2012)

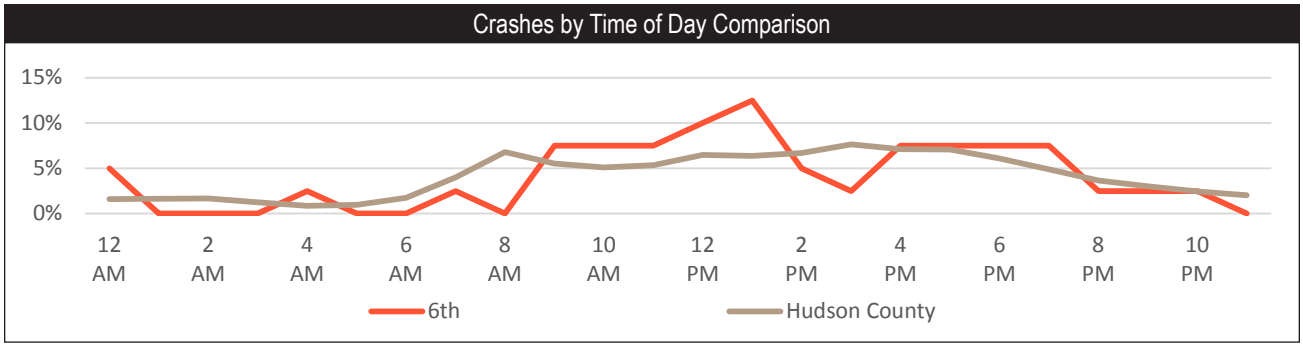


Figure 52 – Time of Day (2010–2012)

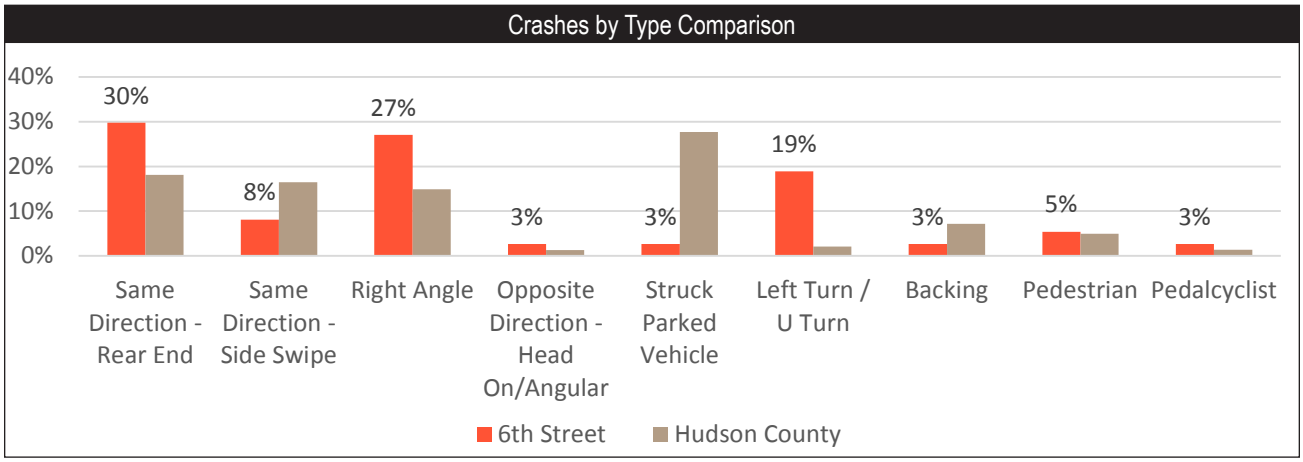


Figure 53 – Comparison of Intersection With Hudson County Municipal and County Roads (2010–2012)

>> 4.0 Identified Issues

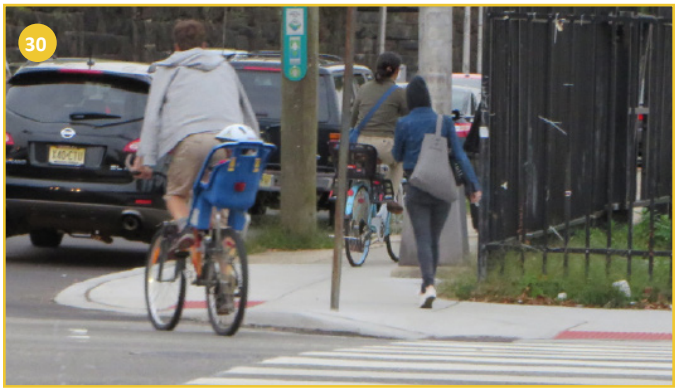
Ref #	Issues	Marin (Corridor)	Montgomery Street	Columbus Drive	Bay Street	First Street	Second Street	Sixth Street
	Pedestrian Behavior & Facilities							
5	ADA non-compliant ramp					✔		
6	Lack of pedestrian-level lighting (though difficult to gauge since RSA occurred during daylight hours)	✔						
13	Significant pedestrian traffic		✔	✔				
	Intersection crossings							
1	Pedestrians were observed crossing against signal • At Columbus Drive, pedestrians crossed during green arrow phase, causing motorists to line up and get trapped in the intersection	✔						
42	Pedestrians not always utilizing push button to initiate phase	✔						
7	Long crossing distance, pedestrians observed being trapped in middle of street by median		✔					✔
8	Pedestrians crowd refuge island (pork chop island)			✔				
9	Pedestrians cross outside of crosswalk • At Columbus Drive, pedestrians cross outside of crosswalk at the southeast corner to refuge island	✔						
10	Crossing time not fully utilized • At Columbus Drive, east crosswalk has “dead time” (in which there is no direct vehicle-pedestrian conflict, but the pedestrian signal phase times out earlier than needed)			✔				
11	Push buttons are located too far from intersection and appeared to be underutilized							✔
	Sidewalk problems							
4	Prolonged sloping in sidewalks due to wide driveway entrances • Multiple wide driveway entrances at Montgomery Street, especially north of the intersection for the City Hall parking lots • One single long driveway entrance between Bay Street and First Street on west side to accommodate parking lot		✔		✔	✔		
12	Sidewalk is extremely narrow and does not comply with ADA regulations on west side of south leg							✔
	Maintenance							
14	Faded lane markings	✔						
17	Sign post damage • Faded signs and lack of retroreflectivity • Sign clutter	✔						
3	Sections of broken sidewalk	✔						
15	Many broken street lights	✔						
16	Missing or broken valve covers	✔						
18	Broken walk signal at southwest corner of First Street					✔		
41	Exposed wires near signal foundation on southeast corner							
	Motorist Behavior & Operations							
19	Speeding • Especially along Columbus Drive • South of Sixth Street where wide four-lane cross-section may be conducive to speeding • Westbound vehicles turning right onto Marin Boulevard from Montgomery Street take turn too quickly or pass using wide, right-turn lane	✔						

Ref #	Issues	Marin (Corridor)	Montgomery Street	Columbus Drive	Bay Street	First Street	Second Street	Sixth Street
20	Pedestrian/vehicle turning conflicts • Motorists do not make complete stops at the right-turn slip ramp—in one crash at this location, two pedestrians were struck at Sixth Street • Crash history of left-turning vehicles striking pedestrians in the crosswalk at Montgomery Street and Columbus Drive	✔	✔	✔				✔
24	Vehicles parked illegally too close to intersections	✔						
28	Aggressive driving patterns • Motorists were observed to run red lights at Sixth Street • Motorists were observed to jump the left-turn at southbound Sixth Street • A motorist was observed to make an illegal u-turn at the east leg at Sixth Street • Aggressive passing between Sixth Street and Second Street with reintroduced lane		✔	✔				✔
	Operations							
21	East-west movements at unsignalized intersections tended to have high crash volumes (especially right-angle crash history at Bay and Second Streets), possibly due to lack of sight distance or lack of traffic gaps	✔			✔		✔	
27	Only one through lane at Sixth Street southbound but two receiving lanes, which merge at 2nd Street. The re-introduction of another lane south of Sixth Street creates another merge conflict.						✔	✔
	Inappropriate lane use							
25	Motorists illegally utilize left-turn bus lane at Columbus Drive and right-turn bus lane			✔				
26	Motorists were observed to use left-turn lane to travel straight • Northbound lane at Columbus Drive • Southbound at 6th Street			✔				✔
	Bicycle Accommodations							
29	No bicycle accommodations, except for bike lanes on Montgomery Street that terminate at Marin Boulevard	✔						
30	Missing links in bike network	✔						
31	Possible cyclist conflict with westbound right-turning vehicles		✔					
	Transit Accommodations							
32	Poorly defined bus stops	✔						
33	Lack of bus shelters, additional benches, other necessary amenities	✔						
	Other							
34	Street sign names are difficult to see	✔						
35	Missing one-way sign				✔			
36	General lack of street amenities to indicate pedestrian-friendly space						✔	✔
	Geometry							
37	Stop bar located at driveway entrance on north leg		✔					
38	Wide lanes and wide cross section • Westbound curbside of west leg of Columbus Drive was also noted to be utilized for illegal parking • Outer lanes from Second Street to Sixth Street were also noted to be significantly wider than inner lanes		✔					✔
39	Intersection curb lines do not align, contributing to irregularly shaped approaches and crosswalks		✔					✔
40	Negative offset for left turns corresponds with a history of left-turn crashes		✔					✔

Visualizing Corridor Issues

Note that numbers in circles refer to numbered issues on the previous two pages.

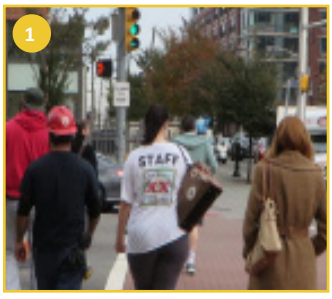
Lack of Cycling Facilities



Lack of safe cycling facilities for individual adult cyclists and children mounted onto the back of adult bikes. Cyclists choose to either travel on the edge of the travel lane (often with inadequate space) or use the sidewalks for riding.

Pedestrian Behavior and Facilities

Few pedestrian-level lighting fixtures (left); pedestrian desire lines not reflected in straight, point-to-point crosswalk placement (right)



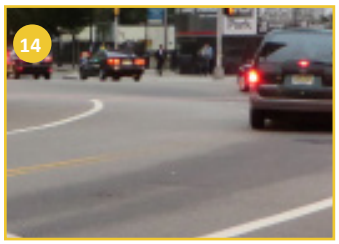
Pedestrians crossing against signals (left), broken sidewalks (right)

Maintenance

Broken sidewalks (left), faded signs (right)

Exposed wires at Sixth Street (left), valves missing covers at Sixth Street (right)

Sign clutter (left) and seemingly broken street lights (right). The merit of installing breakaway posts was also discussed.



Faded pavement markings

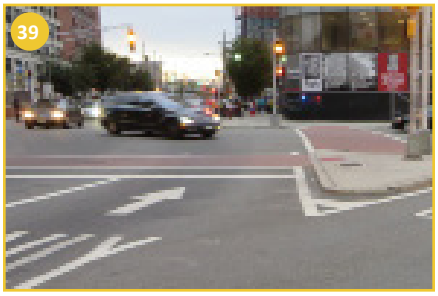
Transit Accommodations

Bus stop facilities do not accommodate high user demand, as evidenced by lack of seating near bus stops and lack of shelters.

Roadway Geometry

Wide lanes are often associated with speeding and aggressive driving (above and left)

Many intersection curb lines do not align (right)



Motorist Behavior and Operations

Heavy traffic during evening peak hours (above)

Motorists not stopping for pedestrians in crossing (left)

Uneven sidewalks at driveway entrances

Westbound bicycle lane approach for straight-through movement conflicts with right-turning vehicles

24 Illegally parked vehicles too close to the intersection

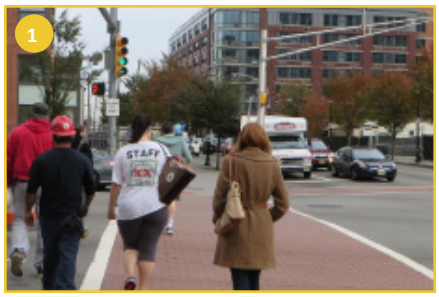
20 Stop bar located in driveway entrance

39 Curbs on the north side of the intersection do not align, creating a longer crosswalk and "dead" street space (hatched area between through and right turn lane on Montgomery Street westbound)

20 History of left-turn crashes striking pedestrians in crosswalk

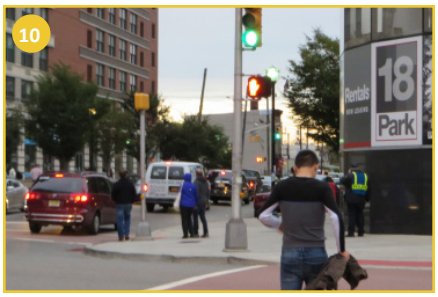
7 Long crossing distance with short crossing time. Pedestrians observed to begin crossing only to become stranded and exposed on median

38



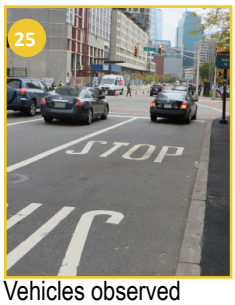
Pedestrians crossing against the signal when vehicles have a lead-left, causing left-turning traffic to back up into the intersection. Crossing distance in the crosswalk (90 feet) is the longest of the legs.

Aggressive driving where car blocks crosswalk. Cyclist using sidewalk facilities instead of on-street facilities

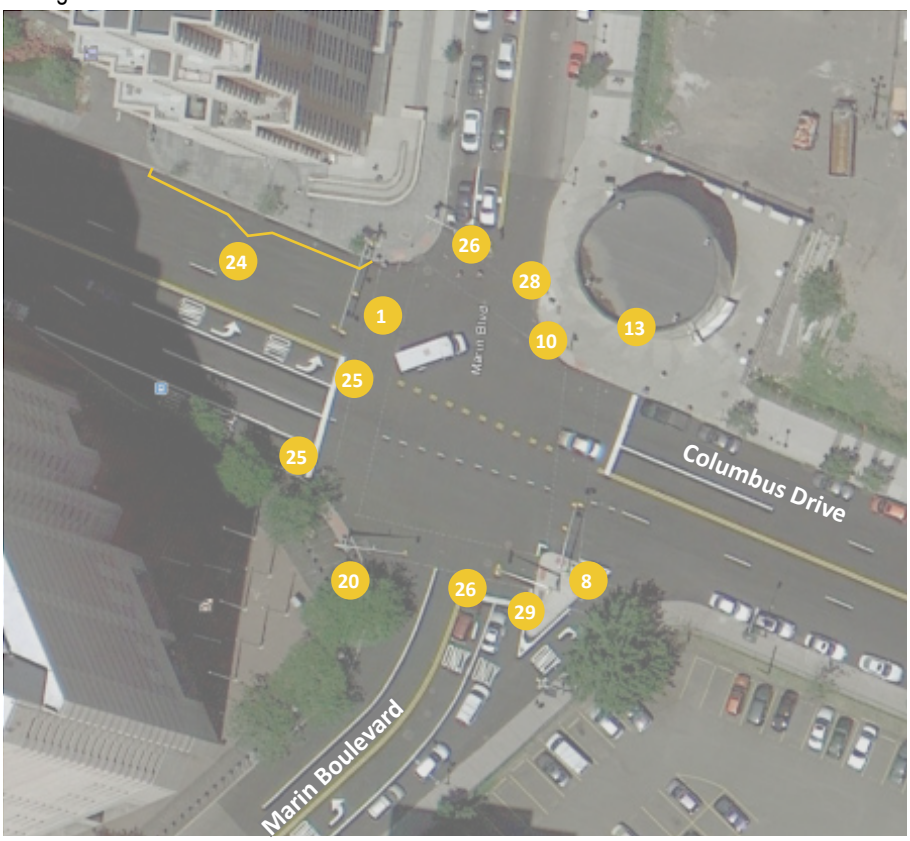


Pedestrian crossing with green ball during interval's "dead time"

24 Illegal parking



Vehicles observed using the bus stop lane as a right-turn lane



19 Speeding, especially along Columbus Drive

26 Vehicles observed utilizing both lanes (one of which is a dedicated left-turn lane) to travel southbound or northbound. There are two southbound receiving lanes.

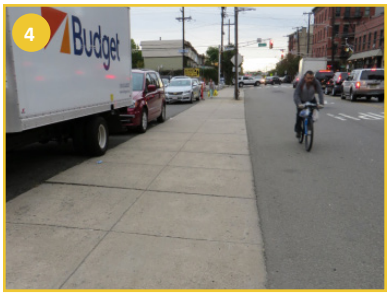
Bicyclists self-creating unmarked lane, in absence of designated facilities

Vehicles illegally entering bus-only left-turn lane

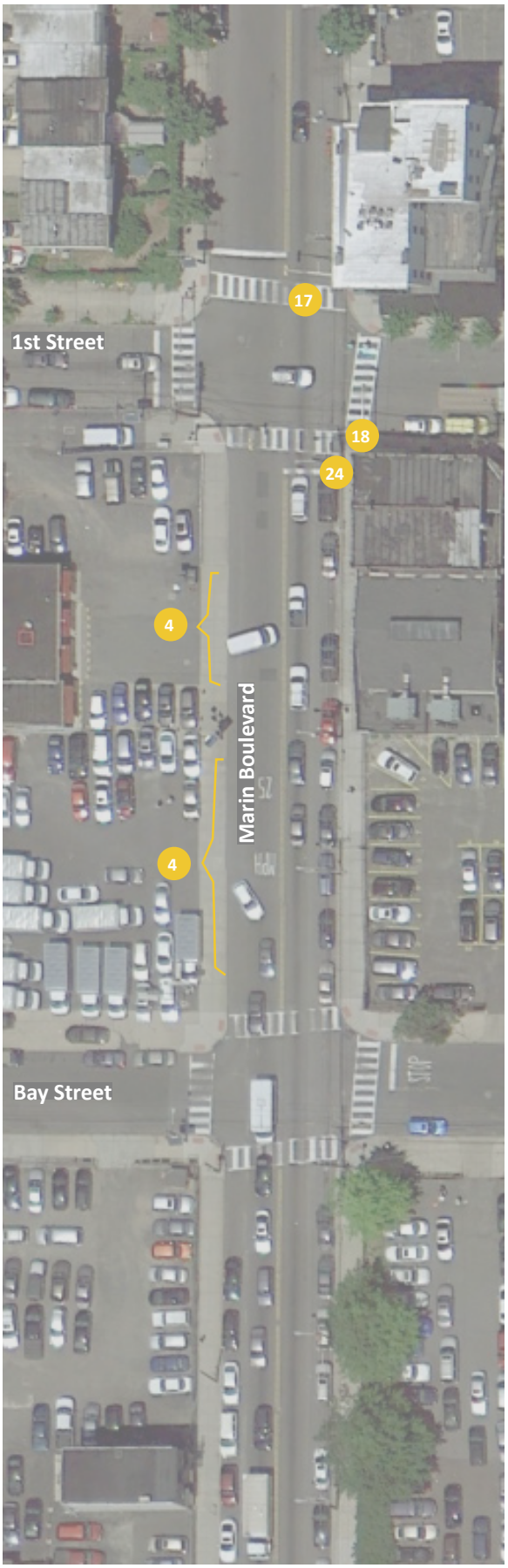
Pedestrian crossing outside of crosswalk nearly getting struck by vehicle making wide right turn at the southwest corner

High pedestrian volume near PATH station during a.m. and p.m. rush hours. RSA team described overcrowding on "pork chop" island.

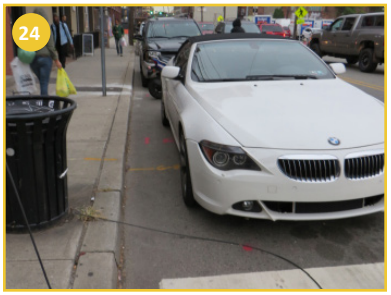
Faded signs



Two wide driveway entrances
(45-foot wide and 80-foot wide)

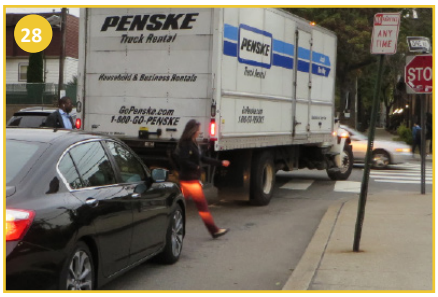


Nonfunctioning pedestrian walk signal

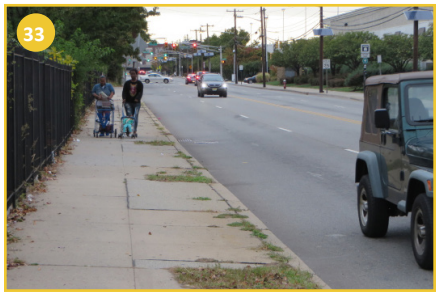


Cars parked too close to the
intersection, blocking sight triangles

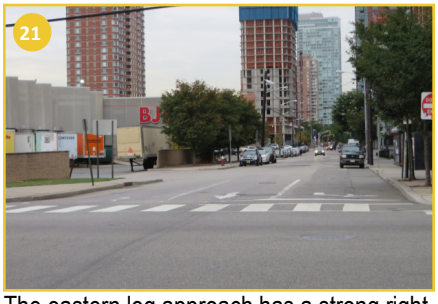
28 21 19 Speeding and aggressive passing behavior as vehicles approach Second Street, possibly contributing to the intersection's high right angle crash history



Vehicles blocking crosswalk



Lack of pedestrian amenities to separate sidewalk from fast-moving southbound traffic, creates a vehicle-oriented character rather than a pedestrian-oriented character



The eastern leg approach has a strong right angle crash history

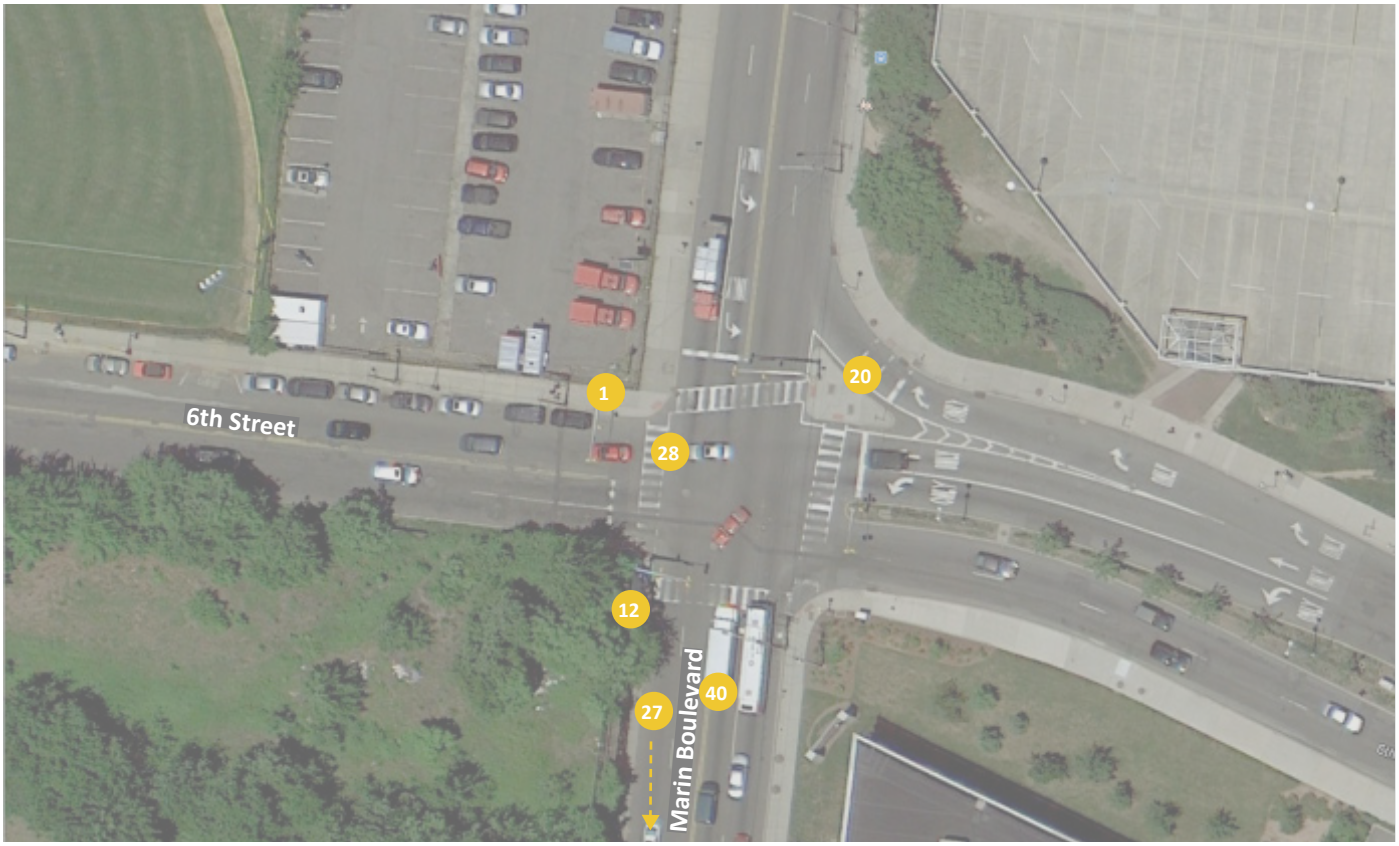
Identified Issues – Sixth Street/Thomas Gangemi Drive

Push buttons are located far from intersection, and appear to be underutilized

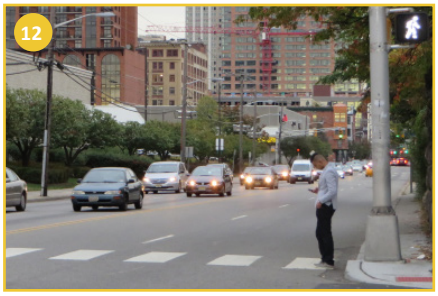
12 Missing or broken valve covers

27 Only one through lane at Sixth Street southbound, but two receiving lanes, which merge at Second Street intersection. The reintroduction of another lane south of Sixth Street creates another merge conflict.

Aggressive driving behavior, blocking intersection



Negative offsets on the northbound and southbound approaches may be the reason for the high frequency of left-turn crashes



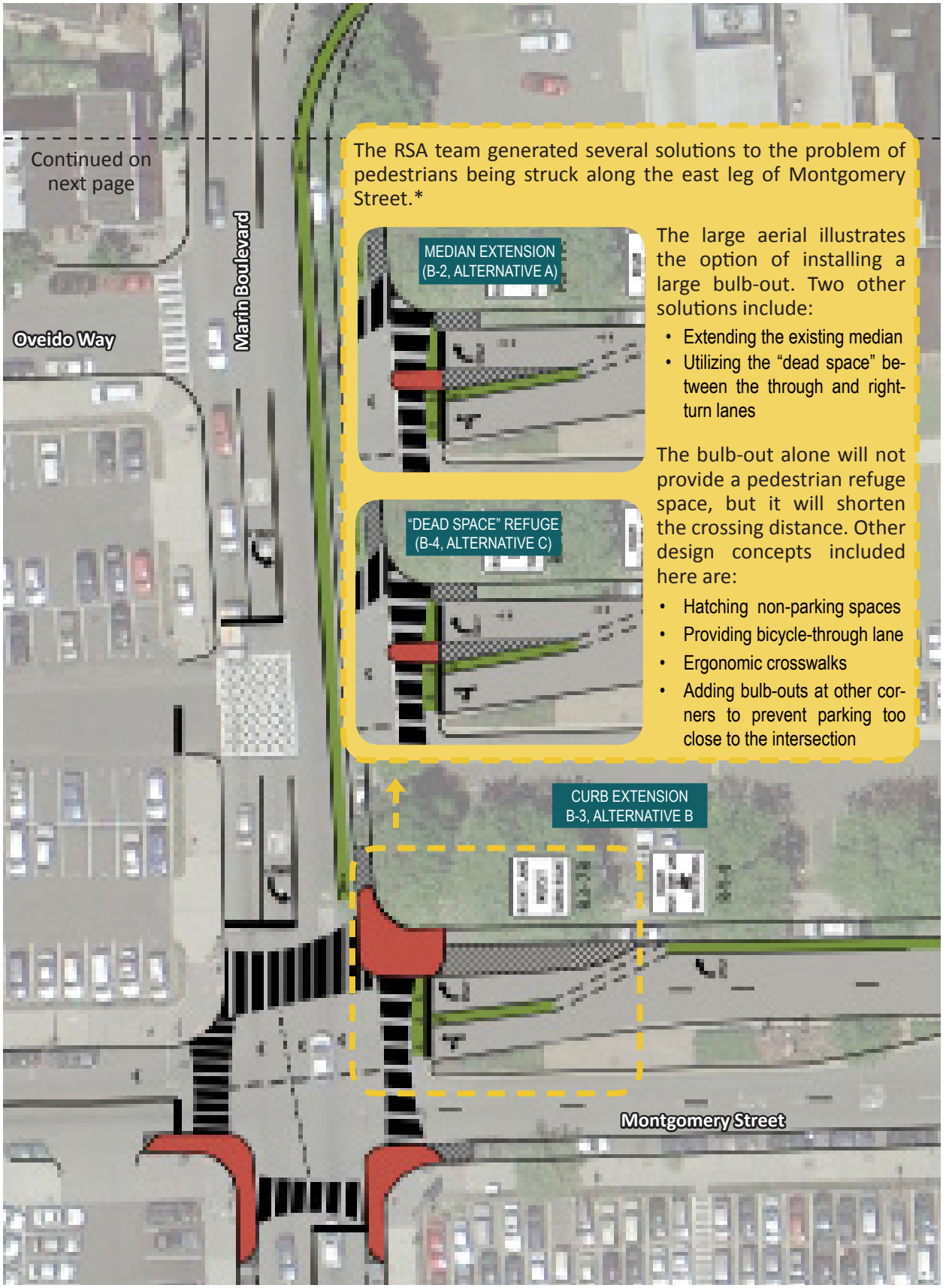
Narrow sidewalk

Turning conflicts with pedestrians at slip ramp

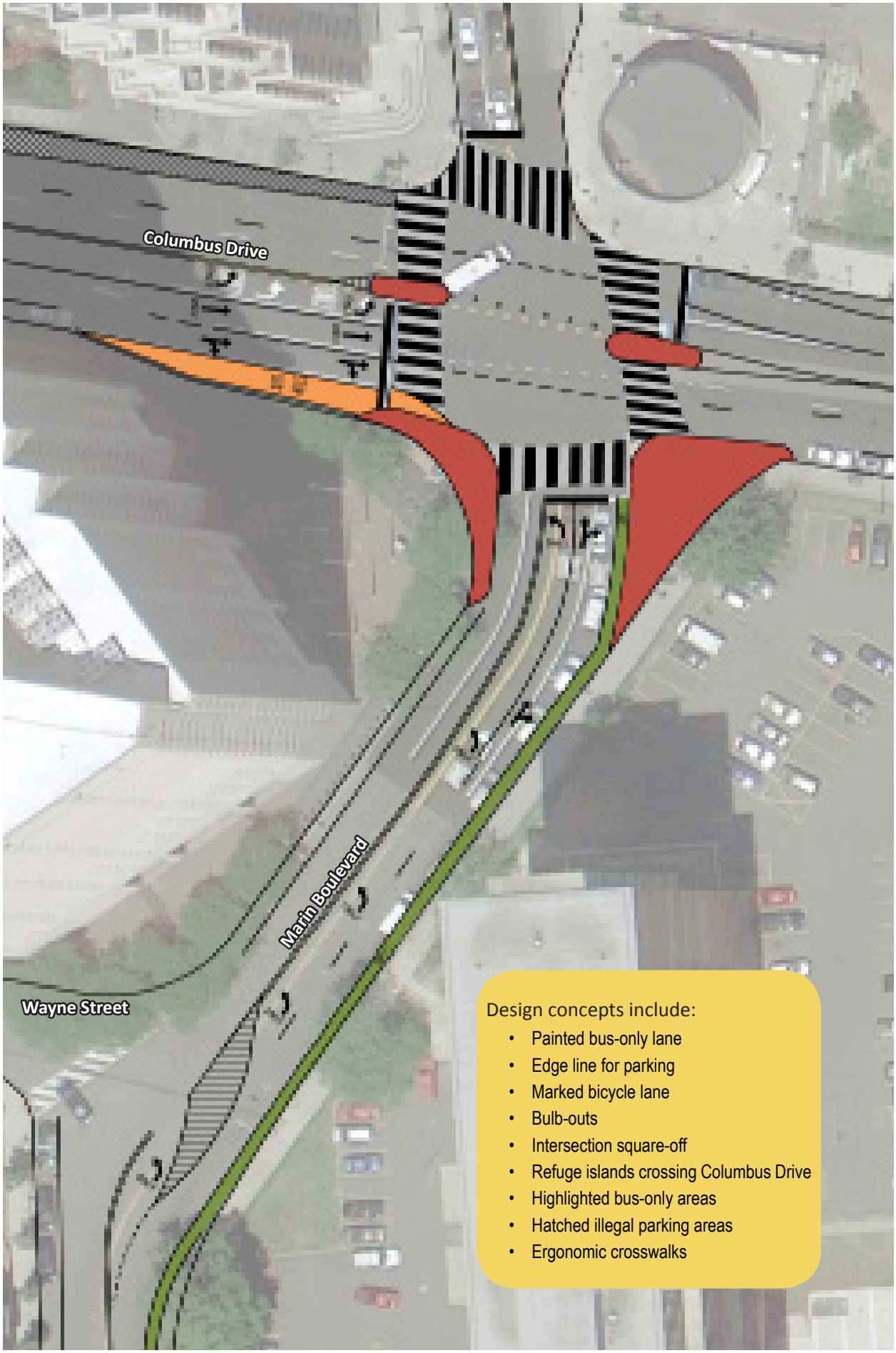
	Location	Safety Benefit	Jurisdiction	Time Frame	Cost	Issue Ref. #
	Marin Boulevard Corridor					
	Improve pedestrian and vehicle lighting					
A-1	Professional staff should conduct an engineering study of existing lighting conditions throughout the corridor to evaluate where both vehicle and pedestrian level lighting can be improved	Medium	Jersey City	Short	$	6, 15
	Repair broken/faded facilities					
A-2	Pavement markings and parking edge lines should be re-striped so they are clearly visible	High	Jersey City	Medium	$$	14
A-3	Replace broken valve covers	Low	Jersey City	Short	$	16
A-4	Narrow travel lanes by re-striping to create visual friction	Medium	Jersey City	Medium	$	19
A-5	Non-parking areas near intersections should be clearly marked with paint and hatching	Medium	Jersey City	Short	$	24
A-6	Consider installing ergonomic crosswalks at intersections that more accurately reflect pedestrian desire lines	Medium	Jersey City	Short	$	9
	Accommodate safer and more compliant pedestrian behavior					
A-7	Upgrade curb ramps to include truncated domes and ADA-compliant dimensions	Medium	Jersey City	Short	$$	5
A-8	Install and upgrade pedestrian push buttons with countdown signal	Medium	Jersey City	Short	$	1
A-9	Orient pedestrian push buttons to align with intersection and include an arrow to indicate crossing direction	Low	Jersey City	Short	$	1
A-10	Install automatic recall; or signage (instructional and hour) to press button	Medium	Jersey City	Short	$	1
A-11	Increase education and enforcement with Street Smart and pedestrian decoys	Medium	Jersey City	Medium	$$	28
A-12	Create pedestrian-only phase at peak pedestrian times and locations	High	Jersey City	Medium	$$	13, 8
A-13	Employ lead pedestrian intervals	Medium	Jersey City	Medium	$	20
A-14	Increase crosswalk width	Medium	Jersey City	Medium	$$	13, 8
A-15	Install pedestrian refuge islands or curb extensions, physical or painted	High	Jersey City	Medium/Long	$/$$$	7, 8, 13
	Accommodate safer cyclist behavior					
A-16	Consider the provision of shared lane markings or bicycle lanes to encourage on-street riding	Medium	Jersey City	Medium	$	29, 30
	Enforce appropriate roadway behavior					
A-17	Increase enforcement of reckless/aggressive driving	Medium	Jersey City Police Dept	Long	$$	28
A-18	Install radar speed sign with consideration for pedestrian clearance on sidewalk	High	Jersey City Police Dept	Long	$$	28
A-19	Increase enforcement of jaywalking and crossing against the signal	Medium	Jersey City Police Dept	Long	$$	1, 7, 9
	Improve directional signage					
A-20	Reorient and relocate signs so they are clearly visible	Low	Jersey City	Short	$	34
A-21	Upgrade to retroreflective signs	Medium	Jersey City	Short/ Medium	$$	17
A-22	Professional staff should conduct an engineering study of corridor signage	Short	Jersey City	Medium	$$	17
	Improve signals and intersection operations					
A-23	Upgrade 8" signal heads to 12" signal heads	Medium	Jersey City	Medium	$$	21
A-24	Install retroreflective backplates	Medium	Jersey City	Medium	$$	21
A-25	Professional staff should conduct an engineering study of signal phasing and traffic patterns to coordinate signal progression	Medium	Jersey City	Long	$$	21
A-26	Evaluate sight triangles	Medium	Jersey City	Short	$	40

	Location	Safety Benefit	Jurisdiction	Time Frame	Cost	Issue Ref. #
	Improve street amenities					
A-27	Install street furniture	Low	Jersey City	Short	$	36
A-28	Plant trees between curb and sidewalk as traffic calming measure	Low	Jersey City	Medium	$$	38, 36
A-29	Improve physical bus shelter structures and improve bus stop signage	Low	Jersey City	Medium	$$	33
	Montgomery Street					
	Accommodate safer and more compliant pedestrian behavior					
B-1	Convert existing spaces into pedestrian refuges:		Jersey City			
B-2	Alternative A: Extend concrete median to include pedestrian refuge island	Medium	Jersey City	Medium/Long	$$$	7
B-3	Alternative B: Extend north side curb line to straighten crosswalk	Medium	Jersey City	Medium/Long	$$/ $$$	9, 7
B-4	Alternative C: Install island in place of hatching	Medium	Jersey City	Medium/Long	$/$$	7
B-5	Narrow driveway entrances	Low	Jersey City	Short/Medium	$/$$	4, 3
B-6	Add truncated domes at driveway entrances	Low	Jersey City	Short	$	4,3
B-7	Install countdown timers at crosswalks	Medium	Jersey City	Short/Medium	$/$$	1, 13, 7
B-8	Align westbound through/left-turn lane with west curb lane by modifying median width	Medium	Jersey City	Long	$$$	39
B-9	Install painted bulb-outs with stanchions or flexible delineators	Medium	Jersey City	Short/Medium	$$	9, 7, 13
	Accommodate safer cyclist behavior					
B-10	Accommodate bikes to continue straight without right-turning vehicle conflict, possibly with painted lane	Medium	Jersey City	Medium	$	31
B-11	Provide connectivity to bicycle network, possibly with sharrows	High	Jersey City	Long	$$/ $$$	29, 30, 31
	Christopher Columbus Drive					
C-1	Increase clearance phase for vehicles	Low	Jersey City	Short	$$	?
	Adjust geometry for calmer traffic flow					
C-2	Align intersections by reconfiguring slip lane as squared off right turn lane	Medium/ High	Jersey City	Long	$$$	39
	Accommodate safer and more compliant pedestrian behavior					
C-3	Update pedestrian crossing time to maximum time allowed in cycle	High	Jersey City	Short	$	10, 13
C-4	Create pedestrian refuge islands on west and east sides by narrowing travel lanes	High	Jersey City	Medium/ Long	$$/ $$$	10, 13, 7, 38
	Clarify appropriate lane use					
C-5	Reduce curb radii at southwest corner, but remain compliant with bus turning	High	Jersey City	Medium	$$$	22
C-6	Paint colorized bus lanes	Low	Jersey City	Short	$$	25, 32
C-7	Direct vehicles into right lane south of Columbus Drive with signs and pavement markings to reserve left lane exclusively for left-turning vehicles	High	Jersey City	Short	$	26
C-8	Reduce lane width at northwest corner	High	Jersey City	Short	$	38
	Address speeding					
C-9	Raise intersection or install speed tables to alert drivers to pedestrian area	High	Jersey City	Long	$$$	19
	Bay Street					
D-1	Install countdown timers at crosswalks	Medium	Jersey City	Short	$$	2, 1
D-2	Conduct warrant analysis to potentially signalize intersection	High	Jersey City	Long	$$$	21
	First Street					
E-1	Stripe to delineate travel lane on approach to intersection along Marin Boulevard	Low	Jersey City	Short	$	4, 38
E-2	Approach property owner(s) to limit driveway widths, or review current width allowances	Low	Jersey City	Short	$	4

	Location	Safety Benefit	Jurisdiction	Time Frame	Cost	Issue Ref. #
E-3	Improve daylighting with stanchions	Medium	Jersey City	Short	$	24
E-4	Repair broken walk signal	High		Short	$$	18
	Second Street					
F-1	Create single southbound travel lane north of the intersection	Medium	Jersey City	Short	$	27, 38
F-2	Conduct warrant analysis to potentially signalize intersection	High	Jersey City	Long	$$$	19
	Sixth Street/Thomas Gangemi Drive					
G-1	Relocate curbside parking to accommodate shifted eastbound travel lane	Medium	Jersey City	Short	$	40
	Adjust geometry for calmer traffic flows					
G-2	Align intersections by reconfiguring slip lane as squared off right turn lane	High	Jersey City	Long	$$$	39
	Create safer facilities for left-turn movements					
G-3	Head to head left turns on north-south approaches	Low	Jersey City	Medium	$$	40
G-4	Head to head left turns on east-west approaches	High	Jersey City	Long	$$$	40
G-5	Shift center line and narrow lanes to allow for a wider sidewalk	Low	Jersey City	Short	$	40
G-6	Investigate permitted lead protected interval	Medium	Jersey City	Short	$	40, 28
	Reduce aggressive driving behaviors, including speeding					
G-7	Create single southbound lane south of intersection	High	Jersey City	Long	$$$	27, 38
G-8	Reconfigure lane widths	High	Jersey City	Long	$$$	38, 19
	Accommodate safer and more compliant pedestrian behavior					
G-9	Install automated pedestrian signals	High	Jersey City	Medium/ Short	$	11, 1
G-10	Introduce an all-pedestrian signal phase	Medium	Jersey City	Short	$	11, 1
G-11	Create pedestrian lead interval	High	Jersey City	Short	$	11, 1
G-12	Widen sidewalk on southwest corner to five feet	High	Jersey City	Medium	$$	12

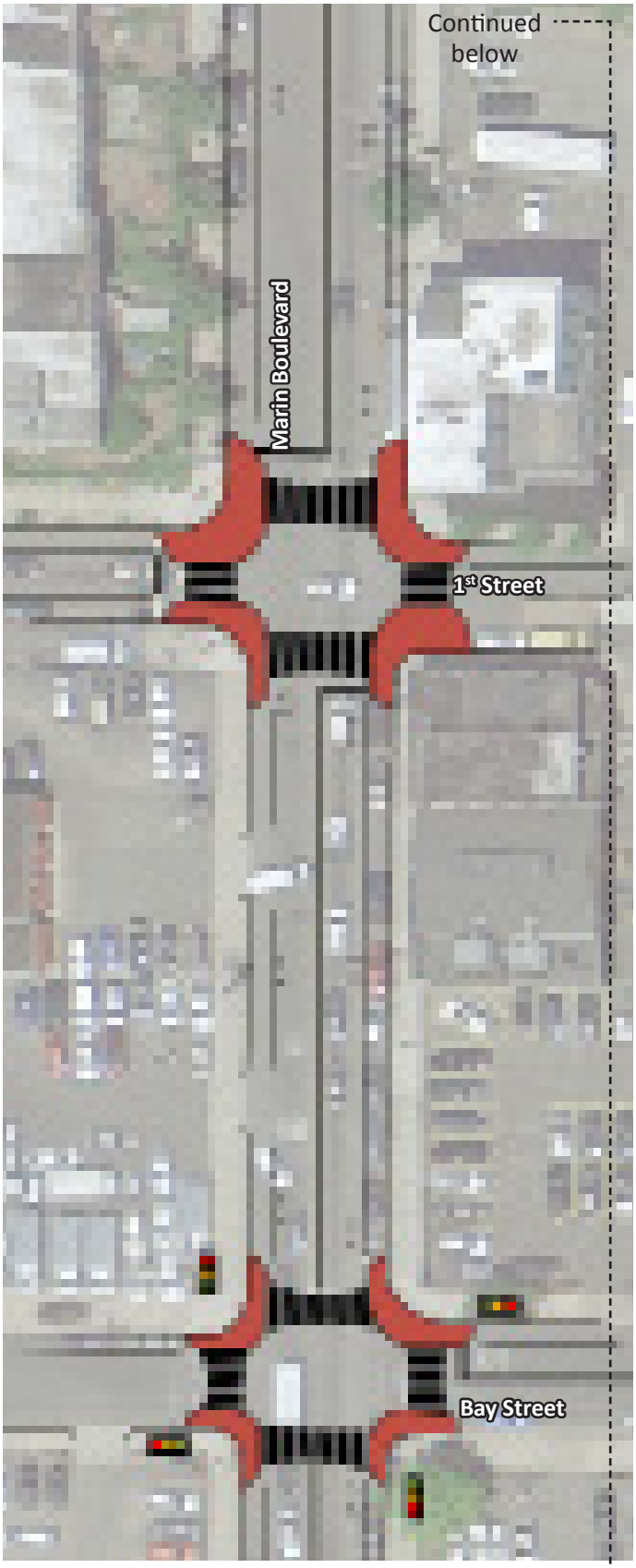


*Note that because this is an unusually shaped intersection where the curbs do not align, the east leg bike lane approach may necessitate a unique design; however, the design should still conform with the MUTCD manual. The green bike lanes and bike boxes are currently "experimental" designs. See link for more information: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/mutcd/



Design concepts include:

- Painted bus-only lane
- Edge line for parking
- Marked bicycle lane
- Bulb-outs
- Intersection square-off
- Refuge islands crossing Columbus Drive
- Highlighted bus-only areas
- Hatched illegal parking areas
- Ergonomic crosswalks

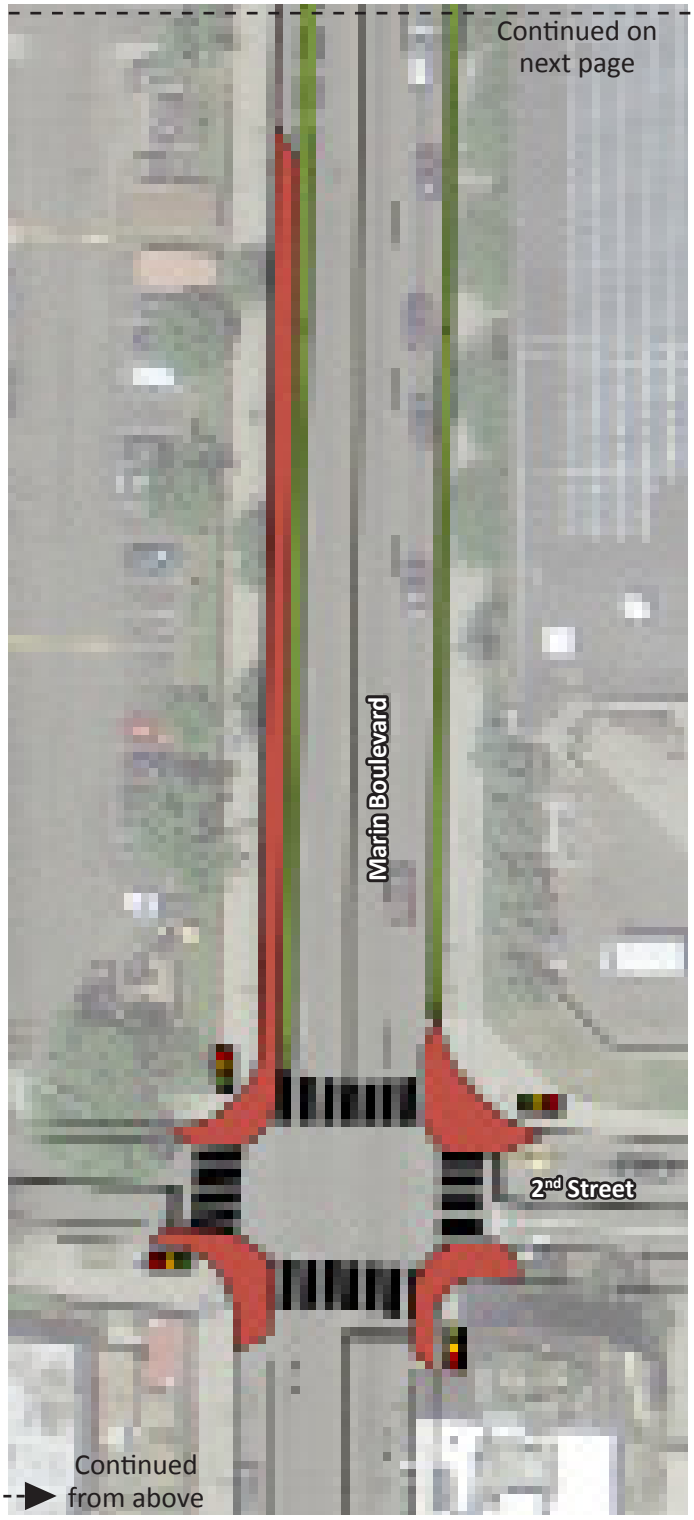


Recommendations between First Street and Bay Street include:

- Bulb-outs
- Striping edge line to designate parking areas
- Clear identification of where driveway access is permitted

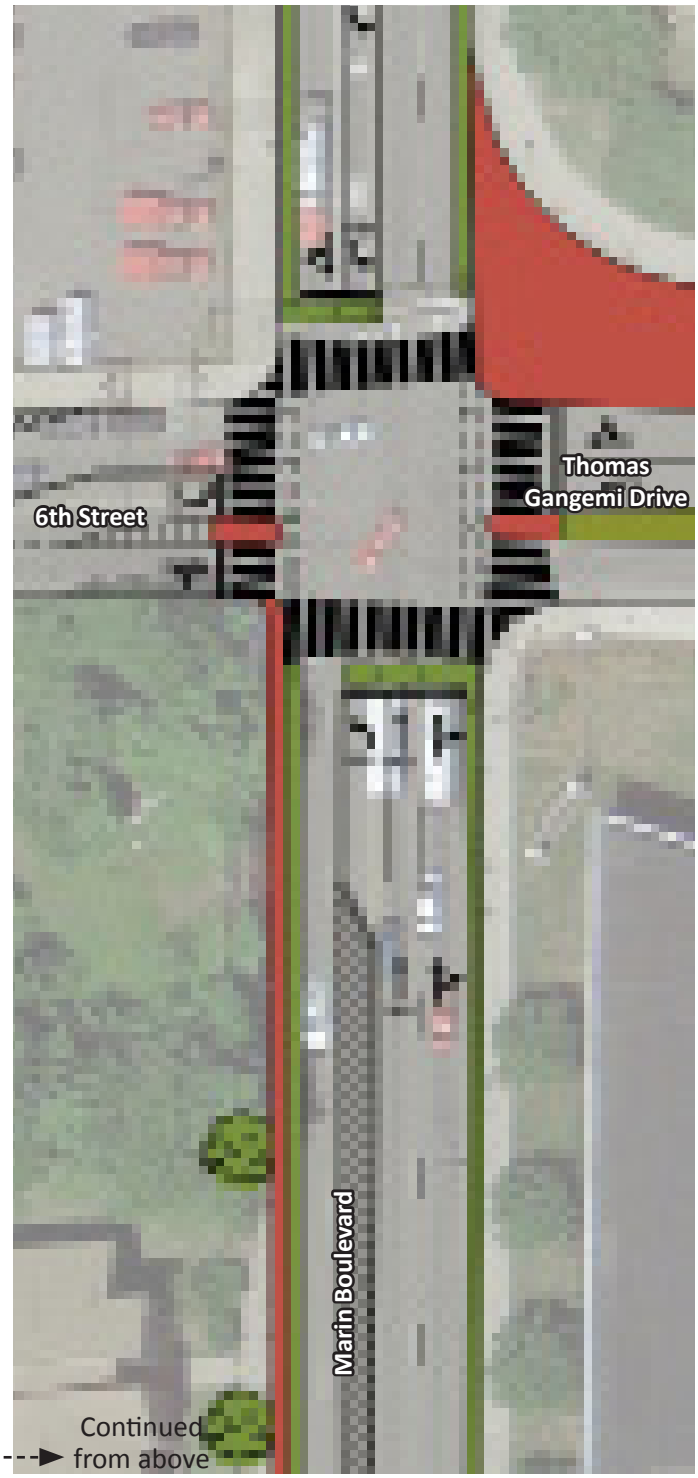
The Second Street intersection is already slated for redesign, but was still included in the RSA study. Along with the planned signalization, the RSA team's recommendations also include:

- Elimination of southbound travel lane along Marin Boulevard between Sixth Street and Second Street
- Bulb-outs where appropriate
- Pedestrian amenities
- Sidewalk extension
- Marked bike lane



The RSA team recommended corridor improvements between Sixth Street and Second Street. Design concepts along this segment include:

- Intersection square-off at Sixth Street intersection
- Sidewalk extension on west curb (south of Sixth Street)
- Elimination of one southbound travel lane along Marin Boulevard between Sixth Street and Second Street
- Median extension for refuge island
- Ergonomic crosswalks
- Marked bicycle lane
- Street amenities (such as trees, where sidewalk space permits)

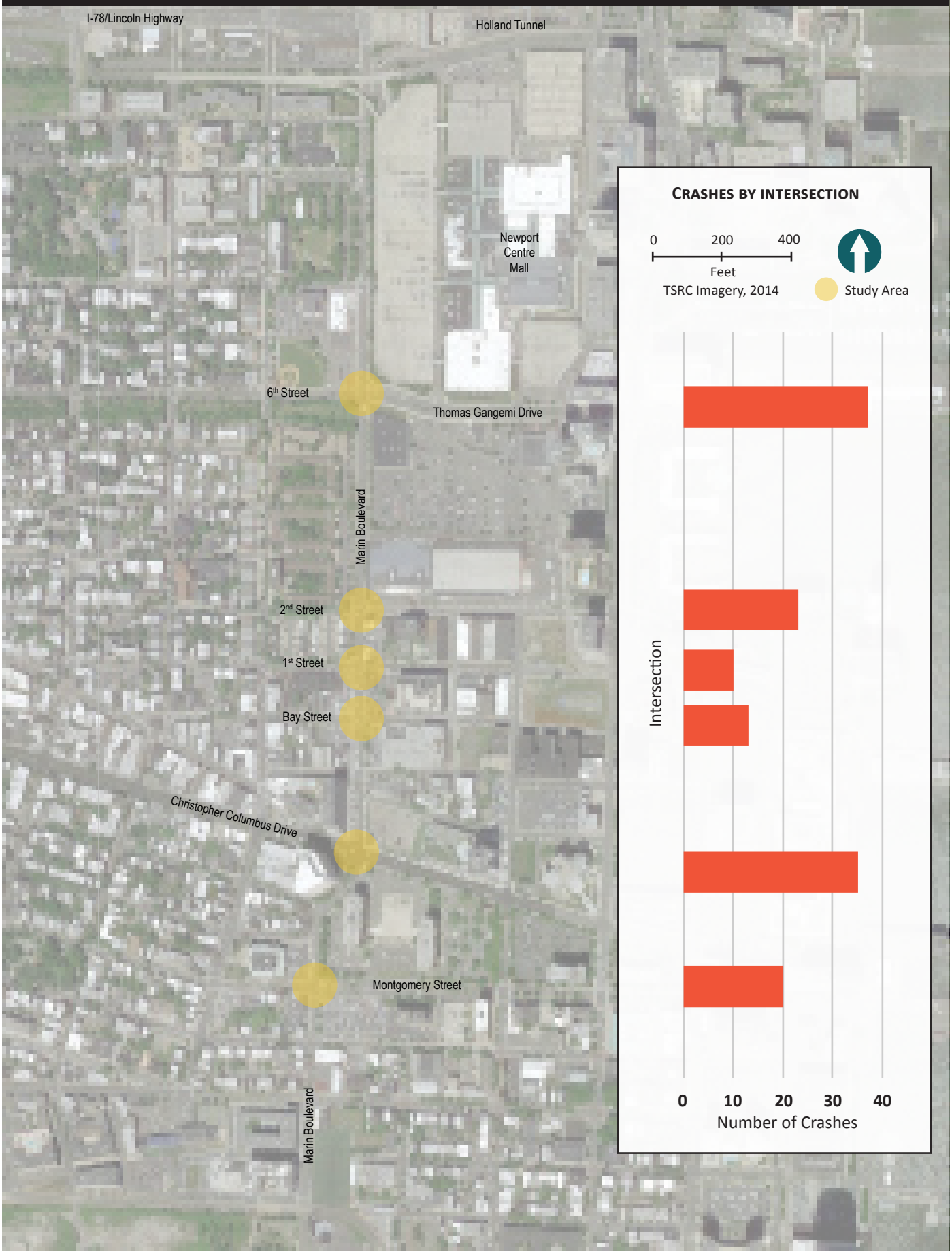


The photo simulation below illustrates many of the recommendations for the Sixth Street/Thomas Gangemi Drive intersection, including:

- Intersection square-off at Sixth Street intersection
- Sidewalk widening
- Elimination of one southbound travel lane along Marin Boulevard between Sixth Street and Second Street
- Median extension for refuge island
- Marked bicycle lane
- Shifted centerline for head-to-head left turns

>> 7.0 Crash Diagrams

7.1 RSA Corridor



RSA Corridor – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	32
Same Direction – Side Swipe	25
Right Angle	41
Opposite Direction – Head On/Angular	2
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	9
Left Turn / U-Turn	12
Backing	3
Encroachment	1
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	10
Pedalcyclist	2
Non-fixed Object	1
Rail Car–Vehicle	-
Other	-
Total	138

Month	#
January	14
February	6
March	10
April	18
May	6
June	15
July	11
August	7
September	17
October	9
November	13
December	12
Total	138

Severity	#
Property Damage Only (PDO)	101
Pain	32
Moderate Injury	5
Incapacitating Injury	-
Fatal	-
Total	138

Crash Year	#
2010	26
2011	55
2012	57
Total	138

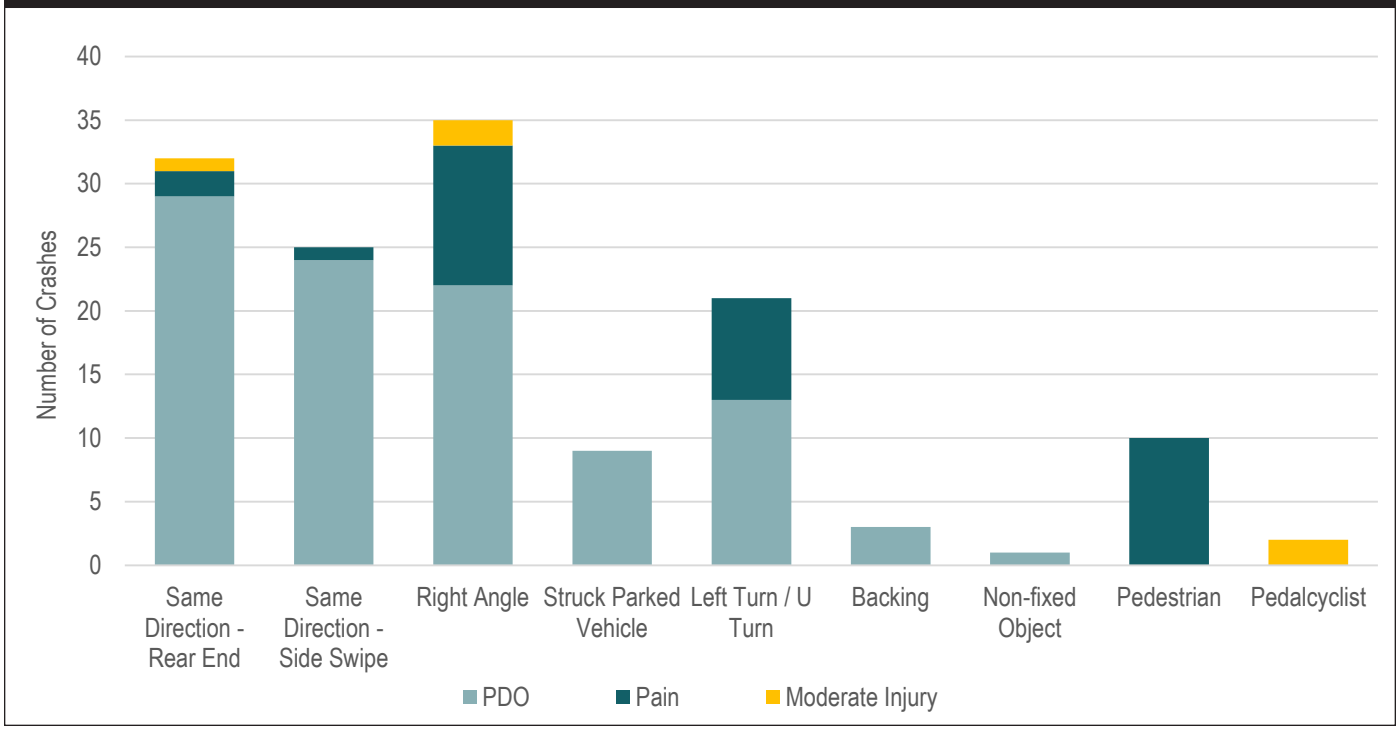
Intersection	#
At Intersection	108
Not at Intersection	30
At or Near Railroad	-
Total	138

Surface Condition	#
Dry	112
Wet	25
Snowy	1
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	138

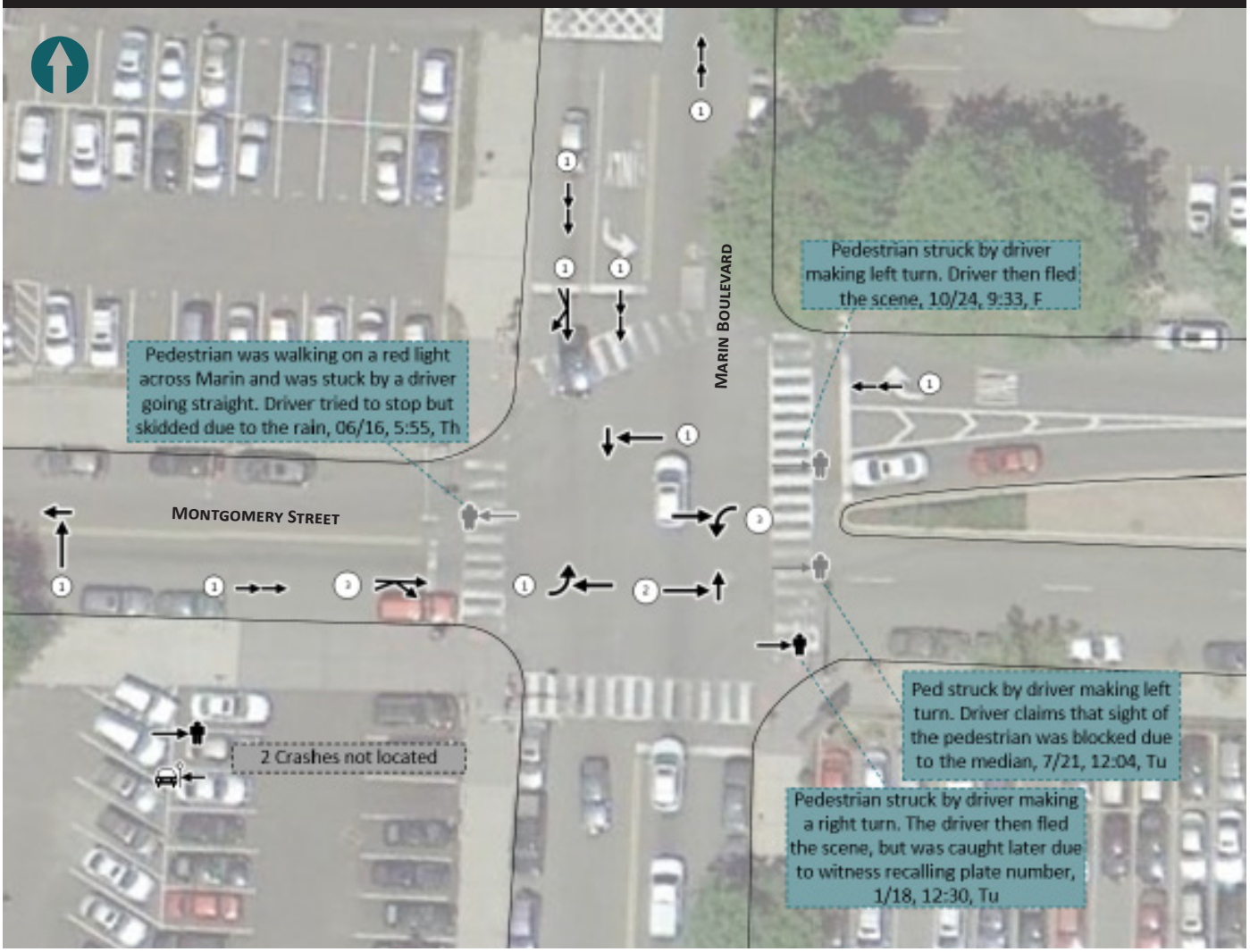
Light Condition	#
Daylight	89
Dawn	-
Dusk	2
Dark–No Street Lights	1
Dark–Street Lights On/Continuous	35
Dark–Street Lights On/Spot	7
Dark–Street Lights Off	3
Other	1
Total	138

Day	#
Monday	19
Tuesday	18
Wednesday	13
Thursday	16
Friday	34
Saturday	21
Sunday	17
Total	138

Crash Type and Severity



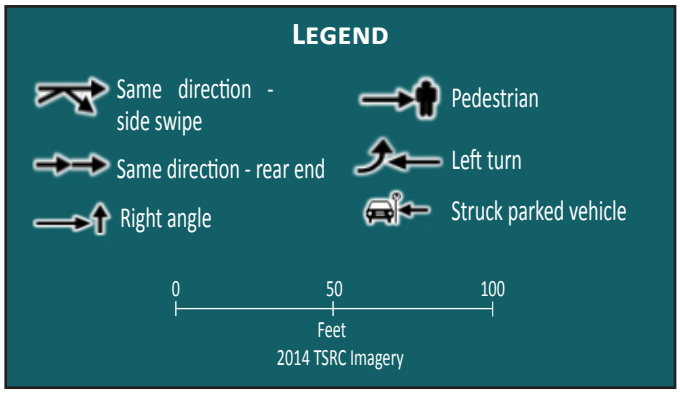
7.2 Montgomery Street and Marin Boulevard



All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color-coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

= Complaint of pain



Montgomery Street and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	5
Same Direction – Side Swipe	4
Right Angle	4
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	2
Left Turn / U-Turn	4
Backing	-
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	1
Pedalcyclist	-
Non-fixed Object	-
Rail Car–Vehicle	-
Other	-
Total	20

Month	#
January	4
February	1
March	3
April	3
May	-
June	1
July	3
August	-
September	-
October	2
November	2
December	1
Total	20

Severity	#
Property Damage Only (PDO)	16
Pain	4
Moderate Injury	-
Incapacitating Injury	-
Fatal	-
Total	20

Crash Year	#
2010	5
2011	10
2012	5
Total	20

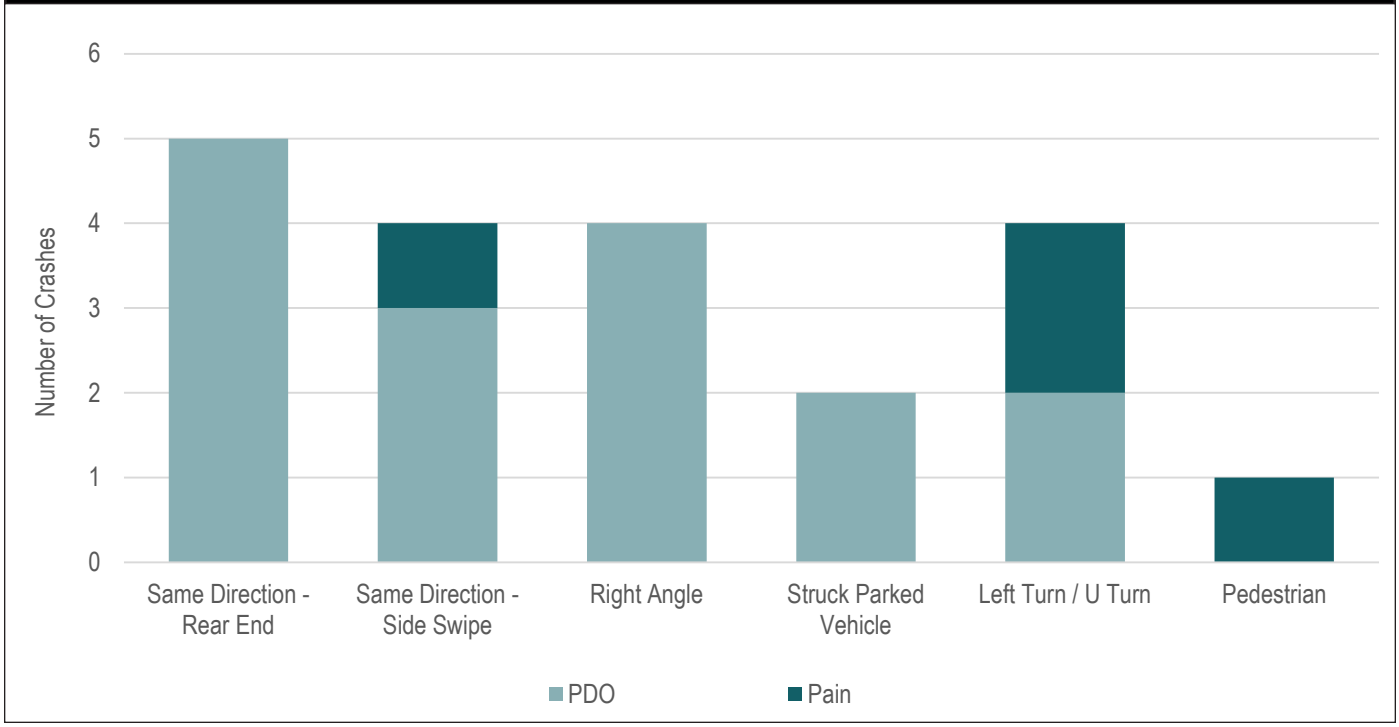
Intersection	#
At Intersection	15
Not at Intersection	5
At or Near Railroad	-
Total	20

Surface Condition	#
Dry	12
Wet	8
Snowy	-
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	20

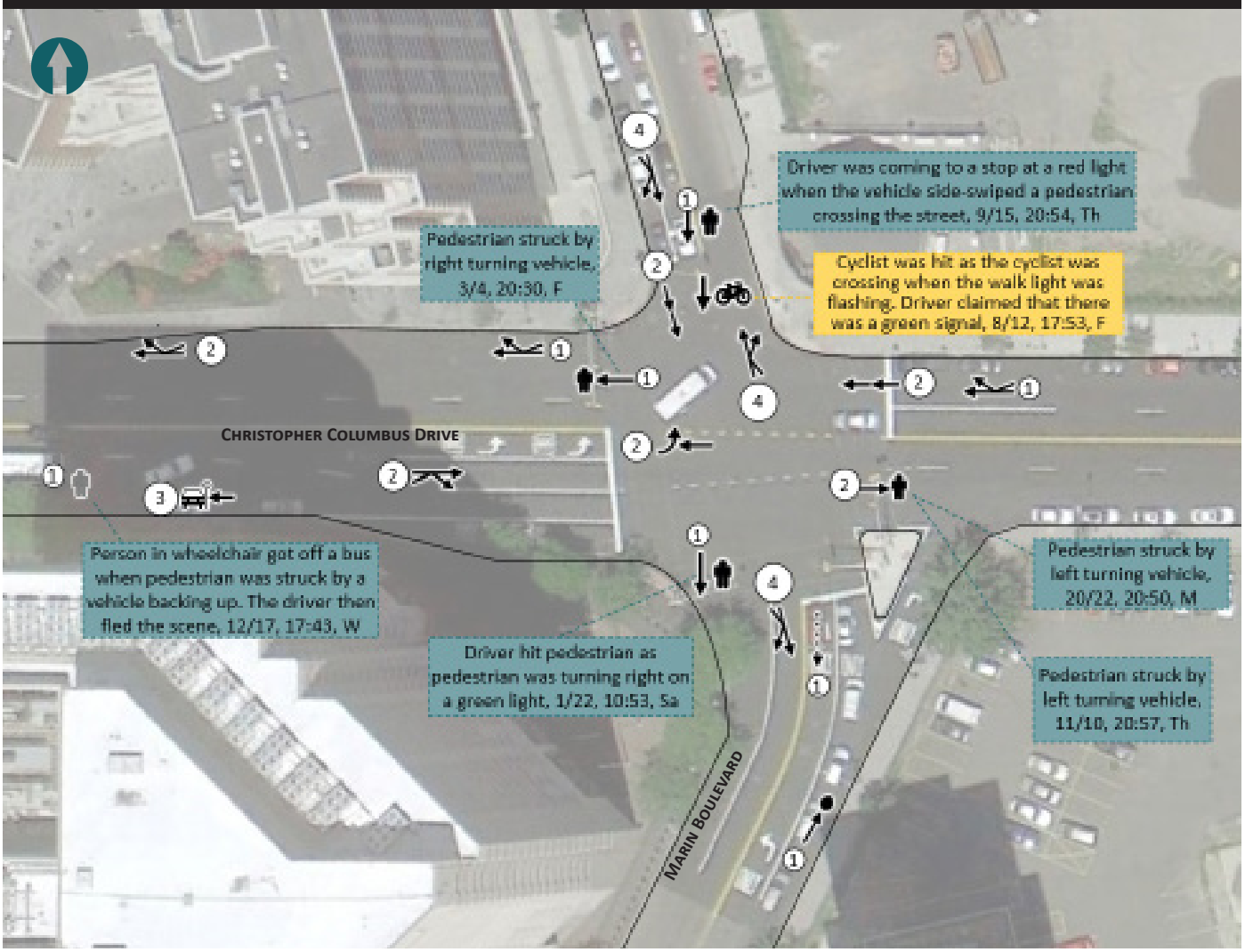
Light Condition	#
Daylight	16
Dawn	-
Dusk	2
Dark–No Street Lights	-
Dark–Street Lights On/Continuous	2
Dark–Street Lights On/Spot	-
Dark–Street Lights Off	-
Other	-
Total	20

Day	#
Monday	3
Tuesday	3
Wednesday	2
Thursday	3
Friday	6
Saturday	2
Sunday	1
Total	20

Crash Type and Severity



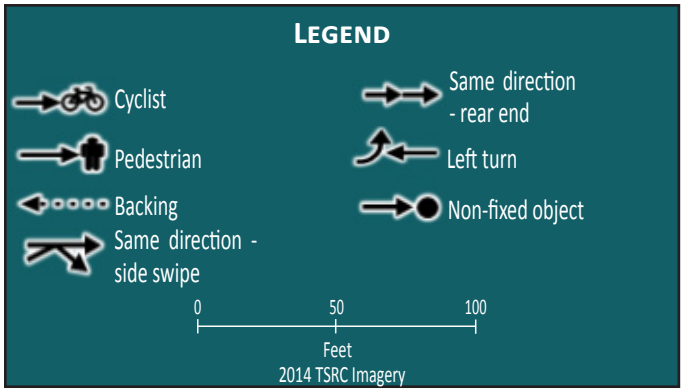
7.3 Christopher Columbus Drive and Marin Boulevard



All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

= Complaint of pain



Christopher Columbus Drive and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	4
Same Direction – Side Swipe	18
Right Angle	-
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	3
Left Turn / U-Turn	2
Backing	1
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	5
Pedalcyclist	1
Non-fixed Object	1
Rail Car–Vehicle	-
Other	-
Total	35

Month	#
January	2
February	1
March	1
April	5
May	2
June	7
July	3
August	2
September	3
October	2
November	3
December	4
Total	35

Severity	#
Property Damage Only (PDO)	29
Pain	5
Moderate Injury	1
Incapacitating Injury	
Fatal	
Total	35

Crash Year	#
2010	3
2011	12
2012	20
Total	35

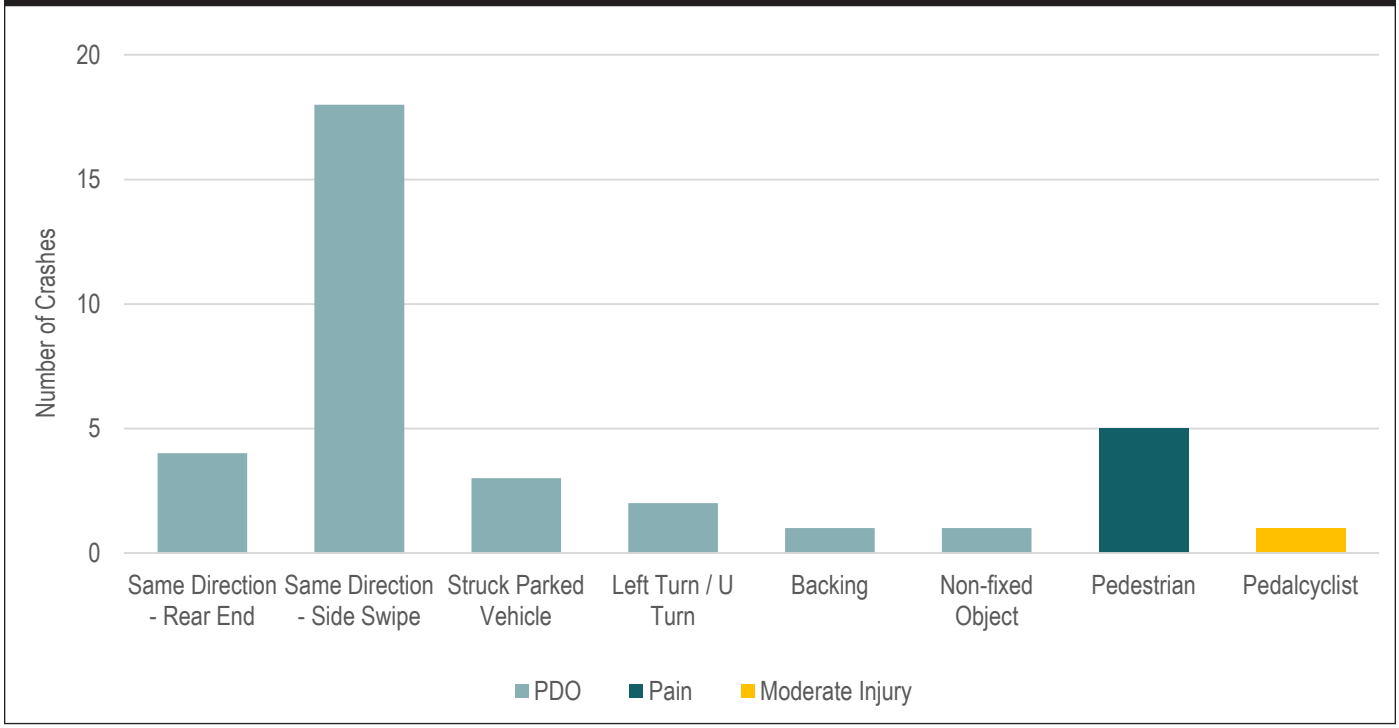
Intersection	#
At Intersection	36
Not at Intersection	9
At or Near Railroad	-
Total	35

Surface Condition	#
Dry	31
Wet	4
Snowy	-
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	35

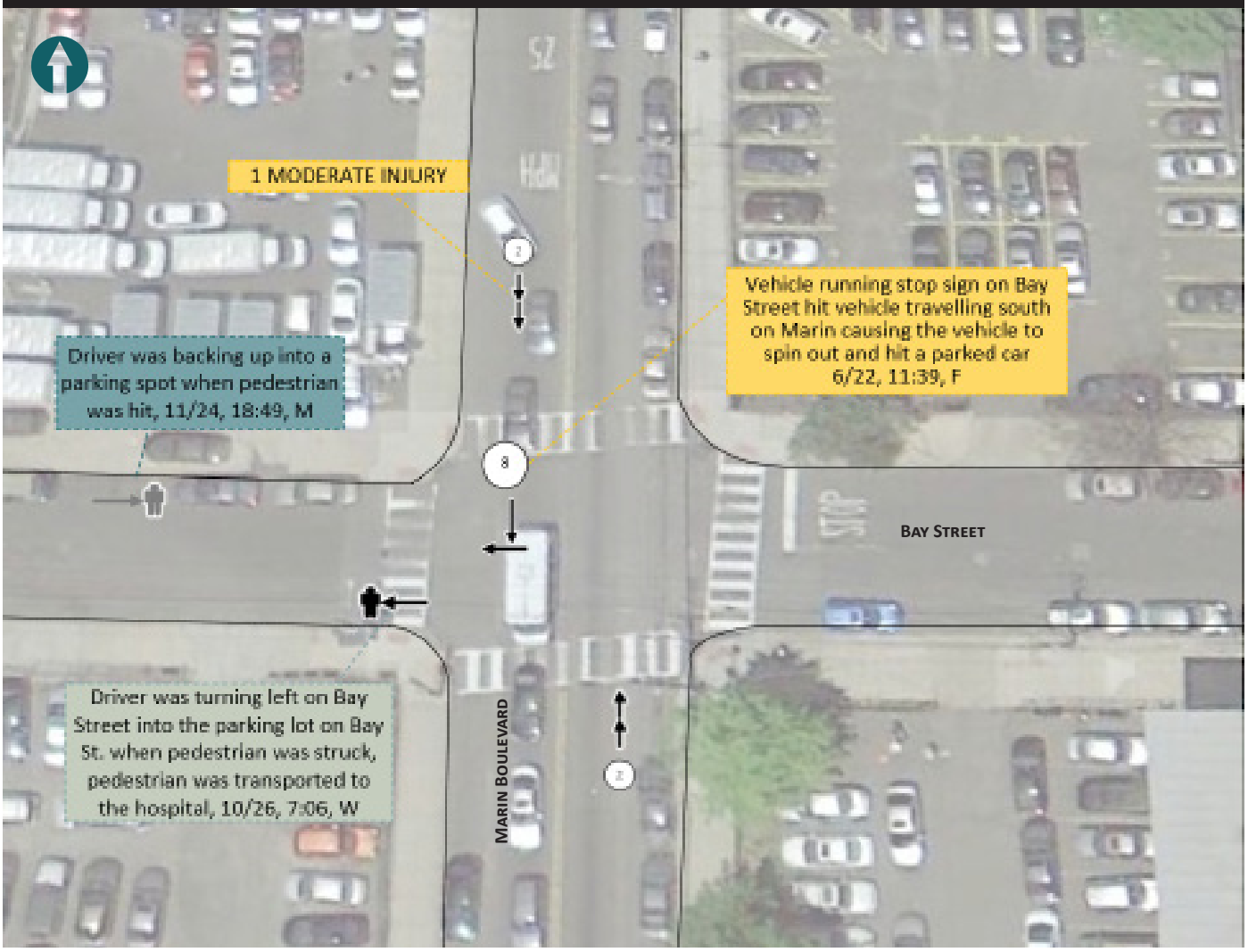
Light Condition	#
Daylight	22
Dawn	-
Dusk	-
Dark–No Street Lights	-
Dark–Street Lights On/Continuous	11
Dark–Street Lights On/Spot	-
Dark–Street Lights Off	1
Other	1
Total	35

Day	#
Monday	5
Tuesday	5
Wednesday	7
Thursday	4
Friday	7
Saturday	3
Sunday	4
Total	35

Crash Type and Severity



7.4 Bay Street and Marin Boulevard

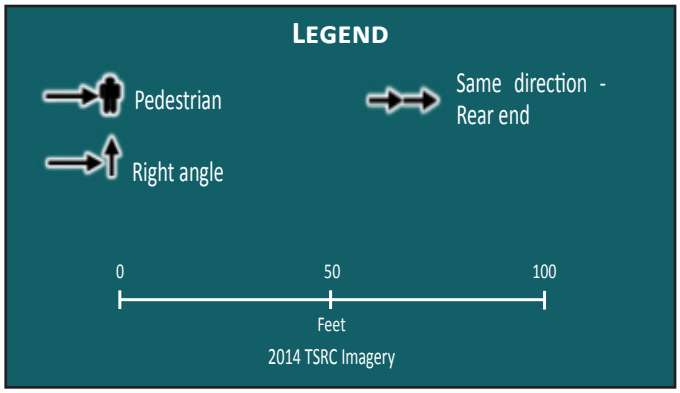


All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color-coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

= Complaint of pain

= Property Damage Only



Bay Street and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	4
Same Direction – Side Swipe	-
Right Angle	8
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	-
Left Turn / U-Turn	-
Backing	-
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	1
Pedalcyclist	-
Non-fixed Object	-
Rail Car–Vehicle	-
Other	-
Total	13

Month	#
January	2
February	-
March	2
April	3
May	-
June	1
July	-
August	-
September	1
October	3
November	1
December	-
Total	13

Severity	#
Property Damage Only (PDO)	10
Pain	1
Moderate Injury	2
Incapacitating Injury	-
Fatal	-
Total	13

Crash Year	#
2010	-
2011	6
2012	7
Total	13

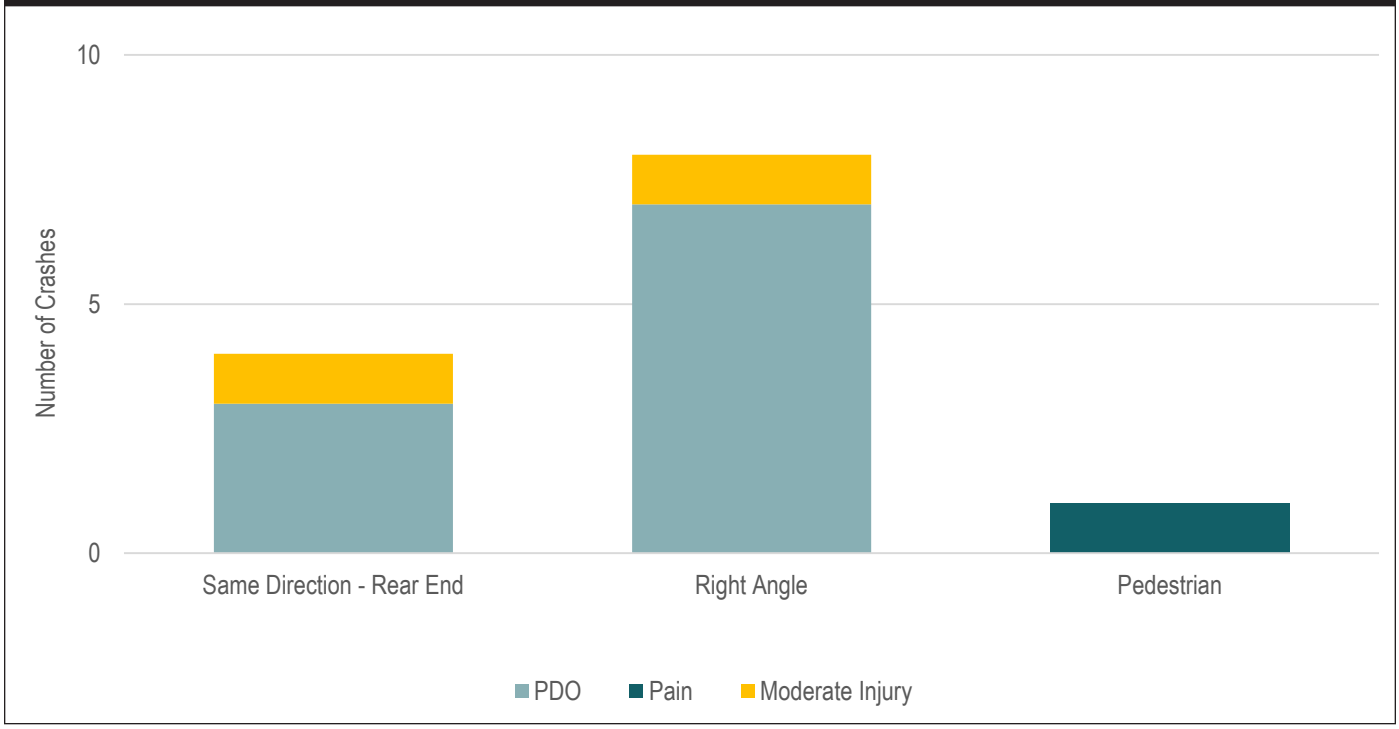
Intersection	#
At Intersection	10
Not at Intersection	3
At or Near Railroad	-
Total	13

Surface Condition	#
Dry	11
Wet	1
Snowy	1
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	13

Light Condition	#
Daylight	6
Dawn	-
Dusk	-
Dark–No Street Lights	-
Dark–Street Lights On/Continuous	5
Dark–Street Lights On/Spot	2
Dark–Street Lights Off	-
Other	-
Total	13

Day	#
Monday	-
Tuesday	2
Wednesday	1
Thursday	3
Friday	6
Saturday	1
Sunday	-
Total	13

Crash Type and Severity

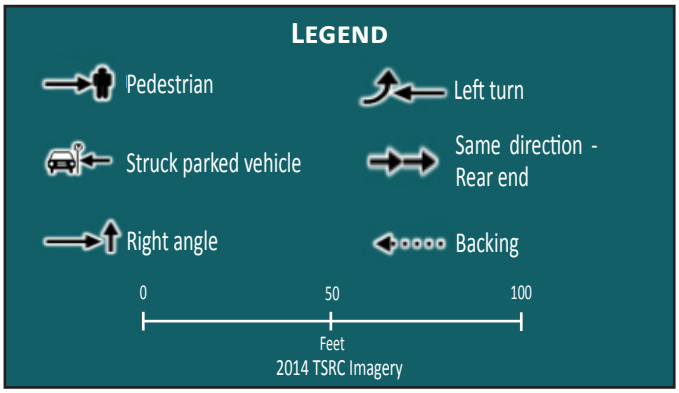


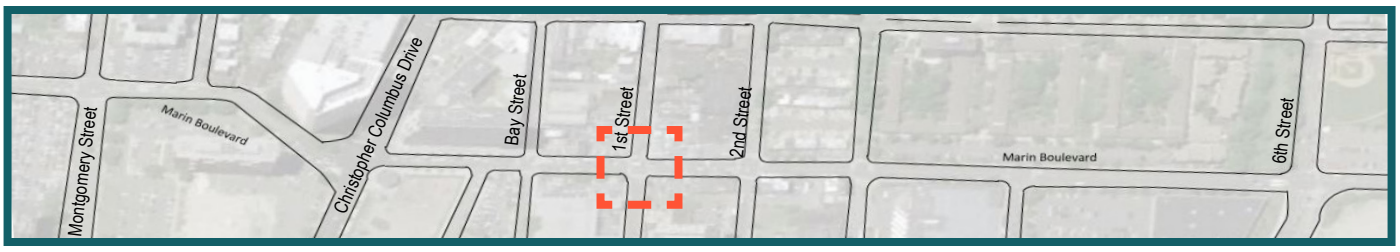
7.5 First Street and Marin Boulevard

All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color-coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any vehicle crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

= Complaint of pain





First Street and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	4
Same Direction – Side Swipe	-
Right Angle	1
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	2
Left Turn / U-Turn	1
Backing	1
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	1
Pedalcyclist	-
Non-fixed Object	-
Rail Car–Vehicle	-
Other	-
Total	10

Month	#
January	-
February	1
March	-
April	-
May	-
June	1
July	1
August	-
September	3
October	-
November	2
December	2
Total	10

Severity	#
Property Damage Only (PDO)	8
Pain	1
Moderate Injury	1
Incapacitating Injury	
Fatal	
Total	10

Crash Year	#
2010	-
2011	3
2012	7
Total	10

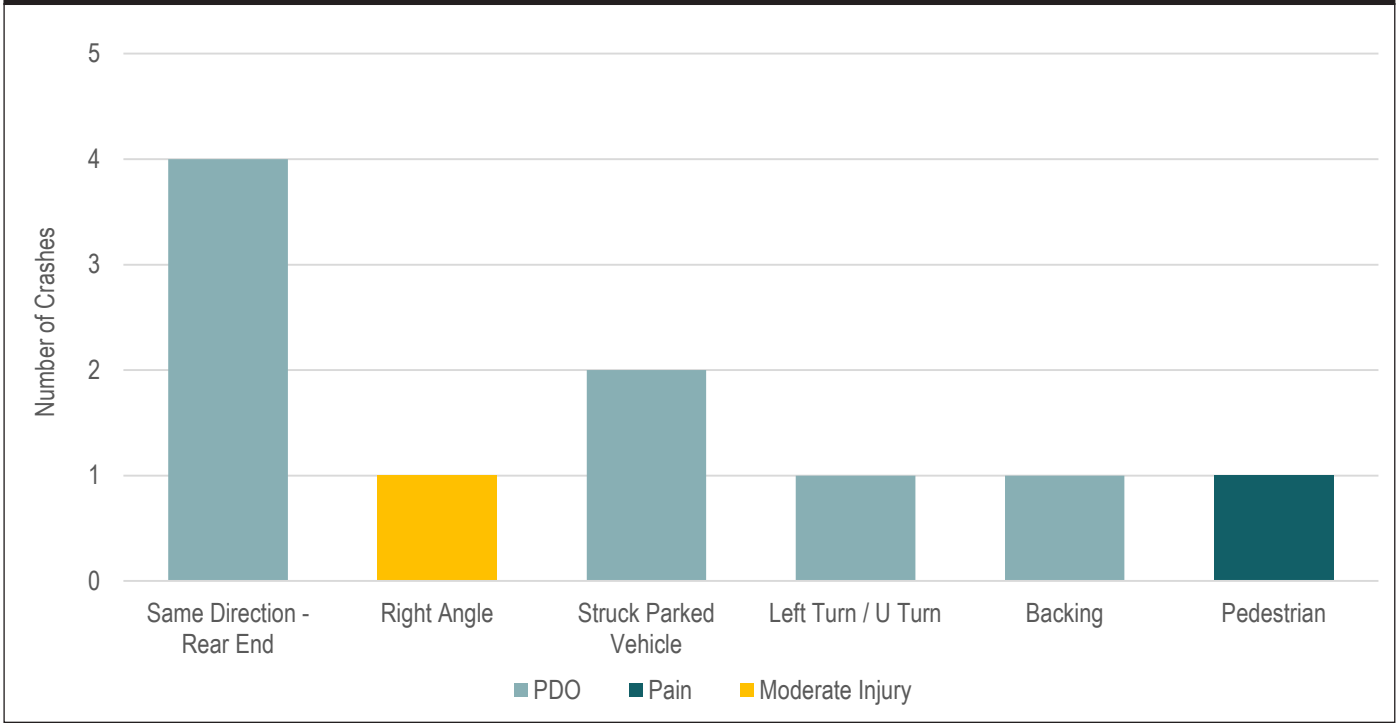
Intersection	#
At intersection	8
Not at intersection	2
At or Near Railroad	-
Total	10

Surface Condition	#
Dry	7
Wet	3
Snowy	-
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	10

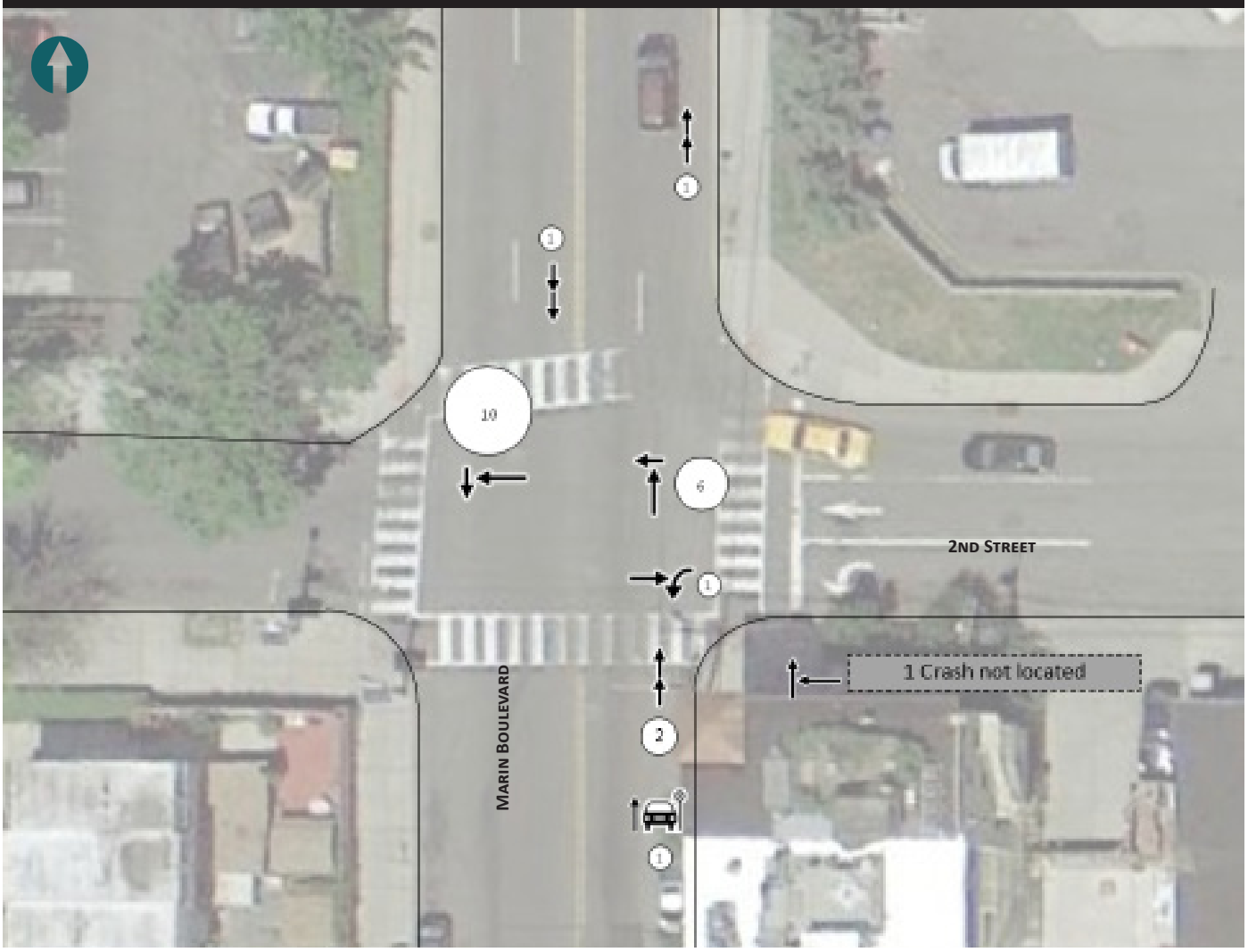
Light Condition	#
Daylight	8
Dawn	-
Dusk	-
Dark–No Street Lights	-
Dark–Street Lights On/Continuous	2
Dark–Street Lights On/Spot	-
Dark–Street Lights Off	-
Other	-
Total	10

Day	#
Monday	3
Tuesday	-
Wednesday	-
Thursday	-
Friday	3
Saturday	2
Sunday	2
Total	10

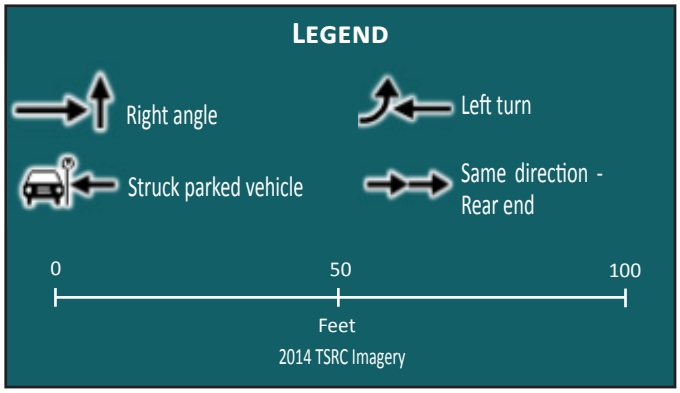
Crash Type and Severity

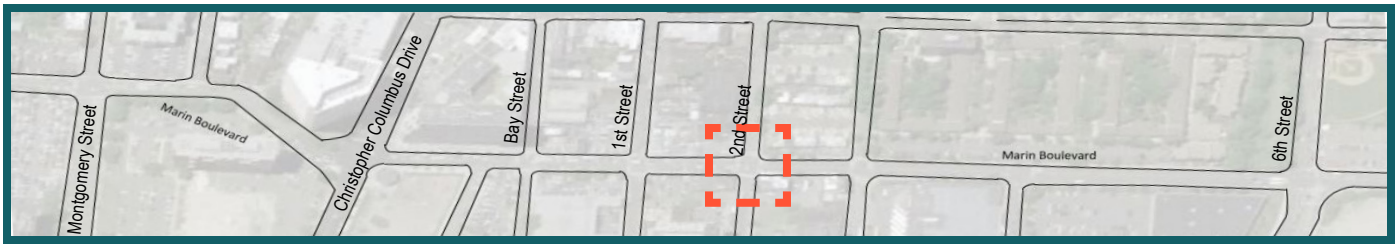


7.6 Second Street and Marin Boulevard



All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color-coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any vehicle crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.





Second Street and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	4
Same Direction – Side Swipe	-
Right Angle	17
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	1
Left Turn / U-Turn	1
Backing	-
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	-
Pedalcyclist	-
Non-fixed Object	-
Rail Car–Vehicle	-
Other	-
Total	23

Month	#
January	2
February	1
March	3
April	2
May	1
June	1
July	1
August	3
September	3
October	2
November	1
December	3
Total	23

Severity	#
Property Damage Only (PDO)	14
Pain	9
Moderate Injury	-
Incapacitating Injury	-
Fatal	-
Total	23

Crash Year	#
2010	4
2011	10
2012	9
Total	23

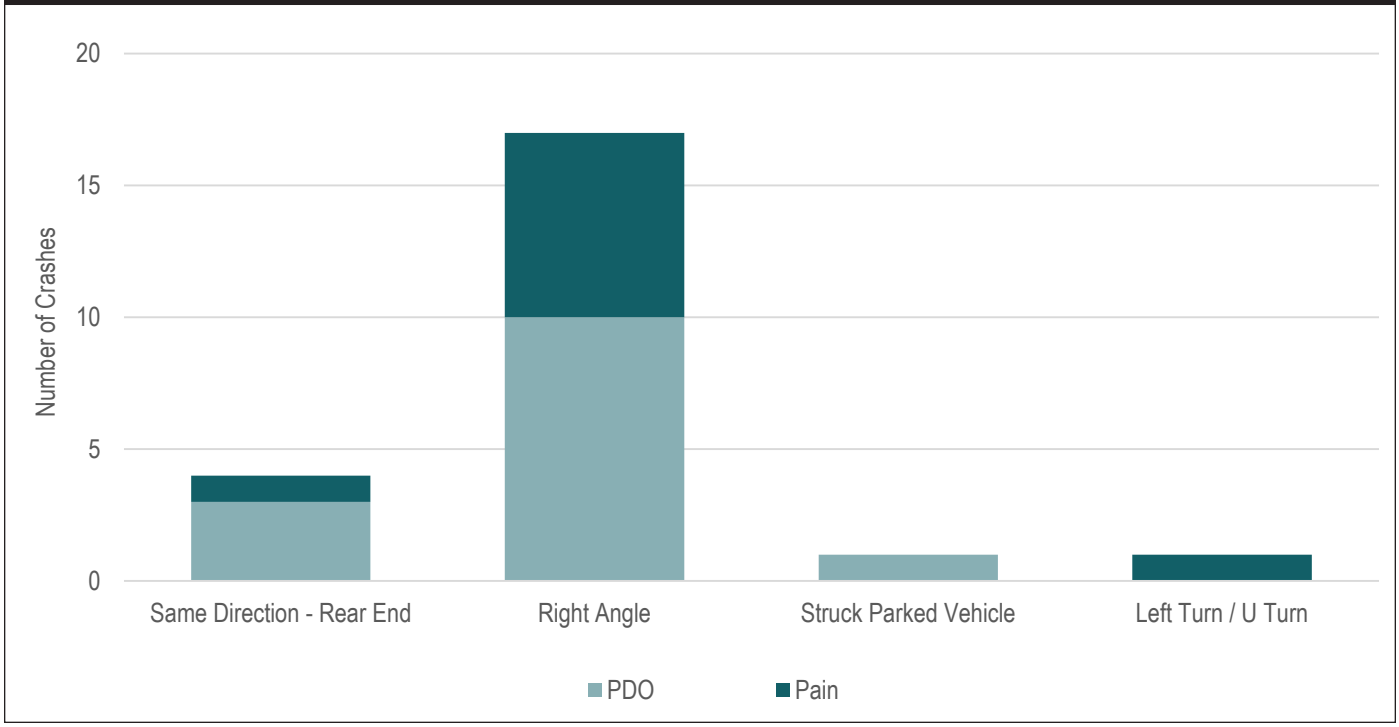
Intersection	#
At Intersection	20
Not at Intersection	3
At or Near Railroad	-
Total	23

Surface Condition	#
Dry	18
Wet	5
Snowy	-
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	23

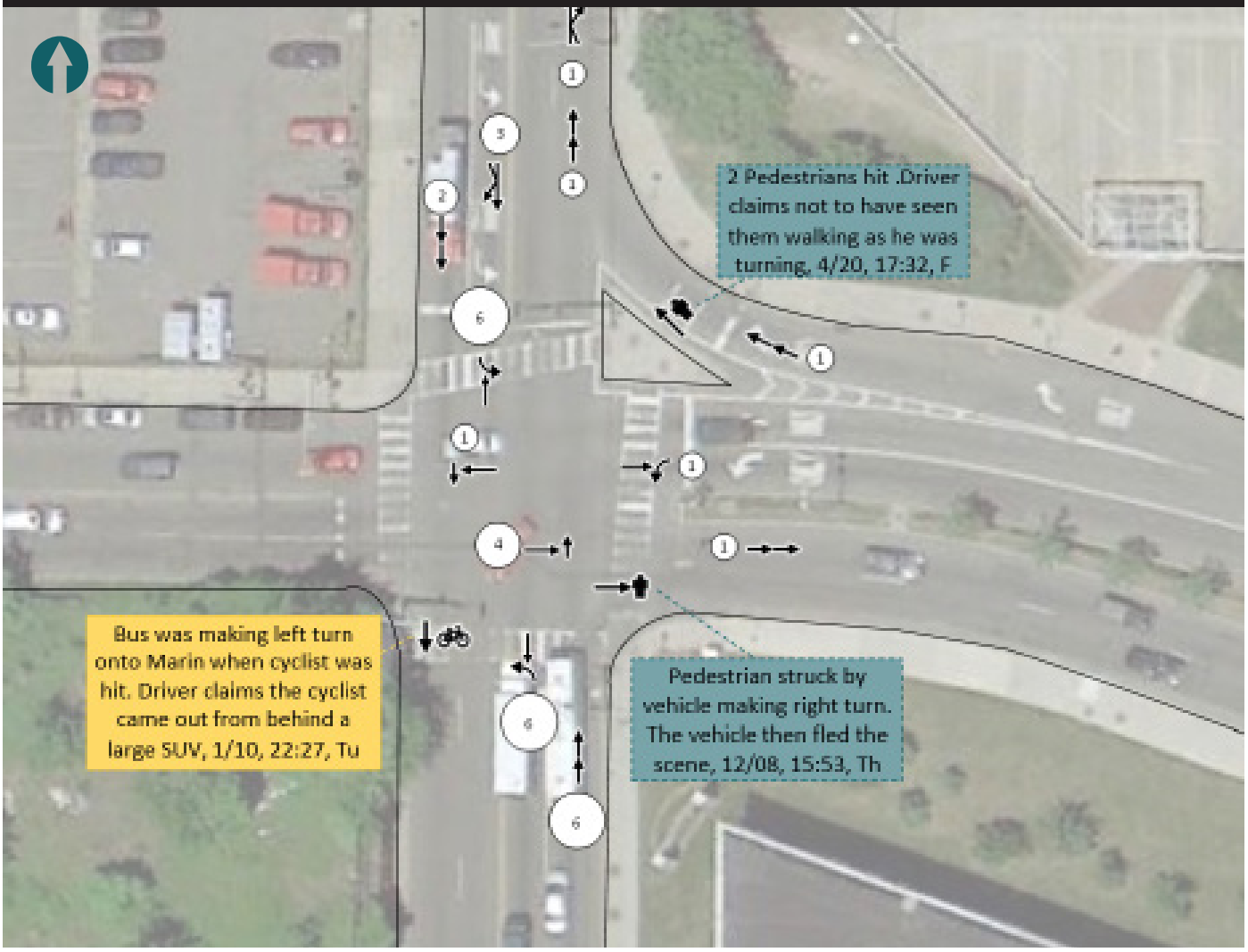
Light Condition	#
Daylight	11
Dawn	-
Dusk	-
Dark–No Street Lights	1
Dark–Street Lights On/Continuous	7
Dark–Street Lights On/Spot	3
Dark–Street Lights Off	1
Other	-
Total	23

Day	#
Monday	3
Tuesday	1
Wednesday	2
Thursday	2
Friday	4
Saturday	5
Sunday	6
Total	23

Crash Type and Severity



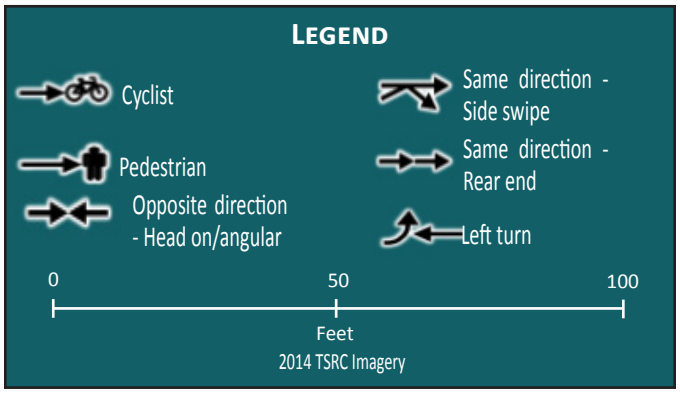
7.7 Sixth Street/Thomas Gangemi Drive and Marin Boulevard



All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color-coded by severity. Pedestrian and cyclist crashes from 2008–2010 have gray icons. Additionally, any crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

= Complaint of pain



Sixth Street/Thomas Gangemi Drive and Marin Boulevard – Crash Summary (2010–2012)

Crash Type	#
Same Direction – Rear End	11
Same Direction – Side Swipe	3
Right Angle	5
Opposite Direction – Head On/Angular	-
Opposite Direction – Side Swipe	-
Struck Parked Vehicle	1
Left Turn / U-Turn	13
Backing	1
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	2
Pedalcyclist	1
Non-fixed Object	-
Rail Car–Vehicle	-
Other	-
Total	37

Month	#
January	4
February	2
March	1
April	5
May	3
June	4
July	3
August	2
September	7
October	-
November	4
December	2
Total	37

Severity	#
Property Damage Only (PDO)	24
Pain	12
Moderate Injury	1
Incapacitating Injury	-
Fatal	-
Total	37

Crash Year	#
2010	14
2011	14
2012	9
Total	37

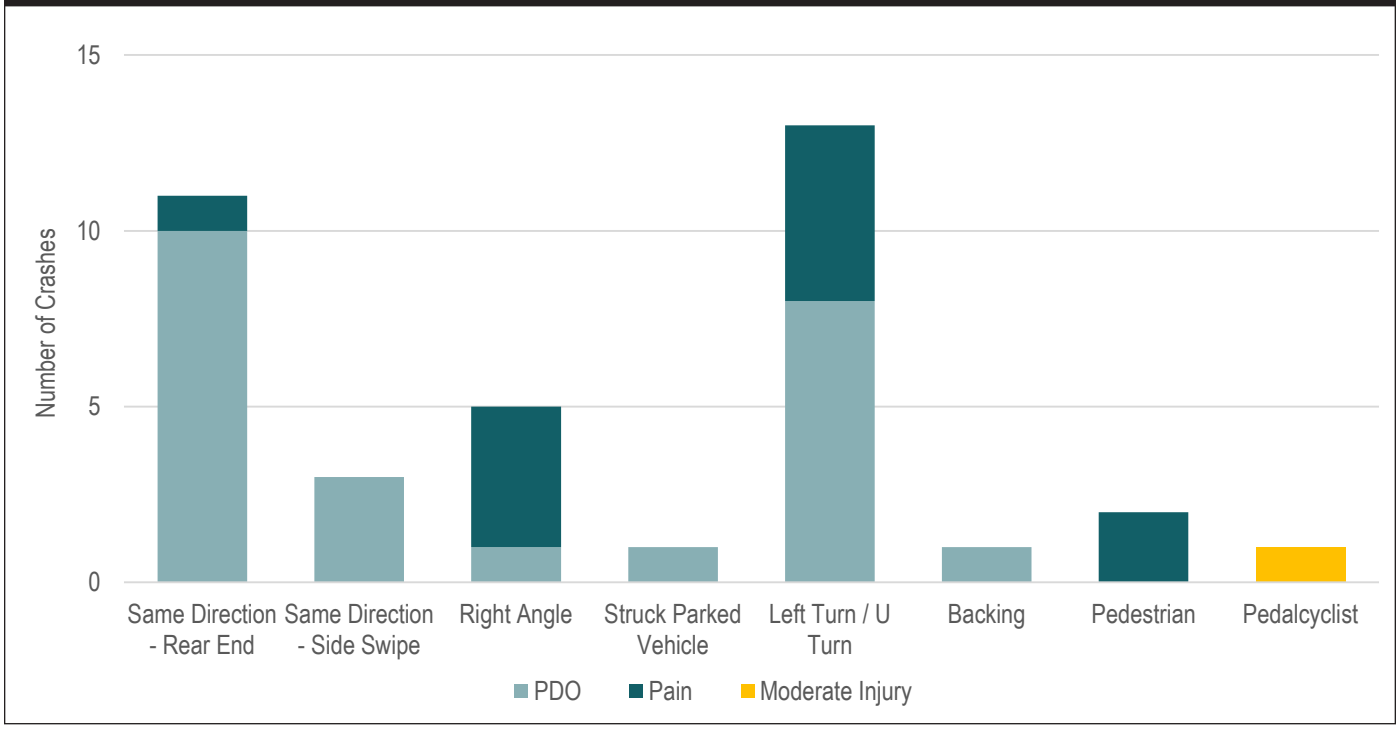
Intersection	#
At Intersection	29
Not at Intersection	8
At or Near Railroad	-
Total	37

Surface Condition	#
Dry	33
Wet	4
Snowy	-
Icy	-
Slush	-
Water – Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	37

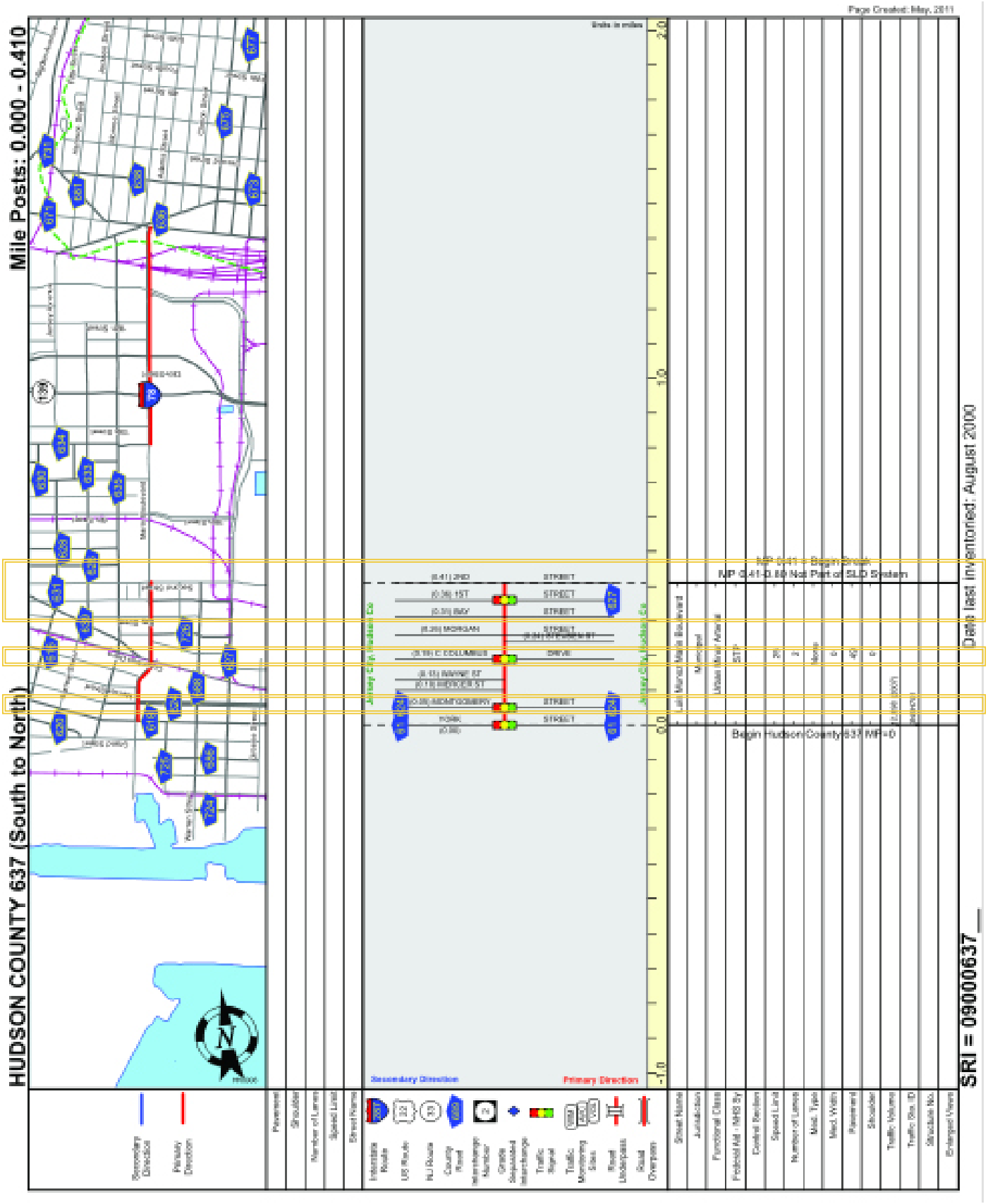
Light Condition	#
Daylight	26
Dawn	-
Dusk	-
Dark–No Street Lights	-
Dark–Street Lights On/Continuous	8
Dark–Street Lights On/Spot	2
Dark–Street Lights Off	1
Other	-
Total	37

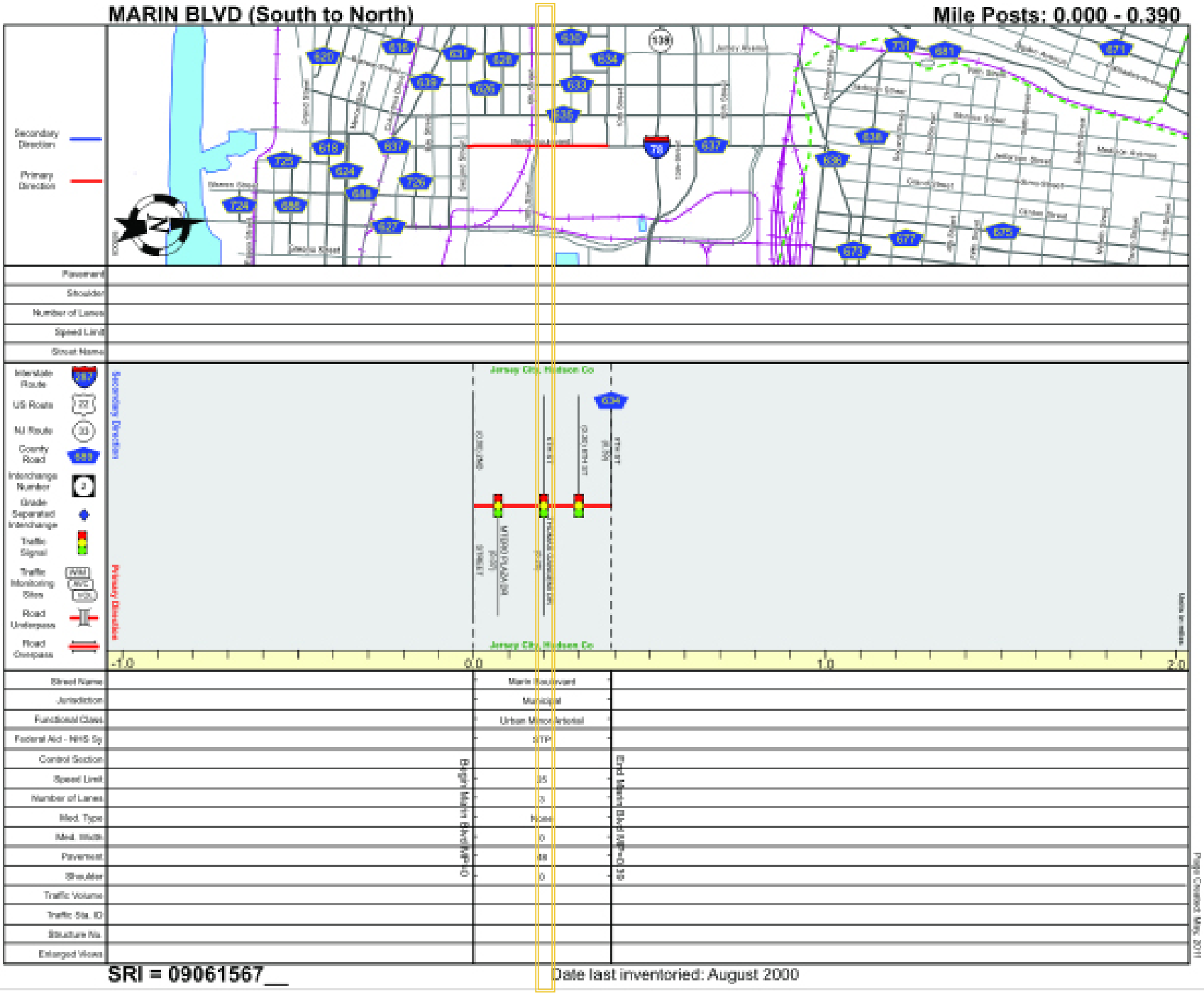
Day	#
Monday	5
Tuesday	7
Wednesday	1
Thursday	4
Friday	8
Saturday	8
Sunday	4
Total	37

Crash Type and Severity

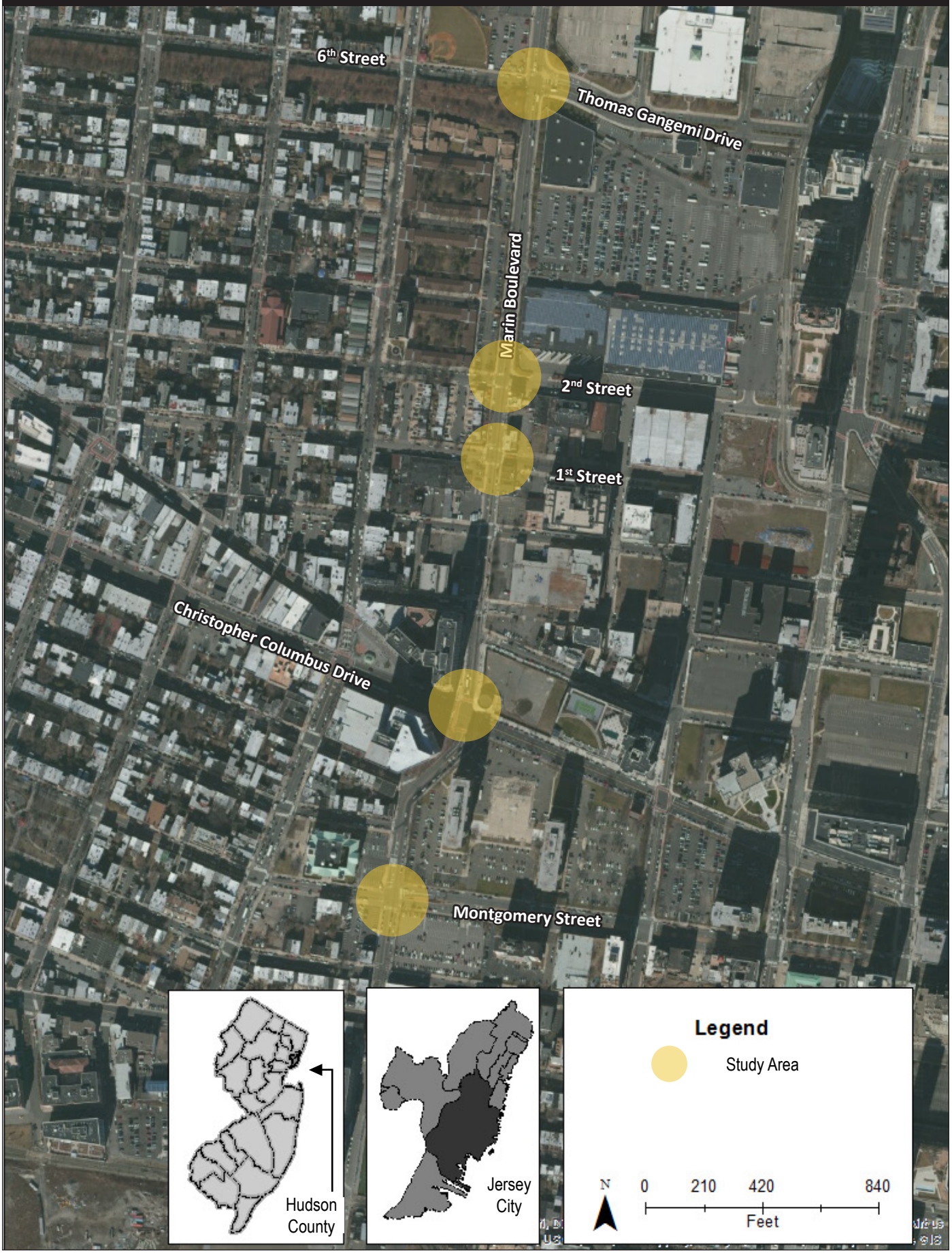


8.1 Straight Line Diagrams

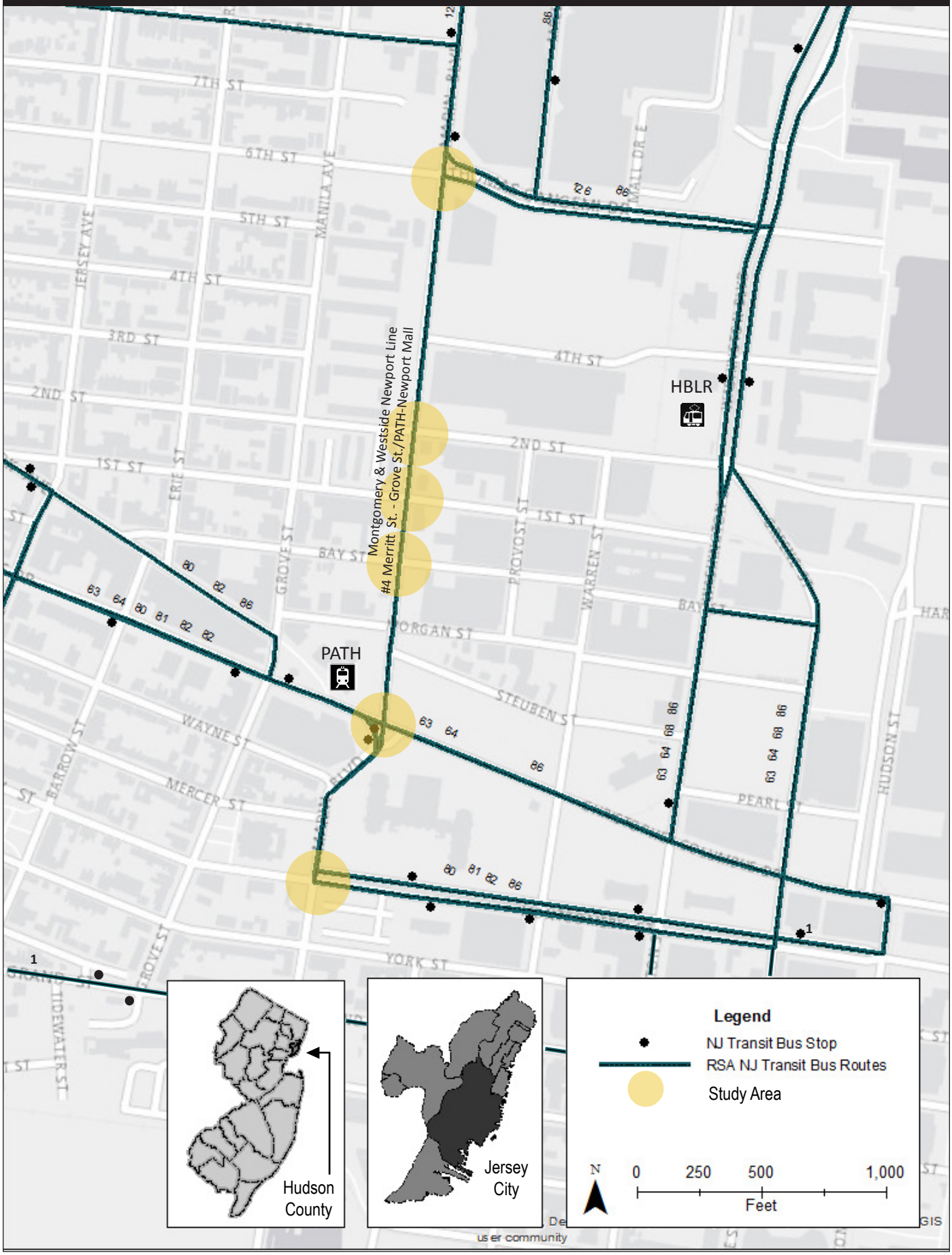



MARIN BLVD (South to North)
Mile Posts: 0.000 - 0.390
Secondary Direction
Primary Direction
Pavement
Shoulder
Number of Lanes
Speed Limit
Street Name
Interstate Route
US Route
NJ Route
County Road
Interchange Number
Grade-Separated Interchange
Traffic Signal
Traffic Monitoring Sites
Road Underpass
Road Overpass
Secondary Direction
Primary Direction
Jersey City, Hudson Co
Jersey City, Hudson Co
-1.0
0.0
1.0
2.0
Street Name
Jurisdiction
Functional Class
Federal Aid - NHS Sy
Control Section
Speed Limit
Number of Lanes
Med. Type
Med. Width
Pavement
Shoulder
Traffic Volume
Traffic Sta. ID
Structure No.
Enlarged Views
Marin Boulevard
Municipal
Urban Minor Arterial
STP
35
3
None
0
8
0
Begin Main Segment RLO
End Main Segment RLO
SRI = 09061567__
Date last inventoried: August 2000
Page Created: May 2011

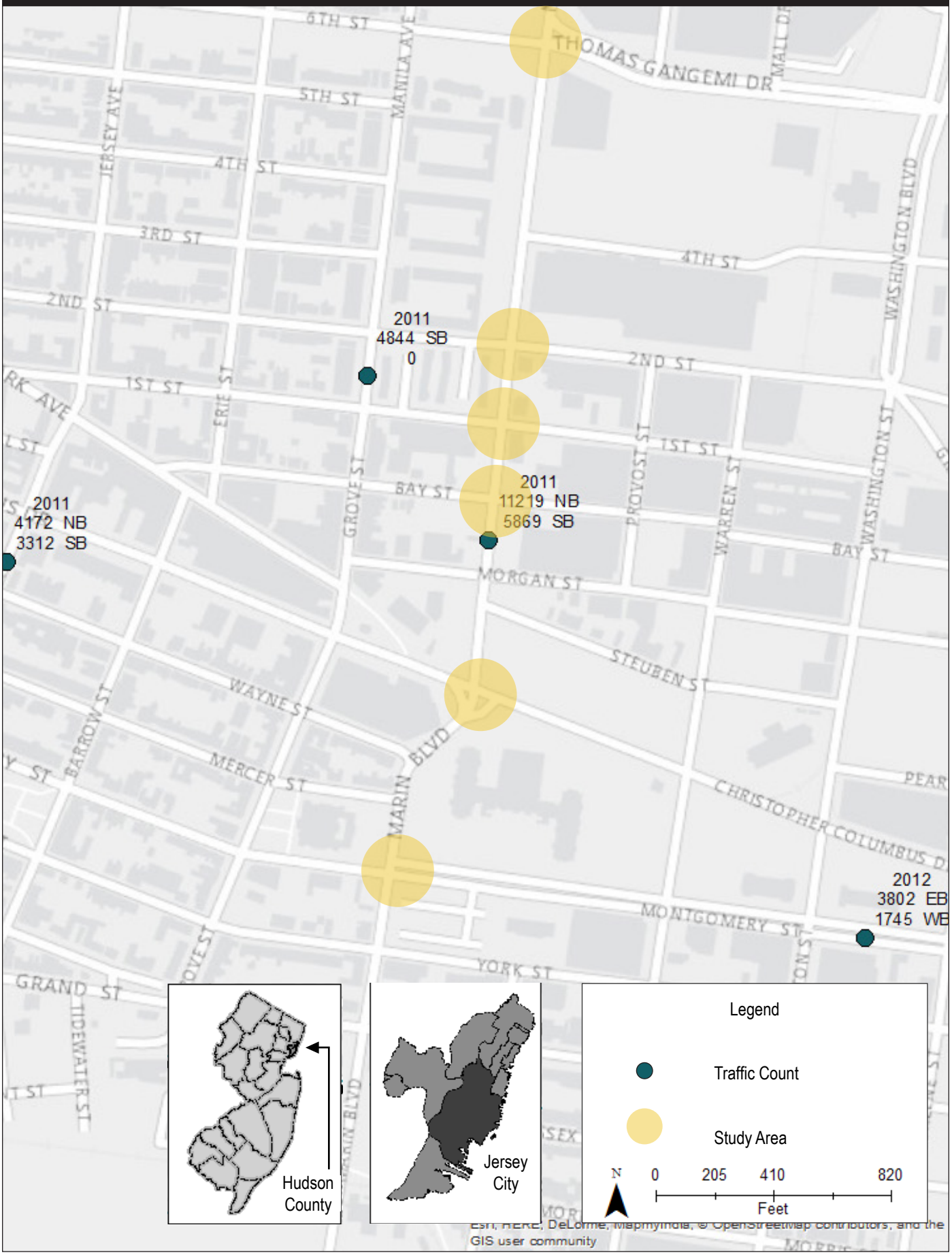
8.2 Study Area



8.3 Area Transit



8.4 Traffic Volumes



8.5 RSA Participants

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