CEDAR BRIDGE AVENUE

ROAD SAFETY AUDIT

Lakewood, Ocean 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 Ocean County, with funding provided by the Federal Highway Administration (FHWA) and the New Jersey Department of Transportation (NJDOT)

>> cait.rutgers.edu/tsrc

>> Table of Contents

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 offers 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 long- and short-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 Andy Kaplan, Program Manager, TSRC, at andy.kaplan@rutgers.edu.

Disclaimer

Road Safety Audit reports provided by the Center for Advanced Infrastructure and Transportation staff are not engineering reports. 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 US government assumes no liability for the contents or use thereof.

Executive Summary

The Road Safety Audit (RSA) at four intersections along Cedar Bridge Avenue in Lakewood Township was chosen as a result of a North Jersey Transportation Planning Authority (NJTPA) network screening of crashes on county and municipal roadways. The Network Screening ranking was created using the database in Rutgers' Transportation Safety Resource Center's (TSRC's) Plan4Safety software. The crashes were weighted according to severity. The list of intersection rankings put New Hampshire Avenue at number one and Oberlin Avenue at number three in Ocean County. On the list of pedestrian spots (road segments of one-tenth of a mile), Arlington Avenue ranked number one in Ocean County. The RSA process helped to identify safety issues, evaluate risks, and suggest countermeasures. This document is the final report for the RSA conducted in Lakewood Township. The result, detailed in this report, is a summary of the four intersections' safety history from 2010–2012 and a listing of recommended improvements that were created by the RSA team.

Cedar Bridge Avenue (County Road 528) is a heavily traveled east-west roadway, an Urban Principal Arterial that crosses multiple jurisdictions. In the RSA area, it connects US Route 9 to the Garden State Parkway. West of Dr. Martin Luther King Drive, it turns into Clinton Avenue and continues into downtown Lakewood. An industrial park is situated at the eastern end of the RSA corridor; residences and small businesses are situated at the western end. There is no NJ Transit bus service along Cedar Bridge Avenue, but there are local Job Link buses. Three of the intersections are signalized; Arlington Avenue is unsignalized. The cross section has two lanes in each direction, with designated turning lanes at Oberlin Avenue and New Hampshire Avenue.

The character of the intersections at the southeastern end of the study corridor varies greatly from the character of the two intersections at the northwestern end of the corridor. The southeastern intersections—Oberlin Avenue and New Hampshire Avenue—have no shoulders, no sidewalks, a higher speed limit, and less residential or commercial land use. These intersections experience a higher frequency of motor vehicle crashes, particularly left-turn crashes.

By contrast, the two intersections at the northwestern end of the corridor–Arlington Avenue and Dr. Martin Luther King Drive—have shoulders, sidewalks, more residential and commercial land use, and a higher incidence of pedestrian- or cyclist-related crashes.

Lakewood's unique population needs and development patterns should also be considered. Given the large number of private schools, each with its own bus system, there is a large volume of school buses operating on similar schedules, contributing to the traffic volume at peak hours. Unique infrastructure needs, such as the need for pedestrian recall, are presented by the majority Orthodox Jewish population. Finally, the area is developing rapidly; there are new housing developments and commercial properties being built, with still more in the planning pipeline. These developments will significantly increase the volume of vehicles and pedestrians in the area, and urbanize the land-use character of the corridor.

Alternatives to the 60-foot-wide cross section were evaluated, in an effort to meet the respective needs of the pedestrians, buses, bicyclists, and vehicles. Two lanes of travel in both directions need to be maintained, while meeting the needs of all aforementioned roadway users. The report contains graphics of alternative proposals, along with suggestions to improve delineation and signage, and to reduce speeding.

>> 1.0 Corridor Description and Analysis

1.1 Site Selection

Ocean County requested that a Road Safety Audit be conducted at four intersections along a corridor of Cedar Bridge Avenue. The corridor had emerged as highly ranked for crashes in Ocean County, through a network screening analysis completed by TSRC for NJTPA. The New Hampshire Avenue intersection was number one, and the Oberlin Avenue intersection was number three. The Arlington Avenue intersection was number one on the list for Pedestrian Spots, and the intersection of Dr. Martin Luther King Drive was number six.

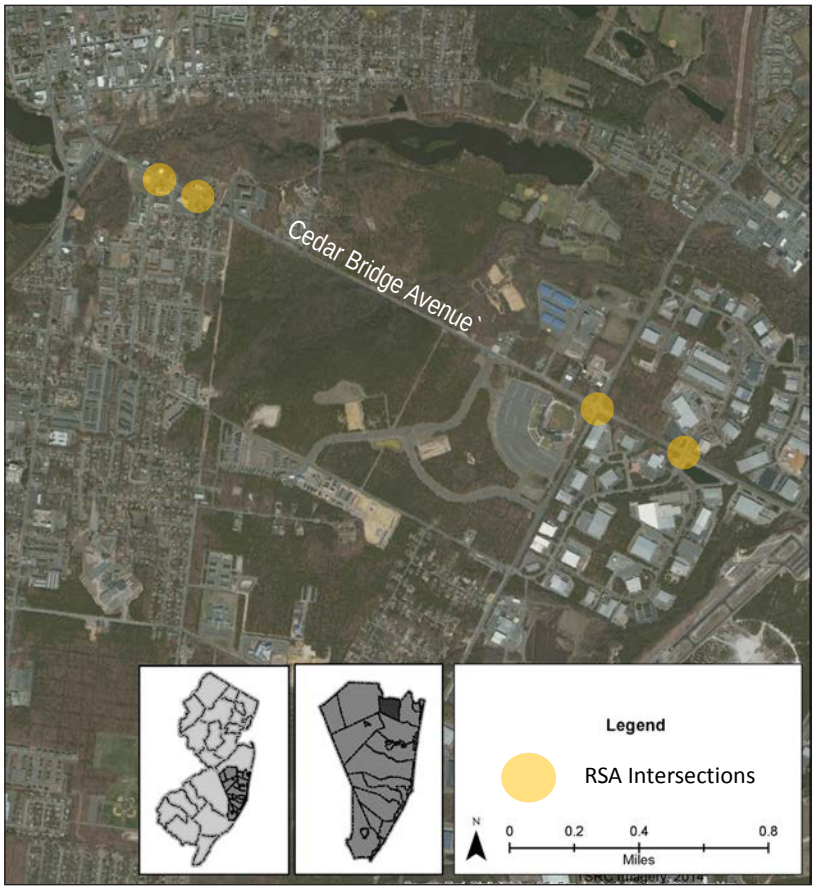


Figure 1 – Identified Priority Crash Locations

Cedar Bridge Avenue Intersection	Network Screening Rankings	
	NJTPA #	Ocean County #
New Hampshire Avenue	#1 Intersection	#1 Intersection
Oberlin Avenue	#17 Intersection	#3 Intersection
Arlington Avenue	#34 Pedestrian Spot #122 Pedestrian Corridor	#1 Pedestrian Spot #2 Pedestrian Corridor
Dr. Martin Luther King Drive	#427 Pedestrian Spot #122 Pedestrian Corridor	#6 Pedestrian Spot #2 Pedestrian Corridor

1.2 Traffic Volumes

A traffic count was conducted along Cedar Bridge Avenue, east of Arlington Avenue. The annual average daily traffic count (AADT) was 20,974 in 2010. The traffic count along New Hampshire Avenue, just north of Cedar Bridge Avenue, was 18,573 AADT in 2011. [See page 44.]

1.3 Transit Service

There is no NJ Transit bus service on Cedar Bridge Avenue. (There is bus service to the west on Route 9, and to the north on Ocean Avenue.) There is a local bus called Job Link that runs within Lakewood Township, between the industrial park and the downtown area, from 6 a.m. to 6 p.m., Monday through Friday. There is a significant presence of school buses from the many private schools. They each operate their own buses, and their schedules are similar.

1.4 Area Characteristics

Cedar Bridge Avenue (County Road 528) is a heavily traveled east-west roadway, an Urban Principal Arterial that crosses multiple jurisdictions. In the RSA area, it connects US Route 9 to the Garden State Parkway. West of Dr. Martin Luther King Drive, it turns into Clinton Avenue and continues into downtown Lakewood. An industrial park is situated at the eastern end of the RSA corridor; residences and small businesses are situated at the western end. West of Cedar Bridge Avenue, Route 9 runs north-south, and bottleneck traffic conditions on Route 9 have significant impact on Cedar Bridge Avenue by forcing traffic onto New Hampshire Avenue, Cedar Bridge Avenue and Dr. Martin Luther King Drive.

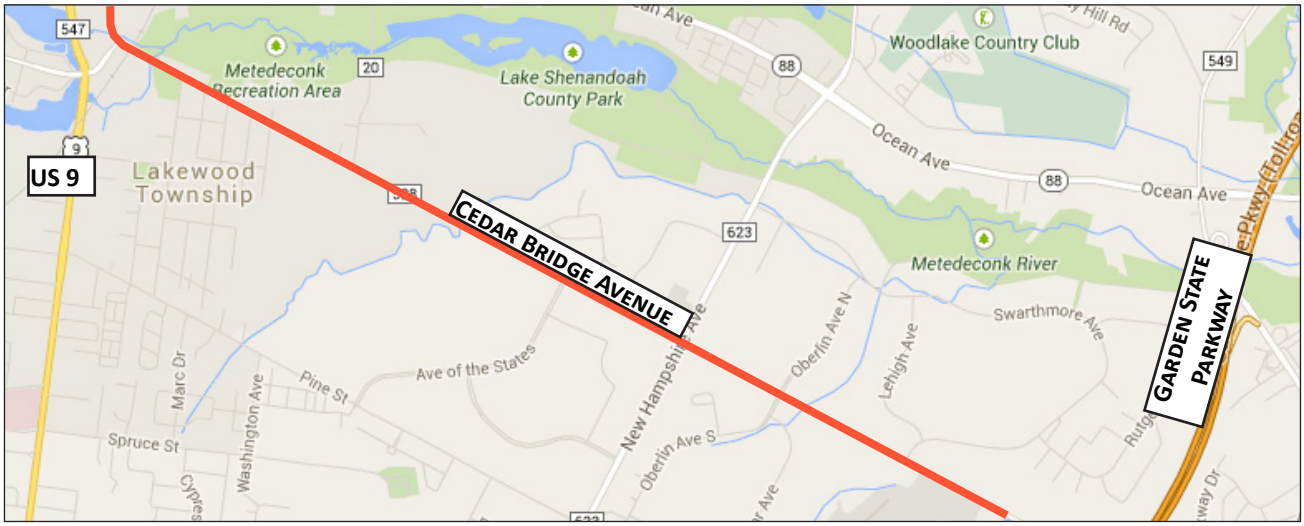


Figure 2 – Map of Area

The roadway is primarily two lanes in each direction, with dedicated left-turn lanes at New Hampshire Avenue. There are shoulders at the western end of the corridor (Dr. Martin Luther King Drive and Arlington Avenue) but no shoulders at the eastern end of the corridor. The speed limit is 45 or 50 mph and transitions to 35 mph west of Dr. Martin Luther King Drive.

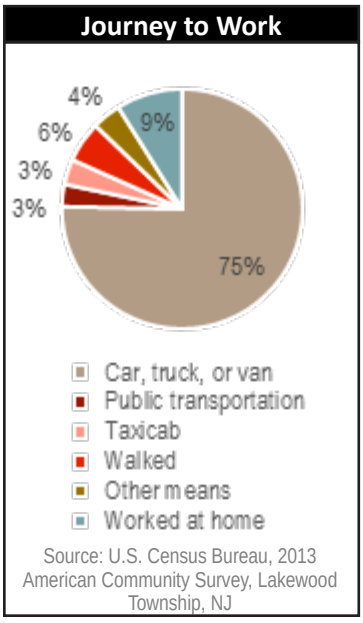


Figure 3 – Journey to Work

Lakewood's population has unique and evolving transportation needs. The city has seen dramatic population growth over the past decade. Members of the RSA team explained that this trend is likely to continue over the next few years, giving the city an increasingly urban character. Some of these new developments are in close proximity to the RSA corridor, including a new residential and commercial development between the Arlington Avenue and New Hampshire Avenue intersections, and a QuickChek near the New Hampshire Avenue intersection. New development is likely to add increased foot and vehicular traffic to the area.

When compared to the rest of Ocean County, Lakewood has more commuters that do not go to work by automobile (25 percent, as compared with 9 percent countywide, according to 2013 US Census Bureau data). Lakewood also has more commuters who do not own vehicles (11 percent, as compared with 2 percent countywide, 2013 US Census Bureau), due in part to Lakewood's large Orthodox Jewish population, in which many people refrain from driving for religious reasons. This data does not necessarily capture non-work trips; local experts on the RSA team noted that a large portion of general trips made by commuters and non-commuters are made by foot.

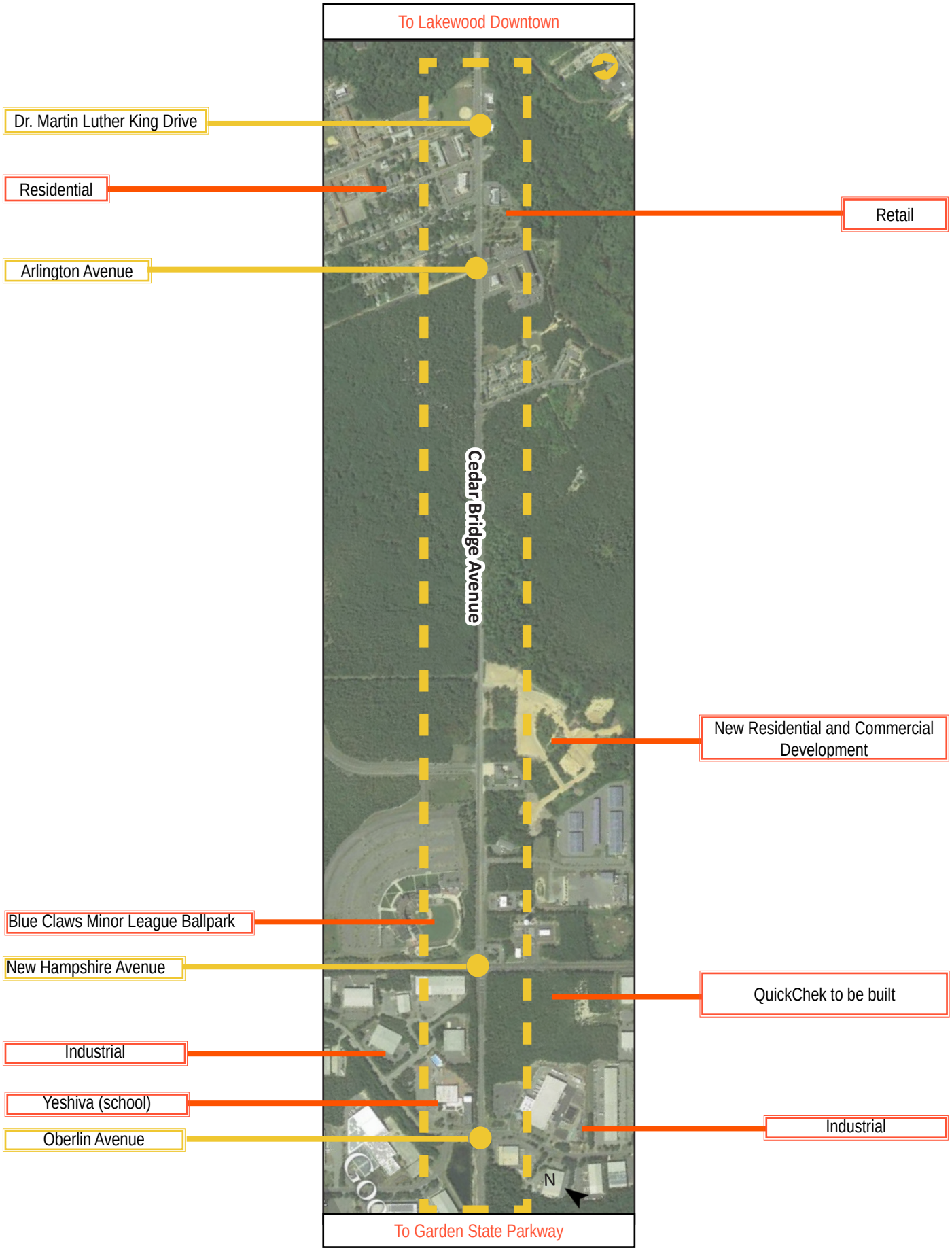


Figure 4 – Map with Area Details

1.5 Intersection Characteristics

Figure 5 – Dr. Martin Luther King Drive

Dr. Martin Luther King Drive

- Signalized Intersection
- T-Intersection
- Two lanes in each direction on Cedar Bridge Avenue
- One lane in each direction on Dr. Martin Luther King Drive
- Baseball field on southwest corner
- Apartment complex on southeast corner
- Retail along north side of Cedar Bridge Avenue
- Driveway very close to intersection on northeast corner
- Two marked crosswalks

Figure 6 – Arlington Avenue

Arlington Avenue

- Stop-controlled Intersection for northbound approach
- T-Intersection
- No marked crosswalks
- Retail on southwest corner and along the north side of Cedar Bridge Avenue
- Businesses on southwest corner
- Residential on southeast corner and further along Arlington Avenue

Figure 7 – New Hampshire Avenue

New Hampshire Avenue

- Signalized Intersection
- Dedicated left-turn lanes on all four legs
- Protected permitted left-turn phasing
- Dedicated right-turn lanes on Cedar Bridge Avenue, both directions
- No shoulders
- Blue Claws minor league ballpark on southwest corner
- Three marked crosswalks

Figure 8 – Oberlin Avenue

Oberlin Avenue

- Signalized Intersection
- No dedicated left-turn lanes
- Grassy median on Oberlin Avenue
- Wide one lane in each direction on Oberlin Avenue
- Commercial properties on southeast and southwest corners
- Yeshiva on southwest corner
- Additional boys' school off Oberlin Avenue, south of the intersection
- Girls' school north of the intersection
- No marked crosswalks

>> 2.0 Crash Findings—RSA Corridor

2.1 Chronology

According to the NJDOT crash database, there were 199 reportable crashes during the three-year analysis period of 2010–2012. The percentage of crashes per year increased only slightly from 2010. Since the rankings of the network screening were based on five years of data (2008–2012) the pedestrian crashes from 2008–2009 were also evaluated. Examining the number of crashes by month over the three-year period, there were a significant number of crashes in October. By the day of the week, crash totals were clearly overrepresented on Wednesday and Thursday as compared to the overall Ocean County distribution. Regarding the time of day, there were two peak periods, from 7 a.m. to 10 a.m. and from 2 p.m. to 4 p.m. These times correspond to the school bus traffic.

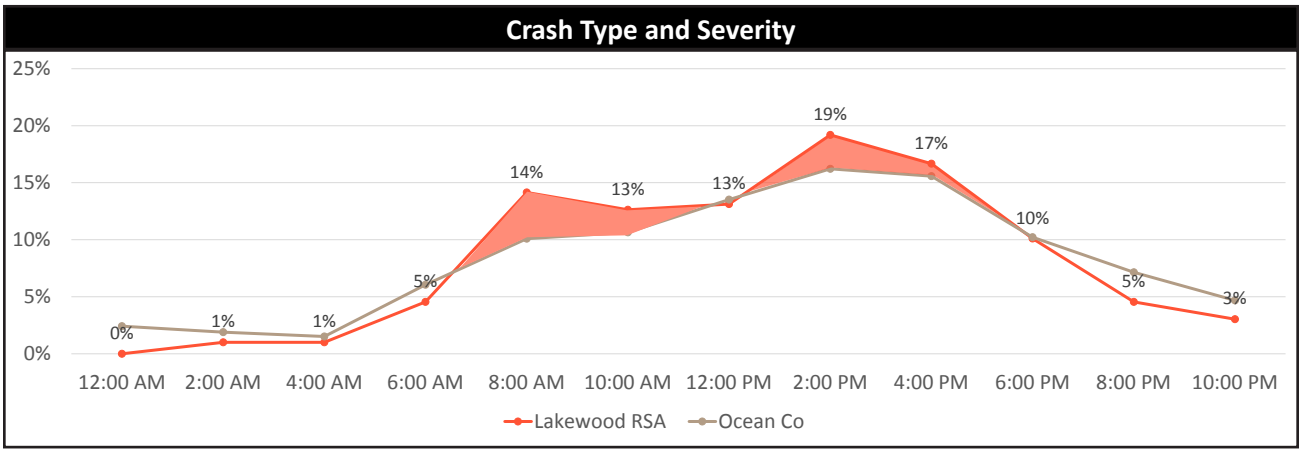


Figure 9 – Crashes by Time of Day

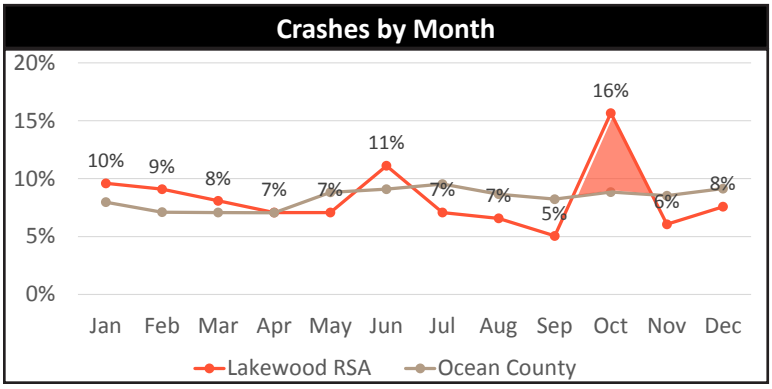


Figure 10 – Crashes by Month

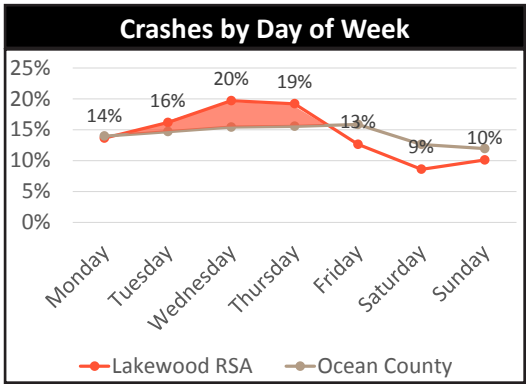


Figure 11 – Crashes by Day of Week

2.2 Severity

Severity	All Crashes	Pedestrians	Bicyclists
Fatal	2	1	-
Incapacitated	1	1	-
Moderate Injury	17	1	-
Complaint of Pain	56	1	2
PDO	127	1	-
TOTAL	199	5	2

Figure 12 – Severity

Almost one-third of the crashes resulted in injury. One of the fatal crashes occurred at New Hampshire Avenue, with two vehicles making left turns from New Hampshire Avenue during a yellow light. The other fatality occurred near Arlington Avenue; a westbound vehicle struck a pedestrian crossing midblock. The incapacitating injury occurred at Dr. Martin Luther King Drive.

2.3 Collision Type

There was a significant problem with left-turn crashes, primarily at signalized intersections. The pedestrian crashes were significant; they were two percent more frequent than the County average, and the severity was also higher, thus increasing the ranking in the NJTPA ranking list. Same-direction crashes were also more frequent than the County average, but these were lower in severity.

Crash Type	# in RSA Area	% in RSA Area	% in Ocean-County
Same Direction—Rear End	76	38%	27%
Same Direction—Sideswipe	23	12%	8%
Right Angle	14	7%	20%
Opposite Direction — Head On/Angular	3	2%	2%
Opposite Direction —Sideswipe	1	1%	1%
Struck Parked Vehicle	3	2%	11%
Left Turn / U Turn	55	28%	3%
Backing	-	-	5%
Encroachment	-	-	0%
Overturned	1	1%	1%
Fixed Object	9	5%	13%
Animal	2	1%	4%
Pedestrian	5	3%	1%
Pedalcyclist	2	1%	1%
Non-fixed Object	4	2%	1%
Railcar/Vehicle	-	-	0%
Other/NULL	1	1%	1%
TOTAL	**199**	**100%**	**100%**

Figure 13 – Crash Type RSA vs. County

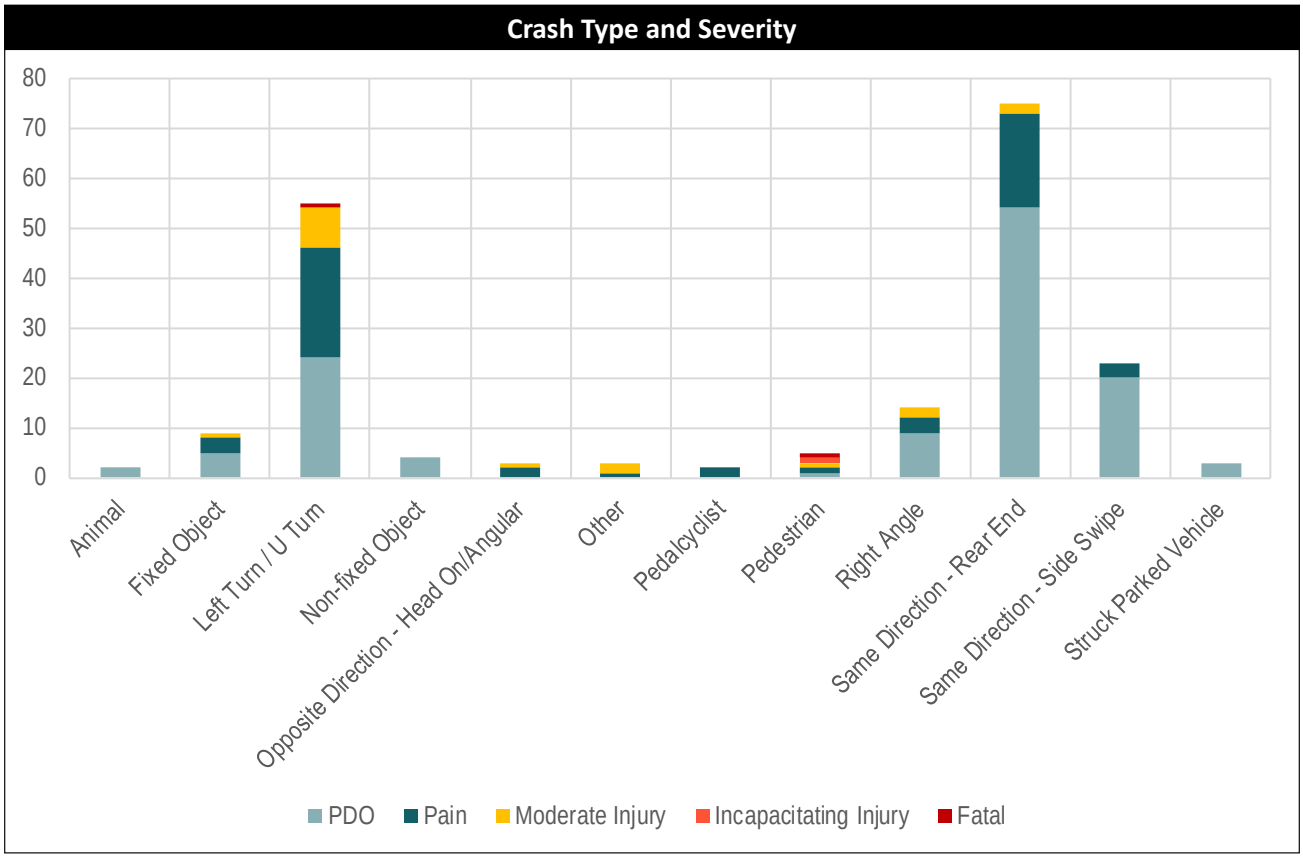


Figure 14 – Crash Type and Severity

2.4 Roadway Surface and Lighting Conditions

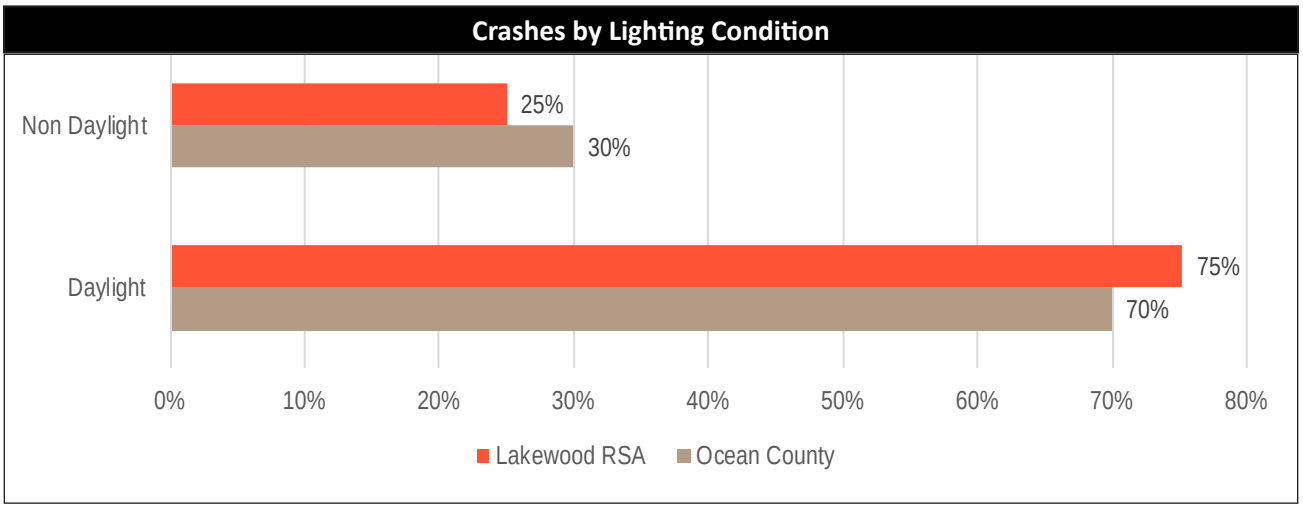


Figure 15 – Crashes by Light Condition

The lighting conditions do not appear to be a major factor in the crashes. The rates of crashes during daylight hours are slightly higher than the Ocean County numbers.

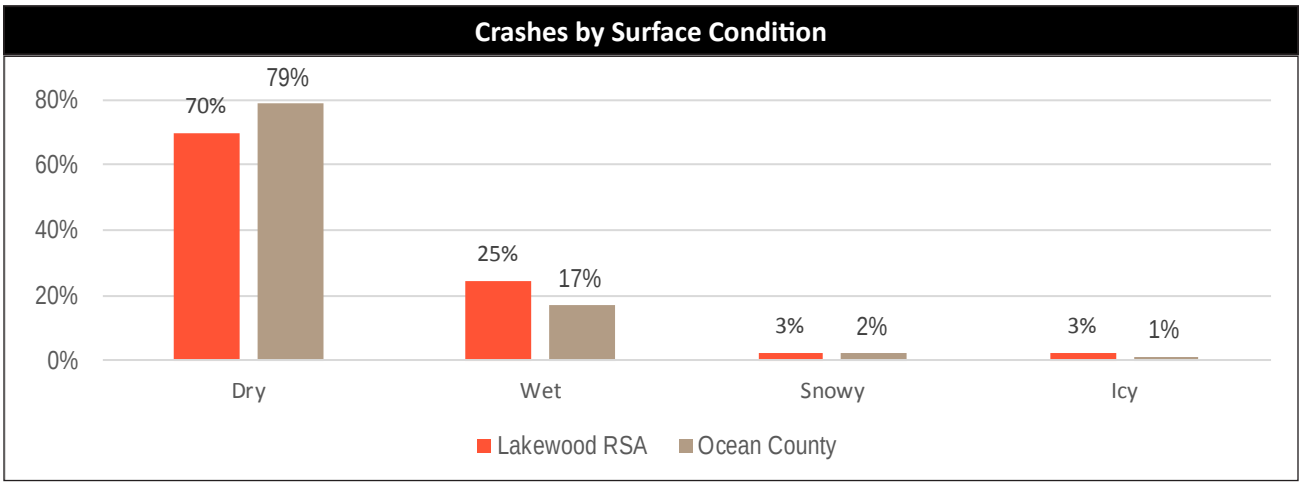


Figure 16 – Crashes by Surface Condition

A higher percentage of crashes occurred in the RSA area in wet conditions, as compared to Ocean County.

2.5 Cross Section Geometry

The cross section in the area of Oberlin Avenue and New Hampshire Avenue has two lanes in each direction with no shoulders. At New Hampshire Avenue there are dedicated left-turn lanes. There are no sidewalks in this section of Cedar Bridge Avenue.

Figure 17 – Cross Section Eastern Side

The cross section in the area of Dr. Martin Luther King Drive has two lanes in each direction with shoulders. There are sidewalks on both sides of the roadway on Cedar Bridge Avenue.

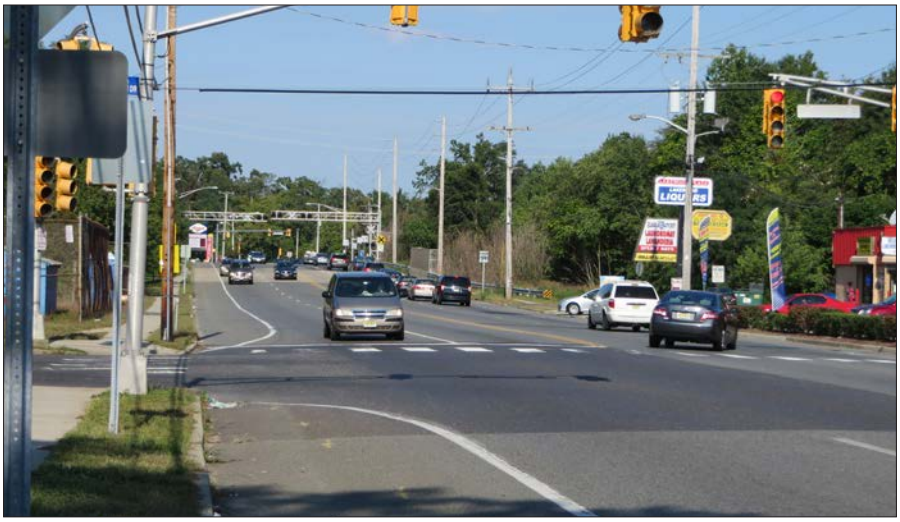


Figure 18 – Cross Section Western Side

>> 3.0 Crash Findings—Oberlin Avenue

3.1 Chronology

According to the NJDOT crash database, there were 55 reportable crashes during the three-year analysis period of 2010–2012 at the intersection of Oberlin Avenue and Cedar Bridge Avenue. The percentage of crashes per year decreased slightly over the three-year period.

Examining concentrations by month over the three-year period, the total ranged between one and eight crashes per month. The highest number of crashes (8) occurred in June followed by March (7) and May (7). There was only one crash in April, and two in September and December. By the day of the week, crash totals were highest from Tuesday through Friday with very few on the weekends. Regarding the time of day, most of the crashes occurred between approximately 8 a.m. and 4 p.m., with a dip from 10 a.m. to noon.

3.2 Severity

Severity	All Crashes	Pedestrians
Incapacitated	-	-
Moderate Injury	6	-
Complaint of Pain	19	-
PDO	30	-
TOTAL	**55**	**-**

Figure 19 – Oberlin Ave: Crash Severity

Of the 55 crashes, slightly fewer than half resulted in injury. There were no pedestrian crashes.

3.3 Collision Type

Of the 55 crashes in the years of 2010–2012, 56 percent were left-turn crashes. A third of the crashes were same-direction crashes (rear-end and sideswipe combined). When compared to Ocean County, the RSA area has a significant overrepresentation of left-turn crashes. Right-angle crashes are underrepresented at this intersection.

Crash Type	Count in Intersection	% in Intersection	% Ocean County
Same Direction—Rear End	16	29%	27%
Same Direction—Sideswipe	2	4%	8%
Right Angle	2	4%	20%
Opposite Direction–Head On/Angular	2	4%	2%
Left Turn / U Turn	31	56%	3%
Fixed Object	2	4%	13%
TOTAL	**55**	**100%**	

Figure 21 – Oberlin Ave: Crash Type RSA vs. County

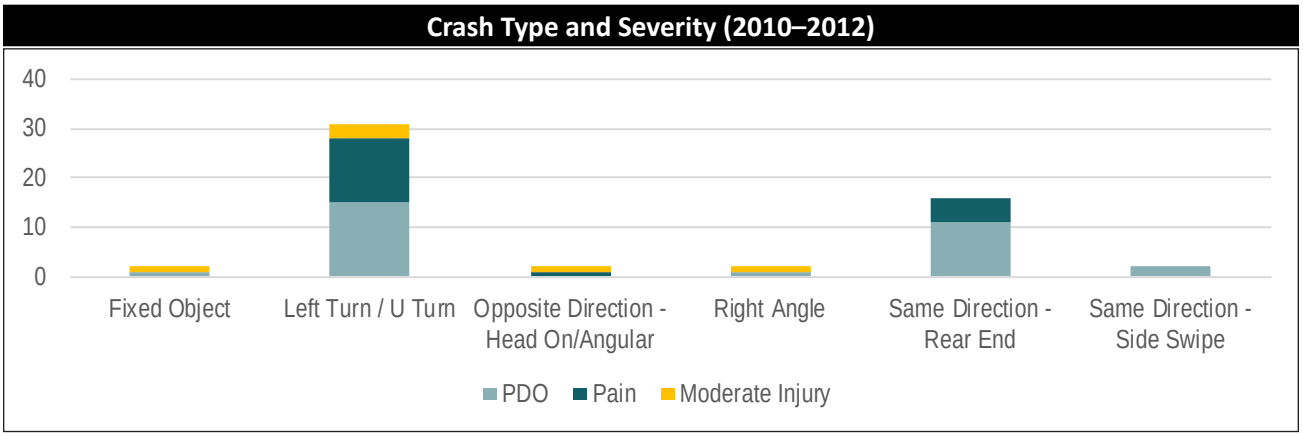


Figure 20 – Oberlin Ave: Crash Type and Severity

3.4 Roadway Surface and Lighting Conditions

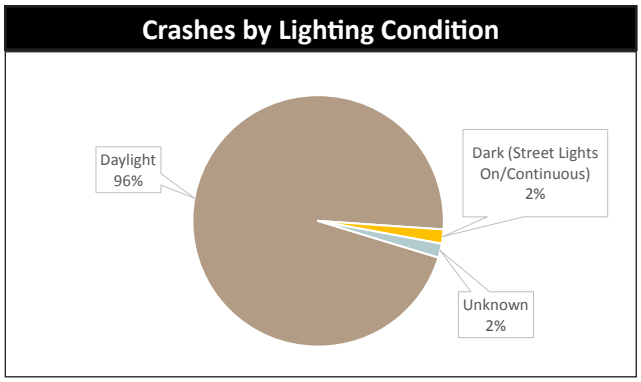


Figure 22 – Oberlin Lighting Conditions

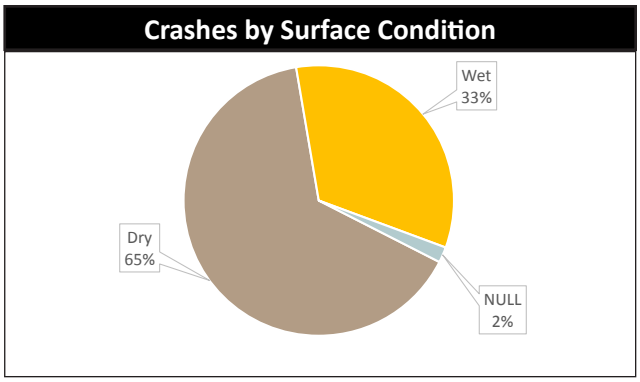


Figure 23 – Oberlin Ave: Surface Conditions

Almost all of the crashes occurred during daylight hours. A third of the crashes occurred with wet conditions.

4.1 Chronology

According to the NJDOT crash database, there were 91 reportable crashes during the three-year analysis period of 2010–2012. The percentage of crashes per year increased in 2011, and decreased in 2012. Examining concentrations by month over the three-year period, the total ranged between two and ten crashes per month. As can be seen by the graph, the numbers jumped around, with the highest month being October. By the day of the week, crash totals were highest on Tuesday and Wednesday, with fewer than average over the weekend. Regarding the time of day, most of the crashes occurred between approximately 4 p.m. and 7 p.m..

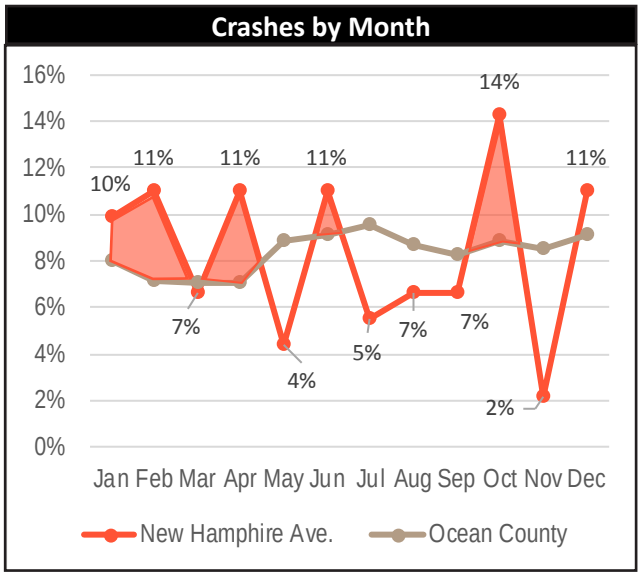


Figure 24 – New Hampshire Ave: Month

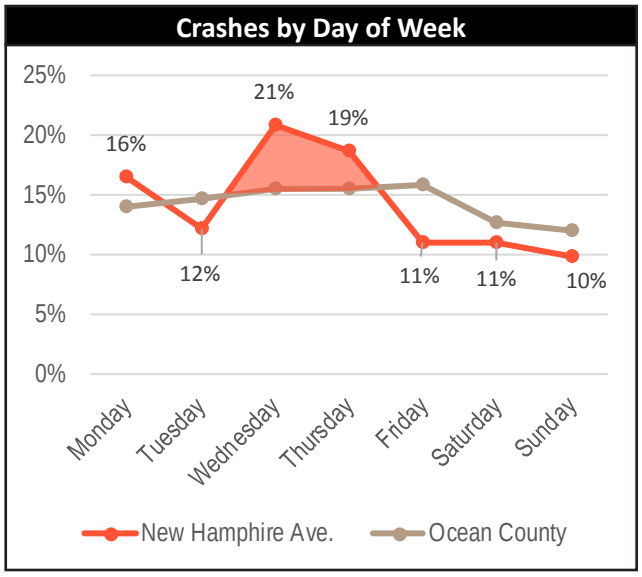


Figure 25 – New Hampshire Ave: Day of Week

4.2 Severity

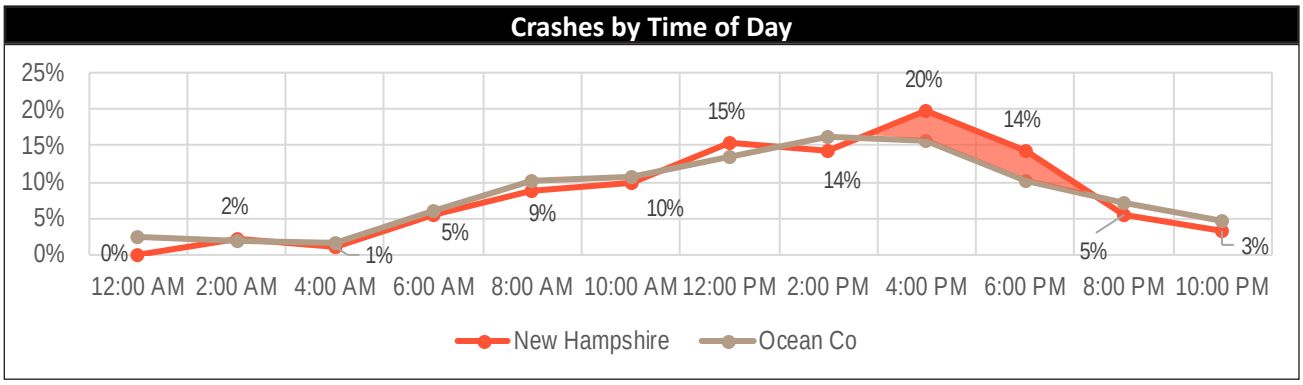


Figure 26 – New Hampshire Ave: Time of Day

Severity	All Crashes	Pedestrians
Fatal	1	-
Incapacitated	-	-
Moderate Injury	7	-
Complaint of Pain	22	1
PDO	61	-
TOTAL	**91**	**1**

Figure 27 – New Hampshire Ave: Severity

Out of the 91 crashes, a third of the crashes resulted in injury or a fatality.

4.3 Collision Type

Of the 91 crashes between the years of 2010–2012, 51 percent were same-direction crashes. Almost a quarter of the crashes were left-turn crashes, including the fatal crash. These were all significantly overrepresented when compared to Ocean County, while right-angle crashes were not as common at this intersection.

Crash Type	Count in Intersection	% in Intersection	% Ocean County
Same Direction—Rear End	37	41%	27%
Same Direction—Sideswipe	9	10%	8%
Right Angle	6	7%	20%
Opposite Direction—Head On/Angular	1	1%	2%
Opposite Direction—Sideswipe	1	1%	1%
Struck Parked Vehicle	2	2%	11%
Left Turn / U Turn	22	24%	3%
Fixed Object	7	8%	13%
Animal	2	2%	4%
Non-fixed Object	3	**3%**	**1%**
Other	1	**1%**	**1%**
TOTAL	**91**	**100%**	**100%**

Figure 28 – New Hampshire Ave: Crash Type RSA vs. County

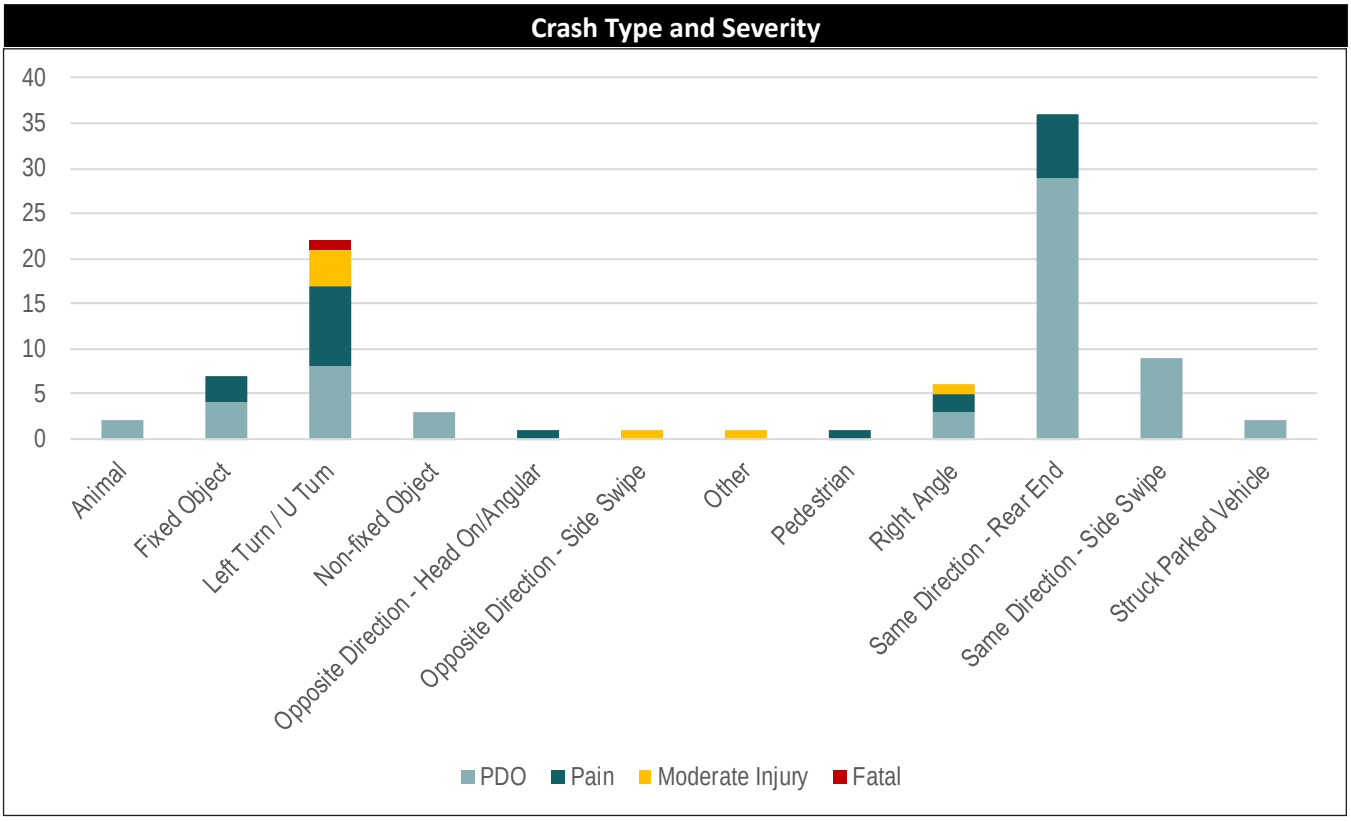


Figure 29 – New Hampshire Ave: Crash Type RSA and Severity

4.4 Roadway Surface and Lighting Conditions

The conditions of the roadway surface and lighting conditions were very similar to the Ocean County averages. Almost a third of the crashes occurred at night. Slightly less than a third of the crashes occurred in wet conditions.

>> 5.0 Crash Findings—Arlington Avenue

5.1 Chronology

According to the NJDOT crash database, there were 21 reportable crashes during the three-year analysis period of 2010–2012. The percentage of crashes per year increased significantly over the three-year period as seen in the adjacent chart.

Examining concentrations by month over the three-year period, the total ranged between one and eight crashes per month. The highest number of crashes occurred in October, and no crashes occurred in May and June. By the day of the week, crash totals were highest on Wednesday, Thursday and Sunday, with few crashes on Monday and Friday.

Regarding the time of day, most of the crashes occurred between approximately 5 p.m. and 7 p.m., with a smaller increase from 8 a.m. to 10 a.m.

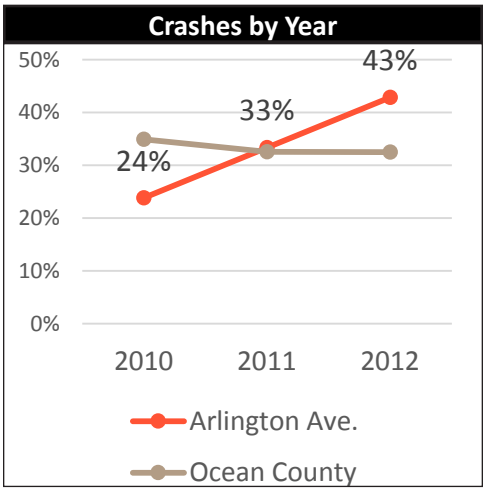


Figure 30 – Arlington Ave: Crashes by Year

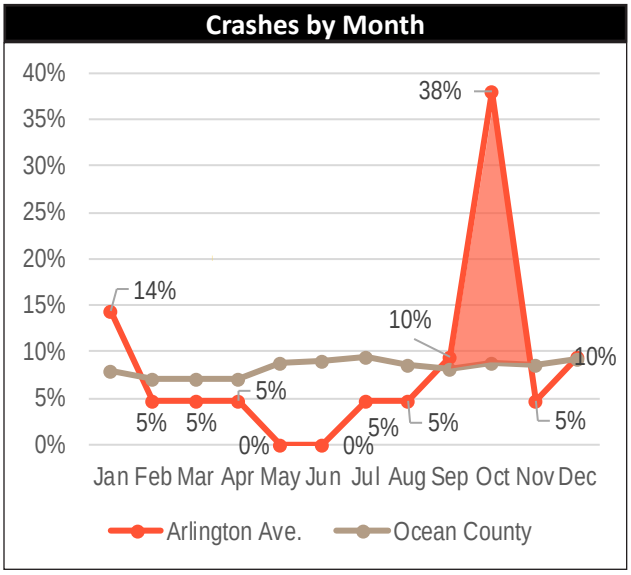


Figure 32 – Arlington Ave: Crashes by Month

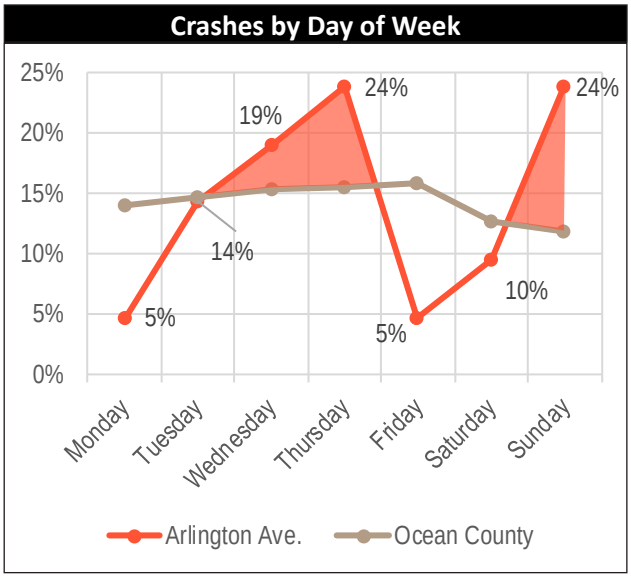


Figure 31 – Arlington Ave: Crashes by Day of Week

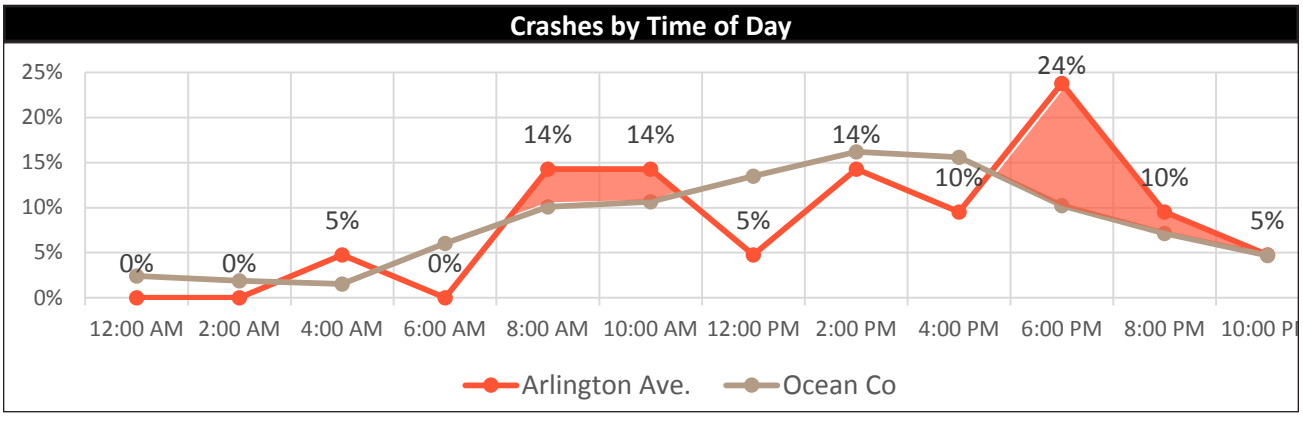


Figure 33 – Arlington Ave: Crashes by Time of Day

5.2 Severity

Severity	All Crashes	Pedestrians
Fatal	1	1
Incapacitated	1	1
Moderate Injury	-	-
Complaint of Pain	9	-
PDO	10	1
TOTAL	**21**	

Figure 34 – Arlington Ave: Severity

Out of the 21 crashes, more than half of them resulted in injury. Out of the three pedestrian crashes, one was fatal and one was incapacitated.

5.3 Collision Type

Out of the 21 crashes between the years of 2010–2012, 66 percent were same-direction crashes. When compared to Ocean County, the RSA area has a significant overrepresentation of both same-direction and pedestrian crashes.

Crash Type	Count in Intersection	% in Intersection	% Ocean County
Same Direction - Rear End	7	33%	27%
Same Direction - Sideswipe	7	33%	8%
Right Angle	2	10%	20%
Overturned	1	5%	1%
Pedestrian	3	14%	1%
Pedalcyclist	1	5%	1%
TOTAL	**21**	**100%**	

Figure 35 – Arlington Ave: Crash Type RSA vs. County

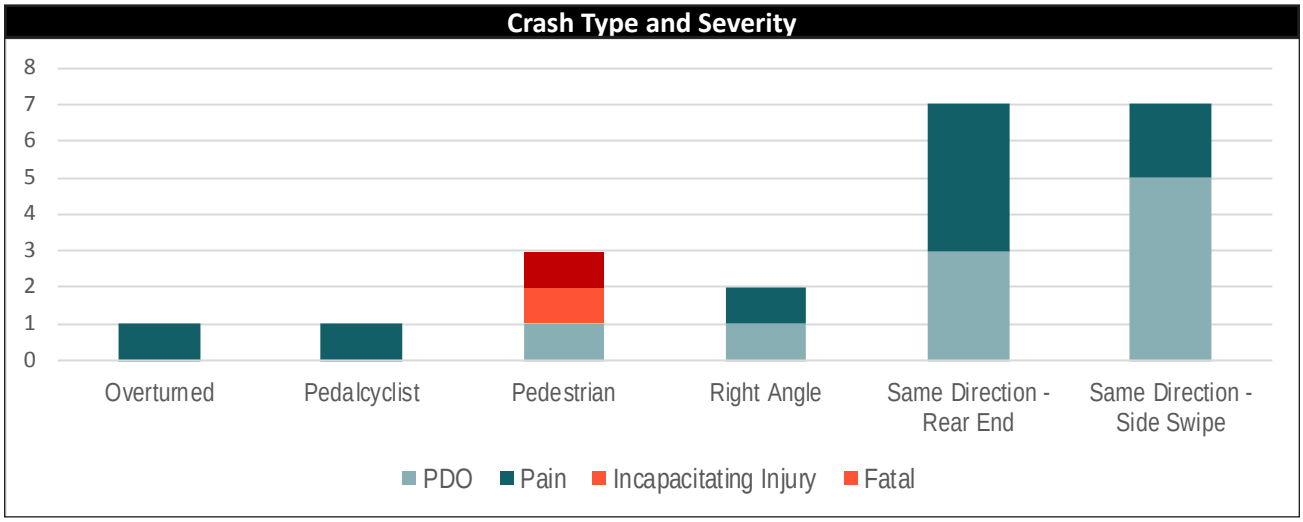


Figure 36 – Arlington Ave: Crash Type and Severity

5.4 Roadway Surface and Lighting Conditions

Almost half of all the crashes occurred at night, and a third of the crashes occurred during wet conditions. This was higher than the Ocean County averages.

>> 6.0 Crash Findings—Dr. Martin Luther King Drive

6.1 Chronology

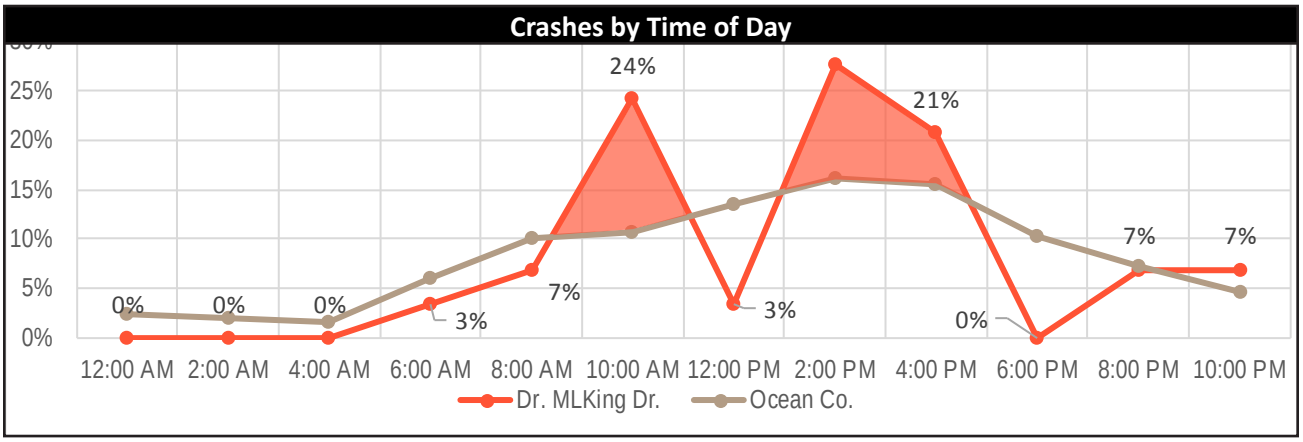


Figure 37 – Dr. Martin Luther King Drive: Crash Time of Day

According to the NJDOT crash database, there were 30 reportable crashes during the three-year analysis period of 2010–2012. The percentage of crashes per year increased from eight in 2010 to twelve in 2012.

Examining concentrations by month over the three-year period, the total ranged between one and eight crashes per month. The highest number of crashes (5) occurred in November followed by October (4) and June(4). There were no crashes in September. By the day of the week, crash totals were highest on Thursday and lowest on Sunday. Regarding the time of day, most of the crashes occurred around 10 a.m., and from 2 p.m. to 4 p.m., with dips around noon and around 6 p.m.

6.2 Severity

Severity	All Crashes	Pedestrians & Pedcyclists
Incapacitated	-	-
Moderate Injury	4	1
Complaint of Pain	5	1
PDO	21	-
TOTAL	**30**	**2**

Figure 38 – Dr. Martin Luther King Drive: Severity

Of the 30 crashes, less than a third of them resulted in injuries, none severe. One pedcyclist had a moderate injury and one pedestrian suffered pain only.

6.3 Collision Type

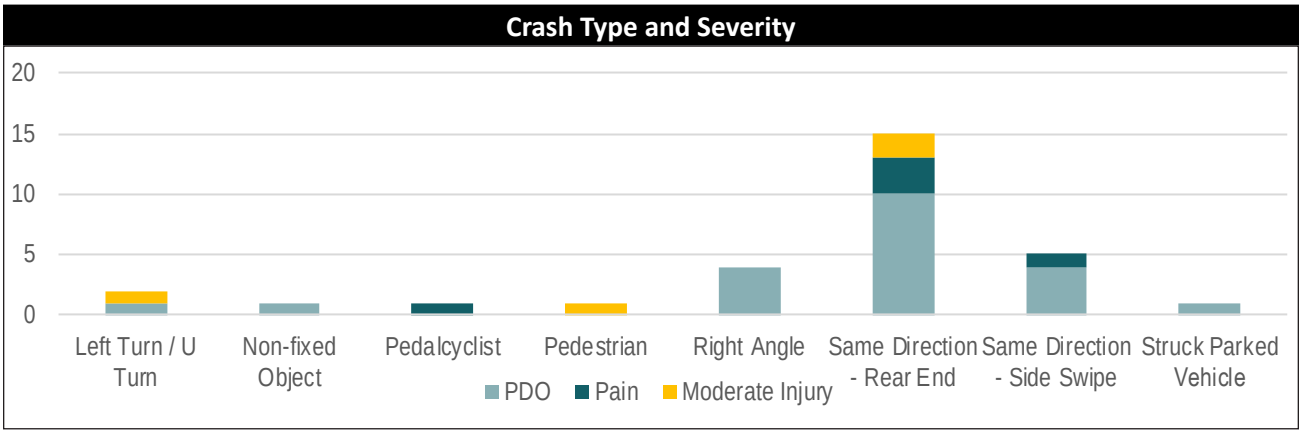


Figure 39 – Dr. Martin Luther King Drive: Crash Type RSA and Severity

Out of the 30 crashes between the years of 2010–2012, two-thirds of the crashes were same-direction crashes, with the majority of those being rear-end crashes. When compared to Ocean County, the RSA area has a significant over-representation of this crash type. The majority of these were property-damage-only crashes.

Crash Type	Count in Intersection	% in Intersection	% Ocean County
Same Direction - Rear End	15	50%	27%
Same Direction -Sideswipe	5	17%	8%
Right Angle	4	13%	20%
Struck Parked Vehicle	1	3%	11%
Left Turn / U Turn	2	7%	3%
Pedestrian	1	3%	1%
Pedalcyclist	1	3%	1%
Non-fixed Object	1	3%	**0%**
TOTAL	**30**	**100%**	

Figure 40 – Dr. Martin Luther King Drive: Crash Type RSA vs. County

6.4 Roadway Surface and Lighting Conditions

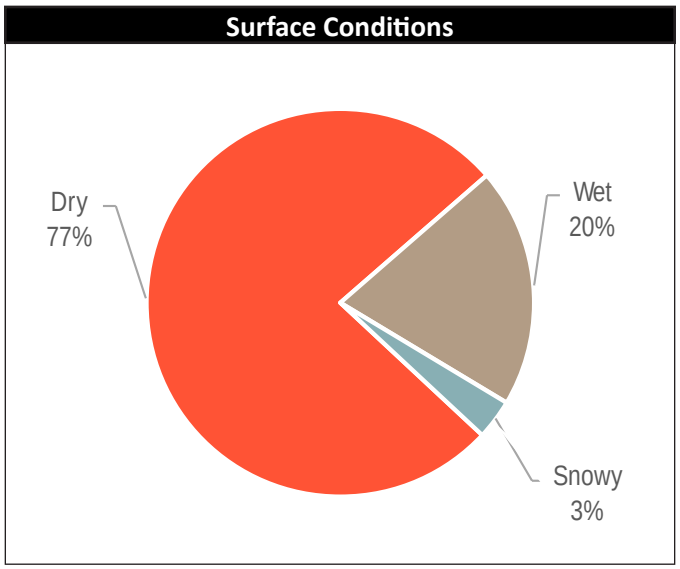


Figure 41 – Dr. Martin Luther King Drive: Surface Conditions

Out of the 30 crashes, less than a third of them occurred in wet conditions.

Fewer crashes (27 percent) occurred during dark conditions, as compared to Ocean County (30 percent).

>> 7.0 Identified Issues

Ref #	Issues
	General
	Traffic Operations
1	There is a significant problem of vehicles traveling at excessive speed.
2	Traffic volume will increase significantly with the new commercial and residential developments that are already in construction and those yet to be built.
3	Improvements to Airport Road (east of Oberlin) will increase volume coming from the Garden State Parkway.
4	There was a significant amount of aggressive driving behavior.
5	Left turns were often difficult to make.
	Traffic Signals
6	Above-the-roadway signal heads lack retroreflective strips, and some of the backplates are missing.
	Pedestrians and Bicycles
7	There are no bicycle accommodations.
8	Pedestrians were observed crossing midblock.
9	Some of the pedestrian accommodations were not ADA compliant.
	Lighting
10	Lighting may be insufficient for pedestrian and vehicle activity.
	Pavement Markings
11	Some of the pavement markings and crosswalks are faded.
	Miscellaneous
12	There is a large Orthodox religious community with non-traditional needs of the pedestrian infrastructure.
	Oberlin Avenue
	Traffic Operations
13	There were a significant number of left-turn crashes.
14	Because of the negative offset of the left-turn lanes, it is difficult to see oncoming traffic from Cedar Bridge Avenue, due to the shadow effect.
15	There is significant congestion for vehicles travelling northbound on Oberlin Avenue and waiting to turn left, especially school buses.
16	There is confusion with lane delineation on Oberlin Avenue; there is no striping but it often functions as two lanes approaching the intersection.
	Pedestrians and Bicycles
17	Pedestrians were required to walk on Cedar Bridge Avenue, as there are no sidewalks.
18	There are no pedestrian signal accommodations (no crosswalk, no ramps, no ped heads).
19	There are no bicycle facilities in this area, and no shoulders to safely accommodate bicyclists.
	Sight Distance
20	When vehicles are traveling eastbound on Cedar Bridge Avenue and turning right, the drivers' sight distance of pedestrians crossing Oberlin Avenue is limited by trees.
	Traffic Signals
21	The signal phasing does not adequately accommodate left-turn movements.
	Infrastructure
22	The curb radii are insufficient for the larger trucks.
23	The guiderail is damaged and the end treatments are substandard.
	New Hampshire Avenue
	Traffic Operations
24	There is a significant history of left-turn crashes.
25	Speed is probably a factor in left-turn crashes, as there is insufficient time to gauge gaps in traffic.

Ref #	Issues
26	There is significant left-turn queuing on New Hampshire Avenue, especially on the northbound side.
27	New Hampshire Avenue has a significant amount of traffic volume as a result of regional bypass traffic.
28	Many left-turning vehicles do not follow the lane line extensions, and cut into the opposite left turn lane.
	Traffic Signals
29	There are a significant number of left-turn crashes that are occurring during the permissive phase.
30	It may be difficult to judge the gap in traffic during left-turn movements during the permissive phase, due to the two through-lanes opposing the left-turn movement in all approaches.
31	There is limited clearance and change intervals, especially for left-turn timing phases.
32	There aren't adequate signal heads for each lane of travel.
	Pedestrians
33	There is lack of sidewalk connectivity.
34	The pedestrian push button on the northeast corner has been destroyed, and has a history of being knocked down.
35	There is no pedestrian crossing on the east side of the intersection, and no sign warning pedestrians not to cross there.
36	The pedestrian push button is located too far away from the ramp on the northwest corner.
	Sight Distance
37	Sight distance may be compromised by a crest on New Hampshire Avenue north of the intersection, and on Cedar Bridge Avenue west of the intersection.
	Lighting
38	Lighting of the baseball stadium and electronic messaging signs may interfere with roadway lighting.
	Infrastructure
39	The guiderails on the southeast and southwest corners have inadequate end terminals.
40	The very wide intersection increases driver confusion.
	Signs
41	Wayfinding signs may be insufficient for ballpark patrons who are unfamiliar with the area.
	Arlington Avenue (and other unsignalized intersections)
	Traffic Operations
42	Arlington Avenue and Dr. Martin Luther King Drive are used as a bypass for regional congestion.
43	Speed is an issue in this transition zone, where the industrial/rural area approaches the urban area.
	Pedestrians
44	There were six pedestrian crashes between 2008-2012. One was fatal, and one caused incapacitating injury.
45	There are no accommodations for pedestrians to cross Cedar Bridge Avenue.
46	There is significant pedestrian activity, including children and strollers, as the area is residential with small businesses.
47	The roadway is very wide and dangerous for pedestrians to cross.
	Lighting
48	Pedestrian and vehicle lighting may be insufficient.
	Dr. Martin Luther King Drive
	Traffic Operations
49	On eastbound Cedar Bridge Avenue, vehicles are using the shoulder as a right turn lane.
50	The driveway is directly adjacent to the intersection and is confusing.
51	Dr. Martin Luther King Drive northbound is marked as one lane, but functions as two lanes.
	Pedestrians
52	Pedestrian heads are activated only with actuation, which is a problem for the orthodox community.
53	There is a missing crosswalk on the eastern side of the intersection.

Visualizing Issues—General

Wide cross section encourages speeding

Many people unfamiliar with the area may come to the ballpark

There are no retroreflective back plates

Pedestrians crossing midblock

Bicycles in lane of traffic in area with no shoulders

Pedestrian accommodations are lacking

Visualizing Issues—Oberlin Avenue and Cedar Bridge Avenue

Many conflicts with left-turning movement

Backplates lacking retroreflective strips

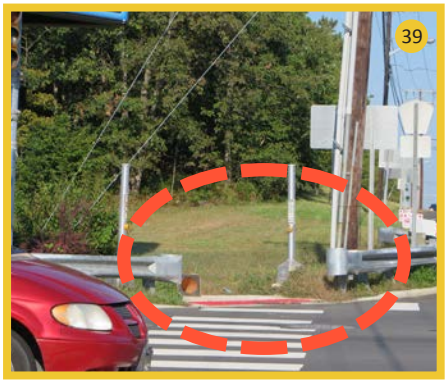
One lane functions as two lanes on Oberlin Avenue

Many school buses at this intersection

Damaged guiderail on southeast corner

There are no pedestrian accommodations although there is a push button

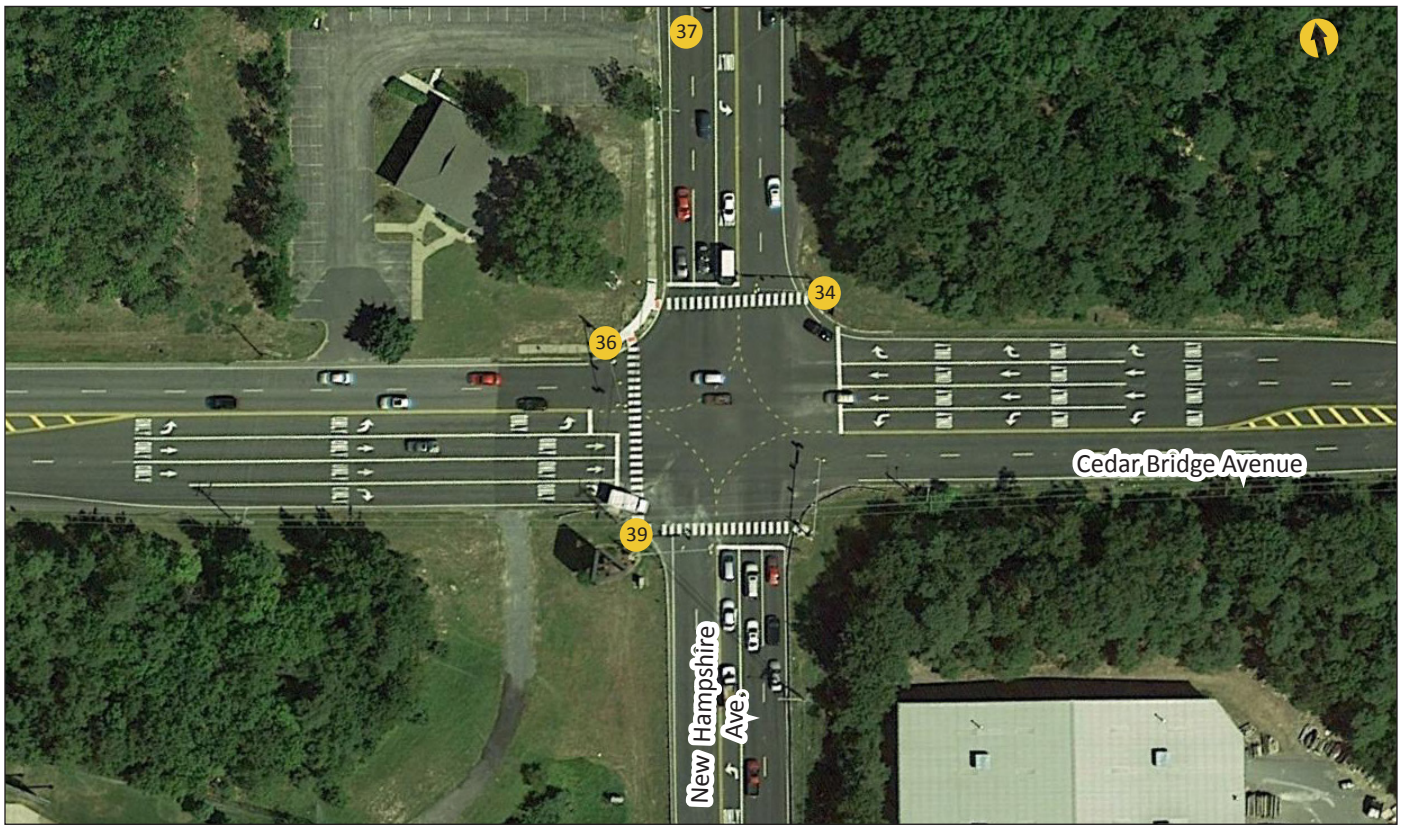
Visualizing Issues—New Hampshire Avenue and Cedar Bridge Avenue



Guiderail not up to design standards

Conflict created by left turning movement

Pedestrian push button broken off from pedestal

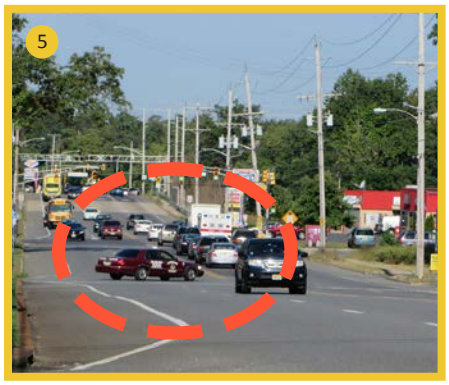


Significant traffic volume

Pedestrian push button too far from ramp

Crest of southbound New Hampshire Avenue

Visualizing Issues—Arlington Avenue and Cedar Bridge Avenue



Difficulty making left turns

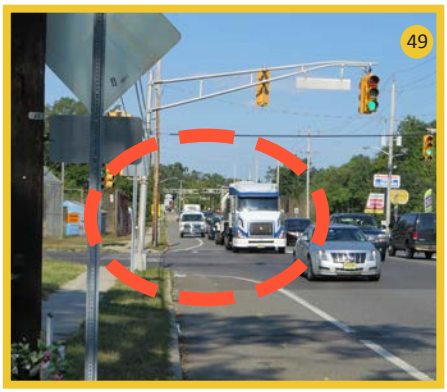
Wide cross section encourages speeding

This is a residential and retail area and speed is an issue

Wide roadway with no marked crosswalk

Lack of ADA accommodations

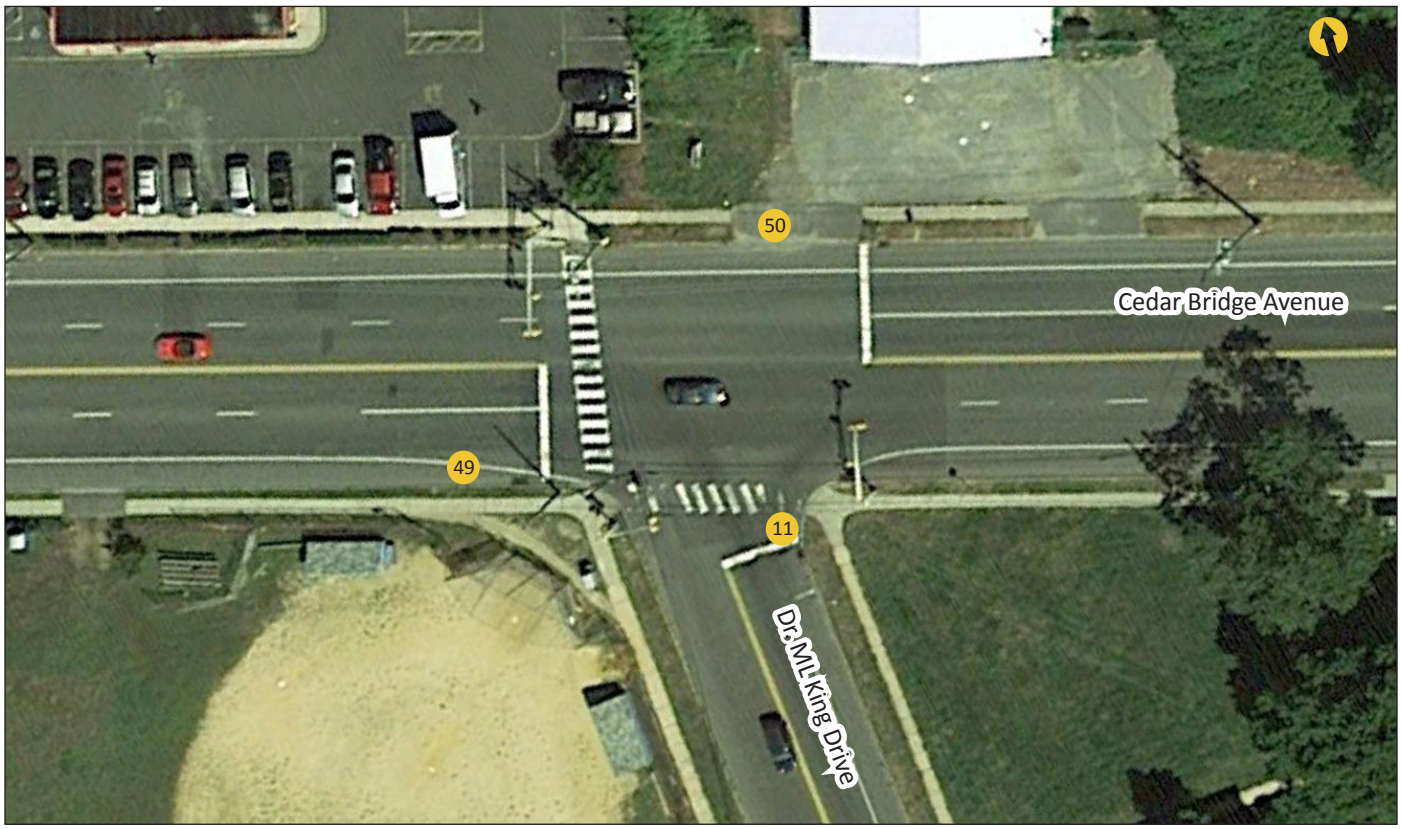
Visualizing Issues—Dr. Martin Luther King Drive and Cedar Bridge Avenue



Shoulder is used as right turn lane

Driveway access on north side of intersection creates conflict

There are no bicycle accommodations



Faded pavement markings

Speed limit stepdown not located prior to residential area

Dr. ML King Drive used as a bypass for regional congestion

>> 8.0 Recommendations

Ref #		Safety Benefit	Time Frame	Cost	Jurisdiction	Issue Ref #
A - General						
	Traffic Operations					
1	Support the study of regional traffic patterns.	Medium	Long	$	Ocean County, NJDOT & Lakewood	2,27,42
	Pedestrians and Bicycles					
2	Install ADA compliant pedestrian accommodations at all intersections.	Medium	Medium	$$	Ocean County	9
3	Revise ADA accommodations where they do not meet design standards.	Medium	Medium	$$	Ocean County	9,18
4	Consider conducting a study of pedestrian and bicycle use in the corridor and evaluate connectivity requirements.	Medium/ High	Short	$	Ocean County	7,8,33
5	All pedestrian actuation needs to be appropriate to the unique needs of the Orthodox community.	High	Short	$	Ocean County	12
	Traffic Signal					
6	Add backplates where lacking and install retroreflective strips on all backplates for above-the-roadway signal heads, especially on east-west roads.	High	Short	$	Ocean County	6
	Lighting					
7	Professional staff should conduct a formal engineering review of existing lighting conditions to evaluate where both vehicles and pedestrian level lighting can be enhanced.	Medium/ High	Medium	$$	Ocean County	10
	Education and Enforcement					
8	Increased enforcement would help reduce the problem of speeding.	High	Short	$$	Lakewood PD	1, 4
9	Consider implementing a Street Smart education program.	Medium	Short	$	Lakewood & NJTPA	8
B - Oberlin Avenue						
	Traffic Operations					
1	Revise lane pavement markings to have head-to-head alignment of left-turn lanes.	High	Long	$$	Ocean County	13,14
2	Consider reducing the inside lane width on Cedar Bridge Avenue to 11 feet to help control excessive speeding.	Medium/ High	Medium	$	Ocean County	1
	Pedestrians and Bicycles					
3	Add marked crosswalks across Cedar Bridge Avenue.	Medium	Low	$	Ocean County	18
4	Add countdown pedestrian signal heads.	Medium/ High	Medium	$$	Ocean County	18
5	Install sidewalks or a multi-use path along Cedar Bridge Avenue, as there are no shoulders in this area.	High	Long	$$$	Lakewood Twp	17,19
6	Consider the installation of pedestrian refuge islands across Cedar Bridge Avenue to accommodate the students from the school who will likely access the new business across Cedar Bridge Avenue.	High	Long	$$	Ocean County	18
7	Consider the installation of pedestrian refuge islands across Oberlin Avenue, using the existing island.	Medium	Long	$$	Ocean County	18

Ref #		Safety Benefit	Time Frame	Cost	Jurisdiction	Issue Ref #
	Pavement Condition and Markings					
8	Stripe two lanes on Oberlin, one for right/through and one for left turn only, by reducing median width.	Medium/ Low	Long	$$$	Ocean County	16
	Traffic Signal					
9	Revise signal phasing on Cedar Bridge Avenue, to allow left turns on protected-only mode.	High	Short	$	Ocean County	13
10	Install Red Light Running cameras if allowed.	High	Long	$	Ocean County	1
11	Add retroreflective back plates for all above-the-roadway signal heads.	Medium	Short	$	Ocean County	6
	Infrastructure					
12	Evaluate if guide rail is warranted and either remove if it is not or replace damaged guiderail.	Medium	Short	$$	Ocean County	23
13	Evaluate if the radii can accommodate turning trucks and buses, especially on the southeast corner.	Medium/ Low	Medium	$$	Ocean County	22
14	Consider installing a mountable apron to visually change the radius.	Medium/ Low	Long	$$	Ocean County	22
15	Consider widening Cedar Bridge Avenue in order to add a dedicated left-turn lane.	High	Long	$$$	Ocean County	13
	C - New Hampshire Avenue					
	Traffic Signal					
1	Revise signal phasing so all left turns are protected-only mode.	High	Short	$	Ocean County	24
2	Add signal heads so there is one far-right signal head for each through-travel lane.	Small	Medium	$$	Ocean County	32
3	Consider increasing the yellow and red clearance time above the minimum required times, especially for left turns.	Medium/ High	Short	$	Ocean County	24
4	Consider the addition of a dynamic “signal ahead” sign at the crest of New Hampshire Avenue southbound.	Small	Long	$$$	Ocean County	37
	Traffic Operations					
5	Consider reducing the inside lane width to 11 feet to help control excessive speeding.	Medium/ High	Short	$	Ocean County	1
6	May need dual left-turn lanes, if phasing is revised to protected-only.	Medium	Long	$$$	Ocean County	24
7	Consider installation of a roundabout.	High	Long	$$$	Ocean County	24
	Pedestrians and Bicycles					
8	Install sidewalks or a multi-use path along Cedar Bridge Avenue, as there are no shoulders in this area.	High	Long	$$$	Lakewood Twp	33
9	Relocate and replace the knocked down pedestrian push button.	Medium/ High	Short	$	Ocean County	34
10	Add the missing crosswalk on the east side of the intersection.	Medium/ High	Medium	$	Ocean County	35
	Infrastructure					
11	Either remove or replace guide rail so it meets design standards.	Medium/ Low	Medium	$$	Ocean County	39
	D - Arlington Avenue (applied to other unsignalized intersections)					
	Traffic Operations					
1	Consider conducting a speed study to evaluate if the step-down speed limit can be sited in advance of the residential area, for traffic on Cedar Bridge Avenue.	Medium/ High	Short	$	Ocean County	43

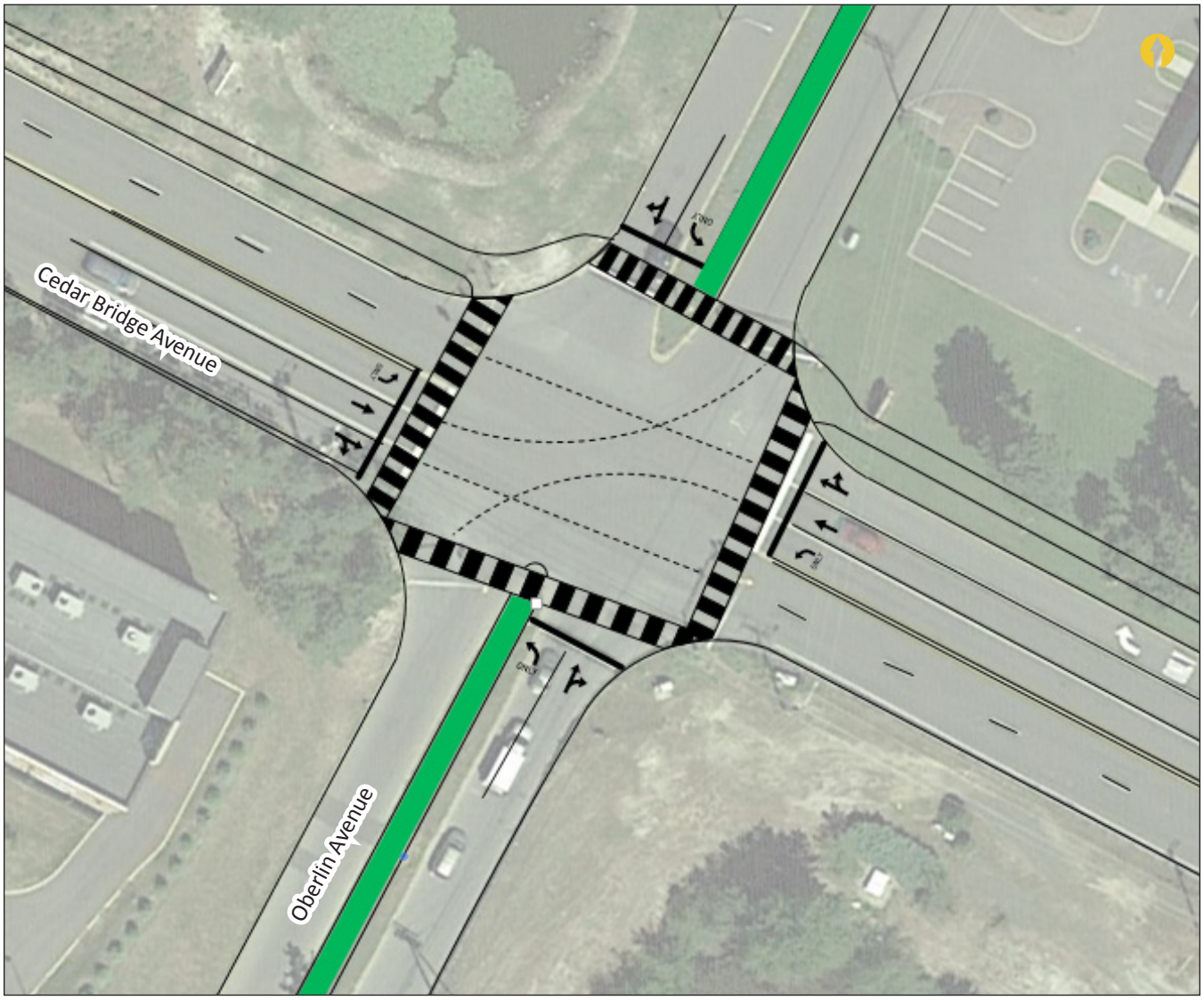
Ref #		Safety Benefit	Time Frame	Cost	Jurisdiction	Issue Ref #
2	Consider the installation of transverse rumble strips in speed step-down area.	Medium/ High	Short	$	Ocean County	43
3	Consider the addition of a two-way left-turn lane in the corridor between Arlington Avenue and Dr. ML King Drive, using width from the existing shoulders.	Medium/ High	Long	$	Ocean County	5
	Pavement Markings					
4	Refresh roadway markings that are faded.	Medium	Short	$	Ocean County	11
	Pedestrians and Bicycles					
5	Consider the installation of a median including a pedestrian refuge island at the unsignalized intersections.	High	Medium	$	Ocean County	44,45, 46,47
6	Consider the installation of a HAWK signal or an RRFB to increase visibility of pedestrians, with accommodations for the Orthodox community.	High	Long	$$	Ocean County	44,45, 46,47
7	Add high visibility crosswalks across Cedar Bridge Avenue.	High	Short	$	Ocean County	45
8	Installation of bump-outs on Cedar Bridge Avenue to reduce the width of the crosswalk.	Medium/ High	Long	$$	Ocean County	44,45, 46,47
9	Fixed timing or pedestrian recall at Dr. Martin Luther King Drive would also create gaps in traffic for pedestrians further down Cedar Bridge Avenue at Ashley and Arlington.	Medium	Short	$	Ocean County	44,45, 46,47
10	Create a dedicated bicycle lane in the shoulders in the corridor near Arlington Avenue and Dr. Martin Luther King Drive.	Medium	Medium	$	Ocean County	7
	E - Dr. Martin Luther King Road					
	Traffic Operations					
1	Consider the installation of a dedicated left-turn lane for traffic to turn onto Dr. Martin Luther King Drive. [See Graphics on p. 38.]	Medium/ High	Long	$$	Ocean County	5
2	Consider the installation of a two-way left-turn lane between Dr. Martin Luther King Drive and Ashley Avenue.	Medium/ High	Long	$$	Ocean County	5
3	Revise property access at the signalized driveway on the north side of Cedar Bridge Avenue.	Medium	Long	$$$	Ocean County	50
	Pedestrians					
4	Add the crosswalk on the east side of the intersection.	Medium/ High	Long	$	Ocean County	53
	Pavement Markings					
5	Stripe two lanes on Dr. Martin Luther King Drive, approaching Cedar Bridge Avenue.	Medium	Short	$	Ocean County	51

>> Appendix A—Recommended Graphics

9.0 Oberlin Avenue—Two Alternatives

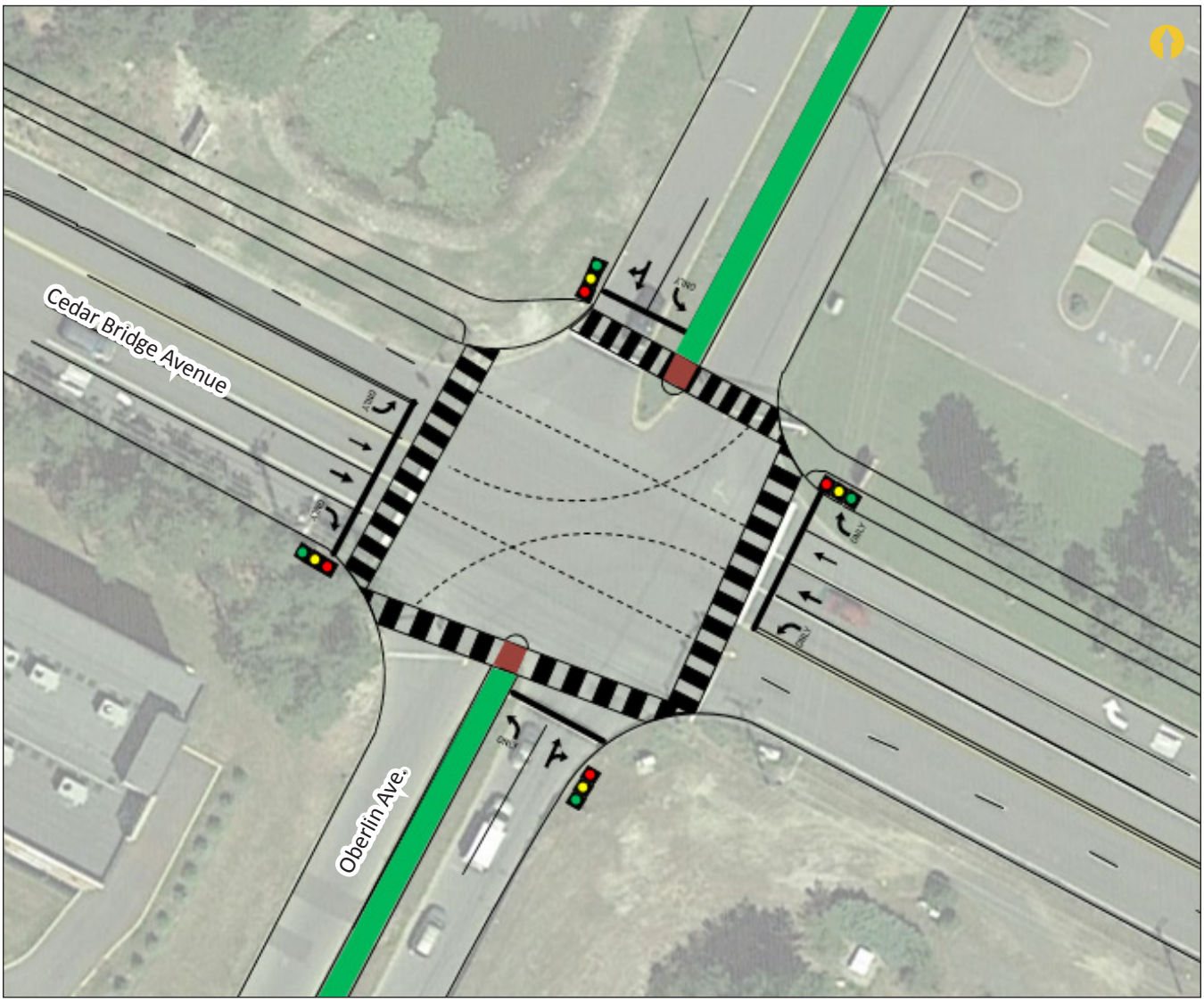
9.1 Alternative 1—Striping on Oberlin Avenue

- Narrow median on Oberlin Avenue
- Pedestrian refuge island crossing Oberlin Avenue
- Stripe two lanes on Oberlin approaching Cedar Bridge Avenue
- Add marked crosswalks across Cedar Bridge Avenue
- Sidewalk or multi-use path
- Designated left turn lanes with protected only



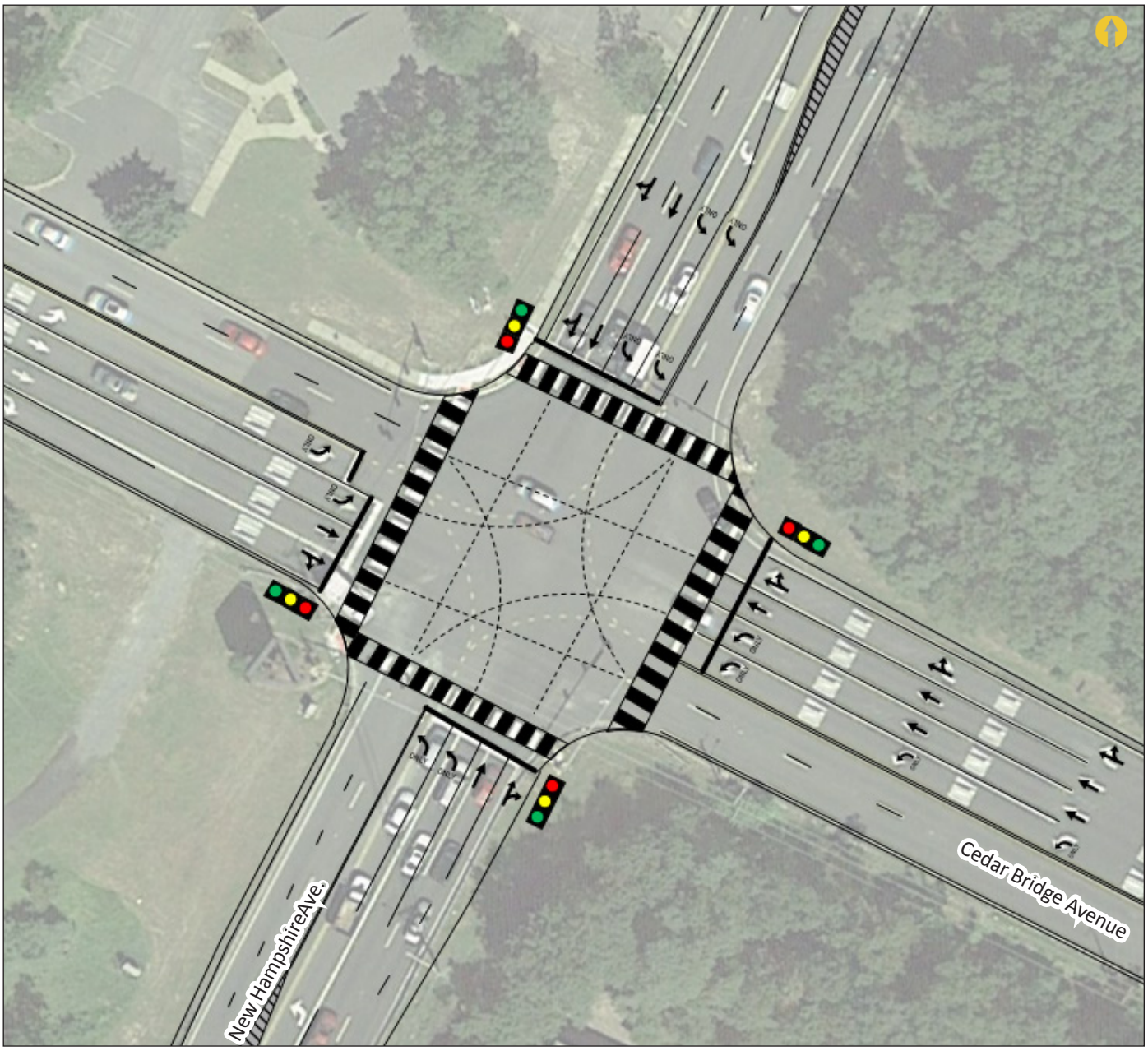
9.2 Alternative 2—Additional Through-Lane

- Widen Cedar Bridge Avenue in order to add lane: right-turn-only, two through-lanes, and left-turn-only
- Narrow median on Oberlin Avenue
- Pedestrian refuge island crossing Oberlin Avenue
- Stripe two lanes on Oberlin approaching Cedar Bridge Avenue
- Add marked crosswalks across Cedar Bridge Avenue
- Sidewalk or multi-use path
- Designated left-turn lanes with protected-only mode

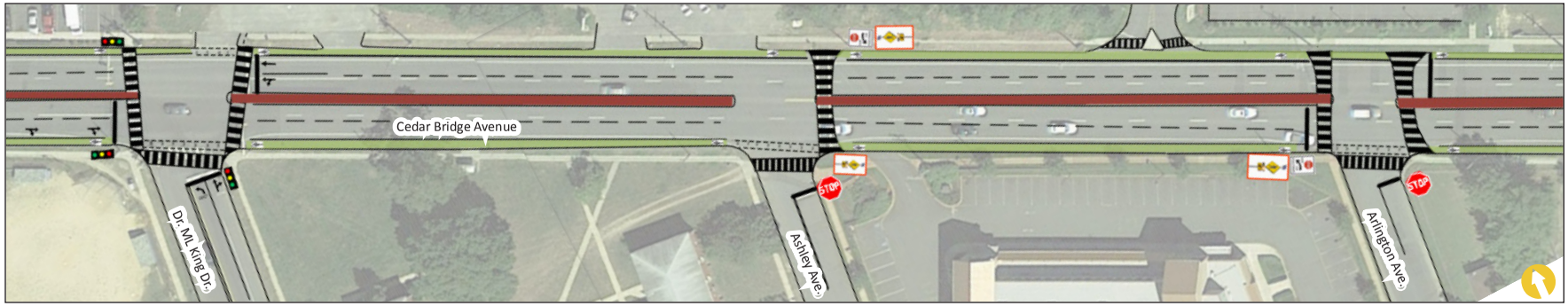


10.0 New Hampshire Avenue

- Widen New Hampshire Avenue in order to have dual left-turn lanes.
- Protected-only left turns
- Cedar Bridge Avenue lanes approaching New Hampshire Avenue, same as above.
- Add missing crosswalk on east side of intersection

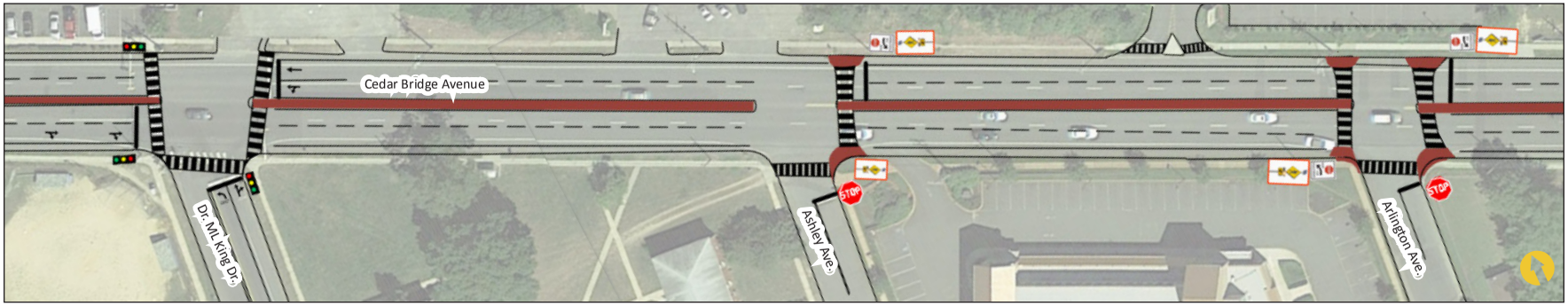


11.1 Alternative 1a—Bike Lanes and Median



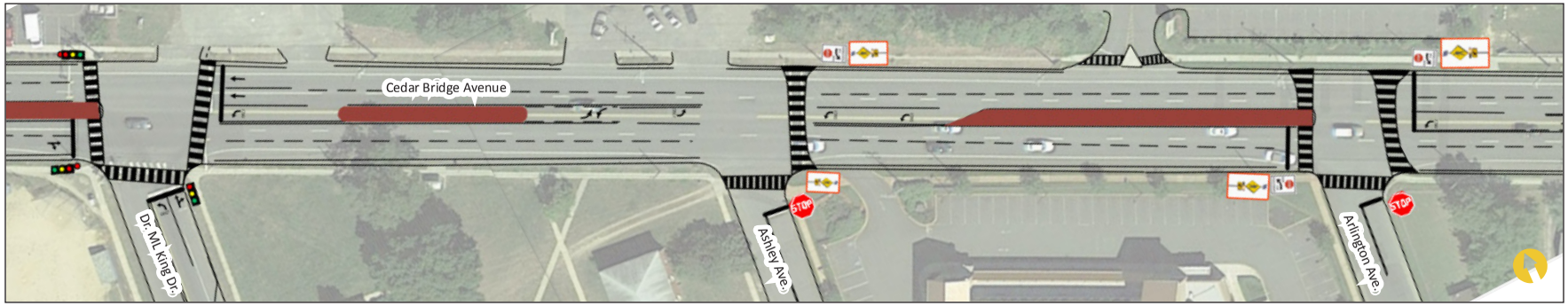
- Install bike lanes on each side of roadway.
- Curbed median between Arlington Avenue and Dr. Martin Luther King Drive
- Pedestrian refuge islands
- Install RRFBs at unsignalized intersections.
- Add marked crosswalks at Arlington Avenue.
- Initially preferred by RSA Team

11.2 Alternative 1b—Bump-outs at Unsignalized Intersections



- Curbed median between Arlington Avenue and Dr. Martin Luther King Drive
- Pedestrian refuge islands
- Bump-outs at Ashley Avenue and Arlington Avenue
- Install RRFBs at unsignalized intersections.
- Add marked crosswalks at Arlington Avenue.
- No dedicated bicycle lane, as bump-outs are likely to interfere with cyclists' movement (cyclists would have to merge with vehicular traffic at intersections to bypass bump-outs); accommodations would be needed for cyclists at the bump-outs.

11.3 Alternative 2—Partial Two-Way Left-Turn Lane



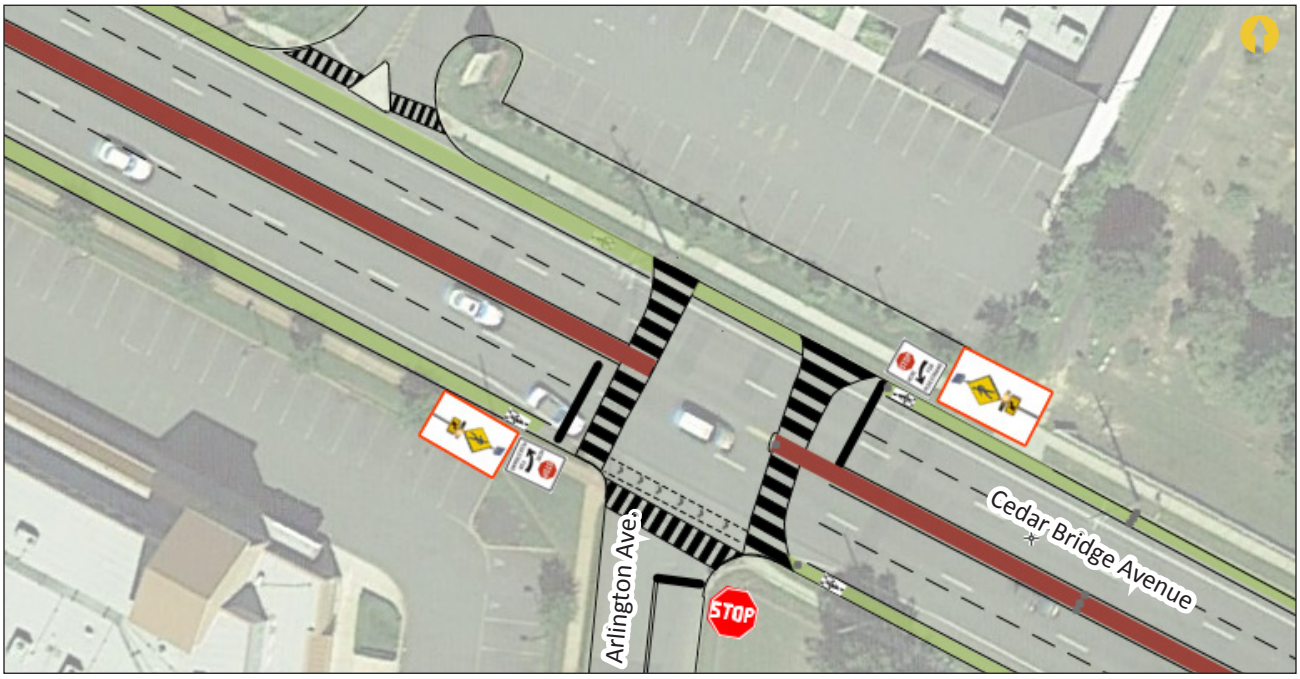
- Two-way left-turn lane*
- Pedestrian refuge islands at one crosswalk at Dr. Martin Luther King Drive, and at Arlington Avenue
- Install RRFBs at unsignalized intersections
- Add marked crosswalks at Arlington Avenue

*Note that aspects of this alternative would provide safer pedestrian accommodations at some intersections, but it would also increase the number of live lanes for pedestrians to cross at intersections, without pedestrian refuge islands. This alternative also requires the elimination of roadway shoulders that were observed in use by cyclists and scooter-users, possibly forcing cyclists onto the sidewalks if they are uncomfortable sharing a travel lane with the fast-moving, motorized traffic.

12.0 Arlington Avenue—Three Alternatives (zoomed in from pp. 35-36)

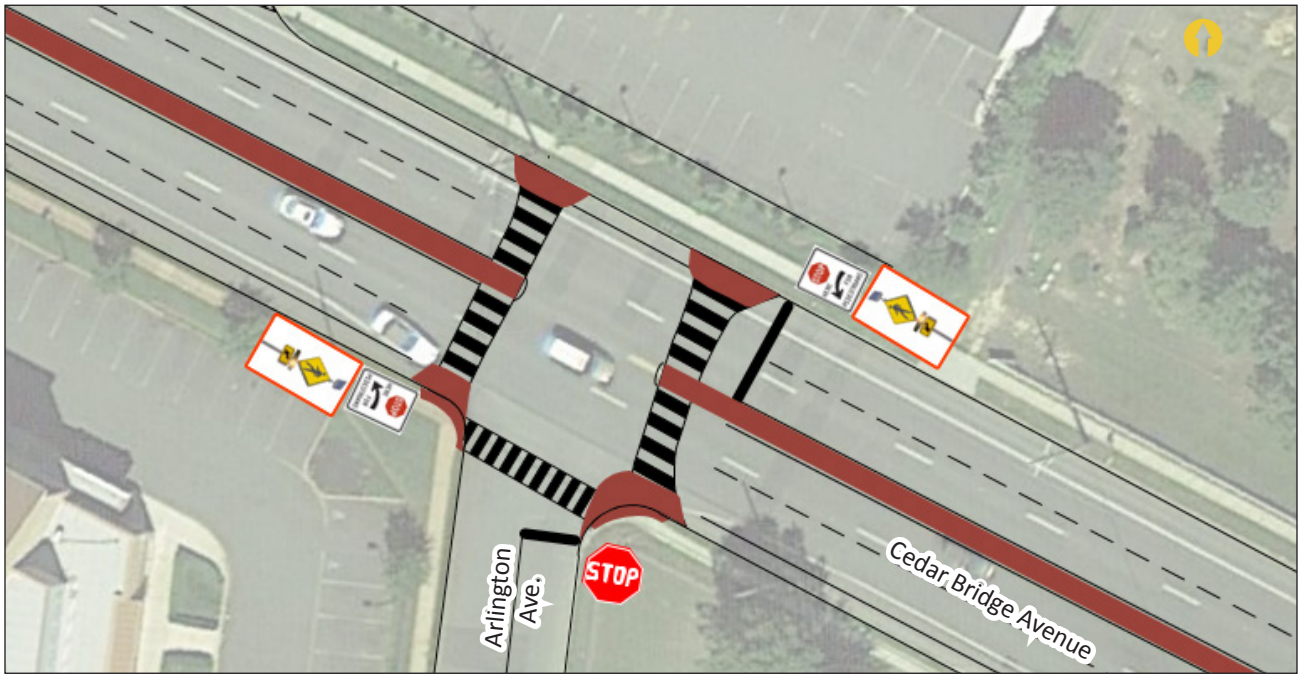
12.1 Alternative 1a—Bike Lanes and Median (photosimulation below)

- Curbed median on Cedar Bridge Avenue with pedestrian refuge island
- Installation of RRFBs
- Installation of dedicated bicycle lanes



12.2 Alternative 1b—Bump-outs at Unsignalized Intersections (photosimulation below)

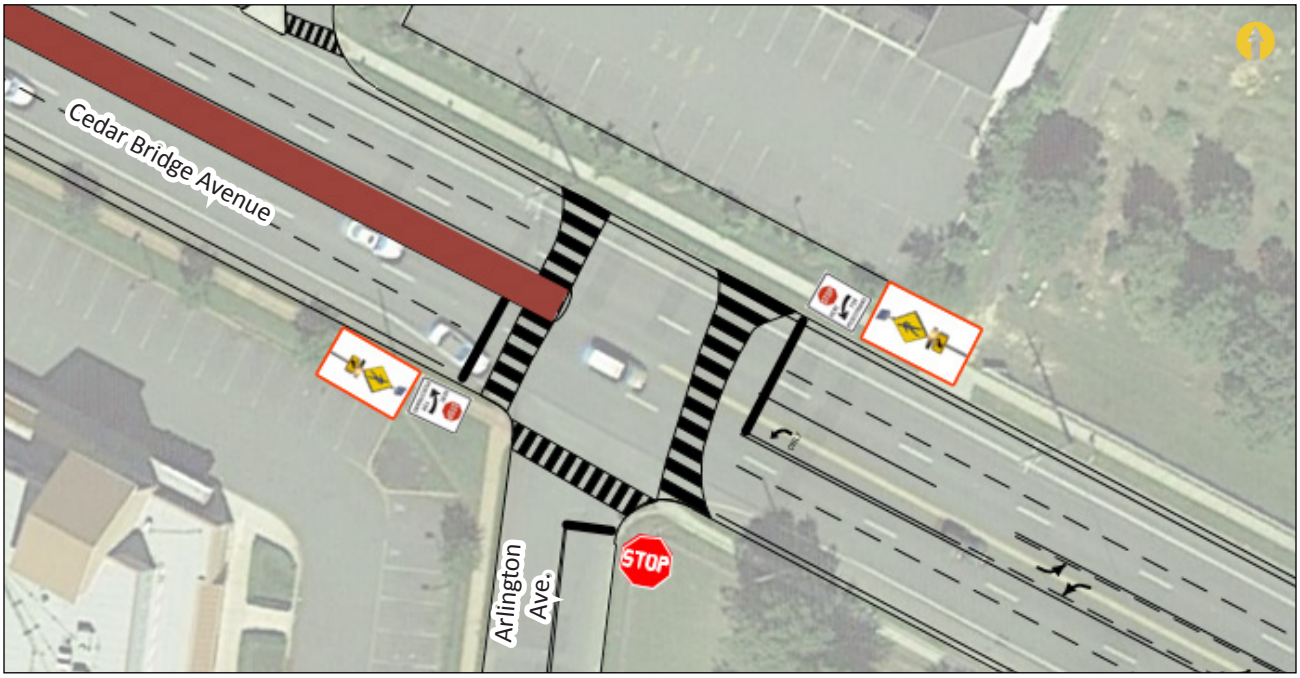
- Curbed median on Cedar Bridge Avenue with pedestrian refuge island
- Installation of RRFBs
- Bump-outs*



* Several cyclists were observed using the shoulder facilities for bicycle travel. To continue to accommodate this use, bump-out designs might include curb-cuts for shared refuge space or travel, so the cyclists need not merge into the regular vehicle travel lanes at each bumped-out intersection.

12.3 Alternative 2 - Two-Way Left-Turn Lane

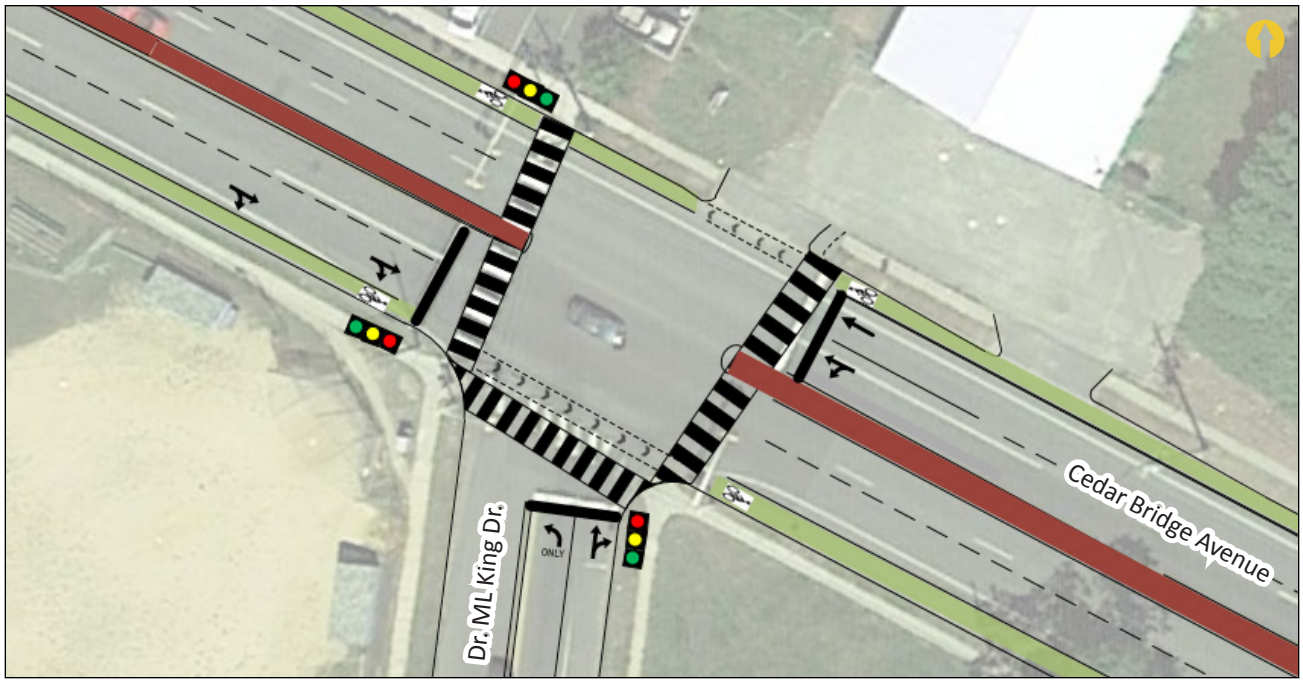
- Two-way left-turn lane on east side of intersection (see note referring to decreased de facto cyclists' facilities on page 36)
- Pedestrian refuge island on west side of intersection
- Installation of RRFBs
- Narrow shoulder



13.0 Dr. Martin Luther King Drive—Three Alternatives (zoomed in from pp. 35-36)

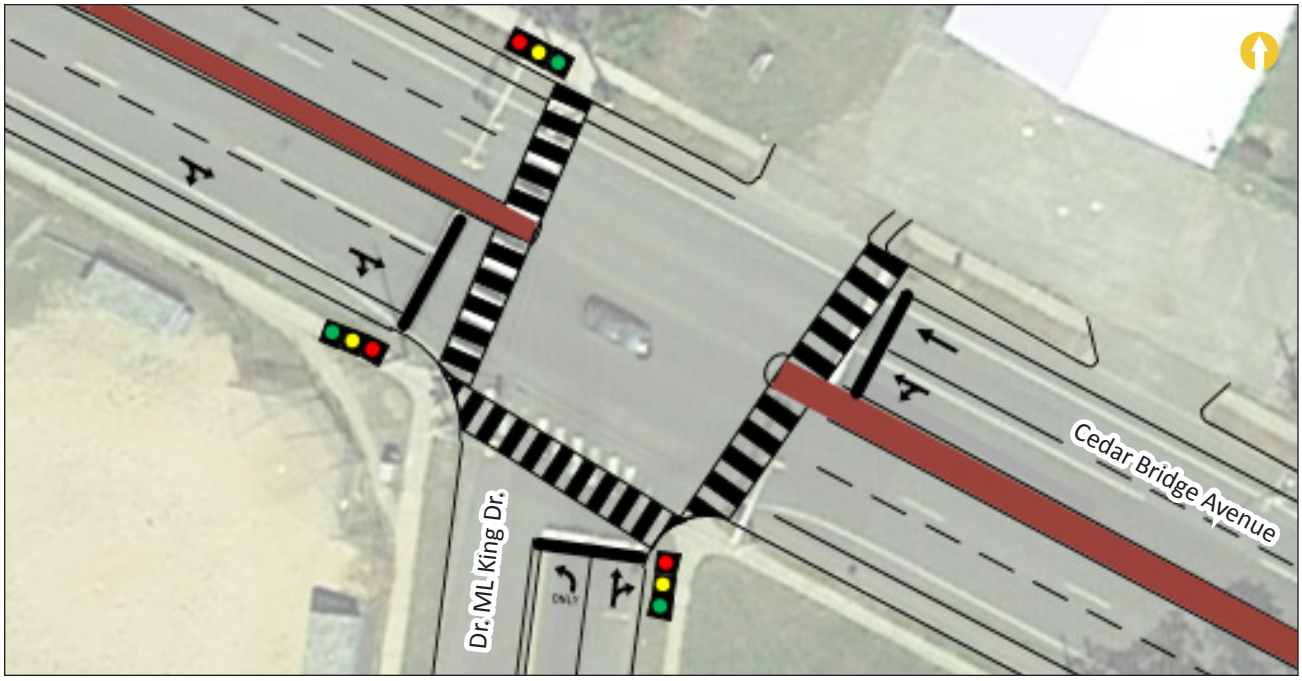
13.1 Alternative 1a—Bike Lanes and Median

- Two delineated lanes on Dr. Martin Luther King Drive approaching Cedar Bridge Avenue
- Curbed center median on Cedar Bridge Avenue with pedestrian refuge island
- Installation of dedicated bicycle lanes
- Additional crosswalk on east leg (see inset and note on page 40)



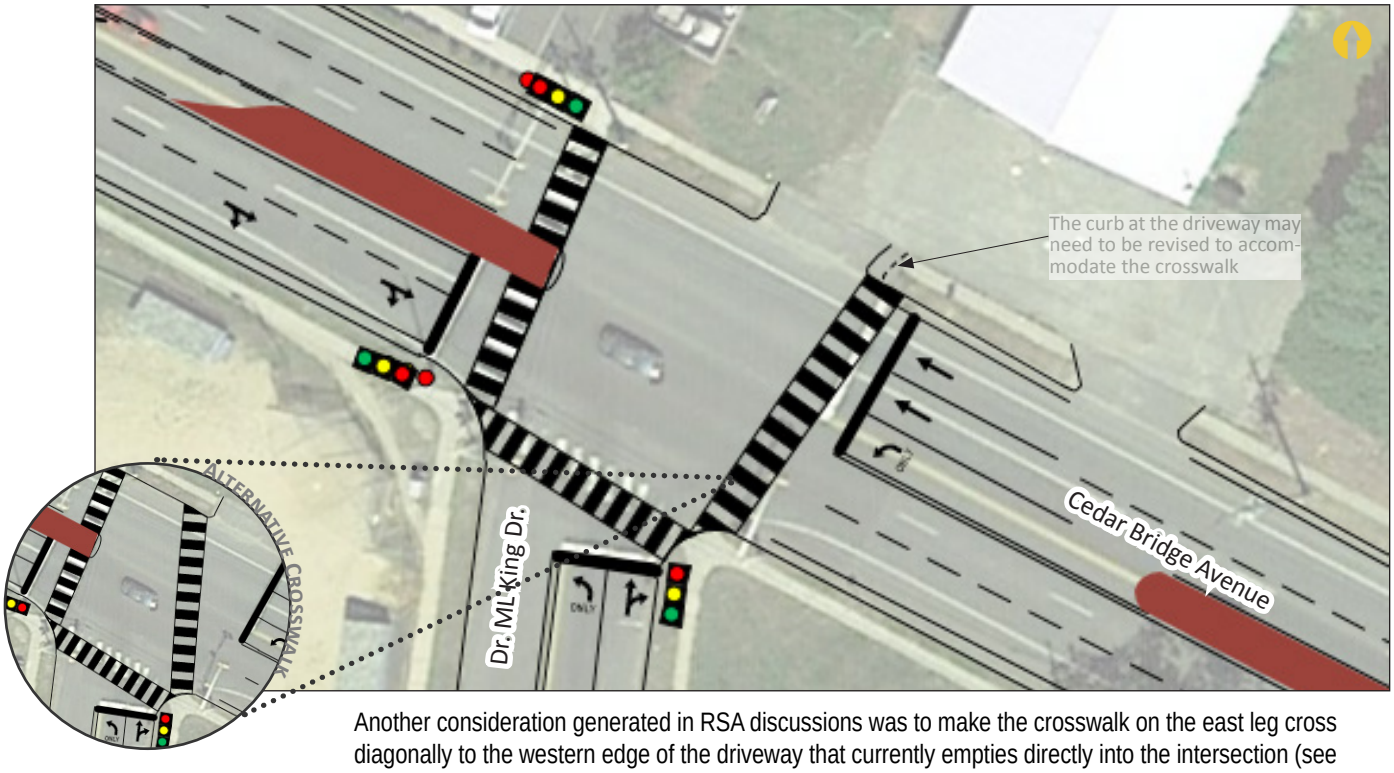
13.2 Alternative 1b—Bump-outs at Unsignalized Intersections

- Two delineated lanes on Dr. Martin Luther King Drive approaching Cedar Bridge Avenue
- Curbed center median on Cedar Bridge Avenue with pedestrian refuge island
- No dedicated bicycle lanes (bump-outs at Arlington Avenue)
- Additional crosswalk on east leg (see inset below for alternative layout)



13.3 Alternative 2—Two-way left-turn lane

- Two delineated lanes on Dr. Martin Luther King Drive approaching Cedar Bridge Avenue
- Two-way left-turn lane (see note referring to decreased de facto cyclists' facilities on page 36)
- Additional crosswalk on east leg (see inset and note below)

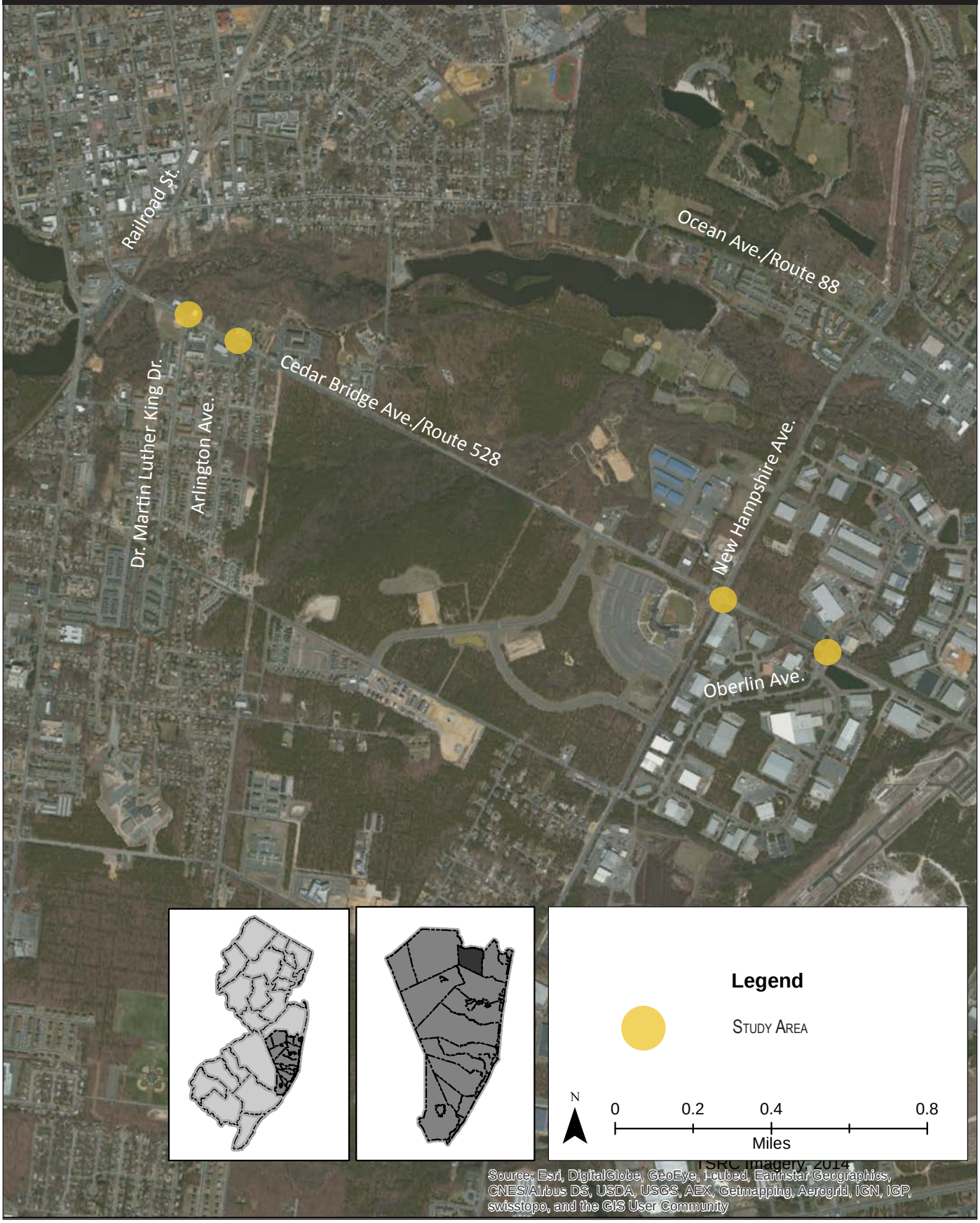


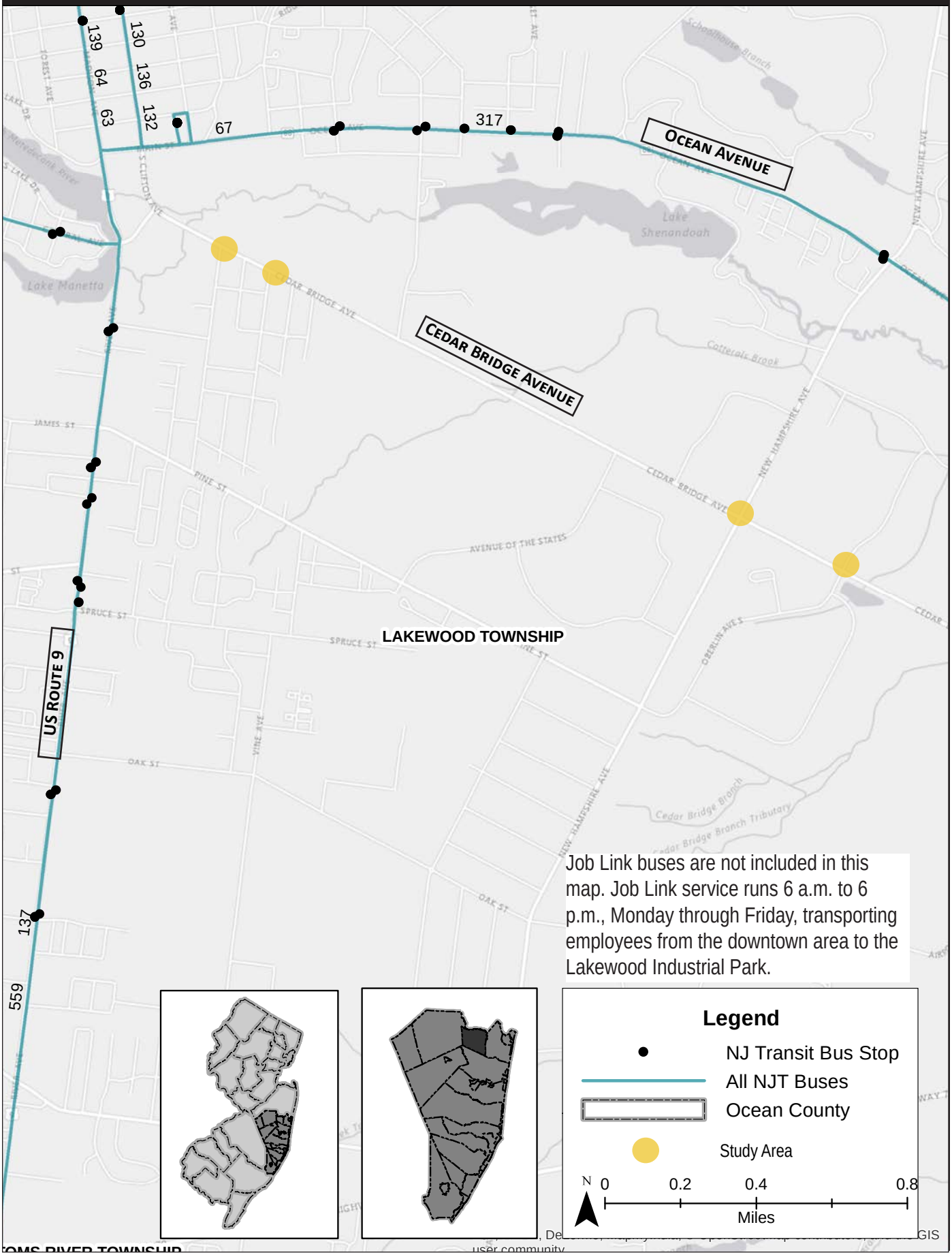
Another consideration generated in RSA discussions was to make the crosswalk on the east leg cross diagonally to the western edge of the driveway that currently empties directly into the intersection (see inset).

>> Appendix B—RSA Team

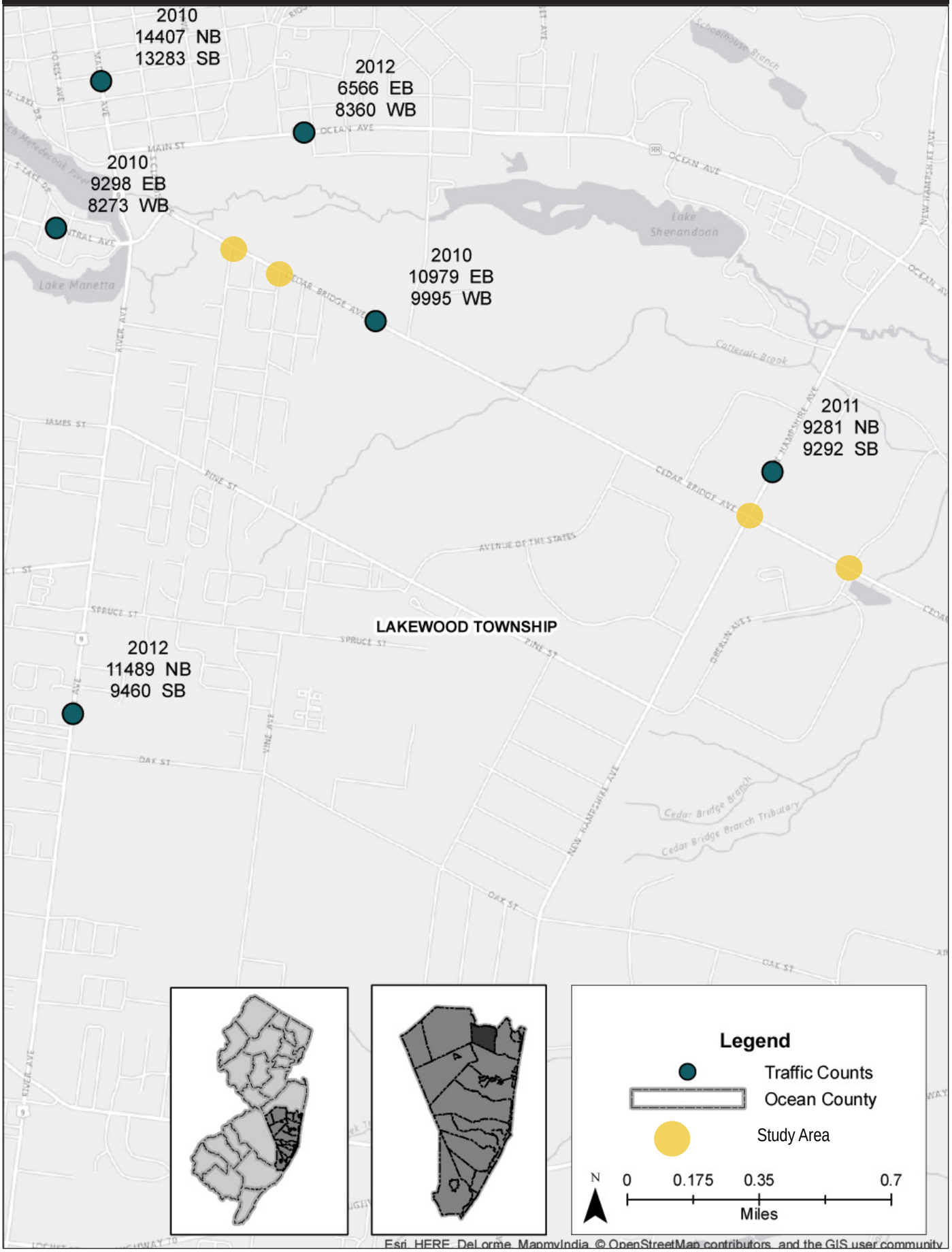
Name	Representing	E-mail
Betsy Harvey	Alan M. Voorhees Transportation Center	ebharvey@ejb.rutgers.edu
Andy Kaplan	Center for Advanced Infrastructure and Transportation	andy.kaplan@rutgers.edu
Sally Karasov	Center for Advanced Infrastructure and Transportation	sally.karasov@rutgers.edu
Aimee Jefferson	Center for Advanced Infrastructure and Transportation	aimee.jefferson@rutgers.edu
Jerry Foster	Greater Mercer Transportation Management Association	jfoster@gmtma.org
Jeffrey W. Staiger	Lakewood Engineer	jeffstaiger@lakewoodnj.gov
Sgt. Frank Work	Lakewood Police Department	fwork@lakewoodpolicenj.com
Bill Butterworth	Lakewood Police Department	wbutterworth@lakewoodpolicenj.com
Virgilio Tan	New Jersey Department of Transportation	Virgilio.Tan@dot.nj.gov
Jemini Shah	New Jersey Department of Transportation	Jemini.Shah@dot.nj.gov
Christine Mittman	North Jersey Transportation Planning Authority	cmittman@njtpa.org
Megan Kelley	North Jersey Transportation Planning Authority	mkelly@njtpa.org
Frank S. Scarantino	Ocean County Engineering	OCEngineering@co.ocean.nj.us
Mark Jehnke	Ocean County Engineering	MJehnke@co.ocean.nj.us
John Ernst	Ocean County Engineering	jernst@co.ocean.nj.us
Craig Sneddon	Ocean County Engineering	kerrys3@comcast.net
Shaw Quandt	Ocean County Engineering	squandt@co.ocean.nj.us
Jen Protonentis	Ocean County Engineering	JProtonentis@co.ocean.nj.us
Vicky Pecchioli	Ocean County Planning Department	VPecchioli@co.ocean.nj.us
Rebecca Ziefle	Ocean County Planning Department	RZiefle@co.ocean.nj.us

Study Area


Railroad St.
Ocean Ave./Route 88
Dr. Martin Luther King Dr.
Arlington Ave.
Cedar Bridge Ave./Route 528
New Hampshire Ave.
Oberlin Ave.
Legend
Study Area
N
0
0.2
0.4
0.8
Miles
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

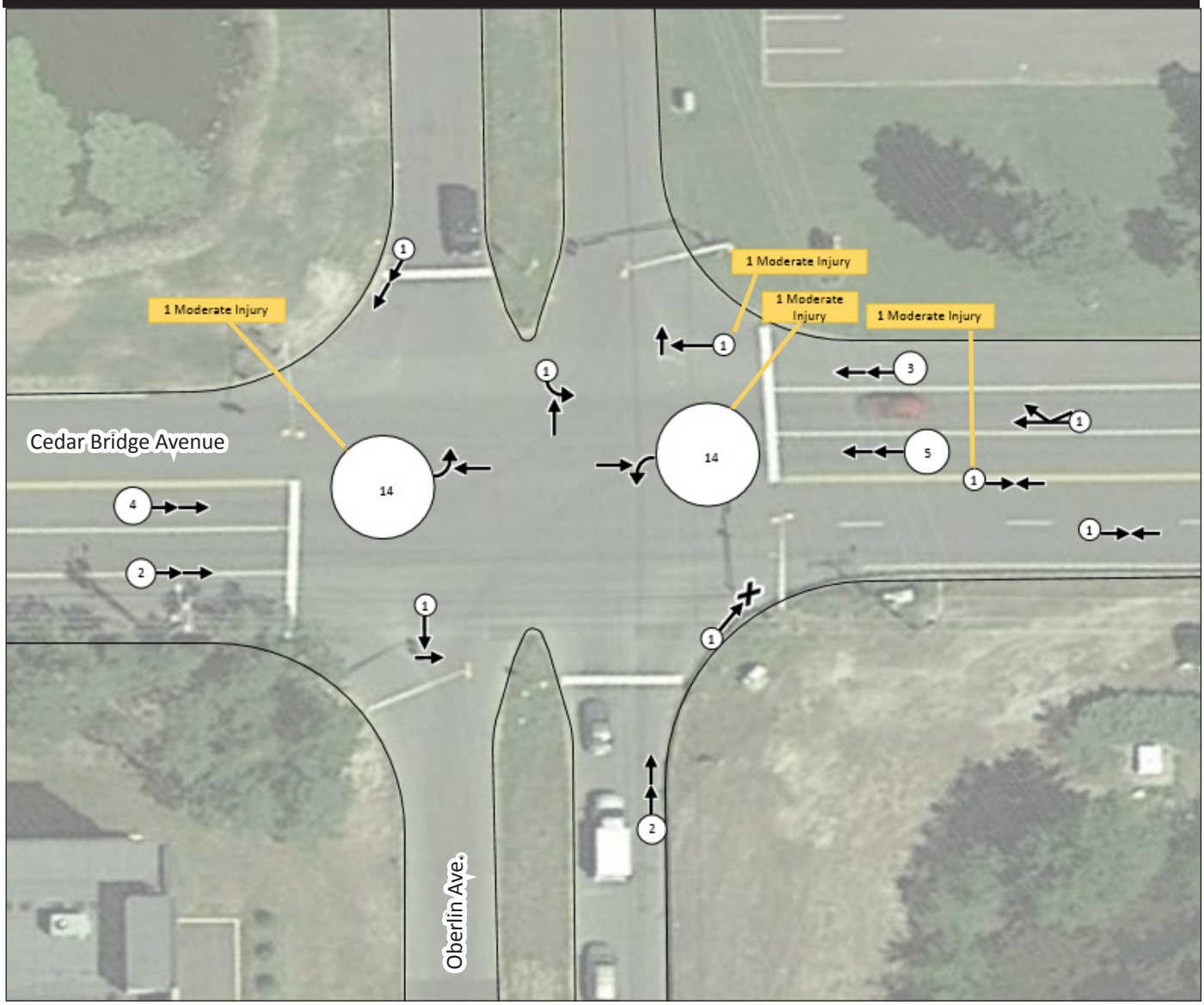

139
64
63
130
136
132
67
317
OCEAN AVENUE
CEDAR BRIDGE AVENUE
LAKEWOOD TOWNSHIP
US ROUTE 9
137
559
Lake Manetta
Lake Shenandoah
Schoolhouse Branch
Cottrells Brook
Cedar Bridge Branch
Cedar Bridge Branch Tributary
JAMES ST
PINE ST
SPRUCE ST
OAK ST
AVENUE OF THE STATES
NEW HAMPSHIRE AVE
OBERLIN AVE S
VINE AVE
Job Link buses are not included in this map. Job Link service runs 6 a.m. to 6 p.m., Monday through Friday, transporting employees from the downtown area to the Lakewood Industrial Park.
Legend
NJ Transit Bus Stop
All NJT Buses
Ocean County
Study Area
N
0
0.2
0.4
0.8
Miles

Traffic Volumes



>> Appendix D—Crash Data and Crash Diagrams

Oberlin Avenue Crash Diagram

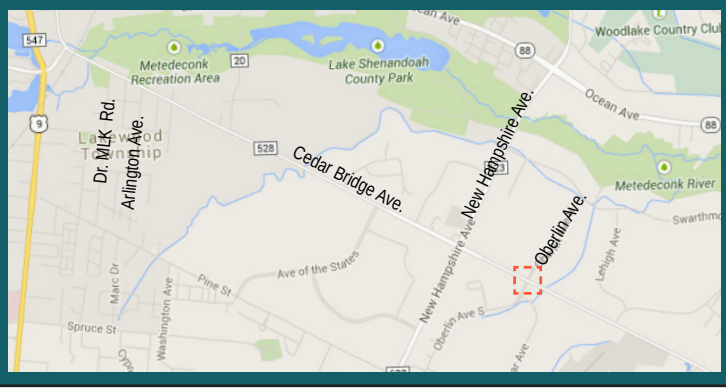


All pedestrian and cyclist crashes from 2008–2012 have a brief crash narrative included in the diagram and are color coded by severity. Additionally, any crash from 2010–2012 that has a severity of "moderate injury" or greater has a color-coded narrative.

= Moderate injury

Legend

- Fixed object
- Same direction- rear end
- Left turn
- Right angle
- Opposite direction – head on/ angular
- Same direction- side swipe



2014 TSRC Imagery, Google Earth aerials

0 25 50
Feet

Oberlin Avenue—Crash Summary (2010–2012)

Crash Type	#
Same Direction—Rear End	16
Same Direction—Sideswipe	2
Right Angle	2
Opposite Direction—Head On / Angular	2
Opposite Direction—Sideswipe	-
Struck Parked Vehicle	-
Left Turn / U-Turn	31
Backing	-
Encroachment	-
Overturned	-
Fixed Object	2
Animal	-
Pedestrian	-
Pedalcyclist	-
Non-fixed Object	-
Railcar—Vehicle	-
Other	-
Total	55

Month	#
January	4
February	5
March	7
April	1
May	7
June	8
July	6
August	4
September	2
October	6
November	3
December	2
Total	55

Severity	#
Property Damage Only (PDO)	30
Pain	19
Moderate Injury	6
Incapacitating Injury	-
Fatal	-
Total	55

Crash Year	#
2010	14
2011	18
2012	23
Total	55

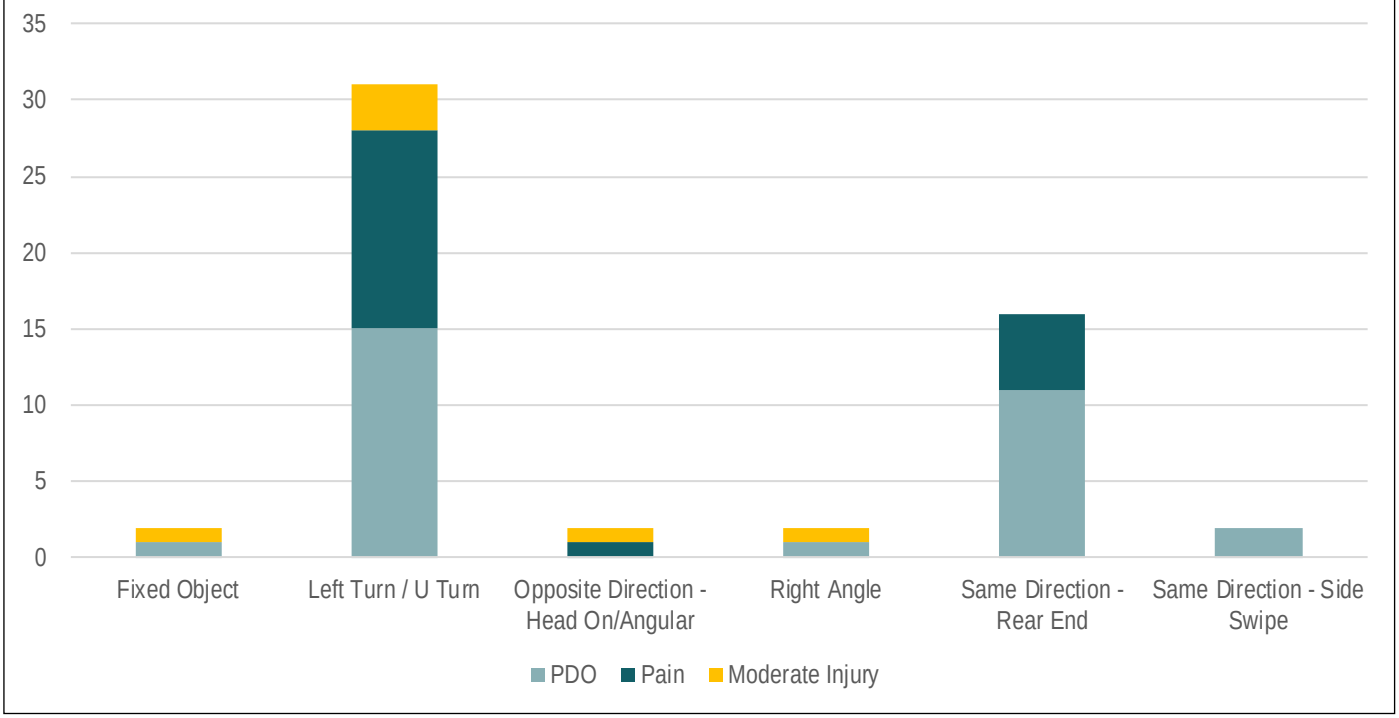
Intersection	#
At intersection	43
Not at intersection	12
At or Near Railroad	-
Total	55

Surface Condition	#
Dry	35
Wet	18
Snowy	1
Icy	-
Slush	-
Water—Standing/ Moving	-
Sand, Mud, Dirt	-
Oil	-
Null	1
Total	55

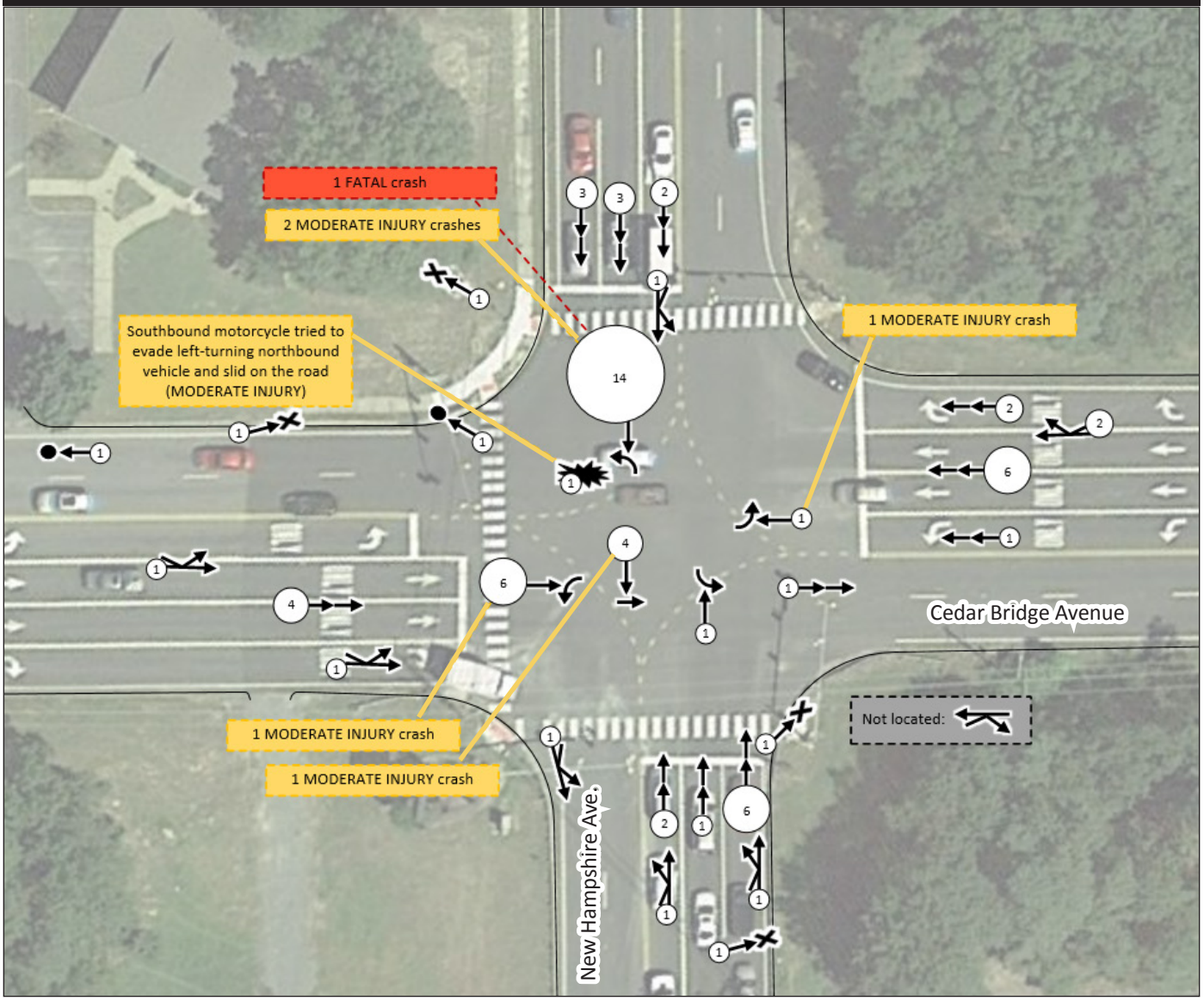
Light Condition	#
Daylight	53
Dawn	-
Dusk	-
Dark—No Street Lights	-
Dark—Street Lights On / Continuous	1
Dark – Street Lights On / Spot	-
Null	1
Total	55

Day	#
Monday	7
Tuesday	13
Wednesday	11
Thursday	10
Friday	10
Saturday	1
Sunday	3
Total	55

Crash Type and Severity



New Hampshire Avenue Crash Diagram



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

= Fatal

= Moderate injury

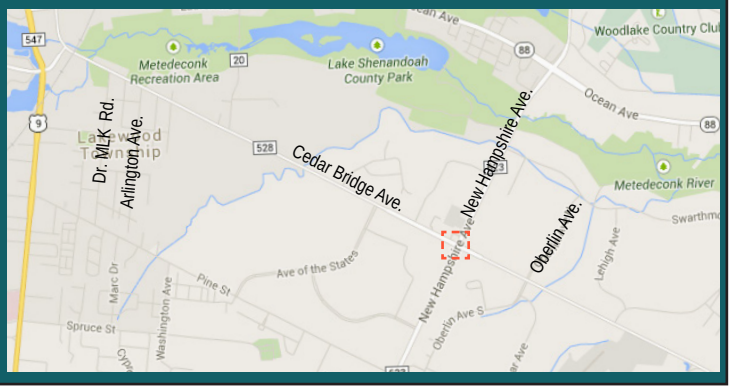
There was an additional pedestrian crash in 2009 with complaint of pain. Pedestrian was crossing Cedar Bridge Avenue. Signal was green for vehicles on Cedar Bridge Avenue.

Legend

- Fixed object
- Same direction-rear end
- Left turn
- Right angle
- Non-fixed object
- Same direction-side swipe
- Other

2014 TSRC Imagery, Google Earth aerials

0 25 50 Feet



New Hampshire Avenue – Crash Summary (2010 – 2012)

Crash Type	#
Same Direction—Rear End	37
Same Direction—Sideswipe	9
Right Angle	6
Opposite Direction—Head On / Angular	1
Opposite Direction—Sideswipe	1
Struck Parked Vehicle	2
Left Turn / U-Turn	22
Backing	-
Encroachment	-
Overturned	-
Fixed Object	7
Animal	2
Pedestrian	-
Pedalcyclist	-
Non-fixed Object	3
Railcar—Vehicle	-
Other	1
Total	91

Month	#
January	9
February	10
March	6
April	10
May	4
June	10
July	5
August	6
September	6
October	13
November	2
December	10
Total	91

Severity	#
Property Damage Only (PDO)	61
Pain	22
Moderate Injury	7
Incapacitating Injury	-
Fatal	1
Total	91

Crash Year	#
2010	29
2011	34
2012	28
Total	91

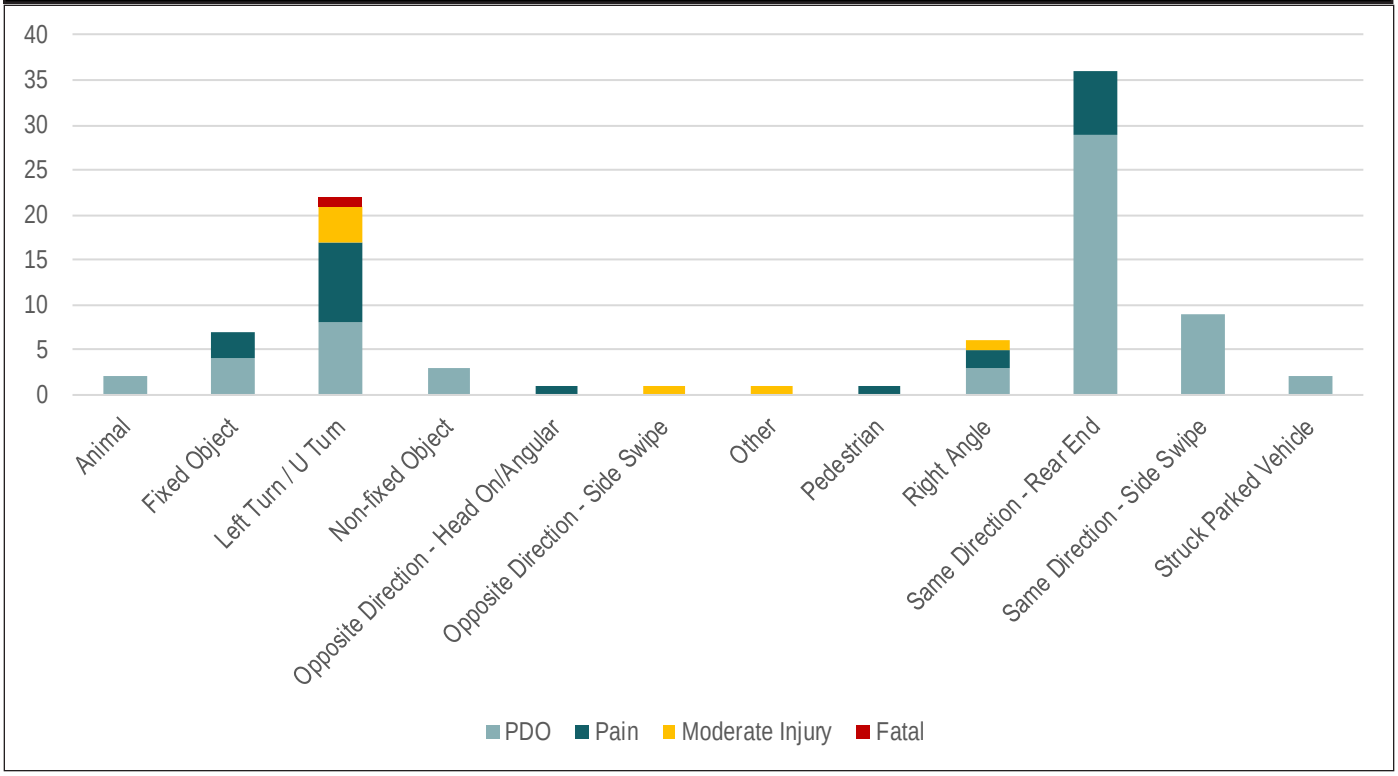
Intersection	#
At intersection	57
Not at intersection	34
At or Near Railroad	-
Total	91

Surface Condition	#
Dry	65
Wet	19
Snowy	3
Icy	4
Slush	-
Water—Standing/Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	91

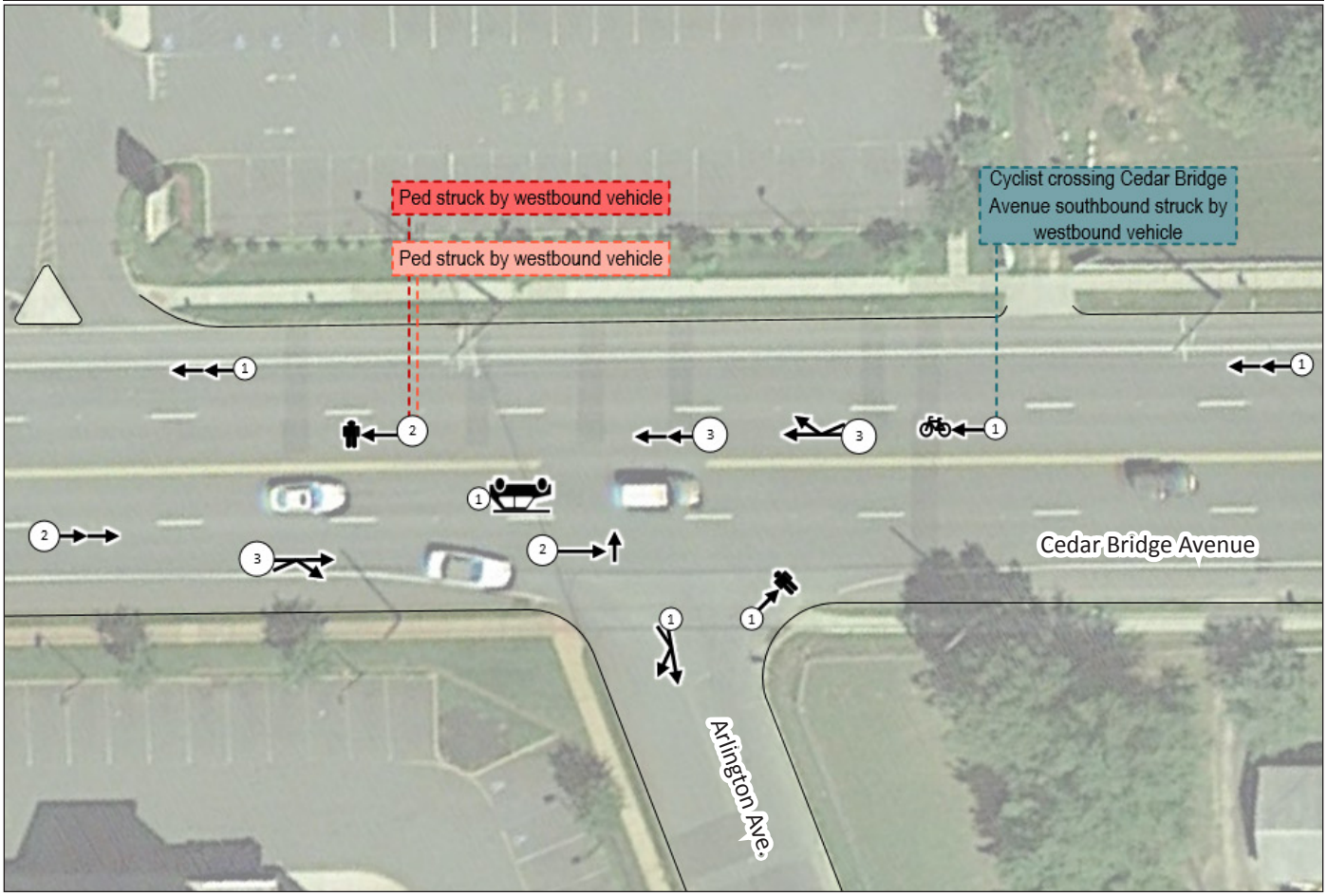
Light Condition	#
Daylight	62
Dawn	-
Dusk	3
Dark—No Street Lights	1
Dark—Street Lights On / Continuous	12
Dark—Street Lights On / Spot	13
Dark—Street Lights Off	-
Total	91

Day	#
Monday	15
Tuesday	11
Wednesday	19
Thursday	17
Friday	10
Saturday	10
Sunday	9
Total	91

Crash Type and Severity



Arlington Avenue Crash Diagram



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

= Fatal

= Incapacitating injury

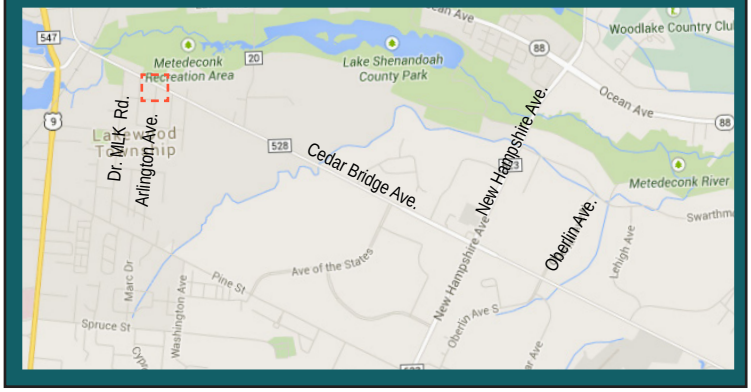
= Complaint of pain

Legend

- Pedestrian
- Same direction-side swipe
- Same direction-rear end
- Right angle
- Overturned
- Cyclist

2014 TSRC Imagery, Google Earth aerials

0 25 50 Feet



Arlington Avenue—Crash Summary (2010–2012)

Crash Type	#
Same Direction—Rear End	7
Same Direction—Sideswipe	7
Right Angle	2
Opposite Direction—Head On / Angular	-
Opposite Direction—Side Swipe	-
Struck Parked Vehicle	-
Left Turn / U-Turn	-
Backing	-
Encroachment	-
Overturned	1
Fixed Object	-
Animal	-
Pedestrian	3
Pedalcyclist	1
Non-fixed Object	-
Railcar—Vehicle	-
Other	-
Total	21

Month	#
January	3
February	1
March	1
April	1
May	-
June	-
July	1
August	1
September	2
October	8
November	1
December	2
Total	21

Severity	#
Property Damage Only (PDO)	10
Pain	9
Moderate Injury	-
Incapacitating Injury	1
Fatal	1
Total	21

Crash Year	#
2010	5
2011	7
2012	9
Total	21

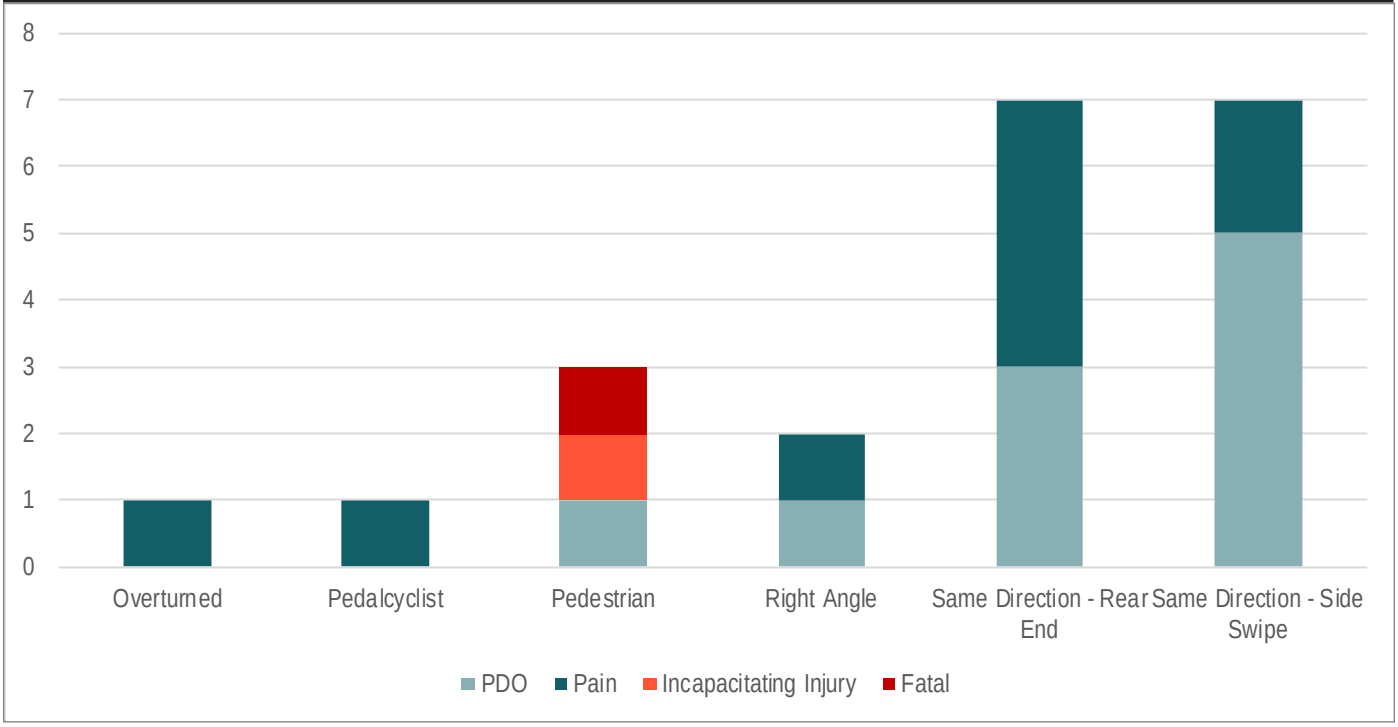
Intersection	#
At intersection	10
Not at intersection	11
At or Near Railroad	-
Total	21

Surface Condition	#
Dry	14
Wet	6
Snowy	-
Icy	1
Slush	-
Water—Standing/ Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	21

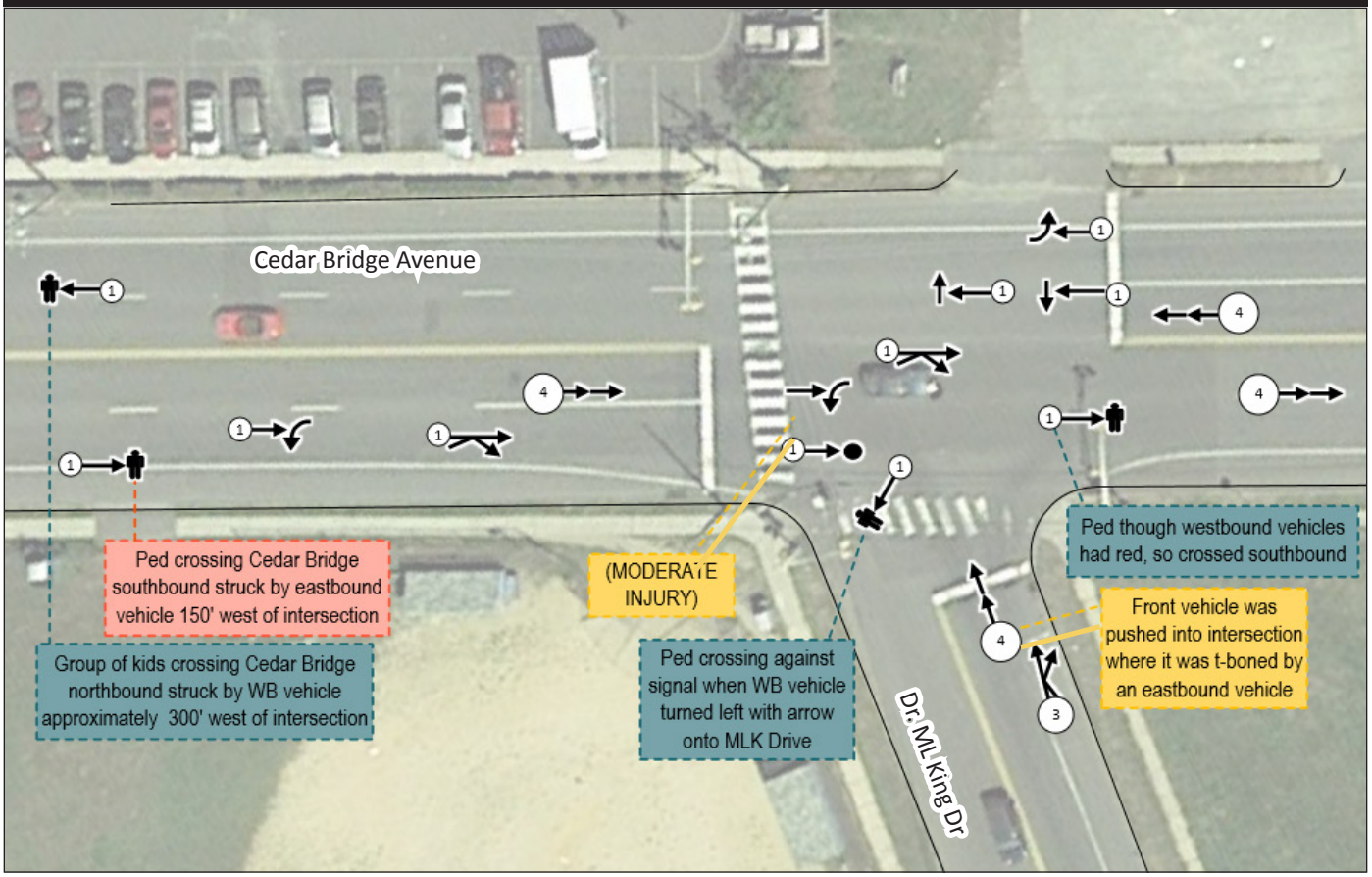
Light Condition	#
Daylight	11
Dawn	-
Dusk	-
Dark—No Street Lights	-
Dark—Street Lights On / Continuous	1
Dark—Street Lights On / Spot	9
Dark—Street Lights Off	-
Other	-
Total	21

Day	#
Monday	1
Tuesday	3
Wednesday	4
Thursday	5
Friday	1
Saturday	2
Sunday	5
Total	21

Crash Type and Severity



Dr. Martin Luther King Drive Crash Diagram



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

= Incapacitating injury

= Moderate injury

= Complaint of pain

Legend

Pedestrian

Left turn

Non-fixed object

Same direction-rear end

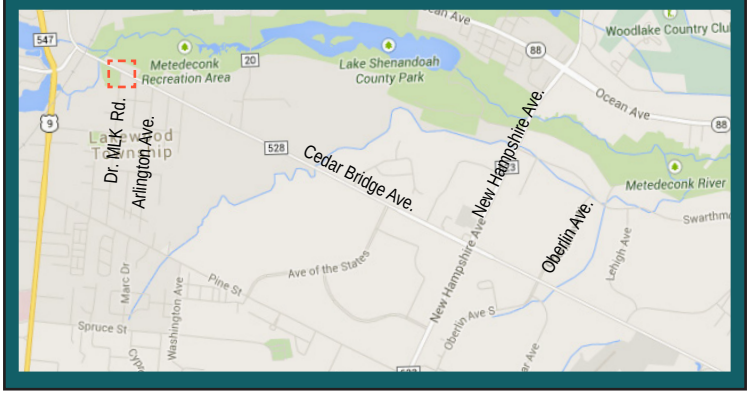
Right angle

Same direction-side swipe

2014 TSRC Imagery, Google Earth aerials

0 25 50

Feet



Dr. Martin Luther King Drive—Crash Summary (2010–2012)

Crash Type	#
Same Direction—Rear End	15
Same Direction—Sideswipe	5
Right Angle	4
Opposite Direction—Head On / Angular	-
Opposite Direction—Sideswipe	-
Struck Parked Vehicle	1
Left Turn / U-Turn	2
Backing	-
Encroachment	-
Overturned	-
Fixed Object	-
Animal	-
Pedestrian	1
Pedalcyclist	1
Non-fixed Object	1
Other	-
Total	30

Month	#
January	3
February	2
March	2
April	2
May	3
June	4
July	2
August	1
September	0
October	4
November	5
December	2
Total	30

Severity	#
Property Damage Only (PDO)	21
Pain	5
Moderate Injury	4
Incapacitating Injury	0
Fatal	0
Total	30

Crash Year	#
2010	8
2011	10
2012	12
Total	30

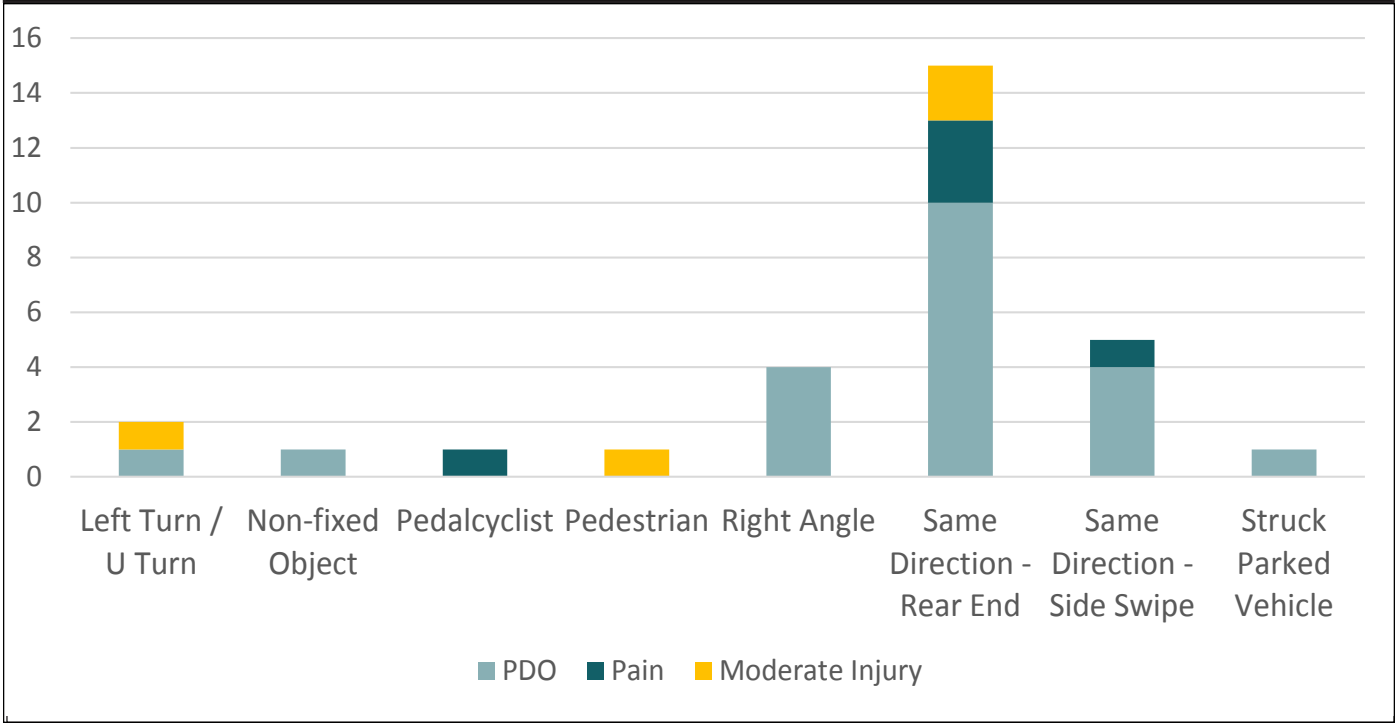
Intersection	#
At intersection	14
Not at intersection	18
At or Near Railroad	-
Total	32

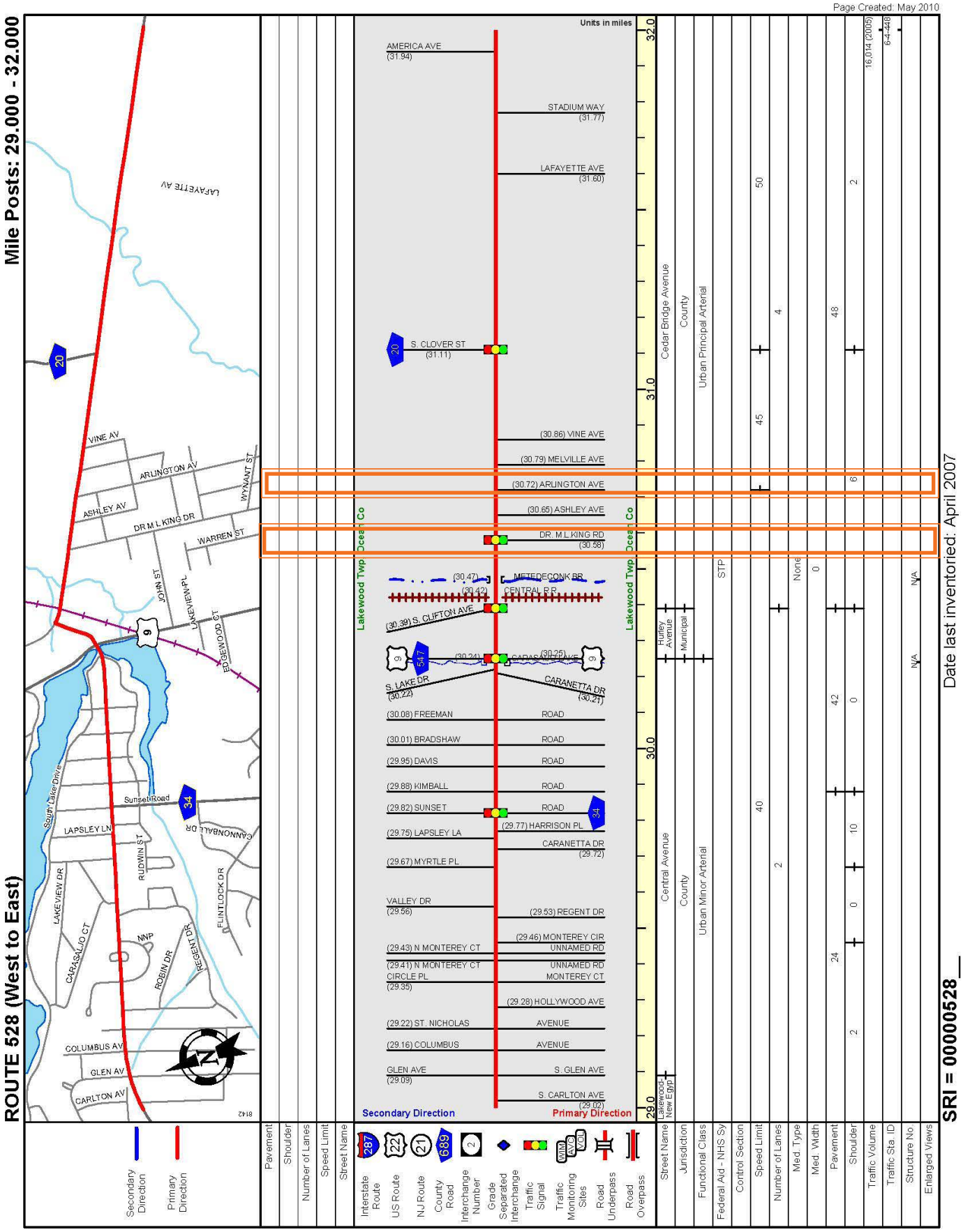
Surface Condition	#
Dry	23
Wet	6
Snowy	1
Icy	-
Slush	-
Water—Standing/ Moving	-
Sand, Mud, Dirt	-
Oil	-
Total	30

Light Condition	#
Daylight	22
Dawn	-
Dusk	1
Dark—No Street Lights	-
Dark—Street Lights On / Continuous	3
Dark—Street Lights On / Spot	4
Dark—Street Lights Off	-
Other	-
Total	30

Day	#
Monday	4
Tuesday	4
Wednesday	5
Thursday	7
Friday	4
Saturday	4
Sunday	2
Total	30

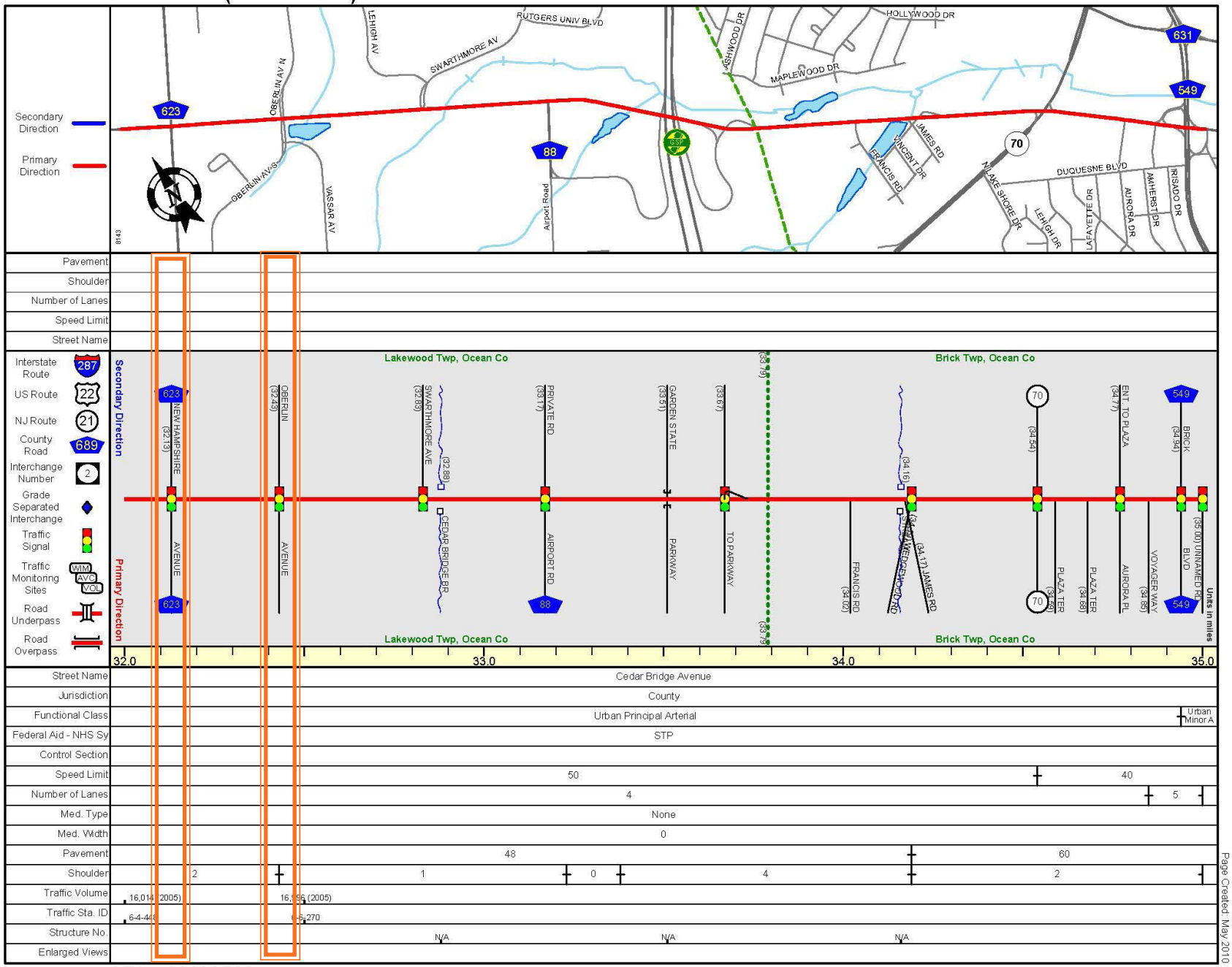
Crash Type and Severity




Page Created: May 2010
ROUTE 528 (West to East)
Mile Posts: 29.000 - 32.000
Units in miles
Secondary Direction
Primary Direction
Lakewood Twp
Ocean Co
AMERICA AVE (31.94)
STADIUM WAY (31.77)
LAFAYETTE AVE (31.60)
S. CLOVER ST (31.11)
(30.86) VINE AVE
(30.79) MELVILLE AVE
(30.72) ARLINGTON AVE
(30.65) ASHLEY AVE
DR. M L KING RD (30.58)
(30.47) METEDECONK RR
(30.42) CENTRAL RR
(30.39) S. CLIFTON AVE
(30.24)
(30.25)
S. LAKE DR (30.22)
CARANETTA DR (30.21)
(30.08) FREEMAN ROAD
(30.01) BRADSHAW ROAD
(29.95) DAVIS ROAD
(29.88) KIMBALL ROAD
(29.82) SUNSET ROAD
(29.77) HARRISON PL
(29.75) LAPSLEY LA
CARANETTA DR (29.72)
(29.67) MYRTLE PL
VALLEY DR (29.56)
(29.53) REGENT DR
(29.46) MONTEREY CIR
(29.43) N MONTEREY CT
UNNAMED RD
(29.41) N MONTEREY CT
UNNAMED RD
CIRCLE PL (29.35)
MONTEREY CT
(29.28) HOLLYWOOD AVE
(29.22) ST. NICHOLAS AVENUE
(29.16) COLUMBUS AVENUE
GLEN AVE (29.09)
S. GLEN AVE
S. CARLTON AVE (29.02)
Secondary Direction
Primary Direction
VINE AV
ARLINGTON AV
ASHLEY AV
DR M L KING DR
WARREN ST
WYNANT ST
JOHN ST
LAKEVIEW PL
EDGEWOOD CT
South Lake Drive
Sunset Road
LAPSLEY LN
RUDWIN ST
CANNONBALL DR
LAKEVIEW DR
CARASALJO CT
NNP
ROBIN DR
REGENT DR
FLINTLOCK DR
COLUMBUS AV
GLEN AV
CARLTON AV
LAFAYETTE AV
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
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
Cedar Bridge Avenue
Central Avenue
Hurley Avenue
Municipal
County
Urban Principal Arterial
Urban Minor Arterial
STP
None
N/A
Lakewood - New Egm
Date last inventoried: April 2007
SRI = 00000528__

ROUTE 528 (West to East)

Mile Posts: 32.000 - 35.000



SRI = 00000528__

Date last inventoried: April 2007

Page Created: May 2010