

Transportation Improvements for the US 130-Bridgeboro Road Corridor



JUNE 2017



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Table of Contents

Executive Summary	1
CHAPTER 1: Purpose and Need	3
CHAPTER 2: Transportation Network	5
Highway Network.....	5
Bicycle and Pedestrian Network.....	5
Public Transportation Service.....	5
CHAPTER 3: Crash Analysis.....	7
CHAPTER 4: Traffic Operation Analyses.....	11
Existing Condition	11
2025 No Build	14
2025 Build	17
2025 Build with New Development	21
CHAPTER 5: Summary, Conclusion, and Implementation	31

Figures

● Figure 1: Improvement Concept.....	1
● Figure 2: Existing Configuration of the Jughandle Intersection.....	3
● Figure 3: Study Area.....	6
● Figure 4: Crash Rate and Directional Distribution.....	9
● Figure 5: Crash by Type.....	10
● Figure 6: Existing AM Peak-Hour Traffic Operation.....	12
● Figure 7: Existing PM Peak-Hour Traffic Operation.....	13
● Figure 8: 2025 No Build AM Peak-Hour Traffic Operation.....	15
● Figure 9: 2025 No Build PM Peak-Hour Traffic Operation.....	16
● Figure 10: Proposed Improvement.....	17
● Figure 11: Signal Diagram.....	18
● Figure 12: Roundabout Design.....	18
● Figure 13: Bicycle and Pedestrian Improvement.....	20
● Figure 14: Planned New Development.....	22
● Figure 15: 2025 Build with New Development AM Peak-Hour Volumes.....	24
● Figure 16: 2025 Build with New Development AM Peak-Hour Level of Service.....	25
● Figure 17: 2025 Build with New Development PM Peak-Hour Volumes.....	26
● Figure 18: 2025 Build with New Development PM Peak-Hour Level of Service.....	27

Tables

● Table 1: Crash Summary (2012–2014).....	7
● Table 2: Signal Timing Offsets.....	18
● Table 3: Trip Generation Summary.....	23
● Table 4: Comparison Summary (AM Peak 7:30 AM–8:30 AM).....	28
● Table 5: Comparison Summary (PM Peak 4:30 PM–5:30 PM).....	29
● Table 6: Implementation Matrix.....	32

Executive Summary

At the request of Burlington County, the Delaware Valley Regional Planning Commission (DVRPC) conducted a study to assess the improvement alternative for a segment of the US 130 (Burlington Pike) corridor. The study corridor encompasses the section of US 130 between Bridgeboro Road and Mount Holly Road/Beverly Road (CR 626) in Edgewater Park and Willingboro townships. The intersection at US 130 and Bridgeboro Road is the focus of this study.

The study corridor was analyzed both qualitatively and quantitatively. The feasibility of the proposed alternative to accommodate current volumes and future traffic growth was evaluated. Improving multimodal connections between adjacent public park facilities was also explored.

The existing condition analysis indicates that the jughandle at the US 130 and Bridgeboro Road intersection is the bottleneck of the study corridor. The long queue of the turning traffic extends into the through lane, which causes delay and safety problems. It is also observed that the operation condition during the PM peak hour is generally worse than during the AM peak hour.

Congestion and delay become much more pronounced with projected traffic growth by the 2025 horizon year. Effective improvements are needed to accommodate future travel demand.

Based on the traffic operation analysis, an alternative to realign the US 130 and Bridgeboro Road jughandle is proposed, as well as a roundabout at the Bridgeboro Road and Creek Road (CR 625) intersection. **Figure 1** illustrates the conceptualized modeled road network. Effectiveness is evaluated in terms of delay and level of service.

Improvement to the bicycle and pedestrian network is also recommended. A pedestrian-friendly crosswalk at the US 130 and Creek Road (CR 625) intersection will make crossing much more comfortable. And by connecting a few missing sidewalk segments, the connectivity between Willingboro Lakes Park and Pennington Park will be greatly enhanced.

In conclusion, the proposed future 2025 Build alternative will improve traffic operation, address safety issues, and benefit bicycle and pedestrian accessibility.

Figure 1: Improvement Concept



CHAPTER 1:

Purpose and Need

The segment of US 130 (Burlington Pike) between Bridgeboro Road and Mount Holly Road/Beverly Road (CR 626) in Edgewater Park and Willingboro townships experiences recurring traffic congestion and safety challenges due to inadequate capacity of the US 130 and Bridgeboro Road jughandle.

As a major thoroughfare, US 130 carries high volumes of traffic. To ensure the smooth traffic flow along the corridor, all left- and U-turn movements are directed to the jughandles.

Among the signalized intersections along US 130, the intersection at Bridgeboro Road is particularly problematic. **Figure 2** shows the existing configuration of the jughandle intersection. During peak hours, vehicles queue up at the northeast-bound jughandle and spill over to the through lanes on US 130. Spill back regularly compromises operations at the adjacent intersections. Willingboro Lakes Park, adjacent to the Bridgeboro Road intersection, constrains the size of the northeast-bound jughandle and limits opportunities for its improvement.

With background traffic growth and new development in the vicinity of the study area, a steady growth of demand along this corridor is expected. The purpose of this study is to develop solutions to reduce delay, improve traffic operation, and promote bicycle and pedestrian network connectivity.

This study analyzes the issues at the US 130 and Bridgeboro Road intersection and its spill-over effect, evaluates potential improvement alternative, and provides recommendations to enhance corridor travel, in anticipation of the growing traffic volumes over the next decade.

Figure 2: Existing Configuration of the Jughandle Intersection



Source: DVRPC, 2016

CHAPTER 2:

Transportation Network

The study area is heavily auto oriented, and highways are the predominant transportation infrastructure. Two bus routes complement highway travel in the corridor, while minimal bicycle and pedestrian facilities exist.

Highway Network

The study area is roughly bounded by US 130 (Burlington Pike) to the south, Mount Holly Road/Beverly Road (CR 626) to the east, Coopertown Road/Delanco Road (CR 624) to the north, and Creek Road (CR 625) to the west. The area encompassed by US 130, Bridgeboro Road, and Creek Road, as highlighted in **Figure 3**, is the area of particular interest. In order to simulate the vehicle progression through the signalized intersections, the simulation models are extended to include the US 130 intersection at Cooper Street/Charleston Road (CR 630).

US 130 (Burlington Pike)

US 130, a north-south major arterial highway through southern New Jersey, has a cross-section of six lanes divided by a median barrier. Recent traffic counts indicate annual average daily traffic (AADT) volumes of 24,000 vehicles in each direction.

Bridgeboro Road

Bridgeboro Road is a two-lane minor arterial highway. It provides access to the residential areas, a church, and several freight facilities and employment centers. The AADT between Perkins Lane and Creek Road was approximately 3,500 vehicles in each direction.

Creek Road (CR 625)

Creek Road is a two-lane highway with an AADT of 2,500 vehicles. Along Creek Road, traffic generators include FedEx Freight, Drivetime, and the Abundant Life Fellowship Church.

Coopertown Road/Delanco Road (CR 624)

Coopertown Road/Delanco Road provides direct access to Delanco Township from US 130.

Mount Holly Road/Beverly Road (CR 626)

Mount Holly Road/Beverly Road connects US 130 and Coopertown Road/Delanco Road.

Bicycle and Pedestrian Network

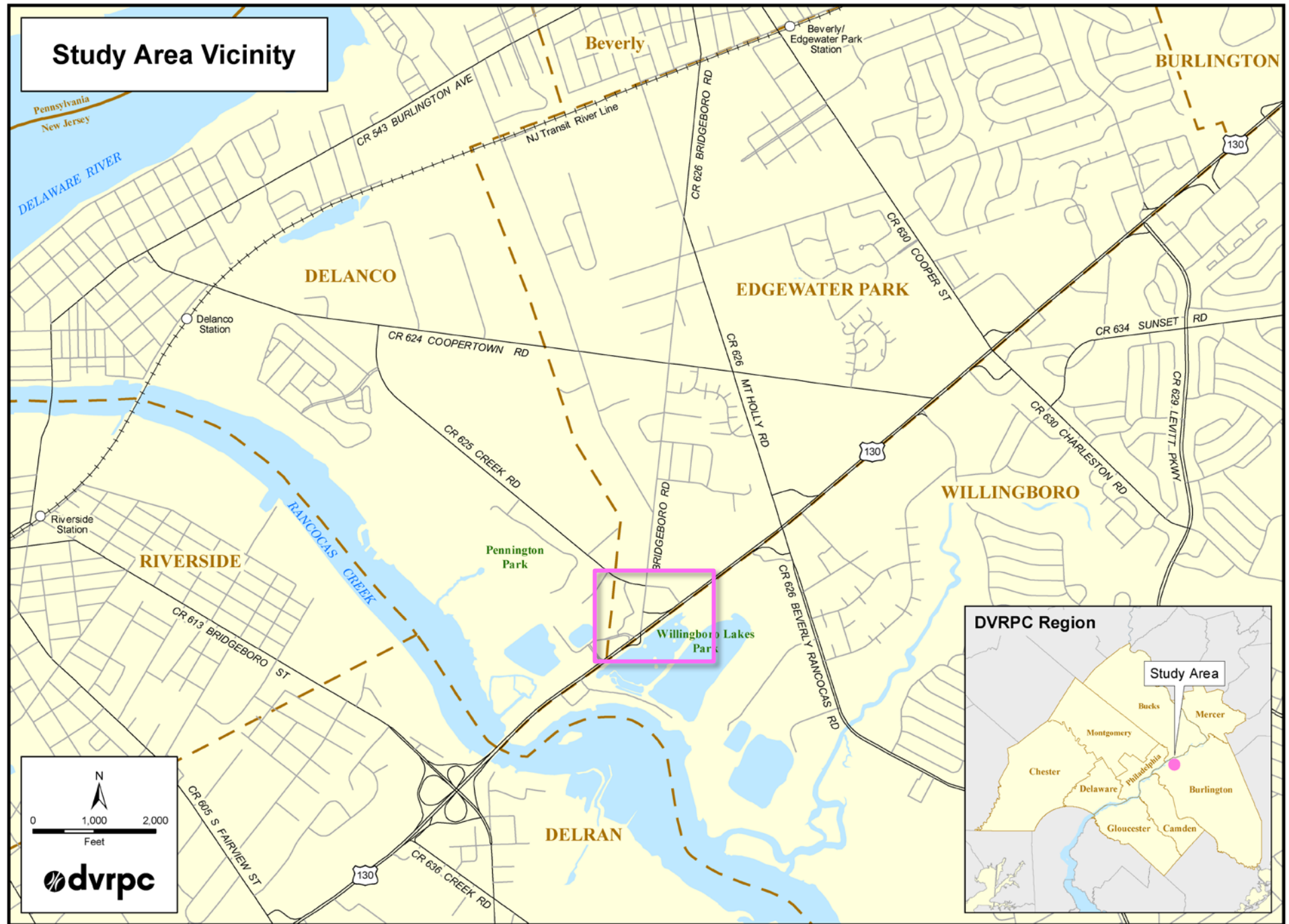
The area is very auto oriented, and there is currently no bicycle lane along the study corridor. The sidewalk coverage is not continuous, making travel by foot unpleasant and unattractive. Pennington Park and Willingboro Lakes Park offer protected trails. Despite the parks being close to each other, US 130 is a physical barrier for bicycles and pedestrians to move between them.

Public Transportation Service

NJ Transit Route 409 generally operates along US 130 seven days a week between Philadelphia and Trenton. Weekday service consists of 15-minute peak and 30-minute off-peak headways. The operation headways on weekends are one hour.

The BurLink B1 Route is a shuttle bus service that connects the River LINE Beverly/Edgewater Park Station with NJ Transit Route 409 via Cooper Street during daylight hours with one-hour headways Monday through Friday.

Figure 3: Study Area



CHAPTER 3:

Crash Analysis

A crash analysis using the latest available data from 2012 to 2014 was conducted to investigate the crash pattern, distribution, and concentration along the US 130 corridor. **Table 1** summarizes the statistics of the crashes. Major findings are as follows.

- There were 192 crashes in total along the segment of US 130 between Milepost 41.37 and Milepost 43.43.
- One hundred eleven crashes (57.8 percent) were in the northbound direction, and 81 crashes (42.2 percent) were southbound.
- The top four crash types were same direction rear end, same direction sideswipe, fixed object, and right angle, in descending order.
- One hundred twenty-eight crashes (66.7 percent) caused property damages, 63 crashes (32.8 percent) caused injuries, and one crash (0.5 percent) resulted in a pedestrian fatality.

Table 1: Crash Summary (2012–2014)

Type of Crash	Count
Same Direction Rear End	93
Same Direction Sideswipe	40
Fixed Object	29
Right Angle	15
Other	15
Total	192
Severity	Count
Property Damage	128
Injury	63
Fatality	1
Total	192

Source: *Crashes–NJDOT, 2012–2014*

The entire study segment between Milepost 41.37 and Milepost 43.43 was divided into five segments by four major intersecting streets: Bridgeboro Road, Mount Holly Road/Beverly Road, Pennypacker Drive, and Cooper Street/Charleston Road. **Figure 4** displays the crash rate per million vehicle miles traveled of each individual segment. **Figure 5** marks the locations of the crashes.

A. US 130 Milepost 41.37–41.60

Thirty-seven crashes occurred in this segment during the study period. The crash rate of 4.58 is more than double the statewide average of 1.77 in 2014 for roads of the same functional class with similar cross-section geometries.¹ More than 60 percent of the crashes were in the northbound direction approaching the jughandle at the Bridgeboro

¹ New Jersey Department of Transportation, *Statewide Crash Rate by Cross Section Geometry* (Trenton: New Jersey Department of Transportation, 2016).

Road intersection. Twenty-six of the crashes caused property damages, and 10 crashes caused minor to moderate injuries. The most prevalent crash type was same direction rear end (16), followed by same direction sideswipe (eight) and right angle crashes (six).

B. US 130 Milepost 41.60–42.16

With 68 crashes, or two-fifths of the total crashes, this segment experienced the greatest number of crashes. The crash rate of 4.71 is over twice the statewide average and is the second highest among all five segments. More than 60 percent of the crashes happened in the northbound direction approaching the Mount Holly Road/Beverly Road intersection. The southbound crashes were concentrated in the approach to the Bridgeboro Road intersection. Forty-nine out of the 68 crashes caused property damages, and the remaining 19 involved minor to moderate injuries. With 34 crashes, same direction rear end crash is the most frequent crash type, followed by same direction sideswipe (16) and fixed object crashes (10).

C. US 130 Milepost 42.16–42.72

Thirty-seven crashes occurred in this segment during the study period. The crash rate of 2.49 is higher than the statewide average. This is one of the two segments where crashes happened more frequently in the southbound direction. Among all the crashes, 21 crashes caused property damages, 15 involved injuries, and there was one fatality. A pedestrian was killed near the Pennypacker Drive intersection at night, a crash in which two vehicles were involved. With 18 incidents, same direction rear end crash ranked the top among all types of crashes, followed by same direction sideswipe (16) and fixed object (10).

D. US 130 Milepost 42.72–43.01

Over one-fifth of the total crashes, or 41 crashes, occurred in this segment. The crash rate of 5.47 is more than triple the statewide average and is the highest among all five segments. More than 60 percent of the crashes occurred in the northbound direction approaching the Cooper Street/Charleston Road intersection. The southbound crashes concentrated near the Delanco Road intersection. Among all the crashes, 25 crashes caused property damages, and for the remaining 16 cases, minor injuries were involved. Same direction rear end crash (22) is the most prevailing crash type, followed by same direction sideswipe (eight) and fixed object (seven).

E. US 130 Milepost 43.01–43.43

Nine crashes occurred within this segment during the study period. The crash rate of 0.74 is the lowest among all five segments and is below the statewide average. This is one of the two segments where crashes happened more frequently in the southbound direction. The southbound crashes concentrated near the Cooper Street/Charleston Road intersection. Among all the crashes, six crashes incurred property damages, and the remainder involved minor to moderate injuries. With three occurrences, rear end crash ranked the top among all crash types, followed by same direction sideswipe (two) and fixed object (two).

Figure 4: Crash Rate and Directional Distribution

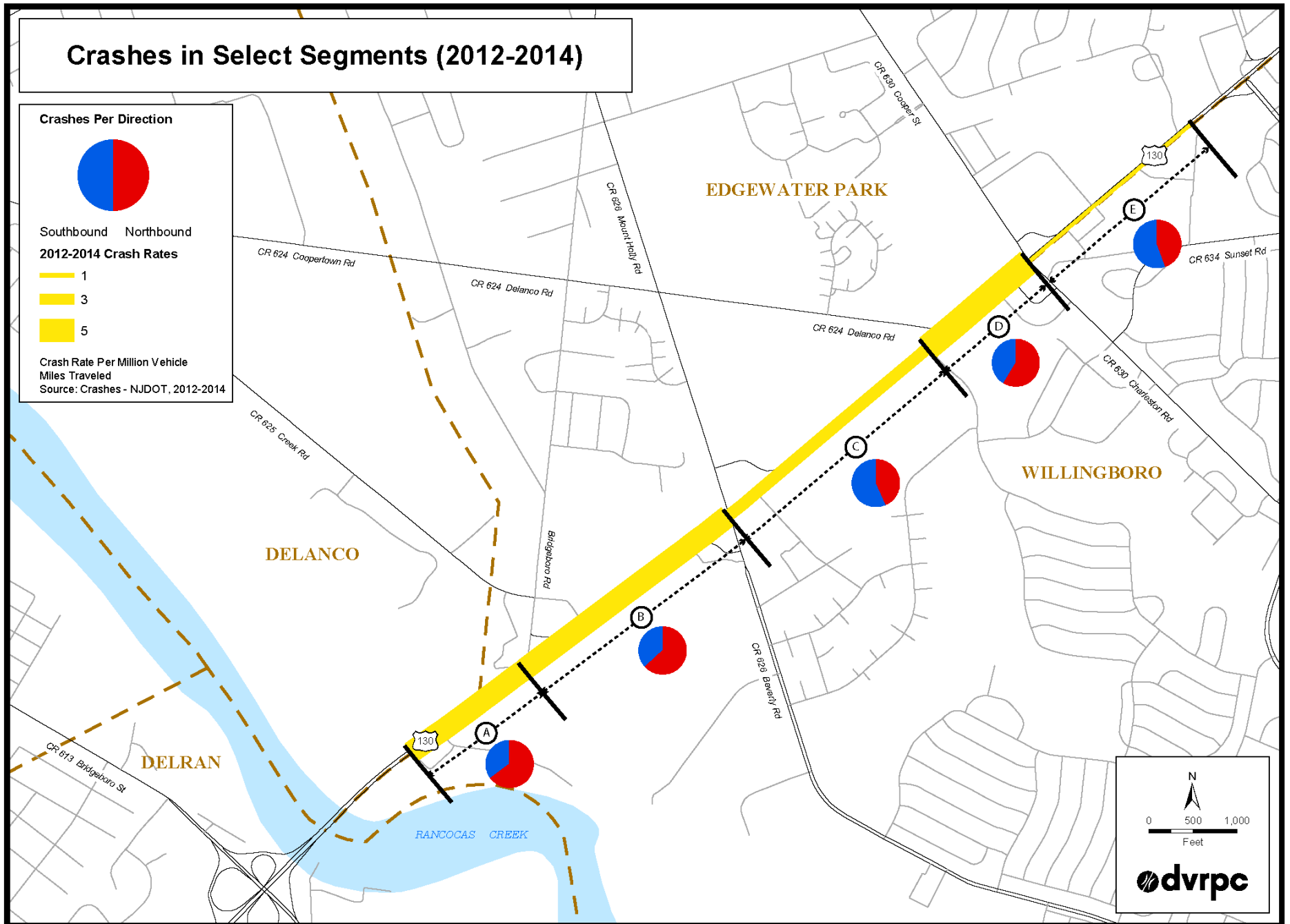
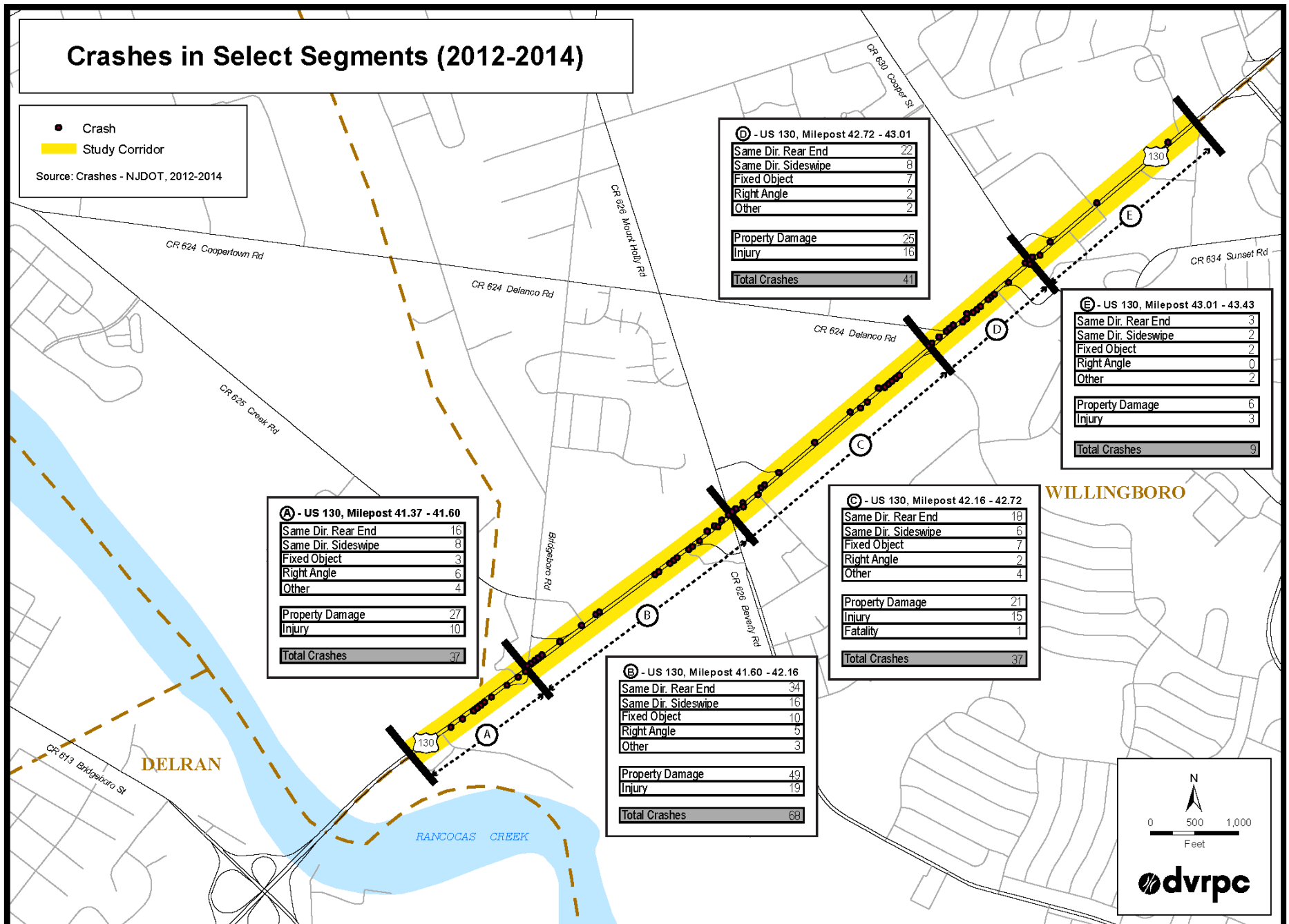


Figure 5: Crash by Type



N

0 500 1,000

Feet

CHAPTER 4:

Traffic Operation Analyses

Traffic operations are analyzed using SYNCHRO traffic engineering software. Comparison scenarios include Existing Condition, 2025 No Build, 2025 Build, and 2025 Build with New Development. Delay and level of service (LOS) at each approach and intersection aggregation are selected as the primary performance metrics. Queue length is also monitored for calibration and comparison purposes.

- Existing Condition: existing infrastructure with recent traffic volumes, which creates a baseline model;
- 2025 No Build: existing infrastructure with traffic volumes factored to 2025 levels to represent ongoing regional growth;
- 2025 Build: proposed infrastructure with forecasted 2025 volumes; and
- 2025 Build with New Development: proposed infrastructure with 2025 forecasted volumes plus additional traffic volumes generated by new development within the study area.

Explanation of Performance Measures

Delay – Delay is the average amount of time, in seconds, that it takes a vehicle passing through an intersection beyond what would be experienced in a free-flow condition. The value given is the average for all vehicles completing the movement.

Level of Services (LOS) – LOS are letter grades assigned to various degrees of delay. A LOS of “A” corresponds with free-, or near free-flowing conditions, while an “F” score corresponds with a breakdown in traffic flow. The goal in traffic operations is not to achieve a LOS of A, but to create conditions that maintain stable traffic flow which typically is achieved within the LOS range of A to C.

Existing Condition

Existing condition analysis is conducted and calibrated as a baseline model. Performance measures are calculated for both the AM and PM peak hours. **Figure 6** and **Figure 7** provide the volume and LOS summaries during the AM and PM peak hours.

US 130 & Bridgeboro Road

This intersection generally operates at a LOS of C. The northeast-bound approach suffers from the inadequate capacity/storage on the existing jughandle with a LOS of D during the AM peak hour and a LOS of E during the PM peak hour. Queue lengths of 300 feet spill back to the through travel lanes, causing unwanted delay on mainline northeast-bound US 130. Field observation also confirms that this intersection is the bottleneck of the study corridor.

Bridgeboro Road & Creek Road

This intersection performs adequately during AM and PM peak hours with a LOS of C and intersection delay of around 30 seconds per vehicle.

US 130 & Mount Holly/Beverly Road

This intersection experiences delays on all approaches, and the overall LOS is D. Because of the significantly higher volume of the southwest approach and northbound approach during the PM peak hour, the approach delays are more than 50 seconds per vehicle, corresponding to a LOS of E.

Existing Condition Summary

Baseline analysis indicates that intersections in the study area mostly perform at a LOS of C or D. Due to higher traffic volumes, the PM peak-hour performance is worse than the AM peak. The existing jughandle fails to provide enough capacity for the turning volumes.

Figure 6: Existing AM Peak-Hour Traffic Operation



Figure 7: Existing PM Peak-Hour Traffic Operation



2025 No Build

DVRPC's regional travel demand model estimates an average annual growth factor of 0.25 percent per year for the study area. The growth factor is based on the DVRPC Board-adopted Long-Range Plan, which includes long-range forecast and major regional transportation projects by county and federal functional classification. Therefore, the traffic volume is projected to grow by 2.53 percent by the year 2025. By applying the growth factor to the SYNCHRO existing models and keeping everything else unchanged, a 2025 No Build scenario is generated. **Figure 8** and **Figure 9** summarize volumes and intersection LOS of the AM and PM models.

US 130 & Bridgeboro Road

This intersection remains at the LOS of C, and the intersection delay increases by one second. The northeast-bound approach suffers further from the inadequate capacity of the current jughandle, especially during the PM peak hour. The queue length will be more than 400 feet that spills back to the through travel lanes. It could be a major disruption for the northeast-bound traffic flow and a safety issue.

Bridgeboro Road & Creek Road

This intersection maintains adequate performance during the AM and PM peak hours. The LOS remains the same at C and the delay increases slightly by less than one second per vehicle.

US 130 & Mount Holly/Beverly Road

The intersection delay increases by six seconds during the PM peak hour, and the overall LOS degrades to E. Northeast-bound and southwest-bound queue lengths will be more than 400 feet along US 130.

2025 No Build Summary

Compared to the baseline analysis, the projected new traffic will add stress to the already congested US 130 corridor within the study area. Vehicles will experience more delays as expected. The PM future year

degradation is worse than the AM peak hour. Operation at a LOS C or below will be prevalent. The jughandle at US 130 and Bridgeboro Road is one of the bottlenecks along the corridor. The spill back of the long queue will be a greater safety issue if no action is taken. It is necessary to take initiatives to improve the operation of the corridor. However, due to the wetlands constraint, there is no space to expand the existing jughandle. Another configuration needs to be evaluated to replace the jughandle.

Figure 8: 2025 No Build AM Peak-Hour Traffic Operation



Figure 9: 2025 No Build PM Peak-Hour Traffic Operation



N

0 200 400

Feet

Aerial Imagery: DVRPC, 2015

dvrpc

2025 Build

With future traffic growth, the physical bottleneck at the Bridgeboro Road jughandle needs to be addressed. The 2025 Build scenario presents an alternative to design a new jughandle and redistribute traffic flow, which enhances the corridor operation by relieving the capacity constraint and provides a smoother vehicular traffic flow. The proposed improvement concept is shown in **Figure 10**, which includes the relocation of the existing jughandle, an intersection control update, and a new roundabout. Additionally, there is a capability to provide an improved bicycle and pedestrian connection between public parks.

Figure 10: Proposed Improvement



Relocation of the Jughandle

It is proposed to move the existing northeast-bound jughandle from the near side to the far side, toward a less environmentally sensitive area. The new jughandle will be a 270-degree loop that aligns with Creek Road. The existing parking space at the Willingboro Lakes Park entrance will be converted to a 100-foot storage lane to eliminate the conflict between through traffic and exiting traffic at the right side.

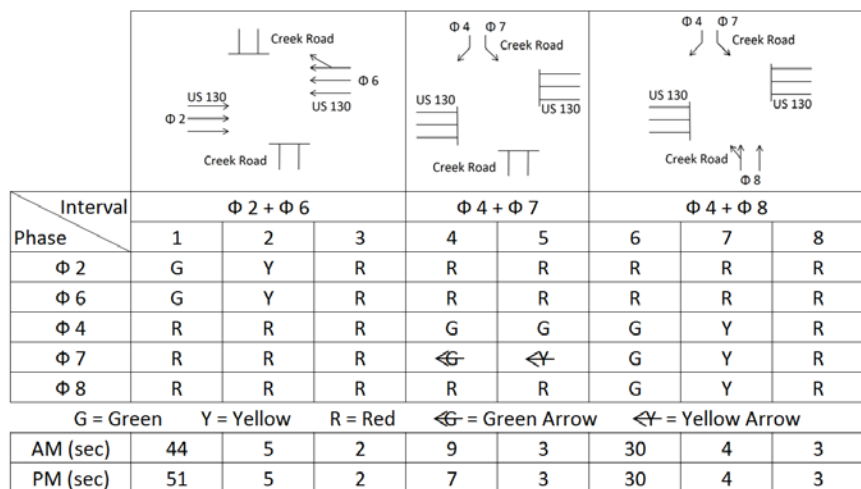
Intersection Control Update

In order to minimize the interruption caused by traffic control, the signal controller at the existing jughandle intersection will be removed. A median barrier will be installed to prevent northbound vehicular traffic to Bridgeboro Road. A segment of Bridgeboro Road next to the Holiday Ice Cream property, approximately 300 feet long, will be changed to one-way southbound right-turn only. A yield sign will be installed to control the right-turn traffic entering southwest-bound US 130.

A signal controller will be installed at the new jughandle intersection at Creek Road. The northwest leg will be converted from a one-way street into a two-way street. The new signal will be coordinated with other signals along the corridor. To be consistent with current settings of nearby intersections, the cycle lengths are set to be 100 seconds and 105 seconds during the AM peak hour and the PM peak hour, respectively. A protected left-turn phase is provided for the southbound left-turn vehicles on Creek Road. The detailed signal diagram optimized by SYNCHRO is shown in **Figure 11**, which includes the movement, the sequence, and the timing.

The signal offsets are set to ensure the free flow of the through traffic and minimize the disturbance of the proposed signalized intersection. **Table 2** summarizes the offsets of the intersections. The reference point is the beginning of yellow for southwest-bound through movement at each intersection.

Figure 11: Signal Diagram



Source: DVRPC, 2016

Table 2: Signal Timing Offsets

Intersection	AM Peak Offset (sec)	PM Peak Offset (sec)
US 130 Burlington Pike & Creek Road Jughandle	85	12
US 130 Burlington Pike & Beverly Road/Mt Holly Road	24	51
US 130 Burlington Pike & Pennypacker Drive	72	72
US 130 Burlington Pike & Charleston Road/Cooper Road	19	19

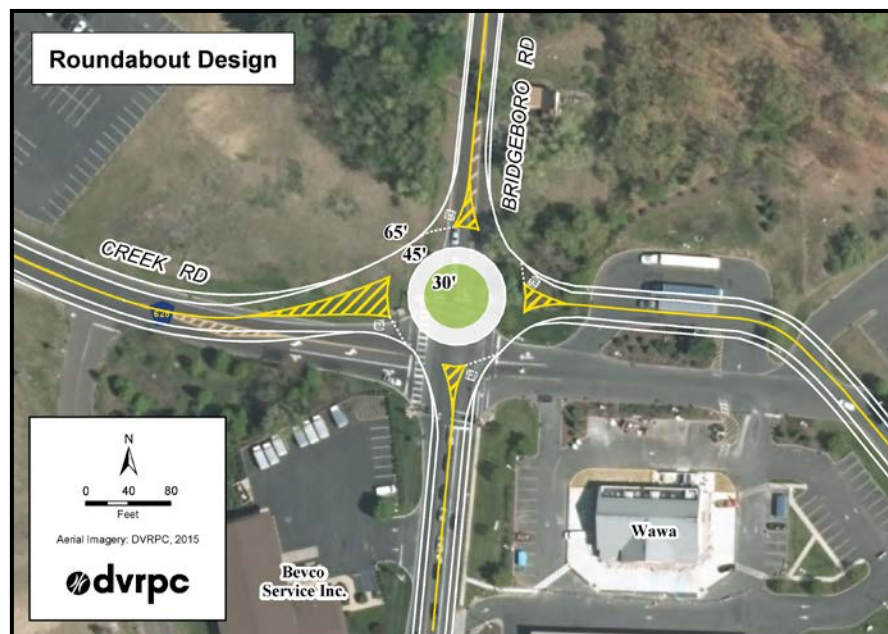
Source: DVRPC, 2016

New Roundabout at Bridgeboro Road and Creek Road

A roundabout is a circular intersection, through which vehicles travel counterclockwise around a center island. Compared to the conventional stop-sign control and signal control, a roundabout is designed to improve safety for all users.

In this study, a one-lane roundabout is proposed to replace the existing signal controller, as **Figure 12** shows. Major design elements include an inscribed circle with a radius of 65 feet, a 20-foot wide circulatory road, a 15-foot wide truck apron, and a center island with a radius of 30 feet. The design speed is 20 miles per hour. The dimensions are primarily based on the turning templates in *A Policy on Geometric Design of Highways and Streets*, 6th ed. (Washington DC: American Association of State Highway and Transportation Officials, 2011). The design vehicle is the Double-Trailer Combination (WB-20D [WB-67D]). More detailed specifications require further engineering analysis.

Figure 12: Roundabout Design



Bicycle and Pedestrian Improvement

Because the existing parking area at the Willingboro Lakes Park entrance will be converted to the new off ramp, the obsolete jughandle to the south will become the new parking area instead. The entrance to Willingboro Lakes Park will also be relocated, as **Figure 13** shows. Missing sidewalks and pedestrian crosswalks will be installed to connect Pennington Park and nearby residential housing with Willingboro Lakes Park, a county park, which improves the quality of life for local communities. Consequently, this section of Creek Road should be under the county's jurisdiction. The bus stop at the US 130 and Bridgeboro Road intersection will be relocated to the new jughandle accordingly.

Signage Update

The signage at the jughandle would be updated to inform road users of intersecting routes and important destinations.

The simulation models were edited to reflect the proposed modifications, and the results were compared to the 2025 No Build scenario.

US 130 & Bridgeboro Road

The far-side design will increase storage length and provide more capacity to the turning volumes, and the intersection delay will be reduced by eight seconds during the AM peak hour and six seconds during the PM peak hour. The intersection LOS improves from C to B during the AM peak hour and remains at C during the PM peak hour. The queue length of the turning vehicles will be reduced to about 200 feet. The average delay reduction for northeast-bound traffic is three seconds. Northbound travel also benefits from the new jughandle configuration and the approach LOS improves from E to D during the PM peak hour.

Bridgeboro Road & Creek Road

As an alternative to traffic signals, a roundabout at this location operates much more efficiently. The intersection delay is reduced by 16 seconds during the AM peak hour and eight seconds during the PM peak hour. The overall intersection LOS improves from C to B during the AM peak hour. The queue lengths are generally less than four vehicles per approach.

US 130 & Mount Holly/Beverly Road

The overall intersection delay will be reduced by six seconds in both the AM and PM peak hours due to signal optimization. Northeast-bound and southwest-bound delay along US 130 will decrease during the AM and PM peak hours; however, the northbound and southbound delay will increase.

2025 Build Scenario Summary

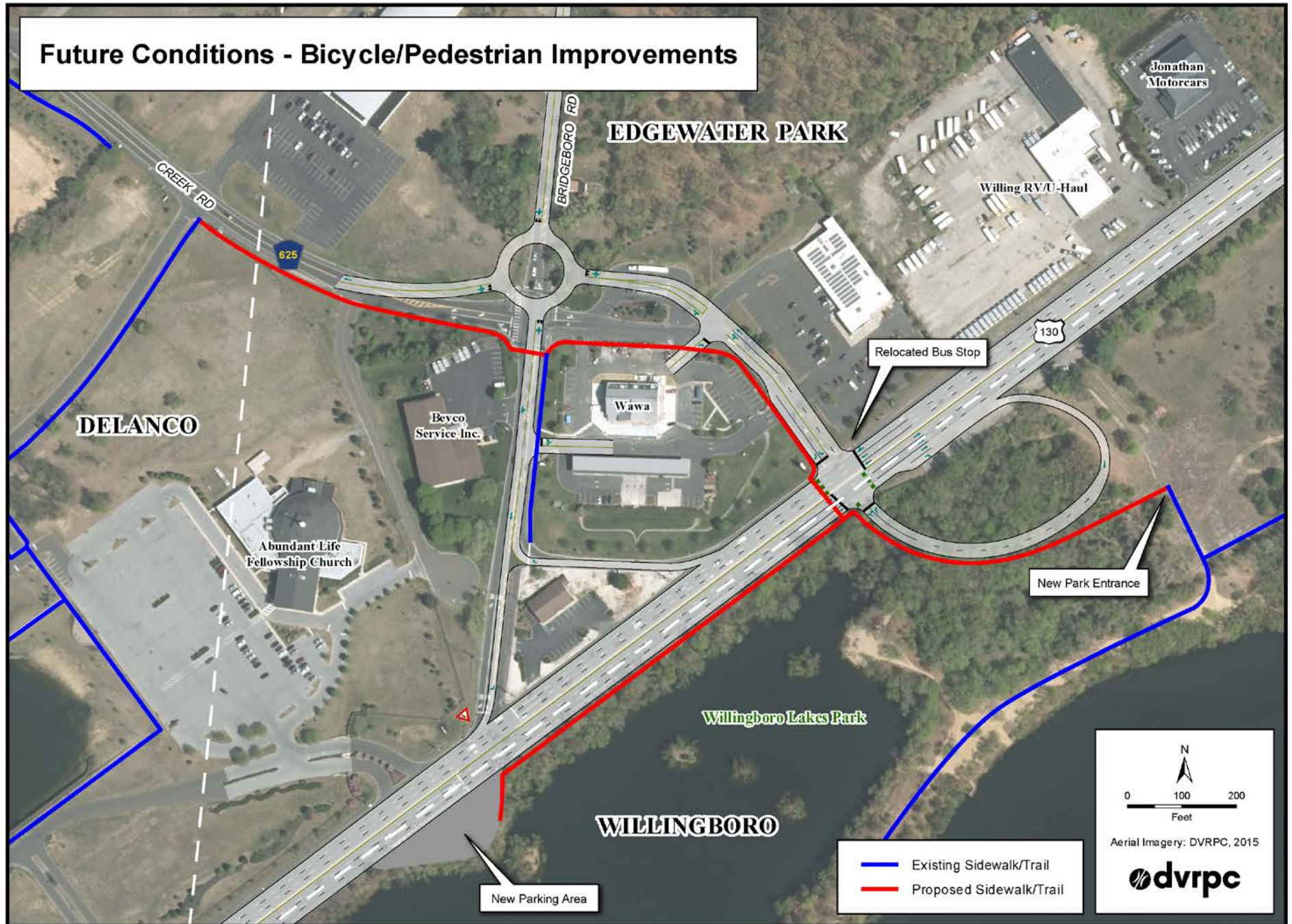
The new jughandle will have sufficient storage for the turning vehicles and reduce the queue length significantly. This relieves the bottleneck at the existing jughandle.

By replacing the signalized intersection with a roundabout, vehicles will move much more efficiently. Unnecessary delays associated with the protected left-turn signal are eliminated.

Despite the improvement, additional space is required to build the new jughandle. The environmental consequences should be evaluated.

Figure 13: Bicycle and Pedestrian Improvement

Conceptualized Modeled Road Network



2025 Build with New Development

Besides the regional growth, the new development planned within the study area may also generate new traffic. **Figure 14** provides the geographical representation of five land development sites within the study area. New development traffic is modeled in the network to assess the impact of the additional travel demand.

The procedures in the *Trip Generation Manual*, 9th ed. (Washington, DC: Institute of Transportation Engineers, 2012) were applied to the planned development, as **Table 3** summarizes. Approximately 456 trips will be added to the development driveways and adjacent streets during the AM peak hour, and approximately 516 trips will be added during the PM peak hour.

To distribute the additional trips generated by the new development, it was assumed that traffic patterns differ among different trip purposes. Trips were then assigned to the network, the turning volumes at each study intersection were revised, and SYCHRO analysis was re-performed. The impact of new development on the 2025 Build network, especially on the new roundabout, was evaluated. **Figures 15–18** summarize the volumes and the LOS for the AM and PM peak hours.

US 130 & Bridgeboro Road

The intersection delay increases by four seconds during the AM peak hour and two seconds during the PM peak hour compared to the 2025 Build scenario without new development. The northeast-bound and southwest-bound approaches are affected by the new development as expected, as more traffic is assigned to travel along US 130 to reach the planned destinations. Although additional traffic adds stress to the new jughandle, it still operates much better than in the 2025 No Build scenario even without planned new development.

Bridgeboro Road & Creek Road

The roundabout is negatively affected by the new development. The LOS drops from B to C in the AM peak hour, and it drops from C to D in the PM peak hour. During the PM peak hour, the eastbound and westbound delays increase significantly. This is partially because of the new trips generated by the Motor Vehicle Commission Testing Center that have to go through the roundabout in order to reach Creek Road.

US 130 & Mount Holly/Beverly Road

This intersection delay increases slightly by two seconds during the AM peak hour compared to the 2025 Build scenario without new development. During the PM peak hour, the intersection delay increases by seven seconds, and the LOS degrades to E.

2025 Build with New Development Summary

Compared to the 2025 Build without new development, the operation degrades when additional trips are assigned to the network. To provide access to the Motor Vehicle Commission Testing Center, the roundabout is heavily travelled, which imposes congestion on the eastbound and westbound approaches. Although the 2025 Build with New Development scenario degrades as expected, the overall operation condition is comparable to the 2025 No Build without new development, meaning that the proposed new jughandle and roundabout are able to accommodate the additional trips generated by the new development.

The comparisons among the scenarios are summarized in **Table 4** and **Table 5**.

Figure 14: Planned New Development



Sources: Delanco and Edgewater Park Townships, 2017

Table 3: Trip Generation Summary

STUDY AREA FUTURE DEVELOPMENT

	Description	Land Use	Weekday	AM Peak Hour			PM Peak Hour		
			TOTAL TRIPS	IN	OUT	TOTAL	IN	OUT	TOTAL
1	Cascade Expansion. 30 Additional Acres (1,306,800 S.F.)	<u>Industrial:</u> High-Cube Warehouse/Distribution Center	2,195	108	49	157	51	115	166
2	R & S (Cold Storage) 435,000 S.F. at Deitz and Watson Site	<u>Industrial:</u> High-Cube Warehouse/Distribution Center	731	24	11	35	16	37	53
3	Pro Builders (Building Supplies) on Burlington Ave. 200,000 S.F.	<u>Industrial:</u> Warehousing	895	96	25	121	23	70	93
4	The Crossings at Delanco. 170 Single Family Housing, Age Restricted	<u>Residential:</u> Senior Adult Housing-Detached	758	21	38	59	41	26	67
5	Motor Vehicle Commission Testing Center	<u>Office:</u> State Motor Vehicles Department	1,488	59	25	84	41	96	137
		Total Development	6,067	308	148	456	172	344	516
6*	Cardinale 50,000 S.F. Commercial Space	<u>Retail:</u> Shopping Center	4,328	63	39	102	181	196	377

Source: *Trip Generation Manual*, 9th ed. (Washington, DC: Institute of Transportation Engineers, 2012).

* This is an estimation of trip generation for this development. Because of the absence of a detailed plan, it is not included in the overall trip generation analysis.

Figure 15: 2025 Build with New Development AM Peak-Hour Volumes

Conceptualized Modeled Road Network



Figure 16: 2025 Build with New Development AM Peak-Hour Level of Service

Conceptualized Modeled Road Network



Figure 17: 2025 Build with New Development PM Peak-Hour Volumes

Conceptualized Modeled Road Network



Figure 18: 2025 Build with New Development PM Peak-Hour Level of Service

Conceptualized Modeled Road Network



Table 4: Comparison Summary (AM Peak 7:30 AM–8:30 AM)

Intersection	Approach	Existing Condition		2025 No Build		2025 Build		2025 Build with New Development	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
US 130 Burlington Pike & Bridgeboro Road Jughandle (Existing)	All	C	23.8	C	24.3	N/A	N/A	N/A	N/A
	NE	C	21.4	C	22.1	N/A	N/A	N/A	N/A
	SW	B	11.4	B	11.5	N/A	N/A	N/A	N/A
	NB	D	53.8	D	53.9	N/A	N/A	N/A	N/A
	SB	D	41.4	D	42.4	N/A	N/A	N/A	N/A
US 130 Burlington Pike & Creek Road CR 625 Jughandle (Relocated)	All	N/A	N/A	N/A	N/A	B	16.6	C	21.0
	NE	N/A	N/A	N/A	N/A	B	19.7	C	25.8
	SW	N/A	N/A	N/A	N/A	A	8.8	B	12.0
	NB	N/A	N/A	N/A	N/A	D	39.7	D	37.0
	SB	N/A	N/A	N/A	N/A	B	19.6	B	18.7
Bridgeboro Road & Creek Road CR 625 (Signalized)	All	C	25.7	C	26.1	N/A	N/A	N/A	N/A
	NB	C	20.2	C	20.6	N/A	N/A	N/A	N/A
	SB	C	30.0	C	30.7	N/A	N/A	N/A	N/A
	EB	B	14.8	B	15.0	N/A	N/A	N/A	N/A
	WB	C	34.4	C	34.8	N/A	N/A	N/A	N/A
Bridgeboro Road & Creek Road CR 625 (Roundabout)	All	N/A	N/A	N/A	N/A	B	10.6	C	15.0
	NB	N/A	N/A	N/A	N/A	A	4.0	A	4.1
	SB	N/A	N/A	N/A	N/A	B	11.9	C	16.7
	EB	N/A	N/A	N/A	N/A	A	9.1	B	11.4
	WB	N/A	N/A	N/A	N/A	B	10.5	C	15.6
US 130 Burlington Pike & Mount Holly Road/ Beverly Road CR 626	All	D	35.3	D	36.4	C	30.4	C	32.3
	NE	C	26.5	C	29.0	C	23.6	C	24.5
	SW	D	36.9	D	36.9	C	25.8	C	27.9
	NB	D	45.1	D	45.9	D	45.9	D	48.8
	SB	D	46.7	D	47.0	D	47.0	D	48.3

Table 5: Comparison Summary (PM Peak 4:30 PM–5:30 PM)

Intersection	Approach	Existing Condition		2025 No Build		2025 Build		2025 Build with New Development	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
US 130 Burlington Pike & Bridgeboro Road Jughandle (Existing)	All	C	25.6	C	26.2	N/A	N/A	N/A	N/A
	NE	C	25.6	C	26.4	N/A	N/A	N/A	N/A
	SW	B	14.2	B	14.2	N/A	N/A	N/A	N/A
	NB	E	64.7	E	67.4	N/A	N/A	N/A	N/A
	SB	C	26.5	C	26.8	N/A	N/A	N/A	N/A
US 130 Burlington Pike & Creek Road CR 625 Jughandle (Relocated)	All	N/A	N/A	N/A	N/A	C	20.5	C	22.4
	NE	N/A	N/A	N/A	N/A	C	22.9	C	26.0
	SW	N/A	N/A	N/A	N/A	B	14.2	B	14.8
	NB	N/A	N/A	N/A	N/A	D	36.4	D	36.3
	SB	N/A	N/A	N/A	N/A	C	20.8	C	23.7
Bridgeboro Road & Creek Road CR 625 (Signalized)	All	C	23.4	C	23.7	N/A	N/A	N/A	N/A
	NB	C	25.5	C	25.9	N/A	N/A	N/A	N/A
	SB	C	23.6	C	23.8	N/A	N/A	N/A	N/A
	EB	B	15.0	B	15.1	N/A	N/A	N/A	N/A
	WB	C	32.7	C	33.4	N/A	N/A	N/A	N/A
Bridgeboro Road & Creek Road CR 625 (Roundabout)	All	N/A	N/A	N/A	N/A	C	15.5	D	29.9
	NB	N/A	N/A	N/A	N/A	A	5.9	A	6.6
	SB	N/A	N/A	N/A	N/A	A	8.9	B	13.7
	EB	N/A	N/A	N/A	N/A	B	12.7	D	32.7
	WB	N/A	N/A	N/A	N/A	C	21.5	E	39.6
US 130 Burlington Pike & Mount Holly Road/ Beverly Road CR 626	All	D	50.0	E	56.3	D	49.3	E	56.7
	NE	C	28.4	C	31.5	C	20.0	C	22.7
	SW	E	65.9	E	77.9	E	63.8	E	75.3
	NB	E	56.1	E	58.2	E	71.1	E	77.1
	SB	D	51.2	D	51.7	D	55.2	E	64.1

CHAPTER 5:

Summary, Conclusion, and Implementation

This report is intended to provide decision makers with information for them to make decisions in the area. It focuses on the impacts of transportation operations, highlights the necessity of making interventions, and provides possible solutions for problem solving.

In summary, intersection performances of US 130 (Burlington Pike) and Bridgeboro Road, and Bridgeboro Road and Creek Road (CR 625), are interrelated and best addressed in tandem. A proposed solution involves relocating the jughandle intersection and reconfiguring geometry and revising traffic control, including a roundabout at Bridgeboro Road and Creek Road, to improve safety and forestall traffic congestion along US 130. The proposal also provides a basis for a trail connection between Pennington Park and Willingboro Lakes Park. A more detailed study is recommended for the environmental impact of making interventions.

Table 6 can be used as a tool for systematic selection of projects proposed within the study area in terms of project phasing, potential benefits, cost range, and responsible agency.

Project Phasing

Project phasing is classified into one of the three categories (short, medium, and long term) based on the general priorities, which may shift depending on funding availability. Generally, if a project is relatively small scale and low cost and can be readily implemented, it is listed as a short-term project (one to four years). Medium-term projects are those that require some engineering analysis and policy changes, which would be ready to implement in five to 10 years. Long-term projects are those that offer a projected high benefit, but require major developer participation, as well as participation from various

governmental entities, and would take more than 10 years to implement.

Potential Benefits

Project benefits describe the kind of impact the improvement will yield. Enhancing safety, improving mobility, and encouraging economic development are major benefit considerations.

Cost Range

Cost range is also assigned to each project. Low-cost projects are often operational improvements or maintenance projects at isolated locations and typically cost less than one hundred thousand dollars. Moderate-cost projects could involve a major reconstruction of an intersection, construction of a short connector road, or widening of an existing road, which typically cost between one hundred thousand dollars and two million dollars. High-cost projects are typically large scale and complex and can entail the construction of new facilities. Anticipated cost may exceed two million dollars. The cost ranges are generalized estimates and could vary significantly due to environmental, right-of-way, or other factors.

Responsible Agencies

Responsible agencies include the New Jersey Department of Transportation (NJDOT), New Jersey Department of Environmental Protection (NJDEP), Burlington County, Edgewater Park Township, and Willingboro Township. While the NJDOT has jurisdiction over the state highways in the corridor, decisions are made in coordination with the county or local municipalities. NJDEP is the implementation agency to approve the use of the Willingboro Lakes Park property for the new jughandle. It would better link the surrounding neighborhoods, adjacent businesses, and associated parks together. Implementing the new pedestrian crossings and sidewalk along the improved Creek Road would be the responsibility of the county as it would connect two county facilities.

Table 6: Implementation Matrix

Recommendations	Phasing	Benefit	Cost	Agency
Jughandle Relocation	Medium Term	Safety Mobility	H	NJDOT NJDEP
One-Lane Roundabout	Medium Term	Safety Mobility	M	County Townships
Signal Timing Update	Short Term	Mobility	M	NJDOT County
Pedestrian Crossing	Short Term	Safety	L	NJDOT County
Sidewalks	Short Term	Safety	M	County Townships
Wayfinding	Short Term	Safety Development	L	NJDOT County
Parking Lots and Driveway Relocation	Short Term	Safety Development	L	County Townships

L = Low M = Moderate H = High

Source: DVRPC, 2017

Next steps would include the detailed assessment of environmental impact of the proposed jughandle, and the further collaboration with stakeholders to finalize the conceptual design. The most complete list of potential funding resources can be found in DVRPC's *Municipal Resource Guide* (Publication # 12003, 2012) or the online database at www.dvrpc.org/asp/MCDResource.

Transportation Improvements for the US 130-Bridgeboro Road Corridor

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Jughandle, Roundabout, Traffic Operation, Intersection Analysis, Bicycle and Pedestrian Safety, Corridor Planning, Trail Connectivity

Abstract:

This study evaluated traffic operations of US 130 (Burlington Pike) between Bridgeboro Road and Mount Holly Road/Beverly Road (CR 626). Improvement alternative was proposed, including relocating and reconfiguring the US 130 and Bridgeboro Road jughandle intersection, and replacing the signal control with a roundabout at Bridgeboro Road and Creek Road (CR 625). Enhancing bicycle and pedestrian connection to public parks was also recommended.

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