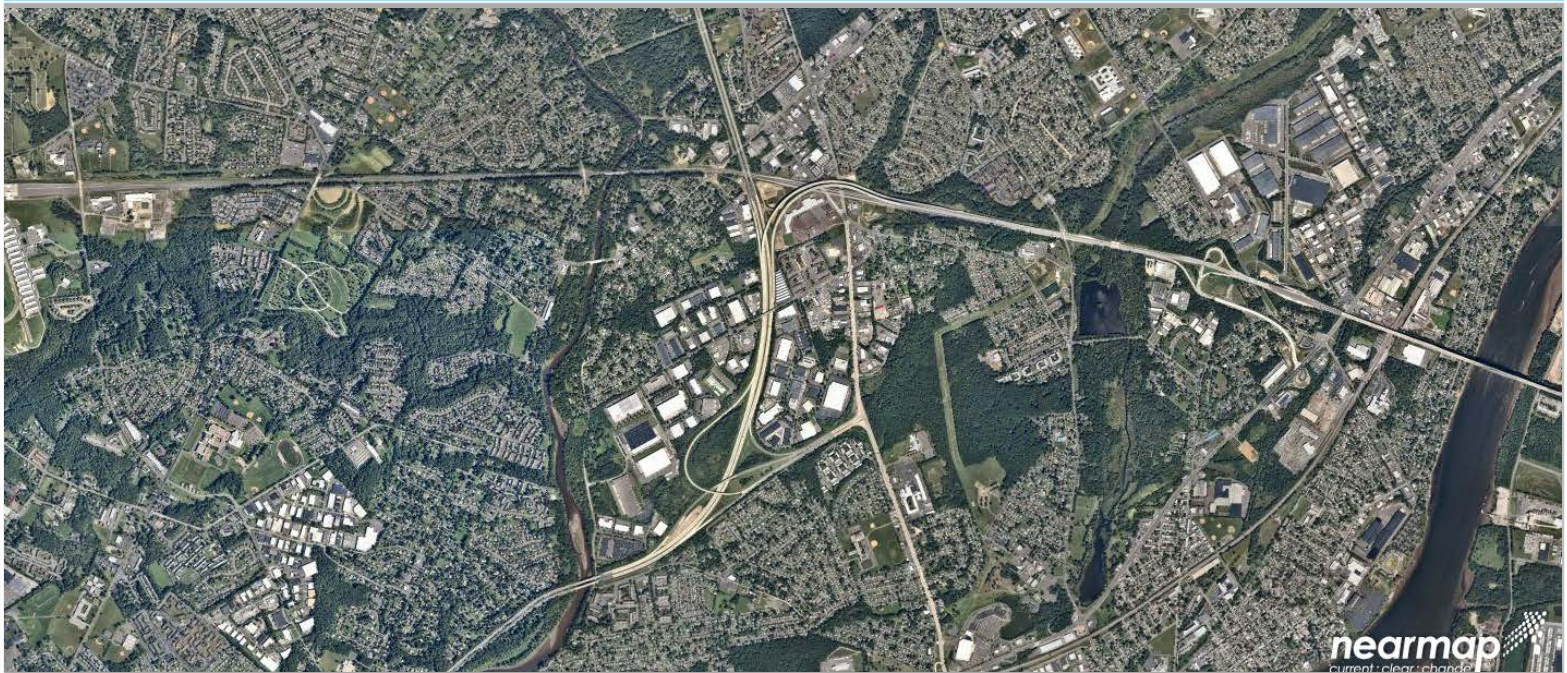


Bristol Corridor Study

Preparing for Growth in Lower Bucks County



JUNE 2021



The Delaware Valley Regional Planning Commission is the federally designated Metropolitan Planning Organization for a diverse nine-county region in two states: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey.



DVRPC's vision for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision-making. We are engaged across the region, and strive to be leaders and innovators, exploring new ideas and creating best practices.

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Executive Summary

For many years, the lack of direct connection between I-95 and I-276 (Pennsylvania Turnpike [PA Turnpike]) has caused confusion and delay for motorists traveling through Lower Bucks County. The opening of the I-95/I-276/I-295 interchange in the fall of 2018 is expected to have a substantial impact on future development, travel patterns, and freight movement in the area. Building on the recommendations of a recent Transportation and Community Development Initiative (TCDI) study to address infrastructure that may constrain growth, this study examined the impact of the recently completed interchange on freight services and local mobility in Bristol Township, Bristol Borough, and the Lower Bucks County region. The objectives were to:

- Understand and manage growth within the Lower Bucks County region that may arise as a result of the new I-95/I-276/I-295 interchange.
- Identify transportation improvement projects to improve traffic circulation and mobility, especially to accommodate freight service in the area.

Three scenarios were modeled using Vissim microsimulation software to evaluate current and future traffic performance and the effect of proposed improvements, as outlined in Table 1:

Table 1: Modeling Scenario Inputs

Base Year (2019)	Future Year (2045)	Future Year (2045) + Improvements
<ul style="list-style-type: none">• 2019 AM and PM peak-hour travel demand from DVRPC regional model• 2019 AM and PM peak-hour traffic counts• Current roadway geometry and traffic signal plans• Includes I-95/I-276/I-295 partial interchange completed in 2018	<ul style="list-style-type: none">• 2045 AM and PM peak hour travel demand from DVRPC regional model, based on projected growth in population and employment• Regionally significant planned transportation improvements funded in Long-Range Plan• Major approved local land developments• Geometry, signal plans, and calibration parameters from Base Year (2019) model	<ul style="list-style-type: none">• Based on Future Year (2045) model (travel demand, calibration parameters, local development and Long-Range Plan improvements)• Additional transportation improvements to address traffic flow issues identified in Future Year (2045) scenario

A key benefit to the new connection between I-95 and I-276 is the ability for drivers, including freight truck drivers, to access the interstate highway system closer to their destination; this can reduce costs by cutting down on total travel time. However, the congestion at the Street Road/I-95 interchange poses a challenge for drivers accessing the Bensalem/Street Road Freight Center. Microsimulation results estimated increased delay in the vicinity of this interchange in the Future Year (2045) scenario.

Reconfiguration of these intersections is constrained due to their location on a highway overpass between a railway and US Route 13 (US 13). Three alternatives were developed in order of project scope, with Alternative A expected to be the simplest and Alternative C the most complex and expensive. Alternative C adds:

- two lanes to I-95 northbound off-ramp (500 feet); northbound intersection approach includes two left-turn lanes and two right-turn lanes;
- two lanes to I-95 southbound off-ramp (500 feet); southbound intersection approach includes two right-turn lanes and one left-turn lane;
- one lane to westbound approach to I-95 northbound intersection (250 feet); westbound approach includes three through lanes and one through/right lane; and
- two lanes (one eastbound and one westbound) from the US 13 ramps onto Street Road, to the I-95 northbound intersection (650 feet).

Based on the microsimulation results for all alternatives, Alternative C is preferred, as it is the only alternative with no failing movements in either the AM or PM peaks.

With over 100 miles of freight railway trackage, three ports, six intermodal facilities, and eight interstate highway interchanges, Bucks County features one of the most robust and comprehensive freight networks in Greater Philadelphia. Access to this network supports a wide range of freight facilities across the county, with the majority clustered in Lower Bucks County, where warehousing and distribution is a growing sector of the economy. This study also examined truck movement patterns and anticipated warehouse and distributing developments to develop a set of freight recommendations to compliment the other proposed improvements.

Most of the freight-focused recommendations have benefits beyond truck movement. Designating specific truck routes with appropriate signage throughout the area can help make truck travel patterns predictable. Traffic-calming measures, such as high-visibility crosswalks and Rectangular Rapid Flashing Beacons (RRFBs), could have broad-reaching positive impacts, from increasing vehicle safety by lowering speeds to creating safe ways for pedestrians and bicyclists to connect to transit and trails.

This study identifies potential constraints on the transportation network and provides recommendations to address those constraints, putting Lower Bucks County in a strong position to prepare for a prosperous future.

CHAPTER 1:

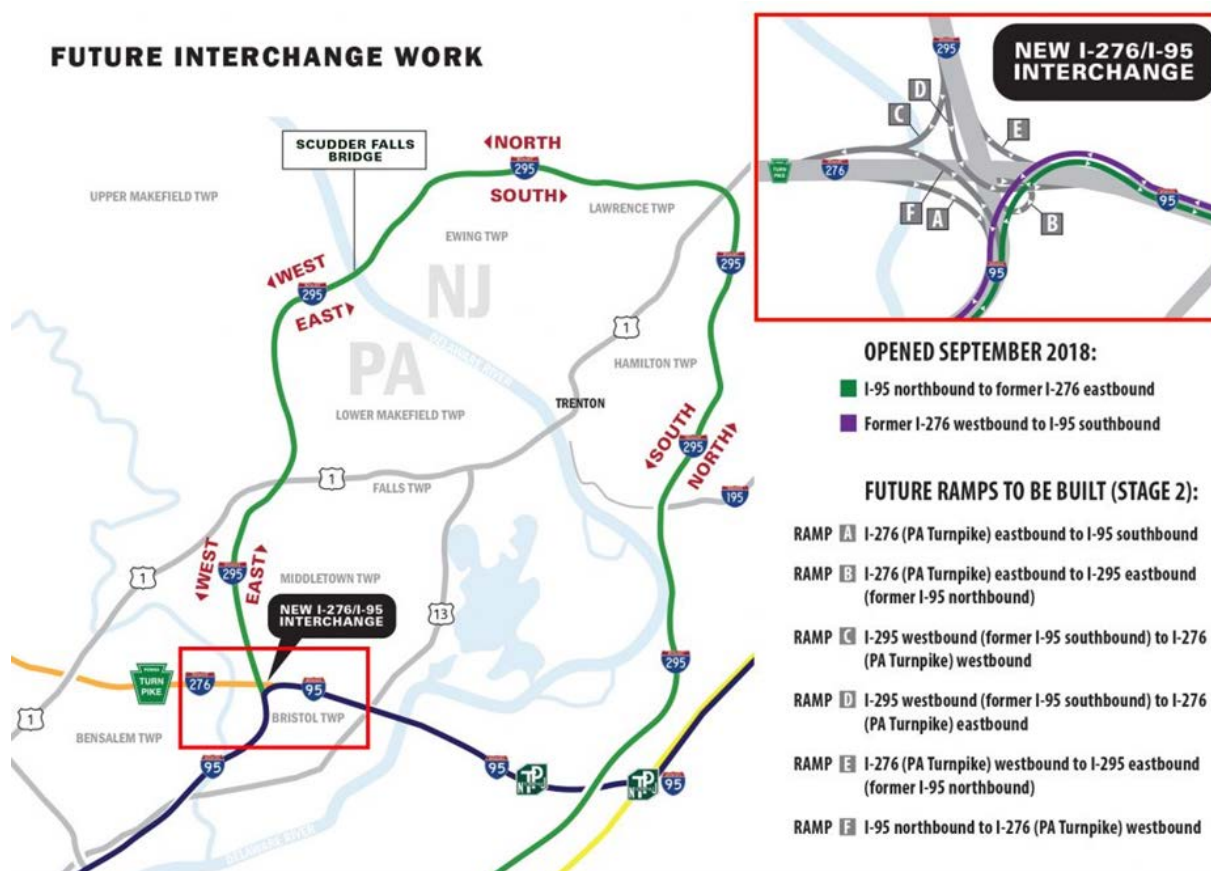
Introduction

The construction of the I-95/I-276/I-295 interchange, completed in 2018, will have a dramatic effect on the travel costs and regional market attractiveness of the Lower Bucks County region. The new connection has the potential to modify development patterns, including population and employment growth, as well as traffic patterns. The new connection will also influence how freight shippers and carriers access neighboring markets.

The purpose of this study is to examine the impact of the recently completed interchange between I-95 and the PA Turnpike on freight services and local mobility in Bristol Township, Bristol Borough, and the Lower Bucks County region. The objectives are to:

- Understand and manage growth within the Lower Bucks County region that may arise as a result of the new I-95/I-276/I-295 interchange.
- Identify transportation improvement projects to improve traffic circulation and mobility, especially to accommodate freight service in the area.

Figure 1: Future Interchange Work



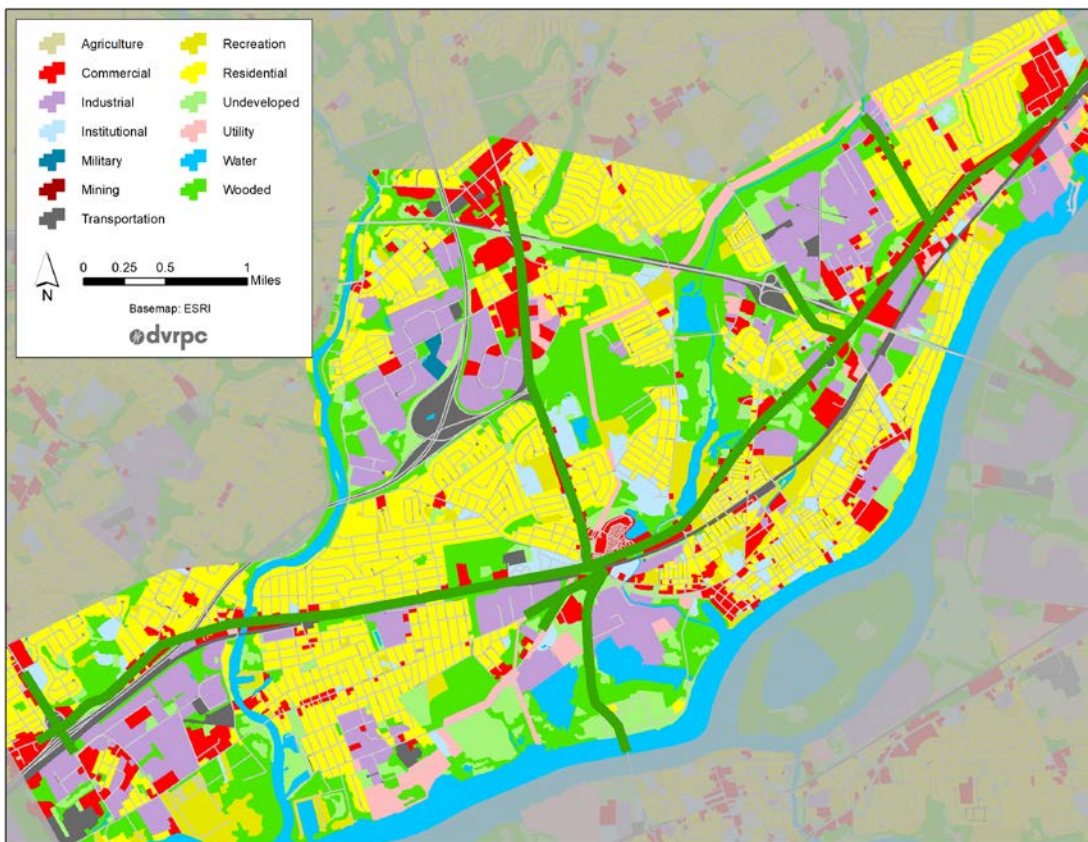
Source: The Pennsylvania Turnpike Commission, 2019

Interstate Connections

The lack of direct connection between I-95 and the PA Turnpike (I-276) has caused decades of confusion for motorists and freight traffic through the region. This confusion has led to congestion and delay on the local road network as travelers tried to make the connection between the two interstates. The idea of directly connecting the two roads has been studied since the 1970s. The PA Turnpike/I-95 interchange project was funded for design in 2004. Since then, numerous local bridges have been reconstructed and wetland and stream mitigation work has been completed. In September 2018, the first two of eight proposed ramps were opened to traffic.¹

This study examined the transportation network under current and future conditions, including the two new ramps. Unfunded proposals, such as the remaining six ramps illustrated in Figure 1, were not included in the analysis. Future analysis could evaluate potential impacts of the remaining six uncompleted movements of the interchange.

Figure 2: Study Area Land Use



Source: DVRPC, 2015

Land Use and Development Context

Over the past decades, Lower Bucks County has undergone periodic land use transformations and shifts in the retail and industrial market. A cluster of industrial parks with access to rail, highway, and port facilities has

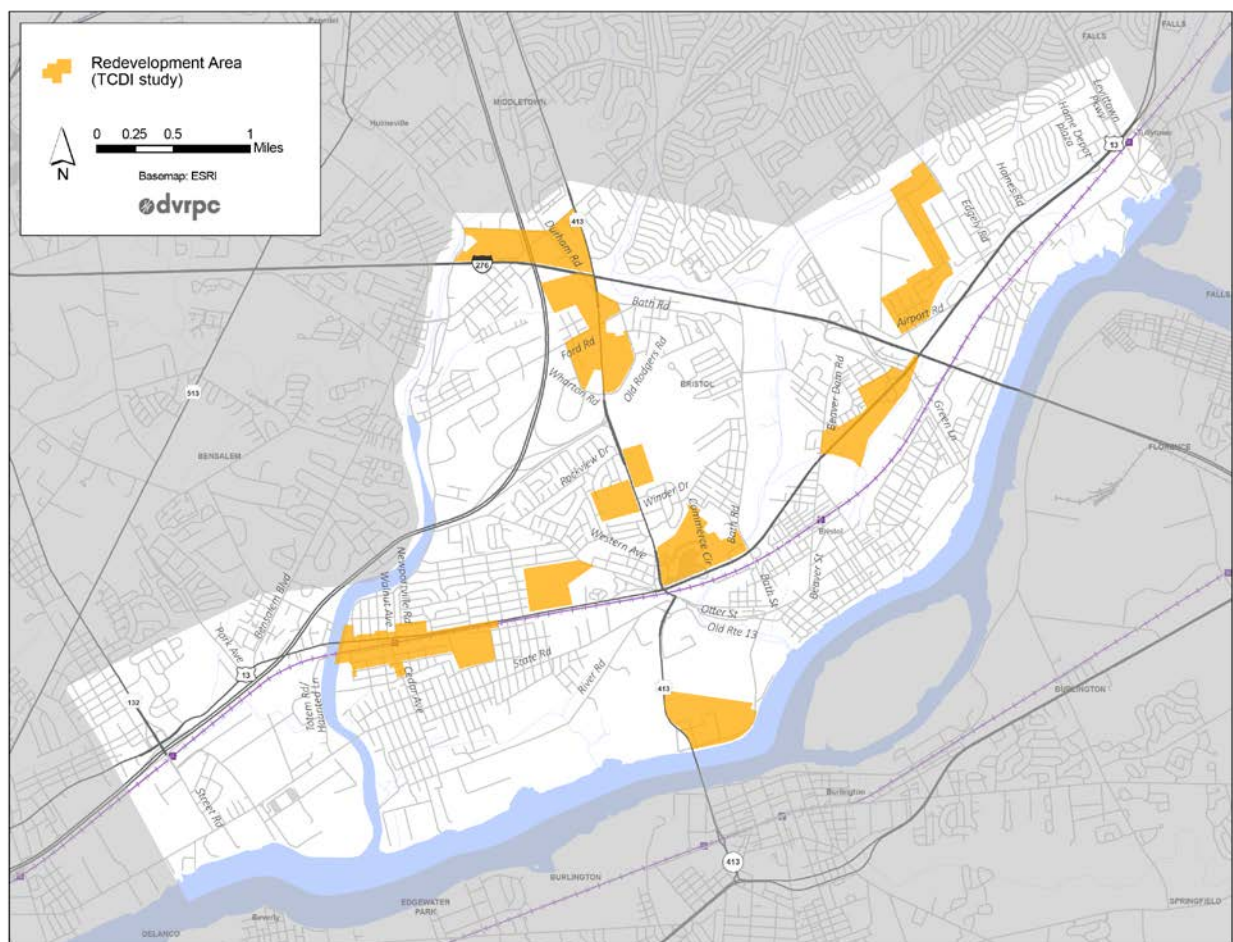
¹ The Pennsylvania Turnpike Commission, "PA Turnpike/I-95 Interchange Project", 2019, www.patpconstruction.com/paturnpikei95/project-overview.aspx.

made the area a great location for manufacturing (Figure 2). However, recent declines in population and an oversaturation of the retail market have led to many store closings.

A 2019 TCDI-funded study conducted by the Bucks County Planning Commission studied the economic impact of the new I-95/PA Turnpike interchange and developed a plan for economic revitalization in Bristol Township and portions of Bristol Borough. The study examined underutilized areas in the study area to identify potential adaptive reuse, infill development, or redevelopment opportunities, shown in Figure 3.

In the past, the lack of a direct connection between I-95 and I-276 caused confusion and congestion on local roadways. Now that some of the ramps have been constructed, travel patterns are changing. An important component to the development/redevelopment vision developed as part of the TCDI study is an assessment of the transportation network and planned improvements, including signalized intersections and other improvement projects that provide access to and from regional Freight Centers. Bucks County and the local municipalities want to ensure that the transportation network is ready to support future growth.

Figure 3: Vacant and Underutilized Areas Identified in TCDI Study

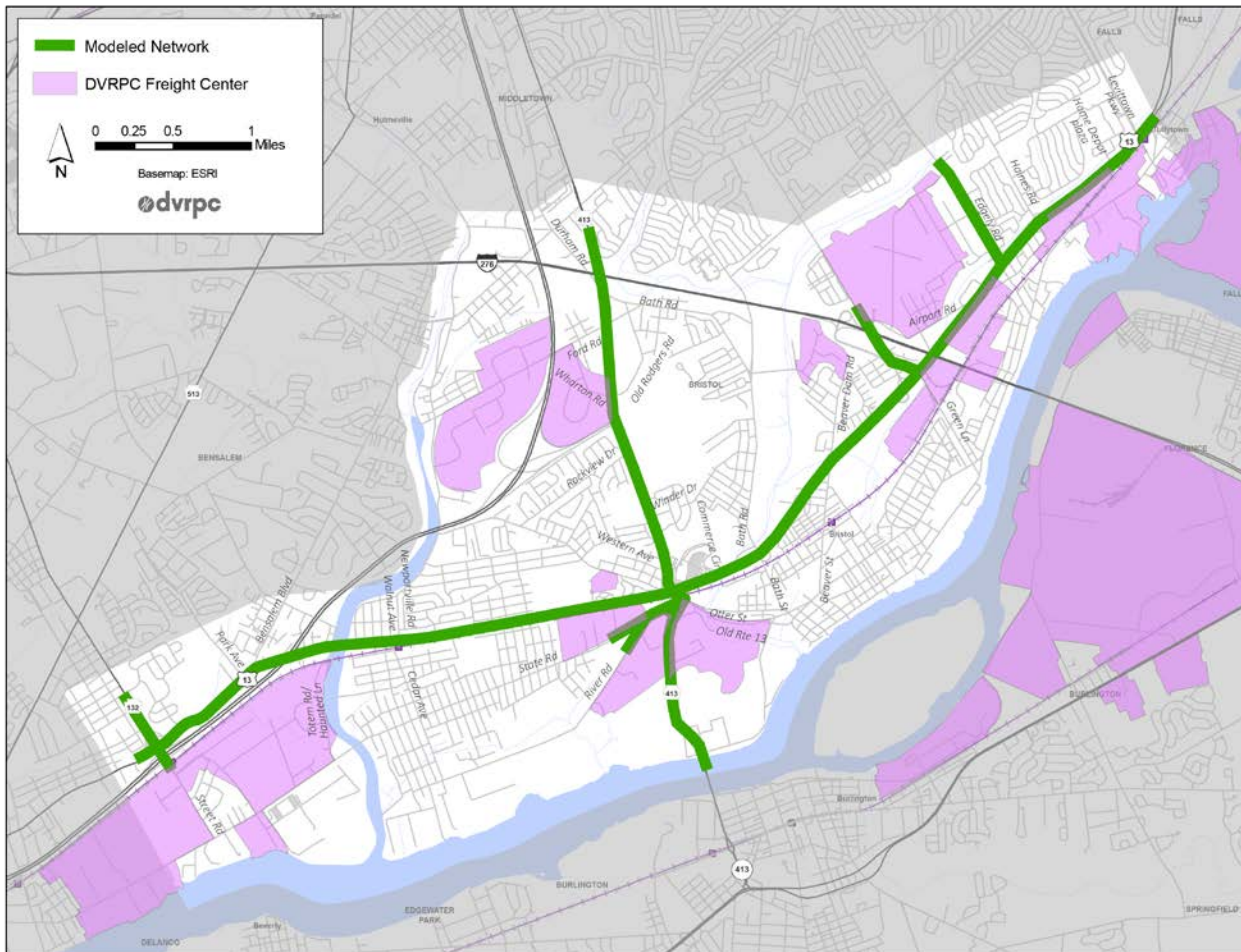


Source: Bristol TCDI Study, BCPC

Study Area

The study primarily focuses on US 13/Bristol Pike from PA 132/Street Road to Levittown Parkway and Pennsylvania 413 (PA 413)/Veteran Highway from Bath Road to State Road. Signalized intersections, highway ramps, and other high-volume intersections along these roadways form the core of the modeled traffic network. The study area, shown in Figure 4, intersects Bristol Township, Bristol Borough, Tullytown Borough, and Bensalem Township.

Figure 4: Study Area



Source: DVRPC, 2021

Project Outline

This project examined traffic using operational modeling for Base Year (2019) conditions, Future Year (2045), and Future Year (2045) + Improvements conditions. Each scenario assessed peak-hour traffic conditions and needs. A special effort was made to engage members of the freight community to help identify strategies, policies, and locations to improve freight access, interconnectivity, and mobility on the area road system, with the goal of attracting, retaining, and expanding industries and jobs while protecting and enhancing community quality of life. A timeline of project work is presented below.

July 2019–January 2020:

- Identify and collect turning movement counts and automated traffic recorder counts for the study area.
- Collect data to inform modeling work, such as traffic signal plans and INRIX travel time data.
- Facilitate a logistics summit meeting with steering committee members and representatives from the local freight community.

February 2020–September 2020

- Create a calibrated travel demand model for Base Year (2019) and a travel demand forecast for Future Year (2045) based on DVRPC's regional model.
- Create a calibrated microsimulation model for Base Year (2019) during AM and PM peak hours based on travel demand model outputs and traffic count data.

September 2020–December 2020

- Complete microsimulation in the AM and PM peak hours for the Future Year (2045) scenario.
- Convene the steering committee to review model results and discuss potential improvements to be evaluated in the Future Year (2045) + Improvements scenario.

January 2021–February 2021

- Evaluate a Future Year (2045) + Improvements scenario and share results in a memo for final review by the steering committee.

March 2021–April 2021

- Summarize findings and recommendations in a report. Share a draft with the steering committee for review prior to publication.

Freight Analysis

With over 100 miles of freight railway trackage, three ports, six intermodal facilities, and eight interstate highway interchanges, Bucks County features one of the most robust and comprehensive freight networks in Greater Philadelphia. Access to this network supports a wide range of freight facilities across the county, with the majority clustered in Lower Bucks County, where warehousing and distribution is a growing sector of the economy.

The Freight Centers and key freight facilities within the study area for this project are shown in Figure 5. Within the study area there are two Local Manufacturing and Distribution Centers: West Bristol/PA 413 and Bristol/PA Turnpike 358 Interchange. This center typology is focused around locally serving small manufacturing and distribution facilities. It often comprises densely developed, smaller-footprint warehouses and industrial facilities. The study area also contains the Bensalem/Street Road High Tech Manufacturing Center. This center typology is focused around advanced manufacturing land uses and businesses. Employment and development at these centers are primarily in bio-pharmaceuticals, electronic components, and advanced chemical manufacturing, with a mix of research and development activity.

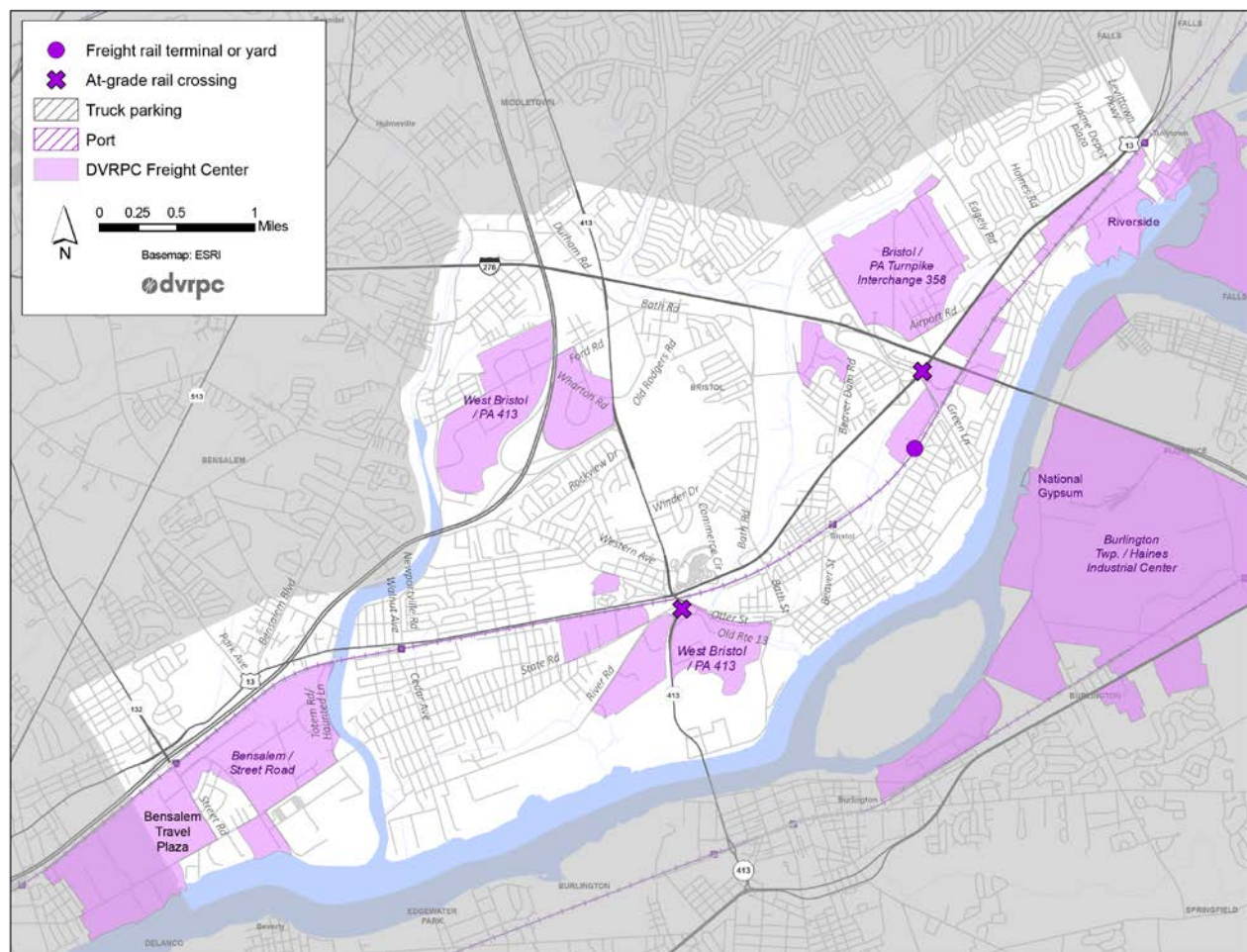
DVRPC Freight Centers

The production and distribution of goods is an integral part of the region's economy, requiring dedicated expanses of land in order to meet the needs of businesses and consumers. This land is an essential resource for a prosperous economy and an important part of communities and a source of valuable tax revenues. The goal of the DVRPC Freight Centers inventory is to identify and categorize these key locations to enhance planning necessary to concentrate growth, invest in appropriate transportation infrastructure, and minimize conflict with host communities. For more information on DVRPC's Freight Centers, visit www.dvrpc.org/webmaps/PhillyFreightFinder.

Northeast of the study area are two additional Freight Centers: Falls Township/Tullytown Borough Heavy Industrial Center and Falls Township High Tech Manufacturing Center; truck drivers often utilize study area roadways to connect to these centers.

The study area is served by freight rail via the Northeast Corridor with interchange provided by Conrail. A single freight rail yard, Bristol Yard, is located just south of Grundy. In addition, the Bristol Industrial Terminal Railway is a shortline industrial rail line serving the Bristol/PA Turnpike Interchange 358 Freight Center. The availability of freight rail service is critical for several generators in the study area, but future growth in service is limited by the heavy passenger activity on Amtrak's Northeast Corridor.

Figure 5: Freight Centers and Infrastructure



Source: DVRPC, 2021

The existing Freight Centers include proposed or approved developments, and vacant parcels that could be redeveloped in the future. In some areas, the Freight Centers border or overlap potential redevelopment areas identified in the Bristol Township TCDI study. The figures in Appendix A identify large Freight Center buildings by development status and their proximity to potential redevelopment areas. Table A-1 provides additional information about the buildings.

Truck Movement Patterns

The expansive freight development in and around the study area has a substantial impact on the movement of the trucks across the network. To better inform the understanding of how these trips move through the study area, an analysis was conducted utilizing INRIX Trips data. The INRIX data is compiled from global positioning system (GPS) trace trip tour data, categorized between medium and heavy trucks, and was collected over four one-week periods in 2018 that represent each season. These weeks include January 21–27, April 22–28, July 15–21, and October 14–20. Due to the timing of the sample data, only the final week sample represents the current conditions of the fully opened I-95 ramps.

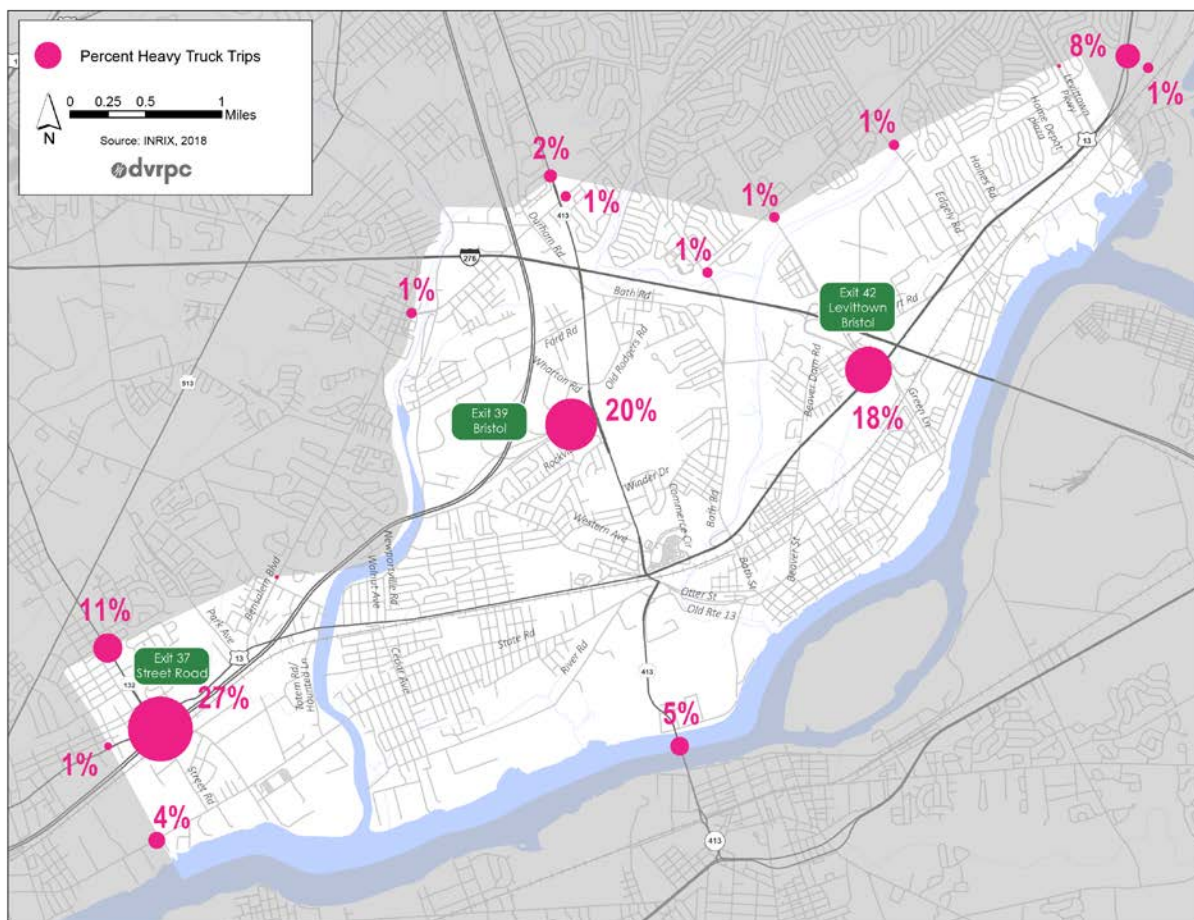
The analysis of these trips focused on activity that originated in, or was destined for, the study area. This origin-destination analysis provides a clearer definition of where truck trips are originating from when they enter the study area and where truck trips are heading when they depart the study area.

Gateways

Understanding the routes and interchange ramps that trucks utilize to access the study area is essential to understanding the distribution of truck activity in the area. To evaluate how trucks access the study area, gateway locations were defined at the access points along the study area boundary or at interchanges that connect to the surface street network. The gateways were analyzed to calculate the distribution of inbound and outbound trip behavior.

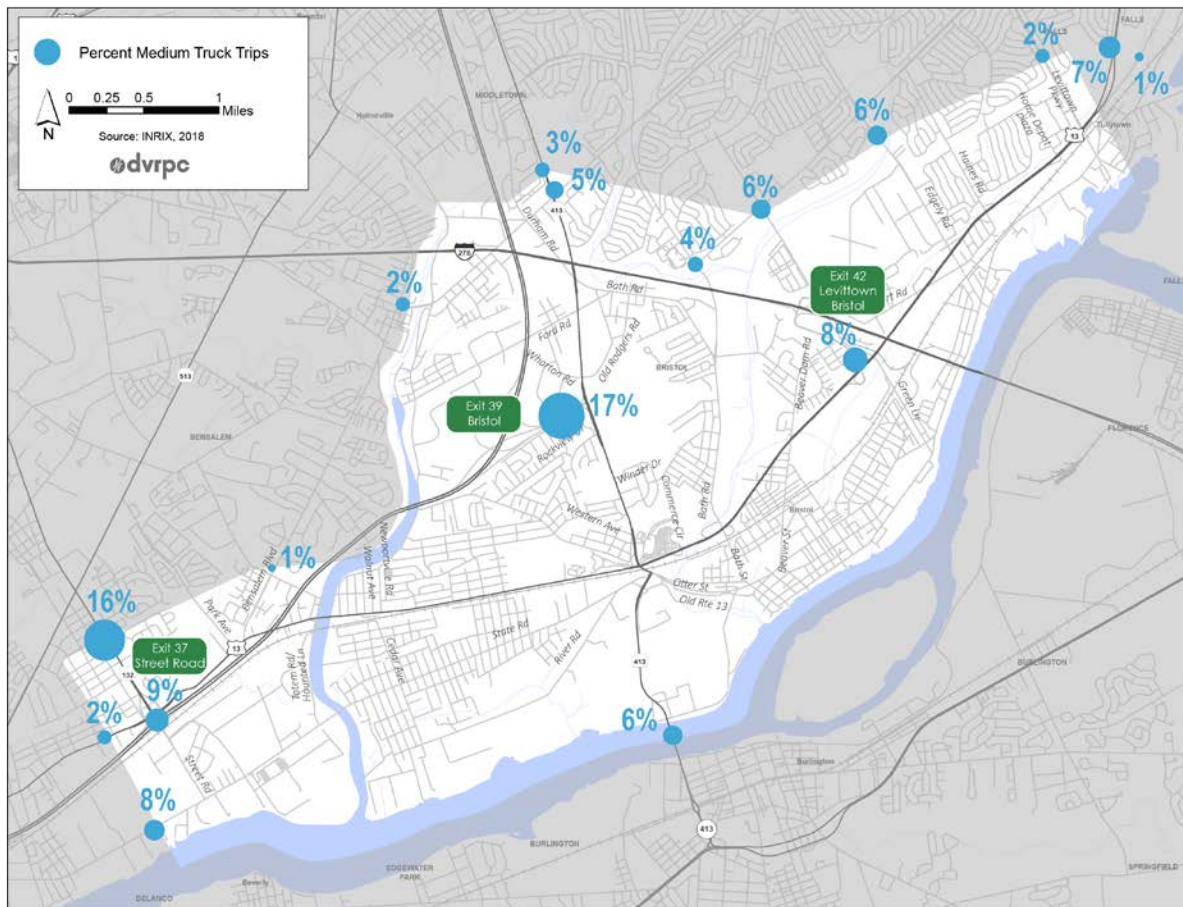
For heavy trucks conducting business in the study area, the predominant points of entry and exit were via the three I-95 interchanges, as illustrated in Figure 6. These primary access points to the national and regional freight network demonstrated substantially higher shares of heavy truck activity versus the surface street gateways. Street Road and US 13 (from the north) handled the largest share of heavy trucks entry/leaving the study area of the surface street gateways.

Figure 6: Heavy Truck Gateways



Medium trucks in the study area demonstrated a more dispersed pattern of entry/exit, as shown in Figure 7. This is typical of the smaller fleet vehicles that tend to be more locally serving. For these trucks, the busiest points of entry/exit were Street Road and I-95 Interchange 39. The remaining gateways handled a mixed share, emphasizing that these vehicles are less reliant on access to/from the national and regional freight network.

Figure 7: Medium Truck Gateways



Trip Paths

The INRIX data is compiled from a collection of data points generated by anonymized GPS devices aboard commercial vehicles, allowing for analysis to illustrate the path selection for both medium and heavy trucks. This can be used to look at truck paths within and beyond the study area to understand how trucks are connecting from local freight generators to the regional freight network.

The visualizations of the distribution of truck trips in the study area (Figures 8 and 9) show the primary generators are mostly captured by the identified Freight Centers. Some generators exist beyond these geographic areas, most notably the Levittown Town Center and the FedEx Freight facility on Bristol Pike.

The distribution of trucks through the study area shows expected patterns with high concentrations on Major Collectors, as well as the Principal and Minor Arterials. Routes like PA 413, US 13 (north of 413), and Street Road serve the largest share of heavy trucks in the study area. South of PA 413, truck volumes are more heavily distributed to State Road and River Road with more local serving traffic remaining on US 13. The heavy truck moves on River Road in this area are significant as it is served via connection on Cedar Avenue in Croydon, which runs through a mix of residential and commercial land uses. Special attention should be given to multimodal improvements along these corridors to reduce conflict between trucks and other modes.

Figure 8: Heavy Truck Trip Distribution



National trends related to growth in e-commerce and shifting consumer behaviors have driven up demand for distribution space in the region. High cost of land in traditional markets (northern New Jersey) and the need to have more immediate access to the consumer base is leading to increasing levels of industrial land redevelopment. In addition, reuse of older warehouse spaces for newer types of distribution and fulfillment activities is introducing higher levels of activity to existing properties. The local impacts of these trends require additional analysis.

In addition to the sheer size of development, the nature of the proposed development being focused on distribution centers and fulfillment activities has the potential to create a higher trip generation rate than typical warehouse uses currently located in Lower Bucks County. The quantity and distribution of this activity is yet to be fully understood as only the first few buildings have been officially proposed. The proposed site will require access to major interstates such as I-95 and I-195 in New Jersey for vital connections to ports and consumer markets. The Turnpike/I-95 interchange at Bristol Pike in Bristol Township is one of several access points to this network.

Though beyond the scope of this study, the NorthPoint development has the potential to introduce added truck activity to the study area. More significantly, the development proposal will have substantial truck trip generation impacts in Lower Bucks County. Workforce access to these new facilities will generate additional vehicular traffic and increase the demand for transit connections in the area. The accommodation of such a massive development will require additional study to assess the potential impacts of these new types of trips and their distribution across the transportation system.

CHAPTER 2:

Traffic Analysis

Traffic Modeling Process

Three scenarios were modeled using Vissim microsimulation software to evaluate current and future traffic performance and the effect of proposed improvements (Table 2):

- **Base Year (2019):** A portion of DVRPC's regional model was exported to Vissim and calibrated based on 2019 traffic counts and other existing conditions data to evaluate present traffic performance (level of service [LOS], delay, queuing, etc.).
- **Future Year (2045):** A portion of DVRPC's regional model for future year 2045 was exported to Vissim. Currently approved developments and funded transportation projects were included in this scenario. The goal of this future year model is to evaluate the effect of anticipated growth on traffic performance and identify potential future deficiencies in the transportation network.
- **Future Year (2045) + Improvements:** Based on deficiencies identified in the Future Year (2045) scenario, transportation improvement alternatives were developed. The Future Year (2045) + Improvements scenario evaluates their effect on future traffic performance.

Table 2: Scenario Inputs

Base Year (2019)	Future Year (2045)	Future Year (2045) + Improvements
<ul style="list-style-type: none">● 2019 AM and PM peak-hour travel demand from DVRPC regional model● 2019 AM and PM peak-hour traffic counts● Current roadway geometry and traffic signal plans● Includes I-95/I-276/I-295 partial interchange completed in 2018	<ul style="list-style-type: none">● 2045 AM and PM peak-hour travel demand from DVRPC regional model, based on projected growth in population and employment● Regionally significant planned transportation improvements funded in Long-Range Plan● Major approved local land developments● Geometry, signal plans, and calibration parameters from Base Year (2019) model	<ul style="list-style-type: none">● Based on Future Year (2045) model (travel demand, calibration parameters, local development and Long-Range Plan improvements)● Additional transportation improvements to address traffic flow issues identified in Future Year (2045) scenario

Base Year (2019) Analysis

The first step in many traffic modeling studies is to establish a baseline. Data showing existing traffic conditions in the study area is collected and used in the model calibration process to ensure the model is accurately representing reality. The Base Year (2019) model is used to determine the existing traffic volume, queue length, delay, and overall LOS at each intersection, which serves as a baseline for comparison to other modeled scenarios. The new interchange connecting I-276 and I-95 is included in the Base Year (2019) scenario. In addition to roadway geometry and signal plans for the study area, as well as 2019 AM and PM peak-hour travel demand from DVRPC’s regional travel model, the following information was collected to inform model calibration.

Traffic Counts

Figure 10 shows the location of traffic counts conducted for this study, as well as the extent of the microsimulation (Vissim) network. Counts were collected on typical weekdays in Fall 2019. AM and PM peak hours were derived from these counts: **8:15–9:15 AM** and **5:15–6:15 PM**.

Table 3 shows AM and PM peak-hour volumes for several major intersections in the study area.

Figure 10: Traffic Count Locations

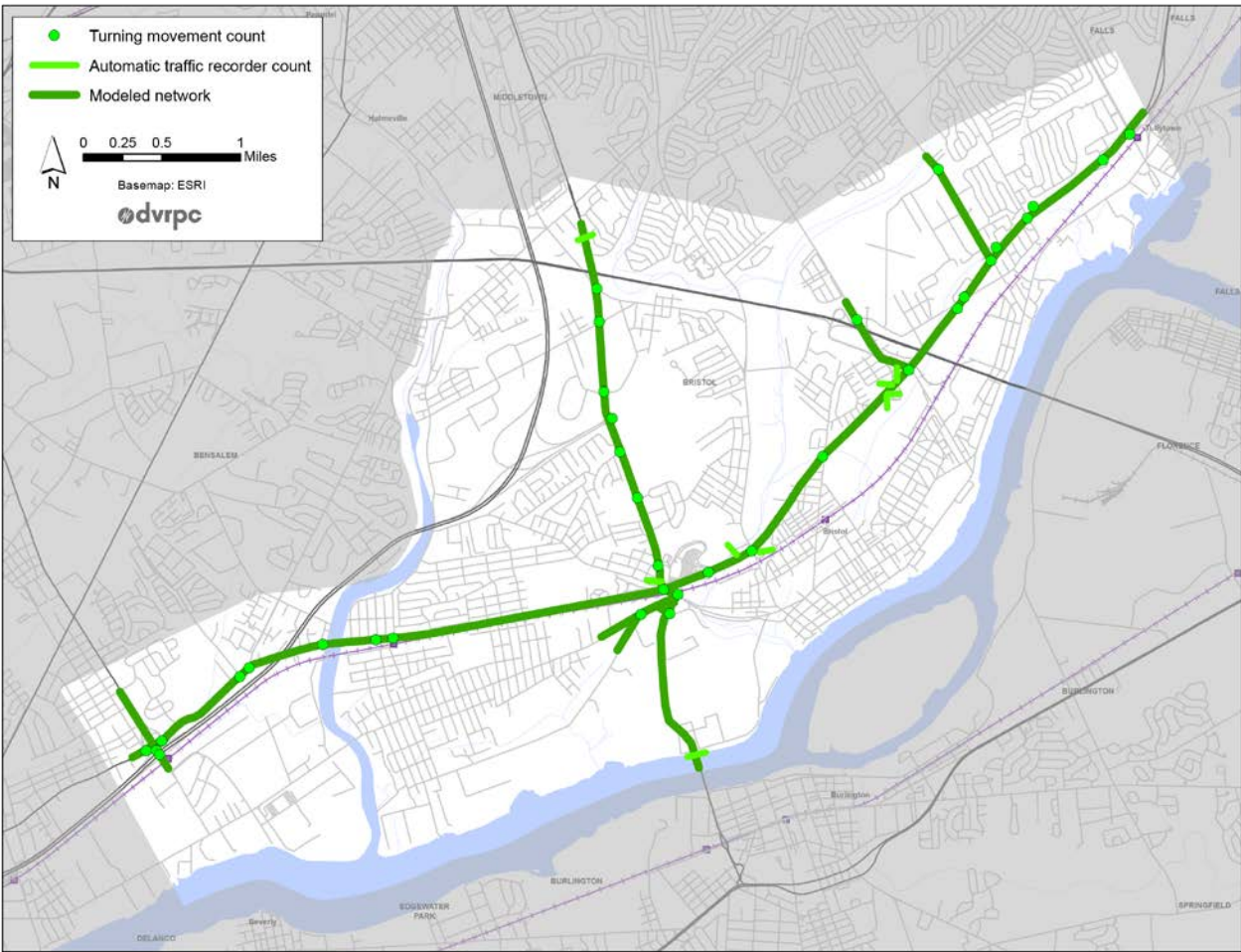


Table 3: Traffic Volumes

Intersection/Interchange	Approach	Approach Volume – AM Peak	Approach Volume – PM Peak	Total Intersection Volume – AM Peak
Street Road and I-95 northbound	Northbound ramp	692	920	1,970
	Eastbound Street Road	743	801	
	Westbound Street Road	535	918	
Street Road and I-95 southbound	Eastbound Street Road	1,135	1,056	2,411
	Southbound ramp	351	541	
	Westbound Street Road	925	1,330	
PA 413 and I-95 ramp connector	Northbound 413	991	1,264	3,151
	Eastbound ramp connector	1,208	1,658	
	Southbound 413	952	1,065	
US 13 and I-95 interchange	Northbound on-ramp	273	256	2,365
	Northbound off-ramp	588	598	
	Southbound on-ramp	702	604	
	Southbound off-ramp	802	792	
PA 413 and US 13	Northbound 13	470	509	3,396
	Eastbound 413	1,271	1,099	
	Southbound 13	705	916	
	Westbound 413	950	932	

Travel Times, Average Speed, and Travel Time Index (TTI)

To calibrate the existing conditions model, vehicle travel times were recorded for several road segments in the study area (Table 4, Figure 11). These travel times are based on INRIX data and represent average conditions for all weekdays in 2019. Travel times were recorded for the AM and PM peak hours, as well as 12:00–1:00 AM to represent free-flow conditions.

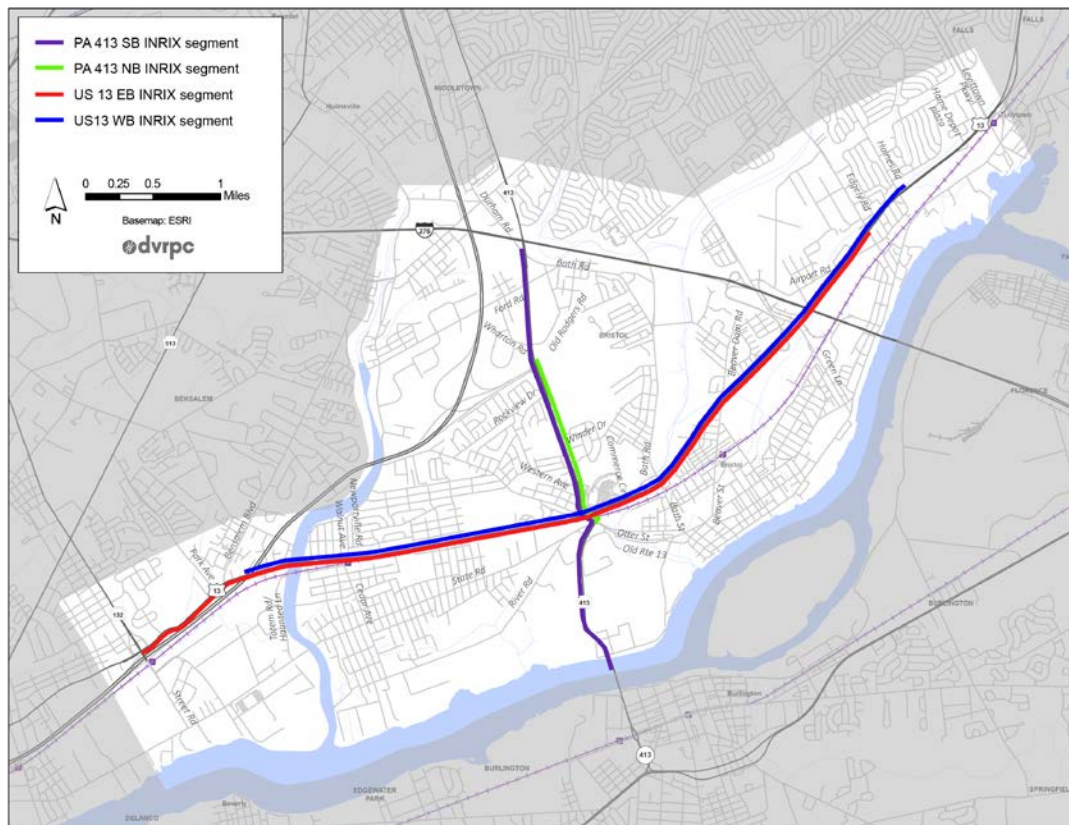
Average speed was calculated by dividing the travel time for a given segment by the segment length. This method of calculating average speed includes delay due to traffic signals, as well as congestion.

Finally, TTI was calculated for each segment during the AM and PM peak hours by dividing peak-hour travel times by free-flow travel times. By comparing peak-hour travel time to free-flow conditions, TTI reflects the increase in travel time experienced by drivers due to traffic congestion. A TTI of 1.0 means no increase in travel time; a TTI of 1.5 means that travel times increase by 50 percent. It is normal and appropriate for TTI to increase during peak hours, and a peak-hour TTI of up to 1.5 means the roadway is busy as expected. A TTI of 1.5 or greater would reflect seriously congested conditions.

Table 4: Travel Times, Average Speed and Travel Time Index (TTI)

Road Segment	Distance (mi)	Average AM Peak Travel Time (min)	Average PM Peak Travel Time (min)	Free-Flow Travel Time (min)	AM Peak Average Speed (mph)	PM Peak Average Speed (mph)	AM Peak TTI	PM Peak TTI
PA 413 SB: I-95 underpass to Otter St.	2.12	5.4	5.9	4.7	23.6	21.6	1.1	1.3
PA 413 NB: Otter St. to I-95 ramps	1.16	2.6	3	2.5	26.8	23.2	1	1.2
US 13 EB: Street Rd. to Edgely Rd.	6.44	12.6	14.5	12	30.7	26.6	1.1	1.2
US 13 WB: Haines Rd. to Bensalem Blvd.	6.17	12.4	14.6	11.3	29.9	25.4	1.1	1.3

Figure 11: Travel Times, Average Speed, and TTI



Source: INRIX, weekdays Jan 2019–Dec 2019; Reference Map: ESRI

Results

What LOS is:

LOS is a transportation engineering method used to quantify motor vehicle traffic conditions. The *Highway Capacity Manual* uses letter grades, “A” through “F,” to describe vehicle congestion and average delay by turning movement, intersection approach, or entire intersections, as outlined in Table 5.

Table 5: LOS for Signalized and Unsignalized Intersections

LOS Value	Average Delay (seconds per vehicle), Signalized Intersection	Average Delay (seconds per vehicle), Unsignalized Intersection	General Description
A	0–10	0–10	Free flow (minimal delay)
B	>10–20	>10–15	Stable flow (slight delay)
C	>20–35	>15–25	Stable flow (acceptable delay)
D	>35–55	>25–35	Approaching unstable (tolerable delay)
E	>55–80	>35–50	Unstable flow (intolerable delay)
F	>80	>50	Forced flow (Congested, queues fail to clear)

Source: Transportation Research Board, *Highway Capacity Manual*, 2010

Agencies often base transportation and development decisions on their impact on LOS, with the intention of maintaining or improving the quality of life for residents and users of the local road network. However, traditional LOS does not paint the entire picture of mobility.

What LOS is not:

Although it uses letter grades, LOS results should not be read like a report card. The goal in traffic operations is not to achieve an LOS of A, but to create conditions that maintain stable traffic flow that is typically achieved within the LOS range of A to C. An entire network of intersections with an LOS of A during peak hours often points to a system designed for more capacity than necessary.

The bigger picture:

Focusing solely on LOS centers the conversation around vehicle congestion, without considering relationships and conflicts with other modes and skewing recommendations away from designs that create truly Complete Streets. Transportation improvement projects should prioritize the movement of people and goods, not just the movement of vehicles.

A variety of methods exist for calculating LOS-like measures for other modes, such as bikes, pedestrians, and transit, and for calculating combined Multimodal LOS measures. However, it is difficult to quantify the quality of service for non-motorized modes, since the comfort, convenience, and safety of walking, biking, and using transit are often more subjective. Many of these methods require copious amounts of data that may not be reliably available or are not trusted to result in an apples-to-apples comparison between modes.

Although this report/document/memo will provide LOS results, it will also present ideas to support mobility for all road users. LOS should be considered as an important part of a larger picture of mobility.

A summary of intersection-level performance measures for the AM and PM Base Year (2019) scenario are shown in Tables 6 and 7. More detailed performance measures broken down by movement and approach are found in Appendix B. This scenario has been calibrated to 2019 traffic counts, and includes the new connection between I-95 and I-276.

Table 6: Base Year (2019) Summary – AM Peak Hour

AM Peak: 8:15–9:15 AM	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Rd	4,179	39	D
I-95 SB ramps at Street Rd	5,593	64.5	E
US 13 and Street Road EB ramps	2,143	60.3	E
US 13 and Street Road WB ramps	3,481	48	D
US 13 and Park Ave	2,467	12.6	B
US 13 and Bensalem Blvd	2,239	15.6	B
US 13 and Haunted Ln/ Totem Rd	845	6.1	A
US 13 and Walnut Ave/ Cedar Ave	1,950	18.9	B
US 13 and Newportville Rd	2,558	14.7	B
US 13 and PA 413	2,933	35.3	D
US 13 and Commerce Dr	1,081	15.1	B
US 13 and Bath Rd	2,650	31.1	C
US 13 and Beaver St/ Beaver Dam Rd	2,098	19.7	B
US 13 and Green Ln	4,436	36.4	D
US 13 and Edgely Rd	1,339	18.6	B
US 13 and Haines Rd	649	19.8	B
US 13 and Home Depot driveway	909	6.9	A
US 13 and Levittown Pkwy	1,856	17.4	B
PA 413 and Bath Rd/ Durham Rd	1,944	28.3	C
PA 413 and Ford Rd	1,944	28.3	C
PA 413 and Wharton Rd/ Old Rodgers Rd	1,166	12.6	B
PA 413 and I-95 ramps	1,639	23.9	C
PA 413 and Rockview Dr	1,660	19	B
PA 413 and Winder Dr	918	20.1	C
PA 413 and Western Ave	1,592	28.5	C
PA 413 and Otter St	2,181	31.3	C
PA 413 and State Rd	2,304	30	C

Table 7: Base Year (2019) Summary – PM Peak Hour

PM Peak: 5:15–6:15pm	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Rd	2,485	108.5	F
I-95 SB ramps at Street Rd	3,125	37	D
US 13 and Street Road EB ramps	1,531	11.5	B
US 13 and Street Road WB ramps	1,999	16.3	B
US 13 and Park Ave	2,122	9.5	A
US 13 and Bensalem Blvd	2,180	23.2	C
US 13 and Haunted Ln/ Totem Rd	948	4.1	A
US 13 and Walnut Ave/ Cedar Ave	2,037	35.7	D
US 13 and Newportville Rd	1,716	20.6	C
US 13 and PA 413	3,755	28.3	C
US 13 and Commerce Dr	1,967	13.6	B
US 13 and Bath Rd	2,809	33.7	C
US 13 and Beaver St/ Beaver Dam Rd	2,593	19.7	B
US 13 and Green Ln	3,434	33	C
US 13 and Edgely Rd	2,309	14.9	B
US 13 and Haines Rd	351	12.5	B
US 13 and Home Depot driveway	2,111	6.6	A
US 13 and Levittown Pkwy	2,517	25.7	C
PA 413 and Bath Rd/ Durham Rd	2,437	37.8	D
PA 413 and Ford Rd	2,439	19.4	B
PA 413 and Wharton Rd/ Old Rodgers Rd	2,380	6.4	A
PA 413 and I-95 ramps	3,941	29.8	C
PA 413 and Rockview Dr	2,909	20	B
PA 413 and Winder Dr	2,392	7.5	A
PA 413 and Western Ave	2,338	16.1	B
PA 413 and Otter St	2,727	22.7	C
PA 413 and State Rd	2,684	23.5	C

Analysis

AM Peak Hour (8:15 AM–9:15 AM): Intersections with LOS E or F

During the AM peak hour, the intersection of Street Road and I-95 southbound operates at LOS E. Movements experiencing significant delay at this intersection include all movements exiting the highway onto Street Road, and all eastbound movements (turning onto I-95 south and continuing on toward the northbound ramp and State Road).

Long queues on the eastbound approach to I-95 southbound spill all the way back to the intersection of US 13 and Street Road eastbound, also causing that intersection to perform at LOS E. Queues on the westbound approach to I-95 southbound sometimes spill back into the intersection of Street Road and I-95 northbound.

AM Peak Hour (8:15 AM–9:15 AM): Intersections with LOS D

LOS D is usually considered tolerable and appropriate for urbanized facilities. However, intersections with LOS D may include unstable movements, and may be sensitive to future volume increases. The following intersections operate at LOS D during the AM peak:

- I-95 northbound ramps and Street Road;
- US 13 and Street Road westbound (delay on westbound approach);
- US 13 and PA 413 (delay on westbound and eastbound left turns from PA 413 onto US 13); and
- US 13 and Green Lane (delay on westbound left from Green Lane onto US 13).

PM Peak Hour (5:15 PM–6:15 PM): Intersections with LOS E or F

During the PM peak hour, the intersection of Street Road and I-95 northbound operates at LOS F. Movements experiencing significant delay at this intersection include all movements exiting the highway onto Street Road, and all westbound movements (turning right onto I-95 north and continuing on toward the southbound ramps and US 13).

PM Peak Hour (5:15 PM–6:15 PM): Intersections with LOS D

The following intersections operate at LOS D during the AM peak:

- I-95 southbound ramps and Street Road (delay on southbound approach—vehicles exiting highway);
- US 13 and Walnut Avenue/Cedar Avenue (delay on westbound approach); and
- PA 413 and Bath Road/Durham Road.

Future Year (2045) Analysis

The Future Year (2045) AM and PM scenarios reflect projected population and employment, regionally significant transportation improvements that are funded in DVRPC's Long-Range Plan, and approved land developments. A number of developments have been recently proposed or approved in the study area, including several in DVRPC-designated Freight Centers. The figures in Appendix A illustrate large sites (greater than 50,000 square feet) in the four major study area Freight Centers, including currently occupied, vacant, approved, and proposed sites. Approved developments with more than 50,000 industrial or commercial square feet were included in the microsimulation model for a more detailed estimate of traffic impact to adjacent roadways.

An approved Wawa development at the intersection of PA 413 and State Road was also included due to an expected traffic impact at that intersection.

The transportation improvements and land developments included in the Future Year (2045) scenario are listed below and shown in Figure 12, identified by the same numbers.

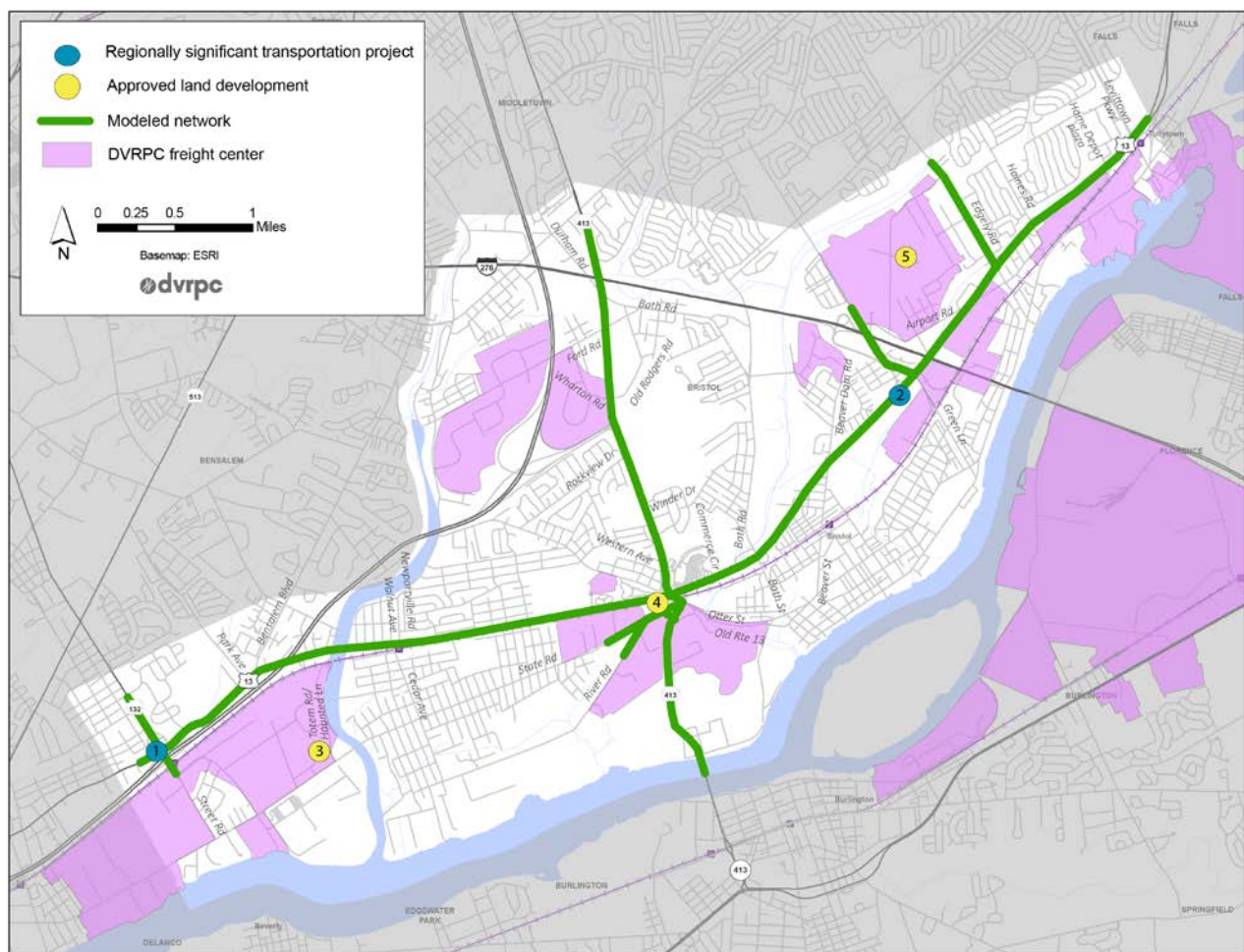
Transportation Improvements:

- (1) I-95/US 13/PA 132 Slip Ramp Operation Improvement: This improvement will provide direct, one-way access to I-95 southbound from the US 13/PA 132 (Street Road) intersection by rerouting traffic from the Street Road off-ramp from eastbound Street Road to I-95 southbound via a direct connection to the I-95 southbound on-ramp.
- (2) Route 13 Connector: Interchange 42 to US 13 ramp reconstruction includes at-grade, signalized intersection with US 13.²

Land Developments:

- (3) Bristol Industrial Park Lots 7B and 7C (81,600 industrial-manufacturing square feet);
- (4) Wawa Food Market and Fueling Station at PA 413 and State Road (10,881 commercial-gas station square feet); and
- (5) 3750 State Road – tentatively an Amazon warehouse (235,240 industrial-warehouse square feet).

Figure 12: Transportation Improvements and Land Developments in Future Year Scenario



² This project is complete at the time of writing. However, it was not complete at the time that traffic counts were taken. Therefore, the Base Year (2019) AM and PM scenarios include an unsignalized interchange, while the Future Year (2045) scenarios will include the new signal.

Results

LOS results, as well as volumes and intersection delay for the Future Year (2045) AM and PM scenarios, are summarized in Tables 8 and 9, and in Figure 13. Detailed performance measures broken down by approach and movement are found in Appendix C. Locations with traffic flow issues in this scenario are reviewed below. In general, study recommendations will address intersections operating at LOS E or F. Intersections with LOS D may also be addressed where high-volume movements or approaches fail.

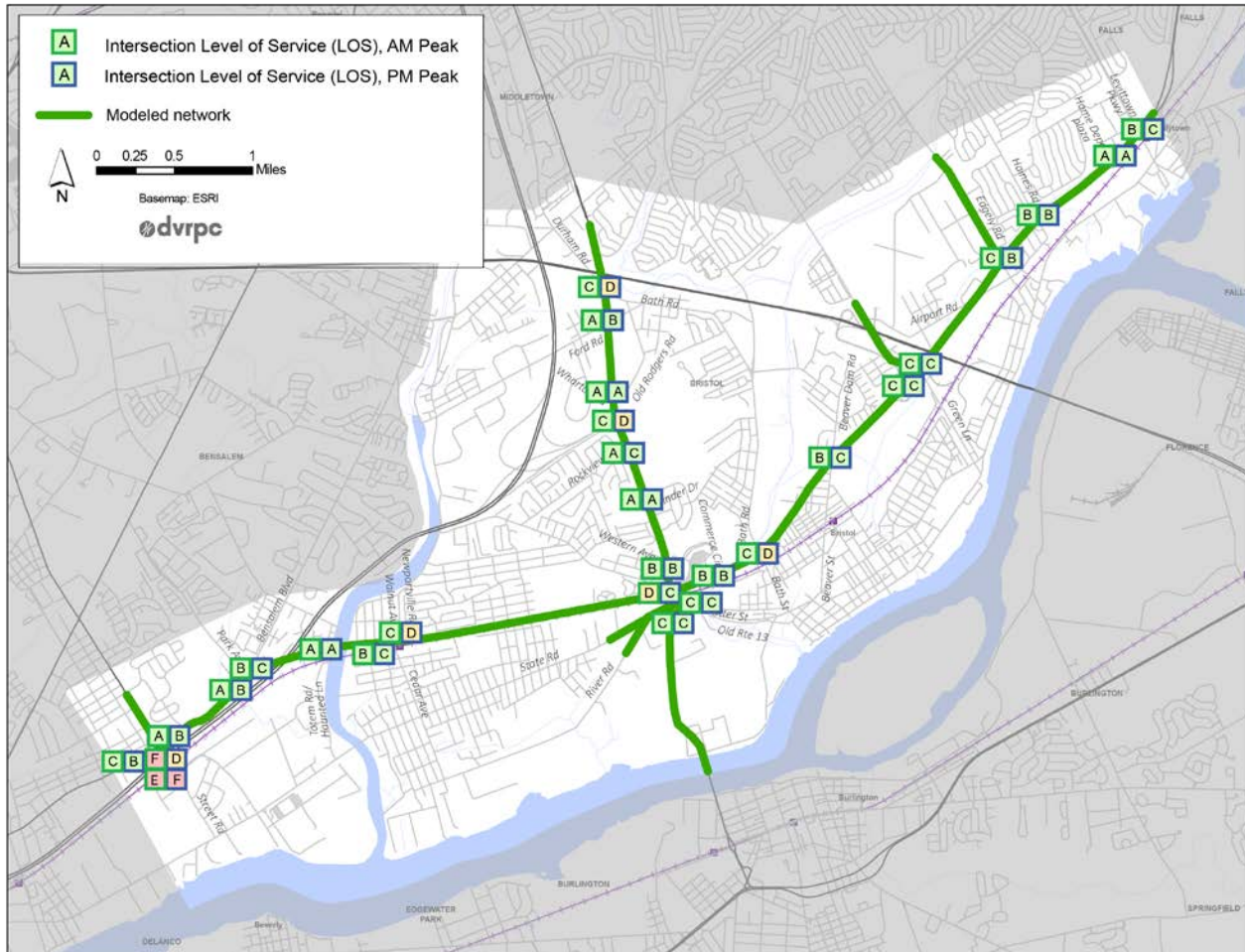
Table 8: Future Year (2045) Scenario: AM Peak Performance Measure Summary

AM Peak: 8:15–9:15 AM	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Rd	2,213	56	E
I-95 SB ramps at Street Rd	2,006	98	F
US 13 and Street Road EB ramps	1,643	27.9	C
US 13 and Street Road WB ramps	1,433	10	A
US 13 and Park Ave	1,397	9.4	A
US 13 and Bensalem Blvd	1,562	14.2	B
US 13 and Haunted Ln/Totem Rd	567	5.2	A
US 13 and Walnut Ave/Cedar Ave	1,337	17.7	B
US 13 and Newportville Rd	1,079	19.5	C
US 13 and PA 413	3,357	35.4	D
US 13 and Commerce Dr	1,160	12.8	B
US 13 and Bath Rd	3,033	24.7	C
US 13 and Beaver St/ Beaver Dam Rd	2,255	16.5	B
US 13 and Green Ln	3,116	20.1	C
US 13 and Edgely Rd	1,018	12.1	B
US 13 and Haines Rd	734	10.5	B
US 13 and Home Depot driveway	1,000	5	A
US 13 and Levittown Pkwy	2,114	18.7	B
PA 413 and Bath Rd/ Durham Rd	1,945	24	C
PA 413 and Ford Rd	2,008	9.2	A
PA 413 and Wharton Rd/ Old Rodgers Rd	1,335	5.5	A
PA 413 and I-95 ramps	2,080	25.1	C
PA 413 and Rockview Dr	1,840	10	A
PA 413 and Winder Dr	973	4.7	A
PA 413 and Western Ave	2,663	15.7	B
PA 413 and Otter St	2,086	29.9	C
PA 413 and State Rd	2,660	30	C

Table 9: Future Year (2045) Scenario: PM Peak Performance Measure Summary

PM Peak: 5:15–6:15pm	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Rd	2,540	117.7	F
I-95 SB ramps at Street Rd	2,909	45	D
US 13 and Street Road EB ramps	1,879	16.6	B
US 13 and Street Road WB ramps	2,084	16.9	B
US 13 and Park Ave	2,234	10.2	B
US 13 and Bensalem Blvd	2,285	33.6	C
US 13 and Haunted Ln/Totem Rd	1,027	4.1	A
US 13 and Walnut Ave/Cedar Ave	2,136	21.2	C
US 13 and Newportville Rd	1,744	27.1	D
US 13 and PA 413	3,825	29.3	C
US 13 and Commerce Dr	2,020	13.2	B
US 13 and Bath Rd	2,949	37.6	D
US 13 and Beaver St/ Beaver Dam Rd	2,808	24.3	C
US 13 and Green Ln	3,699	30	C
US 13 and Edgely Rd	2,510	17	B
US 13 and Haines Rd	383	14.1	B
US 13 and Home Depot driveway	2,339	6.9	A
US 13 and Levittown Pkwy	2,855	31	C
PA 413 and Bath Rd/ Durham Rd	2,477	37.7	D
PA 413 and Ford Rd	2,452	16.5	B
PA 413 and Wharton Rd/ Old Rodgers Rd	2,434	6.4	A
PA 413 and I-95 ramps	4,029	47.6	D
PA 413 and Rockview Dr	3,004	27.9	C
PA 413 and Winder Dr	2,468	9	A
PA 413 and Western Ave	2,428	18.2	B
PA 413 and Otter St	2,812	21.3	C
PA 413 and State Rd	2,807	27.4	C

Figure 13: Future Year (2045) Scenario: AM and PM Peak LOS



Analysis

AM Peak Hour (8:15 AM–9:15 AM): Intersections with LOS E or F

- I-95 southbound ramps at Street Road: During the AM peak hour, the intersection of Street Road and I-95 southbound operates at LOS F. All eastbound and southbound movements experience at least 80 seconds of delay, on average. Westbound through movements are not significantly delayed, although westbound lefts experience an average of 80 seconds of delay. The average delay for this intersection is about 47 seconds greater than in the Base Year (2019) scenario, despite the addition of a slip ramp from US 13 to I-95. The westbound left turn onto I-95 southbound also fails, leading to traffic spillback into the I-95 northbound intersection.
- I-95 northbound ramps at Street Road: During the AM peak hour, the intersection of Street Road and I-95 northbound operates at LOS E. Westbound through movements experience the most delay with an average of 108 seconds.

AM Peak Hour (8:15 AM–9:15 AM): Intersections with LOS D

- US 13 and PA 413: During the AM peak hour, the intersection of US 13 and PA 413 operates at LOS D. The left and through movements on PA 413 eastbound both experience over 55 seconds of delay on average.

PM Peak Hour (5:15 PM–6:15 PM): Intersections with LOS E or F

- I-95 northbound ramps at Street Road: During the PM peak hour, the intersection of Street Road and I-95 northbound operates at LOS F. All northbound and westbound movements experience two or more minutes of delay, on average, while eastbound movements are not significantly delayed. The average delay for this intersection is about 10 seconds greater than in the Base Year (2019).

PM Peak Hour (5:15 PM–6:15 PM): Intersections with LOS D

- I-95 southbound ramps at Street Road: On average, vehicles traveling southbound off of I-95 experience about two minutes of delay.
- PA 413 and Bath Road: On average, westbound left-turning vehicles experience about 70 seconds of delay.
- US 13 and Bath Road: Northbound and southbound left turns experience the most delay at this intersection, with about 2.5 and 1.5 minutes of delay, respectively. Other movements experience tolerable levels of delay.
- PA 413 and I-95 ramps: During the PM peak hour, the intersection of PA 413 and the interchange to I-95 operates at LOS D. Westbound through vehicles experience about a minute of delay at this intersection, and westbound vehicles turning left toward I-95 experience over two minutes of delay. Other movements experience moderate delay, indicating that signal timing adjustments could partially mitigate delay at this intersection.

Comparing Base Year (2019) to Future Year (2045)

Overall, traffic flow on US 13 and PA 413 is worse in the Future Year (2045) scenario compared with Base Year (2019), with delay increasing at several high-volume intersections. Since the I-95 and Street Road intersections are forecast to experience the most delay, Figures 14 and 15 graphically represent details of the intersection delay by movement and approach.

A reshuffling and general increase in delay is typical between base and future year scenarios, as shifting travel patterns operate on a roadway and signal timing network meant to accommodate current demand. At some intersections, adjustments to signal timing may partially or entirely address traffic flow issues. At other intersections, changes to roadway design may be needed. The roadway improvement alternatives presented in the next section are intended to mitigate the issues identified in this analysis.

Figure 14: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Future Year (2045), AM Peak

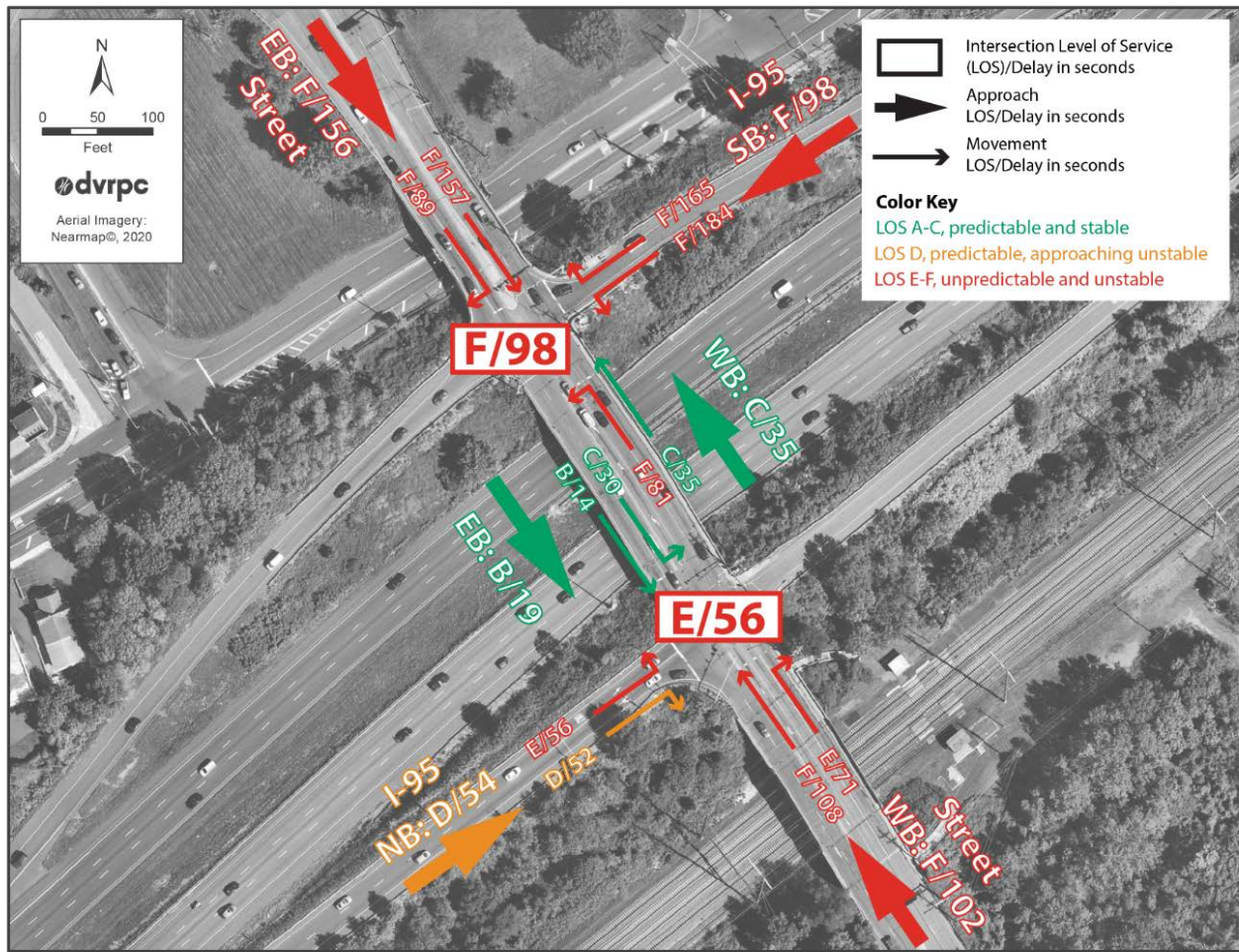
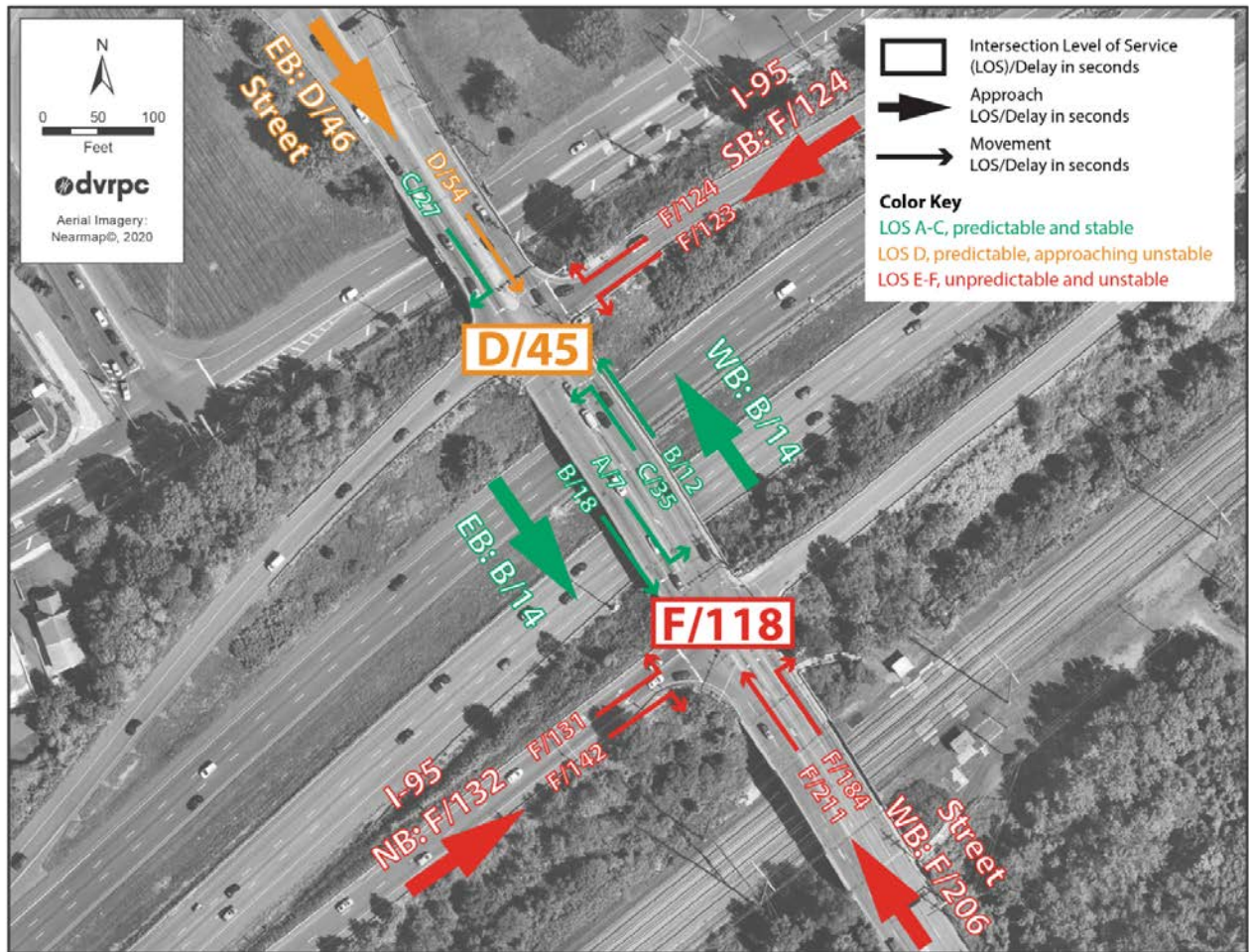


Figure 15: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Future Year (2045), PM Peak



CHAPTER 3:

Recommendations

Vehicular Improvement Alternatives

Improvement alternatives were developed to mitigate anticipated congestion at Street Road and I-95. The baseline roadway configuration used in the Base Year (2019) and Future Year (2045) scenarios is shown in Figure 16.

The three improvement alternatives to modify these intersections are cumulative, and are ordered by increasing project scope. All three would require modifications to the Street Road overpass over I-95, with Alternative C requiring the most modification. Table 10 summarizes the improvements included in each alternative. Figures 17 through 19 illustrate the three roadway configuration alternatives.

Figure 16: Roadway Configuration, Street Road and I-95 Intersections, Future Year (2045)



Table 10: Alternative Roadway Improvements to Street Road and I-95 Intersections

Alternative A	Alternative B	Alternative C
<ul style="list-style-type: none"> Two lanes added to I-95 northbound off-ramp (500 feet). Northbound intersection approach includes two left-turn lanes and two right-turn lanes. Two lanes added to I-95 southbound off-ramp (500 feet). Southbound intersection approach includes two right-turn lanes and one left-turn lane. 	<ul style="list-style-type: none"> Two lanes added to I-95 northbound off-ramp (500 feet). Northbound intersection approach includes two left-turn lanes and two right-turn lanes. Two lanes added to I-95 southbound off-ramp (500 feet). Southbound intersection approach includes two right-turn lanes and one left-turn lane. One lane added to westbound approach to I-95 northbound intersection (250 feet). Westbound approach includes three through lanes and one right-turn lane. 	<ul style="list-style-type: none"> Two lanes added to I-95 northbound off-ramp (500 feet). Northbound intersection approach includes two left-turn lanes and two right-turn lanes. Two lanes added to I-95 southbound off-ramp (500 feet). Southbound intersection approach includes two right-turn lanes and one left-turn lane. One lane added to westbound approach to I-95 northbound intersection (250 feet). Westbound approach includes three through lanes and one through/right lane. Two lanes added to Street Road (one eastbound and one westbound) from the US 13 ramps onto Street Road, to the I-95 northbound intersection (650 feet).

Figure 17: Roadway Configuration, Street Road and I-95 Intersections, Future Year (2045) + Improvements Alternative A

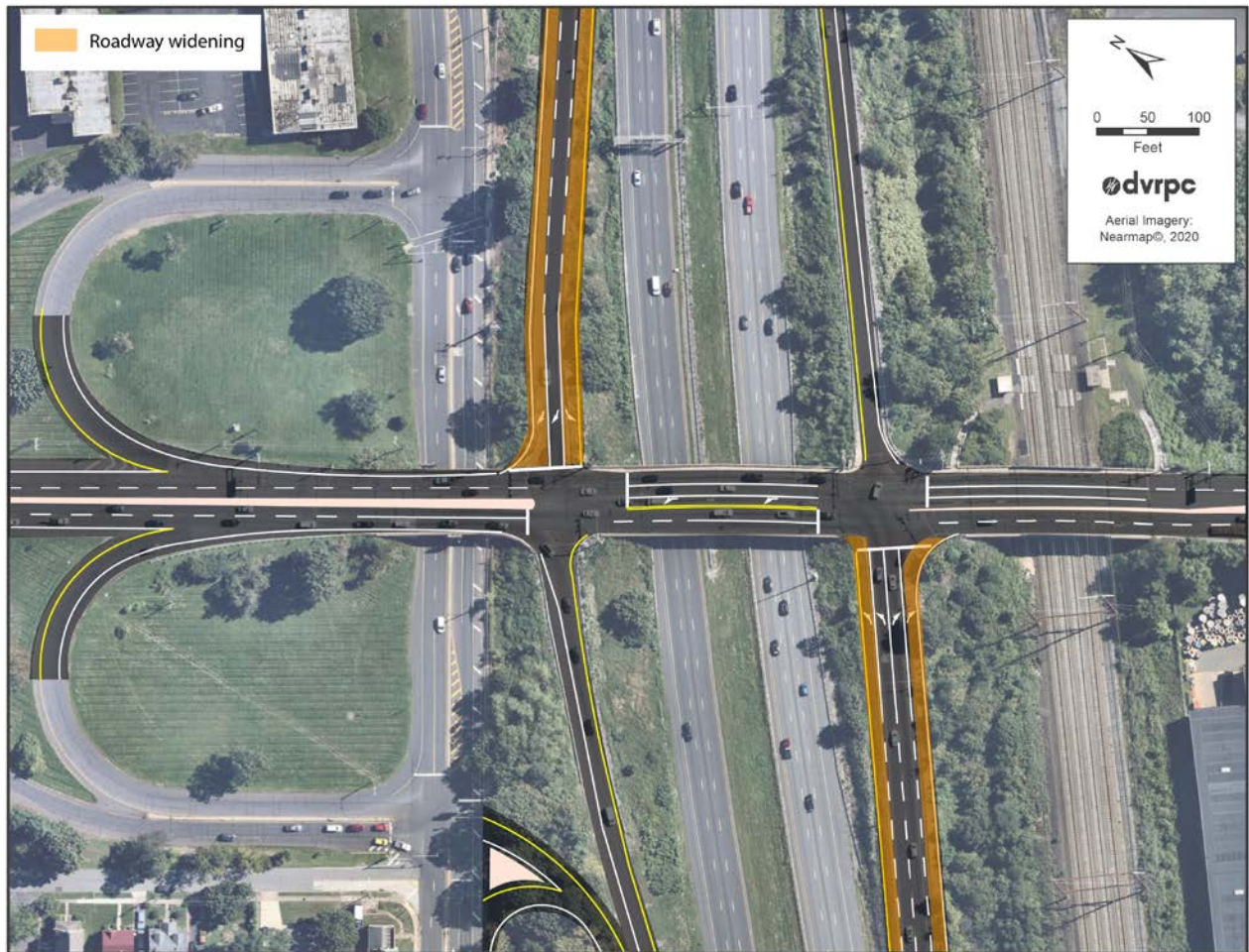
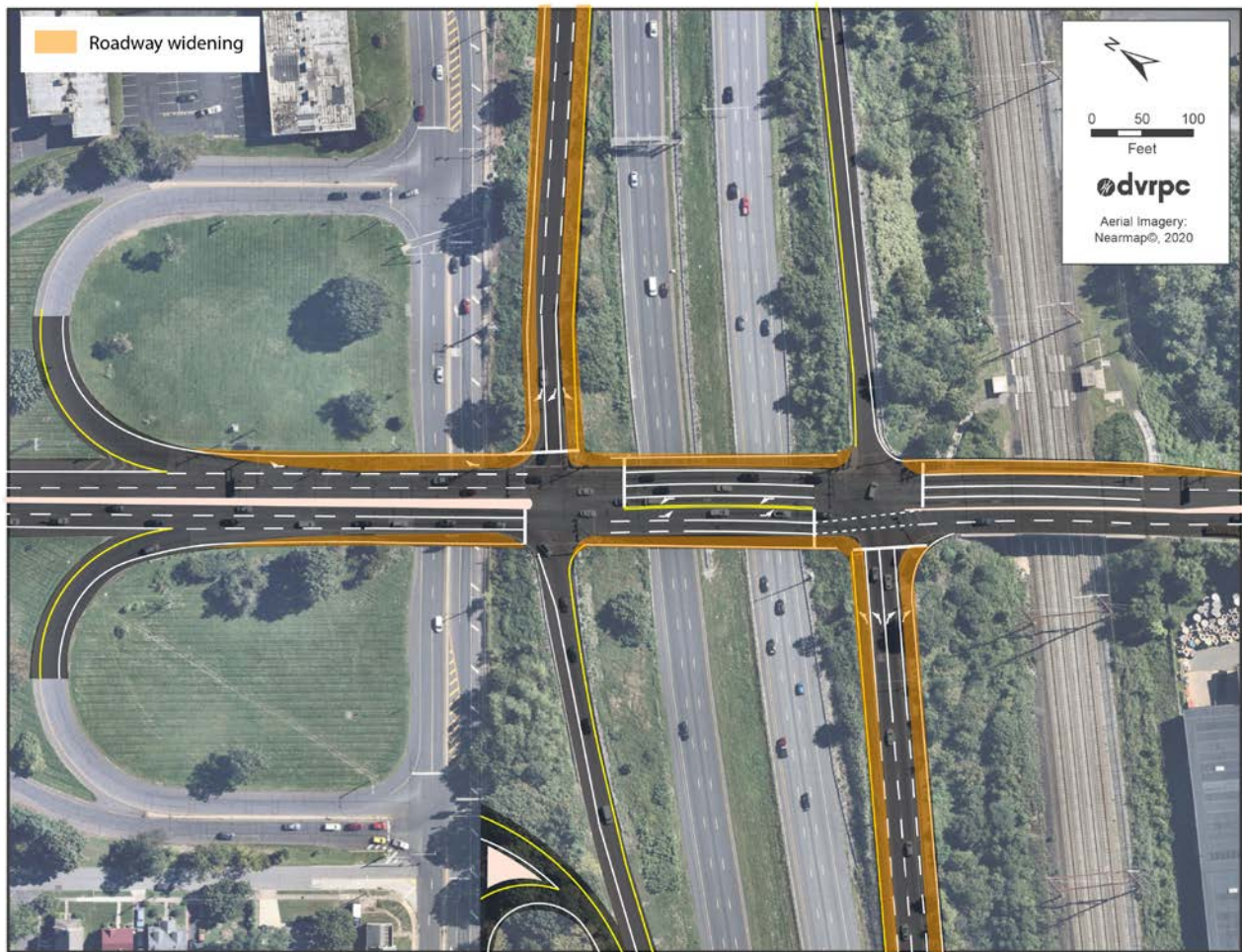


Figure 18: Roadway Configuration, Street Road and I-95 Intersections, Future Year (2045) + Improvements Alternative B



Figure 19: Roadway Configuration, Street Road and I-95 Intersections, Future Year (2045) + Improvements Alternative C



Results

Tables 11 and 12 present the approach- and intersection-level delays resulting from each improvement alternative, compared with the Future Year (2045) scenario. Results for the two intersections of Street Road and US 13 are included in these tables, as these four intersections are in close proximity and operate as a system. Table 13 presents queue length results for the two approaches with spillback issues.

Figures illustrating movement-level delay for each alternative during the AM and PM peak hours are found in Appendices D, E, and F.

Table 11: Delay Results for Improvement Alternatives, AM Peak Hour

		Future Year (2045)				Future Year (2045) + Improvements: Alternative A				Future Year (2045) + Improvements: Alternative B				Future Year (2045) + Improvements: Alternative C			
		Approach		Intersection		Approach		Intersection		Approach		Intersection		Approach		Intersection	
8:15-9:15 AM	Approach	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
I-95 NB ramps at Street Road	I-95 ramps NB	54.4	D	56.0	E	48.3	D	24.1	C	49.0	D	23.9	C	47.3	D	21.6	C
	Street WB	101.5	F			18.0	B			17.8	B			13.8	B		
	Street EB	19.4	B			9.4	A			8.5	A			7.2	A		
I-95 SB ramps at Street Road	I-95 ramps SB	175.0	F	98.0	F	50.7	D	21.4	C	50.0	D	21.2	C	48.9	D	17.7	B
	Street EB	155.8	F			16.8	B			16.5	B			10.3	B		
	Street WB	34.8	C			12.9	B			12.9	B			12.5	B		
US13 and Street Road EB ramps	Street ramps EB	48.4	D	27.9	C	47.0	D	26.8	C	46.7	D	26.6	C	27.8	C	14.6	B
	US13 SB	8.6	A			6.8	A			6.6	A			5.1	A		
	US13 NB	12.9	B			12.1	B			12.9	B			9.8	A		
US13 and Street Road WB ramps	Street ramps WB	35.1	D	10.0	A	36.9	D	11.2	B	36.6	D	11.1	B	36.9	D	11.0	B
	US13 SB	5.3	A			6.0	A			5.8	A			5.7	A		
	US13 NB	5.8	A			6.9	A			7.0	A			6.7	A		

Table 12: Delay Results for Improvement Alternatives, PM Peak Hour

		Future Year (2045)				Future Year (2045) + Improvements: Alternative A				Future Year (2045) + Improvements: Alternative B				Future Year (2045) + Improvements: Alternative C			
		Approach		Intersection		Approach		Intersection		Approach		Intersection		Approach		Intersection	
5:15-6:15 PM	Approach	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
I-95 NB ramps at Street Road	I-95 ramps NB	132.4	F	117.7	F	50.0	D	50.1	D	50.4	D	42.1	D	48	D	32.2	C
	Street WB	205.8	F			83.7	F			60.3	E			32.8	C		
	Street EB	13.7	B			10.5	B			10.3	B			11.8	B		
I-95 SB ramps at Street Road	I-95 ramps SB	123.4	F	45.0	D	50.3	D	22.5	C	50.4	D	22.8	C	53.2	D	20.1	C
	Street EB	45.8	D			27.9	C			28.5	C			19.2	B		
	Street WB	14.1	B			9.8	A			9.9	A			8.9	A		
US13 and Street Road EB ramps	Street ramps EB	34.9	C	16.6	B	35.2	D	16.8	B	35.2	D	16.7	B	37.7	D	12.8	B
	US13 SB	7.2	A			7.3	A			7.1	A			4.7	A		
	US13 NB	13.5	B			13.6	B			13.6	B			10.3	B		
US13 and Street Road WB ramps	Street ramps WB	40.2	D	16.9	B	40.1	D	17.6	B	39.2	D	17.4	B	41.9	D	17.9	B
	US13 SB	15.3	B			15.5	B			15.4	B			15.1	B		
	US13 NB	8.6	A			9.3	A			9.3	A			9.8	A		

Table 13: Select Approach-Level Queue Length Results for Improvement Alternatives

		Average Queue (ft)				Maximum Queue (ft)			
		2045	Alternative A	Alternative B	Alternative C	2045	Alternative A	Alternative B	Alternative C
AM	Eastbound Approach to I-95 Northbound Intersection	179	47	41	21	321	308	301	232
	Westbound Approach to I-95 Southbound Intersection	178	56	55	39	329	321	325	310
PM	Eastbound Approach to I-95 Northbound Intersection	72	60	59	38	320	313	317	301
	Westbound Approach to I-95 Southbound Intersection	82	60	65	41	318	319	316	304

Values in red exceed available storage length (200 ft).

Analysis

A key benefit to the new connection between I-95 and I-276 is the ability for drivers, including freight truck drivers, to access the interstate highway system closer to their destination; this can reduce costs by cutting down on total travel time. However, the congestion at the Street Road/I-95 interchange poses a challenge for drivers accessing the Bensalem/Street Road Freight Center.

Reconfiguration of these intersections is constrained due to their location on a highway overpass between a railway and US 13. Although cost analysis was not included in the scope of this analysis, the alternatives were developed in order of project scope, with Alternative A expected to be the least expensive, and

Alternative C the most expensive. **Alternative C is the preferred alternative, as it is the only alternative with no extremely unstable or failing movements in either the AM or PM peaks.**

During the AM peak hour, the three alternatives perform similarly, with Alternative C performing slightly better at the Street Road/I-95 southbound intersection, as well as the US 13/Street Road eastbound intersection. All three alleviate the major failing approaches at the two I-95 intersections.

During the PM peak hour, Alternatives A and B improve these two intersections; however, the westbound approach to the I-95 northbound intersection still fails, and the overall intersection operates at LOS D. In Alternative C, this approach improves to LOS C, and the intersection operates at LOS C.

In addition to delay, queuing is expected to be an issue between the two I-95 intersections. The distance between these two intersections is 200 feet, so any queue lengths greater than 200 feet lead to spillback and intersection blockage, worsening delay as vehicles cannot enter the intersection until the queue clears. During the AM peak hour, average queues are just under 200 feet in both directions on the bridge. All three alternatives significantly reduce average queue lengths during the AM peak, and slightly improve the more moderate average queue lengths during the PM peak.

However, it should be noted that maximum queue lengths exceed storage in all alternatives during both the AM and PM peak hours. Although these spillback events are less common, they do contribute to peak-hour congestion. Alternative C reduces the AM maximum queue length for the eastbound approach to I-95 northbound, although it still exceeds storage by 32 feet.

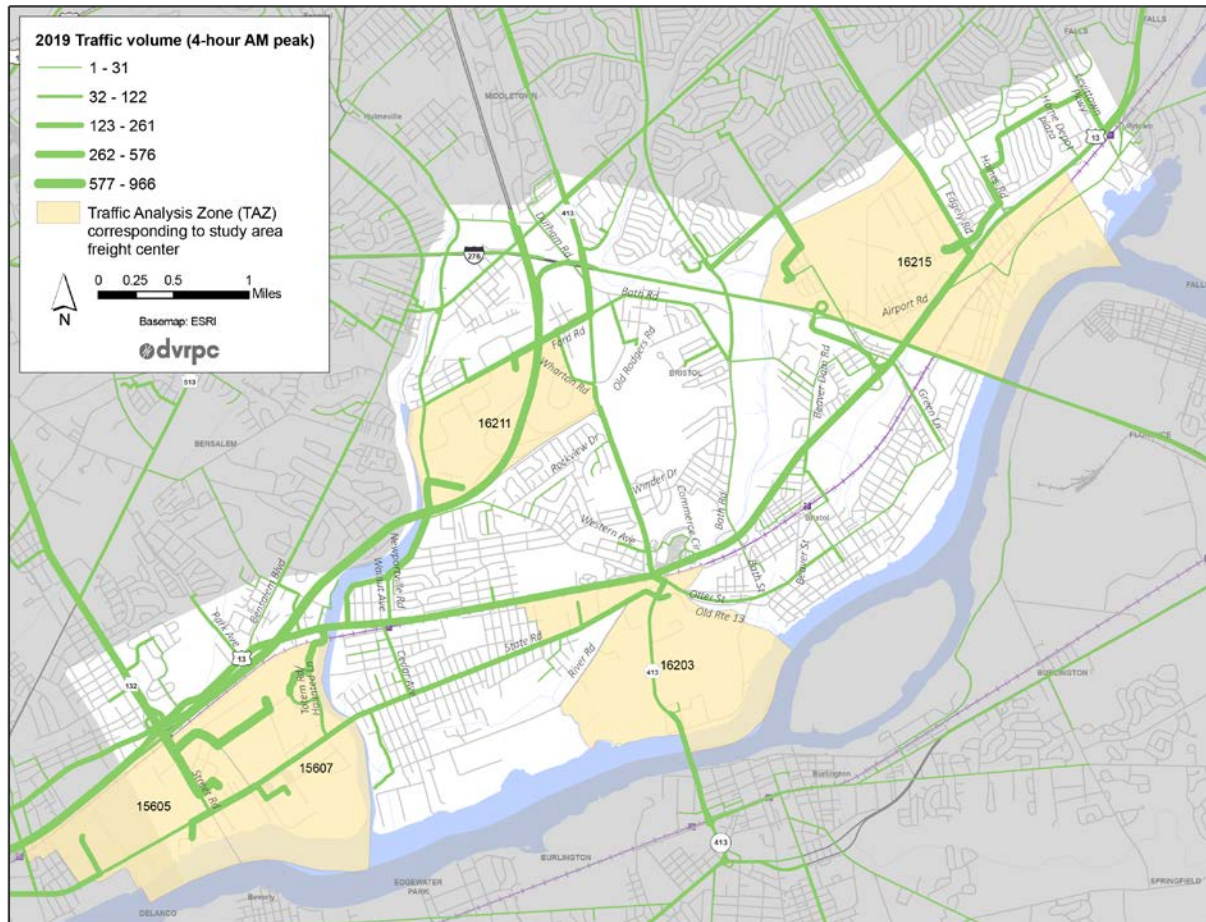
Missing Movements

Although this study was not scoped to analyze the impacts of the six missing movements of the I-95/I-276/I-295 interchange, the regional modeling work completed in support of this project's microsimulation analysis was examined to identify some potential impacts at a high level. The addition of the six missing movements would enable more direct interstate access in the desired direction of travel. The benefits of direct interstate access include decreasing overall travel time and increasing efficiency, leading to an overall reduction in the cost of goods movement.

The map in Figure 20 shows the results of an analysis to determine where these benefits might be realized in the study area. The map portrays the 2019 AM vehicle volumes to and from the Traffic Analysis Zones (TAZ) associated with freight centers in the study area. The thicker the green line, the more volume travels along those roads while traveling to or from the freight centers. The thickest green lines reiterate the results of the microsimulation analysis, highlighting the fact that the I-95 interchange at Street Road is heavily used. Creating direct access from northbound I-95 to westbound I-276 with a new ramp, one of the six missing movements, has the potential to alleviate some of the congestion at this interchange.

It also seems possible that northbound trucks leaving the northernmost freight center would be more likely to use the interchange on US-13 near Green Lane to take I-95 westbound to I-295 northbound if that missing movement were added. This could alleviate some of the demand on Edgely Road and US-13 in the northern part of the study area.

Figure 20: Freight Center Travel Flows from DVRPC's Regional Travel Demand Model



Source: DVRPC, 2021

Freight Recommendations

The extensive industrial development within and adjacent to the study area emphasizes the need for local consideration of freight movement. There are opportunities to improve the safety of the network while enhancing truck maneuverability. Bucks County along with municipalities and key stakeholders should undertake a comprehensive freight access and truck routing study in Lower Bucks County. In response to the proposal for over 10 million square feet of new distribution center development, this study should analyze the nature of activity this new style of development will generate, document existing trip distribution, identify critical truck network components, and develop strategies and investments to improve freight access while minimizing community impacts.

The freight-focused recommendations in this section also require additional study and engineering but can provide critical improvements that enhance the livability within the study area as freight activity continues to grow.

Truck Route Designation

Host communities of regional Freight Centers often deal with a variety of challenges related to the accommodation of large truck volumes that serve these critical economic generators. This study explored the

distribution of some of these trips through the truck O-D analysis. The communities in Lower Bucks County could benefit from pursuing the development of a truck route network. A truck route network is composed of multiple components that form the system. Not all of these components need to be communicated to road users through signage because some may be established primarily for planning purposes. The identification of these facilities enhances the ability to properly incorporate freight considerations into Complete Street infrastructure designed to preserve the safety and efficiency of the system for all users.

The recommended components listed in Table 14 are consistent with the standards established by DVRPC for truck route networks in communities throughout the region.

Table 14: Truck-Appropriate Routes

Limited-Access Highways/Regional Freight Corridors	This component of the draft truck network represents the highest level of the truck-appropriate routes and is composed of regionally and nationally significant through routes. These include all Primary Highway Freight System components of the network, as well as major limited-access facilities or state and U.S. routes that serve regional travel. These facilities are often high-speed facilities that have limited interaction with pedestrians and other non-vehicular modes. The points at which this network interchanges with the surface street network are significant ingress/egress points for freight traffic to access the study area.
Primary Truck Routes	Primary Truck Routes create redundancy and move trucks from the Regional Freight Corridors network to lower-level routes and final O-Ds. These routes will require special consideration for the design of transit, bike, and pedestrian activity because they are likely to carry higher volumes of trucks, including tractor-trailers.
Secondary Truck Routes	Secondary Truck Routes fill the gaps in the network, providing key connections to commercial corridors and individual freight generators. Although at a lower intensity than the Primary Truck Routes, this network will need to accommodate trucks that continue to serve commercial and industrial clients. As such, additional consideration should be made in the design of transit, bike, and pedestrian facilities that coexist on these routes.
Last-Mile Connectors	Last-Mile Connectors serve to connect intermodal terminals and high-intensity Freight Centers to the rest of the freight network. These roads experience high volumes of heavy freight traffic and will need to accommodate significant tractor-trailer volumes.

Also of importance to the truck route network are truck-restricted routes (Table 15). These are streets that have been identified and/or signed as restricted for all trucks or some trucks based on size or weight.

Table 15: Truck-Restricted Routes

Geometric and Weight Restrictions	<p>Geometric restrictions may limit the length, width, or height of a vehicle. The national standard trailer width is 102 inches, and 102-inch-wide trailers are permitted on all state roads in Pennsylvania unless there is a geometric constraint. In Pennsylvania, trailers are restricted to a maximum of 53 feet in length for a single trailer and 28½ feet for a twin trailer combination. Signage must be used to specify the length, width, or height limits of a road constrained beyond these standards.</p> <p>Weight restrictions are applied to roads that are not structurally adequate to support heavy-truck loads. These restrictions may apply to, and be posted by, the gross load of a vehicle or the axle weight.</p>
Local Restrictions	<p>Local restrictions are those where a municipality may restrict truck traffic using a “No Trucks” sign with the option to allow an exception for local or residential deliveries using an “Except Local/Residential Deliveries” sign. Local truck restrictions can be effective in helping to manage the movement of trucks that are not appropriate for certain streets.</p> <p>It is important that there be clear policy guidance for the use of these restrictions. This policy should include the requirement to undertake analysis about the type of truck behavior being addressed and the impact to distribution of these trips as a result of any new restrictions. Failure to undertake a complete assessment of the goals and impacts of the truck restrictions prior to issuing them can result in more problems than they solve.</p>

Truck Network Designation Process

The DVRPC truck network designation process is a locally led effort that seeks to engage key stakeholders and the public. The key to a successful process is inclusion of more than a single municipality, and it is recommended that a truck network be established at the county or a multimunicipal level. The steps for designation include:

Preliminary Screening

The first step in defining a truck route network is to identify key connectivity and potential route options. The starting point for this screening is the mapping of the regional and national highway freight systems that have been identified by DVRPC. This is the highest tier of the truck network and serves to move high volumes of interstate trips and bring trucks closer to their final deliveries in the city.

The objective of this step is to draft a network of connections that link these Regional Freight Corridors to the key freight generators and attractors in the study area. These locations are the points or corridors that truck trips are directly serving and may include industrial properties, commercial corridors, or intermodal terminals. These draft network segments should be matched to compatible existing classification systems that can serve the route function and the current classification of the streets.

Data Evaluation

The second step of the process is the evaluation of the preliminary network for activity levels and accommodation of existing trip distribution. This data evaluation step is meant to measure the validity of the initial assumptions. It provides quantitative data to the process, measuring the activity levels for each of the draft network facilities. Truck trip trajectory data provides better contextual information on how trucks currently move through the network and guides decisions on the appropriate facilities to be recommended for inclusion in the final network.

Review and Adoption

Once a final draft network has been established through the data evaluation step, the network will require additional review and public input. This is a critical step in the advancement of the network. During this step, internal and external stakeholder input is solicited on the recommended network. This step includes the critical process of public outreach and education on the network. The engagement of community members is an important piece of building support for the adoption of the network. Community education and outreach are intended to aid the public in understanding what the network is and is not and clearly articulating to the public the value of the network designation in designing infrastructure that accommodates trucks while preserving quality of life. Feedback from communities should be considered and modifications to the final network designation may need to be made to accommodate local concerns if alternatives can be established.

The final component of the review and adoption of the network is the act of adopting local ordinances codifying the network designation.

Application

After adoption of the truck route network, the county and impacted municipalities must act to ensure the system is implemented. There are several applications for a truck route network. As was specified previously, not all components are intended for signage. The primary use of the network is as a planning and design tool.

The network should also be communicated in local transportation maps and supported by a signage plan that reinforces the location of both preferred and restricted routes. Local truck route maps and outreach to key freight generators may also be leveraged to address specific areas of interest or locations where problematic routing was identified in earlier steps. Land use and economic development policies can also be used to complement truck route network planning.

Wayfinding and Signage

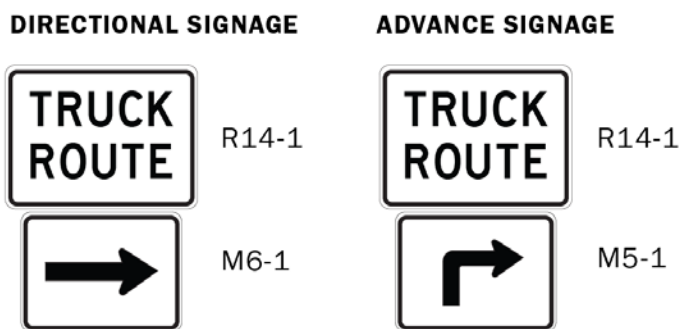
Following the process of designating a truck route network, it is recommended that the county and local municipalities develop a signage plan to support routing across the critical network components.

Truck-Appropriate Route Signage

In order to guide trucks on the roads that are intended to accommodate them, the signage plan should include consistent placement of signs to reinforce the route. This can be done through the use of three types of truck route signs: directional, advance, and on-route signs. These signs are described in detail in Table 16 and Figure 21.

Table 16: Truck Route Signs and Recommended Locations

Sign Type	Description	Location
Directional	Truck route sign (R14-1) with 90-degree turn arrow plaque (W16-5PR/L) pointing to truck route at intersections or other decision points.	All intersections Points at which truck routes turn left or right at intersections with non-truck routes. At base of exit ramps At tunnel and bridge exits
Advance	Truck route sign (R14-1) with advance 90-degree turn arrow plaque (W16-6PR/L) in advance of intersections where trucks have to turn onto truck route.	150 feet before intersection
On-Route	Truck route sign (R14-1) reassuring driver that they are on a truck route.	All truck routes One-half-mile increments

Figure 21: Truck Sign Configuration

In addition to the truck route signage, the signage plan should consider utilizing a "TO Marker" (M4-5) in conjunction with U.S. route or Pennsylvania route markers, along with corresponding arrow plaques to direct truck traffic to major regional freight routes. This helps to supplement the truck route wayfinding and reinforce to drivers that the route provides the necessary highway interchange for their trip. These signs can be especially useful at egress points from Freight Centers.

Truck-Restriction Signage

Similar to the application for truck route signs, restriction signage should also be incorporated into the signage plan. Restriction signage should be applied consistently across the study area to provide adequate advanced notice to truckers of truck restrictions. Advance signage is common for weight and height restrictions. The two types of signage, advance and restriction signs, are critical to communicating restrictions to drivers and are described in detail in Table 17.

Table 17: Truck Restriction Sign Types

Sign Type	Description	Location
Restriction	Applicable restriction sign at the intersection marking the beginning of the restricted route.	At intersections nearest the beginning of the restriction at which point an alternative move is available to the driver.
Advance	Applicable restriction sign with advance move restriction.	150 feet before intersection

Traffic Calming

Safety is a critical consideration in planning for large trucks as they interact with communities. Several locations in and adjacent to the study area exhibited truck movements that moved from industrial areas into mixed commercial or residential communities. These areas present elevated potential for conflict. The truck route designation process can help to identify the location of these points of conflict more comprehensively. To reduce the potential for conflicts, the deployment of traffic-calming measures should be considered, with a focus on locations where secondary truck facilities transition from industrial to residential or commercial land uses.

Traffic calming uses physical and visual interventions that alter driver behavior and reduce motor vehicle speed to improve the conditions and safety of non-motorized road users. This can be used to reduce the speed of vehicles as they transition from rural arterial roads to slower-speed borough streets or on sections of road where extra driver attention is warranted. Some example measures for consideration include:

- Median gateways: Installing raised or mountable medians can be used to narrow travel lanes and may require a shift in an otherwise straight travel path for drivers. These physical changes manage driver speed as drivers inherently slow down to navigate the change in lane.
- High-visibility crosswalks: High-visibility crosswalks are ladder markings extending the length of the crosswalk that can be seen from about twice as far away as the traditional two transverse lines marking.
- Rectangular rapid-flashing beacon (RRFB): RRFBs use LEDs to supplement warning signs at uncontrolled intersections or mid-block crosswalks. They can be activated by a pedestrian using a manual push button or using a passive pedestrian detection system.

Transit, Bicycle, and Pedestrian Recommendations

Connecting Commuters to Transit

With anticipated growth in the industrial and warehousing sectors, it will be increasingly important to provide transportation options for commuters with limited access to personal vehicles. Although Lower Bucks County is served by the Southeastern Pennsylvania Transportation Authority (SEPTA) Trenton Line and a network of buses, there are gaps between employment sites and fixed-route transit service. Additionally, many industrial and warehousing employees have late-night shifts, but there is no late-night transit service in the area due to a low density of demand.

Addressing the spatial and temporal mismatch between employment sites and transit service may require tailored programming, such as employee shuttle services, or innovative mobility solutions like the recently launched SEPTA Owl Link pilot program, which provides on-demand service between employment sites in

Lower Bucks County and the nearest late-night transit routes. Building a cost-effective, long-term program will require close collaboration with SEPTA, local employers, and private service providers.

Delaware Canal Towpath/D&L Trail Crossings

The historical alignment of the Delaware Canal Towpath crosses high-volume arterials at several unsignalized locations, including Levittown Parkway, Haines Road, and Edgely Road west of US 13, and US 13 north of Green Lane. Recent treatments, such as signage and sidewalk improvements, encourage trail users to deviate from the towpath alignment and cross at signalized intersections at US 13/Green Lane and US 13/Levittown Parkway. With potential increases in truck traffic along these arterials, these trail crossings should be monitored for bike/truck conflicts to understand whether additional safety measures may be needed.

Similar measures should be taken at other major crossings and across high-volume driveways. Alternatively, trail crossings at mid-block locations could be enhanced with safety measures, such as high-visibility crosswalks and RRFBs.

East Coast Greenway Alignment

The East Coast Greenway currently follows the D&L Trail and would benefit from the safety improvements described above. South of Bath Street, the Greenway is tentatively planned to follow segments of Old Route 13, State Road, and River Road, and may include both in-street and sidepath facilities (although separated facilities are preferred in the long term). As with the D&L Trail portion, care should be taken to design these facilities to ensure safe bike/truck interactions.

The development of the Greenway also presents an opportunity to connect pedestrians and cyclists to transit facilities. As the final alignment is established, the county, township, and borough should consider adding or enhancing bicycle and pedestrian facilities on Street Road, Cedar Avenue, and Washington Street to connect the Greenway to the Eddington, Croydon, and Bristol rail stations. The development of a designated truck route network will aid in decision making around safe bicycle and pedestrian connections between trails and attractions.

Next Steps

Further Study

This study examined the local traffic impacts of the two new ramps connecting I-95 and I-276, which opened in 2018, and developed recommendations to help mitigate those impacts. However, six additional ramps are planned for the area. Future studies should assess the impacts of these additional movements on the local road network so that it does not constrain future economic development in Lower Bucks County.

The travel demand forecasts used in this study draw on demographic trends like population and employment growth. Additionally, the traffic impact of approved study area developments was incorporated into the microsimulation model. However, development proposals that are not yet approved, such as the NorthPoint Development proposal to redevelop Falls Township's U.S. Steel plant, were not included. This and other future developments have the potential to change the distribution of truck travel and general traffic beyond what was considered in this study, and should be revisited as more data becomes available.

Implementation

One of the key strategies to work towards Bristol Township's economic vision, as outlined in the TCDI study, is to address infrastructure that may constrain growth. This study has identified potential constraints on the transportation network and provided recommendations to address those constraints. The next step in

preparing the study area's transportation infrastructure to support future economic growth is to pursue funding. The TCDI study describes a variety of funding sources in great detail. A selection of potential funding sources relevant to the recommendations of this study is provided below.

Transportation Improvement Program (TIP): Regionally agreed-upon list of priority transportation projects, listing all projects that intend to use federal funds.

Multimodal Transportation Fund (MTF): State-distributed grants for non-motorized freight and roadway improvements.

Automatic Red Light Enforcement (ARLE) Program: State-funds for low-cost, smaller-scale transportation and mobility improvements.

Congestion Mitigation and Air Quality (CMAQ) Program: Funds transportation projects that can help reduce emissions from mobile sources, such as personal vehicle and truck traffic, to help meet National Clean Air Act standards.

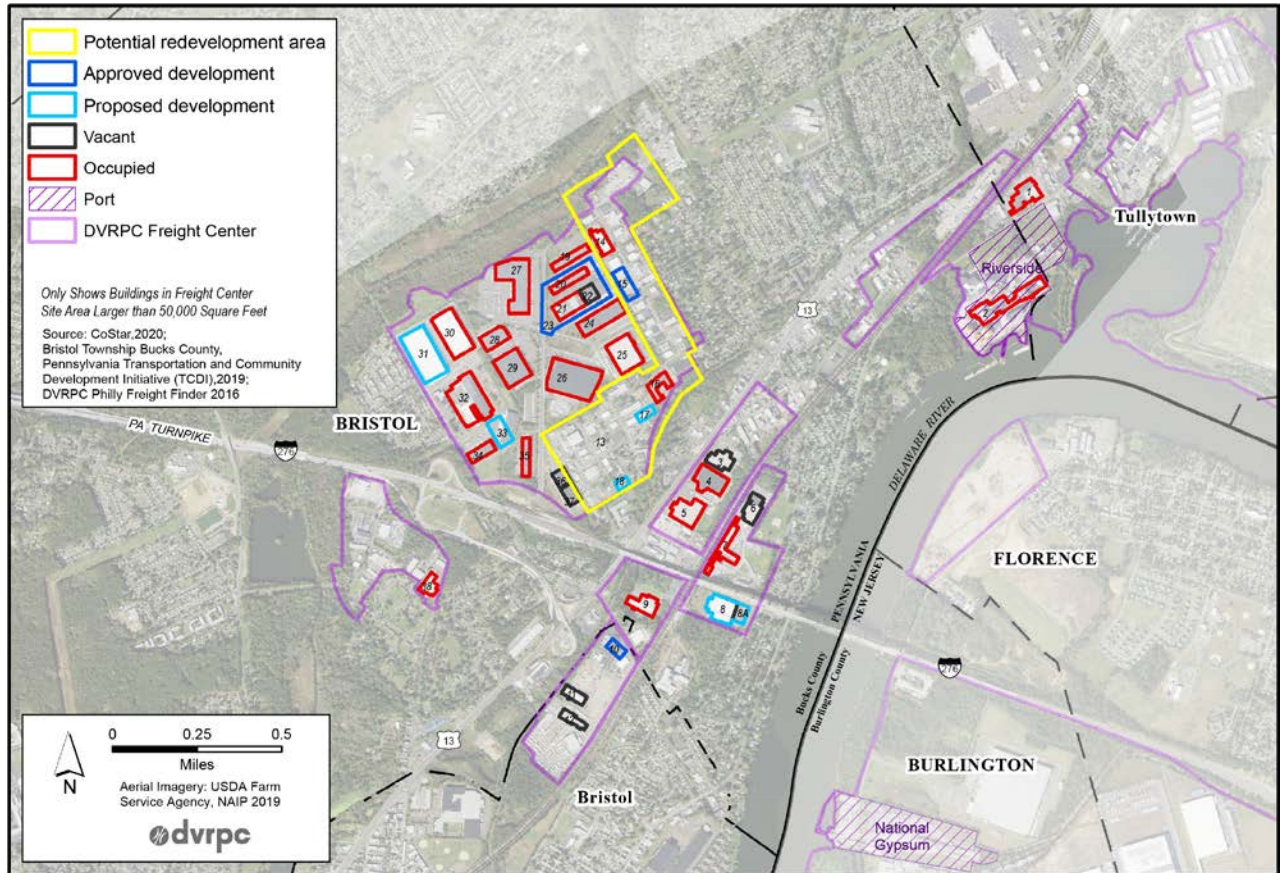
Transportation Alternatives Program (TAP): Funds improvements primarily for non-motorized modes.

Appendices

- A. Land Developments and Study Area Freight Centers
 - B. Base Year (2019) Result Details
 - C. Future Year (2045) Result Details
 - D. Future Year (2045) Improvement Alternative A
 - E. Future Year (2045) Improvement Alternative B
 - F. Future Year (2045) Improvement Alternative C
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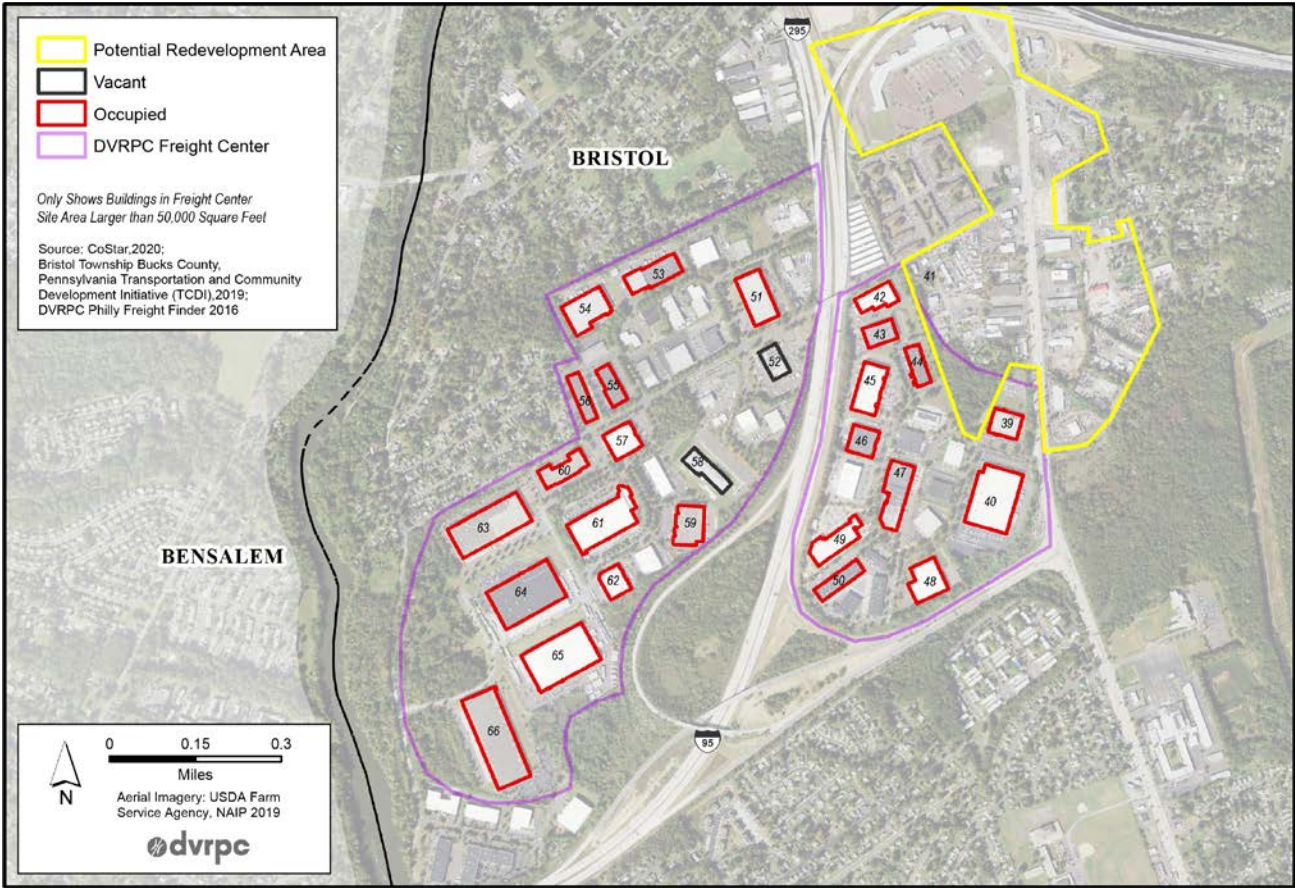
Appendix A: Land Developments in Study Area Freight Centers

Figure A-1: Land Development–Bristol/PA Turnpike Interchange 358 Freight Center



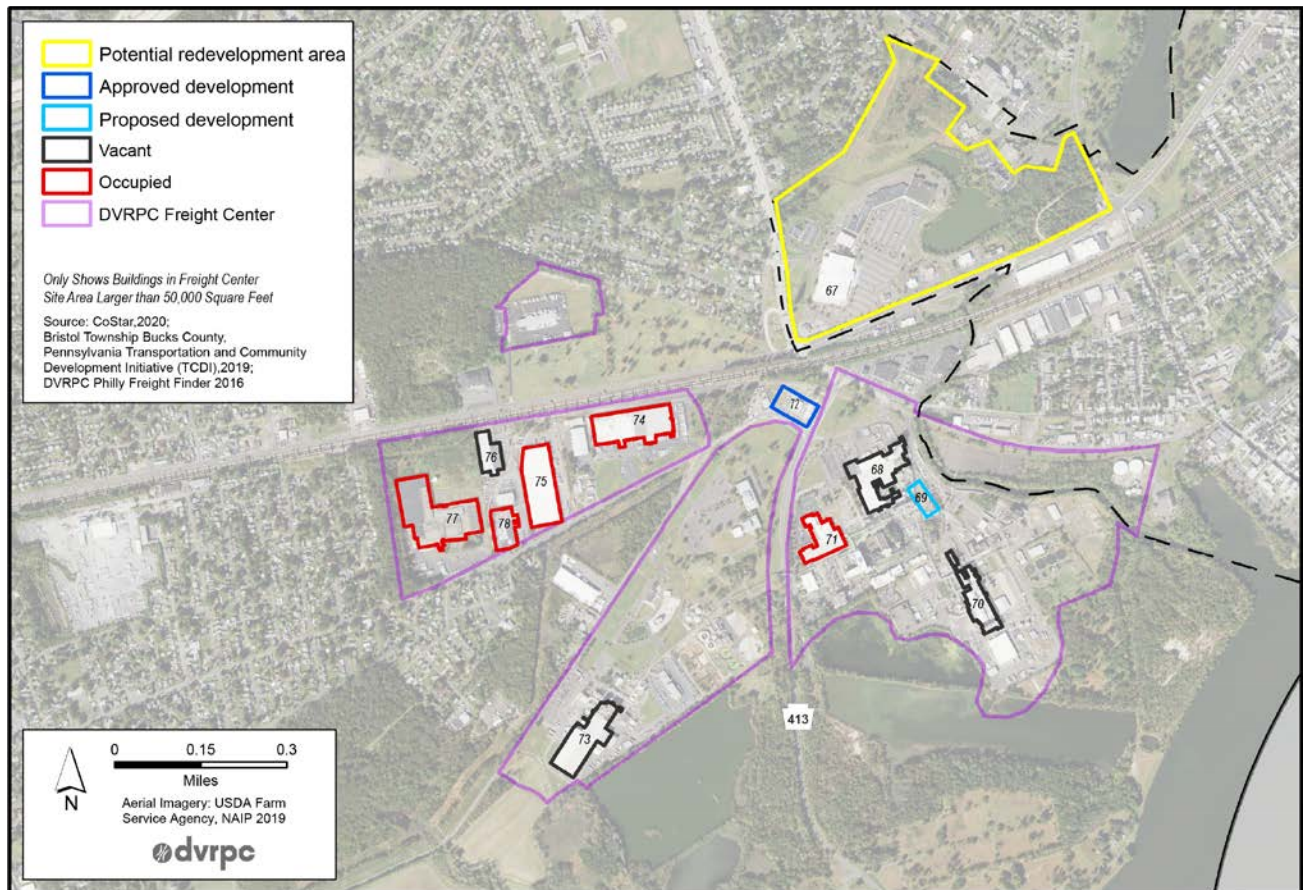
Note: See Table A-1 for site legend

Figure A-2: Land Development–West Bristol/PA 413 Freight Center, West of US 13



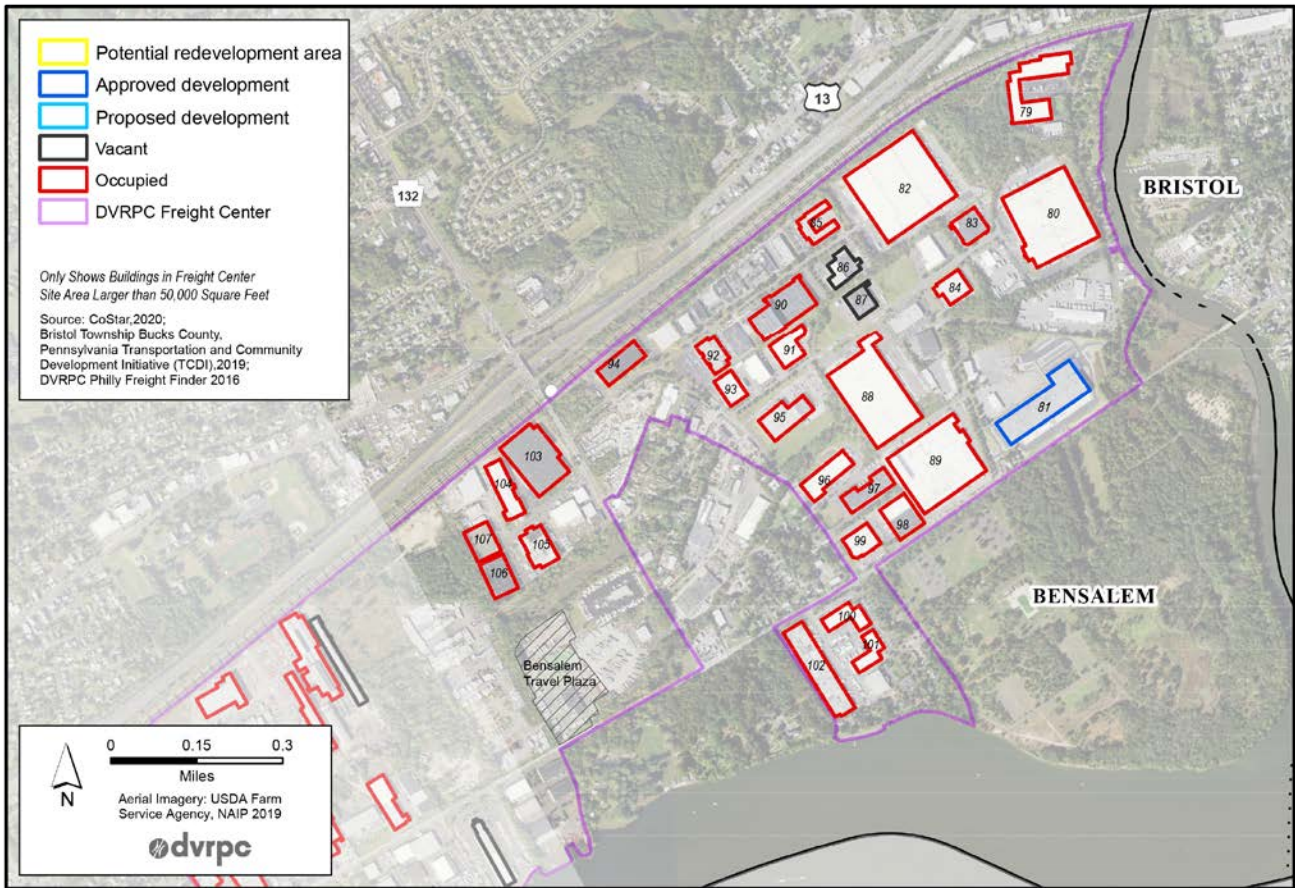
Note: See Table A-1 for site legend

Figure A-3: Land Development–West Bristol/PA 413 Freight Center, East of US 13



Note: See Table A-1 for site legend

Figure A-4: Land Development–Bensalem/Street Road Freight Center, west of US 13



Note: See Table A-1 for site legend

Table A-1: Study Area Buildings and Sites

ID	CATEGORY	PROPERTY TYPE	STATUS	SITE SQUARE FOOTAGE	BUILDING NAME	ADDRESS	MUNICIPALITY
1	Existing Building	Warehouse	Occupied	133,970	National Performance Packaging Holdings, LLC	100 Main St	Tullytown Borough
2	Existing Building	Warehouse	Occupied	232,661	Riverside Industrial Complex	7900 N Raddiffe St	Bristol Township
3	Existing Building		Vacant	90,472		6450 Bristol Pike	Bristol Township
4	Existing Building	Warehouse	Occupied	150,472	BDL Supply	6400 Bristol Pike	Bristol Township
5	Existing Building	Warehouse	Occupied	151,153	Solid Wood Cabinets	6300 Bristol Pike	Bristol Township
6	Existing Building		Vacant	93,601			Bristol Township
7	Existing Building	Warehouse	Occupied	119,393	Crownwood Industrial Estates Building 300	805 N Wilson Ave	Bristol Township
8	Existing Building	Manufacturing	Vacant	48,835	Robern	701 N Wilson Ave	Bristol Township
8A	Future Building	Manufacturing	Proposed		Robern(Future Expansion)	701 N Wilson Ave	Bristol Township
9	Existing Building	Manufacturing	Occupied	98,568	Dorset Corporation	411 Green Ln	Bristol Township
10	Future Building	Truck and Machinery Storage	Approved	600		211 Hunter Rd	Bristol Borough
11	Existing Building		Vacant	56,263		2201 Hunter Rd	Bristol Borough
12	Existing Building		Vacant	55,023		2101 Hunter Rd	Bristol Borough
13	Future Development Site	Industrial	Proposed		Edgely Industrial Park		Bristol Township
14	Existing Building	Warehouse	Occupied	73,195		2091 Hartel Ave	Bristol Township
15	Future Building	Industrial	Approved	12,121	Hartel Properties	West side of Hartel Street	Bristol Township
16	Existing Building	Manufacturing	Occupied	74,827		1601 Harmer St	Bristol Township
17	Future Building	Commercial	Proposed	9,600		6605 Manning Blvd	Bristol Township
18	Future Building	Industrial	Proposed	4,000		6401 Airport Road	Bristol Township
19	Existing Building	Warehouse	Occupied	78,011	BC-16	47 Runway Rd	Bristol Township
20	Existing Building	Warehouse	Occupied	77,304	BC-11	45 Runway Rd	Bristol Township
21	Existing Building	Warehouse	Occupied	114,924	BC-12-14	41 Runway Rd	Bristol Township
22	Existing Building		Vacant	52,719			Bristol Township
23	Future Building		Approved	81,600	Bristol Industrial Park, Lots 7B & 7C	Bristol Industrial Park	Bristol Township
24	Existing Building	Warehouse	Occupied	180,932	BA-37	37 Runway Rd	Bristol Township
25	Existing Building	Warehouse	Occupied	199,749	BB-23	35 Runway Rd	Bristol Township
26	Existing Building	Warehouse	Occupied	388,124	BB-22	33 Runway Rd	Bristol Township
27	Existing Building	Warehouse	Occupied	298,893		42 Runway Rd	Bristol Township
28	Existing Building	Warehouse	Occupied	98,764	Bldg 1	32 Runway Rd	Bristol Township
29	Existing Building	Warehouse	Occupied	202,113	BA-30	30 Runway Rd	Bristol Township
30	Existing Building	Warehouse	Occupied	261,634	Airgas Safety Inc.	2501 Green Ln	Bristol Township
31	Future Building	Commercial	Proposed	311,269	Bristol Commerce Center, Lot #5	2401 Green Ln	Bristol Township
32	Existing Building	Warehouse	Occupied	334,790	Bristol Commerce Center, Lot #4	2201 Green Ln	Bristol Township
33	Future Building	Warehouse	Proposed	80,992	Bristol Commerce Center, Lot #3	2151 Grenn Ln	Bristol Township
34	Existing Building	Warehouse	Occupied	71,170	Bristol Commerce Center	2101 Green Ln	Bristol Township
35	Existing Building	Warehouse	Occupied	70,421	BA-10	10 Runway Rd	Bristol Township
36	Existing Building		Vacant	50,564			Bristol Township
37	Existing Building		Vacant	60,609			Bristol Township
38	Existing Building	Warehouse	Occupied	59,598		5601 Beaver Dam Rd	Bristol Township
39	Existing Building	Warehouse	Occupied	61,913		145 Wharton Rd	Bristol Township
40	Existing Building	Manufacturing	Occupied	221,547	Estee Lauder	250 Rittenhouse Cir	Bristol Township
41	Future Development Site	Industrial	Proposed		Route 413 North		Bristol Township
42	Existing Building	Warehouse	Occupied	61,569	United Packaging	102 Wharton Rd	Bristol Township
43	Existing Building	Warehouse	Occupied	53,451	Airgas Safety Inc.	128 Wharton Rd	Bristol Township
44	Existing Building	Manufacturing	Occupied	50,750		130 Wharton Rd	Bristol Township

Continued

Table A-1: Study Area Buildings and Sites—continued

ID	CATEGORY	PROPERTY TYPE	STATUS	SITE SQUARE FOOTAGE	BUILDING NAME	ADDRESS	MUNICIPALITY
45	Existing Building	Warehouse	Occupied	101,374	Epson	150 Rittenhouse Cir	Bristol Township
46	Existing Building	Warehouse	Occupied	60,588	Federal Express	160 Rittenhouse Cir	Bristol Township
47	Existing Building	Warehouse	Occupied	118,622		181 Rittenhouse Cir	Bristol Township
48	Existing Building	Warehouse	Occupied	93,519	Keystone Industrial Park	220 Rittenhouse Cir	Bristol Township
49	Existing Building	Manufacturing	Occupied	90,456	Keystone Industrial Park	190 Rittenhouse Cir	Bristol Township
50	Existing Building	Warehouse	Occupied	63,310	West Building	200 Rittenhouse Cir	Bristol Township
51	Existing Building	Warehouse	Occupied	111,845	Keystone Industrial Park	2578 Pearl Buck Rd	Bristol Township
52	Existing Building		Vacant	51,113			Bristol Township
53	Existing Building	Manufacturing	Occupied	94,547	Keystone Industrial Park	2558 Pearl Buck Rd	Bristol Township
54	Existing Building	Warehouse	Occupied	108,360		2530 Pearl Buck Rd	Bristol Township
55	Existing Building	Flex	Occupied	53,401	Keystone Business Center 2	2500 Pearl Buck Rd	Bristol Township
56	Existing Building	Flex	Occupied	54,266	KBC 1	2014 Ford Rd	Bristol Township
57	Existing Building	Manufacturing	Occupied	71,496	Interprint	2100 Frost Rd	Bristol Township
58	Existing Building		Vacant	67,783			Bristol Township
59	Existing Building	Flex	Occupied	91,310		211 Sinclair Rd	Bristol Township
60	Existing Building	Manufacturing	Occupied	72,249		1900 Frost Rd	Bristol Township
61	Existing Building	Warehouse	Occupied	188,365	Boise Cascade	3001 Frost Rd	Bristol Township
62	Existing Building	Warehouse	Occupied	56,319		411 Sinclair Rd	Bristol Township
63	Existing Building	Warehouse	Occupied	218,991	Keystone Crossing	400 Crossings Dr	Bristol Township
64	Existing Building	Warehouse	Occupied	245,262	Keystone Crossing Bldg 3	300 Crossings Dr	Bristol Township
65	Existing Building	Warehouse	Occupied	244,071	Keystone Crossing Bldg 2	200 Crossings Dr	Bristol Township
66	Existing Building	Warehouse	Occupied	284,613	Keystone Crossing Bldg 2	100 Crossings Dr	Bristol Township
67	Future Development Site	Commercial	Proposed		Bristol Commerce Park Shopping Center		Bristol Borough
68	Existing Building		Vacant	179,745			Bristol Township
69	Future Building		Proposed	3,300	Kettles		Bristol Township
70	Existing Building		Vacant	111,835			Bristol Township
71	Existing Building	Office	Occupied	100,375		310 George Patterson Blvd	Bristol Township
72	Future Building	Commercial	Approved	10,881	Wawa Food Market & Fueling Station	413 and State	Bristol Township
73	Existing Building		Vacant	175,324			Bristol Township
74	Existing Building	Warehouse	Occupied	203,759	Gilbreth Impaxx	3001 State Rd	Bristol Township
75	Existing Building	Distribution	Occupied	202,097	Mid Atlantic Distribution	2955 State Rd	Bristol Township
76	Existing Building		Vacant	67,480			Bristol Township
77	Existing Building	Warehouse	Occupied	298,874		2707 State Rd	Bristol Township
78	Existing Building	Warehouse	Occupied	77,773	Roscom Inc.	2923 Sate Rd	Bristol Township
79	Existing Building	Warehouse	Occupied	177,302	Water Edge Business Center	800 Haunted Ln	Bensalem Township
80	Existing Building	Light Manufacturing	Occupied	488,941		3800 Marshall Ln	Bensalem Township
81	Future Building	Industrial	Approved	235,240	future Amazon warehouse	3750 State Road	Bensalem Township
82	Existing Building	Warehouse	Occupied	555,847		3600 Progress Dr	Bensalem Township
83	Existing Building	Manufacturing	Occupied	65,560		3684 Marshall Ln	Bensalem Township
84	Existing Building	Warehouse	Occupied	59,746		625 Winks Ln	Bensalem Township
85	Existing Building	Light Manufacturing	Occupied	59,373		3580 Progress Dr	Bensalem Township
86	Existing Building		Vacant	64,122			Bensalem Township
87	Existing Building		Vacant	52,834			Bensalem Township
88	Existing Building	Distribution	Occupied	428,820	Expressway 95 Indust Park	3433 Marshall Ln	Bensalem Township
89	Existing Building	Manufacturing	Occupied	433,349	Expressway 95 Bus Center	450 Winks Ln	Bensalem Township

Table A-1: Study Area Buildings and Sites—continued

ID	CATEGORY	PROPERTY TYPE	STATUS	SITE SQUARE FOOTAGE	BUILDING NAME	ADDRESS	MUNICIPALITY
90	Existing Building	Warehouse	Occupied	169,914	Iron Mountain	3433 Progress Dr	Bensalem Township
91	Existing Building	Warehouse	Occupied	70,456	SigmaPharm Laboratories	3366 Marshall Ln	Bensalem Township
92	Existing Building	Flex	Occupied	57,117		3369 Progress Dr	Bensalem Township
93	Existing Building	Warehouse	Occupied	51,585	American Furniture Rental	677 Dunksferry Rd	Bensalem Township
94	Existing Building	Warehouse	Occupied	77,891	Expressway 95 Indust Center	855 DunksFerry Rd	Bensalem Township
95	Existing Building	Warehouse	Occupied	97,566		633 DunksFerry Rd	Bensalem Township
96	Existing Building	Warehouse	Occupied	86,355		593 DunksFerry Rd	Bensalem Township
97	Existing Building	Warehouse	Occupied	79,528	Expressway 95 Bus Center	455 DunksFerry Rd	Bensalem Township
98	Existing Building	Warehouse	Occupied	90,754		3434 State Rd	Bensalem Township
99	Existing Building	Manufacturing	Occupied	63,356		3300 State Rd	Bensalem Township
100	Existing Building	Warehouse	Occupied	60,010	Dunks Ferry Crossing	350 DunksFerry Rd	Bensalem Township
101	Existing Building	Warehouse	Occupied	52,789		354 DunksFerry Rd	Bensalem Township
102	Existing Building	Warehouse	Occupied	186,699		3161 State Rd	Bensalem Township
103	Existing Building	Warehouse	Occupied	221,268		2994 Samuel Dr	Bensalem Township
104	Existing Building	Warehouse	Occupied	85,098		2944 Samuel Dr	Bensalem Township
105	Existing Building	Warehouse	Occupied	81,745		2945 Samuel Dr	Bensalem Township
106	Existing Building	Warehouse	Occupied	81,099	American Tempering	2919 Samuel Dr	Bensalem Township
107	Existing Building	Warehouse	Occupied	71,972	G.a.Warehouse	2900 Samuel Dr	

Appendix B: Base Year (2019) Result Details

Table B-1: Performance Measures, AM Base Year

8:15-9:15 AM	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Average Approach Queue (ft)	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	44.4	707	50.1	D	127	2080	34.7	C
		R	Street EB	230	48.2							
		L	Street WB	472	51.0							
	Street WB	R	I-95 NB	111	28.5	647	39.9	D	116			
		T	Street WB	536	42.2							
	Street EB	L	I-95 NB	228	20.8	726	15.1	B	78			
T	Street EB	498	12.5									
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	177	57.8	360	64.8	E	173	2519	51.5	D
		T	I-95 SB	5	66.4							
		L	Street EB	178	71.7							
	Street EB	R	I-95 SB	607	63.1	1156	72.3	E	877			
		T	Street EB	549	82.5							
	Street WB	T	Street WB	840	20.6	1003	22.7	C	112			
L	I-95 SB	163	33.2									
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	143	35.0	152	34.2	C	29	877	31.3	C
		R	US13 SB	9	21.7							
	US13 SB	R	Street ramps EB	52	89.2	417	39.6	D	206			
		T	US13 SB	365	32.5							
	US13 NB	L	Street ramps EB	16	151.2	308	18.6	B	32			
		T	US13 NB	292	11.3							
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	46	76.6	194	69.1	E	177	1229	35.2	D
		L	US13 NB	148	66.8							
	US13 SB	R	Street ramps WB	197	37.7	601	44.4	D	253			
		T	US13 SB	404	47.8							
	US13 NB	L	Street ramps WB	53	11.5	434	7.4	A	8			
		T	US13 NB	381	6.8							
US13 and Park Ave	Park EB	L	US13 NB	57	15.0	107	24.2	C	32	1293	9.7	A
		R	US13 SB	50	34.7							
	US13 SB	R	Park WB	40	3.0	657	4.9	A	34			
		T	US13 SB	617	5.0							
	US13 NB	L	Park WB	34	12.8	529	12.8	B	21			
		T	US13 NB	495	12.8							
US13 and Bensalem Blvd	US13 SB	T	US13 SB	357	13.9	469	13.7	B	67	1444	13.3	B
		R	Bensalem WB	112	13.1							
	Bensalem EB	R	US13 SB	304	14.8	428	21.2	C	81			
		L	US13 NB	124	36.9							
	US 13 NB	T	US13 NB	350	5.5	547	6.9	A	11			
		L	Bensalem WB	197	9.3							
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	506	3.7	550	3.6	A	0	562	5.2	A
		R	Haunted EB	43	1.6							
		L	Totem WB	1	7.3							
	US 13 SB	T	US13 SB	487	6.4	540	6.5	A	3			
		L	Haunted EB	44	7.7							
		R	Totem WB	9	6.3							
	Haunted WB	L	US13SB	11	11.2	22	8.6	A	1			
		R	US13 NB	11	6.1							
		T	Totem WB	0	0.0							
	Totem EB	R	US13 SB	1	6.4	23	8.9	A	1			
		L	US13 NB	22	9.1							
		T	Haunted EB	0	0.0							
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	12	41.7	33	24.9	C	3	1292	18	B
		R	US13 SB	20	14.5							
		L	US13 NB	1	31.6							
	Cedar WB	L	US13 SB	119	51.8	248	33.3	C	40			
		R	US13 NB	129	16.2							
	US13 NB	R	Cedar EB	127	9.8	509	15.1	B	16			
		T	US13 NB	382	16.8							
	US13 SB	L	Cedar EB	84	12.1	502	13	B	12			
T		US13 SB	418	13.2								

Table B-1: Performance Measures, AM Base Year–continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	140	20.8	185	26.1	C	25	1036	18.3	C
		L	US13 NB	45	42.4							
		T	Newportville EB	0	0.0							
	US13 NB	L	Newportville WB	178	12.1	444	10.8	B	9			
		T	US13 NB	266	9.9							
		R	Newportville EB	0	0.0							
	US13 SB	R	Newportville EB	18	15.2	369	22.3	C	21			
		T	US13 SB	351	22.7							
		L	Newportville WB	0	0.0							
	Station Driveway WB	T	Newportville WB	7	35.8	38	28.9	C	7			
		L	US13 SB	18	36.8							
		R	US13 NB	13	14.3							

US13 and PA413	US13 SB	T	US13 SB	353	22.9	656	13.7	B	13	2933	27	C
		R	PA413 WB	303	3.1							
	US13 NB	T	US13 NB	218	28.6	349	23	C	12			
		R	PA413 EB	131	13.5							
	PA413 WB	L	US13 SB	119	62.4	977	19.7	B	64			
		R	US13 NB	227	15.7							
		T	PA413 WB	631	13.1							
	PA413 EB	R	US13 SB	33	20.6	1391	39.5	D	127			
		L	US13 NB	268	64.5							
		T	PA413 EB	1090	33.9							

US13 and Commerce Drive	US13 SB	R	Commerce WB	117	2.1	616	9.5	A	15	1081	10.7	B
		T	US13 SB	499	11.2							
	Commerce EB	L	US13 NB	49	35.4	56	34.9	C	9			
		R	US13 SB	7	31.2							
	US13 NB	T	US13 NB	665	8.7	694	8.7	A	15			
		L	Commerce WB	29	8.5							
	Commerce WB	T	Commerce WB	0	0.0	17	59.4	E	6			
		L	US13 SB	17	59.4							

US13 and Bath	Bath WB	T	Bath WB	102	39.3	291	33.5	C	32	2650	23.8	C
		L	US13 SB	98	31.3							
		R	US13 NB	91	29.3							
	Bath EB	T	Bath EB	145	37.7	347	33.6	C	39			
		R	US13 SB	111	29.6							
		L	US13 NB	91	31.9							
	US13 NB	R	Bath EB	66	6.0	710	18.4	B	38			
		L	Bath WB	66	68.0							
		T	US13 NB	578	14.1							
	US13 SB	L	Bath EB	74	59.2	633	20.1	C	36			
		R	Bath WB	126	10.3							
		T	US13 SB	433	16.3							

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	96	32.1	217	28.3	C	16	2098	16.1	B
		L	US13 SB	57	31.2							
		R	US13 NB	64	20.0							
	Beaver EB	T	Beaver EB	83	32.3	198	28.3	C	15			
		R	US13 SB	53	17.1							
		L	US13 NB	62	32.6							
	US13 NB	R	Beaver EB	20	7.8	749	14.5	B	24			
		L	Beaver WB	61	13.8							
		T	US13 NB	668	14.8							
	US13 SB	L	Beaver EB	153	15.2	879	11.6	B	19			
		R	Beaver WB	77	4.3							
		T	US13 SB	649	11.6							

US13 and Green Ln	Green EB	T	Green EB	137	42.0	403	39	D	49	4436	32.9	C
		R	US13 SB	196	41.0							
		L	Green WB	70	27.6							
	Green WB	T	Green WB	108	49.5	470	56.2	E	93			
		L	US13 SB	219	76.1							
		R	US13 NB	143	30.7							
	US13 NB	L	Green WB	170	42.7	1029	26	C	67			
		R	Green EB	225	19.4							
		T	US13 NB	634	23.8							
	US13 SB	R	Green WB	35	9.7	790	25	C	46			
		L	Green EB	161	24.0							
		T	US13 SB	594	26.2							

Table B-1: Performance Measures, AM Base Year—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	125	34.8	265	39.8	D	30	1339	15.7	B
		L	US13 NB	86	43.6							
		T	Edgely EB	54	45.5							
	US13 SB	R	Edgely WB	6	9.6	675	11.4	B	19			
		T	US13 SB	627	11.5							
		L	Edgely EB	42	10.1							
	US13 NB	L	Edgely WB	128	12.3	779	10.1	B	16			
		T	US13 NB	650	9.7							
		R	Edgely EB	1	2.5							
	Edgely WB	T	Edgely WB	80	44.9	160	43	D	29			
		L	US13 SB	67	44.7							
		R	US13 NB	13	23.0							

US13 and Haines Rd	US13 NB	L	Haines WB	46	5.3	733	6.1	A	8	649	10.3	B
		R	Haines EB	7	3.9							
		T	US13 NB	680	6.2							
	Haines EB	T	Haines EB	45	48.6	160	46.6	D	21			
		R	US13 SB	78	46.0							
		L	US13 NB	37	45.6							
	Haines WB	T	Haines WB	44	47.5	90	45.3	D	16			
		L	US13 SB	9	39.5							
		R	US13 NB	37	44.2							
	US13 SB	R	Haines WB	38	5.6	661	5.5	A	7			
		L	Haines EB	31	7.2							
		T	US13 SB	592	5.4							

US13 and Home Depot drive	Home Depot EB	R	US13 SB	68	6.5	93	5.3	A	3	909	5.2	A
		L	US13 NB	25	2.2							
	US13 NB	L	Home Depot WB	99	5.3	722	3.7	A	3			
		T	US13 NB	623	3.5							
	US13 SB	R	Home Depot WB	28	2.1	594	5.2	A	6			
		T	US13 SB	566	5.3							
	Home Depot WB	T	Home Depot WB	0	0.0	27	44.6	D	6			
		L	US13 SB	27	44.6							

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	176	43.8	340	43.2	D	59	1856	17.5	B
		R	US13 SB	164	42.6							
		T	SEPTA station EB	0	0.0							
	US13 SB	R	Levittown WB	149	7.1	572	9.4	A	10			
		T	US13 SB	423	10.1							
		L	SEPTA station EB	0	0.0							
	US13 NB	L	Levittown WB	150	12.4	647	10.4	B	14			
		T	US13 NB	497	9.9							
		R	SEPTA station EB	0	0.0							
	SEPTA station WB	T	Levittown WB	13	50.6	22	41	D	3			
		R	US13 NB	4	8.5							
		L	US13 SB	5	41.9							

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	198	35.4	253	33.7	C	38	1944	24.6	C
		L	PA413 WB	21	29.9							
		T	Durham NB	34	25.8							
	PA413 WB	T	PA413 WB	557	19.2	678	22.8	C	44			
		R	Bath NB	17	1.6							
		L	Durham SB	104	45.7							
	Bath SB	L	PA413 EB	68	34.2	175	35.3	D	21			
		R	PA413 WB	78	36.2							
		T	Durham SB	29	35.3							
	PA413 EB	T	PA413 EB	656	21.7	736	20.6	C	42			
		L	Durham SB	60	13.8							
		R	Bath NB	20	4.7							

Table B-1: Performance Measures, AM Base Year–continued

PA413 and Ford Rd	Ford NB	T	Ford NB	26	41.1	232	35.5	D	48	2284	10	A
		L	PA413 WB	108	41.9							
		R	PA413 EB	98	27.1							
	Ford SB	T	Ford SB	21	34.4	70	35.9	D	13			
		R	PA413 WB	3	18.1							
		L	PA413 EB	46	37.7							
	PA413 EB	R	Ford SB	144	5.5	924	5.8	A	11			
		L	Ford NB	3	6.9							
		T	PA413 EB	777	5.9							
	PA413 WB	L	Ford SB	79	10.7	704	4.5	A	4			
		R	Ford NB	55	3.0							
		T	PA413 WB	570	3.8							

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	125	4.3	135	6.9	A	1	1166	4.9	A
		L	PA413 WB	8	41.9							
		T	Old Rodgers NB	2	28.6							
	PA413 WB	L	Wharton SB	225	8.7	936	3.4	A	6			
		T	PA413 WB	682	1.7							
		R	Old Rodgers NB	29	1.5							
	PA413 EB	R	Wharton SB	31	2.6	924	4.2	A	5			
		T	PA413 EB	888	4.2							
		L	Old Rodgers NB	5	6.9							
	Old Rodgers SB	T	Wharton SB	0	0.0	41	49	D	10			
		L	PA413 EB	27	51.6							
		R	PA413 WB	14	44.1							

PA413 and I-95 ramps	I-95 ramps SB	R	PA413 EB	843	13.0	1333	23.1	C	32	1639	22.1	C
		L	PA413 WB	490	40.4							
	PA413 WB	T	PA413 WB	446	16.4	1128	30.4	C	84			
		L	I-95 ramps	682	39.5							
	PA413 EB	T	PA413 EB	486	19.0	1039	11.8	B	10			
		R	I-95 ramps	553	5.4							

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	60	3.1	1329	6.1	A	18	1660	9.3	A
		T	PA413 EB	1216	4.6							
		L	Rockview NB	53	43.7							
	Rockview NB	L	PA413 WB	126	41.0	180	37.2	D	41			
		R	PA413 EB	45	25.6							
		T	Rockview NB	9	41.5							
	PA413 WB	T	PA413 WB	994	8.1	1015	8.2	A	18			
		L	Rockview SB	18	16.5							
		R	Rockview NB	3	6.1							
	Rockview SB	R	PA413 WB	13	6.9	22	25.3	C	2			
		T	Rockview SB	0	0.0							
		L	PA413 EB	9	51.9							

PA413 and Winder Dr	Winder SB	L	PA413 EB	12	43.6	67	15.4	B	4	918	4.4	A
		R	PA413 WB	55	9.3							
	PA413 WB	R	Winder NB	2	3.5	985	3.5	A	6			
		T	PA413 WB	983	3.5							
	PA413 EB	L	Winder NB	28	44.0	1218	4.5	A	13			
		T	PA413 EB	1190	3.6							

PA413 and Western Ave	Western SB	L	PA413 EB	15	44.8	82	19.7	B	9	1592	10.7	B
		R	PA413 WB	59	9.9							
		T	Western SB	8	45.2							
	PA413 WB	R	Western NB	9	5.0	931	9.8	A	21			
		T	PA413 WB	896	8.9							
		L	Western SB	26	43.0							
	PA413 EB	L	Western NB	41	49.7	1257	9.3	A	30			
		T	PA413 EB	1197	8.0							
		R	Western SB	19	7.7							
	Western NB	T	Western NB	18	36.1	132	25.5	C	19			
		R	PA413 EB	62	13.7							
		L	PA413 WB	52	35.9							

PA413 and Otter St	PA413 EB	R	PA413 EB	964	7.7	1216	9.8	A	13	2181	30.3	C
		T	Otter NB	252	18.2							
	PA413 WB	L	PA413 WB	827	69.3	1032	60.2	E	191			
		R	Otter NB	205	23.6							
	Otter SB	T	PA413 WB	150	10.2	316	11.3	B	61			
		L	PA 413 EB	166	12.3							

Table B-1: Performance Measures, AM Base Year—continued

Table B-2: Performance Measures, PM Base Year

5:15-6:15pm	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Average Approach Queue (ft)	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	2.3	929	131.8	F	870	2485	108.5	F
		R	Street EB	123	8.4							
		L	Street WB	801	13.8							
	Street WB	R	I-95 NB	137	2.1	809	168.9	F	645			
		T	Street WB	672	10.7							
	Street EB	L	I-95 NB	271	1.0	747	14	B	64			
T		Street EB	476	0.5								
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	338	8.7	524	70.3	E	228	3125	37	D
		T	I-95 SB	4	1.2							
		L	Street EB	182	2.2							
	Street EB	R	I-95 SB	546	0.6	1113	52.1	D	214			
		T	Street EB									
	Street WB	T	Street WB	1339	17.1	1488	14	B	90			
L		I-95 SB	149	0.5								
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	234	5.7	251	38.3	D	55	1531	11.5	B
		R	US13 SB	17	1.3							
	US13 SB	R	Street ramps EB	43	2.0	754	4.1	A	9			
		T	US13 SB	711	14.6							
	US13 NB	L	Street ramps EB	25	0.4	526	9.3	A	20			
		T	US13 NB	501	10.3							
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	51	3.1	320	39.6	D	74	1999	16.3	B
		L	US13 NB	269	6.0							
	US13 SB	R	Street ramps WB		14.0	943	14.1	B	41			
		T	US13 SB	703	6.5							
	US13 NB	L	Street ramps WB	83	3.9	736	8.9	A	23			
		T	US13 NB	653	10.6							
US13 and Park Ave	Park EB	L	US13 NB	74	2.8	155	37.2	D	36	2122	9.5	A
		R	US13 SB	81	2.2							
	US13 SB	R	Park WB	88	6.0	1047	4.3	A	19			
		T	US13 SB	959	9.5							
	US13 NB	L	Park WB	98	8.2	920	10.8	B	39			
		T	US13 NB	822	11.3							
US13 and Bensalem Blvd	US13 SB	T	US13 SB	727	13.1	822	23.5	C	103	2180	23.2	C
		R	Bensalem WB	95	4.7							
	Bensalem EB	R	US13 SB	320	0.5	457	47.1	D	118			
		L	US13 NB	137	1.2							
	US 13 NB	T	US13 NB	570	9.0	901	10.7	B	30			
		L	Bensalem WB	331	7.4							
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	677	4.1	715	3.7	A	0	948	4.1	A
		R	Haunted EB	22	3.5							
		L	Totem WB	16	4.7							
	US 13 SB	T	US13 SB	834	11.3	876	3.6	A	0			
		L	Haunted EB	31	2.4							
		R	Totem WB	11	4.7							
	Haunted WB	L	US13SB	27	4.0	72	11.1	B	4			
		R	US13 NB	45	6.2							
		T	Totem WB									
	Totem EB	R	US13 SB	4	0.5	25	9.8	A	1			
		L	US13 NB	21	6.0							
		T	Haunted EB	0	#DIV/0!							
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	40	6.0	67	32.1	C	9	2037	35.7	D
		R	US13 SB	22	0.4							
		L	US13 NB	5	1.0							
	Cedar WB	L	US13 SB	165	4.0	386	139.8	F	314			
		R	US13 NB	221	5.7							
	US13 NB	R	Cedar EB	164	2.7	710	12.8	B	26			
		T	US13 NB	546	4.5							
	US13 SB	L	Cedar EB	179	7.0	874	8.7	A	19			
		T	US13 SB	695	9.6							

Table B-2: Performance Measures, PM Base Year–continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	222	5.9	283	28.6	C	43	1716	20.6	C
		L	US13 NB	61	1.9							
		T	Newportville EB	0	3.2							
	US13 NB	L	Newportville WB	257	7.6	752	17.6	B	67			
		T	US13 NB	493	10.0							
		R	Newportville EB	2	2.0							
	US13 SB	R	Newportville EB	25	0.4	629	19.8	B	71			
		T	US13 SB	604	7.9							
		L	Newportville WB	0	1.4							
	Station Driveway WB	T	Newportville WB	21	3.7	52	31.5	C	8			
		L	US13 SB	29	3.5							
		R	US13 NB	2	0.8							

US13 and PA413	US13 SB	T	US13 SB	516	5.5	845	33.4	C	54	3755	28.3	C
		R	PA413 WB	329	1.3							
	US13 NB	T	US13 NB	340	2.5	525	32.3	C	29			
		R	PA413 EB	185	0.8							
	PA413 WB	L	US13 SB	188	5.4	1053	24.4	C	128			
		R	US13 NB	278	0.9							
	PA413 EB	T	PA413 WB	587	0.9	1332	26.6	C	84			
		R	US13 SB	61	2.8							
		L	US13 NB	290	1.7							
T		PA413 EB	981	0.4								

US13 and Commerce Drive	US13 SB	R	Commerce WB	162	5.7	936	11	B	26	1967	13.6	B
		T	US13 SB	774	8.8							
	Commerce EB	L	US13 NB	115	6.9	125	30.2	C	18			
		R	US13 SB	10	0.3							
	US13 NB	T	US13 NB	832	7.4	858	13.1	B	29			
		L	Commerce WB	26	0.8							
	Commerce WB	T	Commerce WB	0	3.2	48	30.2	C	7			
L	US13 SB	48	5.9									

US13 and Bath	Bath WB	T	Bath WB	189	3.4	460	32	C	51	2809	33.7	C
		L	US13 SB	150	4.7							
		R	US13 NB	121	2.9							
	Bath EB	T	Bath EB	199	7.3	432	33	C	52			
		R	US13 SB	90	3.5							
		L	US13 NB	143	4.6							
	US13 NB	R	Bath EB	122	6.6	934	37.3	D	136			
		L	Bath WB	141	7.3							
		T	US13 NB	671	5.7							
	US13 SB	L	Bath EB	102	4.4	983	31.5	C	86			
		R	Bath WB	140	6.0							
		T	US13 SB	741	11.0							

US13 and Beaver St/Beaver Dam Rd	Beaver WB	T	Beaver WB	104	1.6	363	28	C	24	2593	19.7	B
		L	US13 SB	110	6.1							
		R	US13 NB	149	7.4							
	Beaver EB	T	Beaver EB	91	1.0	194	27.5	C	14			
		R	US13 SB	54	0.8							
		L	US13 NB	49	2.4							
	US13 NB	R	Beaver EB	25	3.6	801	19.1	B	38			
		L	Beaver WB	51	1.6							
		T	US13 NB	725	2.4							
	US13 SB	L	Beaver EB	184	5.4	1235	16.4	B	44			
		R	Beaver WB	78	6.2							
		T	US13 SB	973	15.6							

Table B-2: Performance Measures, PM Base Year–continued

US13 and Green Ln	Green EB	T	Green EB	148	1.7	459	27.7	C	36	3434	33	C
		R	US13 SB	219	1.9							
		L	Green WB	92	2.1							
	Green WB	T	Green WB	147	3.4	522	35.3	D	65			
		L	US13 SB	208	0.5							
		R	US13 NB	167	0.8							
	US13 NB	L	Green WB	209	4.0	1216	32.5	C	101			
		R	Green EB	117	5.2							
		T	US13 NB	890	6.5							
	US13 SB	R	Green WB	100	8.1	1237	34.6	C	95			
L		Green EB	218	4.1								
T		US13 SB	919	10.6								

US13 and Edgely Rd	Edgely EB	R	US13 SB	139	3.0	321	45.8	D	43	2309	14.9	B
		L	US13 NB	114	2.8							
		T	Edgely EB	68	2.1							
	US13 SB	R	Edgely WB	7	0.8	1124	11.7	B	32			
		T	US13 SB	1077	15.0							
		L	Edgely EB	40	2.8							
	US13 NB	L	Edgely WB	217	3.3	1113	11	B	25			
		T	US13 NB	893	8.1							
		R	Edgely EB	3	0.0							
	Edgely WB	T	Edgely WB	79	0.2	139	45.9	D	25			
L		US13 SB	54	2.5								
R		US13 NB	6	2.3								

US13 and Haines Rd	US13 NB	L	Haines WB	129	8.1	1021	7.5	A	15	351	12.5	B
		R	Haines EB	6	2.0							
		T	US13 NB	886	7.8							
	Haines EB	T	Haines EB	53	1.3	213	48.1	D	31			
		R	US13 SB	127	1.6							
		L	US13 NB	33	0.8							
	Haines WB	T	Haines WB	66	3.0	124	48.6	D	22			
		L	US13 SB	15	0.0							
		R	US13 NB	43	0.2							
	US13 SB	R	Haines WB	67	4.8	1117	8.5	A	22			
L		Haines EB	68	5.8								
T		US13 SB	982	10.0								

US13 and Home Depot drive	Home Depot EB	R	US13 SB	96	1.8	113	7.3	A	6	2111	6.6	A
		L	US13 NB	17	1.7							
	US13 NB	L	Home Depot WB	173	5.8	918	4.6	A	6			
		T	US13 NB	745	4.0							
	US13 SB	R	Home Depot WB	27	0.4	1046	6.6	A	17			
		T	US13 SB	1019	11.2							
	Home Depot WB	T	Home Depot WB	30	4.5	34	59.7	E	10			
L	US13 SB	4	2.0									

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	263	5.9	548	40	D	80	2517	25.7	C
		R	US13 SB	256	8.9							
		T	SEPTA station EB	29	4.9							
	US13 SB	R	Levittown WB	314	11.0	1092	23.5	C	55			
		T	US13 SB	766	9.1							
		L	SEPTA station EB	12	1.3							
	US13 NB	L	Levittown WB	238	6.8	762	16.8	B	29			
		T	US13 NB	516	0.2							
		R	SEPTA station EB	8	1.6							
	SEPTA station WB	T	Levittown WB	50	7.1	115	36.8	D	15			
		R	US13 NB	45	8.3							
		L	US13 SB	20	3.9							

Table B-2: Performance Measures, PM Base Year—continued

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	197	0.6	267	39.8	D	44	2437	37.8	D
		L	PA413 WB	13	2.2							
		T	Durham NB	57	2.8							
	PA413 WB	T	PA413 WB	900	17.1	1266	42.6	D	156			
		R	Bath NB	26	1.5							
		L	Durham SB	340	15.4							
	Bath SB	L	PA413 EB	58	1.3	241	41.7	D	30			
		R	PA413 WB	84	0.7							
		T	Durham SB	99	8.4							
	PA413 EB	T	PA413 EB	527	0.7	663	26.5	C	44			
		L	Durham SB	89	3.2							
		R	Bath NB	47	5.1							

PA413 and Ford Rd	Ford NB	T	Ford NB	30	0.8	388	44.8	D	106	2439	19.4	B
		L	PA413 WB	243	9.6							
		R	PA413 EB	115	2.1							
	Ford SB	T	Ford SB	21	0.4	67	32.9	C	11			
		R	PA413 WB	7	2.4							
		L	PA413 EB	39	1.1							
	PA413 EB	R	Ford SB	139	0.0	784	11.5	B	22			
		L	Ford NB	3	2.4							
		T	PA413 EB	642	1.2							
	PA413 WB	L	Ford SB	95	2.1	1200	15.6	B	44			
		R	Ford NB	64	1.9							
		T	PA413 WB	1041	20.4							

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	254	9.5	285	9.9	A	4	2380	6.4	A
		L	PA413 WB	30	4.5							
		T	Old Rodgers NB	1	0.0							
	PA413 WB	L	Wharton SB	83	11.0	1261	5.4	A	14			
		T	PA413 WB	1142	17.6							
		R	Old Rodgers NB	36	1.0							
	PA413 EB	R	Wharton SB	14	3.1	794	4.6	A	5			
		T	PA413 EB	776	0.7							
		L	Old Rodgers NB	4	0.5							
	Old Rodgers SB	T	Wharton SB	0	1.4	40	46.6	D	9			
		L	PA413 EB	27	0.2							
		R	PA413 WB	13	0.3							

PA413 and I-95 ramps	I-95 ramps SB	R	PA413 EB	993	8.9	1653	21.4	C	43	3941	29.8	C
		L	PA413 WB	660	7.7							
	PA413 WB	T	PA413 WB	606	9.5	1228	48.8	D	173			
		L	I-95 ramps	622	1.0							
	PA413 EB	T	PA413 EB	521	4.5	1060	21	C	21			
		R	I-95 ramps	539	0.5							

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	199	12.0	1504	15.3	B	50	2909	20	B
		T	PA413 EB	1256	6.0							
		L	Rockview NB	49	0.3							
	Rockview NB	L	PA413 WB	147	1.4	199	37.9	D	44			
		R	PA413 EB	43	0.7							
		T	Rockview NB	9	0.0							
	PA413 WB	T	PA413 WB	1050	6.1	1110	22.8	C	57			
		L	Rockview SB	52	4.9							
		R	Rockview NB	8	0.4							
	Rockview SB	R	PA413 WB	53	7.2	96	23.8	C	10			
		T	Rockview SB	0	1.4							
		L	PA413 EB	43	6.2							

PA413 and Winder Dr	Winder SB	L	PA413 EB	16	0.3	98	17.6	B	7	2392	7.5	A
		R	PA413 WB	82	3.0							
	PA413 WB	R	Winder NB	13	2.3	1004	4.9	A	7			
		T	PA413 WB	991	2.1							
	PA413 EB	L	Winder NB	44	3.0	1290	8.8	A	33			
		T	PA413 EB	1246	7.4							

Table B-2: Performance Measures, PM Base Year—continued

Appendix C: Future Year (2045) Result Details

Table C-1: Performance Measures, AM Future Year

8:15-9:15 AM	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Average Approach Queue (ft)	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	4	59.9	738	54.4	D	116	2213	56	E
		R	Street EB	259	51.8							
		L	Street WB	475	55.8							
	Street WB	R	I-95 NB	125	71.4	671	101.5	F	260			
		T	Street WB	546	108.4							
	Street EB	L	I-95 NB	264	30.2	804	19.4	B	179			
	T	Street EB	540	14.1								
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	171	164.7	354	175	F	630	2006	98	F
		T	I-95 SB	3	202.9							
		L	Street EB	180	184.4							
	Street EB	R	I-95 SB	7	89.1	637	155.8	F	618			
		T	Street EB	630	156.6							
	Street WB	T	Street WB	871	27.2	1015	34.8	C	178			
	L	I-95 SB	144	80.8								
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	145	58.4	761	48.4	D	654	1643	27.9	C
		R	US13 SB	12	47.4							
		T	I-95 SB	604	46.1							
	US13 SB	R	Street ramps EB	78	19.6	550	8.6	A	12			
		T	US13 SB	435	6.9							
		L	I-95 SB	37	5.6							
	US13 NB	L	Street ramps EB	25	26.7	332	12.9	B	16			
		T	US13 NB	307	11.8							
		R	I-95 SB	0	0.0							
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	53	24.8	220	35.1	D	41	1433	10	A
		L	US13 NB	167	38.4							
	US13 SB	R	Street ramps WB	263	5.1	762	5.3	A	11			
		T	US13 SB	499	5.4							
	US13 NB	L	Street ramps WB	58	7.3	451	5.8	A	6			
	T	US13 NB	393	5.5								
US13 and Park Ave	Park EB	L	US13 NB	67	16.0	125	24.2	C	20	1397	9.4	A
		R	US13 SB	58	33.7							
	US13 SB	R	Park WB	42	3.4	722	4.1	A	12			
		T	US13 SB	680	4.1							
	US13 NB	L	Park WB	34	13.2	550	13.1	B	25			
		T	US13 NB	516	13.1							
US13 and Bensalem Blvd	US13 SB	T	US13 SB	366	14.9	496	14.8	B	26	1562	14.2	B
		R	Bensalem WB	130	14.6							
	Bensalem EB	R	US13 SB	358	15.9	492	22	C	64			
		L	US13 NB	134	38.3							
	US 13 NB	T	US13 NB	360	5.5	574	7.1	A	12			
		L	Bensalem WB	214	9.8							
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	534	3.9	579	3.7	A	0	567	5.2	A
		R	Haunted EB	44	1.8							
		L	Totem WB	1	4.1							
	US 13 SB	T	US13 SB	485	6.2	543	6.4	A	0			
		L	Haunted EB	50	8.1							
		R	Totem WB	8	5.2							
	Haunted WB	L	US13SB	12	11.9	24	9	A	1			
		R	US13 NB	12	6.1							
		T	Totem WB	0	0.0							
	Totem EB	R	US13 SB	1	5.0	26	9.3	A	1			
		L	US13 NB	25	9.5							
		T	Haunted EB	0	0.0							

Table C-1: Performance Measures, AM Future Year–continued

US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	12	37.7	37	23.7	C	3	1337	17.7	B
		R	US13 SB	24	16.5							
		L	US13 NB	1	27.2							
	Cedar WB	L	US13 SB	104	40.6	237	26.3	C	28			
		R	US13 NB	133	15.1							
	US13 NB	R	Cedar EB	145	10.7	545	17	B	21			
		T	US13 NB	400	19.2							
	US13 SB	L	Cedar EB	91	13.8	518	14	B	18			
T		US13 SB	427	14.0								

US13 and Newportville Rd	Newportville EB	R	US13 SB	158	21.9	203	26	C	27	1079	19.5	C
		L	US13 NB	45	40.4							
		T	Newportville EB	0	0.0							
	US13 NB	L	Newportville WB	196	14.1	464	12.1	B	12			
		T	US13 NB	268	10.7							
		R	Newportville EB	0	0.0							
	US13 SB	R	Newportville EB	18	18.8	373	24.2	C	29			
		T	US13 SB	355	24.4							
		L	Newportville WB	0	0.0							
	Station Driveway WB	T	Newportville WB	11	39.0	39	30	C	7			
		L	US13 SB	16	35.1							
		R	US13 NB	12	14.7							

US13 and PA413	US13 SB	T	US13 SB	350	23.5	686	13.8	B	17	3357	35.4	D
		R	PA413 WB	336	3.7							
	US13 NB	T	US13 NB	219	27.4	353	21.5	C	11			
		R	PA413 EB	134	11.9							
	PA413 WB	L	US13 SB	115	63.1	980	18.2	B	59			
		R	US13 NB	210	14.6							
		T	PA413 WB	655	11.5							
	PA413 EB	R	US13 SB	31	35.7	1429	61	E	251			
		L	US13 NB	289	77.6							
T		PA413 EB	1109	57.4								

US13 and Commerce Drive	US13 SB	R	Commerce WB	118	2.5	642	11.4	B	19	1160	12.8	B
		T	US13 SB	524	13.4							
	Commerce EB	L	US13 NB	110	29.9	122	29.8	C	17			
		R	US13 SB	12	28.9							
	US13 NB	T	US13 NB	673	10.2	700	10	A	17			
		L	Commerce WB	27	7.5							
	Commerce WB	T	Commerce WB	0	0.0	17	59.8	E	5			
		L	US13 SB	17	59.8							

US13 and Bath	Bath WB	T	Bath WB	109	35.7	326	31.8	C	32	3033	24.7	C
		L	US13 SB	108	30.2							
		R	US13 NB	109	29.4							
	Bath EB	T	Bath EB	166	38.1	390	32.2	C	44			
		R	US13 SB	126	26.3							
		L	US13 NB	98	29.8							
	US13 NB	R	Bath EB	76	8.6	782	21	C	48			
		L	Bath WB	76	74.2							
		T	US13 NB	630	16.1							
	US13 SB	L	Bath EB	48	57.4	572	20.7	C	31			
		R	Bath WB	93	10.6							
		T	US13 SB	431	18.8							

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	104	33.1	227	28.4	C	18	2255	16.5	B
		L	US13 SB	56	30.6							
		R	US13 NB	67	19.3							
	Beaver EB	T	Beaver EB	72	31.2	177	26.9	C	13			
		R	US13 SB	51	17.0							
		L	US13 NB	54	30.4							
	US13 NB	R	Beaver EB	20	7.8	816	14.3	B	26			
		L	Beaver WB	71	14.6							
		T	US13 NB	725	14.4							
	US13 SB	L	Beaver EB	106	15.5	692	12.4	B	17			
		R	Beaver WB	48	4.3							
		T	US13 SB	538	12.6							

Table C-1: Performance Measures, AM Future Year—continued

US13 and Green Ln	Green EB	T	Green EB	157	42.5	451	41.2	D	61	3116	20.1	C
		R	US13 SB	223	42.7							
		L	Green WB	71	33.8							
	Green WB	T	Green WB	109	40.1	499	37.6	D	56			
		L	US13 SB	239	37.4							
		R	US13 NB	151	36.1							
	US13 NB	L	Green WB	141	14.3	969	3.8	A	2			
		R	Green EB	142	5.9							
		T	US13 NB	686	1.3							
	US13 SB	R	Green WB	36	12.2	836	17.1	B	30			
		L	Green EB	177	22.0							
		T	US13 SB	623	15.9							

US13 and Edgely Rd	Edgely EB	R	US13 SB	136	38.6	294	42.4	D	36	1018	12.1	B
		L	US13 NB	98	45.9							
		T	Edgely EB	60	45.4							
	US13 SB	R	Edgely WB	5	11.1	729	11.2	B	19			
		T	US13 SB	675	11.1							
		L	Edgely EB	49	12.5							
	US13 NB	L	Edgely WB	84	9.5	717	4.6	A	5			
		T	US13 NB	632	3.9							
		R	Edgely EB	1	1.3							
	Edgely WB	T	Edgely WB	88	43.9	169	43.8	D	30			
		L	US13 SB	68	48.2							
		R	US13 NB	13	20.3							

US13 and Haines Rd	US13 NB	L	Haines WB	42	5.3	742	5.6	A	8	734	10.5	B
		R	Haines EB	3	4.7							
		T	US13 NB	697	5.7							
	Haines EB	T	Haines EB	48	50.8	175	46.8	D	24			
		R	US13 SB	87	46.6							
		L	US13 NB	40	42.3							
	Haines WB	T	Haines WB	48	47.0	94	44.4	D	17			
		L	US13 SB	8	37.6							
		R	US13 NB	38	42.4							
	US13 SB	R	Haines WB	39	4.3	708	6	A	8			
		L	Haines EB	32	8.8							
		T	US13 SB	637	5.9							

US13 and Home Depot drive	Home Depot EB	R	US13 SB	75	6.3	104	5.4	A	3	1000	5	A
		L	US13 NB	29	2.9							
	US13 NB	L	Home Depot WB	73	5.1	739	3.5	A	3			
		T	US13 NB	666	3.3							
	US13 SB	R	Home Depot WB	31	2.2	631	4.9	A	6			
		T	US13 SB	600	5.0							
	Home Depot WB	T	Home Depot WB	0	0.0	28	47.9	D	7			
		L	US13 SB	28	47.9							

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	204	42.2	388	42.4	D	65	2114	18.7	B
		R	US13 SB	184	42.6							
		T	SEPTA station EB	0	0.0							
	US13 SB	R	Levittown WB	160	8.3	601	10.7	B	12			
		T	US13 SB	441	11.6							
		L	SEPTA station EB	0	0.0							
	US13 NB	L	Levittown WB	163	13.9	694	11.6	B	17			
		T	US13 NB	531	10.9							
		R	SEPTA station EB	0	0.0							
	SEPTA station WB	T	Levittown WB	15	48.5	22	44	D	3			
		R	US13 NB	3	9.7							
		L	US13 SB	4	52.7							

Table C-1: Performance Measures, AM Future Year–continued

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	203	35.9	258	35.1	D	39	1945	24	C
		L	PA413 WB	20	27.0							
		T	Durham NB	35	34.5							
	PA413 WB	T	PA413 WB	607	18.4	734	21.8	C	45			
		R	Bath NB	17	1.4							
		L	Durham SB	110	43.8							
	Bath SB	L	PA413 EB	63	34.4	162	33.8	C	19			
		R	PA413 WB	71	33.0							
		T	Durham SB	28	34.6							
	PA413 EB	T	PA413 EB	672	21.3	752	20.3	C	41			
L		Durham SB	58	15.0								
R		Bath NB	22	4.8								

PA413 and Ford Rd	Ford NB	T	Ford NB	29	41.4	254	30.4	C	35	2008	9.2	A
		L	PA413 WB	118	41.3							
		R	PA413 EB	107	15.3							
	Ford SB	T	Ford SB	25	40.1	81	35.7	D	13			
		R	PA413 WB	2	2.9							
		L	PA413 EB	54	34.9							
	PA413 EB	R	Ford SB	149	5.2	941	5.5	A	10			
		L	Ford NB	3	5.8							
		T	PA413 EB	789	5.5							
	PA413 WB	L	Ford SB	89	9.4	761	3.9	A	3			
R		Ford NB	58	2.8								
T		PA413 WB	614	3.2								

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	125	4.5	141	8.5	A	1	1335	5.5	A
		L	PA413 WB	12	41.9							
		T	Old Rodgers NB	4	35.3							
	PA413 WB	L	Wharton SB	251	10.5	1023	4	A	9			
		T	PA413 WB	738	1.9							
		R	Old Rodgers NB	34	2.1							
	PA413 EB	R	Wharton SB	32	3.4	951	4.5	A	5			
		T	PA413 EB	914	4.5							
		L	Old Rodgers NB	5	8.8							
	Old Rodgers SB	T	Wharton SB	0	0.0	46	50.5	D	12			
L		PA413 EB	32	49.2								
R		PA413 WB	14	53.4								

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	929	19.9	1490	27.1	C	49	2080	25.1	C
		L	PA413 WB	561	39.0							
	PA413 WB	T	PA413 WB	461	19.5	1208	32.6	C	95			
		L	I-95 ramps	747	40.6							
	PA413 EB	T	PA413 EB	524	23.1	1072	14	B	14			
		R	I-95 ramps	548	5.3							

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	65	3.3	1456	6.9	A	22	1840	10	A
		T	PA413 EB	1330	5.2							
		L	Rockview NB	61	47.0							
	Rockview NB	L	PA413 WB	143	39.3	204	35	C	42			
		R	PA413 EB	51	22.8							
		T	Rockview NB	10	35.9							
	PA413 WB	T	PA413 WB	1060	8.9	1080	9.1	A	21			
		L	Rockview SB	18	20.8							
		R	Rockview NB	2	10.0							
	Rockview SB	R	PA413 WB	13	8.0	23	27.5	C	2			
		T	Rockview SB	0	0.0							
		L	PA413 EB	10	53.0							

Table C-1: Performance Measures, AM Future Year–continued

PA413 and Winder Dr	Winder SB	L	PA413 EB	12	55.8	72	16.9	B	4	973	4.7	A
		R	PA413 WB	60	9.1							
	PA413 WB	R	Winder NB	2	1.7	1054	3.7	A	6			
		T	PA413 WB	1052	3.7							
	PA413 EB	L	Winder NB	30	43.5	1325	4.9	A	15			
		T	PA413 EB	1295	4.0							

PA413 and Western Ave	Western SB	L	PA413 EB	16	45.7	86	19.2	B	9	2663	15.7	B
		R	PA413 WB	61	9.0							
		T	Western SB	9	41.6							
	PA413 WB	R	Western NB	10	6.5	992	10.5	B	24			
		T	PA413 WB	953	9.5							
		L	Western SB	29	44.4							
	PA413 EB	L	Western NB	45	51.7	1334	18	B	85			
		T	PA413 EB	1270	16.9							
		R	Western SB	19	15.6							
	Western NB	T	Western NB	20	38.5	140	28.3	C	21			
		R	PA413 EB	65	19.9							
		L	PA413 WB	55	34.6							

PA413 and Otter St	PA413 EB	R	PA413 EB	988	11.4	1240	12.7	B	35	2086	29.9	C
		T	Otter NB	252	17.8							
	PA413 WB	L	PA413 WB	831	66.5	1045	56.3	E	178			
		R	Otter NB	214	16.9							
	Otter SB	T	PA413 WB	150	9.6	334	11.4	B	61			
		L	PA 413 EB	184	12.8							

PA413 and State Rd	State NB	R	PA413 EB	177	3.0	445	48.5	D	71	2660	30	C
		T	industrial dr NB	25	65.9							
		L	PA413 WB	243	79.8							
	industrial drive SB	L	PA413 EB	3	37.5	24	55.4	E	6			
		T	State SB	9	55.8							
		R	PA413 WB	12	59.6							
	PA413 WB	L	State SB	174	47.3	1005	28.4	C	61			
		R	industrial dr NB	23	10.7							
		T	PA413 WB	808	24.8							
	PA413 EB	T	PA413 EB	986	26.2	1181	23.8	C	76			
		R	State SB	134	5.3							
		L	industrial dr NB	61	25.2							

US13 and I-95 Ramps	Driveway (not use	U	Service Drwy	0	0.0	0	0	0	A	150	34.5	C
		L	I-95 ramps WB	355	56.2							
	US13 NB	T	US13 NB	484	6.3	2300	11.7	B	49			
		T	Service Drwy	0	0.0							
	I-95 ramps EB	R	US13 SB	348	33.3	827	123	F	276			
		L	US13 NB	479	188.1							
	US13 SB	R	I-95 ramps WB	735	6.3	1086	15.3	B	2207			
		T	US13 NB	351	34.1							

Table C-2: Performance Measures, PM Future Year

5:15-6:15pm	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Average Approach Queue (ft)	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	136.2	932	132.4	F	858	2540	117.7	F
		R	Street EB	133	141.6							
		L	Street WB	794	130.9							
	Street WB	R	I-95 NB	150	183.5	799	205.8	F	1275			
		T	Street WB	649	211.0							
	Street EB	L	I-95 NB	292	6.5	809	13.7	B	72			
		T	Street EB	517	17.7							
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	362	123.5	564	123.4	F	633	2909	45	D
		T	I-95 SB	4	135.8							
		L	Street EB	198	123.0							
	Street EB	R	I-95 SB	272	27.3	888	45.8	D	107			
		T	Street EB	616	54.0							
	Street WB	T	Street WB	1301	11.6	1457	14.1	B	82			
		L	I-95 SB	156	34.2							
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	222	40.1	517	34.9	C	63	1879	16.6	B
		R	US13 SB	16	30.2							
		T	I-95 SB	279	31.0							
	US13 SB	R	Street ramps EB	32	6.4	824	7.2	A	17			
		T	US13 SB	776	7.3							
		L	I-95 SB	16	4.9							
	US13 NB	L	Street ramps EB	25	11.9	538	13.5	B	35			
		T	US13 NB	512	13.5							
		R	I-95 SB	1	4.8							
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	53	32.8	333	40.2	D	79	2084	16.9	B
		L	US13 NB	280	41.6							
	US13 SB	R	Street ramps WB		14.0	1015	15.3	B	48			
		T	US13 SB	772	15.7							
	US13 NB	L	Street ramps WB	80	14.0	736	8.6	A	22			
		T	US13 NB	656	7.9							
US13 and Park Ave	Park EB	L	US13 NB	77	30.3	160	38.8	D	38	2234	10.2	B
		R	US13 SB	83	46.6							
	US13 SB	R	Park WB	96	3.6	1134	4.2	A	16			
		T	US13 SB	1038	4.3							
	US13 NB	L	Park WB	132	28.3	940	12.6	B	40			
		T	US13 NB	808	10.0							
US13 and Bensalem Blvd	US13 SB	T	US13 SB	777	29.6	888	29.5	C	175	2285	33.6	C
		R	Bensalem WB	111	28.8							
	Bensalem EB	R	US13 SB	357	66.3	503	76.7	E	222			
		L	US13 NB	146	102.1							
	US 13 NB	T	US13 NB	541	6.1	894	13.4	B	39			
		L	Bensalem WB	353	24.7							
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	658	3.7	697	3.8	A	1	1027	4.1	A
		R	Haunted EB	24	2.0							
		L	Totem WB	15	9.1							
	US 13 SB	T	US13 SB	910	3.5	952	3.6	A	0			
		L	Haunted EB	31	5.5							
		R	Totem WB	11	2.5							
	Haunted WB	L	US13SB	29	19.1	75	11.7	B	4			
		R	US13 NB	46	7.0							
		T	Totem WB		0.0							
	Totem EB	R	US13 SB	1	5.8	30	10.5	B	1			
		L	US13 NB	29	10.7							
		T	Haunted EB	0	0.0							

Table C-2: Performance Measures, PM Future Year–continued

US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	51	29.3	77	26.4	C	9	2136	21.2	C
		R	US13 SB	25	20.1							
		L	US13 NB	1	39.8							
	Cedar WB	L	US13 SB	201	38.3	431	29.2	C	56			
		R	US13 NB	230	21.3							
	US13 NB	R	Cedar EB	164	13.0	708	24.9	C	66			
		T	US13 NB	544	28.5							
	US13 SB	L	Cedar EB	196	20.6	920	14.2	B	67			
T		US13 SB	724	12.5								

US13 and Newportville Rd	Newportville EB	R	US13 SB	256	29.5	318	31.2	C	56	1744	27.1	D
		L	US13 NB	62	38.1							
		T	Newportville EB	0	0.0							
	US13 NB	L	Newportville WB	291	33.3	753	23.1	C	87			
		T	US13 NB	462	16.6							
		R	Newportville EB	0	0.0							
	US13 SB	R	Newportville EB	24	30.0	617	29.4	C	108			
		T	US13 SB	593	29.4							
		L	Newportville WB	0	0.0							
	Station Driveway WB	T	Newportville WB	20	34.1	56	32.9	C	9			
		L	US13 SB	36	32.3							
		R	US13 NB	0	0.0							

US13 and PA413	US13 SB	T	US13 SB	544	57.0	914	36.4	D	61	3825	29.3	C
		R	PA413 WB	370	6.1							
	US13 NB	T	US13 NB	317	43.4	485	33	C	28			
		R	PA413 EB	168	13.5							
	PA413 WB	L	US13 SB	178	51.2	1032	25.2	C	125			
		R	US13 NB	282	11.9							
		T	PA413 WB	572	23.6							
	PA413 EB	R	US13 SB	46	10.2	1394	26.4	C	85			
L		US13 NB	268	62.9								
T		PA413 EB	1080	18.1								

US13 and Commerce Drive	US13 SB	R	Commerce WB	177	4.4	1024	10.6	B	27	2020	13.2	B
		T	US13 SB	847	11.9							
	Commerce EB	L	US13 NB	123	30.6	130	30.5	C	20			
		R	US13 SB	7	28.9							
	US13 NB	T	US13 NB	794	12.8	821	12.7	B	27			
		L	Commerce WB	27	11.0							
	Commerce WB	T	Commerce WB	0	0.0	45	32	C	7			
		L	US13 SB	45	32.0							

US13 and Bath	Bath WB	T	Bath WB	208	37.4	497	32.4	C	58	2949	37.6	D
		L	US13 SB	158	30.8							
		R	US13 NB	131	26.3							
	Bath EB	T	Bath EB	227	38.9	480	35.1	D	62			
		R	US13 SB	101	25.1							
		L	US13 NB	152	35.9							
	US13 NB	R	Bath EB	128	17.2	908	46	D	171			
		L	Bath WB	138	165.8							
		T	US13 NB	642	25.9							
	US13 SB	L	Bath EB	108	87.2	1064	33.9	C	101			
		R	Bath WB	147	18.0							
		T	US13 SB	809	29.7							

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	135	33.8	464	29.8	C	36	2808	24.3	C
		L	US13 SB	141	34.2							
		R	US13 NB	188	23.7							
	Beaver EB	T	Beaver EB	107	29.9	215	27.8	C	17			
		R	US13 SB	54	19.5							
		L	US13 NB	54	32.1							
	US13 NB	R	Beaver EB	21	12.4	809	22.2	C	47			
		L	Beaver WB	49	24.8							
		T	US13 NB	739	22.3							
	US13 SB	L	Beaver EB	188	28.4	1320	23.1	C	78			
		R	Beaver WB	84	15.0							
		T	US13 SB	1048	22.8							

Table C-2: Performance Measures, PM Future Year—continued

US13 and Green Ln	Green EB	T	Green EB	169	46.0	509	38.6	D	69	3699	30	C
		R	US13 SB	252	34.8							
		L	Green WB	88	35.5							
	Green WB	T	Green WB	159	60.8	565	59.5	E	166			
		L	US13 SB	222	69.6							
		R	US13 NB	184	46.2							
	US13 NB	L	Green WB	105	15.2	1374	26.6	C	89			
		R	Green EB	249	48.5							
		T	US13 NB	1020	22.4							
US13 SB	R	Green WB	217	24.7	1251	17	B	57				
	L	Green EB	124	7.5								
	T	US13 SB	910	16.5								

US13 and Edgely Rd	Edgely EB	R	US13 SB	143	36.1	340	44.6	D	45	2510	17	B
		L	US13 NB	122	50.5							
		T	Edgely EB	75	51.4							
	US13 SB	R	Edgely WB	6	9.9	1278	14	B	45			
		T	US13 SB	1223	14.0							
		L	Edgely EB	49	14.1							
	US13 NB	L	Edgely WB	206	21.6	1146	13.1	B	32			
		T	US13 NB	940	11.2							
		R	Edgely EB	0	0.0							
Edgely WB	T	Edgely WB	92	48.2	148	47	D	29				
	L	US13 SB	49	46.7								
	R	US13 NB	7	33.3								

US13 and Haines Rd	US13 NB	L	Haines WB	134	13.2	1086	10.1	B	24	383	14.1	B
		R	Haines EB	5	12.3							
		T	US13 NB	947	9.6							
	Haines EB	T	Haines EB	59	51.7	236	48.1	D	33			
		R	US13 SB	139	47.7							
		L	US13 NB	38	44.1							
	Haines WB	T	Haines WB	72	50.2	133	46	D	22			
		L	US13 SB	14	45.8							
		R	US13 NB	47	39.5							
US13 SB	R	Haines WB	73	8.9	1268	10.7	B	34				
	L	Haines EB	76	10.6								
	T	US13 SB	1119	10.8								

US13 and Home Depot drive	Home Depot EB	R	US13 SB	105	8.2	124	7.8	A	7	2339	6.9	A
		L	US13 NB	19	5.6							
	US13 NB	L	Home Depot WB	199	12.6	1018	5.5	A	10			
		T	US13 NB	819	3.8							
	US13 SB	R	Home Depot WB	31	3.4	1186	7.5	A	23			
		T	US13 SB	1155	7.6							
	Home Depot WB	T	Home Depot WB	8	67.5	11	61.4	E	3			
L	US13 SB	3	45.2									

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	324	43.9	663	38.3	D	92	2855	31	C
		R	US13 SB	306	32.0							
		T	SEPTA station EB	33	41.9							
	US13 SB	R	Levittown WB	344	30.2	1219	33	C	94			
		T	US13 SB	862	34.3							
		L	SEPTA station EB	13	24.8							
	US13 NB	L	Levittown WB	259	32.6	836	21.4	C	44			
		T	US13 NB	572	16.4							
		R	SEPTA station EB	5	8.5							
	SEPTA station WB	T	Levittown WB	65	47.0	137	36.6	D	17			
		R	US13 NB	52	23.9							
		L	US13 SB	20	36.1							

Table C-2: Performance Measures, PM Future Year–continued

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	199	41.7	270	39.9	D	45	2477	37.7	D
		L	PA413 WB	13	30.8							
		T	Durham NB	58	36.0							
	PA413 WB	T	PA413 WB	895	33.2	1245	42.7	D	154			
		R	Bath NB	25	4.3							
		L	Durham SB	325	72.0							
	Bath SB	L	PA413 EB	58	40.5	258	42.4	D	34			
		R	PA413 WB	95	41.1							
		T	Durham SB	105	44.5							
PA413 EB	T	PA413 EB	558	29.1	704	26.3	C	46				
	L	Durham SB	96	21.1								
	R	Bath NB	50	5.1								

PA413 and Ford Rd	Ford NB	T	Ford NB	30	41.7	390	38	D	64	2452	16.5	B
		L	PA413 WB	242	46.1							
		R	PA413 EB	118	20.5							
	Ford SB	T	Ford SB	25	36.4	72	35.2	D	11			
		R	PA413 WB	7	12.2							
		L	PA413 EB	40	38.5							
	PA413 EB	R	Ford SB	141	7.4	814	10.2	B	20			
		L	Ford NB	3	8.8							
		T	PA413 EB	670	10.9							
PA413 WB	L	Ford SB	99	14.7	1176	12.5	B	32				
	R	Ford NB	65	8.2								
	T	PA413 WB	1012	12.6								

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	276	4.9	312	10.1	B	3	2434	6.4	A
		L	PA413 WB	35	50.3							
		T	Old Rodgers NB	1	56.9							
	PA413 WB	L	Wharton SB	96	5.5	1252	5	A	12			
		T	PA413 WB	1119	5.0							
		R	Old Rodgers NB	37	3.2							
	PA413 EB	R	Wharton SB	15	2.1	825	4.9	A	5			
		T	PA413 EB	806	4.9							
		L	Old Rodgers NB	4	13.1							
Old Rodgers SB	T	Wharton SB	0	0.0	45	49.2	D	11				
	L	PA413 EB	33	48.8								
	R	PA413 WB	12	50.3								

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	1012	9.1	1703	22.6	C	49	4029	47.6	D
		L	PA413 WB	691	42.3							
	PA413 WB	T	PA413 WB	571	63.0	1209	106.8	F	368			
		L	I-95 ramps	638	146.1							
	PA413 EB	T	PA413 EB	539	38.1	1117	21.5	C	22			
		R	I-95 ramps	578	6.0							

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	207	8.9	1540	17.3	B	58	3004	27.9	C
		T	PA413 EB	1281	17.1							
		L	Rockview NB	52	54.6							
	Rockview NB	L	PA413 WB	161	49.0	214	45	D	52			
		R	PA413 EB	43	29.3							
		T	Rockview NB	10	47.5							
	PA413 WB	T	PA413 WB	1083	38.5	1146	38.8	D	125			
		L	Rockview SB	56	45.9							
		R	Rockview NB	7	33.1							
	Rockview SB	R	PA413 WB	63	20.0	104	28.7	C	11			
		T	Rockview SB	0	0.0							
		L	PA413 EB	41	42.0							

Table C-2: Performance Measures, PM Future Year—continued

PA413 and Winder Dr	Winder SB	L	PA413 EB	15	55.4	104	19.6	B	7	2468	9	A
		R	PA413 WB	89	13.6							
	PA413 WB	R	Winder NB	14	3.9	1048	7.3	A	11			
		T	PA413 WB	1034	7.4							
	PA413 EB	L	Winder NB	44	75.7	1316	9.5	A	37			
		T	PA413 EB	1272	7.2							
PA413 and Western Ave	Western SB	L	PA413 EB	37	38.2	181	31	C	29	2428	18.2	B
		R	PA413 WB	84	19.6							
		T	Western SB	60	42.5							
	PA413 WB	R	Western NB	12	4.8	933	11.1	B	30			
		T	PA413 WB	850	6.4							
		L	Western SB	71	68.8							
	PA413 EB	L	Western NB	78	69.2	1139	19.6	B	66			
		T	PA413 EB	1009	16.1							
		R	Western SB	52	13.0							
	Western NB	T	Western NB	41	42.5	175	33.5	C	28			
		R	PA413 EB	83	21.9							
		L	PA413 WB	51	45.0							
PA413 and Otter St	PA413 EB	R	PA413 EB	955	8.8	1253	10	A	20	2812	21.3	C
		T	Otter NB	298	13.8							
	PA413 WB	L	PA413 WB	809	45.9	1358	32.7	C	76			
		R	Otter NB	315	8.0							
	Otter SB	T	PA413 WB	234	20.6	3248	20.9	C	33			
		L	PA 413 EB	201	15.5							
PA413 and State Rd	State NB	R	PA413 EB	186	2.9	460	42.4	D	68	2807	27.4	C
		T	industrial drive NB	9	61.6							
		L	PA413 WB	265	69.5							
	industrial drive SB	L	PA413 EB	24	56.8	92	58.3	E	22			
		T	State SB	25	62.1							
		R	PA413 WB	43	56.9							
	PA413 WB	L	State SB	267	50.4	1087	24.5	C	84			
		R	industrial drive NB	3	11.3							
		T	PA413 WB	817	16.1							
	PA413 EB	T	PA413 EB	929	25.5	1168	21.8	C	64			
		R	State SB	231	7.2							
		L	industrial drive NB	8	25.8							
US13 and I-95 Ramps	Driveway (not used)	U	Service Drwy	0	0.0	0	0	A	0	3810	30.6	C
		L	I-95 ramps WB	397	72.9							
	US13 NB	T	US13 NB	604	10.4	1001	35.1	D	69			
		T	Service Drwy	0	0.0							
	I-95 ramps EB	R	US13 SB	667	8.9	1314	37.3	D	285			
		L	US13 NB	647	66.5							
	US13 SB	R	I-276 ramps WB	837	6.5	1495	21.7	C	83			
		T	US13 NB	658	40.9							

Appendix D: Future Year (2045) Improvement Alternative A

Table D-1: Performance Measures, AM Future Year Improvement Alternative A

8:15-9:15 AM	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	4	53.9	743	48.3	D	2379	24.1	C
		R	Street EB	260	43.4						
		L	Street WB	479	51.0						
	Street WB	R	I-95 NB	130	10.7	706	18	B			
		T	Street WB	576	19.6						
	Street EB	L	I-95 NB	304	13.3	930	9.4	A			
		T	Street EB	626	7.5						
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	203	43.7	420	50.7	D	2200	21.4	C
		T	I-95 SB	4	39.7						
		L	Street EB	213	57.5						
	Street EB	R	I-95 SB	8	8.9	724	16.8	B			
		T	Street EB	716	16.9						
	Street WB	T	Street WB	892	13.1	1056	12.9	B			
		L	I-95 SB	164	11.6						
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	150	57.5	788	47	D	1671	26.8	C
		R	US13 SB	13	48.0						
		T	I-95 SB	625	44.5						
	US13 SB	R	Street ramps EB	80	5.7	552	6.8	A			
		T	US13 SB	435	7.2						
		L	I-95 SB	37	5.4						
	US13 NB	L	Street ramps EB	25	12.9	331	12.1	B			
		T	US13 NB	306	12.0						
		R	I-95 SB	0	0.0						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	55	26.9	232	36.9	D	1449	11.2	B
		L	US13 NB	177	39.9						
	US13 SB	R	Street ramps WB	262	5.5	761	6	A			
		T	US13 SB	499	6.3						
	US13 NB	L	Street ramps WB	58	8.0	456	6.9	A			
		T	US13 NB	398	6.8						
US13 and Park Ave	Park EB	L	US13 NB	67	16.1	125	24.2	C	1410	10.2	B
		R	US13 SB	58	33.5						
	US13 SB	R	Park WB	42	3.4	721	4.1	A			
		T	US13 SB	679	4.2						
	US13 NB	L	Park WB	34	14.9	564	15	B			
		T	US13 NB	530	15.0						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	364	15.0	494	15	B	1576	14.6	B
		R	Bensalem WB	130	14.9						
	Bensalem EB	R	US13 SB	357	16.7	492	22.8	C			
		L	US13 NB	135	39.0						
	US 13 NB	T	US13 NB	369	6.4	590	7.5	A			
		L	Bensalem WB	221	9.4						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	537	3.7	582	3.5	A	565	5.1	A
		R	Haunted EB	44	2.1						
		L	Totem WB	1	5.4						
	US 13 SB	T	US13 SB	484	6.3	541	6.4	A			
		L	Haunted EB	49	8.0						
		R	Totem WB	8	5.1						
	Haunted WB	L	US13SB	12	11.0	24	8.3	A			
		R	US13 NB	12	5.6						
		T	Totem WB	0	0.0						
	Totem EB	R	US13 SB	1	5.1	26	9	A			
		L	US13 NB	25	9.2						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	12	37.9	37	23.4	C	1341	18	B
		R	US13 SB	24	15.9						
		L	US13 NB	1	27.4						
	Cedar WB	L	US13 SB	104	41.3	237	26.3	C			
		R	US13 NB	133	14.6						
	US13 NB	R	Cedar EB	145	11.0	547	16.8	B			
		T	US13 NB	402	19.0						
	US13 SB	L	Cedar EB	92	15.6	520	15.1	B			
T		US13 SB	428	15.0							

Table D-1: Performance Measures, AM Future Year Improvement Alternative A—continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	158	21.2	203	25.4	C	1083	18.9	C
		L	US13 NB	45	40.4						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	199	13.2	466	11.6	B			
		T	US13 NB	267	10.5						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	18	16.3	375	23.4	C			
		T	US13 SB	357	23.8						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	11	38.9	39	29.8	C			
		L	US13 SB	16	34.8						
		R	US13 NB	12	14.6						

US13 and PA413	US13 SB	T	US13 SB	353	22.1	688	13	B	3375	36.4	D
		R	PA413 WB	335	3.5						
	US13 NB	T	US13 NB	220	28.8	353	22.6	C			
		R	PA413 EB	133	12.3						
	PA413 WB	L	US13 SB	114	64.1	972	18.9	B			
		R	US13 NB	209	14.9						
		T	PA413 WB	649	12.3						
	PA413 EB	R	US13 SB	32	38.7	1458	62.5	E			
		L	US13 NB	297	81.1						
T		PA413 EB	1129	58.3							

US13 and Commerce Drive	US13 SB	R	Commerce WB	117	2.2	641	11.2	B	1252	12.7	B
		T	US13 SB	524	13.2						
	Commerce EB	L	US13 NB	110	30.4	122	30.4	C			
		R	US13 SB	12	29.8						
	US13 NB	T	US13 NB	680	9.9	708	9.8	A			
		L	Commerce WB	28	8.2						
	Commerce WB	T	Commerce WB	0	0.0	17	60.8	E			
L	US13 SB	17	60.8								

US13 and Bath	Bath WB	T	Bath WB	109	35.7	326	32.3	C	2966	24.4	C
		L	US13 SB	108	31.2						
		R	US13 NB	109	30.0						
	Bath EB	T	Bath EB	166	38.5	389	32.7	C			
		R	US13 SB	126	26.5						
		L	US13 NB	97	30.9						
	US13 NB	R	Bath EB	77	8.0	790	20.2	C			
		L	Bath WB	78	70.1						
		T	US13 NB	635	15.5						
	US13 SB	L	Bath EB	47	55.8	571	20	B			
		R	Bath WB	93	9.2						
		T	US13 SB	431	18.5						

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	104	30.5	226	27.2	C	2151	16.5	B
		L	US13 SB	56	30.0						
		R	US13 NB	66	19.7						
	Beaver EB	T	Beaver EB	72	28.6	177	26	C			
		R	US13 SB	51	16.3						
		L	US13 NB	54	31.6						
	US13 NB	R	Beaver EB	21	9.7	821	14.5	B			
		L	Beaver WB	72	14.2						
		T	US13 NB	728	14.7						
	US13 SB	L	Beaver EB	106	15.5	696	13.1	B			
		R	Beaver WB	48	5.1						
		T	US13 SB	542	13.4						

US13 and Green Ln	Green EB	T	Green EB	157	42.9	450	41.3	D	3267	20.2	C
		R	US13 SB	222	42.9						
		L	Green WB	71	33.0						
	Green WB	T	Green WB	109	41.2	498	38.1	D			
		L	US13 SB	238	38.2						
		R	US13 NB	151	35.7						
	US13 NB	L	Green WB	141	15.4	969	4.1	A			
		R	Green EB	141	6.6						
		T	US13 NB	687	1.3						
	US13 SB	R	Green WB	36	9.8	837	16.7	B			
		L	Green EB	177	22.9						
		T	US13 SB	624	15.3						

Table D-1: Performance Measures, AM Future Year Improvement Alternative A—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	137	37.8	295	42.1	D	1109	12.2	B
		L	US13 NB	98	45.7						
		T	Edgely EB	60	45.9						
	US13 SB	R	Edgely WB	5	14.0	729	11.7	B			
		T	US13 SB	675	11.5						
		L	Edgely EB	49	13.6						
	US13 NB	L	Edgely WB	84	10.3	718	4.8	A			
		T	US13 NB	633	4.1						
		R	Edgely EB	1	1.3						
	Edgely WB	T	Edgely WB	88	43.5	169	43.5	D			
		L	US13 SB	68	47.9						
		R	US13 NB	13	20.6						

US13 and Haines Rd	US13 NB	L	Haines WB	43	6.0	743	5.7	A	734	10.5	B
		R	Haines EB	3	5.8						
		T	US13 NB	697	5.6						
	Haines EB	T	Haines EB	48	50.8	175	46.8	D			
		R	US13 SB	87	46.6						
		L	US13 NB	40	42.2						
	Haines WB	T	Haines WB	48	47.1	94	44.6	D			
		L	US13 SB	8	37.6						
		R	US13 NB	38	42.9						
	US13 SB	R	Haines WB	39	4.3	708	6	A			
		L	Haines EB	32	8.0						
		T	US13 SB	637	6.0						

US13 and Home Depot drive	Home Depot EB	R	US13 SB	75	6.4	104	5.5	A	961	5	A
		L	US13 NB	29	2.9						
	US13 NB	L	Home Depot WB	75	4.9	741	3.6	A			
		T	US13 NB	666	3.5						
	US13 SB	R	Home Depot WB	31	2.0	631	4.7	A			
		T	US13 SB	600	4.9						
Home Depot WB	T	Home Depot WB	0	0.0	28	45.7	D				
	L	US13 SB	28	45.7							

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	204	42.2	388	42.4	D	2015	18.6	B
		R	US13 SB	184	42.6						
		T	SEPTA station EB	0	0.0						
	US13 SB	R	Levittown WB	160	8.2	601	10.7	B			
		T	US13 SB	441	11.7						
		L	SEPTA station EB	0	0.0						
	US13 NB	L	Levittown WB	163	13.8	693	11.3	B			
		T	US13 NB	530	10.5						
		R	SEPTA station EB	0	0.0						
	SEPTA station WB	T	Levittown WB	15	48.5	22	44	D			
		R	US13 NB	3	10.0						
		L	US13 SB	4	52.7						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	203	35.9	258	35.1	D	1934	24	C
		L	PA413 WB	20	27.0						
		T	Durham NB	35	34.5						
	PA413 WB	T	PA413 WB	604	18.2	729	22	C			
		R	Bath NB	17	1.5						
		L	Durham SB	108	46.8						
	Bath SB	L	PA413 EB	63	34.4	162	33.8	C			
		R	PA413 WB	71	33.0						
		T	Durham SB	28	34.6						
	PA413 EB	T	PA413 EB	672	21.1	752	20.1	C			
		L	Durham SB	58	14.8						
		R	Bath NB	22	4.7						

PA413 and Ford Rd	Ford NB	T	Ford NB	29	41.4	254	30.4	C	1986	9.2	A
		L	PA413 WB	118	41.4						
		R	PA413 EB	107	15.3						
	Ford SB	T	Ford SB	25	40.2	81	35.7	D			
		R	PA413 WB	2	2.6						
		L	PA413 EB	54	34.9						
	PA413 EB	R	Ford SB	149	5.4	941	5.5	A			
		L	Ford NB	3	7.3						
		T	PA413 EB	789	5.5						
	PA413 WB	L	Ford SB	89	9.2	759	3.8	A			
		R	Ford NB	58	2.8						
		T	PA413 WB	612	3.1						

Table D-1: Performance Measures, AM Future Year Improvement Alternative A—continued

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	125	4.5	141	8.5	A	1296	5.4	A
		L	PA413 WB	12	41.9						
		T	Old Rodgers NB	4	35.3						
	PA413 WB	L	Wharton SB	251	10.1	1019	3.9	A			
		T	PA413 WB	734	1.9						
		R	Old Rodgers NB	34	1.9						
	PA413 EB	R	Wharton SB	32	3.4	952	4.4	A			
		T	PA413 EB	915	4.4						
		L	Old Rodgers NB	5	9.3						
	Old Rodgers SB	T	Wharton SB	0	0.0	46	50.5	D			
		L	PA413 EB	32	49.2						
		R	PA413 WB	14	53.4						

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	929	20.1	1490	27.3	C	2126	25.3	C
		L	PA413 WB	561	39.2						
	PA413 WB	T	PA413 WB	457	19.7	1204	32.8	C			
		L	I-95 ramps	747	40.9						
	PA413 EB	T	PA413 EB	524	23.3	1072	14.2	B			
		R	I-95 ramps	548	5.4						

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	65	3.3	1456	6.9	A	1725	9.8	A
		T	PA413 EB	1330	5.2						
		L	Rockview NB	61	46.5						
	Rockview NB	L	PA413 WB	143	39.3	204	35	C			
		R	PA413 EB	51	22.8						
		T	Rockview NB	10	35.9						
	PA413 WB	T	PA413 WB	1056	8.5	1076	8.7	A			
		L	Rockview SB	18	19.9						
		R	Rockview NB	2	9.5						
	Rockview SB	R	PA413 WB	13	7.4	23	27.2	C			
		T	Rockview SB	0	0.0						
		L	PA413 EB	10	53.0						

PA413 and Winder Dr	Winder SB	L	PA413 EB	12	53.5	72	17	B	988	4.9	A
		R	PA413 WB	60	9.7						
	PA413 WB	R	Winder NB	2	1.6	1046	4	A			
		T	PA413 WB	1044	4.0						
	PA413 EB	L	Winder NB	30	39.0	1324	4.9	A			
		T	PA413 EB	1294	4.1						

PA413 and Western Ave	Western SB	L	PA413 EB	16	44.7	86	19	B	1909	13	B
		R	PA413 WB	61	8.9						
		T	Western SB	9	41.5						
	PA413 WB	R	Western NB	10	4.3	986	10.3	B			
		T	PA413 WB	946	9.3						
		L	Western SB	30	45.7						
	PA413 EB	L	Western NB	46	51.5	1354	13.2	B			
		T	PA413 EB	1289	11.9						
		R	Western SB	19	8.8						
	Western NB	T	Western NB	20	36.8	140	26.9	C			
		R	PA413 EB	65	17.2						
		L	PA413 WB	55	34.8						

PA413 and Otter St	PA413 EB	R	PA413 EB	1006	11.2	1261	12.5	B	2082	31.8	C
		T	Otter NB	255	17.4						
	PA413 WB	L	PA413 WB	826	71.6	1040	61.6	E			
		R	Otter NB	214	23.0						
	Otter SB	T	PA413 WB	150	9.8	334	11.6	B			
		L	PA 413 EB	184	13.1						

PA413 and State Rd	State NB	R	PA413 EB	177	3.7	446	53.3	D	3033	31.9	C
		T	industrial dr NB	25	59.4						
		L	PA413 WB	244	88.7						
	industrial drive SB	L	PA413 EB	3	36.8	24	55.3	E			
		T	State SB	9	55.1						
		R	PA413 WB	12	60.0						
	PA413 WB	L	State SB	175	48.2	1006	31.4	C			
		R	industrial dr NB	23	10.0						
		T	PA413 WB	808	28.4						
	PA413 EB	T	PA413 EB	998	26.3	1196	23.9	C			
		R	State SB	136	6.0						
		L	industrial dr NB	62	24.6						

Table D-1: Performance Measures, AM Future Year Improvement Alternative A—continued

Table D-2: Performance Measures, PM Future Year Improvement Alternative A

5:15-6:15pm	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	47.9	1021	50	D	2808	50.1	D
		R	Street EB	148	29.2						
		L	Street WB	868	53.5						
	Street WB	R	I-95 NB	182	79.6	967	83.7	F			
		T	Street WB	785	84.7						
	Street EB	L	I-95 NB	294	10.6	820	10.5	B			
T		Street EB	526	10.4							
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	385	50.4	593	50.3	D	3151	22.5	C
		T	I-95 SB	4	44.2						
		L	Street EB	204	50.2						
	Street EB	R	I-95 SB	271	13.5	890	27.9	C			
		T	Street EB	619	34.3						
	Street WB	T	Street WB	1482	8.0	1668	9.8	A			
L		I-95 SB	186	24.0							
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	222	40.3	517	35.2	D	1881	16.8	B
		R	US13 SB	16	30.0						
		T	I-95 SB	279	31.4						
	US13 SB	R	Street ramps EB	31	5.3	826	7.3	A			
		T	US13 SB	779	7.4						
		L	I-95 SB	16	5.1						
	US13 NB	L	Street ramps EB	25	12.2	538	13.6	B			
		T	US13 NB	512	13.7						
		R	I-95 SB	1	5.0						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	58	36.4	363	40.1	D	2112	17.6	B
		L	US13 NB	305	40.7						
	US13 SB	R	Street ramps WB		13.7	1013	15.5	B			
		T	US13 SB	769	16.0						
	US13 NB	L	Street ramps WB	80	15.3	736	9.3	A			
		T	US13 NB	656	8.6						
US13 and Park Ave	Park EB	L	US13 NB	77	32.7	160	40.5	D	2249	11.4	B
		R	US13 SB	83	47.8						
	US13 SB	R	Park WB	95	3.3	1130	4.3	A			
		T	US13 SB	1035	4.4						
	US13 NB	L	Park WB	130	30.5	959	14.8	B			
		T	US13 NB	829	12.4						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	778	32.2	889	32	C	2294	34.5	C
		R	Bensalem WB	111	30.6						
	Bensalem EB	R	US13 SB	353	66.2	498	75.4	E			
		L	US13 NB	145	97.6						
	US 13 NB	T	US13 NB	549	8.0	907	14.6	B			
		L	Bensalem WB	358	24.7						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	666	4.4	707	4.4	A	1029	4.4	A
		R	Haunted EB	25	2.4						
		L	Totem WB	16	11.1						
	US 13 SB	T	US13 SB	912	3.6	954	3.6	A			
		L	Haunted EB	31	5.5						
		R	Totem WB	11	2.5						
	Haunted WB	L	US13SB	29	19.7	75	12.3	B			
		R	US13 NB	46	7.7						
		T	Totem WB		0.0						
	Totem EB	R	US13 SB	1	5.6	30	10.6	B			
		L	US13 NB	29	10.7						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	51	30.0	77	26.8	C	2141	26.4	C
		R	US13 SB	25	20.8						
		L	US13 NB	1	14.4						
	Cedar WB	L	US13 SB	201	37.4	430	32.7	C			
		R	US13 NB	229	28.6						
	US13 NB	R	Cedar EB	168	22.9	714	37.5	D			
		T	US13 NB	546	41.9						
	US13 SB	L	Cedar EB	195	24.4	920	14.9	B			
T	US13 SB	725	12.4								
US13 and Newportville Rd	Newportville EB	R	US13 SB	256	30.2	318	31.9	C	1745	30.8	C
		L	US13 NB	62	39.2						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	290	42.8	752	31.1	C			
		T	US13 NB	462	23.7						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	24	27.5	619	29.9	C			
		T	US13 SB	595	30.0						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	20	33.6	56	31	C			
		L	US13 SB	36	29.6						
		R	US13 NB	0	0.0						

Table D-2: Performance Measures, PM Future Year Improvement Alternative A—continued

US13 and PA413	US13 SB	R	US13 SB	545	60.4	917	38.6	D	3830	29.8	C
		R	PA413 WB	372	6.6						
	US13 NB	T	US13 NB	319	44.4	487	33.3	C			
		R	PA413 EB	168	12.2						
	PA413 WB	L	US13 SB	176	50.2	1032	25.1	C			
		R	US13 NB	282	12.3						
		T	PA413 WB	574	23.8						
	PA413 EB	R	US13 SB	46	9.8	1394	26.3	C			
L		US13 NB	269	63.2							
T	PA413 EB	1079	17.7								

US13 and Commerce Drive	US13 SB	R	Commerce WB	176	4.5	1023	11.1	B	2019	13.4	B
		T	US13 SB	847	12.5						
	Commerce EB	L	US13 NB	123	30.5	130	30.5	C			
		R	US13 SB	7	31.3						
	US13 NB	T	US13 NB	794	12.8	821	12.7	B			
		L	Commerce WB	27	11.0						
Commerce WB	T	Commerce WB	0	0.0	45	31	C				
	L	US13 SB	45	31.0							

US13 and Bath	Bath WB	T	Bath WB	208	37.9	497	32.4	C	2950	38.4	D
		L	US13 SB	158	29.9						
		R	US13 NB	131	26.7						
	Bath EB	T	Bath EB	227	39.1	479	35.2	D			
		R	US13 SB	101	25.1						
		L	US13 NB	151	36.1						
	US13 NB	R	Bath EB	129	16.7	911	46.3	D			
		L	Bath WB	137	170.3						
		T	US13 NB	645	25.9						
	US13 SB	L	Bath EB	108	88.8	1063	35.9	D			
R		Bath WB	147	20.1							
T		US13 SB	808	31.7							

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	135	33.3	463	28.8	C	2803	22.9	C
		L	US13 SB	139	33.0						
		R	US13 NB	189	22.4						
	Beaver EB	T	Beaver EB	106	30.2	213	27.7	C			
		R	US13 SB	53	21.0						
		L	US13 NB	54	29.5						
	US13 NB	R	Beaver EB	21	11.0	808	20.8	C			
		L	Beaver WB	48	23.2						
		T	US13 NB	739	20.9						
	US13 SB	L	Beaver EB	189	26.1	1319	21.3	C			
R		Beaver WB	84	13.7							
T		US13 SB	1046	21.1							

US13 and Green Ln	Green EB	T	Green EB	169	45.0	509	38.6	D	3697	29.8	C
		R	US13 SB	252	34.9						
		L	Green WB	88	36.8						
	Green WB	T	Green WB	159	55.8	564	54.8	D			
		L	US13 SB	222	65.4						
		R	US13 NB	183	41.2						
	US13 NB	L	Green WB	105	15.8	1376	27.4	C			
		R	Green EB	250	48.7						
		T	US13 NB	1021	23.3						
	US13 SB	R	Green WB	216	25.9	1248	17.6	B			
L		Green EB	125	7.8							
T		US13 SB	907	16.9							

US13 and Edgely Rd	Edgely EB	R	US13 SB	143	35.8	339	44.4	D	2506	17	B
		L	US13 NB	121	50.7						
		T	Edgely EB	75	50.8						
	US13 SB	R	Edgely WB	6	12.8	1278	14	B			
		T	US13 SB	1222	13.9						
		L	Edgely EB	50	14.6						
	US13 NB	L	Edgely WB	206	22.1	1142	13.1	B			
		T	US13 NB	936	11.2						
		R	Edgely EB	0	0.0						
	Edgely WB	T	Edgely WB	92	47.9	148	46.7	D			
L		US13 SB	49	46.7							
R		US13 NB	7	31.7							

US13 and Haines Rd	US13 NB	L	Haines WB	133	13.6	1080	9.7	A	384	14.1	B
		R	Haines EB	5	8.1						
		T	US13 NB	942	9.2						
	Haines EB	T	Haines EB	59	51.7	236	48	D			
		R	US13 SB	139	47.5						
		L	US13 NB	38	44.1						
	Haines WB	T	Haines WB	72	50.2	134	45.9	D			
		L	US13 SB	14	45.8						
		R	US13 NB	48	39.4						
	US13 SB	R	Haines WB	73	8.2	1267	10.7	B			
L		Haines EB	75	10.1							
T		US13 SB	1119	11.0							

Table D-2: Performance Measures, PM Future Year Improvement Alternative A—continued

US13 and Home Depot drive	Home Depot EB	R	US13 SB	105	8.4	124	8.1	A	2337	7.1	A
		L	US13 NB	19	6.4						
	US13 NB	L	Home Depot WB	200	12.6	1017	5.9	A			
		T	US13 NB	817	4.3						
	US13 SB	R	Home Depot WB	30	4.3	1186	7.6	A			
		T	US13 SB	1156	7.7						
Home Depot WB	T	Home Depot WB	7	63.1	10	55.5	E				
	L	US13 SB	3	37.8							

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	325	44.0	664	38.6	D	2850	31.5	C
		R	US13 SB	306	32.6						
		T	SEPTA station EB	33	41.0						
	US13 SB	R	Levittown WB	344	30.5	1219	33.4	C			
		T	US13 SB	862	34.7						
		L	SEPTA station EB	13	26.0						
	US13 NB	L	Levittown WB	258	34.6	831	22.5	C			
		T	US13 NB	568	17.2						
		R	SEPTA station EB	5	8.4						
	SEPTA station WB	T	Levittown WB	65	46.4	136	35.8	D			
		R	US13 NB	51	22.3						
		L	US13 SB	20	36.0						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	199	41.8	270	40.1	D	2526	39.4	D
		L	PA413 WB	13	32.0						
		T	Durham NB	58	36.0						
	PA413 WB	T	PA413 WB	931	35.9	1294	45.7	D			
		R	Bath NB	25	5.8						
		L	Durham SB	338	75.9						
	Bath SB	L	PA413 EB	58	40.6	258	42.4	D			
		R	PA413 WB	95	41.0						
		T	Durham SB	105	44.6						
	PA413 EB	T	PA413 EB	558	29.2	704	26.5	C			
		L	Durham SB	96	22.4						
		R	Bath NB	50	5.2						

PA413 and Ford Rd	Ford NB	T	Ford NB	30	41.8	391	38.1	D	2504	16.9	B
		L	PA413 WB	243	46.2						
		R	PA413 EB	118	20.5						
	Ford SB	T	Ford SB	25	36.4	72	35.3	D			
		R	PA413 WB	7	13.1						
		L	PA413 EB	40	38.5						
	PA413 EB	R	Ford SB	141	7.5	814	10.3	B			
		L	Ford NB	3	10.2						
		T	PA413 EB	670	10.9						
	PA413 WB	L	Ford SB	101	14.8	1227	13.4	B			
		R	Ford NB	66	8.0						
		T	PA413 WB	1060	13.6						

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	275	4.8	311	10.1	B	2484	6.4	A
		L	PA413 WB	35	50.3						
		T	Old Rodgers NB	1	56.8						
	PA413 WB	L	Wharton SB	98	5.0	1303	5.1	A			
		T	PA413 WB	1168	5.1						
		R	Old Rodgers NB	37	3.1						
	PA413 EB	R	Wharton SB	15	2.1	825	4.8	A			
		T	PA413 EB	806	4.8						
		L	Old Rodgers NB	4	11.1						
	Old Rodgers SB	T	Wharton SB	0	0.0	45	49.7	D			
		L	PA413 EB	33	49.5						
		R	PA413 WB	12	50.3						

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	1017	7.7	1704	21.7	C	4170	21.5	C
		L	PA413 WB	687	42.3						
	PA413 WB	T	PA413 WB	627	10.2	1359	26.3	C			
		L	I-95 ramps	732	40.1						
	PA413 EB	T	PA413 EB	530	25.4	1107	15.2	B			
		R	I-95 ramps	577	5.8						

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	208	6.2	1551	8.6	A	3047	17.2	B
		T	PA413 EB	1291	7.2						
		L	Rockview NB	52	51.9						
	Rockview NB	L	PA413 WB	164	40.0	217	37.2	D			
		R	PA413 EB	43	24.5						
		T	Rockview NB	10	45.7						
	PA413 WB	T	PA413 WB	1110	24.0	1175	24.4	C			
		L	Rockview SB	57	33.2						
		R	Rockview NB	8	14.4						
	Rockview SB	R	PA413 WB	63	8.6	104	22	C			
		T	Rockview SB	0	0.0						
		L	PA413 EB	41	42.6						

Table D-2: Performance Measures, PM Future Year Improvement Alternative A—continued

PA413 and Winder Dr	Winder SB	L	PA413 EB	15	55.4	105	17.5	B	2486	6.7	A
		R	PA413 WB	90	11.2						
	PA413 WB	R	Winder NB	14	4.8	1059	5.2	A			
		T	PA413 WB	1045	5.2						
	PA413 EB	L	Winder NB	46	51.2	1322	7.1	A			
T		PA413 EB	1276	5.6							

PA413 and Western Ave	Western SB	L	PA413 EB	37	38.2	181	31	C	2436	16.2	B
		R	PA413 WB	84	19.6						
		T	Western SB	60	42.5						
	PA413 WB	R	Western NB	12	4.9	933	11.6	B			
		T	PA413 WB	851	6.8						
		L	Western SB	70	71.6						
	PA413 EB	L	Western NB	81	50.8	1147	15	B			
		T	PA413 EB	1013	12.4						
		R	Western SB	53	10.9						
	Western NB	T	Western NB	41	42.1	175	33.4	C			
		R	PA413 EB	83	21.9						
		L	PA413 WB	51	45.0						

PA413 and Otter St	PA413 EB	R	PA413 EB	958	8.2	1253	8.7	A	2816	20.8	C
		T	Otter NB	295	10.5						
	PA413 WB	L	PA413 WB	810	46.2	1362	32.8	C			
		R	Otter NB	318	7.7						
	Otter SB	T	PA413 WB	234	20.8	3251	20.5	C			
L		PA 413 EB	201	15.4							

PA413 and State Rd	State NB	R	PA413 EB	186	2.9	462	41.6	D	2810	26.9	C
		T	industrial drive NB	10	62.5						
		L	PA413 WB	266	67.8						
	industrial drive SB	L	PA413 EB	24	57.7	92	60	E			
		T	State SB	24	62.0						
		R	PA413 WB	44	60.2						
	PA413 WB	L	State SB	267	50.2	1087	24.6	C			
		R	industrial drive NB	3	11.7						
		T	PA413 WB	817	16.3						
	PA413 EB	T	PA413 EB	932	24.0	1169	20.7	C			
		R	State SB	229	6.9						
		L	industrial drive NB	8	27.8						

US13 and I-95 Ramps	Driveway (not used)	U	Service Drwy	0	0.0	0	0	A	3809	29.9	C
	US13 NB	L	I-95 ramps WB	397	70.6	1005	34.3	C			
		T	US13 NB	608	10.7						
	I-95 ramps EB	T	Service Drwy	0	0.0	1310	37	D			
		R	US13 SB	665	9.1						
		L	US13 NB	645	65.7						
	US13 SB	R	I-276 ramps WB	837	5.5	1494	20.7	C			
		T	US13 NB	657	40.2						

Figure D-1: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative A, AM Peak

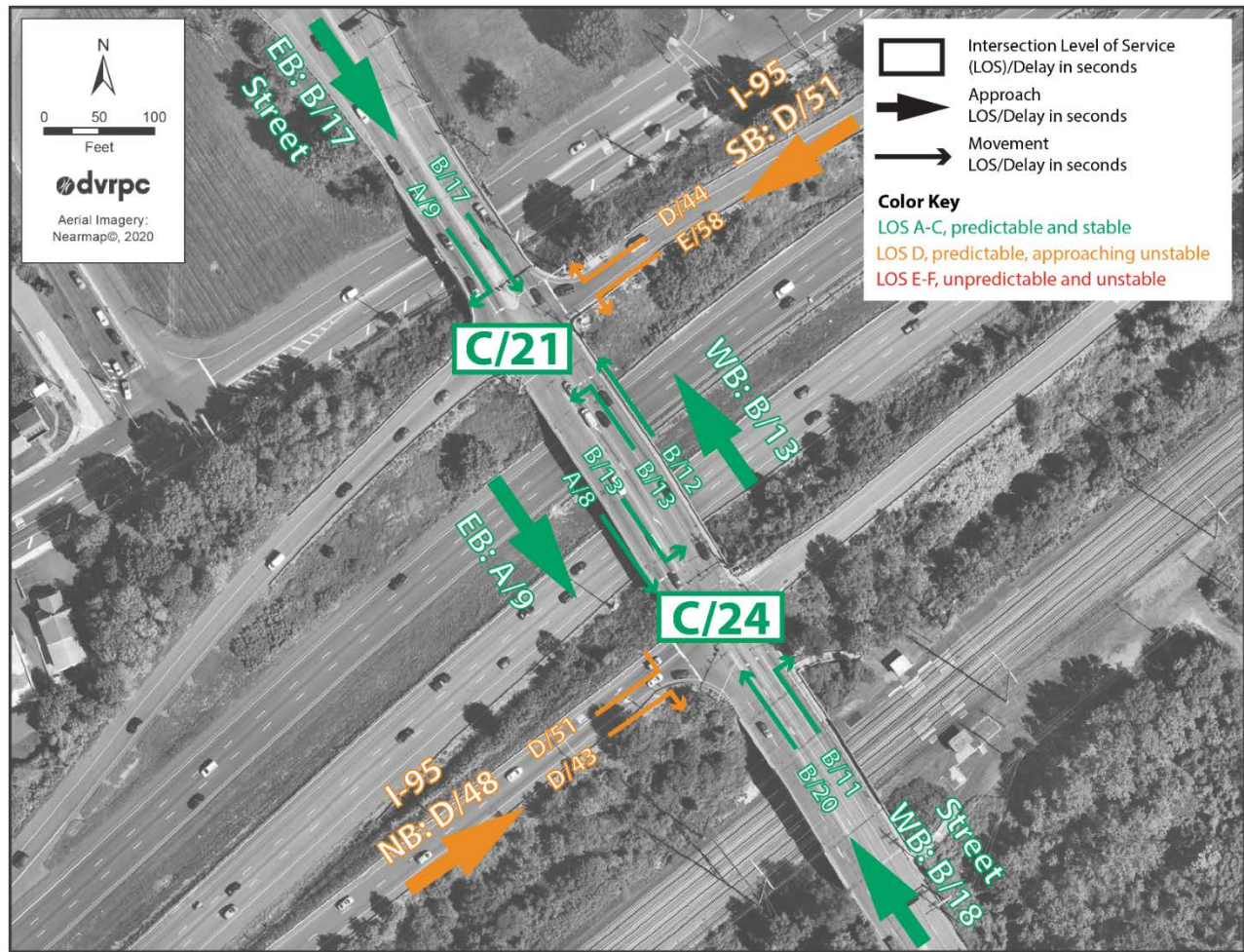
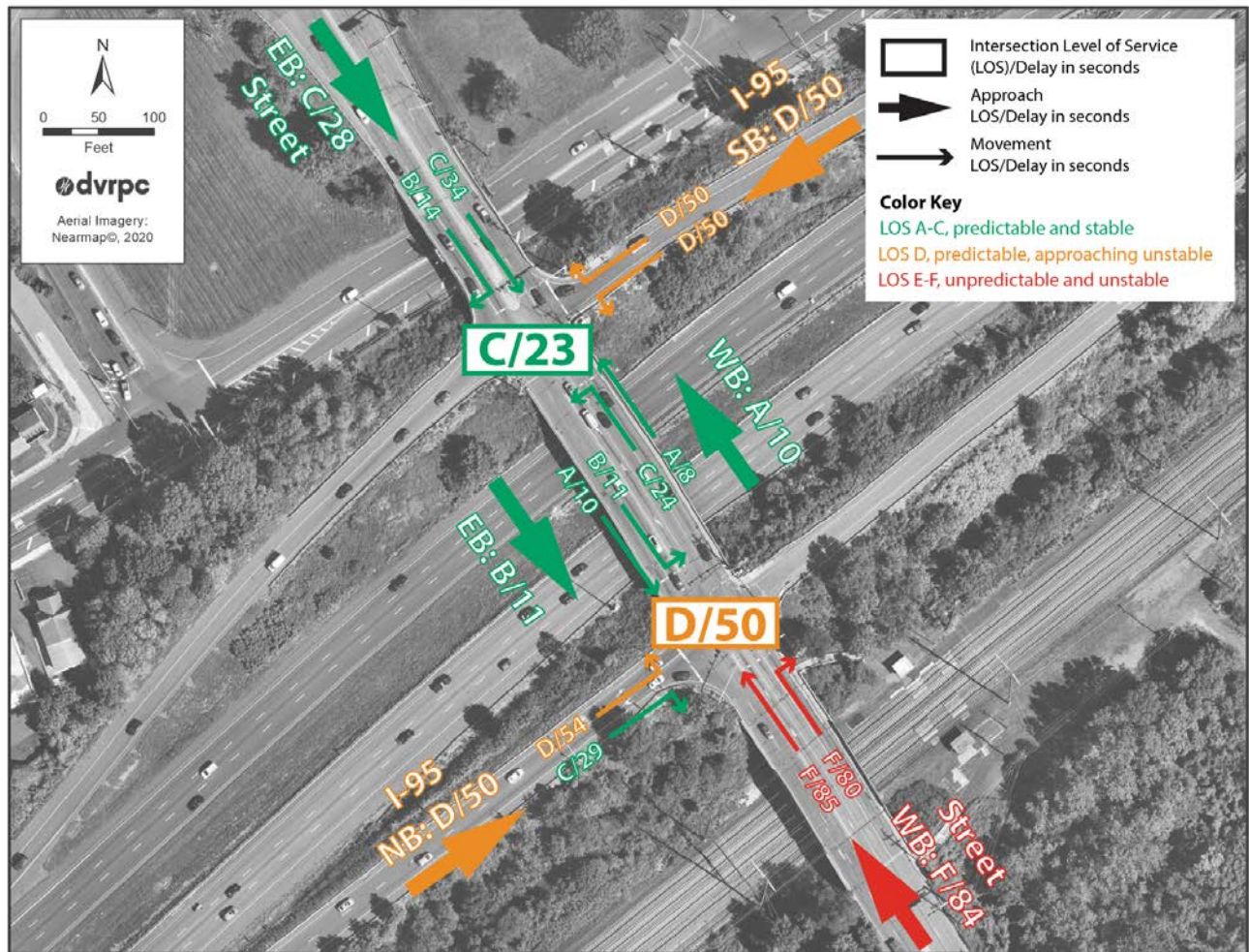


Figure D-2: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative A, PM Peak



Appendix E: Future Year (2045) Improvement Alternative B

Table E-1: Performance Measures, AM Future Year Improvement Alternative B

8:15-9:15 AM	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	4	48.2	743	49	D	2380	23.9	C
		R	Street EB	260	43.9						
		L	Street WB	479	51.7						
	Street WB	R	I-95 NB	130	14.6	706	17.8	B			
		T	Street WB	576	18.5						
	Street EB	L	I-95 NB	305	11.3	931	8.5	A			
T		Street EB	626	7.2							
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	203	43.8	420	50	D	2203	21.2	C
		T	I-95 SB	4	39.7						
		L	Street EB	213	56.1						
	Street EB	R	I-95 SB	8	6.9	727	16.5	B			
		T	Street EB	719	16.6						
	Street WB	T	Street WB	892	13.0	1056	12.9	B			
L		I-95 SB	164	11.8							
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	151	56.6	792	46.7	D	1674	26.6	C
		R	US13 SB	13	45.6						
		T	I-95 SB	628	44.3						
	US13 SB	R	Street ramps EB	79	5.3	551	6.6	A			
		T	US13 SB	435	6.9						
		L	I-95 SB	37	5.9						
	US13 NB	L	Street ramps EB	25	13.1	331	12	B			
		T	US13 NB	306	11.9						
		R	I-95 SB	0	0.0						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	56	25.6	233	36.6	D	1450	11.1	B
		L	US13 NB	177	40.1						
	US13 SB	R	Street ramps WB	262	5.4	760	5.8	A			
		T	US13 SB	498	6.0						
	US13 NB	L	Street ramps WB	58	8.5	457	7	A			
		T	US13 NB	399	6.8						
US13 and Park Ave	Park EB	L	US13 NB	67	15.9	125	24.1	C	1411	10.2	B
		R	US13 SB	58	33.5						
	US13 SB	R	Park WB	42	3.2	722	4.1	A			
		T	US13 SB	680	4.1						
	US13 NB	L	Park WB	34	14.7	564	15	B			
		T	US13 NB	530	15.0						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	364	15.5	494	15.4	B	1577	14.6	B
		R	Bensalem WB	130	15.1						
	Bensalem EB	R	US13 SB	358	16.2	493	22.2	C			
		L	US13 NB	135	38.0						
	US 13 NB	T	US13 NB	370	6.4	590	7.6	A			
		L	Bensalem WB	220	9.7						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	537	3.7	583	3.6	A	565	5.1	A
		R	Haunted EB	45	1.9						
		L	Totem WB	1	4.4						
	US 13 SB	T	US13 SB	484	6.2	541	6.4	A			
		L	Haunted EB	49	8.2						
		R	Totem WB	8	5.2						
	Haunted WB	L	US13SB	12	11.5	24	8.8	A			
		R	US13 NB	12	6.1						
		T	Totem WB	0	0.0						
	Totem EB	R	US13 SB	1	5.1	26	8.9	A			
		L	US13 NB	25	9.1						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	12	37.1	37	22.8	C	1343	18	B
		R	US13 SB	24	15.3						
		L	US13 NB	1	29.9						
	Cedar WB	L	US13 SB	104	41.2	237	26.4	C			
		R	US13 NB	133	14.8						
	US13 NB	R	Cedar EB	145	11.3	549	17.1	B			
		T	US13 NB	404	19.2						
	US13 SB	L	Cedar EB	91	15.2	520	14.8	B			
		T	US13 SB	429	14.7						

Table E-1: Performance Measures, AM Future Year Improvement Alternative B—continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	158	21.4	203	25.6	C	1081	18.8	C
		L	US13 NB	45	40.4						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	197	12.7	466	11.4	B			
		T	US13 NB	269	10.5						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	18	17.7	373	23.3	C			
		T	US13 SB	355	23.6						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	11	38.8	39	29.9	C			
		L	US13 SB	16	35.2						
		R	US13 NB	12	14.7						

US13 and PA413	US13 SB	T	US13 SB	359	22.6	696	13.3	B	3068	34.6	C
		R	PA413 WB	337	3.4						
	US13 NB	T	US13 NB	221	27.6	355	21.6	C			
		R	PA413 EB	134	11.9						
	PA413 WB	L	US13 SB	114	63.1	974	18.6	B			
		R	US13 NB	209	15.1						
		T	PA413 WB	651	11.9						
	PA413 EB	R	US13 SB	31	47.3	1425	59.1	E			
		L	US13 NB	288	78.5						
		T	PA413 EB	1106	54.3						

US13 and Commerce Drive	US13 SB	R	Commerce WB	118	2.5	643	11	B	1215	12.6	B
		T	US13 SB	525	12.9						
	Commerce EB	L	US13 NB	110	30.9	122	31	C			
		R	US13 SB	12	31.3						
	US13 NB	T	US13 NB	673	9.6	700	9.6	A			
		L	Commerce WB	27	9.1						
	Commerce WB	T	Commerce WB	0	0.0	17	60.6	E			
		L	US13 SB	17	60.6						

US13 and Bath	Bath WB	T	Bath WB	109	35.5	326	31.9	C	2967	24.5	C
		L	US13 SB	108	31.5						
		R	US13 NB	109	28.8						
	Bath EB	T	Bath EB	166	38.1	389	32.6	C			
		R	US13 SB	126	26.7						
		L	US13 NB	97	30.9						
	US13 NB	R	Bath EB	75	8.6	778	20.4	C			
		L	Bath WB	75	69.4						
		T	US13 NB	628	16.0						
	US13 SB	L	Bath EB	48	48.8	574	20.4	C			
		R	Bath WB	93	9.8						
		T	US13 SB	433	19.5						

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	103	31.6	226	27.2	C	2213	16	B
		L	US13 SB	56	30.1						
		R	US13 NB	67	18.1						
	Beaver EB	T	Beaver EB	72	30.9	177	26.6	C			
		R	US13 SB	51	17.6						
		L	US13 NB	54	29.4						
	US13 NB	R	Beaver EB	20	7.6	818	13.9	B			
		L	Beaver WB	71	13.9						
		T	US13 NB	727	14.1						
	US13 SB	L	Beaver EB	106	13.9	695	12.1	B			
		R	Beaver WB	48	4.8						
		T	US13 SB	541	12.5						

US13 and Green Ln	Green EB	T	Green EB	157	42.6	449	40.9	D	3209	20.1	C
		R	US13 SB	222	42.2						
		L	Green WB	70	32.9						
	Green WB	T	Green WB	109	40.3	498	37.7	D			
		L	US13 SB	238	37.7						
		R	US13 NB	151	35.7						
	US13 NB	L	Green WB	142	14.2	971	4.1	A			
		R	Green EB	142	7.7						
		T	US13 NB	687	1.2						
	US13 SB	R	Green WB	36	10.5	841	16.9	B			
		L	Green EB	178	22.5						
		T	US13 SB	627	15.7						

Table E-1: Performance Measures, AM Future Year Improvement Alternative B—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	136	37.7	294	42.2	D	997	12.1	B
		L	US13 NB	98	46.0						
		T	Edgely EB	60	46.0						
	US13 SB	R	Edgely WB	5	13.4	729	11.3	B			
		T	US13 SB	675	11.2						
		L	Edgely EB	49	11.3						
	US13 NB	L	Edgely WB	83	10.5	717	4.6	A			
		T	US13 NB	633	3.8						
		R	Edgely EB	1	1.1						
	Edgely WB	T	Edgely WB	88	44.1	169	43.9	D			
		L	US13 SB	68	48.2						
		R	US13 NB	13	20.5						

US13 and Haines Rd	US13 NB	L	Haines WB	43	5.8	743	5.6	A	726	10.5	B
		R	Haines EB	3	3.3						
		T	US13 NB	697	5.6						
	Haines EB	T	Haines EB	48	50.8	175	46.8	D			
		R	US13 SB	87	46.6						
		L	US13 NB	40	42.2						
	Haines WB	T	Haines WB	48	47.0	94	44.6	D			
		L	US13 SB	8	37.7						
		R	US13 NB	38	42.9						
	US13 SB	R	Haines WB	38	4.3	707	6	A			
		L	Haines EB	32	7.9						
		T	US13 SB	637	6.0						

US13 and Home Depot drive	Home Depot EB	R	US13 SB	75	6.5	104	5.5	A	962	5.1	A
		L	US13 NB	29	2.8						
	US13 NB	L	Home Depot WB	75	5.2	742	3.5	A			
		T	US13 NB	667	3.3						
	US13 SB	R	Home Depot WB	31	2.0	631	5	A			
		T	US13 SB	600	5.2						
	Home Depot WB	T	Home Depot WB	0	0.0	28	49.5	D			
		L	US13 SB	28	49.5						

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	204	42.2	388	42.4	D	2140	18.6	B
		R	US13 SB	184	42.7						
		T	SEPTA station EB	0	0.0						
	US13 SB	R	Levittown WB	160	8.3	601	10.7	B			
		T	US13 SB	441	11.6						
		L	SEPTA station EB	0	0.0						
	US13 NB	L	Levittown WB	164	14.3	695	11.4	B			
		T	US13 NB	531	10.5						
		R	SEPTA station EB	0	0.0						
	SEPTA station WB	T	Levittown WB	15	48.5	22	44.1	D			
		R	US13 NB	3	10.3						
		L	US13 SB	4	52.7						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	203	35.9	258	35.1	D	1921	23.9	C
		L	PA413 WB	20	27.0						
		T	Durham NB	35	34.6						
	PA413 WB	T	PA413 WB	604	17.9	730	21.6	C			
		R	Bath NB	17	1.4						
		L	Durham SB	109	45.3						
	Bath SB	L	PA413 EB	63	34.4	162	33.8	C			
		R	PA413 WB	71	33.0						
		T	Durham SB	28	34.6						
	PA413 EB	T	PA413 EB	672	21.3	752	20.2	C			
		L	Durham SB	58	14.4						
		R	Bath NB	22	4.8						

PA413 and Ford Rd	Ford NB	T	Ford NB	29	41.4	254	30.4	C	1898	9.1	A
		L	PA413 WB	118	41.4						
		R	PA413 EB	107	15.3						
	Ford SB	T	Ford SB	25	40.2	81	35.7	D			
		R	PA413 WB	2	2.7						
		L	PA413 EB	54	34.9						
	PA413 EB	R	Ford SB	149	5.3	941	5.5	A			
		L	Ford NB	3	5.8						
		T	PA413 EB	789	5.6						
	PA413 WB	L	Ford SB	89	9.2	758	3.7	A			
		R	Ford NB	59	2.6						
		T	PA413 WB	610	3.0						

Table E-1: Performance Measures, AM Future Year Improvement Alternative B—continued

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	125	4.6	141	8.6	A	1291	5.5	A
		L	PA413 WB	12	41.9						
		T	Old Rodgers NB	4	35.3						
	PA413 WB	L	Wharton SB	252	10.2	1021	4	A			
		T	PA413 WB	735	1.9						
		R	Old Rodgers NB	34	2.6						
	PA413 EB	R	Wharton SB	32	3.5	952	4.5	A			
		T	PA413 EB	915	4.6						
		L	Old Rodgers NB	5	9.3						
	Old Rodgers SB	T	Wharton SB	0	0.0	46	50.5	D			
		L	PA413 EB	32	49.2						
		R	PA413 WB	14	53.4						

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	929	20.1	1490	27.2	C	2020	25.3	C
		L	PA413 WB	561	39.0						
	PA413 WB	T	PA413 WB	458	19.4	1204	33.1	C			
		L	I-95 ramps	746	41.6						
	PA413 EB	T	PA413 EB	524	22.8	1072	14	B			
		R	I-95 ramps	548	5.5						

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	65	3.1	1455	6.9	A	1743	9.9	A
		T	PA413 EB	1329	5.3						
		L	Rockview NB	61	47.1						
	Rockview NB	L	PA413 WB	143	39.3	204	35	C			
		R	PA413 EB	51	22.8						
		T	Rockview NB	10	35.9						
	PA413 WB	T	PA413 WB	1055	8.5	1075	8.7	A			
		L	Rockview SB	18	19.2						
		R	Rockview NB	2	10.5						
	Rockview SB	R	PA413 WB	13	7.4	23	27.2	C			
		T	Rockview SB	0	0.0						
		L	PA413 EB	10	53.0						

PA413 and Winder Dr	Winder SB	L	PA413 EB	12	56.2	72	17.2	B	1484	8.1	A
		R	PA413 WB	60	9.3						
	PA413 WB	R	Winder NB	2	1.8	1047	4.2	A			
		T	PA413 WB	1045	4.2						
	PA413 EB	L	Winder NB	29	44.1	1305	10.8	B			
		T	PA413 EB	1276	10.1						

PA413 and Western Ave	Western SB	L	PA413 EB	16	46.6	86	19.3	B	2580	18.4	B
		R	PA413 WB	61	8.9						
		T	Western SB	9	41.3						
	PA413 WB	R	Western NB	11	5.9	990	10.5	B			
		T	PA413 WB	950	9.5						
		L	Western SB	29	44.4						
	PA413 EB	L	Western NB	45	52.3	1318	23.1	C			
		T	PA413 EB	1254	22.0						
		R	Western SB	19	22.0						
	Western NB	T	Western NB	20	36.6	139	28.7	C			
		R	PA413 EB	64	20.4						
		L	PA413 WB	55	35.6						

PA413 and Otter St	PA413 EB	R	PA413 EB	984	11.3	1238	12.6	B	2055	31.3	C
		T	Otter NB	254	17.6						
	PA413 WB	L	PA413 WB	826	69.6	1040	60	E			
		R	Otter NB	214	22.9						
	Otter SB	T	PA413 WB	150	9.7	334	11.4	B			
		L	PA 413 EB	184	12.9						

PA413 and State Rd	State NB	R	PA413 EB	177	3.0	444	51.3	D	2910	32.3	C
		T	industrial dr NB	25	56.2						
		L	PA413 WB	242	86.1						
	industrial drive SB	L	PA413 EB	3	35.9	24	55.7	E			
		T	State SB	9	55.8						
		R	PA413 WB	12	60.5						
	PA413 WB	L	State SB	174	50.0	1004	33.1	C			
		R	industrial dr NB	23	11.7						
		T	PA413 WB	807	30.1						
	PA413 EB	T	PA413 EB	983	26.4	1177	23.9	C			
		R	State SB	133	5.6						
		L	industrial dr NB	61	23.4						

Table E-1: Performance Measures, AM Future Year Improvement Alternative B—continued

Table E-2: Performance Measures, PM Future Year Improvement Alternative B

5:15-6:15pm	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	51.6	1021	50.4	D	2820	42.1	D
		R	Street EB	148	30.2						
		L	Street WB	868	53.8						
	Street WB	R	I-95 NB	187	11.0	977	60.3	E			
		T	Street WB	790	72.0						
	Street EB	L	I-95 NB	295	9.8	822	10.3	B			
T		Street EB	527	10.5							
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	385	50.2	593	50.4	D	3153	22.8	C
		T	I-95 SB	4	44.0						
		L	Street EB	204	50.9						
	Street EB	R	I-95 SB	271	14.0	890	28.5	C			
		T	Street EB	619	34.8						
	Street WB	T	Street WB	1485	8.1	1670	9.9	A			
L		I-95 SB	185	24.7							
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	222	40.3	517	35.2	D	1883	16.7	B
		R	US13 SB	16	29.9						
		T	I-95 SB	279	31.4						
	US13 SB	R	Street ramps EB	31	6.8	828	7.1	A			
		T	US13 SB	781	7.2						
		L	I-95 SB	16	4.6						
	US13 NB	L	Street ramps EB	25	12.3	538	13.6	B			
		T	US13 NB	512	13.7						
		R	I-95 SB	1	5.0						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	59	34.9	365	39.2	D	2115	17.4	B
		L	US13 NB	306	40.0						
	US13 SB	R	Street ramps WB		14.0	1014	15.4	B			
		T	US13 SB	770	15.9						
	US13 NB	L	Street ramps WB	80	14.4	736	9.3	A			
		T	US13 NB	656	8.7						
US13 and Park Ave	Park EB	L	US13 NB	77	31.3	160	39.7	D	2249	10.8	B
		R	US13 SB	83	47.5						
	US13 SB	R	Park WB	95	3.6	1129	4.2	A			
		T	US13 SB	1034	4.3						
	US13 NB	L	Park WB	131	29.9	960	13.7	B			
		T	US13 NB	829	11.1						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	778	32.4	889	32.1	C	2292	34.1	C
		R	Bensalem WB	111	30.1						
	Bensalem EB	R	US13 SB	350	64.5	495	73.9	E			
		L	US13 NB	145	96.6						
	US 13 NB	T	US13 NB	550	7.5	908	14.4	B			
		L	Bensalem WB	358	24.9						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	666	4.1	707	4.1	A	1028	4.3	A
		R	Haunted EB	25	2.0						
		L	Totem WB	16	8.4						
	US 13 SB	T	US13 SB	911	3.6	953	3.6	A			
		L	Haunted EB	31	5.3						
		R	Totem WB	11	2.4						
	Haunted WB	L	US13SB	29	19.5	75	12.1	B			
		R	US13 NB	46	7.5						
		T	Totem WB		0.0						
	Totem EB	R	US13 SB	1	6.0	30	10.2	B			
		L	US13 NB	29	10.3						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	51	29.1	77	26	C	2140	24	C
		R	US13 SB	25	19.9						
		L	US13 NB	1	15.9						
	Cedar WB	L	US13 SB	201	37.7	430	31.2	C			
		R	US13 NB	229	25.5						
	US13 NB	R	Cedar EB	168	16.9	714	31.4	C			
		T	US13 NB	546	35.8						
	US13 SB	L	Cedar EB	196	23.9	919	14.8	B			
		T	US13 SB	723	12.3						

Table E-2: Performance Measures, PM Future Year Improvement Alternative B—continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	256	31.1	318	32.7	C	1744	30.9	C
		L	US13 NB	62	39.4						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	290	40.8	752	29.6	C			
		T	US13 NB	462	22.6						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	24	31.8	618	31.6	C			
		T	US13 SB	594	31.6						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	20	32.6	56	29.8	C			
		L	US13 SB	36	28.2						
		R	US13 NB	0	0.0						

US13 and PA413	US13 SB	T	US13 SB	544	57.7	913	36.9	D	3824	29.1	C
		R	PA413 WB	369	6.3						
	US13 NB	T	US13 NB	317	42.6	484	32.2	C			
		R	PA413 EB	167	12.3						
	PA413 WB	L	US13 SB	177	49.6	1032	24.7	C			
		R	US13 NB	281	11.8						
		T	PA413 WB	574	23.3						
	PA413 EB	R	US13 SB	46	10.2	1395	26.1	C			
		L	US13 NB	269	63.7						
T		PA413 EB	1080	17.5							

US13 and Commerce Drive	US13 SB	R	Commerce WB	176	4.7	1024	11.2	B	2017	13.4	B
		T	US13 SB	848	12.6						
	Commerce EB	L	US13 NB	123	30.4	130	30.3	C			
		R	US13 SB	7	28.9						
	US13 NB	T	US13 NB	791	12.6	818	12.5	B			
		L	Commerce WB	27	11.3						
	Commerce WB	T	Commerce WB	0	0.0	45	30.3	C			
		L	US13 SB	45	30.3						

US13 and Bath	Bath WB	T	Bath WB	208	37.4	497	32.3	C	2944	38.2	D
		L	US13 SB	158	30.1						
		R	US13 NB	131	26.9						
	Bath EB	T	Bath EB	226	39.1	478	34.9	C			
		R	US13 SB	101	24.9						
		L	US13 NB	151	35.3						
	US13 NB	R	Bath EB	129	15.7	908	47.6	D			
		L	Bath WB	135	184.4						
		T	US13 NB	644	25.3						
	US13 SB	L	Bath EB	105	82.4	1061	34.4	C			
		R	Bath WB	147	20.0						
		T	US13 SB	809	30.8						

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	136	33.8	466	29	C	2805	23.4	C
		L	US13 SB	141	32.9						
		R	US13 NB	189	22.5						
	Beaver EB	T	Beaver EB	106	28.8	213	26	C			
		R	US13 SB	53	18.6						
		L	US13 NB	54	27.7						
	US13 NB	R	Beaver EB	21	14.3	807	22.3	C			
		L	Beaver WB	49	24.5						
		T	US13 NB	737	22.4						
	US13 SB	L	Beaver EB	188	27.6	1319	21.7	C			
		R	Beaver WB	83	13.6						
		T	US13 SB	1048	21.3						

US13 and Green Ln	Green EB	T	Green EB	168	43.8	508	38	D	3695	29.9	C
		R	US13 SB	253	35.3						
		L	Green WB	87	34.6						
	Green WB	T	Green WB	159	60.8	564	59.8	E			
		L	US13 SB	221	70.0						
		R	US13 NB	184	46.6						
	US13 NB	L	Green WB	105	15.5	1375	25.5	C			
		R	Green EB	249	45.1						
		T	US13 NB	1021	21.8						
	US13 SB	R	Green WB	216	25.6	1248	18	B			
		L	Green EB	125	7.9						
		T	US13 SB	907	17.6						

Table E-2: Performance Measures, PM Future Year Improvement Alternative B—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	143	35.6	339	44.4	D	2507	16.8	B
		L	US13 NB	121	50.9						
		T	Edgely EB	75	50.8						
	US13 SB	R	Edgely WB	6	10.7	1276	13.9	B			
		T	US13 SB	1220	13.9						
		L	Edgely EB	50	14.8						
	US13 NB	L	Edgely WB	206	21.3	1145	12.8	B			
		T	US13 NB	939	10.9						
		R	Edgely EB	0	0.0						
	Edgely WB	T	Edgely WB	92	48.9	148	47.4	D			
		L	US13 SB	49	46.7						
		R	US13 NB	7	32.7						

US13 and Haines Rd	US13 NB	L	Haines WB	132	12.8	1082	10.1	B	384	13.9	B
		R	Haines EB	5	8.2						
		T	US13 NB	945	9.7						
	Haines EB	T	Haines EB	59	51.7	236	48	D			
		R	US13 SB	139	47.5						
		L	US13 NB	38	44.2						
	Haines WB	T	Haines WB	72	50.2	134	46	D			
		L	US13 SB	14	45.8						
		R	US13 NB	48	39.7						
	US13 SB	R	Haines WB	73	8.7	1267	10.5	B			
		L	Haines EB	75	10.0						
		T	US13 SB	1119	10.6						

US13 and Home Depot drive	Home Depot EB	R	US13 SB	105	8.3	124	8	A	2341	7.1	A
		L	US13 NB	19	6.0						
	US13 NB	L	Home Depot WB	199	12.4	1016	5.7	A			
		T	US13 NB	817	4.1						
	US13 SB	R	Home Depot WB	30	3.8	1191	7.9	A			
		T	US13 SB	1161	8.0						
	Home Depot WB	T	Home Depot WB	7	59.7	10	53.1	D			
		L	US13 SB	3	37.5						

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	324	43.9	663	38.6	D	2853	30.9	C
		R	US13 SB	306	32.6						
		T	SEPTA station EB	33	42.4						
	US13 SB	R	Levittown WB	345	29.7	1221	32.4	C			
		T	US13 SB	863	33.6						
		L	SEPTA station EB	13	26.2						
	US13 NB	L	Levittown WB	259	33.6	832	21.7	C			
		T	US13 NB	568	16.4						
		R	SEPTA station EB	5	7.6						
	SEPTA station WB	T	Levittown WB	65	45.9	137	35.5	D			
		R	US13 NB	52	22.3						
		L	US13 SB	20	36.0						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	199	41.8	270	40.1	D	2528	38.9	D
		L	PA413 WB	13	32.1						
		T	Durham NB	58	35.9						
	PA413 WB	T	PA413 WB	932	34.7	1296	44.7	D			
		R	Bath NB	25	3.5						
		L	Durham SB	339	75.2						
	Bath SB	L	PA413 EB	58	40.6	258	42.4	D			
		R	PA413 WB	95	41.2						
		T	Durham SB	105	44.6						
	PA413 EB	T	PA413 EB	558	29.2	704	26.4	C			
		L	Durham SB	96	21.0						
		R	Bath NB	50	5.2						

PA413 and Ford Rd	Ford NB	T	Ford NB	30	41.8	391	38.5	D	2505	16.9	B
		L	PA413 WB	243	46.6						
		R	PA413 EB	118	20.8						
	Ford SB	T	Ford SB	25	36.5	72	35.1	D			
		R	PA413 WB	7	12.9						
		L	PA413 EB	40	38.1						
	PA413 EB	R	Ford SB	141	7.6	814	10.3	B			
		L	Ford NB	3	8.7						
		T	PA413 EB	670	10.9						
	PA413 WB	L	Ford SB	101	14.6	1228	13.4	B			
		R	Ford NB	67	8.1						
		T	PA413 WB	1060	13.7						

Table E-2: Performance Measures, PM Future Year Improvement Alternative B—continued

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB		275	4.6	311	9.9	A	2486	6.4	A
		L	PA413 WB		35	50.3						
		T	Old Rodgers NB		1	56.8						
	PA413 WB	L	Wharton SB		100	5.1	1305	5	A			
		T	PA413 WB		1168	5.1						
		R	Old Rodgers NB		37	3.1						
	PA413 EB	R	Wharton SB		15	2.3	825	4.9	A			
		T	PA413 EB		806	4.9						
		L	Old Rodgers NB		4	11.6						
	Old Rodgers SB	T	Wharton SB		0	0.0	45	49.3	D			
		L	PA413 EB		33	48.9						
		R	PA413 WB		12	50.3						

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB		1017	7.7	1704	21.6	C	4173	20.7	C
		L	PA413 WB		687	42.4						
	PA413 WB	T	PA413 WB		629	9.2	1362	24.1	C			
		L	I-95 ramps		733	36.8						
	PA413 EB	T	PA413 EB		530	25.4	1107	15.1	B			
R		I-95 ramps		577	5.7							

PA413 and Rockview Dr	PA413 EB	R	Rockview SB		208	5.8	1552	8.6	A	3047	17.2	B
		T	PA413 EB		1291	7.2						
		L	Rockview NB		53	52.2						
	Rockview NB	L	PA413 WB		164	40.0	217	37.4	D			
		R	PA413 EB		43	25.6						
		T	Rockview NB		10	45.6						
	PA413 WB	T	PA413 WB		1109	24.1	1174	24.5	C			
		L	Rockview SB		57	32.1						
		R	Rockview NB		8	14.5						
	Rockview SB	R	PA413 WB		63	8.5	104	21.9	C			
		T	Rockview SB		0	0.0						
		L	PA413 EB		41	42.6						

PA413 and Winder Dr	Winder SB	L	PA413 EB		15	55.4	105	17.3	B	2486	6.8	A
		R	PA413 WB		90	10.9						
	PA413 WB	R	Winder NB		14	3.3	1059	5.1	A			
		T	PA413 WB		1045	5.1						
	PA413 EB	L	Winder NB		46	52.9	1322	7.4	A			
		T	PA413 EB		1276	5.7						

PA413 and Western Ave	Western SB	L	PA413 EB		37	38.6	181	31.4	C	2435	16	B
		R	PA413 WB		84	20.1						
		T	Western SB		60	42.7						
	PA413 WB	R	Western NB		12	3.2	932	10.8	B			
		T	PA413 WB		851	6.3						
		L	Western SB		69	67.0						
	PA413 EB	L	Western NB		80	49.6	1147	15.1	B			
		T	PA413 EB		1014	12.6						
		R	Western SB		53	10.6						
	Western NB	T	Western NB		41	42.5	175	33.4	C			
		R	PA413 EB		83	21.7						
		L	PA413 WB		51	45.0						

PA413 and Otter St	PA413 EB	R	PA413 EB		956	8.0	1252	8.7	A	2814	21.1	C
		T	Otter NB		296	11.1						
	PA413 WB	L	PA413 WB		810	47.0	1361	33.5	C			
		R	Otter NB		317	8.1						
	Otter SB	T	PA413 WB		234	20.8	3249	20.7	C			
		L	PA 413 EB		201	15.1						

PA413 and State Rd	State NB	R	PA413 EB		186	2.9	460	42.2	D	2807	27.3	C
		T	industrial drive NB		10	70.2						
		L	PA413 WB		264	68.8						
	industrial drive SB	L	PA413 EB		24	58.7	92	60.5	E			
		T	State SB		24	62.3						
		R	PA413 WB		44	60.6						
	PA413 WB	L	State SB		267	50.4	1087	24.7	C			
		R	industrial drive NB		3	11.7						
		T	PA413 WB		817	16.3						
	PA413 EB	T	PA413 EB		931	24.6	1168	21.3	C			
		R	State SB		229	7.6						
		L	industrial drive NB		8	28.5						

US13 and I-95 Ramps	Driveway (not used)	U	Service Drwy		0	0.0	0	0	A	3800	30.5	C
	US13 NB	L	I-95 ramps WB		397	71.4	998	34.6	C			
		T	US13 NB		601	10.2						
	I-95 ramps EB	T	Service Drwy		0	0.0	1311	37.7	D			
		R	US13 SB		666	8.9						
		L	US13 NB		645	67.5						
	US13 SB	R	I-276 ramps WB		835	6.1	1491	21.3	C			
		T	US13 NB		656	40.7						

Figure E-1: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative B, AM Peak

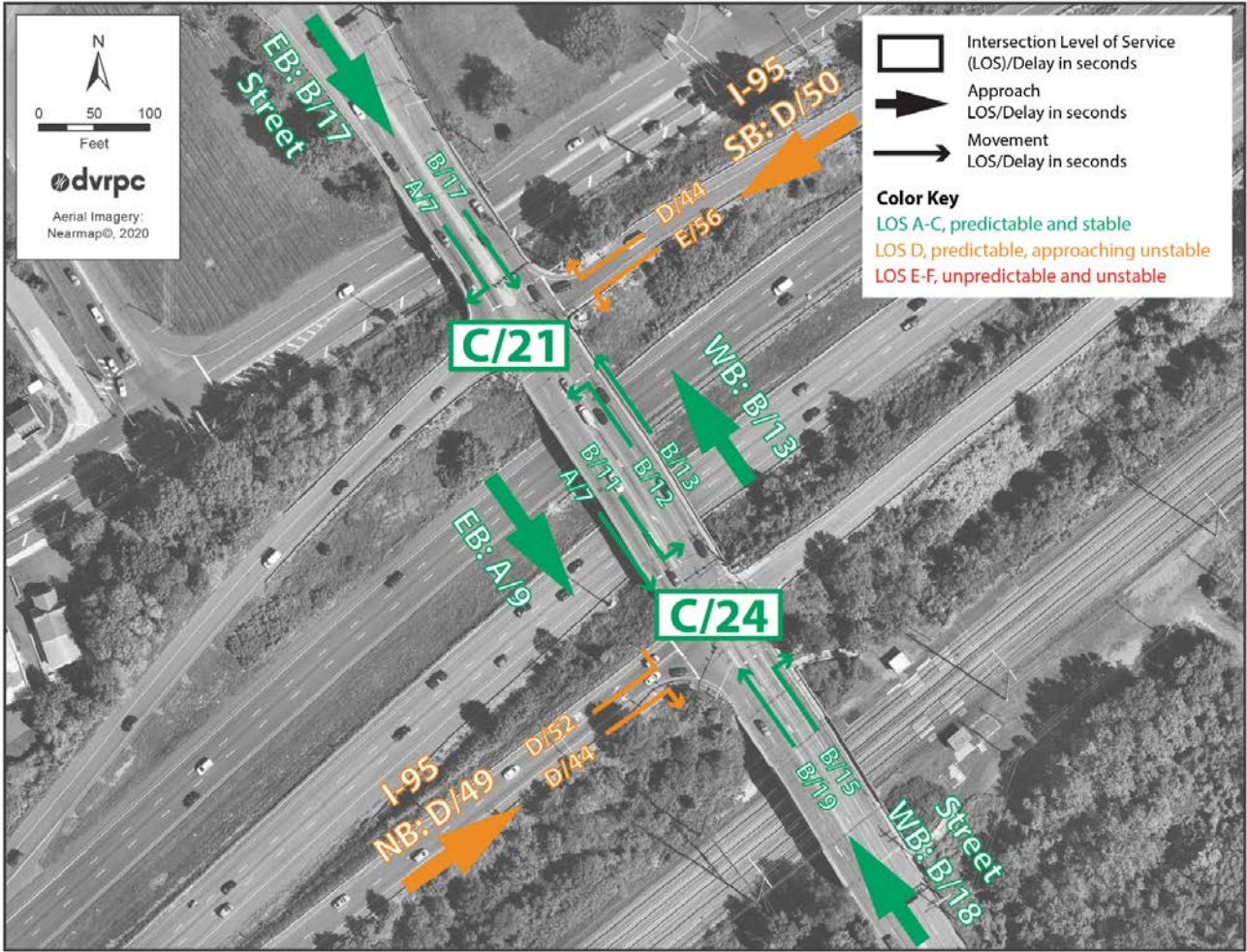
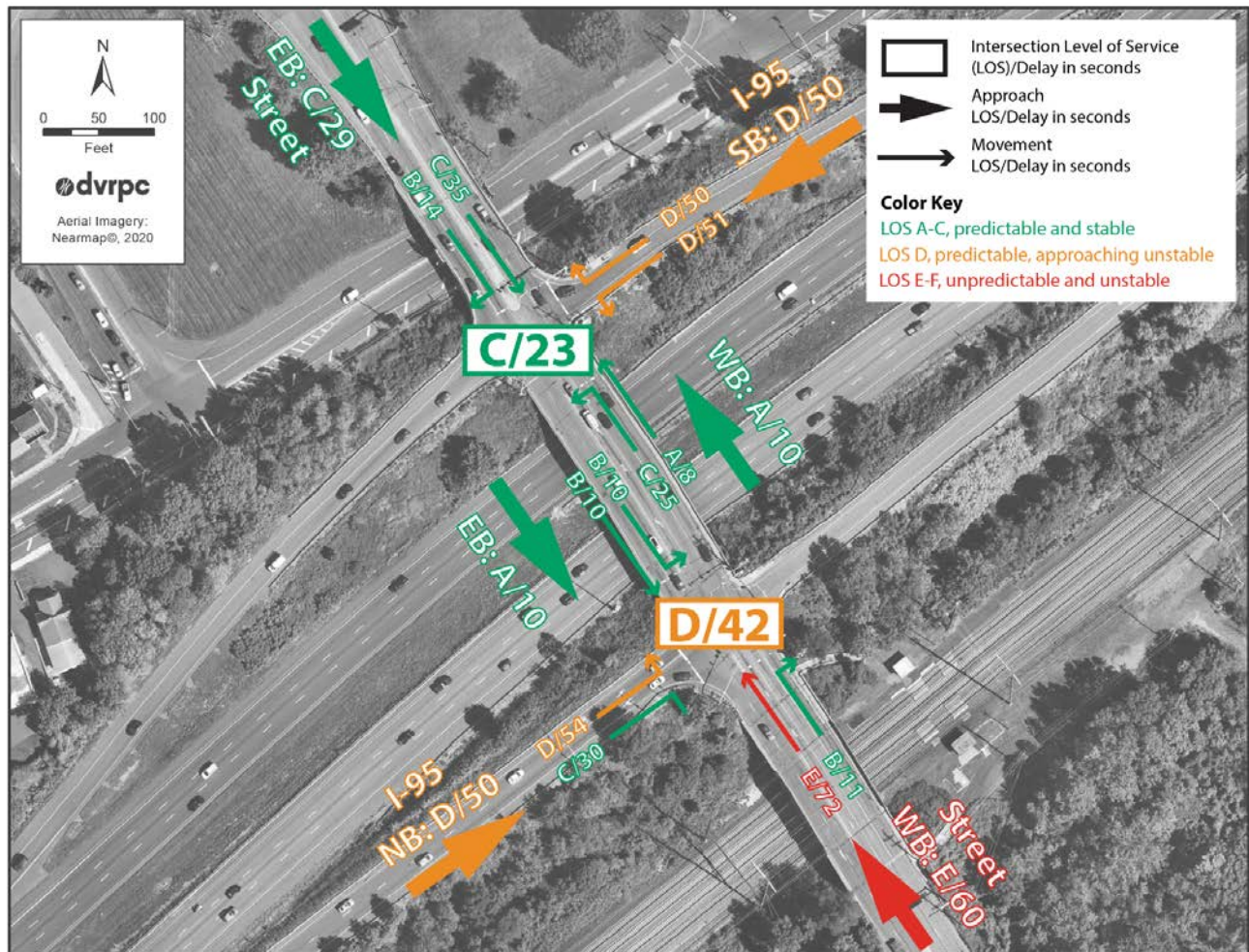


Figure E-2: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative B, PM Peak



Appendix F: Future Year (2045) Improvement Alternative C

Table F-1: Performance Measures, AM Future Year Improvement Alternative C

8:15-9:15 AM	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	4	51.0	740	47.3	D	2390	21.6	C
		R	Street EB	259	44.9						
		L	Street WB	477	48.6						
	Street WB	R	I-95 NB	130	12.6	706	13.8	B			
		T	Street WB	576	14.0						
	Street EB	L	I-95 NB	310	10.0	944	7.2	A			
		T	Street EB	634	5.8						
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	205	44.6	422	48.9	D	2513	17.7	B
		T	I-95 SB	4	43.3						
		L	Street EB	213	53.1						
	Street EB	R	I-95 SB	306	6.2	1037	10.3	B			
		T	Street EB	731	12.1						
	Street WB	T	Street WB	890	12.6	1054	12.5	B			
		L	I-95 SB	164	12.0						
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	154	35.7	515	27.8	C	1400	14.6	B
		R	US13 SB	13	26.1						
		T	I-95 SB	348	24.3						
	US13 SB	R	Street ramps EB	80	4.1	553	5.1	A			
		T	US13 SB	436	5.3						
		L	I-95 SB	37	4.3						
	US13 NB	L	Street ramps EB	25	10.5	332	9.8	A			
		T	US13 NB	307	9.7						
		R	I-95 SB	0	0.0						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	55	26.0	231	36.9	D	1451	11	B
		L	US13 NB	176	40.3						
	US13 SB	R	Street ramps WB	263	5.2	760	5.7	A			
		T	US13 SB	497	6.0						
	US13 NB	L	Street ramps WB	58	8.2	460	6.7	A			
		T	US13 NB	402	6.5						
US13 and Park Ave	Park EB	L	US13 NB	67	16.0	125	24.1	C	1419	10.2	B
		R	US13 SB	58	33.5						
	US13 SB	R	Park WB	42	3.7	723	4	A			
		T	US13 SB	681	4.0						
	US13 NB	L	Park WB	34	15.8	571	15	B			
		T	US13 NB	537	14.9						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	366	15.1	496	15.1	B	1584	14.2	B
		R	Bensalem WB	130	15.0						
	Bensalem EB	R	US13 SB	358	15.4	493	21.5	C			
		L	US13 NB	135	37.7						
	US 13 NB	T	US13 NB	373	6.2	595	7.5	A			
		L	Bensalem WB	222	9.7						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	543	3.9	588	3.7	A	567	5.2	A
		R	Haunted EB	44	2.0						
		L	Totem WB	1	4.4						
	US 13 SB	T	US13 SB	485	6.3	543	6.4	A			
		L	Haunted EB	50	7.8						
		R	Totem WB	8	4.9						
	Haunted WB	L	US13SB	12	11.7	24	8.8	A			
		R	US13 NB	12	6.0						
		T	Totem WB	0	0.0						
	Totem EB	R	US13 SB	1	5.0	26	8.6	A			
		L	US13 NB	25	8.7						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	12	37.8	37	22.9	C	1343	17.8	B
		R	US13 SB	24	15.3						
		L	US13 NB	1	26.7						
	Cedar WB	L	US13 SB	104	41.1	237	26.4	C			
		R	US13 NB	133	15.0						
	US13 NB	R	Cedar EB	145	11.3	550	16.9	B			
		T	US13 NB	405	18.9						
	US13 SB	L	Cedar EB	91	14.6	519	14.4	B			
		T	US13 SB	428	14.4						

Table F-1: Performance Measures, AM Future Year Improvement Alternative C—continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	157	21.5	202	25.7	C	1085	19.4	C
		L	US13 NB	45	40.2						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	198	13.9	469	12.5	B			
		T	US13 NB	271	11.4						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	18	18.0	375	23.7	C			
		T	US13 SB	357	23.9						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	11	38.8	39	29.5	C			
		L	US13 SB	16	34.5						
		R	US13 NB	12	14.4						

US13 and PA413	US13 SB	T	US13 SB	350	23.3	686	13.6	B	3090	32.6	C
		R	PA413 WB	336	3.4						
	US13 NB	T	US13 NB	221	29.3	356	23	C			
		R	PA413 EB	135	12.7						
	PA413 WB	L	US13 SB	114	62.0	979	17.9	B			
		R	US13 NB	209	14.1						
		T	PA413 WB	656	11.5						
	PA413 EB	R	US13 SB	32	31.2	1441	53.9	D			
		L	US13 NB	290	74.0						
T		PA413 EB	1119	49.3							

US13 and Commerce Drive	US13 SB	R	Commerce WB	118	2.6	642	11.2	B	1211	12.7	B
		T	US13 SB	524	13.1						
	Commerce EB	L	US13 NB	110	30.4	122	30.5	C			
		R	US13 SB	12	31.3						
	US13 NB	T	US13 NB	675	9.9	702	9.8	A			
		L	Commerce WB	27	7.1						
	Commerce WB	T	Commerce WB	0	0.0	17	58.7	E			
L	US13 SB	17	58.7								

US13 and Bath	Bath WB	T	Bath WB	109	35.7	326	32.2	C	3029	24.5	C
		L	US13 SB	108	31.2						
		R	US13 NB	109	29.5						
	Bath EB	T	Bath EB	166	38.6	389	32.7	C			
		R	US13 SB	126	26.9						
		L	US13 NB	97	30.0						
	US13 NB	R	Bath EB	77	8.9	783	20.4	C			
		L	Bath WB	76	70.4						
		T	US13 NB	630	15.8						
	US13 SB	L	Bath EB	48	54.8	572	20.2	C			
		R	Bath WB	94	10.0						
		T	US13 SB	430	18.6						

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	103	32.5	226	27.7	C	2271	16.8	B
		L	US13 SB	56	28.7						
		R	US13 NB	67	19.6						
	Beaver EB	T	Beaver EB	71	32.0	175	27.3	C			
		R	US13 SB	51	17.0						
		L	US13 NB	53	30.9						
	US13 NB	R	Beaver EB	20	8.8	817	15.1	B			
		L	Beaver WB	71	13.4						
		T	US13 NB	726	15.4						
	US13 SB	L	Beaver EB	107	15.2	698	12.6	B			
		R	Beaver WB	48	5.1						
		T	US13 SB	543	12.8						

US13 and Green Ln	Green EB	T	Green EB	157	42.8	451	41.4	D	3307	20.1	C
		R	US13 SB	223	42.6						
		L	Green WB	71	34.7						
	Green WB	T	Green WB	109	40.6	498	37.5	D			
		L	US13 SB	238	37.1						
		R	US13 NB	151	35.9						
	US13 NB	L	Green WB	142	16.2	975	4.2	A			
		R	Green EB	143	6.4						
		T	US13 NB	690	1.3						
	US13 SB	R	Green WB	36	10.2	837	16.7	B			
		L	Green EB	177	21.5						
		T	US13 SB	624	15.7						

Table F-1: Performance Measures, AM Future Year Improvement Alternative C—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	137	37.0	295	41.9	D	1049	11.9	B
		L	US13 NB	98	46.3						
		T	Edgely EB	60	45.9						
	US13 SB	R	Edgely WB	5	13.8	729	11.5	B			
		T	US13 SB	675	11.3						
		L	Edgely EB	49	14.0						
	US13 NB	L	Edgely WB	84	9.4	716	4.5	A			
		T	US13 NB	631	3.9						
		R	Edgely EB	1	4.6						
	Edgely WB	T	Edgely WB	88	43.4	169	43.5	D			
		L	US13 SB	68	47.9						
		R	US13 NB	13	20.5						

US13 and Haines Rd	US13 NB	L	Haines WB	42	6.1	740	5.5	A	723	10.4	B
		R	Haines EB	3	5.2						
		T	US13 NB	695	5.5						
	Haines EB	T	Haines EB	48	50.8	175	46.8	D			
		R	US13 SB	87	46.6						
		L	US13 NB	40	42.3						
	Haines WB	T	Haines WB	48	47.0	94	44.6	D			
		L	US13 SB	8	37.5						
		R	US13 NB	38	42.9						
	US13 SB	R	Haines WB	39	4.4	708	5.9	A			
		L	Haines EB	32	7.8						
		T	US13 SB	637	5.9						

US13 and Home Depot drive	Home Depot EB	R	US13 SB	75	6.4	104	5.5	A	927	5.2	A
		L	US13 NB	29	3.3						
	US13 NB	L	Home Depot WB	75	5.0	741	3.7	A			
		T	US13 NB	666	3.6						
	US13 SB	R	Home Depot WB	31	2.0	630	5	A			
		T	US13 SB	599	5.2						
	Home Depot WB	T	Home Depot WB	0	0.0	28	46.7	D			
		L	US13 SB	28	46.7						

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	204	42.2	388	42.4	D	2055	18.8	B
		R	US13 SB	184	42.6						
		T	SEPTA station EB	0	0.0						
	US13 SB	R	Levittown WB	160	8.3	601	10.8	B			
		T	US13 SB	441	11.7						
		L	SEPTA station EB	0	0.0						
	US13 NB	L	Levittown WB	163	13.7	692	11.6	B			
		T	US13 NB	529	11.0						
		R	SEPTA station EB	0	0.0						
	SEPTA station WB	T	Levittown WB	15	48.5	22	44	D			
		R	US13 NB	3	10.0						
		L	US13 SB	4	52.7						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	203	35.9	258	35.1	D	1944	24	C
		L	PA413 WB	20	27.0						
		T	Durham NB	35	34.5						
	PA413 WB	T	PA413 WB	607	18.2	732	21.8	C			
		R	Bath NB	17	1.4						
		L	Durham SB	108	44.8						
	Bath SB	L	PA413 EB	63	34.4	162	33.8	C			
		R	PA413 WB	71	33.0						
		T	Durham SB	28	34.6						
	PA413 EB	T	PA413 EB	671	21.1	751	20.1	C			
		L	Durham SB	58	14.7						
		R	Bath NB	22	4.7						

PA413 and Ford Rd	Ford NB	T	Ford NB	29	41.4	254	30.4	C	1952	9.2	A
		L	PA413 WB	118	41.4						
		R	PA413 EB	107	15.4						
	Ford SB	T	Ford SB	25	40.2	81	35.7	D			
		R	PA413 WB	2	2.6						
		L	PA413 EB	54	34.9						
	PA413 EB	R	Ford SB	149	5.2	941	5.4	A			
		L	Ford NB	3	6.1						
		T	PA413 EB	789	5.4						
	PA413 WB	L	Ford SB	89	9.5	759	3.9	A			
		R	Ford NB	58	3.3						
		T	PA413 WB	612	3.2						

Table F-1: Performance Measures, AM Future Year Improvement Alternative C—continued

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	125	4.5	141	8.5	A	1345	5.5	A
		L	PA413 WB	12	41.9						
		T	Old Rodgers NB	4	35.3						
	PA413 WB	L	Wharton SB	252	10.6	1022	4.2	A			
		T	PA413 WB	736	2.1						
		R	Old Rodgers NB	34	2.6						
	PA413 EB	R	Wharton SB	32	3.3	953	4.4	A			
		T	PA413 EB	916	4.4						
		L	Old Rodgers NB	5	9.0						
	Old Rodgers SB	T	Wharton SB	0	0.0	46	50.1	D			
L		PA413 EB	32	49.1							
R		PA413 WB	14	52.4							

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	930	19.8	1491	27	C	2209	25.2	C
		L	PA413 WB	561	39.0						
	PA413 WB	T	PA413 WB	460	19.4	1208	32.7	C			
		L	I-95 ramps	748	40.8						
	PA413 EB	T	PA413 EB	524	23.3	1072	14.2	B			
		R	I-95 ramps	548	5.5						

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	65	3.4	1456	6.9	A	1849	9.8	A
		T	PA413 EB	1330	5.3						
		L	Rockview NB	61	46.9						
	Rockview NB	L	PA413 WB	143	39.3	204	35	C			
		R	PA413 EB	51	22.9						
		T	Rockview NB	10	35.9						
	PA413 WB	T	PA413 WB	1061	8.4	1081	8.6	A			
		L	Rockview SB	18	20.5						
		R	Rockview NB	2	3.9						
	Rockview SB	R	PA413 WB	13	7.6	23	27.3	C			
		T	Rockview SB	0	0.0						
		L	PA413 EB	10	53.0						

PA413 and Winder Dr	Winder SB	L	PA413 EB	12	55.8	72	17.2	B	993	4.9	A
		R	PA413 WB	60	9.5						
	PA413 WB	R	Winder NB	2	2.1	1051	4	A			
		T	PA413 WB	1049	4.0						
	PA413 EB	L	Winder NB	30	39.8	1325	4.9	A			
		T	PA413 EB	1295	4.1						

PA413 and Western Ave	Western SB	L	PA413 EB	16	44.8	86	19	B	2385	13.9	B
		R	PA413 WB	61	8.8						
		T	Western SB	9	41.5						
	PA413 WB	R	Western NB	11	5.3	992	10.1	B			
		T	PA413 WB	952	9.2						
		L	Western SB	29	41.2						
	PA413 EB	L	Western NB	45	53.8	1341	14.9	B			
		T	PA413 EB	1277	13.6						
		R	Western SB	19	13.3						
	Western NB	T	Western NB	20	36.5	139	28.2	C			
		R	PA413 EB	64	18.6						
		L	PA413 WB	55	36.3						

PA413 and Otter St	PA413 EB	R	PA413 EB	1000	11.5	1253	12.9	B	2044	30.9	C
		T	Otter NB	253	18.6						
	PA413 WB	L	PA413 WB	831	67.9	1046	58.7	E			
		R	Otter NB	215	23.2						
	Otter SB	T	PA413 WB	150	9.7	334	11.5	B			
		L	PA 413 EB	184	13.0						

PA413 and State Rd	State NB	R	PA413 EB	177	3.5	446	53.3	D	3214	30.8	C
		T	industrial dr NB	25	60.0						
		L	PA413 WB	244	88.7						
	industrial drive SB	L	PA413 EB	3	37.0	24	55.1	E			
		T	State SB	9	55.8						
		R	PA413 WB	12	59.2						
	PA413 WB	L	State SB	175	46.7	1007	28.9	C			
		R	industrial dr NB	23	9.9						
		T	PA413 WB	809	25.6						
	PA413 EB	T	PA413 EB	994	25.8	1191	23.4	C			
		R	State SB	135	5.3						
		L	industrial dr NB	62	24.6						

Table F-1: Performance Measures, AM Future Year Improvement Alternative C—continued

Table F-2: Performance Measures, PM Future Year Improvement Alternative C

5:15-6:15pm	From	Movement	To	Movement Volume	Movement Delay	Approach Volume	Approach Delay (s)	Approach LOS	Intersection Volume	Intersection Delay (s)	Intersection LOS
I-95 NB ramps at Street Road	I-95 ramps NB	T	I-95 NB	5	48.1	1023	48	D	2825	32.2	C
		R	Street EB	148	34.7						
		L	Street WB	870	50.2						
	Street WB	R	I-95 NB	185	16.3	978	32.8	C			
		T	Street WB	793	36.6						
	Street EB	L	I-95 NB	296	12.3	824	11.8	B			
		T	Street EB	528	11.5						
I-95 SB ramps at Street Road	I-95 ramps SB	R	Street WB	384	53.6	592	53.2	D	3352	20.1	C
		T	I-95 SB	4	46.6						
		L	Street EB	204	52.4						
	Street EB	R	I-95 SB	468	14.1	1090	19.2	B			
		T	Street EB	622	23.0						
	Street WB	T	Street WB	1485	6.8	1670	8.9	A			
		L	I-95 SB	185	26.0						
US13 and Street Road EB ramps	Street ramps EB	L	US13 NB	223	41.0	322	37.7	D	1686	12.8	B
		R	US13 SB	16	24.5						
		T	I-95 SB	83	31.6						
	US13 SB	R	Street ramps EB	31	4.0	826	4.7	A			
		T	US13 SB	779	4.7						
		L	I-95 SB	16	1.9						
	US13 NB	L	Street ramps EB	25	9.4	538	10.3	B			
		T	US13 NB	512	10.3						
		R	I-95 SB	1	4.3						
US13 and Street Road WB ramps	Street ramps WB	R	US13 SB	58	37.3	365	41.9	D	2113	17.9	B
		L	US13 NB	307	42.8						
	US13 SB	R	Street ramps WB		13.5	1012	15.1	B			
		T	US13 SB	769	15.6						
	US13 NB	L	Street ramps WB	80	13.9	736	9.8	A			
		T	US13 NB	656	9.3						
US13 and Park Ave	Park EB	L	US13 NB	77	32.7	160	41.4	D	2250	10.8	B
		R	US13 SB	83	49.5						
	US13 SB	R	Park WB	95	3.2	1132	4.3	A			
		T	US13 SB	1037	4.4						
	US13 NB	L	Park WB	132	28.6	958	13.3	B			
		T	US13 NB	826	10.9						
US13 and Bensalem Blvd	US13 SB	T	US13 SB	781	28.9	893	28.7	C	2295	35.7	D
		R	Bensalem WB	112	27.5						
	Bensalem EB	R	US13 SB	350	75.7	494	87.3	F			
		L	US13 NB	144	115.6						
	US 13 NB	T	US13 NB	549	7.8	908	14.4	B			
		L	Bensalem WB	359	24.5						
US13 and Haunted Ln/ Totem Rd	US 13 NB	T	US13 NB	664	4.4	705	4.5	A	1030	4.5	A
		R	Haunted EB	25	2.2						
		L	Totem WB	16	9.5						
	US 13 SB	T	US13 SB	913	3.6	955	3.6	A			
		L	Haunted EB	31	5.3						
		R	Totem WB	11	2.4						
	Haunted WB	L	US13SB	29	21.7	75	13.5	B			
		R	US13 NB	46	8.3						
		T	Totem WB		0.0						
	Totem EB	R	US13 SB	1	5.7	30	9.5	A			
		L	US13 NB	29	9.6						
		T	Haunted EB	0	0.0						
US13 and Walnut/ Cedar	Walnut EB	T	Walnut EB	51	28.5	77	25.9	C	2139	25.3	C
		R	US13 SB	25	21.0						
		L	US13 NB	1	15.5						
	Cedar WB	L	US13 SB	202	38.9	431	32.5	C			
		R	US13 NB	229	26.8						
		R	Cedar EB	167	18.6						
	US13 NB	T	US13 NB	543	37.9	710	33.4	C			
		L	Cedar EB	195	25.5						
		T	US13 SB	726	13.1						
US13 SB	L	Cedar EB	195	25.5	921	15.7	B				
	T	US13 SB	726	13.1							

Table F-2: Performance Measures, PM Future Year Improvement Alternative C—continued

US13 and Newportville Rd	Newportville EB	R	US13 SB	256	31.3	318	32.8	C	1744	32.3	C
		L	US13 NB	62	39.0						
		T	Newportville EB	0	0.0						
	US13 NB	L	Newportville WB	291	42.5	750	30.5	C			
		T	US13 NB	459	22.9						
		R	Newportville EB	0	0.0						
	US13 SB	R	Newportville EB	24	32.9	620	34.3	C			
		T	US13 SB	596	34.3						
		L	Newportville WB	0	0.0						
	Station Driveway WB	T	Newportville WB	20	33.1	56	31.1	C			
		L	US13 SB	36	30.0						
		R	US13 NB	0	0.0						

US13 and PA413	US13 SB	T	US13 SB	544	59.1	914	37.7	D	3831	29	C
		R	PA413 WB	370	6.2						
	US13 NB	T	US13 NB	316	43.4	484	33	C			
		R	PA413 EB	168	13.4						
	PA413 WB	L	US13 SB	179	49.1	1036	24.7	C			
		R	US13 NB	282	11.7						
		T	PA413 WB	575	23.4						
	PA413 EB	R	US13 SB	46	8.8	1397	25.1	C			
L		US13 NB	269	63.2							
T		PA413 EB	1082	16.3							

US13 and Commerce Drive	US13 SB	R	Commerce WB	175	4.8	1021	11.4	B	2016	13.7	B
		T	US13 SB	846	12.8						
	Commerce EB	L	US13 NB	123	30.4	130	30.3	C			
		R	US13 SB	7	28.9						
	US13 NB	T	US13 NB	793	12.8	820	12.8	B			
		L	Commerce WB	27	11.5						
	Commerce WB	T	Commerce WB	0	0.0	45	32.4	C			
		L	US13 SB	45	32.4						

US13 and Bath	Bath WB	T	Bath WB	208	37.8	496	32.5	C	2952	37.4	D
		L	US13 SB	158	29.7						
		R	US13 NB	130	27.6						
	Bath EB	T	Bath EB	227	38.5	480	34.8	C			
		R	US13 SB	101	25.5						
		L	US13 NB	152	35.6						
	US13 NB	R	Bath EB	129	15.1	917	45.9	D			
		L	Bath WB	138	175.8						
		T	US13 NB	650	24.4						
	US13 SB	L	Bath EB	106	84.0	1059	33.5	C			
		R	Bath WB	146	18.3						
		T	US13 SB	807	29.6						

US13 and Beaver St/ Beaver Dam Rd	Beaver WB	T	Beaver WB	135	33.9	463	28.8	C	2812	23.9	C
		L	US13 SB	139	32.4						
		R	US13 NB	189	22.7						
	Beaver EB	T	Beaver EB	105	30.9	212	28.6	C			
		R	US13 SB	53	19.9						
		L	US13 NB	54	32.5						
	US13 NB	R	Beaver EB	21	13.6	812	21.4	C			
		L	Beaver WB	48	24.1						
		T	US13 NB	743	21.4						
	US13 SB	L	Beaver EB	189	28.9	1325	22.9	C			
		R	Beaver WB	84	13.8						
		T	US13 SB	1052	22.6						

US13 and Green Ln	Green EB	T	Green EB	169	43.7	509	37.2	D	3701	30.3	C
		R	US13 SB	253	33.6						
		L	Green WB	87	35.2						
	Green WB	T	Green WB	157	63.9	561	61.9	E			
		L	US13 SB	221	72.7						
		R	US13 NB	183	47.0						
	US13 NB	L	Green WB	105	14.5	1376	26.4	C			
		R	Green EB	250	48.5						
		T	US13 NB	1021	22.2						
	US13 SB	R	Green WB	216	26.4	1255	17.7	B			
		L	Green EB	126	7.8						
		T	US13 SB	913	17.0						

Table F-2: Performance Measures, PM Future Year Improvement Alternative C—continued

US13 and Edgely Rd	Edgely EB	R	US13 SB	143	35.4	339	44.2	D	2506	16.9	B
		L	US13 NB	121	50.3						
		T	Edgely EB	75	51.2						
	US13 SB	R	Edgely WB	6	10.2	1276	14.3	B			
		T	US13 SB	1221	14.3						
		L	Edgely EB	49	14.9						
	US13 NB	L	Edgely WB	206	21.8	1144	12.9	B			
		T	US13 NB	938	10.9						
		R	Edgely EB	0	0.0						
	Edgely WB	T	Edgely WB	92	48.8	148	47.4	D			
		L	US13 SB	49	46.7						
		R	US13 NB	7	33.8						

US13 and Haines Rd	US13 NB	L	Haines WB	133	13.8	1085	10.5	B	383	14.2	B
		R	Haines EB	5	7.8						
		T	US13 NB	947	10.0						
	Haines EB	T	Haines EB	59	51.7	236	48	D			
		R	US13 SB	139	47.5						
		L	US13 NB	38	44.1						
	Haines WB	T	Haines WB	72	50.2	133	45.8	D			
		L	US13 SB	14	45.7						
		R	US13 NB	47	39.1						
	US13 SB	R	Haines WB	73	8.4	1267	10.9	B			
		L	Haines EB	75	9.7						
		T	US13 SB	1119	11.2						

US13 and Home Depot drive	Home Depot EB	R	US13 SB	105	8.3	124	8	A	2340	6.9	A
		L	US13 NB	19	6.3						
	US13 NB	L	Home Depot WB	198	12.6	1015	5.5	A			
		T	US13 NB	817	3.8						
	US13 SB	R	Home Depot WB	30	3.8	1191	7.5	A			
		T	US13 SB	1161	7.6						
	Home Depot WB	T	Home Depot WB	7	63.9	10	58.1	E			
		L	US13 SB	3	44.4						

US13 and Levittown Pkwy	Levittown EB	L	US13 NB	325	43.5	663	38.4	D	2852	31.1	C
		R	US13 SB	305	32.8						
		T	SEPTA station EB	33	40.8						
	US13 SB	R	Levittown WB	345	29.7	1220	32.6	C			
		T	US13 SB	862	33.9						
		L	SEPTA station EB	13	24.6						
	US13 NB	L	Levittown WB	260	33.6	833	22.3	C			
		T	US13 NB	568	17.2						
		R	SEPTA station EB	5	6.6						
	SEPTA station WB	T	Levittown WB	65	46.6	136	35.6	D			
		R	US13 NB	51	22.4						
		L	US13 SB	20	33.3						

PA413 and Bath Rd/ Durham Rd	Durham NB	R	PA413 EB	199	41.8	270	40.1	D	2524	38.2	D
		L	PA413 WB	13	32.1						
		T	Durham NB	58	35.9						
	PA413 WB	T	PA413 WB	929	33.8	1292	43.3	D			
		R	Bath NB	25	3.5						
		L	Durham SB	338	72.3						
	Bath SB	L	PA413 EB	58	40.6	258	42.4	D			
		R	PA413 WB	95	41.2						
		T	Durham SB	105	44.6						
	PA413 EB	T	PA413 EB	558	29.4	704	26.6	C			
		L	Durham SB	96	21.4						
		R	Bath NB	50	5.2						

PA413 and Ford Rd	Ford NB	T	Ford NB	30	41.8	391	38.1	D	2506	16.7	B
		L	PA413 WB	243	46.1						
		R	PA413 EB	118	20.6						
	Ford SB	T	Ford SB	25	36.4	72	35	C			
		R	PA413 WB	7	12.0						
		L	PA413 EB	40	38.1						
	PA413 EB	R	Ford SB	141	7.5	814	10.3	B			
		L	Ford NB	3	8.6						
		T	PA413 EB	670	10.9						
	PA413 WB	L	Ford SB	101	14.5	1229	13.1	B			
		R	Ford NB	67	7.9						
		T	PA413 WB	1061	13.2						

Table F-2: Performance Measures, PM Future Year Improvement Alternative C—continued

PA13 and Wharton Rd/ Old Rodgers Rd	Wharton NB	R	PA413 EB	275	4.8	311	10.1	B	2489	6.4	A
		L	PA413 WB	35	50.3						
		T	Old Rodgers NB	1	56.8						
	PA413 WB	L	Wharton SB	100	5.2	1308	5	A			
		T	PA413 WB	1171	5.0						
		R	Old Rodgers NB	37	2.9						
	PA413 EB	R	Wharton SB	15	2.1	825	4.9	A			
		T	PA413 EB	806	4.9						
		L	Old Rodgers NB	4	11.1						
	Old Rodgers SB	T	Wharton SB	0	0.0	45	49.7	D			
		L	PA413 EB	33	49.5						
		R	PA413 WB	12	50.3						

PA413 and I-95 ramps	I-95 ramps NB	R	PA413 EB	1017	7.7	1704	21.7	C	4171	20.9	C
		L	PA413 WB	687	42.4						
	PA413 WB	T	PA413 WB	630	10.2	1361	24.8	C			
		L	I-95 ramps	731	37.4						
	PA413 EB	T	PA413 EB	529	25.1	1106	15	B			
		R	I-95 ramps	577	5.8						

PA413 and Rockview Dr	PA413 EB	R	Rockview SB	208	6.0	1551	8.6	A	3049	17.3	B
		T	PA413 EB	1291	7.3						
		L	Rockview NB	52	51.7						
	Rockview NB	L	PA413 WB	164	40.0	217	37.4	D			
		R	PA413 EB	43	25.5						
		T	Rockview NB	10	45.7						
	PA413 WB	T	PA413 WB	1112	24.3	1177	24.7	C			
		L	Rockview SB	57	33.1						
		R	Rockview NB	8	15.5						
	Rockview SB	R	PA413 WB	63	8.5	104	21.9	C			
		T	Rockview SB	0	0.0						
		L	PA413 EB	41	42.5						

PA413 and Winder Dr	Winder SB	L	PA413 EB	15	55.4	105	17.4	B	2488	6.6	A
		R	PA413 WB	90	11.1						
	PA413 WB	R	Winder NB	14	3.9	1060	5.3	A			
		T	PA413 WB	1046	5.3						
	PA413 EB	L	Winder NB	47	51.7	1323	6.8	A			
		T	PA413 EB	1276	5.2						

PA413 and Western Ave	Western SB	L	PA413 EB	37	38.6	181	31.4	C	2438	15.9	B
		R	PA413 WB	84	20.0						
		T	Western SB	60	43.0						
	PA413 WB	R	Western NB	12	6.1	935	10.7	B			
		T	PA413 WB	852	5.9						
		L	Western SB	71	69.4						
	PA413 EB	L	Western NB	80	50.1	1147	15	B			
		T	PA413 EB	1014	12.4						
		R	Western SB	53	11.0						
	Western NB	T	Western NB	41	42.7	175	33.4	C			
		R	PA413 EB	83	21.7						
		L	PA413 WB	51	45.1						

PA413 and Otter St	PA413 EB	R	PA413 EB	959	8.1	1256	8.7	A	2820	21.1	C
		T	Otter NB	297	10.6						
	PA413 WB	L	PA413 WB	812	46.9	1363	33.4	C			
		R	Otter NB	317	7.7						
	Otter SB	T	PA413 WB	234	21.1	3255	20.7	C			
		L	PA 413 EB	201	15.3						

PA413 and State Rd	State NB	R	PA413 EB	186	2.9	461	42.6	D	2812	27.2	C
		T	industrial drive NB	10	63.4						
		L	PA413 WB	265	69.8						
	industrial drive SB	L	PA413 EB	24	57.7	93	59.3	E			
		T	State SB	25	63.1						
		R	PA413 WB	44	57.9						
	PA413 WB	L	State SB	267	50.4	1087	24.8	C			
		R	industrial drive NB	3	11.4						
		T	PA413 WB	817	16.5						
	PA413 EB	T	PA413 EB	934	24.3	1171	20.9	C			
		R	State SB	229	7.0						
		L	industrial drive NB	8	29.3						

US13 and I-95 Ramps	Driveway (not used)	U	Service Drwy	0	0.0	0	0	A	3808	30.5	C
	US13 NB	L	I-95 ramps WB	394	72.8	1001	34.9	C			
		T	US13 NB	607	10.3						
	I-95 ramps EB	T	Service Drwy	0	0.0	1312	37.3	D			
		R	US13 SB	666	9.0						
	US13 SB	L	US13 NB	646	66.5	1495	21.5	C			
		R	I-276 ramps WB	837	6.0						
		T	US13 NB	658	41.1						

Figure F-1: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative C, AM Peak

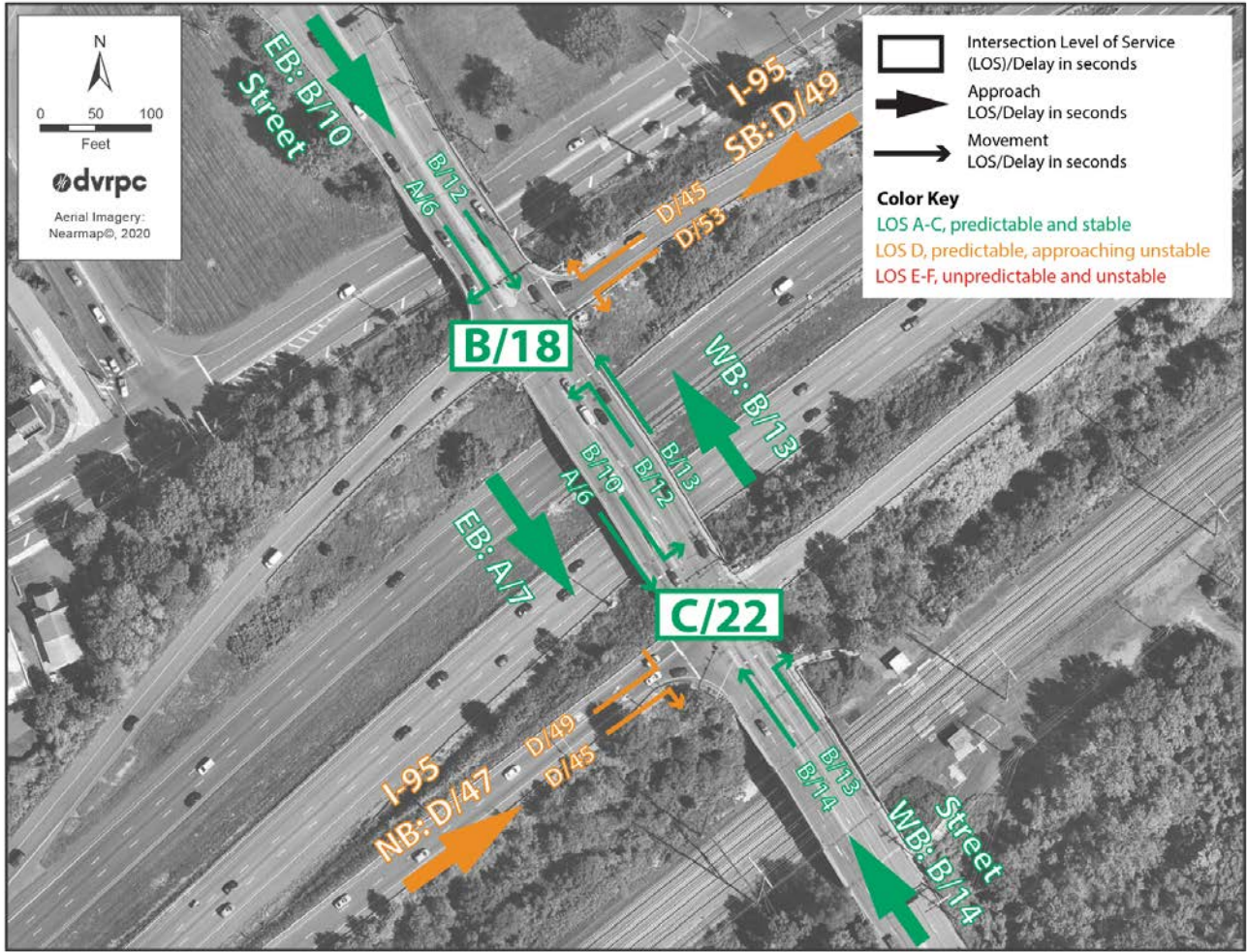
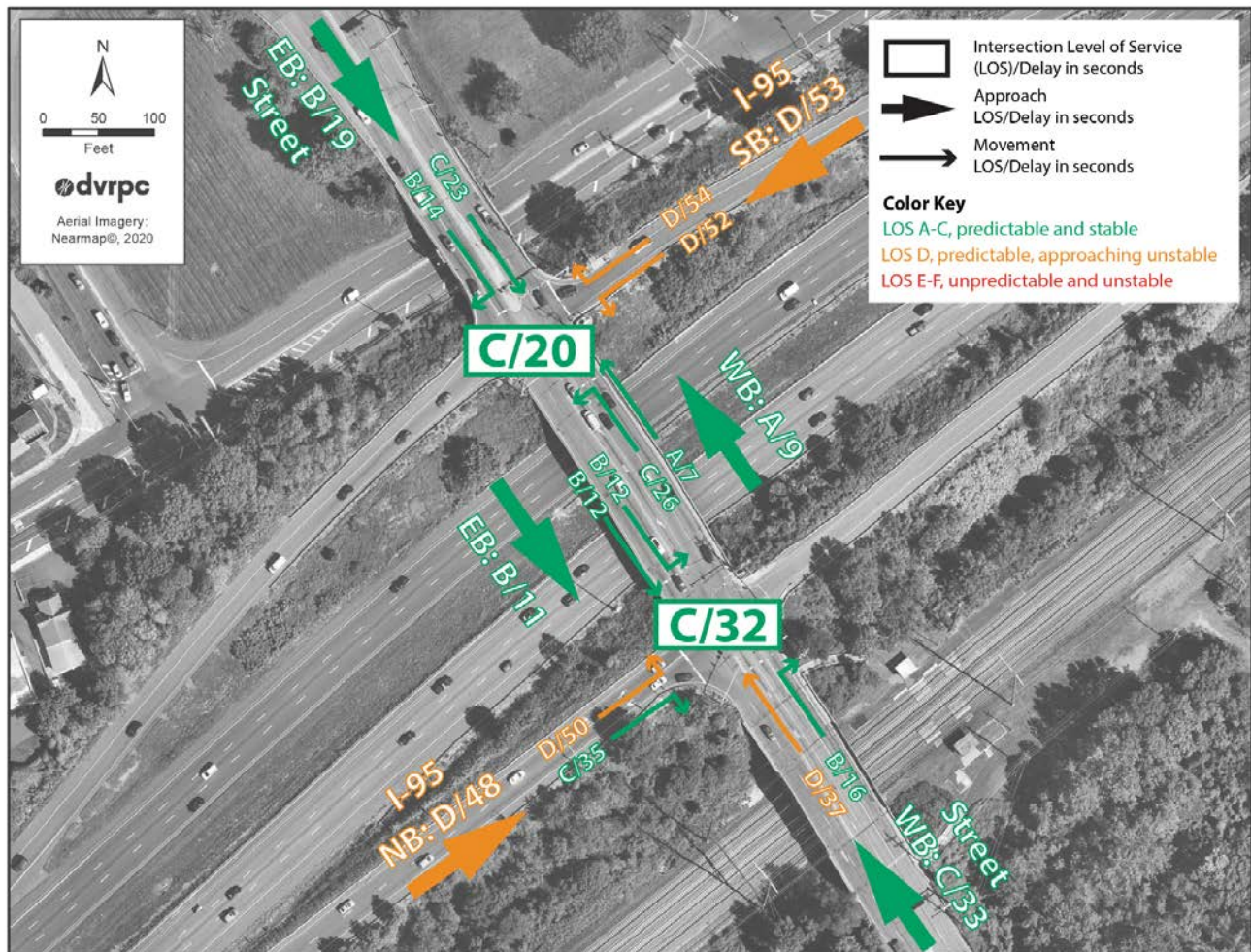


Figure F-2: Movement, Approach, and Intersection LOS, Street Road and I-95 Intersections, Alternative C, PM Peak



Bristol Corridor Study

Preparing for Growth in Lower Bucks

Publication Number: TR20034

Date Published: June 2021

Geographic Area Covered:

Bristol Borough and Bristol Township in Lower Bucks County, Pennsylvania

Key Words:

I-95, I-276, Bristol, Bucks County, freight, interchange, microsimulation, TCDI

Abstract:

For many years, the lack of direct connection between I-95 and I-276 (Pennsylvania Turnpike) has caused confusion and delay for motorists traveling through Lower Bucks County. The opening of the I-95/I-276/I-295 interchange in the fall of 2018 is expected to have a substantial impact on future development, travel patterns, and freight movement in the area. Building on the recommendations of a recent Transportation and Community Development Initiative study to address infrastructure that may constrain growth, this study examined the impact of the recently completed interchange on freight services and local mobility in Bristol Township, Bristol Borough, and the Lower Bucks County region.

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