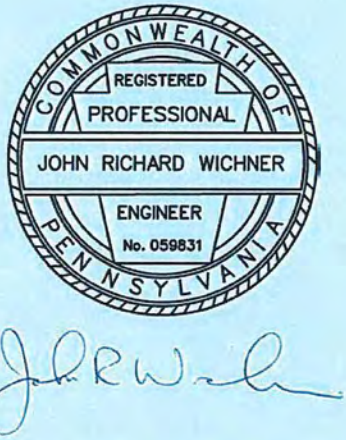
Transportation Impact Study For the St. Mary's Villa Residential Redevelopment

Upper Dublin Township, Montgomery County, PA



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Executive Summary

McMahon Associates, Inc. has completed a transportation impact study for the proposed St. Mary's Villa residential redevelopment, to be located at the existing site on the eastern side of Bethlehem Pike (S.R. 2018) between Lindenwold Terrace and Highland Avenue in Upper Dublin Township, Montgomery County, PA. The development is proposed to consist of 250 senior living apartment units, 32 single family attached twins, and 72 single family attached townhomes. Access to the site is proposed via two driveways along Bethlehem Pike (S.R. 2018); a full movement driveway directly opposite Mattison Avenue, and an enter-only driveway opposite Church Street. Additionally, an enter-only driveway is proposed along Lindenwold Terrace.

A Scoping Meeting Application was submitted to PennDOT on October 28, 2013. The scoping application was deemed acceptable per their traffic review letter November 21, 2013. A Transportation Impact Study was submitted to PennDOT, Upper Dublin Township, and Ambler Borough in November 2014. Additional correspondence with PennDOT can be found in **Appendix A**. The scope of this Transportation Impact Study is based on the approved scoping application, PennDOT/Township/Borough comments, as well as PennDOT guidelines, per the Department's publication *Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits*, dated January 28, 2009, revised October 21, 2013 (SOL 494-13-13). The scope of this transportation impact study includes an evaluation of the weekday morning and weekday afternoon commuter peak hours for existing (2016) conditions, future build-out year (2018) conditions, and future design year (2023) conditions, both without-development and with-development of the proposed site at each of the following five study area intersections, which have been reviewed and agreed upon by PennDOT District 6-0:

- Lindenwold Terrace and Proposed enter-only Access.
- Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace
- Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Access
- Bethlehem Pike (S.R. 2018) and Church Street/Proposed enter-only Access
- Bethlehem Pike (S.R. 2018) and Highland Avenue

The evaluation of traffic conditions associated with the proposed development reveals the following findings and conclusions:

- **Existing Traffic Volumes –** Manual turning movement traffic counts were conducted in March 2014 during the weekday morning peak period (7:00 A.M. to 9:00 A.M.) and weekday afternoon peak period (4:00 P.M. to 6:00 P.M), at each of the study intersections. Furthermore, traffic counts were conducted in March 2016 at Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace to determine the increase/decrease in traffic growth in the area from 2014 to 2016. Based on the relative change in traffic volumes, the 2014 traffic volumes at each intersection were increased by 2.18 percent to obtain existing 2016 traffic volumes at the study area intersections.

- **Future Traffic Volumes without Development –** To account for regional traffic growth, the 2016 traffic volumes were increased by an annual traffic growth rate of 0.64 percent. It is our understanding that there are no other proposed developments that would affect the future traffic conditions in the vicinity of the site.

- **Trip Generation –** Based on trip generation data compiled from numerous studies contained in the Institute of Transportation Engineers (ITE) publication, *Trip Generation, 9th Edition,* the proposed development will generate approximately 111 total (inbound and outbound) new trips during the weekday morning peak hour and 133 total (inbound and outbound) new trips during the weekday afternoon peak hour.

- **Site Access Recommendations –** Access to the site will be provided via three access driveways; one enter-only driveway along Lindenwold Terrace located approximately 1,000 feet to the east of Bethlehem Pike (S.R. 2018); one full-movement driveway along Bethlehem Pike (S.R. 2018) directly opposite Mattison Avenue; and one enter-only driveway along Bethlehem Pike (S.R. 2018) directly opposite Church Street. The following recommendations have been made regarding the proposed design of the accesses for the development:

  <u>Lindenwold Terrace and Access</u>

  - Provide one 16-foot wide ingress lane for the driveway
  - Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway

  <u>Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access</u>

  - Provide one 14-foot wide ingress lane, one 12-foot wide separate left-turn egress lane, and 14-foot wide shared through/right-turn egress lane for the driveway
  - Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
  - A two-way center left-turn lane is currently provided along Bethlehem Pike (S.R. 2018) along the site frontage. This lane should be restriped to provide 75-foot left-turn lanes in both the northbound and southbound directions at its intersection with Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access
  - Upgrade the pedestrian facilities at the intersection, including ADA compliant curb ramps and crosswalks
  - Turning movements at this intersection (to or from Mattison Avenue) may be restricted depending upon the potential future actions of Ambler Borough, which is considering the adoption of an ordinance to make Mattison Avenue one-way
  - The Applicant is desirable of a traffic signal at this location. Analysis has been provided under this scenario. However, PennDOT does not support a traffic signal at this location at this time. As outlined in PennDOT's review letter dated August 10, 2016, the Applicant will perform a post development study after the proposed site is open and fully occupied to determine if the traffic signal warrant is satisfied.

  <u>Bethlehem Pike (S.R. 2018) and Church Street/Access</u>

  - Provide one 16-foot wide ingress lane for the driveway
  - Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
  - A two-way center left-turn lane is already provided along Bethlehem Pike (S.R. 2018) and should be utilized for ingress vehicles

- **Pedestrian Amenities** - The applicant will provide updated ADA compliant crosswalks and ramps at the intersection of Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace. Additionally, the pedestrian facilities will be upgraded at the intersection of Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access, including ADA compliant curb ramps and crosswalks.

- **Capacity/Level-of-Service Results for Off-Site Intersections** – The study intersections were evaluated to determine the operational characteristics under existing and future without- and with-development conditions. A review of the levels-of-service indicates that the study intersections will operate with similar levels-of-service overall, as well as along the individual lane groups during the future build-out year (2018) and future design year (2023) without-development and with-development conditions.

The traffic analyses contained herein reveals that efficient access to and from the proposed development can be provided and that site-generated traffic can be accommodated at the off-site study area intersections with the construction of the recommended improvements. Level-of-service matrix tables are provided at the end of the report for each of the study area intersections.

Introduction

McMahon Associates, Inc. has completed a Transportation Impact Study for the proposed St. Mary's Villa residential redevelopment, to be located at the existing site on the eastern side of Bethlehem Pike (S.R. 2018) between Lindenwold Terrace and Highland Avenue in Upper Dublin Township, Montgomery County, PA. **(Figure 1)**. The development is proposed to consist of 250 senior living apartment units, 32 single family attached twins, and 72 single family attached townhomes. Access to the site is proposed via two driveways along Bethlehem Pike (S.R. 2018); a full movement driveway directly opposite Mattison Avenue, and an enter-only driveway opposite Church Street. Additionally, an enter-only driveway is proposed along Lindenwold Terrace. A copy of the latest development site plan is illustrated in **Figure 2**.

The purpose of this Transportation Impact Study is to present an evaluation of the incremental traffic impacts associated with the proposed additional traffic that will be generated as a result of the proposed mixed use development within the study area in Upper Dublin Township, as well as to provide recommendations regarding the site access designs in order to provide safe and efficient access to the site. The scope of this Transportation Impact Study is based on the approved PennDOT scoping application, PennDOT/Township/Borough comment letters, as well as PennDOT guidelines entitled, *Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits*, dated January 28, 2009, revised October 21, 2013 (SOL 494-13-13) . Copies of the relevant correspondence, including the application and PennDOT review letters are provided in **Appendix A.**

Manual turning movement traffic counts were completed in March 2014 at four intersections during the weekday morning peak period (7:00 A.M. to 9:00 A.M.) and the weekday afternoon peak period (4:00 A.M. to 6:00 P.M. Traffic counts were also conducted in March 2016 at Bethlehem Pike (S.R. 2018) and Lindenwold Terrace/Avenue in order to determine the relative change in traffic from 2014 to 2016, at the request of the Township. Accordingly, the 2014 traffic volumes at the study area intersections were increased by a growth rate of 2.18 percent to obtain 2016 traffic volumes. In order to assess the 2016 existing traffic conditions, these traffic volumes were subjected to detailed capacity/level-of-service analysis, in accordance with accepted methodologies, for the highest peak hour during each peak period, which serves as the basis for this evaluation.

Next, future traffic volumes without the proposed development were projected utilizing an annual traffic growth rate to account for regional traffic growth. The future traffic volumes were projected to the year 2018, the anticipated build-out year of the development and 2023, the anticipated design year of the development, at each of the study intersections. The future traffic volumes without development were then subjected to detailed capacity/level-of-service analysis.

Finally, the traffic generated by the development was established based on accepted methodologies and assigned to the roadway network and site accesses. The site-generated traffic volumes were added to future without-development traffic volumes, and subjected to detailed capacity/level-of-service analysis to assess the future traffic conditions with the development.

Existing Transportation Setting

The proposed development will be located on the east side of Bethlehem Pike (S.R. 2018), south of Lindenwold Terrace in Upper Dublin Township, Montgomery County, PA. The existing roadways and intersections in the vicinity of the site, which comprise the study area roadway network, are described in this section.

Roadway Characteristics

The study area roadway network and characteristics are summarized below in **Table 1**.

Table 1 - Existing Roadway Characteristics

Roadway	Roadway Jurisdiction	Daily Traffic Volume	Roadway Classification		Travel Lanes (per direction)	Sidewalks	Speed Limit (mph)
			Smart Transportation (1)	PennDOT/ Township (2)			
Bethlehem Pike (S.R. 2018)	State	14,521(3)	Community Arterial	Urban – Minor Arterial	1	Yes	40
Highland Avenue (G216)	Municipal	4,886(3)	Neighborhood Collector	Urban - Collector	1	Yes	35
Mattison Avenue	Municipal	NA	Local	NA	1	Yes	25
Church Street	Municipal	NA	Local	NA	1	Yes	25
Lindenwold Avenue/Terrace	Municipal	1,290(4)	Local	NA	1	Yes	25

(1) Based on Table 5.1 – Roadway Categories in the PennDOT publication, *Smart Transportation Guidebook.*
(2) Based on the roadway classifications provided on PennDOT's Internet Traffic Monitoring System (iTMS) website
(3) Based on the average daily traffic provided in PennDOT's iTMS
(4) Based on counts conducted by McMahon.

The following key intersections in the vicinity of the site comprise the study area.

- Lindenwold Terrace and Proposed enter-only Access.
- Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace
- Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Access
- Bethlehem Pike (S.R. 2018) and Church Street/Proposed enter-only Access
- Bethlehem Pike (S.R. 2018) and Highland Avenue

The study intersections were reviewed and agreed upon by PennDOT District 6-0. The existing characteristics of the study intersections, including photographs, field sketches, sight distance (PennDOT M-950S) forms and signal permit plans are provided in **Appendix B**.

Existing Traffic Volumes

Daily traffic counts were conducted in March 2014, along Lindenwold Terrace in the vicinity of the enter-only driveway. Lindenwold Terrace carries approximately 1,290 vehicles per day (total both directions), while the 85th percentile speed was between 25-26 mph. Copies of the count worksheets have been included in **Appendix C**.

Manual turning movement traffic counts were also conducted in March 2014 during the weekday morning peak period (7:00 A.M. to 9:00 A.M.) and the weekday afternoon peak period (4:00 A.M. to 6:00 P.M) at each of the study intersections. Furthermore, traffic counts were conducted in March 2016 at Bethlehem Pike (S.R. 2018) and Lindenwold Terrace/Avenue to determine the relative change in traffic volumes from 2014 to 2016. The 2014 traffic volumes at each intersection were increased by a growth rate of 2.18 percent to obtain existing 2016 traffic volumes. The results of these traffic counts are tabulated by 15-minute intervals in **Appendix D**. The four highest consecutive 15-minute peak intervals during these traffic count periods constitute the peak hours that are the basis of this traffic analysis. The 2016 peak hour traffic volumes are depicted in **Figure 3A** for the weekday morning and weekday afternoon peak hours.

Area Transit Services

SEPTA Bus Route 94 (Montgomery Mall to/from Chestnut Hill) and Route 95 (Willow Grove to/from Gulph Mills) have stops along Bethlehem Pike (S.R. 2018) at Highland Avenue, Church Street, and Lindenwold Terrace/Avenue. The Applicant anticipates coordinating with SEPTA for possible bus stop consolidation along the Bethlehem Pike corridor at the intersection with Mattison Avenue.

Existing Pedestrian-Bicycle Facilities Surrounding the Site

There is currently sidewalk provided along the west side of Bethlehem Pike (S.R. 2018) (with a few missing sections), both sides of Highland Avenue, and both sides of Lindenwold Terrace/Avenue. There are no dedicated bicycle lanes provided along either roadway adjacent to the site frontage. Crosswalks and pedestrian push buttons are located at the signalized intersection of Bethlehem Pike (S.R. 2018) and Highland Avenue.

Planned Roadway Improvements

Through a review of PennDOT's *Twelve Year Transportation Program*, there are no definitive plans to improve any of the study area roadways by PennDOT, Upper Dublin Township, or Ambler Borough.

Future Build-Out Year (2018) Traffic Volumes without Development

This section presents projected traffic volumes without the proposed development for the future build-out year 2018. The 2018 future without-development traffic volumes were estimated by increasing the 2016 existing peak hour traffic volumes to account for regional growth as described below. The 2018 future without-development traffic volumes for the weekday morning and weekday afternoon peak hours are illustrated in **Figure 5A**.

Regional Traffic Growth

To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 0.64 percent compounded to the proposed build-out year (2018). This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2015 to July 2016* for similar, non-interstate, urban roadways in Montgomery County.

Local Traffic Growth

It is our understanding that there are no other proposed developments that would affect the future traffic conditions in the vicinity of the site.

Future Build-Out Year (2018) Traffic Volumes with Development

Evaluation of the proposed development is based upon the incremental increase in traffic volumes generated by the development during the peak hours, as described below, for the anticipated full build-out year (2018) of the site.

Trip Generation

Traffic volumes expected to be generated by the proposed development were prepared based on trip generation data compiled from numerous studies contained in the Institute of Transportation Engineers (ITE) publication, *Trip Generation, 9th Edition*. A combination of the rates for Residential Condo/Townhouse (ITE Land Use Code 230) and Senior Adult Housing-Attached (ITE Land Use Code 252) were utilized for all peak hours to calculate the trip generation for the residential units.

Table 2 indicates trip generation rates and equations utilized in the subsequent analysis.

Table 2 – Trip Generation Rates/Equations

Land Use	Land Use Code	Daily	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour	
			Equation/Rate	Enter	Equation/Rate	Enter
Single Family Attached Twins	230 (Residential Condo/Townhouse)	Ln(T)=.87Ln(x)+2.46	Ln(T)=.80Ln(x)+0.26	17%	Ln(T)=.82Ln(x)+0.32	67%
Single Family Attached Townhomes	230 (Residential Condo/Townhouse)	Ln(T)=.87Ln(x)+2.46	Ln(T)=.80Ln(x)+0.26	17%	Ln(T)=.82Ln(x)+0.32	67%
Senior Independent Living Apartments	252 (Senior Adult Housing – Attached)	T=3.44(x)	T=.20(x)	34%	T=.25(x)	54%

Table 3 indicates the anticipated new trip generation for the overall development.

Table 3 - Vehicular Trip Generation

Description	Dwelling Units	Average Daily	Weekday Morning			Weekday Afternoon		
		Weekday	In	Out	Total	In	Out	Total
Single Family Attached Twins	32	239	4	17	21	16	8	24
Single Family Attached Townhomes	72	483	7	33	40	31	15	46
Senior Living Apartments	250	860	17	33	50	34	29	63
Total		**1,582**	**28**	**83**	**111**	**81**	**52**	**133**

Trip Distribution and Assignment

Site-generated traffic will approach and depart the site via different routes depending on factors such as the existing traffic patterns, location of roadways, and the location of the development's site accesses. The distribution percentages for the anticipated directions of approach and departure are illustrated in **Figure 4A**. These patterns are consistent with existing traffic patterns in the area during both peak hours.

Application of the percentages illustrated in Figure 4A to the total new peak hour trips contained in Table 3, provides an estimate of site traffic to be added to the study area. **Figure 4B** provides a summary of the total new site trips.

The site-generated traffic volumes illustrated in Figure 4B were then added to the future without-development traffic volumes illustrated in Figure 5A for each peak hour to result in total future peak hour traffic volumes with development for each peak hour. The 2018 future traffic volumes with development are illustrated in **Figures 5B** for the weekday morning and weekday afternoon peak hours for the surrounding roadway network.

Future Design Year (2023) Traffic Volumes without Development

This section presents projected traffic volumes without the proposed development for the future design year 2023. The 2023 future without-development traffic volumes were estimated by increasing the 2016 existing peak hour traffic volumes to account for regional growth as described below. The 2023 future without-development traffic volumes for the weekday morning and weekday afternoon peak hours are illustrated in **Figure 6A**.

Regional Traffic Growth

To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 0.64 percent compounded to the proposed build-out year (2023). This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2015 to July 2016* for similar, non-interstate, urban roadways in Montgomery County.

Local Traffic Growth

It is our understanding that there are no other proposed developments that would affect the future traffic conditions in the vicinity of the site.

Future Design Year (2023) Traffic Volumes with Development

Evaluation of the proposed development is based upon the incremental increase in traffic volumes generated by the development during the peak hours, as described below.

Trip Generation

Estimates of total traffic generated by the development are the same as described in the "Future Build-Out Year (2018) Traffic Volumes with Development" section. Table 3, previously shown, details the estimated trip generation for the proposed development of the site.

Trip Distribution and Assignment

The distribution percentages for the anticipated directions of approach and departure, and the total new site trips, are illustrated in Figures 4A and 4B, as previously noted.

The site generated traffic volumes were added to the future without-development traffic volumes to result in total future peak hour traffic volumes with development for each peak hour. The 2023 future traffic volumes with development are illustrated in **Figures 6B** for the weekday morning and weekday afternoon peak hours.

Site Access

The site will have access provided via an enter-only, unsignalized driveway located along Lindenwold Terrace approximately 1,000 feet to the east of Bethlehem Pike (S.R. 2018). Another enter-only, unsignalized driveway will be provided along Bethlehem Pike (S.R. 2018), directly opposite Church Street. Primary access to the site is proposed to be provided via a proposed full-movement, unsignalized intersection along Bethlehem Pike (S.R. 2018), directly opposite Mattison Avenue.

It should be noted that this limited proposed access along Lindenwold Terrace is intended, in part, so as to not create cut-thru traffic along Lindenwold Terrace. Any existing cut-thru traffic which may currently be on Lindenwold Terrace is not associated with this development, nor will it be encouraged by this development.

Additionally, the geometric design of the proposed site access driveways were preliminarily evaluated based on guidelines contained in the *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveway and Local Roads,* as well as local PennDOT District polices. PennDOT lane warrant worksheets were compiled to determine any recommended turn lanes (if necessary) and appropriate lengths and are located in **Appendix L**. Based on the results of this evaluation, the following access configurations and traffic controls are recommended, subject to the detailed engineering of the site accesses:

<u>Lindenwold Terrace and Access</u>

- Provide one 16-foot wide ingress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway

<u>Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access</u>

- Provide one 14-foot wide ingress lane, one 12-foot wide separate left-turn egress lane, and 14-foot wide shared through/right-turn egress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
- A two-way center left-turn lane is currently provided along Bethlehem Pike (S.R. 2018) along the site frontage. This lane should be restriped to provide 75-foot left-turn lanes in both the northbound and southbound directions at its intersection with Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access
- Upgrade the pedestrian facilities at the intersection, including ADA compliant curb ramps and crosswalks
- Turning movements at this intersection (to or from Mattison Avenue) may be restricted depending upon the potential future actions of Ambler Borough, which is considering the adoption of an ordinance to make Mattison Avenue one-way.
- The Applicant is desirable of a traffic signal at this location. Analysis has been provided under this scenario. However, PennDOT does not support a traffic signal at this location at this time. As outlined in PennDOT's review letter dated August 10, 2016, the Applicant will perform a post development study after the proposed site is open and fully occupied to determine if the traffic signal warrant is satisfied.

Bethlehem Pike (S.R. 2018) and Church Street/Access

- Provide one 16-foot wide ingress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
- A two-way center left-turn lane is already provided along Bethlehem Pike (S.R. 2018) and should be utilized for ingress vehicles

Sight Distance

Sight distance field measurements and an evaluation were performed for the proposed access roadway intersections. Generally, the prevailing (or 85th percentile) travel speeds, posted speed limit, roadway grades and profiles, and the number of travel lanes play a role in determining if safe sight distances are available for egress and ingress at each driveway. The existing sight distances at the proposed access locations were measured and compared to PennDOT's requirements, which are contained in the PennDOT publication *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads.*

Table 4 summarizes the available sight distance measurements, as well as the required desirable and minimum PennDOT sight distances for each driveway location along Bethlehem Pike (S.R. 2018) and Lindenwold Terrace.

Table 4 – Sight Distance Evaluation
Lindenwold Terrace and Enter-only Access

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Required Sight Distance (feet)		Available Sight Distance (feet)
				Desirable	Minimum	
Left turn Entering	Looking Ahead	25	+1.0%	190	159	1000+
	From the Rear	25	-1.0%	190	164	700+

Bethlehem Pike (S.R. 2018) and Mattison Ave/Access

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Required Sight Distance (feet)		Available Sight Distance (feet)
				Desirable	Minimum	
Exiting	Looking Left	40	+2.0%	537	314	800+
	Looking Right	40	-2.0%	460	337	468
Left turn Entering	Looking Ahead	40	+2.0%	373	314	500+
	From the Rear	40	-2.0%	373	337	444

Bethlehem Pike (S.R. 2018) and Church Street/Enter-only Access

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Required Sight Distance (feet)		Available Sight Distance (feet)
				Desirable	Minimum	
Left turn Entering	Looking Ahead	40	+1.0%	373	319	600+
	From the Rear	40	-1.0%	373	331	600+

As shown in Table 4 above, the existing available sight distance measurements exceed the desirable PennDOT requirements based upon the posted speed limits. It is recommended that any proposed landscaping be maintained along the site frontages to continue to provide for adequate sight distance according to the above tables. Furthermore, the available sight distance at the site accesses should be verified during the detailed engineering of the site.

Future Pedestrian Facilities Surrounding the Site

The applicant will provide updated ADA compliant crosswalks and ramps at the intersection of Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace. Additionally, the pedestrian facilities will be upgraded at the intersection of Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access, including ADA compliant curb ramps and crosswalks for crossing Bethlehem Pike (S.R. 2018).

Capacity/Level-of-Service Analysis

The peak hour traffic volumes were analyzed to determine the existing conditions and future conditions, without and with the proposed development, in accordance with the standard techniques contained in the current *Highway Capacity Manual (2010)*. These standard capacity/level-of-service analysis techniques, which calculate total control delay, are more thoroughly described in **Appendix E** for unsignalized and signalized intersections, as well the correlation between average total control delay and the respective level-of-service (LOS) criteria for each intersection type.

Please note that according to PennDOT's *Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits*, dated January 28, 2009, revised October 21, 2013 (SOL 494-13-13), no mitigation requirements are required for an overall level-of-service drop from without- to with-development conditions (i.e. LOS D to LOS E), if the increase in the overall delay per vehicle is less than 10 seconds (i.e. 48.2 to 56.5 seconds per vehicle). The results of the capacity/level-of-service analyses are illustrated in **Figures 3B, 5C, 5D, 6C, and 6D** for the existing conditions, 2018 future without-development conditions, 2018 future with-development conditions, 2023 future without-development conditions, and 2023 future with-development respectively, at the study area intersections and proposed access driveways.

Detailed capacity/level-of-service analysis worksheets, as well as the intersection volume spreadsheets, are contained in **Appendices F, G, H, I, and J** for the existing, 2018 future without-development, 2018 future with-development, 2023 future without-development, 2023 future with-development peak hour traffic conditions at the study area intersections, respectively. The analysis results are summarized below for each study intersection and matrix tables are provided at the end of the study.

Lindenwold Terrace and Enter-only Access

The ingress movements at the proposed enter-only site access along Lindenwold Terrace will operate at a highly acceptable LOS A during all peak hours under 2018 and 2023 future with-development conditions based upon the design recommendations previously presented for each driveway.

Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace

Under existing, 2018 and 2023 without-development conditions, the stop-controlled approaches of Lindenwold Avenue/Terrace will operate at acceptable level-of-service conditions (LOS D or better) during all peak hours, except for Lindenwold Avenue/Terrace approaches during the weekday afternoon peak hour, which will operate at LOS E or F.

Under with development conditions, this intersection will operate at similar overall levels-of-service as under without development conditions, with <u>no</u> LOS degradations.

Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access

The Mattison Avenue approach to Bethlehem Pike (S.R. 2018) is stop-controlled. The stop-controlled approach operates at acceptable levels-of-service (LOS D or better) under existing and future 2018 and 2023 without- and with-development conditions. The Proposed Access approach to Bethlehem Pike (S.R. 2018) is stop-controlled. The stop-controlled approach will operate at acceptable levels-of-service (LOS D or better) under future 2018 and 2023 without- and with-development conditions, except for the left-turn egress movement, which will operate at LOS E.

It should be noted that a Signal Feasibility Study, dated June 23, 2016, was previously submitted.

Based on the speed study conducted on August 18, 2016, the prevailing speed is 38 mph in both the northbound and southbound directions of Bethlehem Pike. Therefore, the traffic signal warrants were updated to include the results from the speed study. The four-hour weekday manual turning movement traffic volumes at this intersection were utilized to determine if the intersection satisfies warrants for a traffic signal. Based on the projection of the existing four-hour count data to the design year (2023) with-development conditions, Warrant 3 (Peak Hour) is not satisfied for the weekday morning and afternoon peak hours. Warrant 2 (Four-Hour) is not satisfied. With signalization of this intersection, the intersection and all movements will operate at acceptable levels of service.

The Applicant is desirable of a traffic signal at this location. Analysis has been provided under this scenario. However, PennDOT does not support a traffic signal at this location at this time. As outlined in PennDOT's review letter dated August 10, 2016, the Applicant will perform a post development study after the proposed site is open and fully occupied to determine if the traffic signal warrant is satisfied. A copy of the traffic signal warrant analysis is provided in **Appendix K**.

Bethlehem Pike (S.R. 2018) and Church Street/Enter-only Access

The Church Street approach to Bethlehem Pike (S.R. 2018) is stop-controlled. The stop-controlled approach operates at acceptable levels-of-service (LOS C or better) under existing and future 2018 and 2023 without- and with-development conditions.

The proposed enter-only driveway will create a fourth leg to this intersection. The intersection will continue to operate at acceptable LOS C or better during all peak hours under 2018 and 2023 future with-development conditions based upon the design recommendations previously presented for each driveway.

Bethlehem Pike (S.R. 2018) and Highland Avenue

This signalized intersection currently operates at acceptable levels-of-service overall (LOS C or better) under existing, 2018 without-development conditions, and 2023 without-development conditions with the lane groups also operating acceptably (LOS C or better) during all three peak hours.

With development of the site, this intersection will continue to operate at the same acceptable levels-of-service as under without-development conditions overall and on the lane groups. Therefore, no mitigation measures are recommended at this intersection.

Alternatives Analysis – Roundabout Analysis

There are movements at the study intersections along Bethlehem Pike (S.R. 2018) that cannot be mitigated to pre-development LOS/delay conditions with conventional traffic improvements as previously described due to various reasons such traffic signal warrants not being satisfied, or Right-of-Way limitations; specifically, at Lindenwold Avenue/Terrace and Mattison Avenue/Proposed Access. Therefore, a single-lane roundabout was analyzed at these intersections in the future 2023 with development conditions, in accordance with the standard techniques contained in the current *Highway Capacity Manual (2010)* utilizing the proposed 2015 parameters per the Technical Memo, "PennDOT Open-End Roundabout Support" by Kittelson & Associates, Inc., dated August 10, 2015.

A single-lane roundabout at Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace will operate at acceptable LOS B or better during all peak hours. However, based on a conceptual plan, this roundabout will have significant impacts to adjacent properties, and does not appear feasible based on right-of-way acquisition and driveway restrictions for private properties.

A single-lane roundabout at Bethlehem Pike (S.R. 2018) and Mattison Avenue/proposed Access will operate with acceptable LOS B or better during all peak hours. However, based on a conceptual plan, this roundabout will have significant impacts to adjacent properties, and does not appear feasible based on right-of-way acquisition and driveway restrictions for private properties.

Each concept has been developed based upon requirements outlined in the *NCHRP Report 672 Roundabouts: an Informational Guide*

The results of the capacity/level-of-service analyses are illustrated in **Figure 6D,** and a copy of the roundabout analyses are provided in **Appendix M**. A conceptual plan has been completed for these intersections, and is provided in Appendix M.

Conclusions

In conjunction with the proposed development, the following recommendations are proposed for the three driveways that will provide access to the site:

Lindenwold Terrace and Access

- Provide one 16-foot wide ingress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway

Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access

- Provide one 14-foot wide ingress lane, one 12-foot wide separate left-turn egress lane, and 14-foot wide shared through/right-turn egress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
- A two-way center left-turn lane is currently provided along Bethlehem Pike (S.R. 2018) along the site frontage. This lane should be restriped to provide 75-foot left-turn lanes in both the northbound and southbound directions at its intersection with Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access.
- Upgrade the pedestrian facilities at the intersection, including ADA compliant curb ramps and crosswalks
- Turning movements at this intersection (to or from Mattison Avenue) may be restricted depending upon the potential future actions of Ambler Borough, which is considering the adoption of an ordinance to make Mattison Avenue one-way
- The Applicant is desirable of a traffic signal at this location. Analysis has been provided under this scenario. However, PennDOT does not support a traffic signal at this location at this time. As outlined in PennDOT's review letter dated August 10, 2016, the Applicant will perform a post development study after the proposed site is open and fully occupied to determine if the traffic signal warrant is satisfied.

Bethlehem Pike (S.R. 2018) and Church Street/Access

- Provide one 16-foot wide ingress lane for the driveway
- Provide a minimum driveway radii of 25 feet at the access driveway, which should be designed based on the largest vehicle anticipated to utilize this driveway
- A two-way center left-turn lane is already provided along Bethlehem Pike (S.R. 2018) and should be utilized for ingress vehicles

In conjunction with the development of the site, the applicant will provide updated ADA compliant crosswalks and ramps at the intersection of Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace. Additionally, the pedestrian facilities will be upgraded at the intersection of Bethlehem Pike (S.R. 2018) and Mattison Avenue/Access, including ADA compliant curb ramps and crosswalks.

The traffic analyses contained herein reveals that safe and efficient access to and from the proposed development can be provided and that site-generated traffic can be accommodated at the off-site study area intersections with the construction of the recommended improvements.

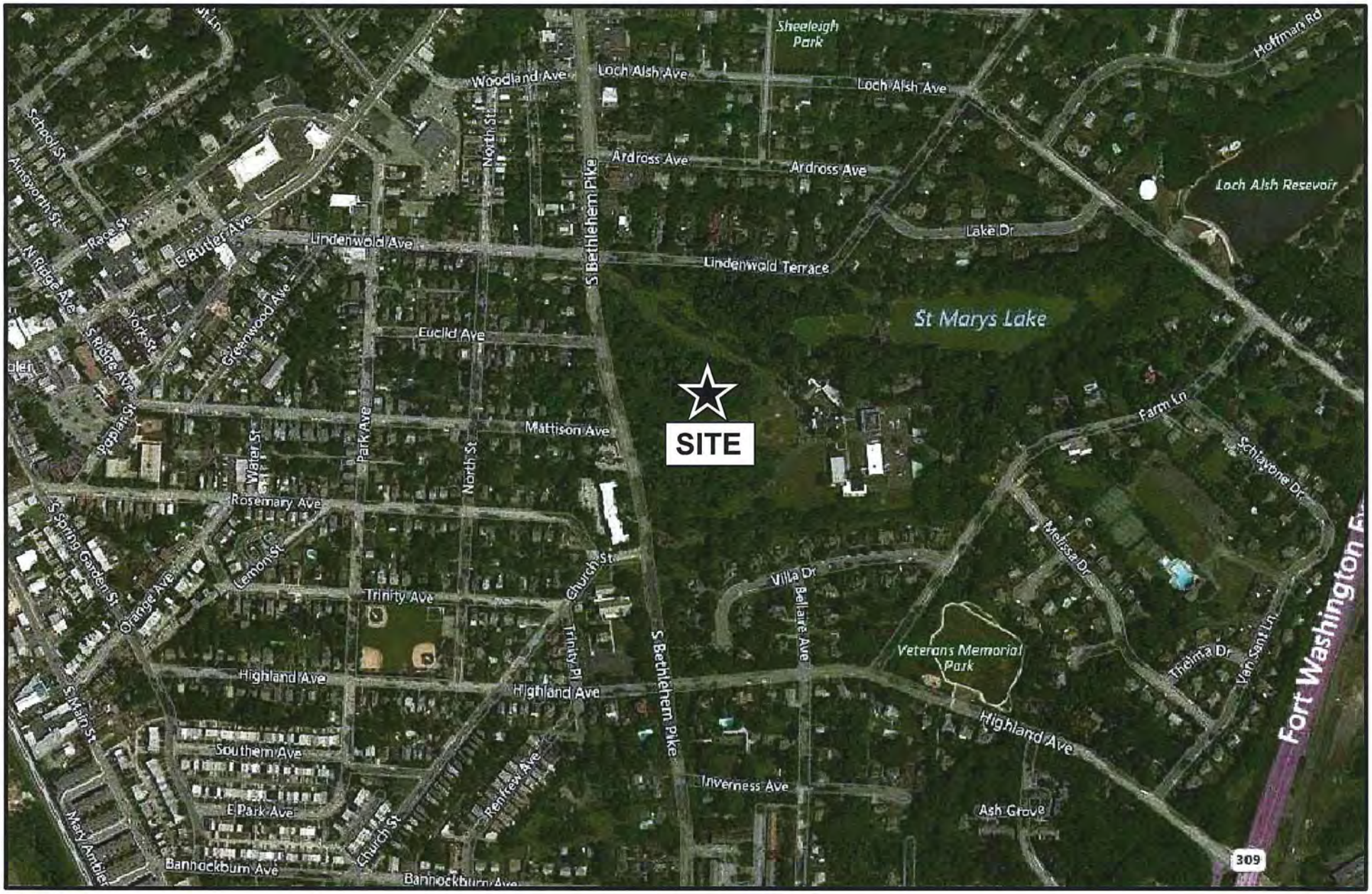

FIGURE 1
Site Location Map

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

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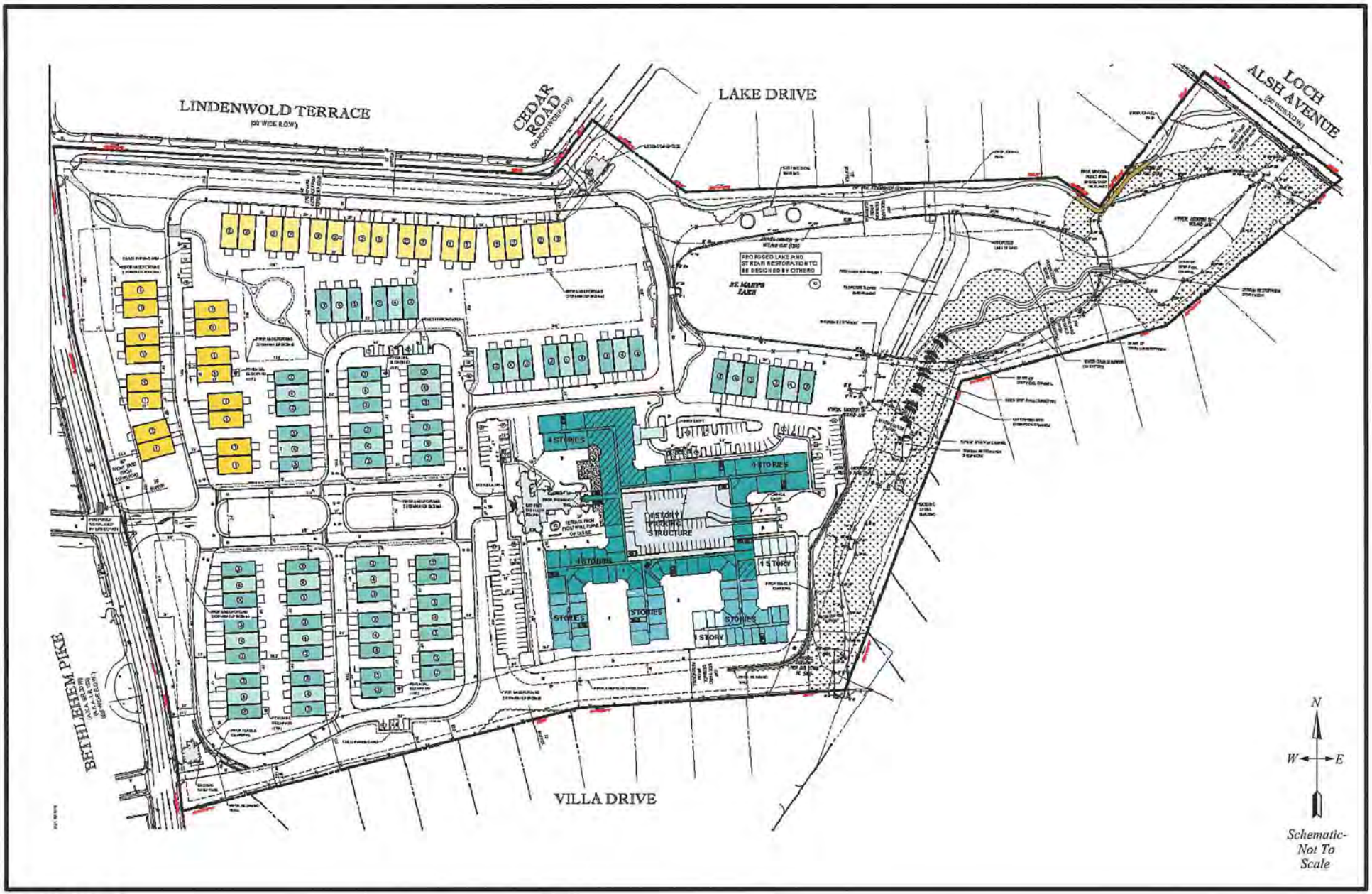

FIGURE 2

Site Plan (prepared by Bohler Engineering)

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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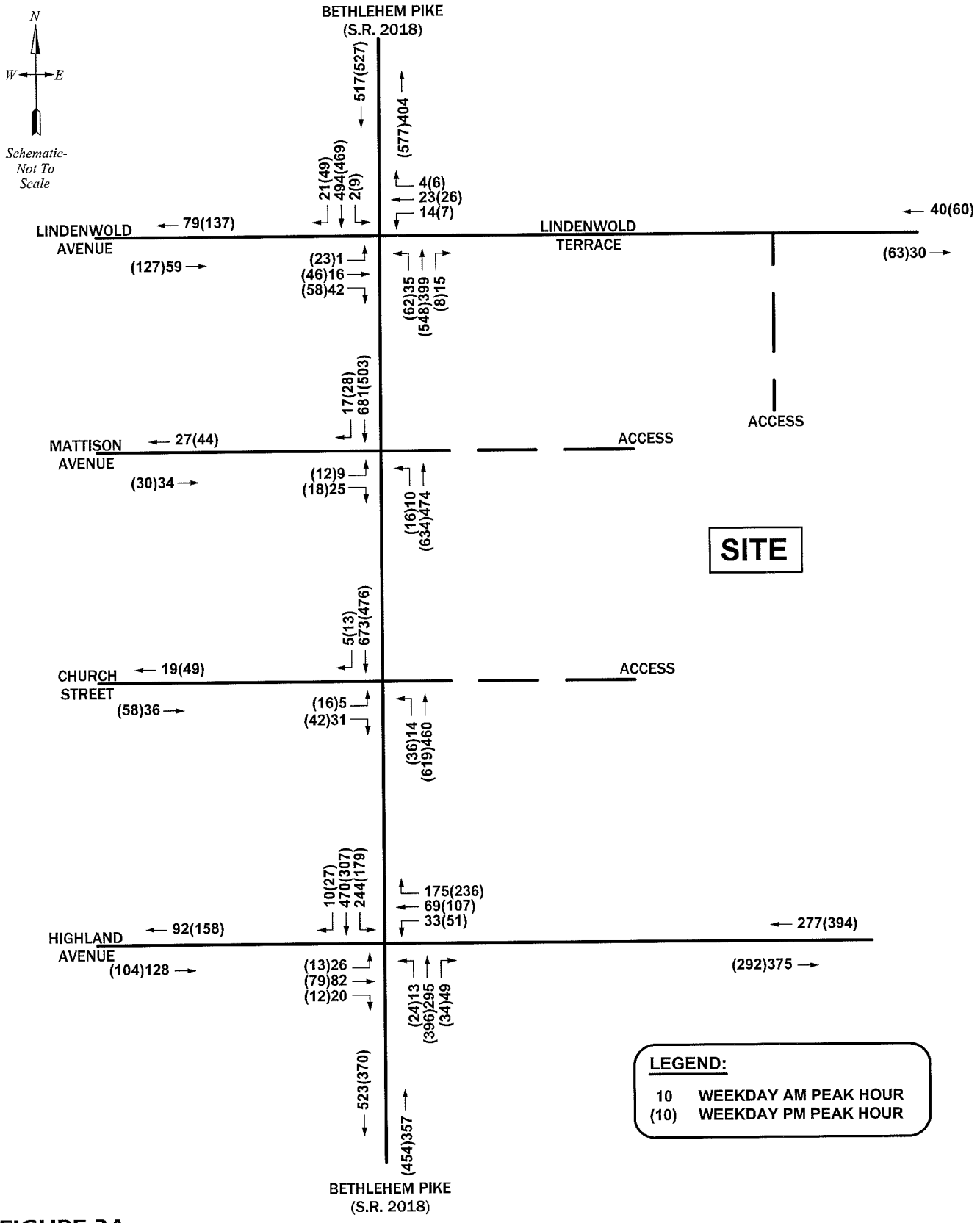

FIGURE 3A

2016 Existing Peak Hour Traffic Volumes

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

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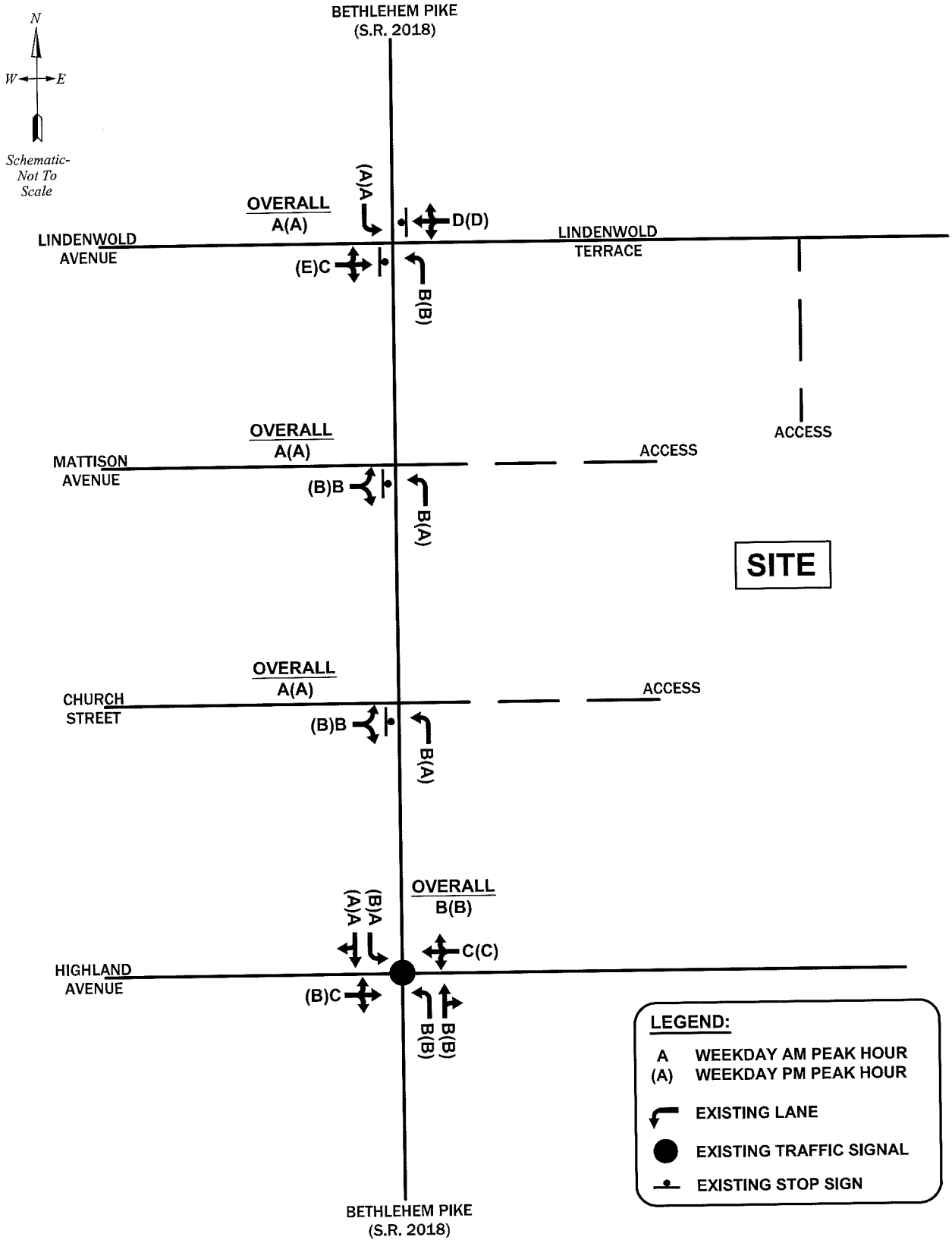

FIGURE 3B

2016 Existing Levels of Service

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

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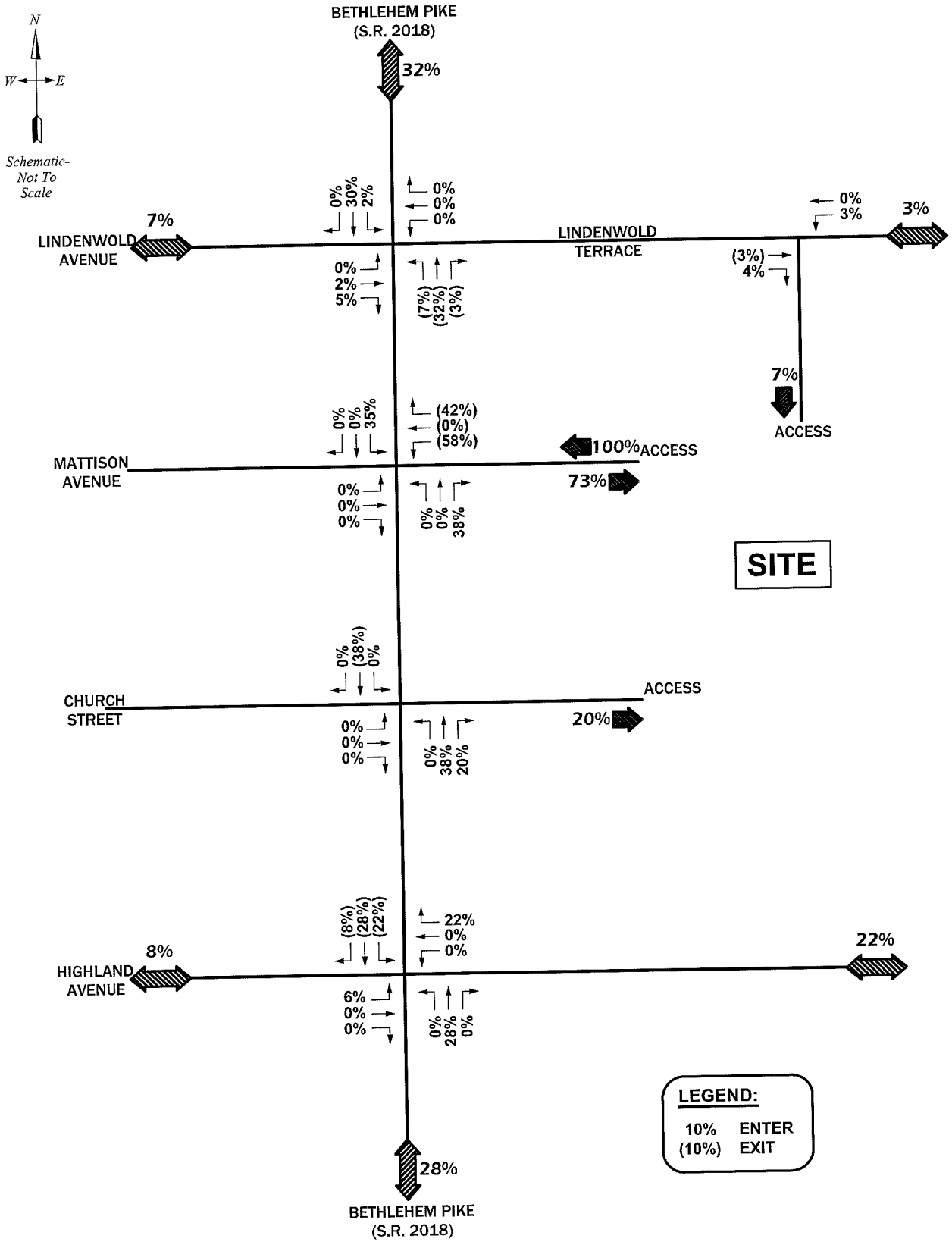

FIGURE 4A

"New" Trip Distribution

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

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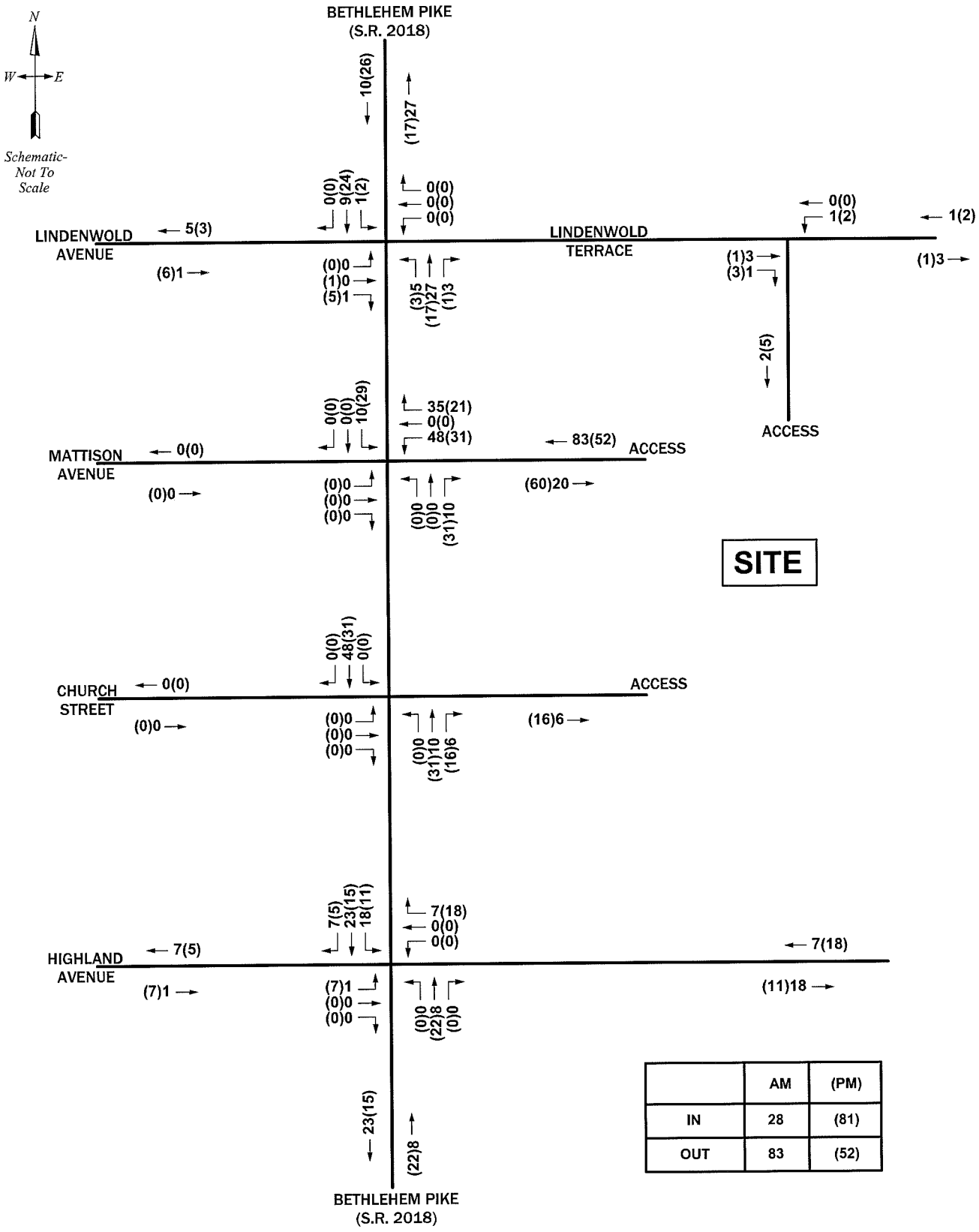

	AM	(PM)
IN	28	(81)
OUT	83	(52)

FIGURE 4B

"New" Trip Assignment

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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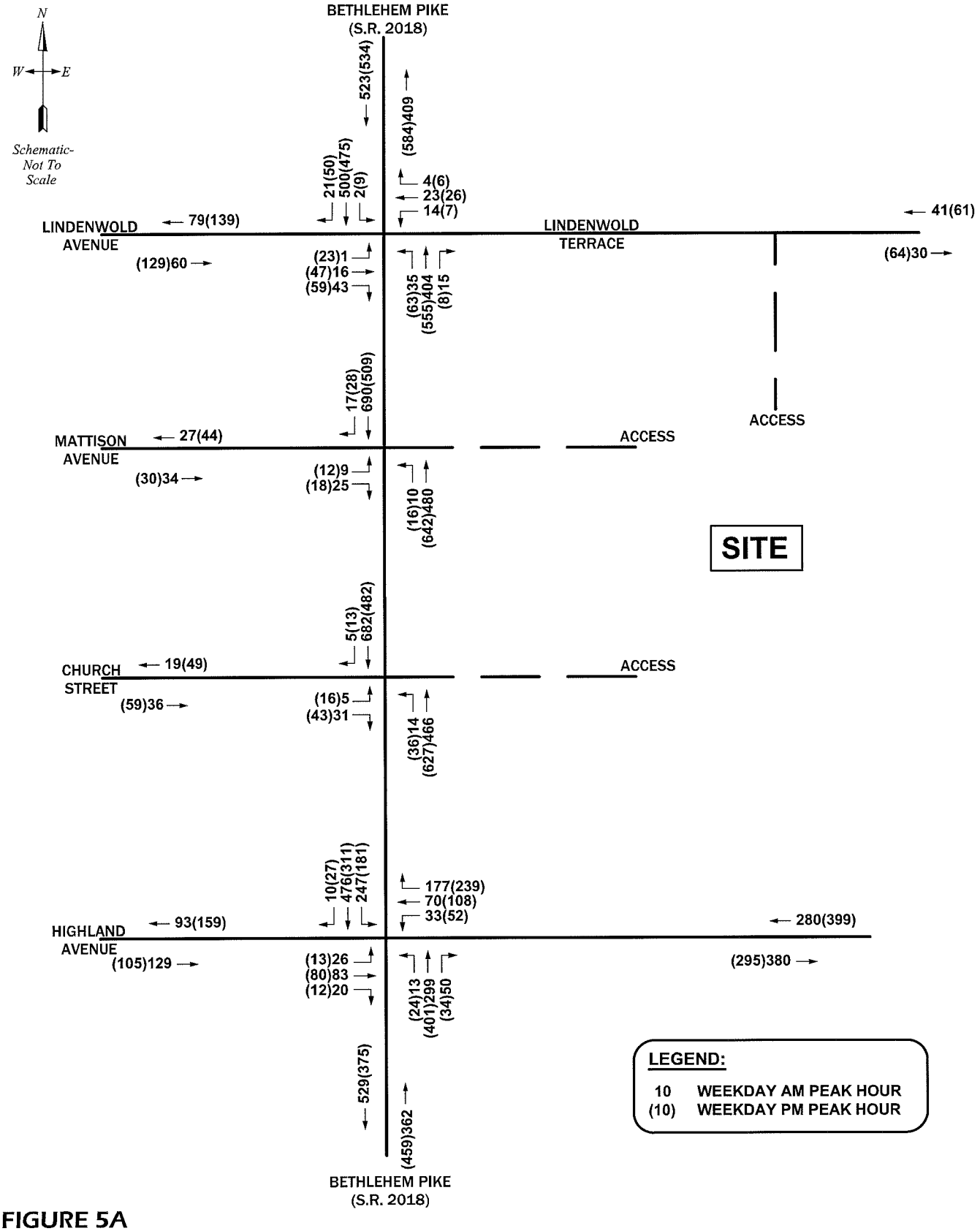

FIGURE 5A

2018 Future Peak Hour Traffic Volumes without Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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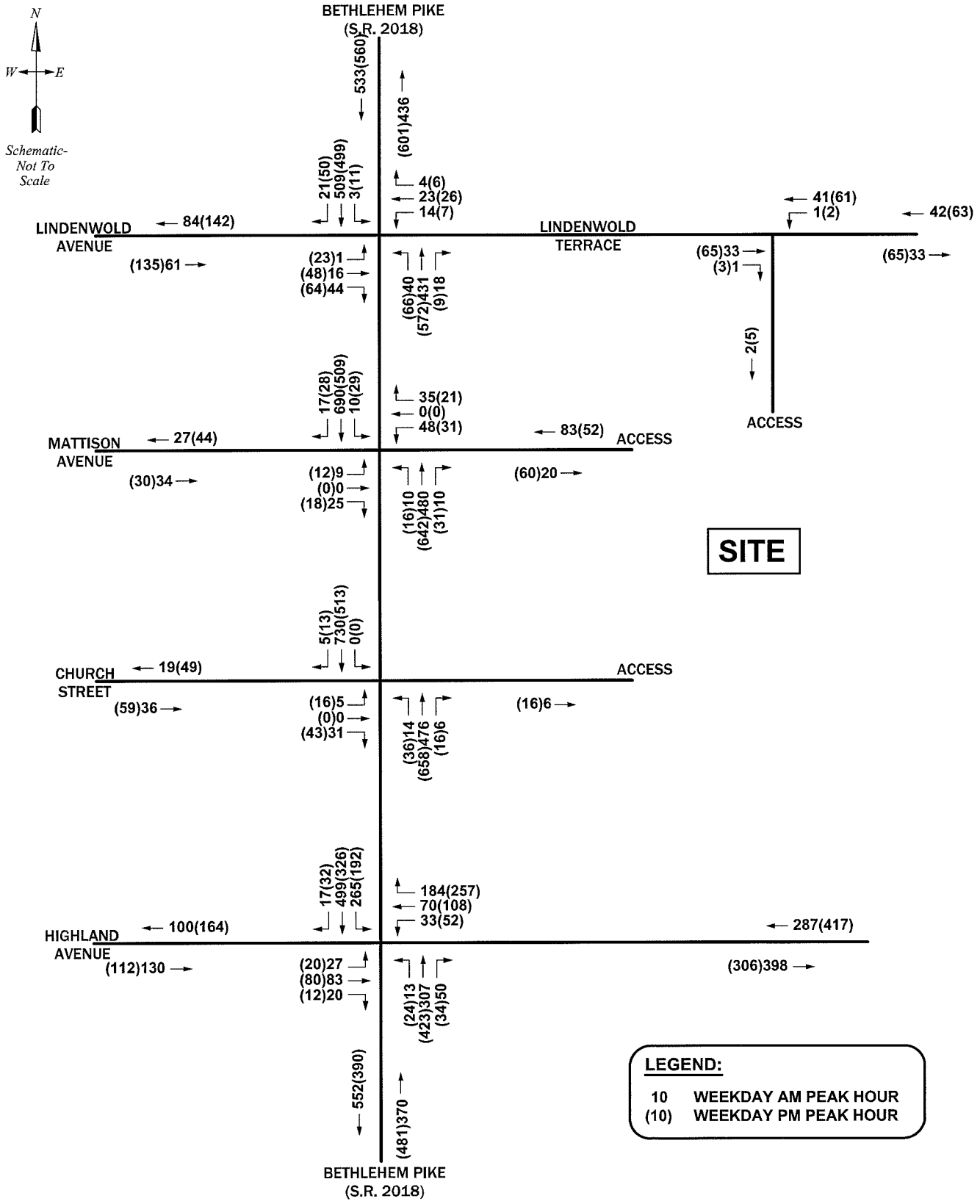

FIGURE 5B

2018 Future Peak Hour Traffic Volumes with Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

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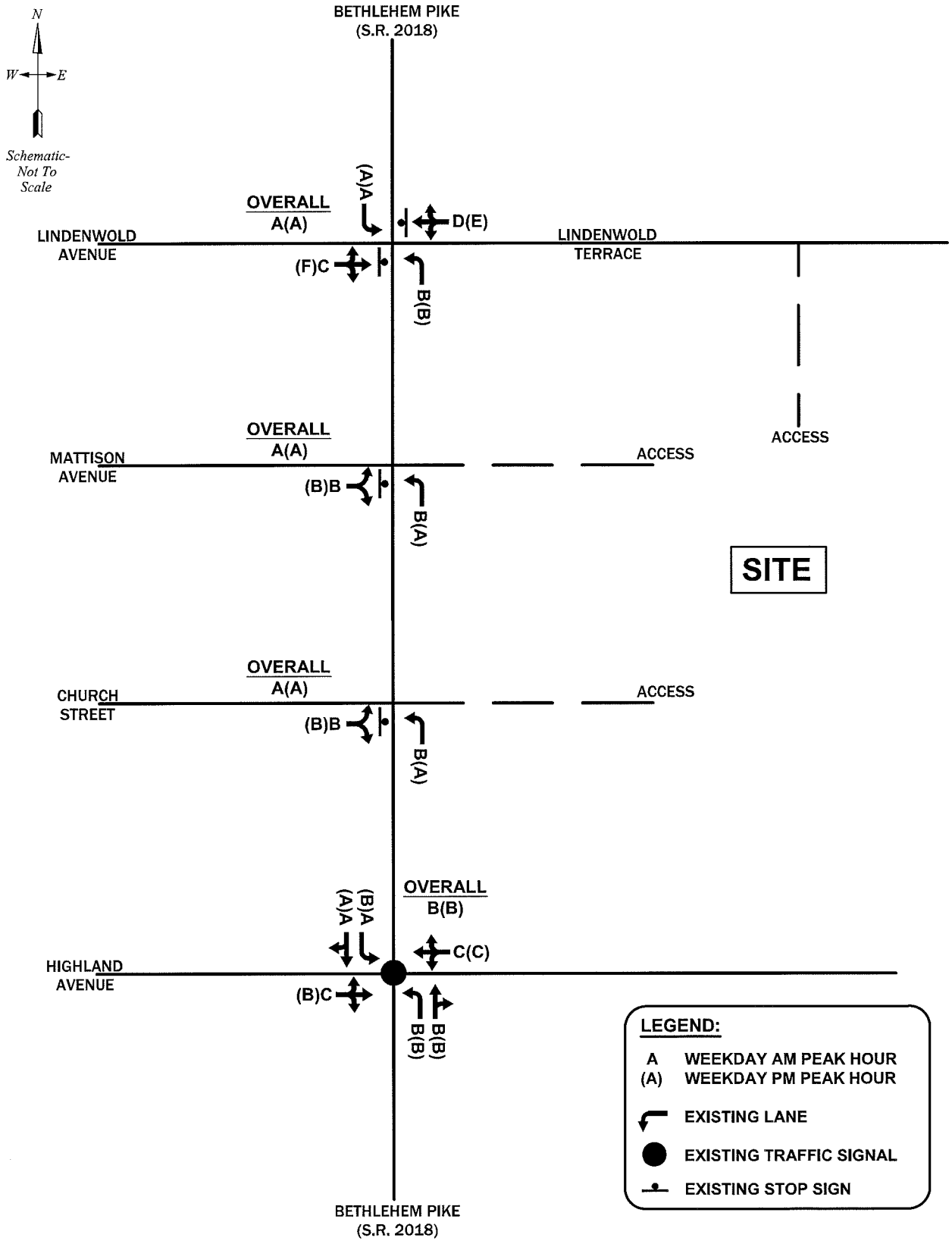

FIGURE 5C

2018 Future Levels of Service without Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

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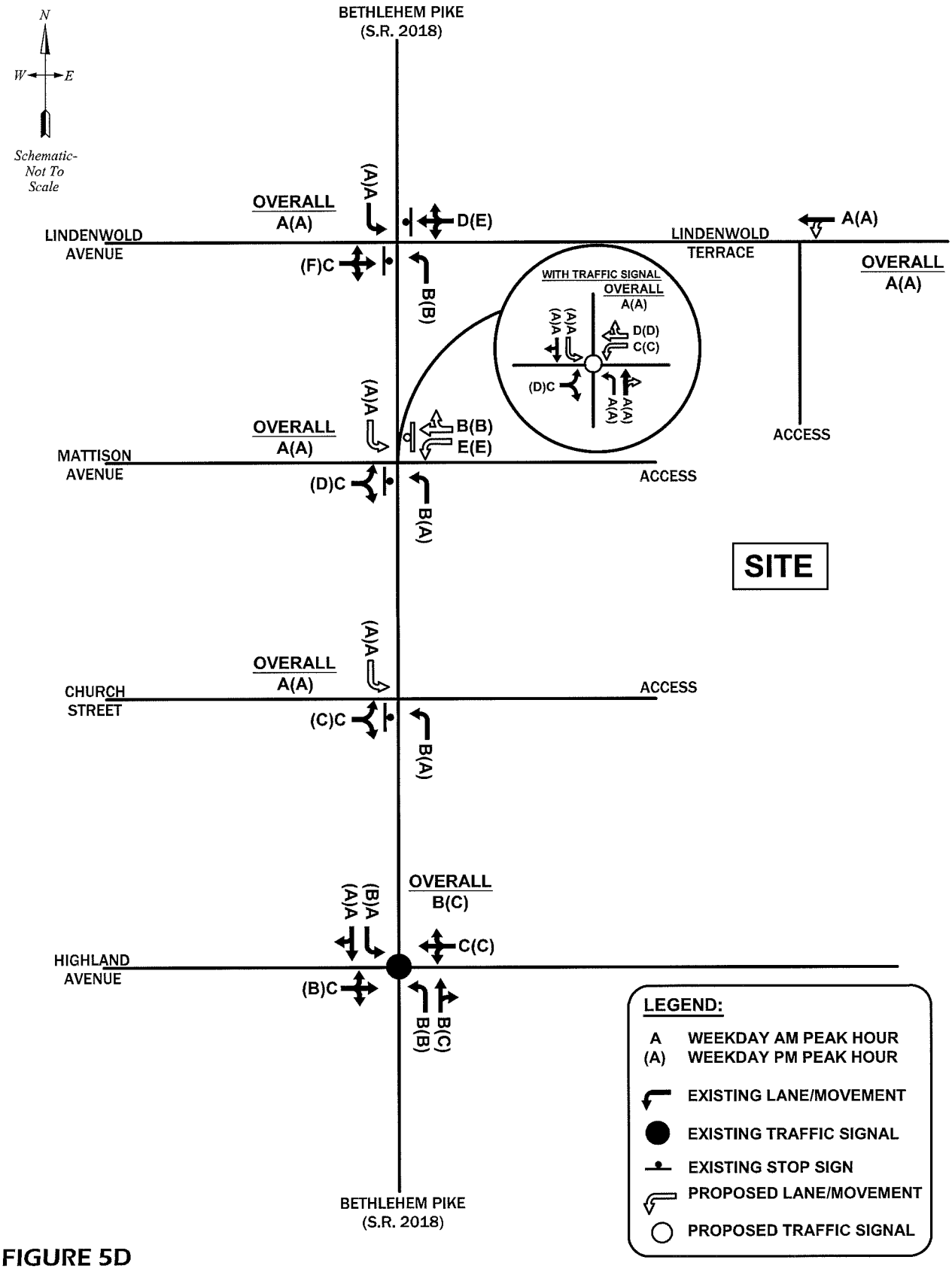

FIGURE 5D

2018 Future Levels of Service with Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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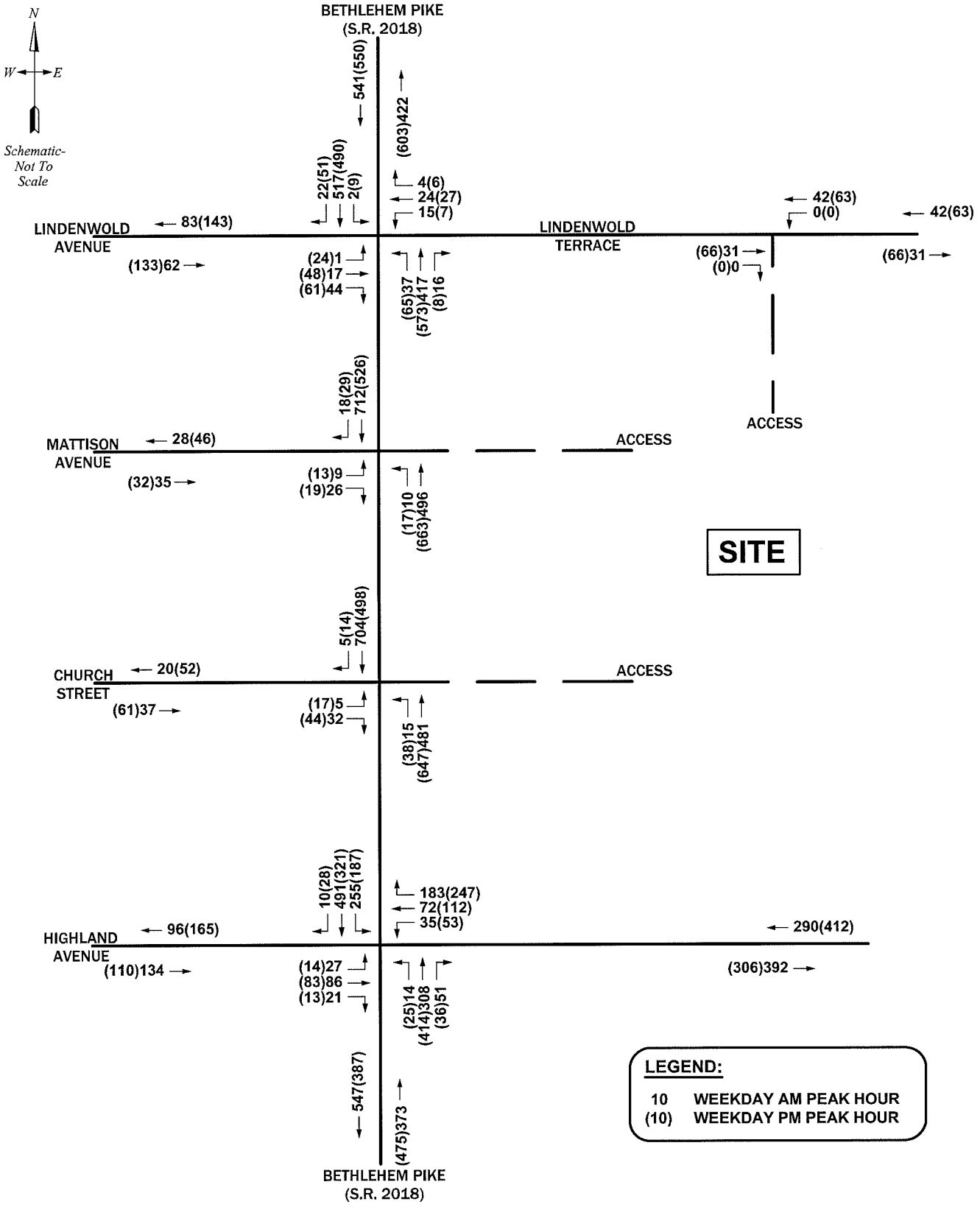

FIGURE 6A

2023 Future Peak Hour Traffic Volumes without Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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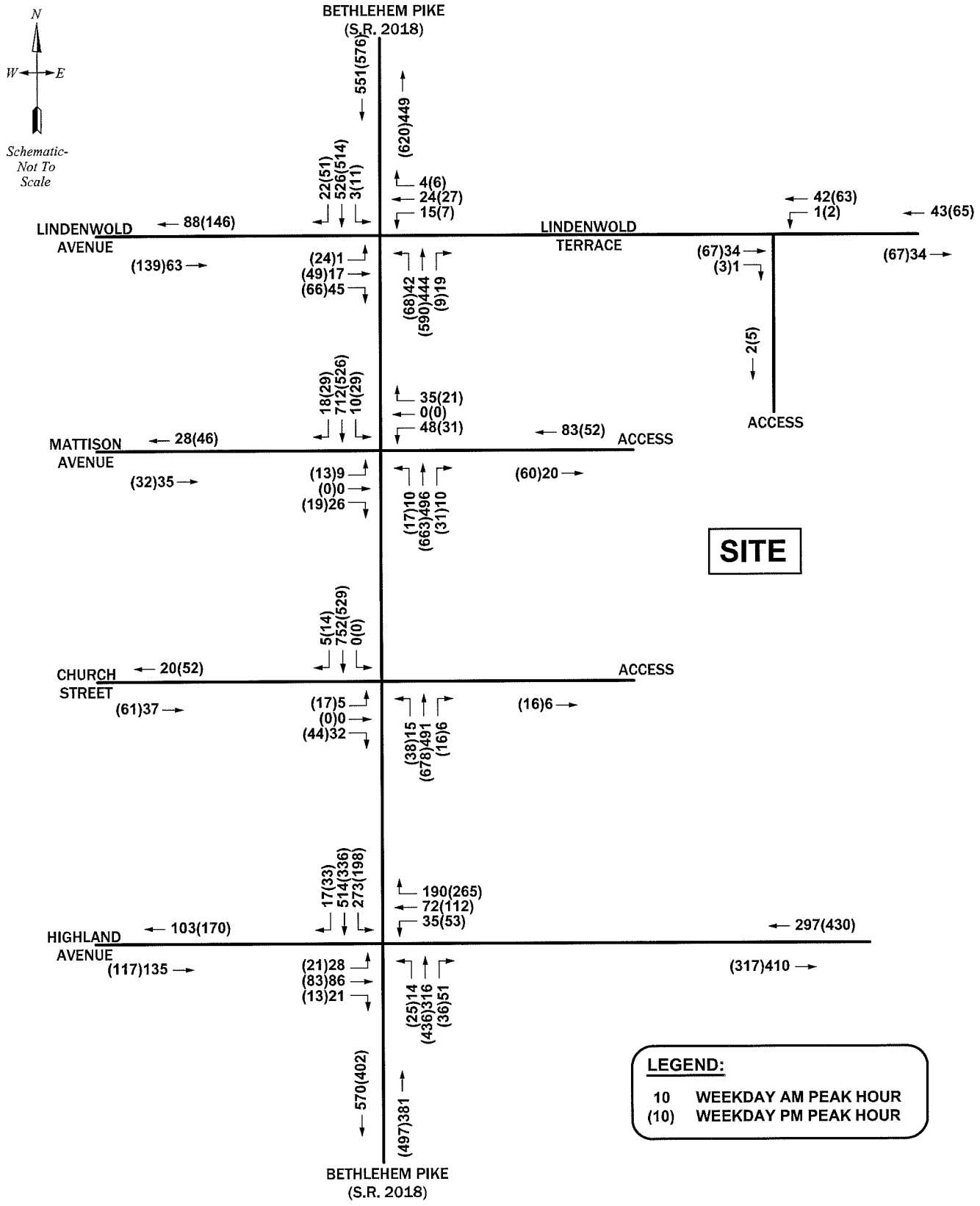

FIGURE 6B

2023 Future Peak Hour Traffic Volumes with Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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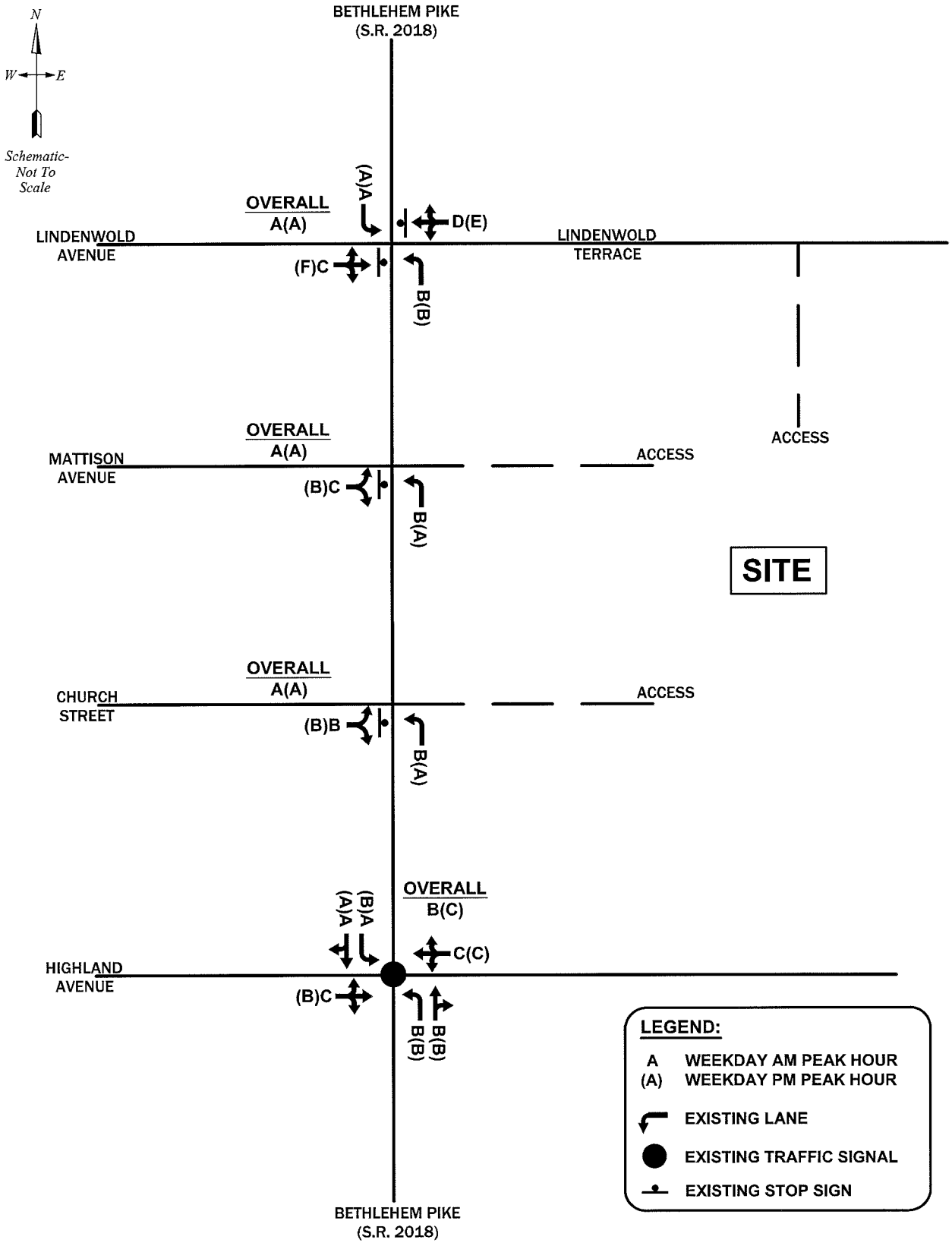

FIGURE 6C

2023 Future Levels of Service without Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

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UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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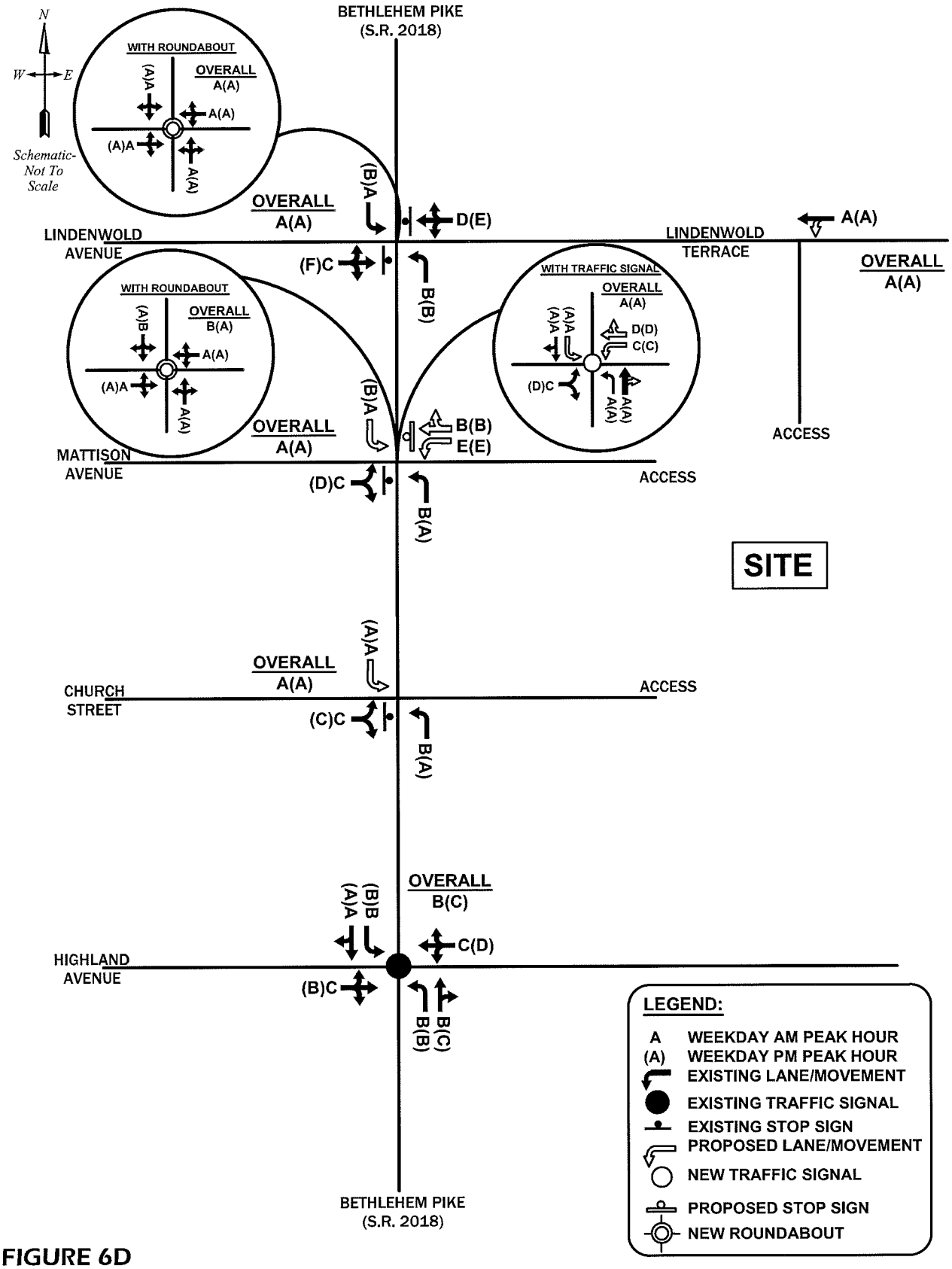

FIGURE 6D

2023 Future Levels of Service with Development

ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

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Level of Service

1. Lindenwold Terrace and Access

Time Period			Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
Design Year			2018 Build-Out Year		2023 Design Year		2018 Build-Out Year		2023 Design Year	
Development Condition			w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps
Lindenwold Terrace	EB	Thru	(1)	---	(1)	---	(1)	---	(1)	---
		Right		---		---		---		---
	WB	Left	A	---	A	---	A	---	A	---
		Thru	8.1	---	8.1	---	8.2	---	8.2	---
Access	NB	Left	---	---	---	---	---	---	---	---
		Right	---	---	---	---	---	---	---	---
Overall			A	---	A	---	A	---	A	---
			0.1	---	0.1	---	0.1	---	0.1	---

(1) Movement operates at free-flow conditions.

Level Of Service

2. Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace

Time Period			Weekday Morning Peak Hour						
Design Year			2016	2018 Build-Out Year			2023 Design Year		
Development Condition			Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps (Roundabout)
Lindenwold Avenue/Terrace	EB	Left	C	C	C	---	C	C	A
		Thru							
		Right	17.2	17.4	18.2	---	18.4	19.3	6.5
	WB	Left	D	D	D	---	D	D	A
		Thru							
		Right	25.8	26.3	28.8		28.6	31.5	5.5
Bethlehem Pike (S.R. 2018)	NB	Left	B 10.1	B 10.2	B 10.3	--- ---	B 10.3	B 10.4	A
		Thru							
		Right	(1)	(1)	(1)	(1)	(1)	(1)	7.3
	SB	Left	A 9.3	A 9.3	A 9.4	--- ---	A 9.4	A 9.5	A
		Thru							
		Right	(1)	(1)	(1)	(1)	(1)	(1)	8.7
Overall			A 2.3	A 2.3	A 2.4	--- ---	A 2.5	A 2.7	A 7.9

Weekday Afternoon Peak Hour						
2016	2018 Build-Out Year			2023 Design Year		
Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps (Roundabout)
E	F	F	---	F	F	A
48.5	51.5	64.4	---	62.1	78.2	6.3
D	E	E	---	E	E	A
34.4	35.6	40.4		39.0	44.6	6.1
A 10.0	B 10.1	B 10.2	--- ---	B 10.2	B 10.3	A
(1)	(1)	(1)	(1)	(1)	(1)	9.3
A 9.8	A 9.9	A 10.0	--- ---	A 9.9	A 10.0	A
(1)	(1)	(1)	(1)	(1)	(1)	8.3
A 6.3	A 6.6	A 8.0	--- ---	A 7.7	A 9.5	A 8.5

(1) Movement operates at free-flow conditions.

Level Of Service

3. Bethlehem Pike (S.R. 2018) and Mattison Ave/Access

Time Period			Weekday Morning Peak Hour							
Design Year			2016	2018 Build-Out Year			2023 Design Year			
Development Condition			Existing	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/Dev Imps (Roundabout)
Mattison Ave/Access	EB	Left	B	B	C	C	C	C	C	A
		Thru								
		Right	14.8	14.9	21.2	34.5	15.3	22.2	34.5	7.6
	WB	Left			E	C		E	C	
					45.3	34.4		49.6	34.4	A
		Thru	---	---	B	D	---	B	D	
		Right			11.4	37.3		11.5	37.2	5.9
Bethlehem Pike (S.R. 2018)	NB	Left	B	B	B	A	B	B	A	
			10.5	10.5	10.5	5.6	10.6	10.6	5.9	A
		Thru	(1)	(1)	(1)	A	(1)	(1)	A	
		Right				3.4			3.5	6.9
	SB	Left	---	---	A	A	---	A	A	
					9.5	3.7		9.6	3.8	B
		Thru	(1)	(1)	(1)	A	(1)	(1)	A	
		Right				4.7			5.0	13.9
Overall			A	A	A	A	A	A	A	B
			0.5	0.5	2.7	7.0	0.5	2.8	7.1	10.7

Time Period			Weekday Afternoon Peak Hour							
Design Year			2016	2018 Build-Out Year			2023 Design Year			
Development Condition			Existing	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/Dev Imps (Roundabout)
Mattison Ave/Access	EB	Left	B	B	C	D	B	C	D	A
		Thru								
		Right	13.7	13.8	23.8	35.2	14.2	25.8	35.2	5.3
	WB	Left			E	C		E	C	
					38.3	34.4		41.6	34.3	A
		Thru	---	---	B	D	---	B	D	
		Right			12.6	36.3		12.9	36.0	6.3
Bethlehem Pike (S.R. 2018)	NB	Left	A	A	A	A	A	A	A	
			9.7	9.7	9.7	3.5	9.8	9.8	3.7	A
		Thru	(1)	(1)	(1)	A	(1)	(1)	A	
		Right				3.7			3.9	8.8
	SB	Left	---	---	B	A	---	B	A	
					10.3	4.4	---	10.4	4.6	A
		Thru	(1)	(1)	(1)	A	(1)	(1)	A	
		Right				3.2			3.3	7.5
Overall			A	A	A	A	A	A	A	A
			0.4	0.4	2.1	5.6	0.5	2.2	5.7	8.1

(1) Movement operates at free-flow conditions.

Level Of Service

4. Bethlehem Pike (S.R. 2018) and Church St/Access

Time Period			Weekday Morning Peak Hour						
Design Year			2016	2018 Build-Out Year			2023 Design Year		
Development Condition			Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps
Church St/Access	EB	Left	B	B	C	---	B	C	---
		Thru							
		Right	14.0	14.2	16.4	---	14.5	16.9	---
	WB	Left	---	---	---	---	---	---	---
		Thru							
		Right							
Bethlehem Pike (S.R. 2018)	NB	Left	B	B	B	---	B	B	---
			10.4	10.4	10.7	---	10.5	10.8	---
		Thru	(1)	(1)	(1)	(1)	(1)	(1)	(1)
		Right							
	SB	Left	---	---	---	---	---	---	---
			---	---	---	---	---	---	---
		Thru	(1)	(1)	(1)	(1)	(1)	(1)	(1)
		Right							
Overall			A	A	A	---	A	A	---
			0.5	0.5	0.6	---	0.6	0.6	---

Weekday Afternoon Peak Hour						
2016	2018 Build-Out Year			2023 Design Year		
Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps
B	B	C	---	B	C	---
13.1	13.2	17.2	---	13.5	18.1	---
---	---	---	---	---	---	---
A	A	A	---	A	A	---
9.7	9.7	9.8	---	9.8	9.9	---
(1)	(1)	(1)	(1)	(1)	(1)	(1)
---	---	---	---	---	---	---
---	---	---	---	---	---	---
(1)	(1)	(1)	(1)	(1)	(1)	(1)
A	A	A	---	A	A	---
0.9	0.9	1.1	---	0.9	1.1	---

(1) Movement operates at free-flow conditions.

Level of Service

5. Bethlehem Pike (S.R. 2018) and Highland Avenue

Time Period			Weekday Morning Peak Hour							Weekday Afternoon Peak Hour						
Design Year			2016	2018 Build-Out Year			2023 Design Year			2016	2018 Build-Out Year			2023 Design Year		
Development Condition			Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps	Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps
Highland Ave	EB	Left	C	C	C	---	C	C	---	B	B	B	---	B	B	---
		Thru														
		Right	21.7	22.1	22.2		22.1	22.3		19.3	19.3	19.4		19.4	19.6	
	WB	Left	C	C	C	---	C	C	---	C	C	C	---	C	D	---
		Thru														
		Right	26.8	29.7	30.7		30.0	30.9		31.9	32.3	34.3		34.7	38.5	
Bethlehem Pike (S.R. 2018)	NB	Left	B 11.5	B 11.7	B 12.1	---	B 12.2	B 12.6	12.6	B 13.2	B 13.4	B 14.0	---	B 13.7	B 13.9	---
		Thru	B	B	B	---	B	B	---	B	B	C	---	B	C	---
		Right	14.8	15.1	15.9		16.1	16.8		18.6	19.0	20.8		19.8	21.0	
	SB	Left	A 9.1	A 9.1	A 9.6	---	A 9.6	B 10.1	---	B 11.3	B 11.6	B 12.5	---	B 12.1	B 12.7	---
		Thru	A	A	A	---	A	A	---	A	A	A	---	A	A	---
		Right	7.1	7.0	7.4		7.4	7.8		8.1	8.2	8.7		8.5	8.6	
Overall			B 14.2	B 14.8	B 15.2	---	B 15.3	B 15.7	---	B 18.8	B 19.1	C 20.4	---	C 20.1	C 21.6	---

Queue Length

1. Lindenwold Terrace and Access

Time Period			Current Storage (1)	Future Storage (2)	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
Design Year					2018 Build-Out Year		2023 Design Year		2018 Build-Out Year		2023 Design Year	
Development Condition					w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps	w/Dev Base	w/Dev Imps
Lindenwold Terrace	EB	Thru	500+		25	---	25	---	25	---	25	---
		Right				---		---		---		---
	WB	Left										
		Thru	*325*		25	---	25	---	25	---	25	---
						---		---		---		---
Access	NB	Left			---	---	---	---	---	---	---	---
		Right			---	---	---	---	---	---	---	---

(1) Distance to adjacent intersections shown in italics.

(2) Future storage/distance to adjacent intersections shown if different/improved from existing conditions.

Queue Length

2. Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Terrace

Time Period / Design Year / Development Condition			Current Storage (1)	Future Storage (2)	Weekday Morning Peak Hour							Weekday Afternoon Peak Hour						
					2016	2018 Build-Out Year			2023 Design Year			2016	2018 Build-Out Year			2023 Design Year		
					Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps (Roundabout)	Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps (Roundabout)
Lindenwold Avenue/Terrace	EB	Left / Thru / Right	*370*		25	25	25	--- / ---	25	25	0	95	100	123	--- / ---	118	140	25
Lindenwold Avenue/Terrace	WB	Left / Thru / Right	500+		25	25	25	---	25	25	0	25	25	28	---	28	33	0
Bethlehem Pike (S.R. 2018)	NB	Left	TWLTL		25	25	25	---	25	25	50	25	25	25	---	25	25	100
Bethlehem Pike (S.R. 2018)	NB	Thru / Right	*315*		25	25	25	---	25	25		25	25	25	---	25	25	
Bethlehem Pike (S.R. 2018)	SB	Left	TWLTL		25	25	25	---	25	25	75	25	25	25	---	25	25	75
Bethlehem Pike (S.R. 2018)	SB	Thru / Right	500+		25	25	25	---	25	25		25	25	25	---	25	25	

(1) Distance to adjacent intersections shown in italics.

(2) Future storage/distance to adjacent intersections shown if different/improved from existing conditions.

Queue Length

3. Bethlehem Pike (S.R. 2018) and Mattison Ave/Access

Time Period			Current Storage (1)	Future Storage (2)	Weekday Morning Peak Hour								Weekday Afternoon Peak Hour							
Design Year					2016	2018 Build-Out Year			2023 Design Year				2016	2018 Build-Out Year			2023 Design Year			
Development Condition					Existing	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/o Dev	w/Dev Base	w/Dev Imps (signal)	w/Dev Imps (Roundabout)	Existing	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/o Dev	w/Dev Base	w/Dev Imps (Signal)	w/Dev Imps (Roundabout)
Mattison Ave/Access	EB	Left Thru Right	500+		25	25	25	33	25	25	33	0	25	25	25	28	25	25	30	0
Mattison Ave/Access	WB	Left	---	100	---	---	40	50	---	43	50	0	---	---	25	33	---	25	30	0
		Thru Right					25	38		25	38				25	25		25	25	
Bethlehem Pike (S.R. 2018)	NB	Left	TWLTL		25	25	25	25	25	25	25	50	25	25	25	25	25	25	30	75
		Thru Right	*500*		25	25	25	153	25	25	158		25	25	25	203	25	25	215	
Bethlehem Pike (S.R. 2018)	SB	Left	---	TWLTL	---	---	25	25	---	25	25	150	---	---	25	25	---	25	25	50
		Thru Right	*340*		25	25	25	255	25	25	270		25	25	25	158	25	25	170	

(1) Distance to adjacent intersections shown in italics.

(2) Future storage/distance to adjacent intersections shown if different/improved from existing conditions.

Queue Length

4. Bethlehem Pike (S.R. 2018) and Church St/Access

Time Period			Current Storage (1)	Future Storage (2)	Weekday Morning Peak Hour							Weekday Afternoon Peak Hour						
Design Year					2016	2018 Build-Out Year			2023 Design Year			2016	2018 Build-Out Year			2023 Design Year		
Development Condition					Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps	Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps
Church St/Access	EB	Left						---			---				---			---
		Thru	*150*		25	25	25		25	25		25	25	25		25	25	
		Right						---			---				---			---
	WB	Left																
		Thru	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Right																
Bethlehem Pike (S.R. 2018)	NB	Left	TWLTL		25	25	25	---	25	25	---	25	25	25	---	25	25	---
		Thru	500+		25	25	25	---	25	25	---	25	25	25	---	25	25	---
		Right																
	SB	Left	---	TWLTL	---	---	25	---	---	25	---	---	---	25	---	---	25	---
		Thru	*475*		25	25	25	---	25	25	---	25	25	25	---	25	25	---
		Right																

(1) Distance to adjacent intersections shown in italics.

(2) Future storage/distance to adjacent intersections shown if different/improved from existing conditions.

Queue Length

5. Bethlehem Pike (S.R. 2018) and Highland Avenue

Time Period			Current Storage (1)	Future Storage (2)	Weekday Morning Peak Hour							Weekday Afternoon Peak Hour						
Design Year					2016	2018 Build-Out Year			2023 Design Year			2016	2018 Build-Out Year			2023 Design Year		
Development Condition					Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps	Existing	w/o Dev	w/Dev Base	w/Dev Imps	w/o Dev	w/Dev Base	w/Dev Imps
Highland Ave	EB	Left																
		Thru	*315*		95	98	100	---	103	105	---	73	75	80	---	80	85	---
		Right																
	WB	Left																
		Thru	*510*		230	245	255	---	253	265	---	340	345	370	---	368	398	---
		Right																
Bethlehem Pike (S.R. 2018)	NB	Left	135		25	25	25	---	25	25	---	25	25	25	---	25	25	---
		Thru	500+		213	220	230	---	233	240	---	285	293	320	---	310	330	---
		Right																
	SB	Left	160		108	110	120	---	115	128	---	88	90	98	---	95	100	---
		Thru	500+		215	218	233	---	228	250	---	155	163	178	---	173	183	---
		Right																

(1) Distance to adjacent intersections shown in italics.

(2) Future storage/distance to adjacent intersections shown if different/improved from existing conditions.

APPENDIX A

Correspondence

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

McMAHON ASSOCIATES, INC.
425 Commerce Drive | Suite 200 | Fort Washington, PA 19034
p 215-283-9444 | f 215-283-9445
mcmahonassociates.com

PRINCIPALS
Joseph W. McMahon, P.E.
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
William T. Steffens
Casey A. Moore, P.E.
Gary R. McNaughton, P.E., PTOE

ASSOCIATES
John J. Mitchell, P.E.
Christopher J. Williams, P.E.
R. Trent Ebersole, P.E.
Matthew M. Kozsuch, P.E.

October 28, 2013

Mr. Francis Hanney
PennDOT District 6-0
7000 Geerdes Boulevard
King of Prussia, PA 19406

RE: **Transportation Impact Study Scoping Meeting Application**
Saint Mary's Villa Mixed Use Residential Community
Upper Dublin Township, Montgomery County, PA
McMahon #813468.11

Dear Fran:

McMahon Associates, Inc. (McMahon) is pleased to submit the following Transportation Impact Study (TIS) Scoping Meeting Application, per the Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits (Strike-off Letter 470-09-4) for the proposed residential redevelopment to be located at the existing St. Mary's Villa for Children and Families site on the eastern side of South Bethlehem Pike (S.R. 2018), between Lindenwold Terrace/Avenue and Highland Avenue in Upper Dublin Township, Montgomery County, PA. We request that you review the following information and provide feedback on the proposed scope and methodology.

TRANSPORTATION IMPACT STUDY (TIS) SCOPING MEETING APPLICATION

Scoping Meeting Date: TBD

Applicant: Lindenwold Residential Associates, LLC

Applicant's Consultant: McMahon Associates, Inc.

Applicant's Primary Contact: John R. Wichner, P.E., PTOE

(See attached a list of meeting attendees along with phone numbers and email addresses)

(1) LOCATION OF PROPOSED DEVELOPMENT: (See attached location map – **Figure 1**)

PennDOT Engineering Dist.: 6-0 County: Montgomery
Municipality: Upper Dublin Township

State Route(s) (SR): SR 2018 (S. Bethlehem Pike) (Highland Avenue to Lindenwold Ave/Terrace)

Segment(s): 0110 Offset(s): 889 ~ 2000

Segment(s): 0120 Offset(s): 0000 ~ 350

(2) DESCRIPTION OF PROPOSED DEVELOPMENT: (See attached site plan – **Figure 2**)

Proposed land uses:

- 34 Single Family Attached Twins
- 54 Single Family Attached Townhomes
- 40 Age Targeted Condominiums
- 250 Senior Independent Living Apartments

Proposed site accesses:

- One (1) full-access driveway as the fourth leg of the intersection of South Bethlehem Pike (S.R. 2018) and Mattison Avenue. It is anticipated that a traffic signal will be proposed as part of the development.
- One (1) enter-only access driveway serving Lindenwold Terrace.
- One (1) enter-only access driveway serving South Bethlehem Pike (S.R. 2018).

Community linkages *(access to neighboring properties, cross easements, pedestrian and transit accommodations)*:
N/A

(3) DEVELOPMENT SCHEDULE AND STAGING:

Anticipated Opening Date: 2016
Full Build out Date: 2016
Describe Proposed Development Schedule/Staging:
Although some phasing of the project may be considered, the Land Development application will likely request approval for the full build-out of the site, anticipated to be occupied by 2016. Therefore, the Transportation Impact Study will apply site-generated traffic to the surrounding network assuming all units are constructed in one phase.

(4) TRIP GENERATION

Trip generation for the proposed development will be based on:

X ITE Trip Generation Manual 9th Edition
__Other independent surveys

Table 1 indicates trip generation rates and equations utilized in the subsequent analysis.

TABLE 1
TRIP GENERATION RATES/EQUATIONS

Land Use	Land Use Code	Daily	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour	
			Equation/Rate	Enter	Equation/Rate	Enter
Single Family Attached Twins	230 (Residential Condo/Townhouse)	Ln(T)=.87Ln(x)+2.46	Ln(T)=.80Ln(x)+0.26	17%	Ln(T)=.82Ln(x)+0.32	67%
Single Family Attached Townhomes	230 (Residential Condo/Townhouse)	Ln(T)=.87Ln(x)+2.46	Ln(T)=.80Ln(x)+0.26	17%	Ln(T)=.82Ln(x)+0.32	67%
Age Targeted Condominiums(1)	230 (Residential Condo/Townhouse)	Ln(T)=.87Ln(x)+2.46	Ln(T)=.80Ln(x)+0.26	17%	Ln(T)=.82Ln(x)+0.32	67%
Senior Independent Living Apartments	252 (Senior Adult Housing – Attached)	T=3.44(x)	T=.20(x)	34%	T=.25(x)	54%

X = Independent Variable (units)
T = Traffic Volume
(1) Age Targeted Condominiums are marketed towards adults 55 and older; however are not explicitly age-restricted. Therefore, to be conservative, LU Code 230 was utilized.

Table 2 indicates the anticipated new trip generation for the overall development.

TABLE 2
TRIP GENERATION
PROPOSED DEVELOPMENT

Land Use	Size	Daily	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
Single Family Attached Twins	34 Units	252	4	18	22	17	8	25
Single Family Attached Townhomes	54 Units	376	5	27	32	24	12	36
Age Targeted Condominiums	40 Units	290	4	21	25	19	9	28
Senior Independent Living Apartments	250 Units	860	17	33	50	34	29	63
Total Trips		***1,778***	***30***	***99***	***129***	***94***	***58***	***152***

(5) ESTIMATED DAILY TRIP GENERATION/DRIVEWAY CLASSIFICATION:

(a) Estimated Daily Trip Generation of Proposed Development – Assuming One Full-Movement Access Point, and One Enter-Only Access Point along S. Bethlehem Pike

(S.R. 2018) and Full Build out/Occupancy of Entire Tract: 1,600 trips/day ** Approximately 10% of the trips utilize the enter-only access along Lindenwold Terrace.

(b) Driveway Classification Based on Trip Generation and Two Access Points on S. Bethlehem Pike (S.R. 2018): ** Driveway Classification will be confirmed following the manual turning movements counts after existing traffic patterns are determined.

Full-Access Driveway
Low Volume: ___
Medium Volume: X
High Volume: _

Enter-Only Driveway
Low Volume: _X__
Medium Volume: __
High Volume: _

(6) TRANSPORTATION IMPACT STUDY REQUIRED?

__No

X_Yes, based on: __3,000 or more vehicle trips/day generated

X During any one-hour time period, 100 or more new (added) vehicle trips generated entering or 100 or more new (added) vehicle trips generated exiting development

_____ Other considerations as described below:

(7) TRAFFIC IMPACT ASSESSMENT REQUIRED? X No Yes

(8) TIS STUDY AREA: (Describe; attach map and/or diagram)

Roadway and Study Intersections

- S. Bethlehem Pike (S.R. 2018) and Highland Avenue (signalized)
- S. Bethlehem Pike (S.R. 2018) and Church Street/Proposed Enter-only Access
- S. Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Signalized full-access Driveway
- S. Bethlehem Pike (S.R. 2018) and Lindenwold Terrace/Avenue
- Lindenwold Terrace and Proposed Enter-only Access

Land use context (Refer to Smart Transportation Handbook):
Urban

Known Congestion Areas:
N/A

Known Safety Concerns:
N/A

Known Environmental Constraints:
N/A

Pedestrian/Bike Review (Community Centers, Parks, Schools, etc.):
Trinity Episcopal Church is located along S. Bethlehem Pike (S.R. 2018), north of Highland Avenue. Veterans Memorial Park is located along Highland Avenue, east of S. Bethlehem Pike (S.R. 2018). Multiple baseball fields are located along Highland Avenue, west of S. Bethlehem Pike (S.R. 2018). Sidewalk is currently provided along the western side of S. Bethlehem Pike (S.R. 2018), along Highland Avenue, as well as Lindenwold Terrace/Avenue.

Transit Review (Current routes/stops):
Septa Bus Route 94 (Montgomery Mall to/from Chestnut Hill) and Route 95 (Willow Grove to/from Gulph Mills) have stops along S. Bethlehem Pike (S.R. 2018)at Highland Avenue, Church Street, and Lindenwold Terrace/Avenue.

(9) STUDY AREA TYPE: Urban _X_ Rural _____

(10) TIS ANALYSIS PERIODS AND TIMES:

McMahon will analyze the following conditions:
- Existing conditions,
- 2016 full build-out without development conditions
- 2016 full build-out with development conditions
- 2021 horizon year full build-out without development conditions
- 2021 horizon year full build-out with development conditions

McMahon will analyze the following time periods:
- Weekday morning peak hour (7:00-9:00 AM)
- Weekday afternoon peak hour (4:00-6:00 PM)

(11) TRAFFIC ADJUSTMENT FACTORS:

(a) Seasonal Adjustment: (Identify counts requiring adjustment and methodology):
N/A

(b) Annual Base Traffic Growth: 0.73 %/yr.
Source: PennDOT Growth Factor Table for September 2012 to July 2013

(c) Pass-By Trips:

Land Use	%	Source
N/A	N/A	N/A

(d) Captured Trips for Multi-Use Sites:
- N/A

(e) Modal Split Reductions:
N/A

(f) Other Reductions:

N/A

(12) OTHER PROJECTS WITHIN STUDY AREA TO BE ADDED TO BASE TRAFFIC:
(Identify proposed developments with issued permits that need to be included.)
None

(13) TRIP DISTRIBUTION AND ASSIGNMENT:

The trips will be distributed based on existing traffic patterns and the location of any local attractions.

(14) APPROVAL OF DATA COLLECTION ELEMENTS AND METHODOLOGIES:

Location	**Period**	
	AM	**PM**
S.R. 2018 and Highland Avenue	MTM 7-9AM	MTM 4-6PM
S.R. 2018 and Church Street	MTM 7-9AM	MTM 4-6PM
S.R. 2018 and Mattison Avenue	MTM 7-9AM	MTM 4-6PM
S.R. 2018 and Lindenwold Terrace/Avenue	MTM 7-9AM	MTM 4-6PM

(15) CAPACITY/LOS ANALYSIS:

Location	Period	Type
Site access intersections and study intersections listed above	AM and PM	Synchro 8 (HCM2010 Results)

(16) ROADWAY IMPROVEMENTS/MODIFICATIONS BY OTHERS TO BE INCLUDED:
(Projects programmed for construction of other developments with issued permits.)

None

(17) OTHER NEEDED ANALYSES:

(a) Sight Distance Analysis:
(Required for all site access driveways; identify other locations)

McMahon will complete this for the proposed site accesses

(b) Signal Warrant Analysis:

McMahon will perform a traffic signal warrant analysis at the intersection of S. Bethlehem Pike (S.R. 2018)and Mattison Avenue/Proposed Access in future with development conditions

(c) Required Signal Phasing/Timing Modifications:

McMahon will indicate any proposed signal modifications at S. Bethlehem Pike (S.R. 2018) and Highland Avenue

(d) Traffic Signal Corridor/Network Analysis:

If a signal is warranted at S. Bethlehem Pike (S.R. 2018) and Mattison Avenue under build conditions, a corridor analysis will be performed for S. Bethlehem Pike (S.R. 2018)/Highland Avenue and S. Bethlehem Pike (S.R. 2018)/Mattison Avenue, as they are approximately 1,100 feet apart.

(e) Analysis of the Need for Turning Lanes:

McMahon will complete this at the proposed accesses, as applicable, using PennDOT's latest guidelines in Publication 46. It should be noted that S. Bethlehem Pike (S.R. 2018) contains a two-way left-turn lane (TWLTL) along the site frontage.

(f) Turning Lane Lengths:

McMahon will complete this at the proposed accesses, as applicable, using PennDOT's latest guidelines in Publication 46 and 95th percentile queues.

(g) Left Turn Signal Phasing Analysis:

Left Turn conflict factors will be analyzed to determine if left turn advanced phasing is warranted at the existing signalized intersection at S. Bethlehem Pike (S.R. 2018) and Highland Avenue; as well as the proposed signal at S. Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Driveway.

(h) Queuing Analysis:

McMahon will complete this at the study intersections based on our Synchro analyses results.

(i) Gap Studies:

McMahon will complete this, if necessary.

(j) Crash Analysis:

Crash data will be requested from PennDOT (reportable) and Upper Dublin Township (non-reportable) for the study intersections.

(k) Weaving Analysis:

N/A

(l) Other Required Studies:

N/A

(18) ADDITIONAL COMMENTS OR RECOMMENDATIONS RELATIVE TO THE SCOPE OF THE TIS:

N/A

_____ Date: _____

Signature of Applicant's Engineer

_____ Date: _____

Signature of District Traffic PennDOT Representative

_____ Date: _____

Signature of District Permit PennDOT Representative (if present)

_____ Date: _____

Signature of Municipal Traffic Representative

Please do not hesitate to contact me with any questions. Thank you.

Sincerely,

John R. Wichner, P.E., PTOE
Senior Project Manager

Attachments

cc: Paul Leonard, Upper Dublin Township
Jeffrey Wert, P.E., PLS, Metz Engineers
Dean Kaiser, P.E., PTOE, Orth-Rodgers & Associates
Peter Monaghan, Manager, Lindenwold Residential Associates, LLC
Robert Freedman, The Goldenberg Group
Casey A. Moore, P.E., McMahon Associates, Inc.
Heather M. Balgowan, P.E., McMahon Associates, Inc.

List of Potential Scoping Meeting Attendees:

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PennDOT District 6-0
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FHanney@pa.gov

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Upper Dublin Township
Township Manager
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Pete Guidi
Guidi Homes
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Peter Monaghan
Lindenwold Residential Associates, LLC
pmonaghan@strategic-realty.com

pennsylvania
DEPARTMENT OF TRANSPORTATION
www.dot.state.pa.us

RECEIVED
NOV 27 2013

November 21, 2013

MONTGOMERY COUNTY, UPPER DUBLIN TWP.
S.R. 2018 Bethlehem Pike
St. Mary's Villa Development
TRAFFIC LOG NO.: M13-101XQ
TRANSPORTATION IMPACT STUDY

John Wichner, P.E.
McMahon Transportation Engineers & Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Dear Mr. Wichner,

The Scoping Meeting application for the Transportation Impact Study prepared by McMahon Transportation Engineers & Planners, dated October 28, 2013 has been reviewed by the District Traffic Unit. The scoping application identifies the following:

Proposed Development:	34 Single Family Attached Twins
	54 Single Family Attached Townhomes
	40 Age Targeted Condominiums
	250 Senior Independent Living Apartments
Location:	SR 2018 Bethlehem Pike between Lindenwold Terrace and Church Street.
Phasing/Build-out:	2016
Proposed Access	Full access and an in only on SR 2018 Bethlehem Pike and an in only off of Lindenwood Terrace.

Trip Generation, TIS Study Area, TIS Analysis periods and times are acceptable. Once the study is completed it should be forwarded to both Ambler Borough and Upper Dublin Township since Bethlehem Pike boarder's two municipalities. A meeting between Ambler Borough, Upper Dublin Township, the developer and PennDOT should be arranged to discuss the proposed access and signalization. The Department wants to explore the overall access and signalization scheme with both municipalities and the developer prior to making a final determination of the most optimal plan.

If there are any questions or comments concerning this matter, please contact myself at 610-205-6560 or fhanney@pa.gov or Susan LaPenta at 610-205-6595 or slapenta@pa.gov.

Respectfully,

Francis J. Hanney
District Traffic Services Manager
Engineering District 6-0

cc: S. Fletcher
L.R. Belmonte
Traffic Services File
Ambler Borough
Upper Dublin Twp.
Montgomery County Planning Commission

pennsylvania
DEPARTMENT OF TRANSPORTATION

July 20, 2015

MONTGOMERY COUNTY, UPPER DUBLIN TOWNSHIP AND AMBLER BOROUGH
SR 2018 (BETHLEHEM PIKE) SEGMENT 0110-0120
HIGHWAY OCCUPANCY PERMIT APPLICATION NO. M13-101XQ
ST. MARY'S VILLA RESIDENTIAL REDEVELOPMENT
TRAFFIC LOG NO.: M13-101XQ
PRELIMINARY REVIEW OF SUPPLEMENTAL SCENARIO ANALYSIS

McMahon Associates, Inc.
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Dear Mr. Wichner:

The Department has reviewed the supplemental scenario analysis submission for compliance with applicable Department Regulations. This preliminary review has identified deficiencies that must be addressed in order for your application submission to be processed as efficiently as possible.

Our comments on the submission are as follows:

PRELIMINARY COMMENTS

1. The Department's concern about signalization of Mattison Avenue remains. The assumptions utilized in the warrant analysis with respect to traffic redirection aren't firm, and when Mattison Avenue is converted to one-way by Ambler Borough the traffic volume will be reduced further at Mattison Avenue. It is requested that a second meeting be scheduled with Upper Dublin Township, Ambler Borough, the Developer, and the Department to discuss this issue.

2. Scenario 3B (Signal at Lindenwold with exiting left turn site access onto Lindenwold) provides the greatest improvement to traffic flow for the single signalized intersection options. All movements at the Lindenwold Ave and Mattison Ave intersections with Bethlehem Pike are expected to operate at LOS C or better. Without left turn site access onto Lindenwold, the analysis shows that either the westbound Lindenwold or Mattison Avenue approaches are expected to operate at LOS E depending on which intersection is signalized.

3. The analysis submitted for review includes a diversion of traffic from eastbound Lindenwold Ave onto eastbound Mattison Ave to account for traffic that may divert to the proposed signal on Mattison Ave (Scenarios 1A & 2A). However, this diversion is also included in the scenarios where a signal is proposed on Lindenwold Ave (Scenarios 1B, 1C, 2B, 2C, 3B, & 3C). This additional traffic on Mattison Ave may negatively amplify the stated LOS results for the proposed driveway on Bethlehem Pike across from Mattison Ave (reported as LOS E during AM and PM peak for westbound Proposed Driveway approach).

Additional comments may follow upon review of the submitted application. If you have any questions pertaining to the technical aspects of this review, please contact Drew E. Sirianni, PE of Pennoni at (215) 254-7893 or DSirianni@pennoni.com.

Respectfully,

Francis J. Hanney
District Traffic Services Manager
Engineering District 6-0

cc: Matthew Miele, PE
Louis Belmonte, PE
Traffic Services File
Upper Dublin Township
John Smyth, PE, Boles Smyth
Ambler Borough
Michael Shinton, PE, Gilmore & Associates
Montgomery County Planning Commission

pennsylvania
DEPARTMENT OF TRANSPORTATION

Date: 08/10/2016

Subject: Highway Occupancy Permit Application No. 113792 Returned For Revisions

To: Lindenwold Residential Associates, LLC
P.O. Box 845
Bensalem, PA 19020

From: PennDOT Engineering District 6-0
7000 Geerdes Boulevard
King of Prussia, PA 19406

Dear Applicant,

PennDOT has reviewed your application for completeness, consistency and compliance with applicable Department Regulations. This review has identified issues that must be addressed in order for our review to continue.

The Department's review comments are attached.

Once the comments have been addressed, please resubmit the application and associated material for further review.

Upon resubmission, the applicant's engineer should put together a letter that describes how each comment has been addressed and where each can be found. This will help expedite the review. For guidance on HOP applications refer to 67 PA Code, Chapter 441, Chapter 459 and PennDOT Publication 282, "Highway Occupancy Permit Guidelines". Additional comments may follow upon review of the resubmitted application.

If you have any questions regarding this matter, you may contact Drew Sirianni of Pennoni Associates, at (215) 254-7893.

pennsylvania
DEPARTMENT OF TRANSPORTATION

Response Comments
Date: 08/10/2016
Application Number: 113792

Form Letter Notes

(1) * Upon resubmission, the applicant's engineer should put together a letter that describes how each comment has been addressed and where each can be found in the plan set. A copy of these comments and any previously submitted plans should also be provided.

* Additional comments may follow upon review of the resubmitted application. If you have any questions pertaining to the technical aspects of this review, please contact the Department's representative, Drew E. Sirianni, PE, PTOE of Pennoni at (215) 254-7893 or DSirianni@Pennoni.com.

* For guidance on Highway Occupancy Permit applications refer to PA Code Title 67, Chapter 441, Chapter 459 and PennDOT Publication 282. This will help expedite the review.

General

(1) The traffic signal warrant is not satisfied at the intersection of Bethlehem Pike (SR 2018) and Mattison Avenue and therefore the Department does not support the construction of a traffic signal at this location. The Department typically requires Warrant 1 (Eight Hour Vehicular Volume) or Warrant 2 (Four Hour Vehicular Volume) to be met; only under special circumstances can Warrant 3 (Peak Hour) be applied (e.g. industrial facilities, sports complexes, etc).

The TIS states that the Trip Generation Manual may be underestimating the traffic volumes generated by the proposed Senior Adult Housing since it provides additional amenities for the residents such as dining facilities, medical facilities, and other services, whose trips do not appear to be factored in ITE's general description of Land Use Code 252. The Department understands that the Trip Generation Manual may be underestimating the trips, therefore the applicant's engineer may conduct traffic counts at three similar sites in lieu of utilizing the estimates from the Trip Generation Manual. Please be aware that trip generation rates that are developed based on traffic counts at three similar sites will require approval of PennDOT Central Office. In lieu of developing custom trip generation rates based on three similar sites, traffic counts can be conducted after the proposed site is open and fully occupied to determine if the traffic signal warrant is satisfied.

(2) PLEASE SUBMIT A CHECK FOR $100.00 MADE PAYABLE TO PENNDOT-ATTN: MARY

ELLEN CULHANE, PERMITS UNIT, 7000 GEERDES BLVD. KING OF PRUSSIA, PA. 19406. PLEASE INCLUDE THE APPLICATION NUMBER ON THE CHECK FOR OUR REFERENCE.

(3) The following comments pertain to the roundabout concepts.

GENERAL

a. Based on the roundabout concepts provided, neither concept appears to be infeasible, however it is recognized that significant property owner coordination is required. Since the volume of traffic on Lindenwold is higher than Mattison is seems that Lindenwold is a more logical location for a roundabout, however the Mattison location would still be acceptable.

b. The proposed medians on the northbound and southbound approaches of both roundabouts could be cut back substantially in order to maintain existing level of access (left turns) in and out of several properties along SR 2018.

c. A stone wall that is old, is not necessarily historical. It appears that there is sufficient setback available to relocate/reconstruct the wall if necessary to accommodate construction of the roundabout. In order to further assess impacts, please provide formal documentation from a historical/cultural resources professional and/or PHMC indicating that the stone walls shown on the plan are historical/cultural resources.

BETHLEHEM PIKE (SR 2018) AND MATTISON AVENUE

d. Approval from Ambler Borough will be required for the removal of any on-street parking spaces on Mattison Avenue. The proposed median on the eastbound approach could be cut back to minimize the number of lost on-street parking spaces.

BETHLEHEM PIKE (SR 2018) AND LINDENWOLD TERRACE/AVENUE

e. The location of the crosswalk over the eastern leg of the roundabout should be revised so that the existing residential driveway doesn't need to be removed.

f. The plan indicates removal of driveways on the southbound approach, however there do not appear to be any driveways in this area. Please clarify.

Transportation Impact Study/Transportation Impact Assessment

(1) As previously indicated, the following information must be provided and/or revised:

a. Provide crash data/history for critical intersections/roadway network. A summary of crash analysis can be included in the report; however, actual crash records should be included within the appendix with a confidentiality statement on the cover. It is recommended to separate the crash record appendix from the main TIS report.

b. Auxiliary turn lane warrant analysis, in accordance with PennDOT Publication 46.

(2) Please provide Synchro files for review.

(3) Please provide the roundabout analysis using the HCS or SIDRA software. The analysis model must be calibrated to local conditions by updating the critical and follow-up headway based on the HCM 2015 updated values.

Signal Section (Publication 46, 148 And 149)

(1) As indicated in the previous review, the traffic signal warrant analysis was performed using the 70% reduction for the Four-Hour Vehicular Volume warrant, based on an 85th percentile speed on Bethlehem Pike (SR 2018) > 40 MPH. The posted speed limit on Bethlehem Pike is 40 MPH and no ATR/speed study data has been provided. Please provide a speed study for Bethlehem Pike (SR 2018). If the speed study does not indicate an 85th percentile speed of 45 MPH or greater then revise the signal warrant analysis without the 70% reduction.

APPENDIX B

Study Area Sketches, Photographs, Sight Distance Worksheets (M-950S), and Signal Permit Plans

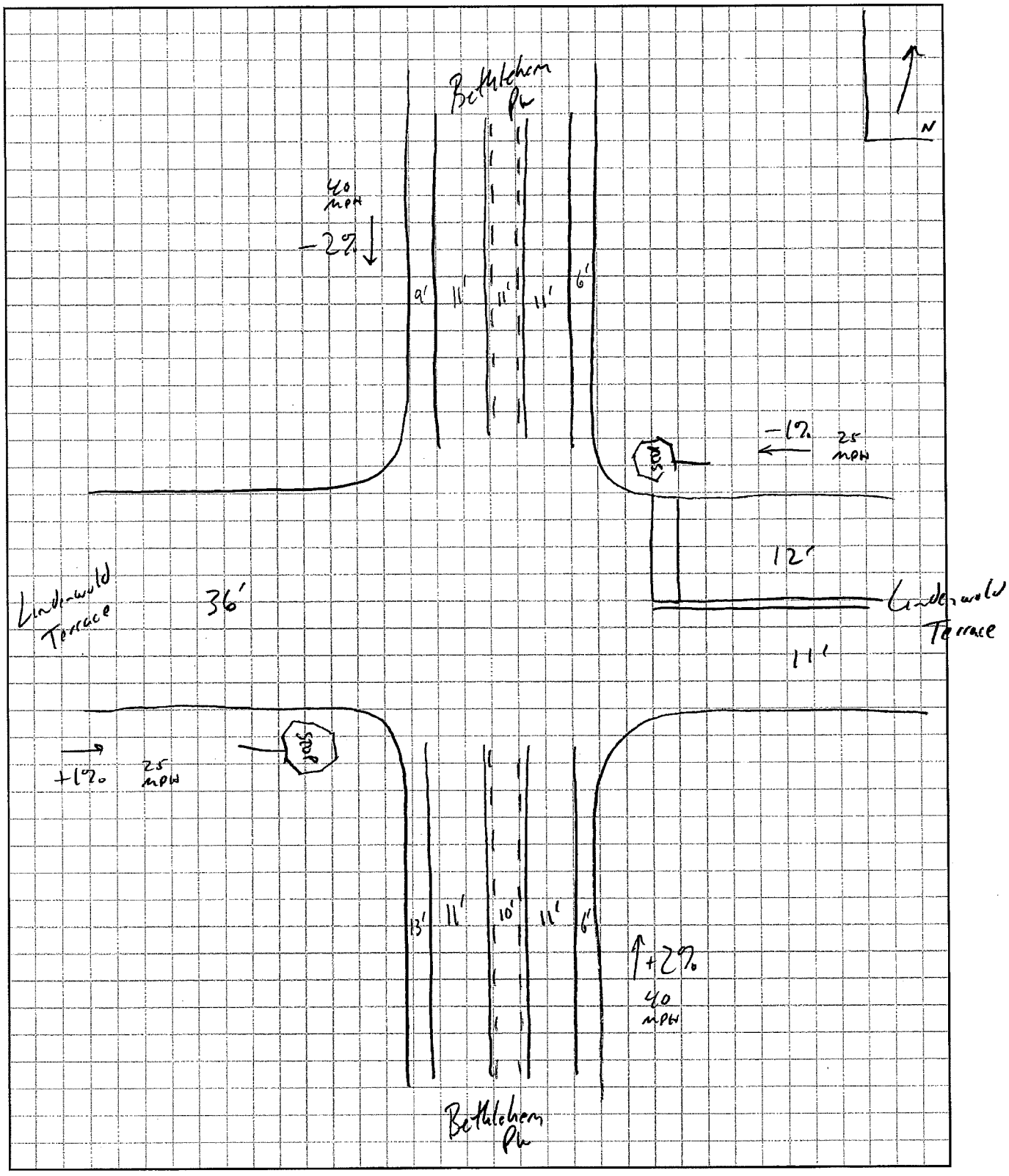
McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. _____ Sheet ____ of ____

Description Bethlehem Pk + Lindenwold Terrace

Designed By MOB Date 3/11/14

Checked By _____ Date _____

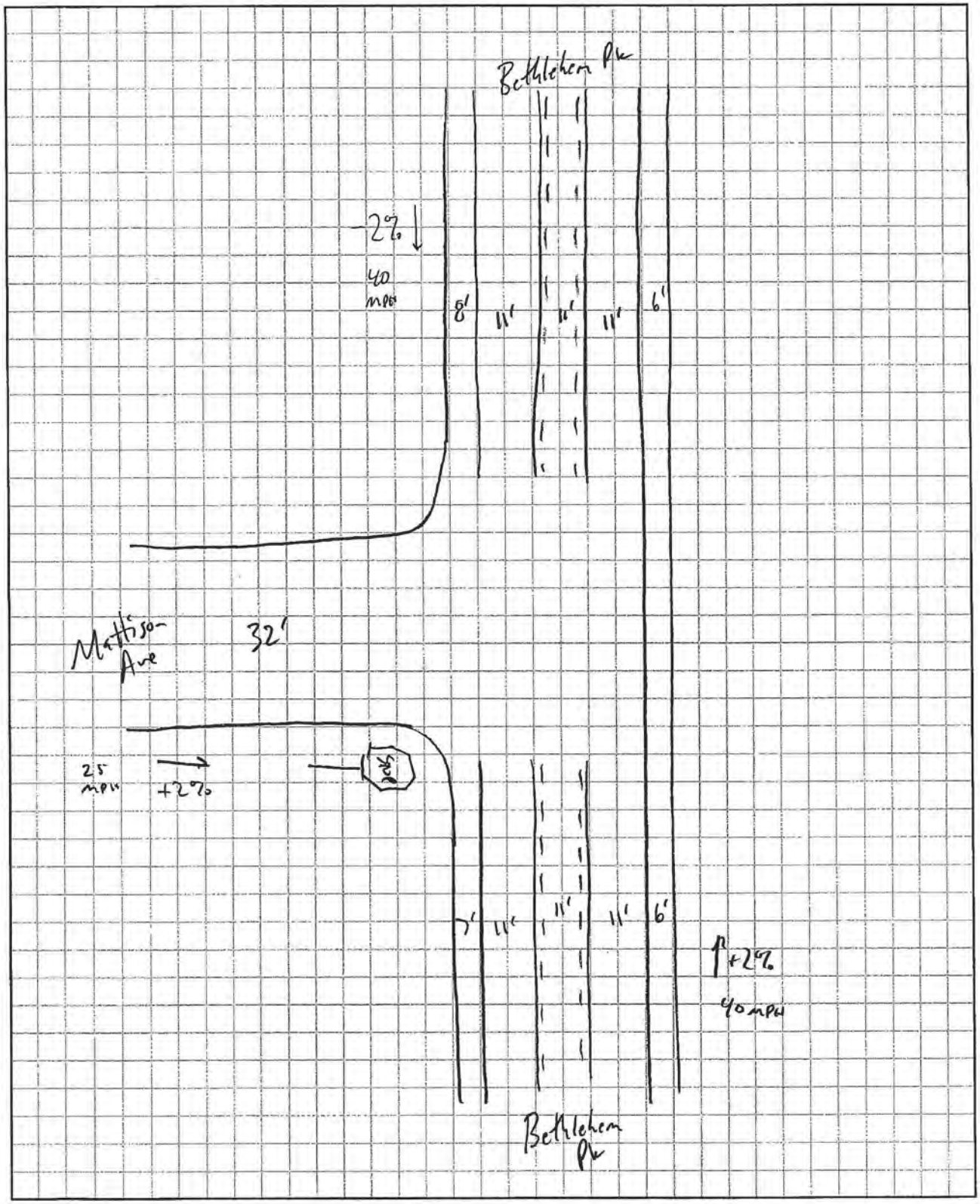


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. _____ Sheet ____ of ____

Description Bethlehem Pk + Mattison Ave Designed By MDB Date 3/11/14

Checked By _____ Date _____



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. _____ Sheet ____ of ____

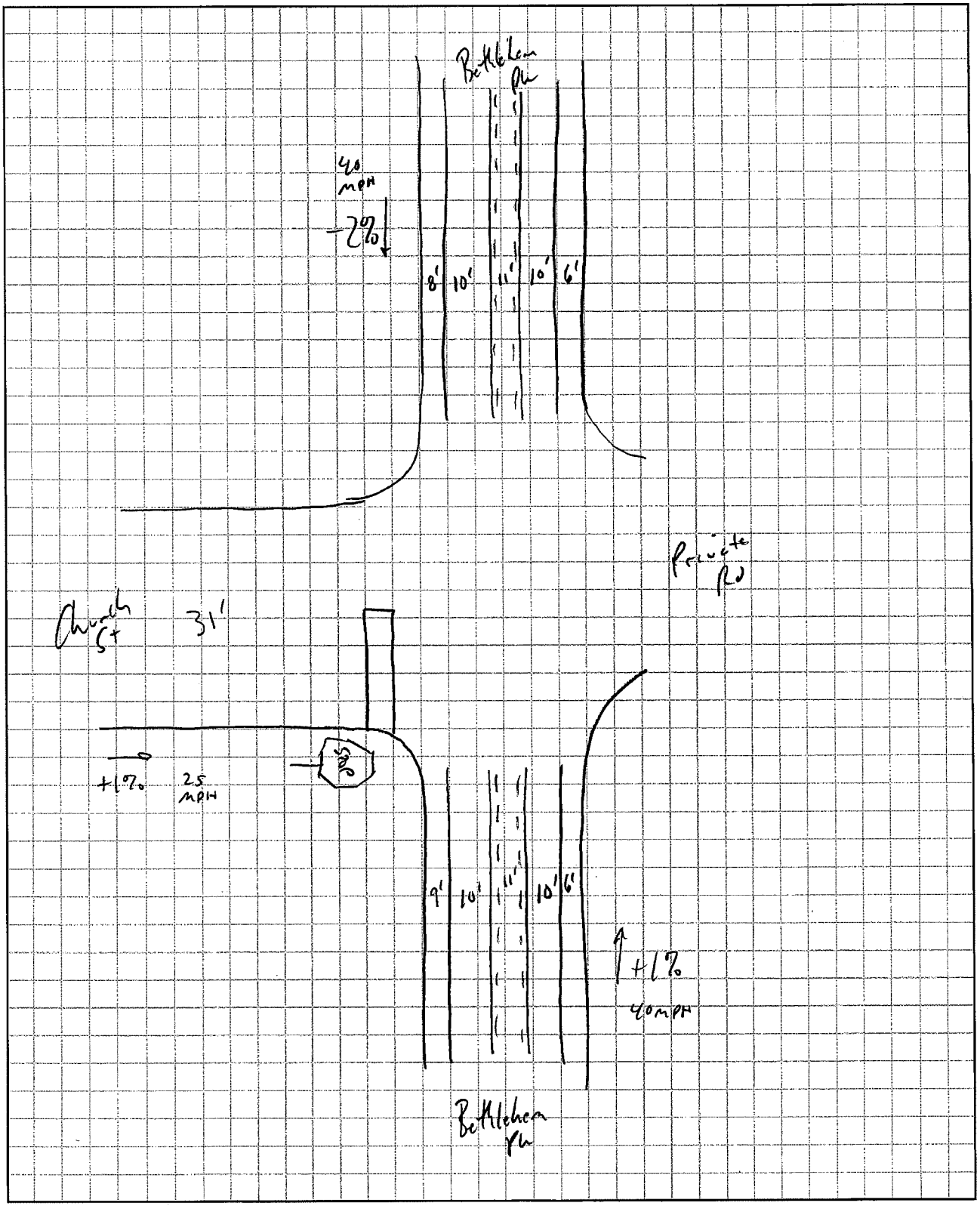
Description Bethlehem Pk + Church Street

Designed By MDB

Date 3/11/14

Checked By _____

Date _____



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Job _____ McMahon Project No. _____ Sheet ____ of ____

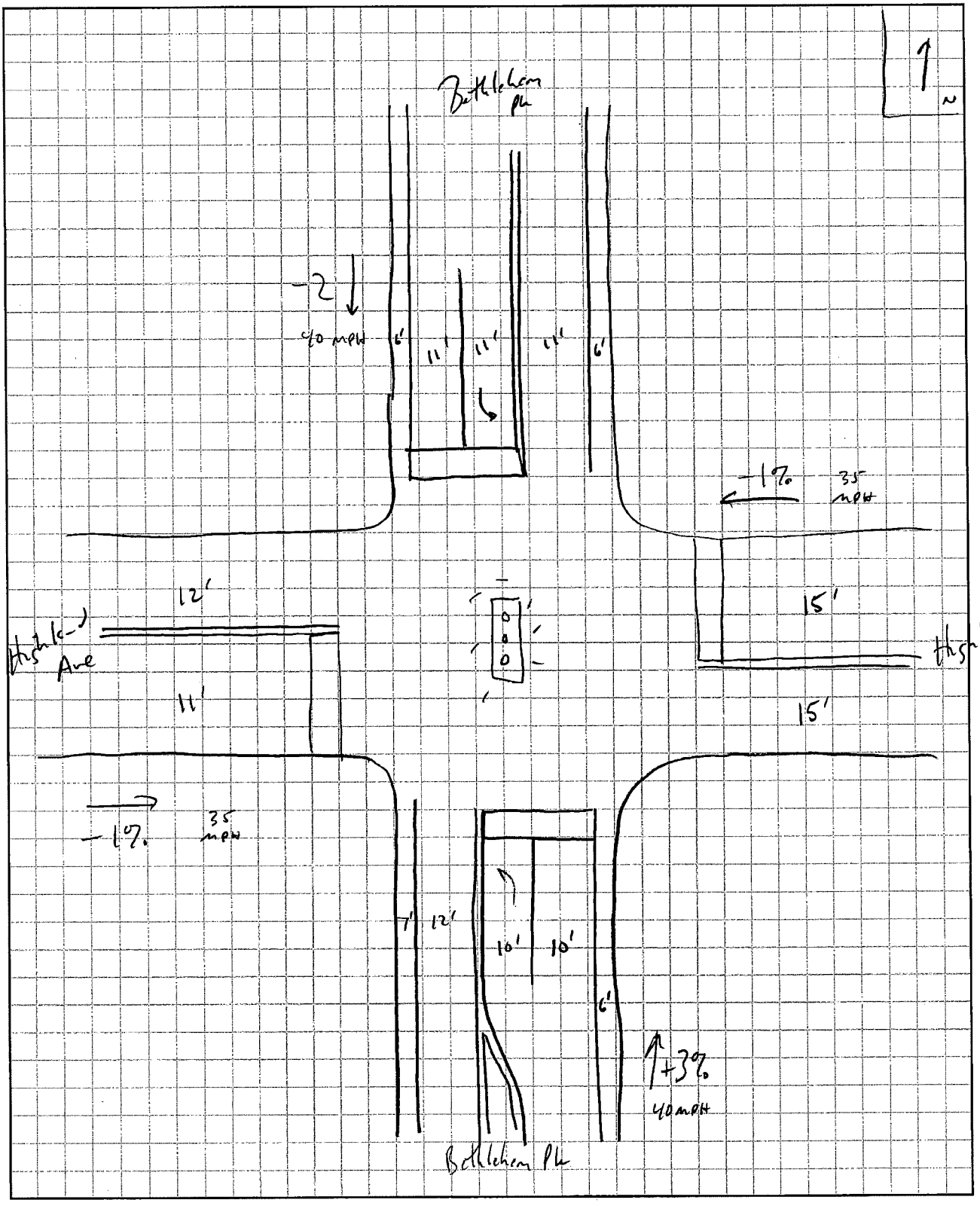
Description Bethlehem Pk + Highland Ave

Designed By NSB

Checked By _____

Date 3/11/14

Date _____



Lindenwold Terrace access

M-950S (3-04)
PENNDOT

DRIVEWAY SIGHT DISTANCE MEASUREMENTS

(FOR LOCAL ROADS, USE PENNDOT PUB 70)

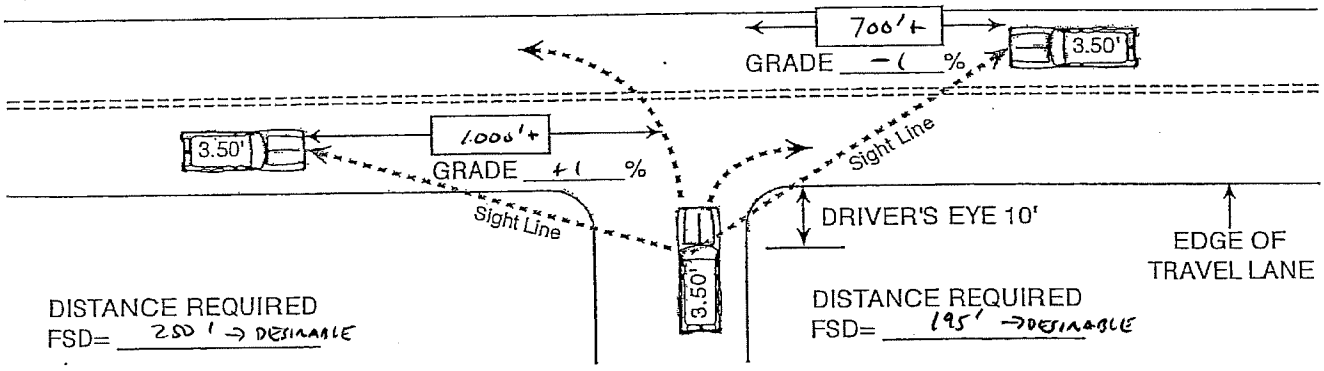
APPLICANT _____ APPLICATION NO. _____

S.R. _____ SEG. _____ OFFSET _____ LEGAL SPEED LIMIT 25 mph

MEASURED BY MOB DATE 3/11/14

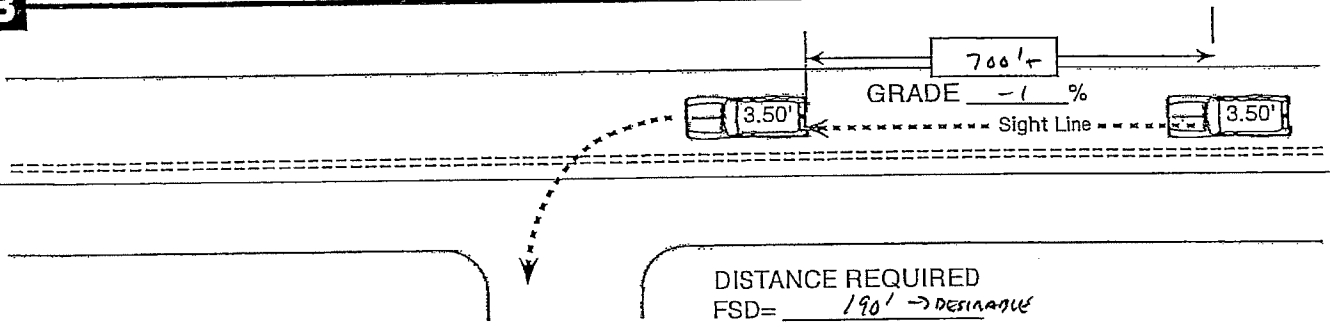
FOR DEPARTMENT USE ONLY: Safe-Running Speed _____ 85th Percentile Speed _____

A



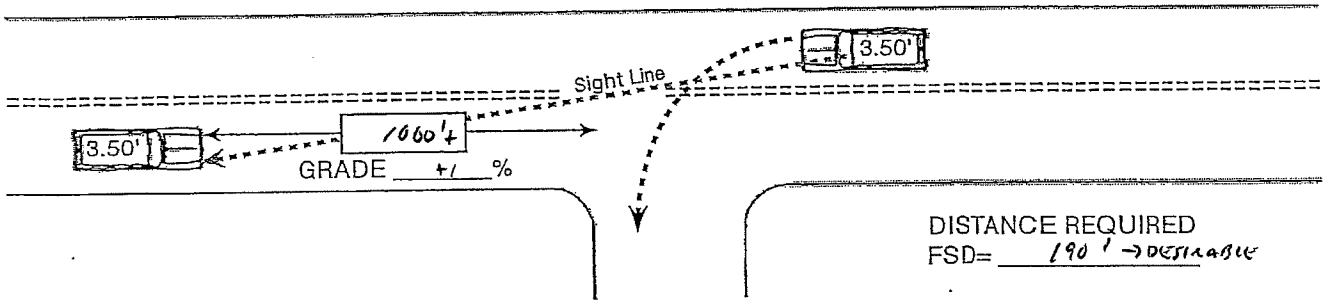
THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER AT A DRIVEWAY LOCATION CAN CONTINUOUSLY SEE ANOTHER VEHICLE APPROACHING ON THE ROADWAY.

B



THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER ON THE ROADWAY CAN CONTINUOUSLY SEE THE REAR OF A VEHICLE WHICH IS LOCATED IN THE DRIVER'S TRAVEL LANE AND WHICH IS POSITIONED TO MAKE A LEFT TURN INTO A DRIVEWAY.

C



THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER OF A VEHICLE INTENDING TO MAKE A LEFT TURN INTO A DRIVEWAY CAN CONTINUOUSLY SEE A VEHICLE APPROACHING FROM THE OPPOSITE DIRECTION.

proposed opposite Mattison

M-950S (3-04)
PENNDOT

DRIVEWAY SIGHT DISTANCE MEASUREMENTS

(FOR LOCAL ROADS, USE PENNDOT PUB 70)

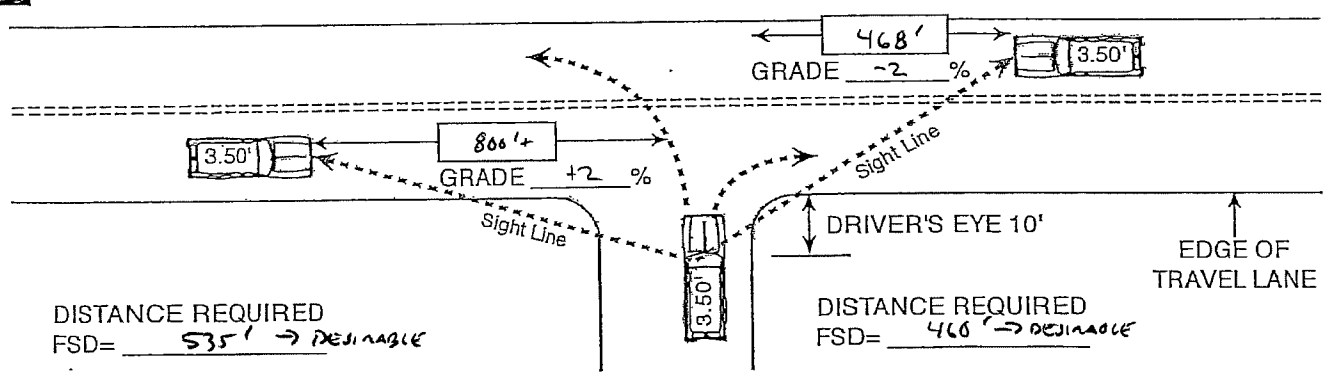
APPLICANT _____ APPLICATION NO. _____

S.R. _____ SEG. _____ OFFSET _____ LEGAL SPEED LIMIT 40 mph

MEASURED BY MDS DATE 3/11/14

FOR DEPARTMENT USE ONLY: Safe-Running Speed _____ 85th Percentile Speed _____

A



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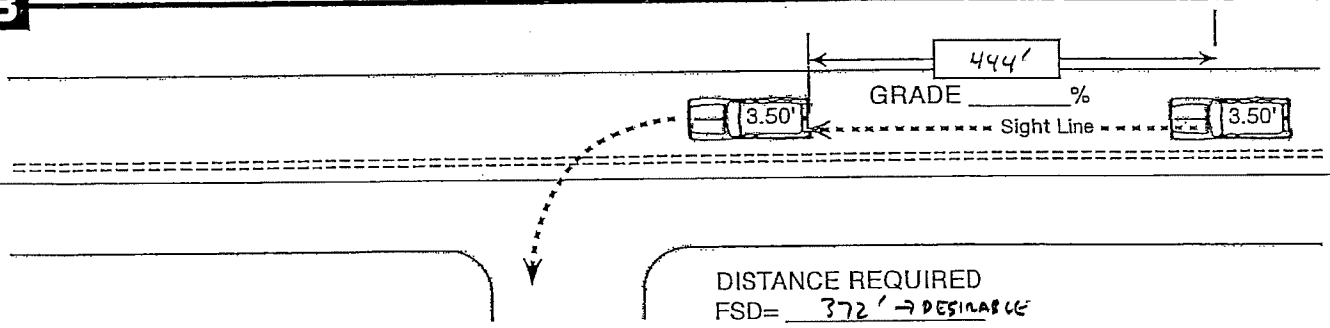

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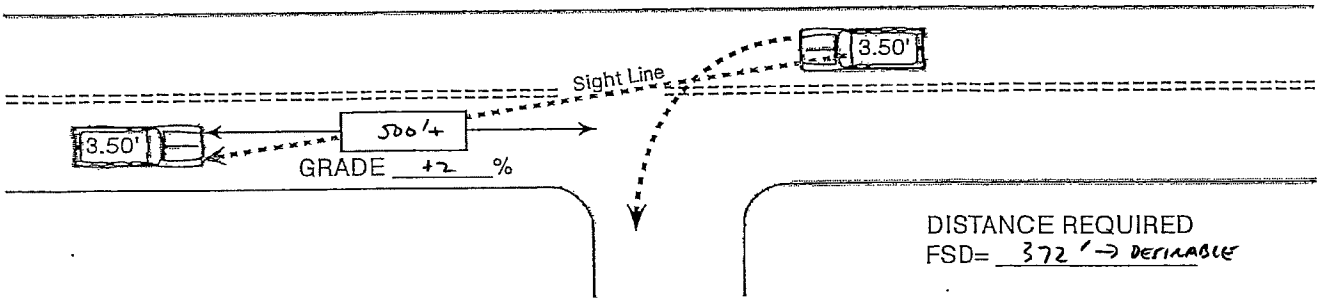
C



THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER OF A VEHICLE INTENDING TO MAKE A LEFT TURN INTO A DRIVEWAY CAN CONTINUOUSLY SEE A VEHICLE APPROACHING FROM THE OPPOSITE DIRECTION.

proposed opposite Church

M-950S (3-04)
PENNDOT

DRIVEWAY SIGHT DISTANCE MEASUREMENTS

(FOR LOCAL ROADS, USE PENNDOT PUB 70)

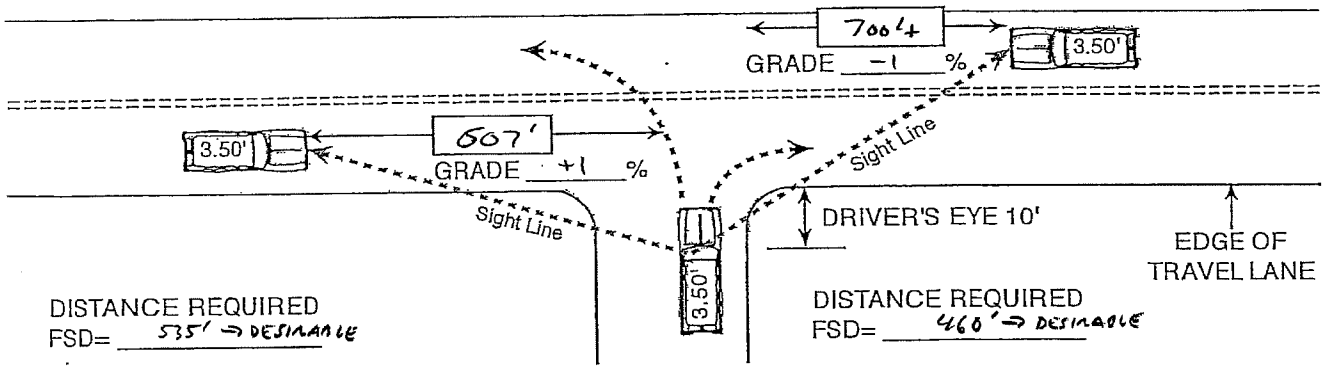
APPLICANT _____ APPLICATION NO. _____

S.R. _____ SEG. _____ OFFSET _____ LEGAL SPEED LIMIT 40mph

MEASURED BY NOB DATE 3/11/14

FOR DEPARTMENT USE ONLY: Safe-Running Speed _____ 85th Percentile Speed _____

A



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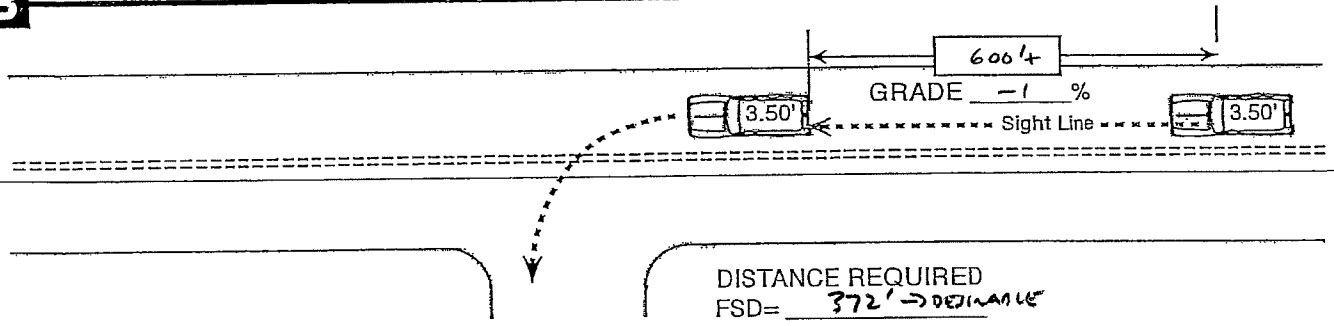
B



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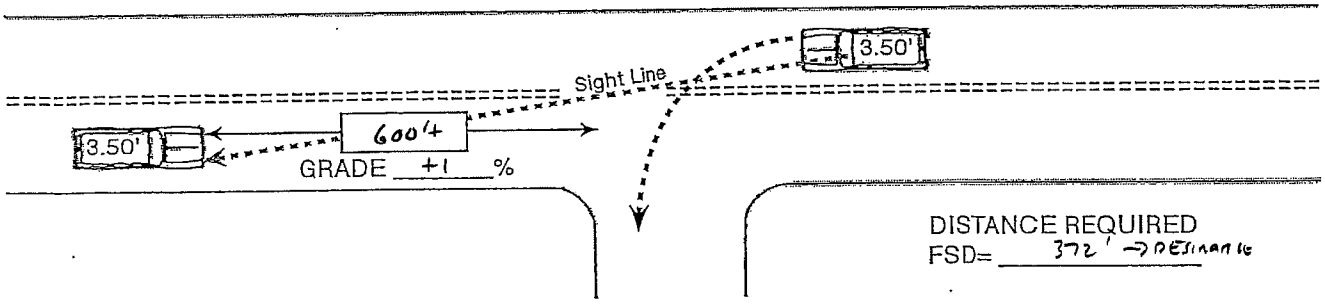
C



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IMG_0851.JPG

Highland & Bethlehem - Looking west

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0852.JPG

Highland & Bethlehem - Looking east

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0853.JPG

Highland & Bethlehem - Looking west from intersection

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0854.JPG

Highland & Bethlehem - Looking south from intersection

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0855.JPG

Highland & Bethlehem - Bethlehem NB Approach

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0856.JPG

Highland & Bethlehem - Eastbound Departure

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0857.JPG

Highland & Bethlehem - Looking north on Bethlehem

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0858.JPG

Highland & Bethlehem - Southbound Approach

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0859.JPG

Bethlehem & Church - Church Eastbound Approach

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0860.JPG

Bethlehem & Church -Looking west on Church

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0861.JPG

Bethlehem & Church -Access opposite Church

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0862.JPG

Bethlehem & Church -Looking north on Bethlehem from Church

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0863.JPG

Bethlehem & Church -Looking south on Bethlehem from Church

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0864.JPG

Bethlehem & Church Access opposite Church

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0865.JPG

Bethlehem & Church -SD Looking Left

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0866.JPG

Bethlehem & Church -SD Looking Right

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0867.JPG

Bethlehem & Church -SD LT Looking Ahead

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0868.JPG

Bethlehem & Church -S DLT Looking Behind

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0869.JPG

Bethlehem & Mattison = Mattison Looking east

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0870.JPG

Bethlehem & Mattison = Mattison Looking west

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0871.JPG

Bethlehem & Mattison = Looking south on Bethlehem from Mattison

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0872.JPG

Bethlehem & Mattison = Looking north on Bethlehem from Mattison

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0873.JPG

Bethlehem & Mattison = SD Looking Left

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0874.JPG

Bethlehem & Mattison = SD Looking Right

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0875.JPG

Bethlehem & Mattison = SD LT Looking Ahead

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0876.JPG

Bethlehem & Mattison = SD Looing Back

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0877.JPG

Bethlehem & Lindenwold = Bethlehem NB Departure

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0878.JPG

Bethlehem & Lindenwold = Bethlehem SB Approach

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0879.JPG

Bethlehem & Lindenwold = Looking west on Lindenwold

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0880.JPG

Bethlehem & Lindenwold = Liondenwold EB Approach

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0881.JPG

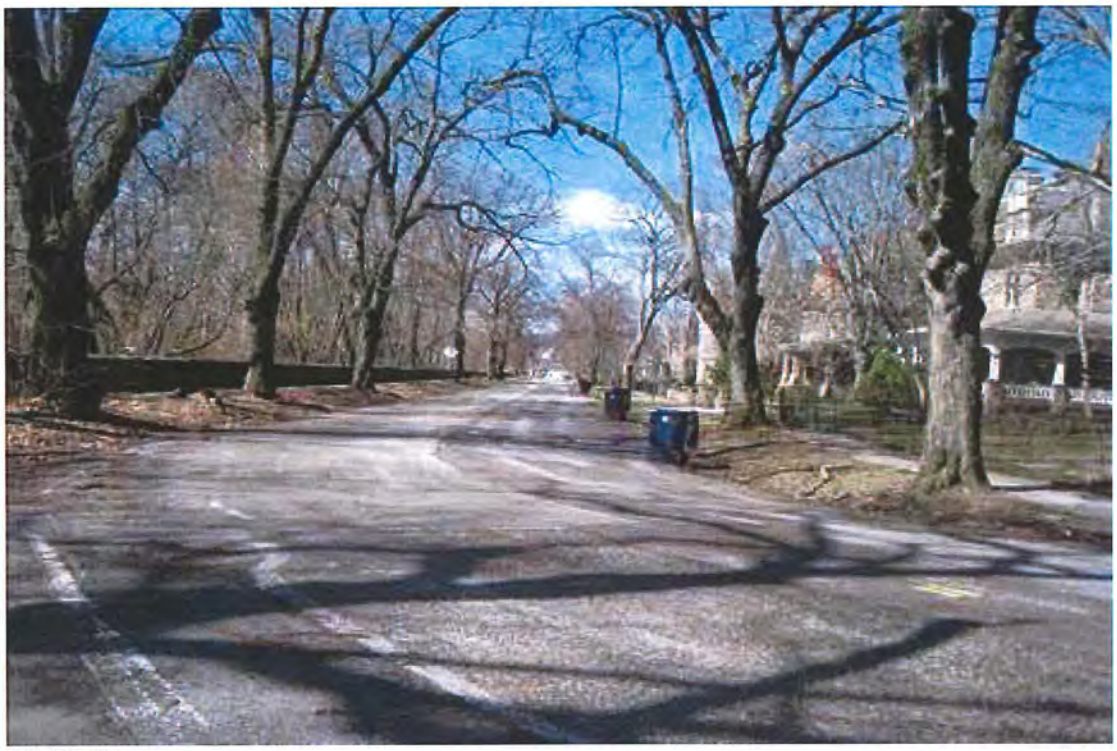
Bethlehem & Lindenwold = Lindenwold EB Departure

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0882.JPG

Bethlehem & Lindenwold = Lindenwold WB Approach

Upper Dublin Township, Montgomery County, Pennsylvania



IMG_0883.JPG

Lindenwold SB - Looking Left

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0884.JPG

Lindenwold SB - Looking Right

Upper Dublin Township, Montgomery County, Pennsylvania

IMG_0885.JPG

Lindenwold SB - LT Looking Ahead

Upper Dublin Township, Montgomery County, Pennsylvania

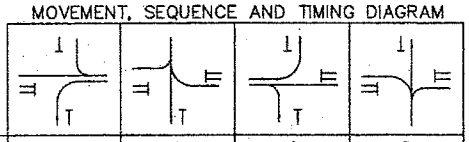
IMG_0886.JPG

Lindenwold SB - LT Looking Back

Upper Dublin Township, Montgomery County, Pennsylvania

EMERGENCY PRE-EMPTION PHASING

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

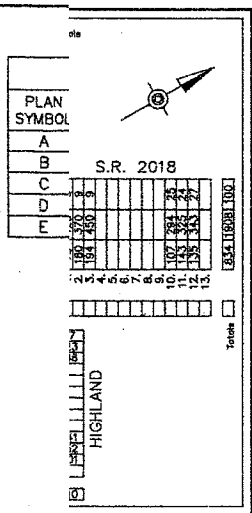


PHASE	2				4				6				8			
INTERVAL / SIGNALS	10	11	12		13	14	15		16	17	18		19	20	21	
1	G/A	Y ⓐ	R ⓑ		R	R	R		R	R	R		R	R	R	
2,9	G	Y ⓑ	R ⓑ		R	R	R		R	R	R		R	R	R	
3,4	R	R	R		R	R	R		G	Y ⓐ	R ⓑ		R	R	R	
5,6	R	R	R		G	Y	R		R	R	R		R	R	R	
7,8	R	R	R		R	R	R		R	R	R		G	Y	R	
10,11	R	R	R		R	R	R		R	R	R		R	R	R	
FIXED	**	4	2		**	4	2		**	4	2		**	4	2	

** FOR DURATION OF PRE-EMPTION

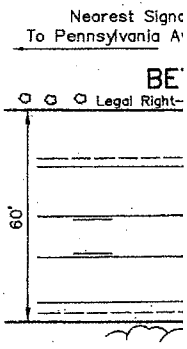
NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

ⓐ G/A WHEN RETURNING TO NORMAL OPERATION
ⓑ G WHEN RETURNING TO NORMAL OPERATION

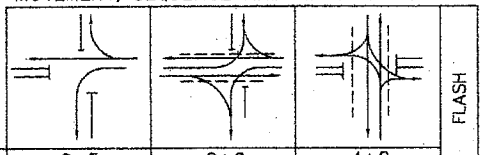


EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF BETHLEHEM PIKE (S.R. 2018) AND THE EASTBOUND & WESTBOUND APPROACHES OF HIGHLAND AVENUE WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION. THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH. LOCATION OF EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY. FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF SIGNALS HAVE BEEN ACTUATED BY PEDESTRIAN PUSH BUTTON AND THE SIGNAL IS PRE-EMPTED, THE PEDESTRIAN TIME SHALL BE SPLIT BETWEEN "PED WALK" AND "PED CLEAR". THE "PED WALK" INTERVAL SHALL TERMINATE IMMEDIATELY FOLLOWED BY THE "PED CLEAR" INTERVAL. THIS INTERVAL SHALL TIME OUT FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE GOING INTO EMERGENCY PRE-EMPTION.
- IF THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, ARE FLASHING ALL SIGNALS SHALL REMAIN FLASHING.
- IF ADDITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE ORIGINAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+6 INTERVAL 4 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.



MOVEMENT, SEQUENCE AND TIMING DIAGRAM



PHASE	2+5				2+6				4+8				FLASH
INTERVAL / SIGNALS	1	2	3		4	5	6		7	8	9		
1	G/A	Y ①	R ②		G	Y	R		R	R	R		Y
2,9	G	Y ②	R ②		G	Y	R		R	R	R		Y
3,4	R	R	R		G	Y	R		R	R	R		Y
5,6,7,8	R	R	R		R	R	R		G	Y	R		R
10	R	R	R		G	Y	R		R	R	R		OFF
11	R	R	R		G	Y	R		R	R	R		OFF

FIXED		4	2			4	2			4	2	
MINIMUM	3				27				3			
PASSAGE	3								3			
MAXIMUM 1	7								21			
MAXIMUM 2	7								16			
PEDESTRIAN*									17			
MEMORY	NL				MN				NL			

* UPON PEDESTRIAN ACTUATION ONLY

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 212.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE LATEST AMENDMENT TO ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, DATED DECEMBER 20, 1974.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT FOR REVIEW PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: MONTGOMERY

MUNICIPALITY: UPPER DUBLIN TOWNSHIP

INTERSECTION: BETHLEHEM PIKE (S.R. 2018) AND HIGHLAND AVENUE

REVIEWED:

DATE

MUNICIPAL OFFICIAL DATE

RECOMMENDED:

J. BARSZOWSKI 7/13/73
SIGNALS ENGINEER DATE

ED WOODS JR. 7/13/73
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	ADDED SIGNS "A"&"B"	PAI	12/30/98	MLK	1/21/99	DWM	1/21/99
2	NEW PLAN---SR 0309 SEC. 2FF	ORA	5/17/04	MLK	8/20/04	LRB	9/20/04
3	ADD PRE-EMPT TO ALL APPROACHES	BJD	9/8/04	ABP	9/21/04	LRB	9/22/04
4	REVISED CLEARANCES	JLH	12/28/10	PLA	[illegible]	[illegible]	[illegible]
5							
6							
7							
8							

SHEET 2 OF 2 | PERMIT # 64-1793 | FILE # 1793

APPENDIX C

Automatic Traffic Recorder (ATR) Counts

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Variable
ATR#/Operator: 11134/NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Lindenwold Terrace east of
Bethlehem Pike
Latitude: 0' 0.000 Undefined

Eastbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/04/14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	**4**	10	13	7	0	0	0	0	0	0	0	0	0	34	25	28
13:00	2	11	14	9	1	0	0	0	0	0	0	0	0	37	26	29
14:00	3	6	16	9	0	0	0	0	0	0	0	0	0	34	26	29
15:00	2	8	15	13	**3**	0	0	0	0	0	0	0	0	41	28	31
16:00	2	8	20	17	1	0	0	0	0	**1**	0	0	0	49	27	29
17:00	4	6	**24**	**18**	3	0	0	0	0	0	0	0	0	**55**	28	30
18:00	3	**12**	21	5	0	0	0	0	0	0	0	0	0	41	24	27
19:00	1	8	8	9	0	0	0	0	0	0	0	0	0	26	27	29
20:00	1	4	6	4	1	0	0	0	0	0	0	0	0	16	26	28
21:00	1	5	8	5	0	0	0	0	0	0	0	0	0	19	27	29
22:00	0	1	5	1	0	0	0	0	0	0	0	0	0	7	24	24
23:00	1	3	4	1	0	0	0	0	0	0	0	0	0	9	23	23
Total	24	82	154	98	9	0	0	0	0	1	0	0	0	368		
Percent	6.5%	22.3%	41.8%	26.6%	2.4%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%			
AM Peak Vol.																
PM Peak	12:00	18:00	17:00	17:00	15:00					16:00				17:00		
Vol.	4	12	24	18	3					1				55		

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Station ID: 00000000000000000000
Lindenwold Terrace east of
Bethlehem Pike
Latitude: 0' 0.000 Undefined

Eastbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/05/14	0	1	1	1	0	0	0	0	0	0	0	0	0	3	*	*
01:00	1	2	2	0	0	0	0	0	0	0	0	0	0	5	*	*
02:00	0	1	0	1	0	0	0	0	0	0	0	0	0	2	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	1	1	1	0	0	0	0	0	0	0	0	0	0	3	*	*
05:00	1	2	2	2	0	0	0	0	0	0	0	0	0	7	*	*
06:00	2	8	14	9	0	0	0	0	0	0	0	0	0	33	27	29
07:00	1	10	19	**11**	3	0	0	0	0	0	0	0	0	44	27	30
08:00	4	**22**	20	1	1	0	0	0	0	0	0	0	0	48	23	24
09:00	2	5	15	5	**4**	0	0	0	0	0	0	0	0	31	29	32
10:00	**10**	10	12	5	0	0	**1**	0	0	0	0	0	0	38	24	27
11:00	9	10	**23**	7	1	0	0	0	0	0	0	0	0	**50**	25	28
12 PM	3	5	18	6	0	0	0	0	0	0	0	0	0	32	25	28
13:00	2	10	12	8	**2**	0	0	0	0	0	0	0	0	34	27	30
14:00	**9**	10	17	5	0	0	0	0	0	0	0	0	0	41	24	27
15:00	6	**25**	18	2	0	0	0	0	0	0	0	0	0	51	22	24
16:00	8	20	**28**	3	0	0	0	0	0	0	0	0	0	**59**	23	25
17:00	3	9	25	11	1	0	0	0	0	0	0	0	0	49	26	29
18:00	1	6	23	**12**	1	0	0	0	0	0	0	0	0	43	27	29
19:00	0	4	15	6	0	0	0	0	0	0	0	0	0	25	26	28
20:00	1	4	8	1	0	0	0	0	0	0	0	0	0	14	24	25
21:00	0	4	1	5	0	0	0	0	0	0	0	0	0	10	28	29
22:00	1	3	8	3	1	0	0	0	0	0	0	0	0	16	26	27
23:00	0	0	3	1	0	0	0	0	0	0	0	0	0	4	23	23
Total	65	172	285	105	14	0	1	0	0	0	0	0	0	642		
Percent	10.1%	26.8%	44.4%	16.4%	2.2%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	08:00	11:00	07:00	09:00		10:00							11:00		
Vol.	10	22	23	11	4		1							50		
PM Peak	14:00	15:00	16:00	18:00	13:00									16:00		
Vol.	9	25	28	12	2									59		

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Station ID: 00000000000000000000
Lindenwold Terrace east of
Bethlehem Pike
Latitude: 0' 0.000 Undefined

Eastbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/06/14	0	0	0	1	0	0	0	0	0	0	0	0	0	1	*	*
01:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2	*	*
02:00	0	0	2	1	0	0	0	0	0	0	0	0	0	3	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3	*	*
05:00	0	2	5	1	0	0	0	0	0	0	0	0	0	8	24	24
06:00	**3**	8	12	7	0	0	0	0	0	0	0	0	0	30	25	28
07:00	1	**13**	20	10	1	0	0	0	0	0	0	0	0	**45**	26	28
08:00	1	12	**24**	3	0	0	0	0	0	0	0	0	0	40	24	26
09:00	1	10	15	5	0	0	0	0	0	0	0	0	0	31	25	28
10:00	2	5	19	7	1	0	0	0	0	0	0	0	0	34	26	29
11:00	1	7	21	**11**	**2**	0	0	0	0	0	0	0	0	42	27	30
12 PM	1	9	16	4	0	0	0	0	0	0	0	0	0	30	24	27
13:00	0	12	16	7	1	0	0	0	0	0	0	0	0	36	26	29
14:00	4	14	15	8	1	0	0	0	0	0	0	0	0	42	26	29
15:00	**12**	**15**	17	7	1	0	0	0	0	0	0	0	0	**52**	24	28
16:00	5	7	24	**14**	0	0	0	0	0	0	0	0	0	50	26	28
17:00	0	11	**28**	12	1	0	0	0	0	0	0	0	0	52	26	29
18:00	1	5	13	12	**4**	0	0	0	0	0	0	0	0	35	29	32
19:00	4	2	10	7	2	0	0	0	0	0	0	0	0	25	28	30
20:00	1	5	5	4	2	0	0	0	0	0	0	0	0	17	27	29
21:00	0	4	7	3	0	0	0	0	0	0	0	0	0	14	26	27
22:00	0	3	3	6	0	0	0	0	0	0	0	0	0	12	28	29
23:00	0	0	3	0	0	0	0	0	0	0	0	0	0	3	22	22
Total	37	147	277	130	16	0	0	0	0	0	0	0	0	607		
Percent	6.1%	24.2%	45.6%	21.4%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00	07:00	08:00	11:00	11:00									07:00		
Vol.	3	13	24	11	2									45		
PM Peak	15:00	15:00	17:00	16:00	18:00									15:00		
Vol.	12	15	28	14	4									52		

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Bethlehem Pike
Latitude: 0' 0.000 Undefined

Eastbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/07/14	0	0	**2**	**2**	0	0	0	0	0	0	0	0	0	**4**	*	*
01:00	0	0	2	0	0	0	0	0	0	0	0	0	0	2	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	0	0	4	2	0	0	0	0	0	0	0	0	0	6		
Percent	0.0%	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak			00:00	00:00										00:00		
Vol.			2	2										4		
PM Peak																
Vol.																
Grand Total	126	401	720	335	39	0	1	0	0	1	0	0	0	1623		
Percent	7.8%	24.7%	44.4%	20.6%	2.4%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%			

15th Percentile :	12 MPH
50th Percentile :	20 MPH
85th Percentile :	26 MPH
95th Percentile :	29 MPH

Stats

10 MPH Pace Speed :	18-27 MPH
Number in Pace :	923
Percent in Pace :	56.9%
Number of Vehicles > 55 MPH :	1
Percent of Vehicles > 55 MPH :	0.0%
Mean Speed(Average) :	20 MPH

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Westbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/04/14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	**9**	**14**	14	7	1	0	0	0	0	**1**	0	0	0	46	24	28
13:00	3	4	**29**	6	0	0	0	0	0	0	0	0	0	42	25	27
14:00	3	14	23	6	0	0	0	0	0	0	0	0	0	46	25	27
15:00	2	9	24	4	2	0	0	0	0	0	0	0	0	41	25	28
16:00	2	9	25	11	2	0	0	0	0	0	0	**1**	0	50	27	29
17:00	1	8	28	**19**	**3**	**2**	0	0	0	1	0	0	0	**62**	28	31
18:00	1	11	17	8	0	0	0	0	0	0	0	0	0	37	26	29
19:00	0	8	12	4	0	0	0	0	0	0	0	0	0	24	25	27
20:00	0	7	12	4	0	0	0	0	0	0	0	0	0	23	25	27
21:00	0	1	10	4	1	0	0	0	0	0	0	0	0	16	27	29
22:00	1	4	6	2	0	0	0	0	0	0	0	0	0	13	24	25
23:00	0	1	8	1	0	0	0	0	0	0	0	0	0	10	24	25
Total	22	90	208	76	9	2	0	0	0	2	0	1	0	410		
Percent	5.4%	22.0%	50.7%	18.5%	2.2%	0.5%	0.0%	0.0%	0.0%	0.5%	0.0%	0.2%	0.0%			
AM Peak Vol.																
PM Peak Vol.	12:00 9	12:00 14	13:00 29	17:00 19	17:00 3	17:00 2				12:00 1		16:00 1		17:00 62		

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Westbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/05/14	0	2	3	1	0	0	0	0	0	0	0	0	0	6	22	22
01:00	0	1	2	2	0	0	0	0	0	0	0	0	0	5	*	*
02:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1	*	*
03:00	2	1	0	0	0	0	0	0	0	0	0	0	0	3	*	*
04:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1	*	*
05:00	1	0	3	1	0	0	0	0	0	0	0	0	0	5	22	22
06:00	0	8	16	4	**1**	0	0	0	0	0	0	0	0	29	25	27
07:00	1	11	14	7	1	0	0	0	0	0	0	0	0	34	26	29
08:00	**9**	**41**	**19**	4	0	0	0	0	0	0	0	0	0	**73**	21	24
09:00	2	6	14	**9**	0	0	0	0	0	0	0	0	0	31	27	29
10:00	7	8	8	6	0	0	0	0	0	0	0	0	0	29	25	28
11:00	4	9	11	7	1	0	0	**1**	0	0	0	0	0	33	26	29
12 PM	3	4	20	6	1	0	**1**	0	0	0	0	0	0	35	26	29
13:00	2	5	22	6	**2**	0	0	0	0	0	0	0	0	37	26	30
14:00	9	17	20	5	0	0	0	0	0	0	0	0	0	51	23	26
15:00	**11**	**28**	17	3	0	0	0	0	0	0	0	0	0	**59**	21	24
16:00	6	13	**28**	2	0	0	0	0	0	0	0	0	0	49	23	25
17:00	0	8	25	**18**	0	**1**	0	0	0	0	0	0	0	52	27	29
18:00	0	7	18	3	2	0	0	0	0	0	0	0	0	30	25	27
19:00	2	5	20	4	0	0	0	0	0	0	0	0	0	31	25	27
20:00	0	4	13	5	0	0	0	0	0	0	0	0	0	22	26	28
21:00	0	2	6	1	0	0	0	0	0	0	0	0	0	9	24	25
22:00	0	1	13	1	0	0	0	0	0	0	0	0	0	15	24	26
23:00	1	1	7	3	1	0	0	0	0	0	0	0	0	13	26	27
Total	60	182	301	98	9	1	1	1	0	0	0	0	0	653		
Percent	9.2%	27.9%	46.1%	15.0%	1.4%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	09:00	06:00			11:00						08:00		
Vol.	9	41	19	9	1			1						73		
PM Peak	15:00	15:00	16:00	17:00	13:00	17:00	12:00							15:00		
Vol.	11	28	28	18	2	1	1							59		

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Variable
ATR#/Operator: 11134/NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Lindenwold Terrace east of
Bethlehem Pike
Latitude: 0' 0.000 Undefined

Westbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/06/14	0	1	5	0	0	0	0	0	0	0	0	0	0	6	24	24
01:00	0	0	0	0	**1**	0	0	0	0	0	0	0	0	1	*	*
02:00	0	0	1	1	0	0	0	0	0	0	0	0	0	2	*	*
03:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2	*	*
04:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2	*	*
05:00	1	1	4	0	0	0	0	0	0	0	0	0	0	6	23	23
06:00	0	6	15	3	1	0	0	0	0	0	0	0	0	25	24	26
07:00	3	7	12	**5**	0	0	0	0	0	0	0	0	0	27	25	27
08:00	**7**	**33**	**22**	0	0	0	0	0	0	0	0	0	0	**62**	22	24
09:00	2	4	16	3	0	0	0	0	0	0	0	0	0	25	24	26
10:00	1	7	14	2	0	0	0	0	0	0	0	0	0	24	24	25
11:00	0	8	17	4	0	0	0	0	0	0	0	0	0	29	25	27
12 PM	0	9	26	10	0	0	0	0	0	0	0	0	0	45	26	28
13:00	3	6	17	5	0	0	0	0	0	0	0	0	0	31	25	28
14:00	3	13	20	7	0	0	0	0	0	0	0	0	0	43	25	28
15:00	**8**	**27**	19	2	0	0	0	0	0	0	0	**1**	0	57	22	24
16:00	3	11	26	5	1	0	0	0	0	0	0	0	0	46	25	27
17:00	0	8	**30**	**17**	**3**	0	0	0	0	0	0	0	0	**58**	28	30
18:00	0	10	10	6	1	0	0	0	0	0	0	0	0	27	26	29
19:00	2	9	18	6	1	0	0	0	0	0	0	0	0	36	25	29
20:00	1	7	11	6	0	0	0	0	0	0	0	0	0	25	26	28
21:00	0	4	14	4	1	0	0	0	0	0	0	0	0	23	26	28
22:00	0	5	3	3	0	0	0	0	0	0	0	0	0	11	20	21
23:00	0	3	0	0	1	0	0	0	0	0	0	0	0	4	*	*
Total	34	182	301	89	10	0	0	0	0	0	0	1	0	617		
Percent	5.5%	29.5%	48.8%	14.4%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%			
AM Peak	08:00	08:00	08:00	07:00	01:00									08:00		
Vol.	7	33	22	5	1									62		
PM Peak	15:00	15:00	17:00	17:00	17:00							15:00		17:00		
Vol.	8	27	30	17	3							1		58		

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Variable
ATR#/Operator: 11134/NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Lindenwold Terrace east of
Bethlehem Pike
Latitude: 0' 0.000 Undefined

Westbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
03/07/14	**1**	**1**	**5**	**2**	0	0	0	0	0	0	0	0	0	**9**	25	25
01:00	0	0	3	0	0	0	0	0	0	0	0	0	0	3	22	22
02:00	0	0	2	0	0	0	0	0	0	0	0	0	0	2	*	*
03:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	1	2	10	2	0	0	0	0	0	0	0	0	0	15		
Percent	6.7%	13.3%	66.7%	13.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	00:00	00:00	00:00	00:00										00:00		
Vol.	1	1	5	2										9		
PM Peak Vol.																
Grand Total	117	456	820	265	28	3	1	1	0	2	0	2	0	1695		
Percent	6.9%	26.9%	48.4%	15.6%	1.7%	0.2%	0.1%	0.1%	0.0%	0.1%	0.0%	0.1%	0.0%			

15th Percentile :	12 MPH
50th Percentile :	20 MPH
85th Percentile :	25 MPH
95th Percentile :	28 MPH

Stats

10 MPH Pace Speed :	17-26 MPH
Number in Pace :	1016
Percent in Pace :	59.9%
Number of Vehicles > 55 MPH :	2
Percent of Vehicles > 55 MPH :	0.1%
Mean Speed(Average) :	20 MPH

APPENDIX D

Manual Turning Movement (MTM) Counts

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Lindenwold Terrace
Counter/Board #: LB

File Name : bethpk01w
Site Code : 81346801
Start Date : 3/5/2014
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound			Lindenwold Terrace Westbound			Bethlehem Pk Northbound			Lindenwold Terrace Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00	0	103	4	6	3	2	4	78	7	2	4	10	223
07:15	0	155	8	1	2	2	12	84	2	2	3	5	276
07:30	0	156	4	2	3	0	5	95	2	1	2	15	285
07:45	1	120	4	4	8	0	9	77	4	0	5	4	236
Total	1	534	20	13	16	4	30	334	15	5	14	34	1020
08:00	0	109	12	5	3	0	18	84	2	1	3	8	245
08:15	1	137	6	4	10	0	8	104	4	3	5	15	297
08:30	0	114	6	3	4	1	12	76	4	1	7	13	241
08:45	1	117	5	4	5	2	13	81	0	2	6	14	250
Total	2	477	29	16	22	3	51	345	10	7	21	50	1033
*** BREAK ***													
16:00	2	101	9	1	6	0	23	108	5	6	7	12	280
16:15	2	88	10	1	6	0	17	107	4	2	5	17	259
16:30	1	115	11	0	3	1	13	130	4	5	8	12	303
16:45	1	94	9	3	7	0	13	113	7	5	11	6	269
Total	6	398	39	5	22	1	66	458	20	18	31	47	1111
17:00	3	113	10	2	11	1	16	116	1	4	12	19	308
17:15	0	77	8	7	6	3	13	139	8	6	9	15	291
17:30	0	109	9	4	8	0	17	117	5	5	7	14	295
17:45	5	86	11	2	10	5	14	123	6	4	6	20	292
Total	8	385	38	15	35	9	60	495	20	19	34	68	1186
Grand Total	17	1794	126	49	95	17	207	1632	65	49	100	199	4350
Apprch %	0.9	92.6	6.5	30.4	59	10.6	10.9	85.7	3.4	14.1	28.7	57.2	
Total %	0.4	41.2	2.9	1.1	2.2	0.4	4.8	37.5	1.5	1.1	2.3	4.6	
Passenger Vehicles	16	1746	122	48	94	15	194	1592	63	47	100	188	4225
% Passenger Vehicles	94.1	97.3	96.8	98	98.9	88.2	93.7	97.5	96.9	95.9	100	94.5	97.1
Heavy Vehicles	1	48	4	1	1	2	13	40	2	2	0	11	125
% Heavy Vehicles	5.9	2.7	3.2	2	1.1	11.8	6.3	2.5	3.1	4.1	0	5.5	2.9

Zero Pedestrians were observed during this study.

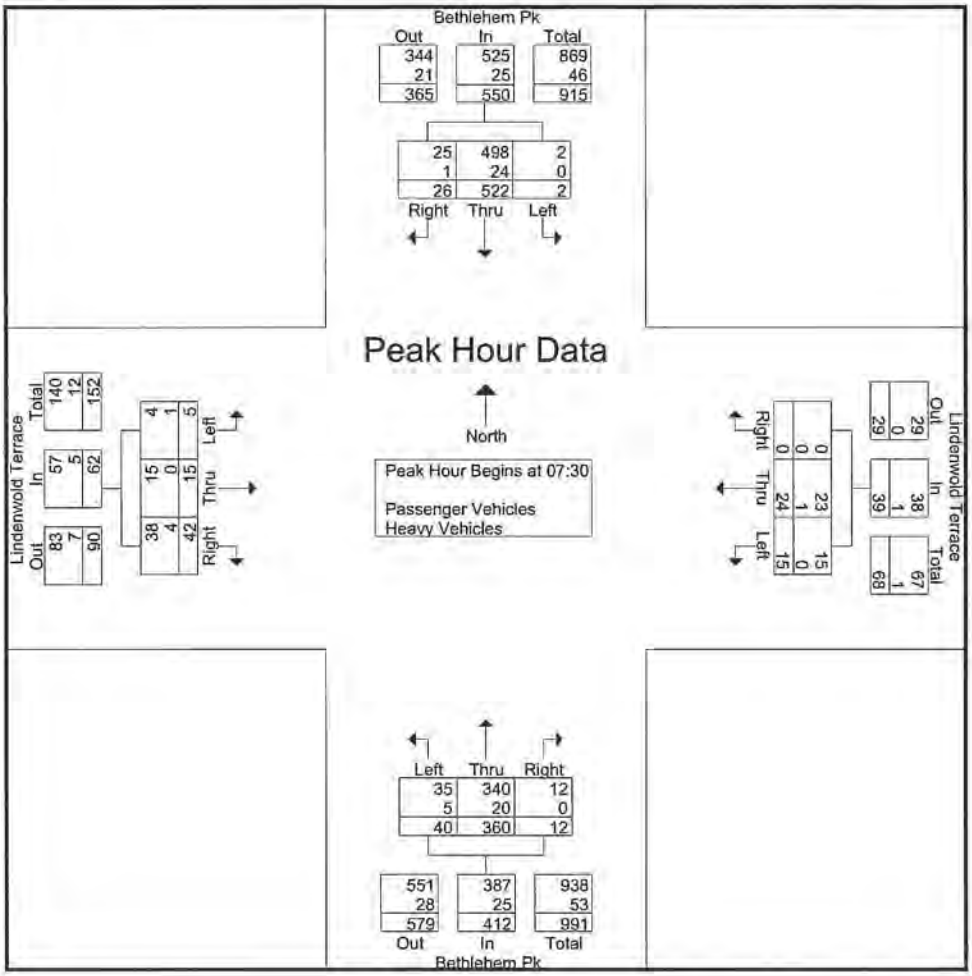
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Lindenwold Terrace
Counter/Board #: LB

File Name : bethpk01w
Site Code : 81346801
Start Date : 3/5/2014
Page No : 2

	Bethlehem Pk Southbound				Lindenwold Terrace Westbound				Bethlehem Pk Northbound				Lindenwold Terrace Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	**156**	4	**160**	2	3	0	5	5	95	2	102	**1**	2	**15**	18	285
07:45	**1**	120	4	125	4	8	0	12	9	77	**4**	90	0	**5**	4	9	236
08:00	0	109	**12**	121	**5**	3	0	8	**18**	84	2	104	**1**	3	8	12	245
08:15	1	137	6	144	4	**10**	0	**14**	8	**104**	4	**116**	**3**	5	15	**23**	**297**
Total Volume	2	522	26	550	15	24	0	39	40	360	12	412	5	15	42	62	1063
% App. Total	0.4	94.9	4.7		38.5	61.5	0		9.7	87.4	2.9		8.1	24.2	67.7		
PHF	.500	.837	.542	.859	.750	.600	.000	.696	.556	.865	.750	.888	.417	.750	.700	.674	.895
Passenger Vehicles	2	498	25	525	15	23	0	38	35	340	12	387	4	15	38	57	1007
% Passenger Vehicles	100	95.4	96.2	95.5	100	95.8	0	97.4	87.5	94.4	100	93.9	80.0	100	90.5	91.9	94.7
Heavy Vehicles	0	24	1	25	0	1	0	1	5	20	0	25	1	0	4	5	56
% Heavy Vehicles	0	4.6	3.8	4.5	0	4.2	0	2.6	12.5	5.6	0	6.1	20.0	0	9.5	8.1	5.3



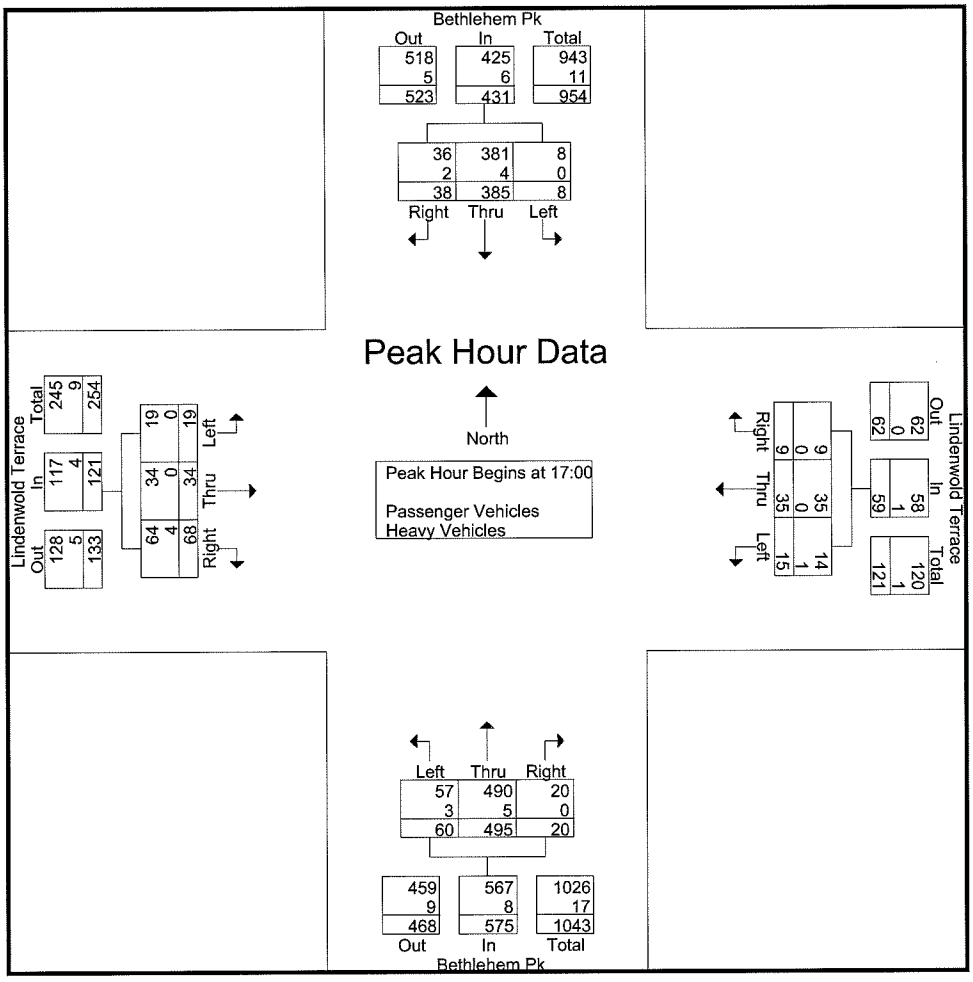
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Lindenwold Terrace
Counter/Board #: LB

File Name : bethpk01w
Site Code : 81346801
Start Date : 3/5/2014
Page No : 3

	Bethlehem Pk Southbound				Lindenwold Terrace Westbound				Bethlehem Pk Northbound				Lindenwold Terrace Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	3	**113**	10	**126**	2	**11**	1	14	16	116	1	133	4	**12**	19	**35**	**308**
17:15	0	77	8	85	**7**	6	3	16	13	**139**	**8**	**160**	**6**	9	15	30	291
17:30	0	109	9	118	4	8	0	12	**17**	117	5	139	5	7	14	26	295
17:45	**5**	86	**11**	102	2	10	**5**	**17**	14	123	6	143	4	6	**20**	30	292
Total Volume	8	385	38	431	15	35	9	59	60	495	20	575	19	34	68	121	1186
% App. Total	1.9	89.3	8.8		25.4	59.3	15.3		10.4	86.1	3.5		15.7	28.1	56.2		
PHF	.400	.852	.864	.855	.536	.795	.450	.868	.882	.890	.625	.898	.792	.708	.850	.864	.963
Passenger Vehicles	8	381	36	425	14	35	9	58	57	490	20	567	19	34	64	117	1167
% Passenger Vehicles	100	99.0	94.7	98.6	93.3	100	100	98.3	95.0	99.0	100	98.6	100	100	94.1	96.7	98.4
Heavy Vehicles	0	4	2	6	1	0	0	1	3	5	0	8	0	0	4	4	19
% Heavy Vehicles	0	1.0	5.3	1.4	6.7	0	0	1.7	5.0	1.0	0	1.4	0	0	5.9	3.3	1.6



McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Mattiston Avenue
Counter/Board #: HR

File Name : bethpk02w
Site Code : 81346803
Start Date : 3/5/2014
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound		Bethlehem Pk Northbound		Mattison Ave Eastbound		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00	131	3	1	89	4	9	237
07:15	165	3	1	91	5	9	274
07:30	179	5	0	104	2	6	296
07:45	182	2	2	119	1	4	310
Total	657	13	4	403	12	28	1117
08:00	141	5	4	125	1	5	281
08:15	164	5	4	116	5	9	303
08:30	141	4	5	107	3	8	268
08:45	137	2	4	107	0	11	261
Total	583	16	17	455	9	33	1113
*** BREAK ***							
16:00	111	4	2	150	2	3	272
16:15	115	1	7	133	2	2	260
16:30	129	6	3	157	3	7	305
16:45	97	8	5	143	1	2	256
Total	452	19	17	583	8	14	1093
17:00	143	7	4	139	1	6	300
17:15	110	4	4	170	4	4	296
17:30	130	8	5	149	3	4	299
17:45	109	8	3	162	4	4	290
Total	492	27	16	620	12	18	1185
Grand Total	2184	75	54	2061	41	93	4508
Apprch %	96.7	3.3	2.6	97.4	30.6	69.4	
Total %	48.4	1.7	1.2	45.7	0.9	2.1	
Passenger Vehicles	2112	68	54	1996	39	91	4360
% Passenger Vehicles	96.7	90.7	100	96.8	95.1	97.8	96.7
Heavy Vehicles	72	7	0	65	2	2	148
% Heavy Vehicles	3.3	9.3	0	3.2	4.9	2.2	3.3

Zero Pedestrians were observed during this study.

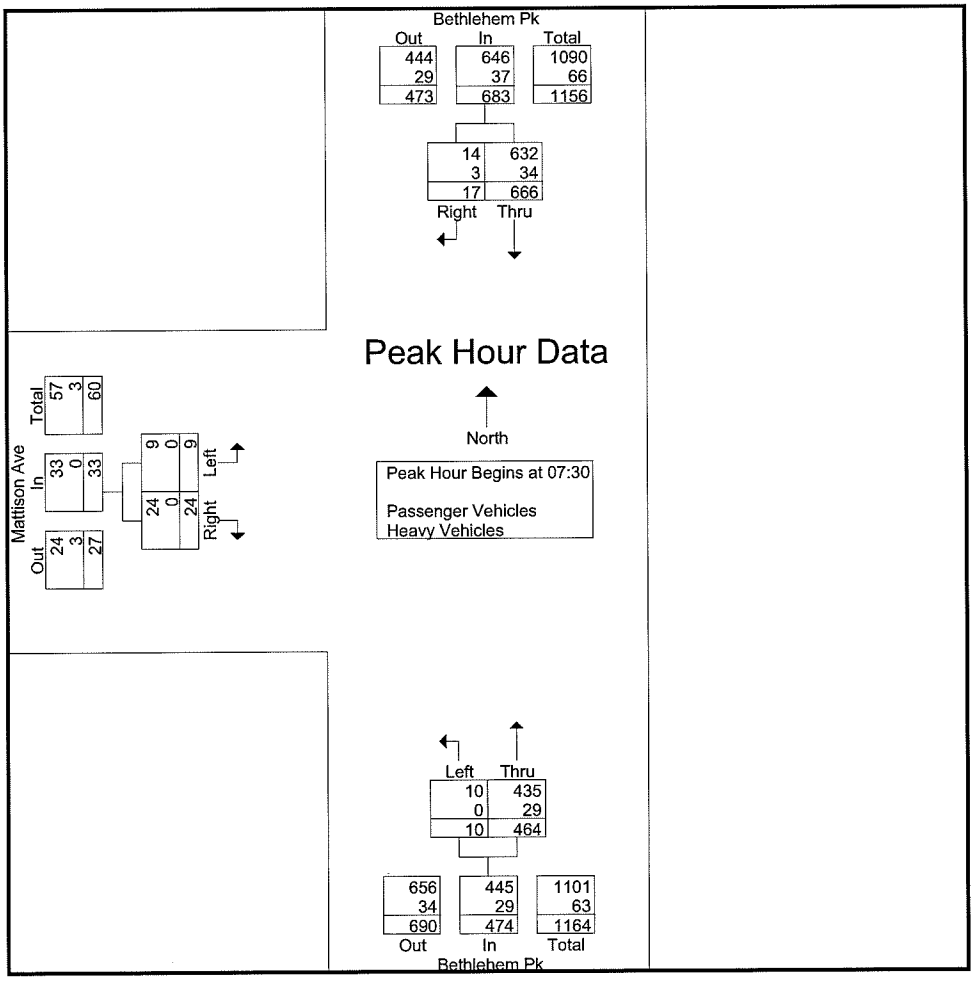
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Mattiston Avenue
Counter/Board #: HR

File Name : bethpk02w
Site Code : 81346803
Start Date : 3/5/2014
Page No : 2

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Mattison Ave Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30										
07:30	179	**5**	**184**	0	104	104	2	6	8	296
07:45	**182**	2	184	2	119	121	1	4	5	**310**
08:00	141	5	146	**4**	**125**	**129**	1	5	6	281
08:15	164	5	169	4	116	120	**5**	**9**	**14**	303
Total Volume	666	17	683	10	464	474	9	24	33	1190
% App. Total	97.5	2.5		2.1	97.9		27.3	72.7		
PHF	.915	.850	.928	.625	.928	.919	.450	.667	.589	.960
Passenger Vehicles	632	14	646	10	435	445	9	24	33	1124
% Passenger Vehicles	94.9	82.4	94.6	100	93.8	93.9	100	100	100	94.5
Heavy Vehicles	34	3	37	0	29	29	0	0	0	66
% Heavy Vehicles	5.1	17.6	5.4	0	6.3	6.1	0	0	0	5.5



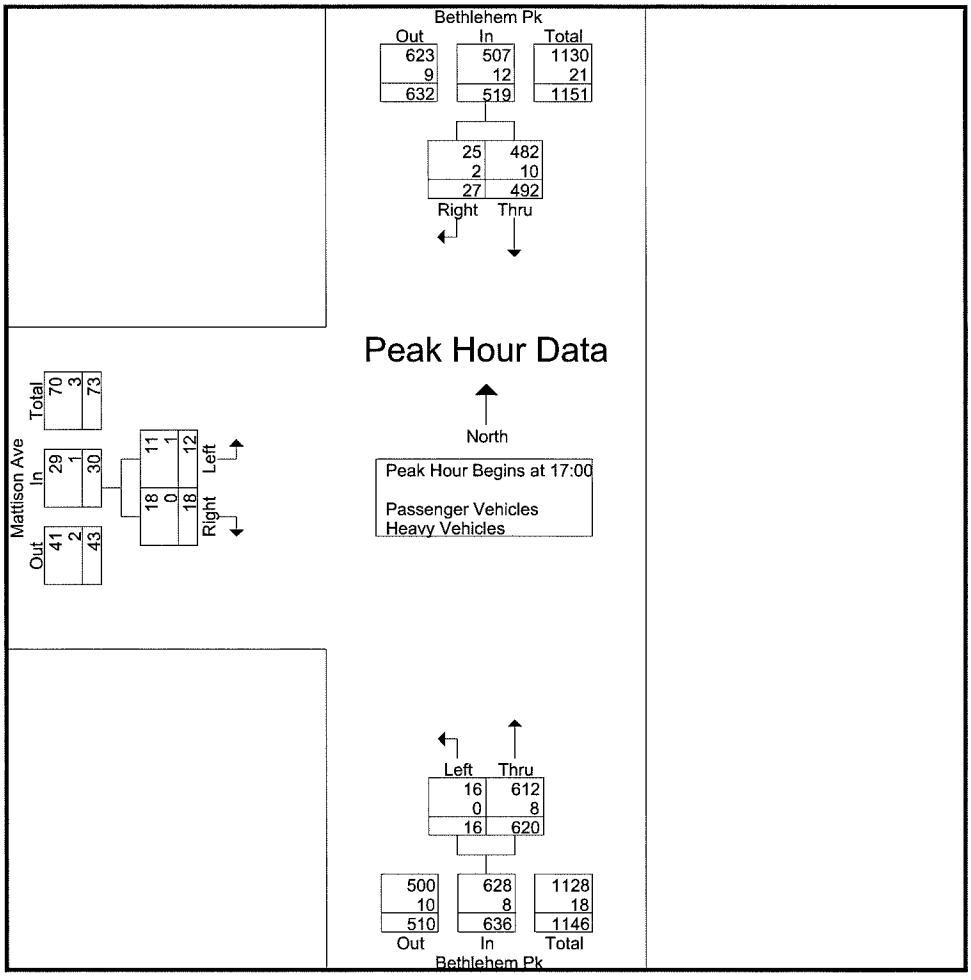
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Mattiston Avenue
Counter/Board #: HR

File Name : bethpk02w
Site Code : 81346803
Start Date : 3/5/2014
Page No : 3

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Mattison Ave Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	**143**	7	**150**	4	139	143	1	**6**	7	**300**
17:15	110	4	114	4	**170**	**174**	**4**	4	**8**	296
17:30	130	**8**	138	**5**	149	154	3	4	7	299
17:45	109	8	117	3	162	165	4	4	8	290
Total Volume	492	27	519	16	620	636	12	18	30	1185
% App. Total	94.8	5.2		2.5	97.5		40	60		
PHF	.860	.844	.865	.800	.912	.914	.750	.750	.938	.988
Passenger Vehicles	482	25	507	16	612	628	11	18	29	1164
% Passenger Vehicles	98.0	92.6	97.7	100	98.7	98.7	91.7	100	96.7	98.2
Heavy Vehicles	10	2	12	0	8	8	1	0	1	21
% Heavy Vehicles	2.0	7.4	2.3	0	1.3	1.3	8.3	0	3.3	1.8



McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Church Road / Private Road
Counter/Board #: RR

File Name : bethpk03w
Site Code : 81346802
Start Date : 3/5/2014
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound			Private Rd Westbound			Bethlehem Pk Northbound			Church St Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00	0	125	1	0	0	0	1	91	0	1	0	10	229
07:15	0	160	5	0	0	0	2	90	0	4	0	9	270
07:30	0	182	0	0	0	0	4	106	0	2	0	6	300
07:45	0	170	3	0	0	0	3	116	0	0	0	10	302
Total	0	637	9	0	0	0	10	403	0	7	0	35	1101
08:00	0	138	0	0	0	0	4	117	0	1	0	11	271
08:15	0	169	2	0	0	0	3	111	0	2	0	3	290
08:30	0	137	0	0	0	0	5	105	0	1	0	12	260
08:45	0	134	6	0	0	0	8	96	0	1	0	6	251
Total	0	578	8	0	0	0	20	429	0	5	0	32	1072
*** BREAK ***													
16:00	0	113	4	0	0	0	10	146	0	3	0	3	279
16:15	0	110	2	0	0	0	4	134	0	1	0	6	257
16:30	0	128	4	0	0	0	4	153	0	1	0	6	296
16:45	0	98	4	0	0	0	9	134	0	5	0	6	256
Total	0	449	14	0	0	0	27	567	0	10	0	21	1088
17:00	0	131	1	0	0	0	5	132	0	4	0	15	288
17:15	0	102	5	0	0	0	8	171	0	4	0	11	301
17:30	0	124	3	0	0	0	12	143	0	4	0	9	295
17:45	0	109	4	0	0	0	10	160	0	4	0	6	293
Total	0	466	13	0	0	0	35	606	0	16	0	41	1177
Grand Total	0	2130	44	0	0	0	92	2005	0	38	0	129	4438
Apprch %	0	98	2	0	0	0	4.4	95.6	0	22.8	0	77.2	
Total %	0	48	1	0	0	0	2.1	45.2	0	0.9	0	2.9	
Passenger Vehicles	0	2058	41	0	0	0	92	1942	0	38	0	127	4298
% Passenger Vehicles	0	96.6	93.2	0	0	0	100	96.9	0	100	0	98.4	96.8
Heavy Vehicles	0	72	3	0	0	0	0	63	0	0	0	2	140
% Heavy Vehicles	0	3.4	6.8	0	0	0	0	3.1	0	0	0	1.6	3.2

Zero Pedestrians were observed during this study.

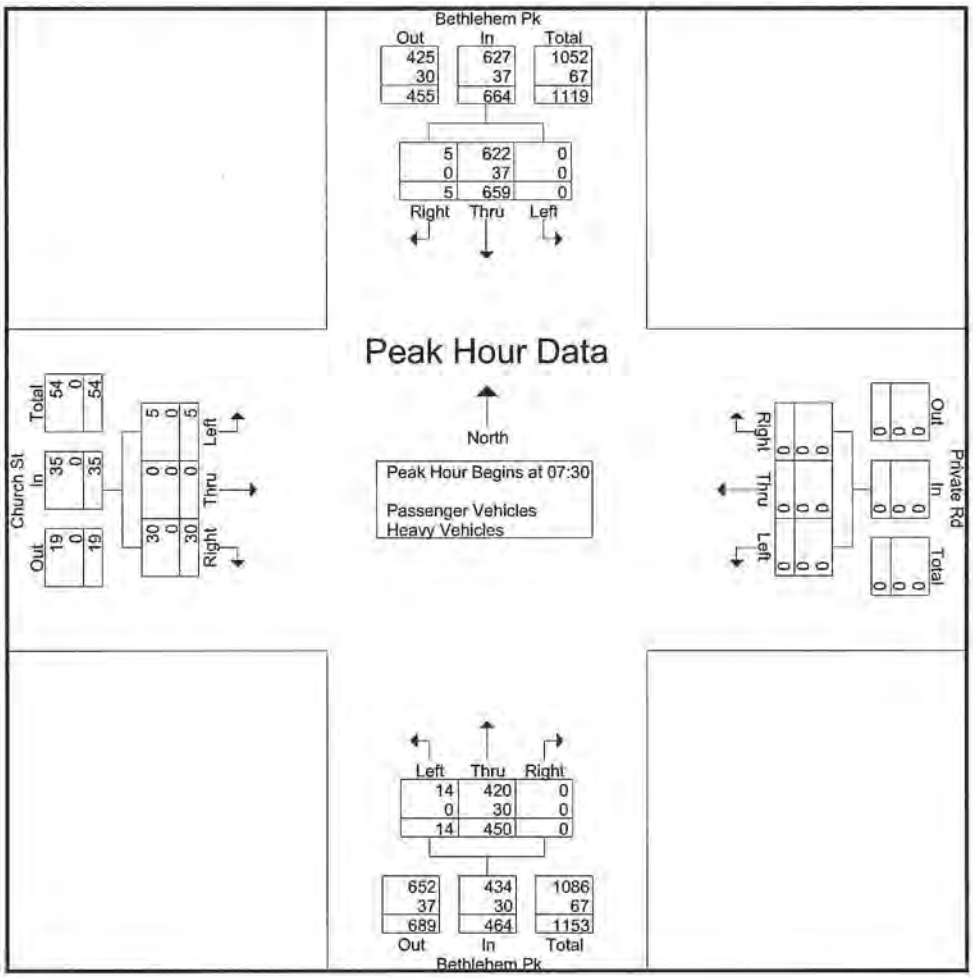
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Church Road / Private Road
Counter/Board #: RR

File Name : bethpk03w
Site Code : 81346802
Start Date : 3/5/2014
Page No : 2

	Bethlehem Pk Southbound				Private Rd Westbound				Bethlehem Pk Northbound				Church St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	**182**	0	**182**	0	0	0	0	**4**	106	0	110	**2**	0	6	8	300
07:45	0	170	**3**	173	0	0	0	0	3	116	0	119	0	0	10	10	**302**
08:00	0	138	0	138	0	0	0	0	4	**117**	0	**121**	1	0	**11**	**12**	271
08:15	0	169	2	171	0	0	0	0	3	111	0	114	2	0	3	5	290
Total Volume	0	659	5	664	0	0	0	0	14	450	0	464	5	0	30	35	1163
% App. Total	0	99.2	0.8		0	0	0		3	97	0		14.3	0	85.7		
PHF	.000	.905	.417	.912	.000	.000	.000	.000	.875	.962	.000	.959	.625	.000	.682	.729	.963
Passenger Vehicles	0	622	5	627	0	0	0	0	14	420	0	434	5	0	30	35	1096
% Passenger Vehicles	0	94.4	100	94.4	0	0	0	0	100	93.3	0	93.5	100	0	100	100	94.2
Heavy Vehicles	0	37	0	37	0	0	0	0	0	30	0	30	0	0	0	0	67
% Heavy Vehicles	0	5.6	0	5.6	0	0	0	0	0	6.7	0	6.5	0	0	0	0	5.8



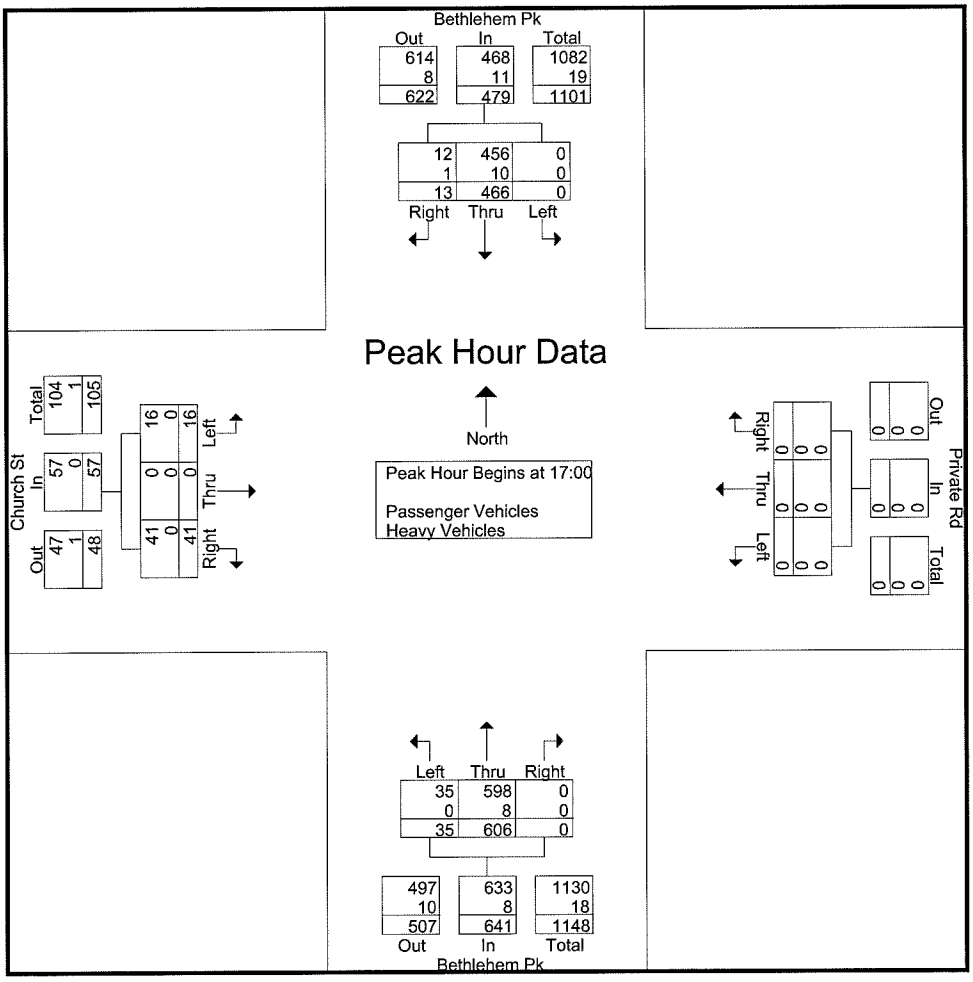
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Church Road / Private Road
Counter/Board #: RR

File Name : bethpk03w
Site Code : 81346802
Start Date : 3/5/2014
Page No : 3

	Bethlehem Pk Southbound				Private Rd Westbound				Bethlehem Pk Northbound				Church St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	0	**131**	1	**132**	0	0	0	0	5	132	0	137	**4**	0	**15**	**19**	288
17:15	0	102	**5**	107	0	0	0	0	8	**171**	0	**179**	4	0	11	15	**301**
17:30	0	124	3	127	0	0	0	0	**12**	143	0	155	4	0	9	13	295
17:45	0	109	4	113	0	0	0	0	10	160	0	170	4	0	6	10	293
Total Volume	0	466	13	479	0	0	0	0	35	606	0	641	16	0	41	57	1177
% App. Total	0	97.3	2.7		0	0	0		5.5	94.5	0		28.1	0	71.9		
PHF	.000	.889	.650	.907	.000	.000	.000	.000	.729	.886	.000	.895	1.00	.000	.683	.750	.978
Passenger Vehicles	0	456	12	468	0	0	0	0	35	598	0	633	16	0	41	57	1158
% Passenger Vehicles	0	97.9	92.3	97.7	0	0	0	0	100	98.7	0	98.8	100	0	100	100	98.4
Heavy Vehicles	0	10	1	11	0	0	0	0	0	8	0	8	0	0	0	0	19
% Heavy Vehicles	0	2.1	7.7	2.3	0	0	0	0	0	1.3	0	1.2	0	0	0	0	1.6



McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Highland Avenue
Counter/Board #: BW

File Name : bethpk04w
Site Code : 81346804
Start Date : 3/5/2014
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound				Highland Ave Westbound				Bethlehem Pk Northbound				Highland Ave Eastbound				
Start Time	Left	Thru	ROR	Right	Left	Thru	ROR	Right	Left	Thru	ROR	Right	Left	Thru	ROR	Right	Int. Total
07:00	60	65	0	4	12	16	0	34	2	49	0	24	3	12	0	3	284
07:15	53	101	0	2	14	15	0	36	1	40	0	24	11	14	0	8	319
07:30	64	137	0	2	13	14	0	36	2	69	0	11	3	23	0	4	378
07:45	64	119	0	3	4	24	0	36	5	80	0	8	9	18	0	3	373
Total	241	422	0	11	43	69	0	142	10	238	0	67	26	67	0	18	1354
08:00	53	92	0	3	6	13	0	55	3	71	0	8	6	19	0	6	335
08:15	58	112	0	2	9	17	0	44	3	69	0	21	7	20	0	7	369
08:30	64	93	0	3	10	14	0	56	3	59	0	7	2	13	0	1	325
08:45	61	74	0	1	14	20	0	39	3	61	0	15	4	23	0	5	320
Total	236	371	0	9	39	64	0	194	12	260	0	51	19	75	0	19	1349
*** BREAK ***																	
16:00	33	72	0	4	11	31	0	52	7	76	0	18	2	14	0	4	324
16:15	44	59	0	7	11	23	0	53	5	104	0	8	2	13	0	4	333
16:30	47	82	0	6	13	27	0	43	3	93	0	7	3	18	0	3	345
16:45	31	73	0	3	9	13	0	55	2	92	0	16	5	24	0	1	324
Total	155	286	0	20	44	94	0	203	17	365	0	49	12	69	0	12	1326
17:00	48	82	0	10	14	23	0	48	9	83	0	5	1	21	0	4	348
17:15	34	91	0	4	12	24	0	59	6	95	0	7	5	18	0	5	360
17:30	49	60	0	7	14	31	0	63	4	90	0	13	4	22	0	2	359
17:45	44	67	0	5	10	27	0	61	4	120	0	8	3	16	0	1	366
Total	175	300	0	26	50	105	0	231	23	388	0	33	13	77	0	12	1433
Grand Total	807	1379	0	66	176	332	0	770	62	1251	0	200	70	288	0	61	5462
Apprch %	35.8	61.2	0	2.9	13.8	26	0	60.3	4.1	82.7	0	13.2	16.7	68.7	0	14.6	
Total %	14.8	25.2	0	1.2	3.2	6.1	0	14.1	1.1	22.9	0	3.7	1.3	5.3	0	1.1	
Passenger Vehicles	795	1326	0	65	173	323	0	757	60	1198	0	195	68	285	0	56	5301
% Passenger Vehicles	98.5	96.2	0	98.5	98.3	97.3	0	98.3	96.8	95.8	0	97.5	97.1	99	0	91.8	97.1
Heavy Vehicles	12	53	0	1	3	9	0	13	2	53	0	5	2	3	0	5	161
% Heavy Vehicles	1.5	3.8	0	1.5	1.7	2.7	0	1.7	3.2	4.2	0	2.5	2.9	1	0	8.2	2.9

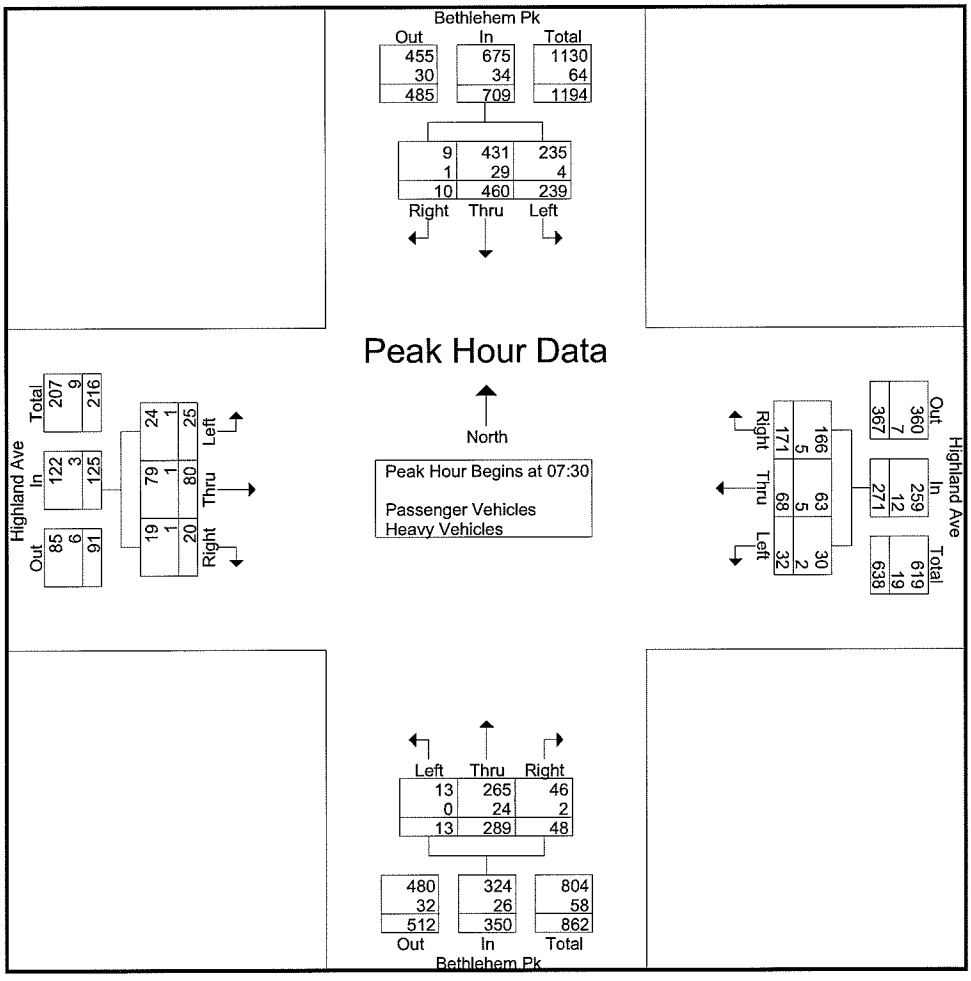
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Highland Avenue
Counter/Board #: BW

File Name : bethpk04w
Site Code : 81346804
Start Date : 3/5/2014
Page No : 2

	Bethlehem Pk Southbound					Highland Ave Westbound					Bethlehem Pk Northbound					Highland Ave Eastbound					
Start Time	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	**64**	**137**	0	2	**203**	**13**	14	0	36	63	2	69	0	11	82	3	**23**	0	4	30	**378**
07:45	64	119	0	**3**	186	4	**24**	0	36	64	**5**	**80**	0	8	**93**	**9**	18	0	3	30	373
08:00	53	92	0	3	148	6	13	0	**55**	**74**	3	71	0	8	82	6	19	0	6	31	335
08:15	58	112	0	2	172	9	17	0	44	70	3	69	0	**21**	93	7	20	0	**7**	**34**	369
Total Volume	239	460	0	10	709	32	68	0	171	271	13	289	0	48	350	25	80	0	20	125	1455
% App. Total	33.7	64.9	0	1.4		11.8	25.1	0	63.1		3.7	82.6	0	13.7		20	64	0	16		
PHF	.934	.839	.000	.833	.873	.615	.708	.000	.777	.916	.650	.903	.000	.571	.941	.694	.870	.000	.714	.919	.962
Passenger Vehicles																					
% Passenger Vehicles	98.3	93.7	0	90.0	95.2	93.8	92.6	0	97.1	95.6	100	91.7	0	95.8	92.6	96.0	98.8	0	95.0	97.6	94.8
Heavy Vehicles																					
% Heavy Vehicles	1.7	6.3	0	10.0	4.8	6.3	7.4	0	2.9	4.4	0	8.3	0	4.2	7.4	4.0	1.3	0	5.0	2.4	5.2



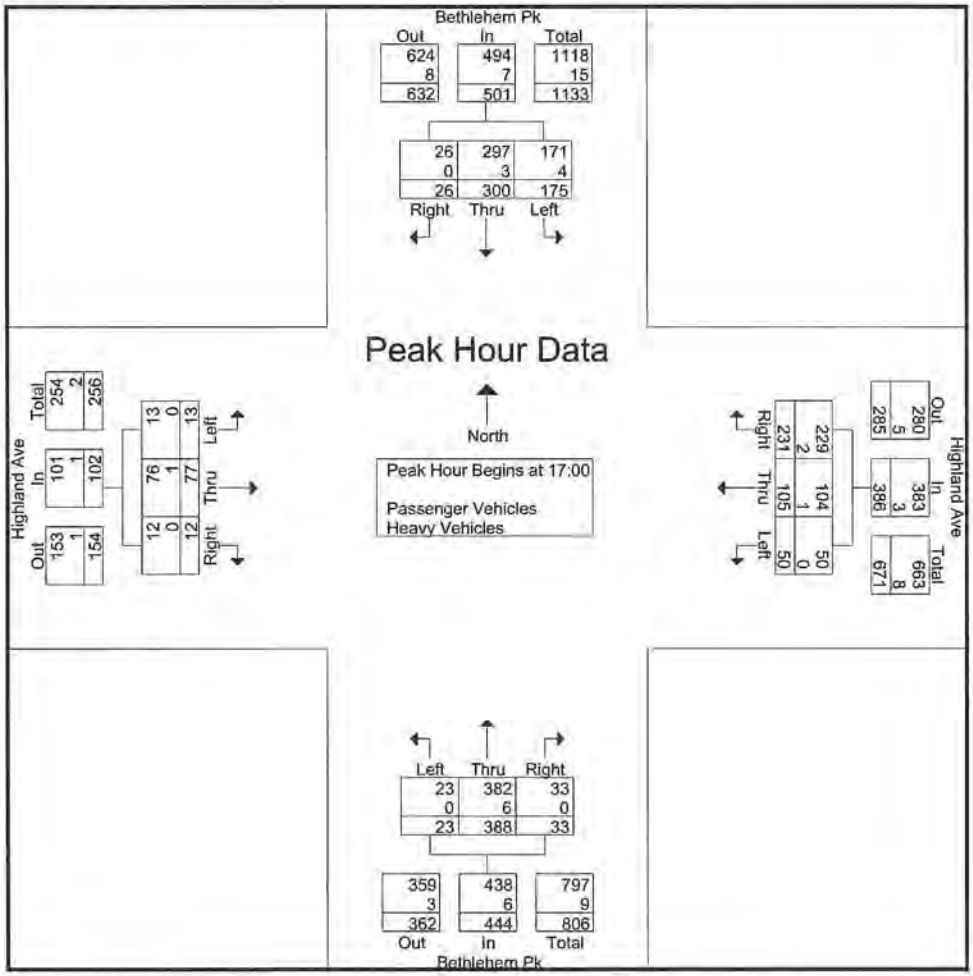
McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Highland Avenue
Counter/Board #: BW

File Name : bethpk04w
Site Code : 81346804
Start Date : 3/5/2014
Page No : 3

	Bethlehem Pk Southbound					Highland Ave Westbound					Bethlehem Pk Northbound					Highland Ave Eastbound					
Start Time	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Left	Thru	ROR	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	48	82	0	**10**	**140**	**14**	23	0	48	85	**9**	83	0	5	97	1	21	0	4	26	348
17:15	34	**91**	0	4	129	12	24	0	59	95	6	95	0	7	108	**5**	18	0	**5**	**28**	360
17:30	**49**	60	0	7	116	14	**31**	0	**63**	**108**	4	90	0	**13**	107	4	**22**	0	2	28	359
17:45	44	67	0	5	116	10	27	0	61	98	4	**120**	0	8	**132**	3	16	0	1	20	**366**
Total Volume	175	300	0	26	501	50	105	0	231	386	23	388	0	33	444	13	77	0	12	102	1433
% App. Total	34.9	59.9	0	5.2		13	27.2	0	59.8		5.2	87.4	0	7.4		12.7	75.5	0	11.8		
PHF	.893	.824	.000	.650	.895	.893	.847	.000	.917	.894	.639	.808	.000	.635	.841	.650	.875	.000	.600	.911	.979
Passenger Vehicles																					
% Passenger Vehicles	97.7	99.0	0	100	98.6	100	99.0	0	99.1	99.2	100	98.5	0	100	98.6	100	98.7	0	100	99.0	98.8
Heavy Vehicles																					
% Heavy Vehicles	2.3	1.0	0	0	1.4	0	1.0	0	0.9	0.8	0	1.5	0	0	1.4	0	1.3	0	0	1.0	1.2



McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Location: Bethlehem Pike &
Highland Avenue
Counter/Board #: BW

File Name : bethpk04w
Site Code : 81346804
Start Date : 3/5/2014
Page No : 1

Groups Printed- Pedestrians

	Bethlehem Pk Southbound	Highland Ave Westbound	Bethlehem Pk Northbound	Highland Ave Eastbound	
Start Time	E/W	N/S	E/W	N/S	Int. Total
*** BREAK ***					
07:45	0	0	0	1	1
Total	0	0	0	1	1
*** BREAK ***					
08:15	1	0	0	0	1
*** BREAK ***					
Total	1	0	0	0	1
*** BREAK ***					
12:30	0	0	1	0	1
*** BREAK ***					
Total	0	0	1	0	1
*** BREAK ***					
16:00	0	0	0	1	1
*** BREAK ***					
Total	0	0	0	1	1
*** BREAK ***					
17:45	0	1	0	0	1
Total	0	1	0	0	1
Grand Total	1	1	1	2	5
Apprch %	100	100	100	100	
Total %	20	20	20	40	

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, P A 19034

Municipality: Ambler Borough
Location: Bethlehem Pike &
Lindenwold Avenue / Lindenwold Terrace
Counter/Board #: GG+KB

File Name : lindenwold01w
Site Code : 81346801
Start Date : 3/31/2016
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound			Lindenwold Terrace Westbound			Bethlehem Pk Northbound			Lindenwold Ave Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00	0	107	2	1	5	0	6	80	4	1	3	6	215
07:15	0	100	2	2	5	0	4	75	1	1	2	11	203
07:30	2	140	4	0	3	1	6	86	2	1	4	7	256
07:45	0	131	7	5	6	3	12	106	3	0	2	10	285
Total	2	478	15	8	19	4	28	347	10	3	11	34	959
08:00	0	105	4	5	6	0	8	86	3	0	4	14	235
08:15	0	118	6	4	8	0	9	121	7	0	6	11	290
08:30	0	114	4	3	2	3	2	95	1	1	3	10	238
08:45	1	98	4	1	4	1	11	87	2	2	1	10	222
Total	1	435	18	13	20	4	30	389	13	3	14	45	985
16:00	0	118	7	2	4	0	15	126	5	1	2	11	291
16:15	2	104	11	5	6	2	11	118	1	5	9	14	288
16:30	1	121	9	1	7	0	12	124	6	4	6	13	304
16:45	1	109	15	3	5	0	13	123	2	4	8	24	307
Total	4	452	42	11	22	2	51	491	14	14	25	62	1190
17:00	1	114	8	2	7	0	15	120	1	7	15	11	301
17:15	3	110	15	0	6	0	15	145	3	7	8	19	331
17:30	1	123	12	3	7	4	18	135	1	6	9	13	332
17:45	4	122	14	2	6	2	14	148	3	3	14	15	347
Total	9	469	49	7	26	6	62	548	8	23	46	58	1311
Grand Total	16	1834	124	39	87	16	171	1775	45	43	96	199	4445
Apprch %	0.8	92.9	6.3	27.5	61.3	11.3	8.6	89.2	2.3	12.7	28.4	58.9	
Total %	0.4	41.3	2.8	0.9	2	0.4	3.8	39.9	1	1	2.2	4.5	
Passenger Vehicles	16	1794	121	39	86	15	159	1741	43	42	95	189	4340
% Passenger Vehicles	100	97.8	97.6	100	98.9	93.8	93	98.1	95.6	97.7	99	95	97.6
Heavy Vehicles	0	40	3	0	1	1	12	34	2	1	1	10	105
% Heavy Vehicles	0	2.2	2.4	0	1.1	6.2	7	1.9	4.4	2.3	1	5	2.4

Zero Pedestrians were observed during this study.

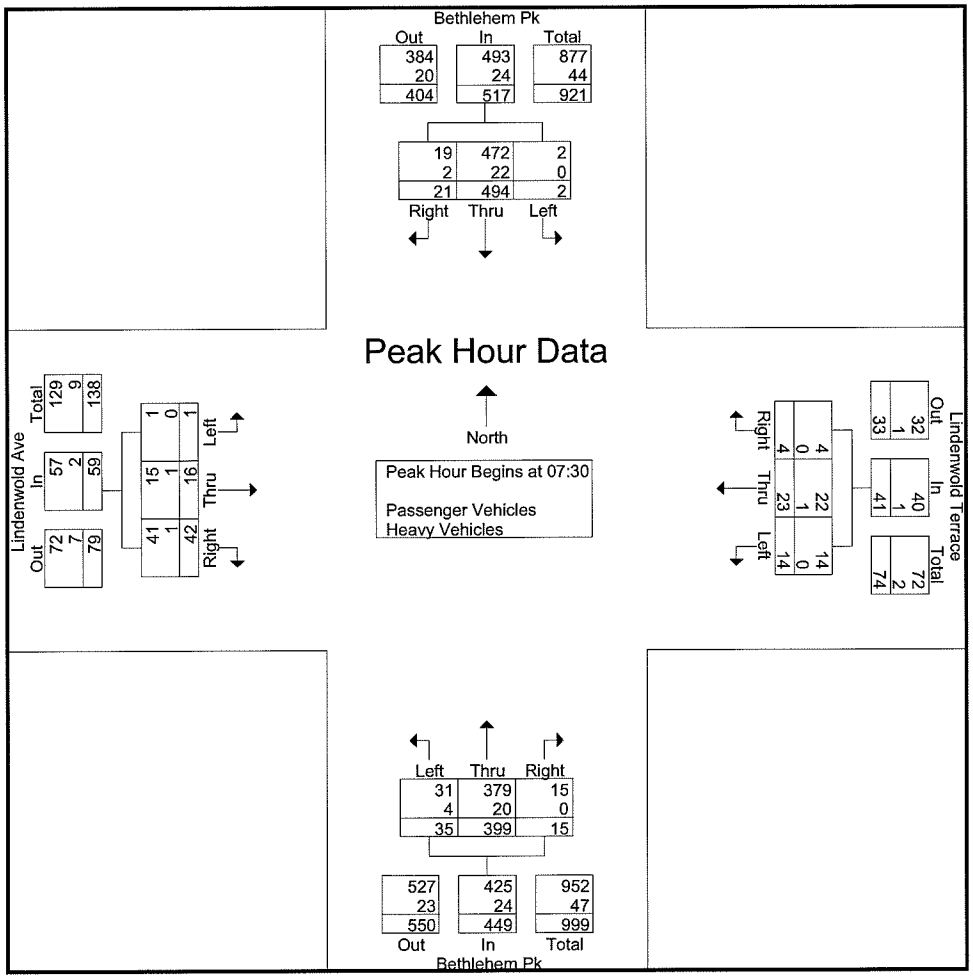
McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, P A 19034

Municipality: Ambler Borough
Location: Bethlehem Pike &
Lindenwold Avenue / Lindenwold Terrace
Counter/Board #: GG+KB

File Name : lindenwold01w
Site Code : 81346801
Start Date : 3/31/2016
Page No : 2

	Bethlehem Pk Southbound				Lindenwold Terrace Westbound				Bethlehem Pk Northbound				Lindenwold Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	2	140	4	146	0	3	1	4	6	86	2	94	1	4	7	12	256
07:45	0	131	7	138	5	6	3	14	12	106	3	121	0	2	10	12	285
08:00	0	105	4	109	5	6	0	11	8	86	3	97	0	4	14	18	235
08:15	0	118	6	124	4	8	0	12	9	121	7	137	0	6	11	17	290
Total Volume	2	494	21	517	14	23	4	41	35	399	15	449	1	16	42	59	1066
% App. Total	0.4	95.6	4.1		34.1	56.1	9.8		7.8	88.9	3.3		1.7	27.1	71.2		
PHF	.250	.882	.750	.885	.700	.719	.333	.732	.729	.824	.536	.819	.250	.667	.750	.819	.919
Passenger Vehicles	2	472	19	493	14	22	4	40	31	379	15	425	1	15	41	57	1015
% Passenger Vehicles	100	95.5	90.5	95.4	100	95.7	100	97.6	88.6	95.0	100	94.7	100	93.8	97.6	96.6	95.2
Heavy Vehicles	0	22	2	24	0	1	0	1	4	20	0	24	0	1	1	2	51
% Heavy Vehicles	0	4.5	9.5	4.6	0	4.3	0	2.4	11.4	5.0	0	5.3	0	6.3	2.4	3.4	4.8



McMahon Associates, Inc.

425 Commerce Drive, Suite 200
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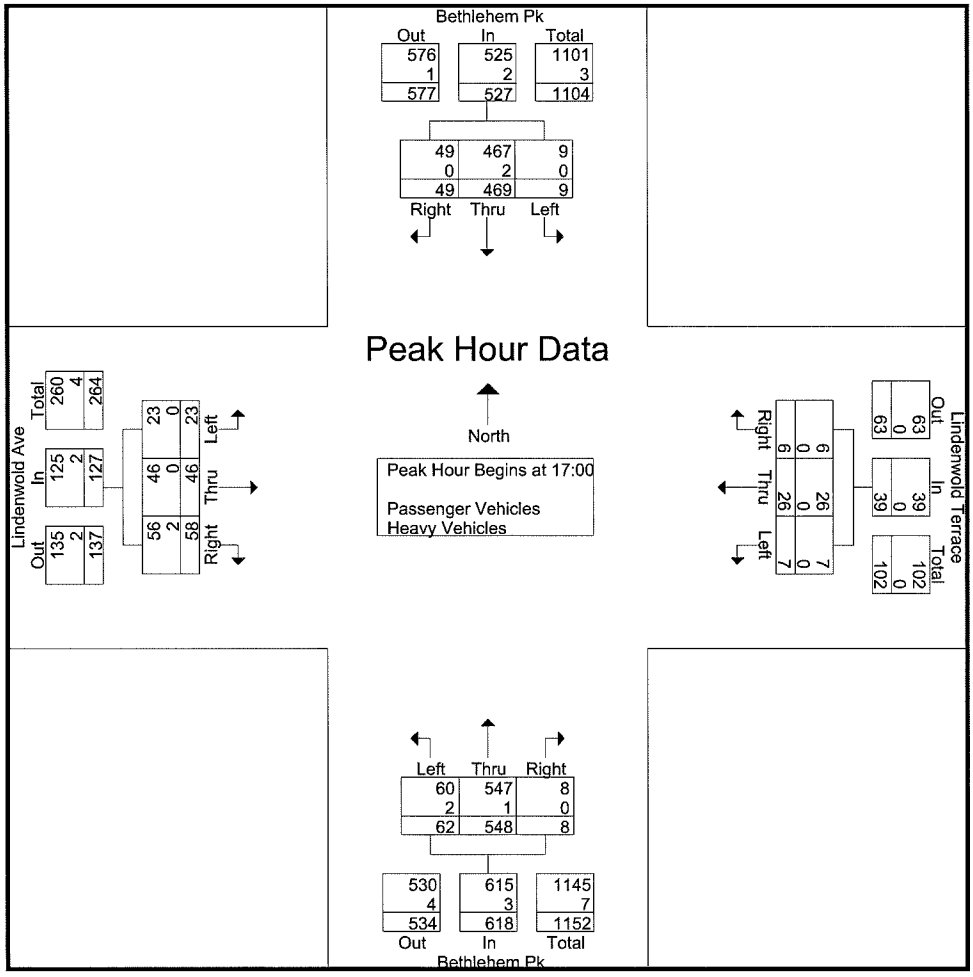
Start Date : 3/31/2016
Page No : 3

	Bethlehem Pk Southbound				Lindenwold Terrace Westbound				Bethlehem Pk Northbound				Lindenwold Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	1	114	8	123	2	7	0	9	15	120	1	136	7	15	11	33	301
17:15	3	110	15	128	0	6	0	6	15	145	3	163	7	8	19	34	331
17:30	1	123	12	136	3	7	4	14	18	135	1	154	6	9	13	28	332
17:45	4	122	14	140	2	6	2	10	14	148	3	165	3	14	15	32	347
Total Volume	9	469	49	527	7	26	6	39	62	548	8	618	23	46	58	127	1311
% App. Total	1.7	89	9.3		17.9	66.7	15.4		10	88.7	1.3		18.1	36.2	45.7		
PHF	.563	.953	.817	.941	.583	.929	.375	.696	.861	.926	.667	.936	.821	.767	.763	.934	.945
Passenger Vehicles	9	467	49	525	7	26	6	39	60	547	8	615	23	46	56	125	1304
% Passenger Vehicles	100	99.6	100	99.6	100	100	100	100	96.8	99.8	100	99.5	100	100	96.6	98.4	99.5
Heavy Vehicles	0	2	0	2	0	0	0	0	2	1	0	3	0	0	2	2	7
% Heavy Vehicles	0	0.4	0	0.4	0	0	0	0	3.2	0.2	0	0.5	0	0	3.4	1.6	0.5



APPENDIX E

HCM Methodology

CAPACITY/LEVEL-OF-SERVICE ANALYSIS METHODOLOGY

The detailed capacity/level-of-service analysis contained in this transportation impact study was performed in accordance with the standard techniques contained in the *Highway Capacity Manual 2010.* By definition, capacity represents "the maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic, and control conditions." The level at which an intersection or a uniform section of a lane or roadway function can be expressed in terms of a level of service. Level of service (LOS) is defined as "a quantitative stratification of a performance measure or measures that represent quality of service, measured on an A-F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst."

Stop-Controlled Intersections

At unsignalized stop-controlled intersections, such as two-way stop-controlled (TWSC) or all-way stop-controlled (AWSC), a methodology for evaluating the relative functioning of these intersections is based upon the control delay. For these types of unsignalized intersections, the analysis of the control delay is based upon the following data:

- Number and configuration of lanes on each approach;
- Percentage of heavy vehicles on each approach;
- Demand flow rate for each entering vehicular movement and pedestrian crossing movement;
- Unique geometric factors such as, channelization aspects; two-way left-turn lanes, raised or striped median storage; approach grades, flared approaches on the minor street; and upstream signals within 0.25 miles.

At TWSC intersections, only drivers on the minor street approaches are required to stop before proceeding into the intersection and left-turning drivers from the major street may have to yield to on-coming major street through or right-turning traffic, but are not required to stop in the absence of on-coming traffic. The capacity at stop-controlled legs is based primarily on three factors: the distribution of gaps in the major stream, driver judgment in selecting the gaps, and the follow-up headways required by each driver in a queue.

At AWSC intersections, every vehicle is required to stop at the intersection before proceeding, and as a result, the decision to proceed is a function of the traffic conditions on the other approaches. Each driver proceeds only after determining that no vehicles are currently in the intersection and that it is the driver's turn to proceed. Capacity at an AWSC intersection is described by the saturation headway or time between departures of successive vehicles on a given approach for a particular case assuming a continuous queue; departure headway or the average time between departures of successive vehicles on a given approach accounting for the probability of each possible case; and service time or the average time sent by a vehicle in first position waiting to depart.

At both TWSC and AWSC intersections, the level of service is based upon the control delay, as well as the corresponding volume-to-capacity ratio for each movement/lane group. For TWSC intersections, the level of service is not calculated for major-street approaches or for the intersection as a whole; however, the intersection-wide level of service is calculated for AWSC intersections. The following table provides a summary of the relationship between the level of service, control delay, and volume-to-capacity ratio for TWSC and AWSC intersections.

Control Delay (Sec/Veh)	LOS by Volume-to-Capacity Ratio	
	v/c ≤ 1.0	v/c > 1.0
≤ 10	A	F
> 10 – 15	B	F
> 15 – 25	C	F
> 25 – 35	D	F
> 35 – 50	E	F
> 50	F	F

Signalized Intersections

At three or four-legged signalized intersections, a methodology for evaluating the capacity and quality of service provided to road users traveling through the signalized intersection. For signalized intersections, the level of service can be characterized for the entire intersection, each approach, and each lane group. The level of service is based upon the control delay and volume-to-capacity ratio. The delay quantifies the increase in travel time due to the traffic signal control and is a surrogate measure of driver discomfort and fuel consumption, while the volume-to-capacity ratio quantifies the degree to which a phase's capacity is utilized by a lane group. Input data in determining the delay and volume-to-capacity ratio include:

- Demand flow rate for each entering vehicular movement and pedestrian crossing movement, including right-turn on red volumes and percent of heavy vehicles;
- Initial queue for each lane group;
- Number and configuration of lanes on each approach;
- Type of signal control and phase sequence;
- Allocation of minimum/maximum green times and clearance intervals (Yellow plus All Red phases); and
- Phase recall.

At signalized intersections, the level of service is based upon the control delay, as well as the corresponding volume-to-capacity ratio for each movement/lane group. The following table provides a summary of the relationship between the level of service, control delay, and volume-to-capacity ratio for signalized intersections.

Control Delay (Sec/Veh)	LOS by Volume-to-Capacity Ratio	
	v/c ≤ 1.0	v/c > 1.0
≤ 10	A	F
> 10 – 20	B	F
> 20 – 35	C	F
> 35 – 55	D	F
> 55 – 80	E	F
> 80	F	F

APPENDIX F

2016 Existing Capacity/Level-of-Service Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	16	42	14	23	4	35	399	15	2	494	21
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.903			0.988			0.995			0.994	
Flt Protected		0.999			0.983		0.950			0.950		
Satd. Flow (prot)	0	1777	0	0	1718	0	1423	1635	0	1670	1660	0
Flt Permitted		0.999			0.983		0.950			0.950		
Satd. Flow (perm)	0	1777	0	0	1718	0	1423	1635	0	1670	1660	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	2%	0%	4%	0%	11%	5%	0%	0%	5%	10%
Adj. Flow (vph)	1	17	46	15	25	4	38	434	16	2	537	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	0	0	44	0	38	450	0	2	560	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	16	42	14	23	4	35	399	15	2	494	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	2	0	4	0	11	5	0	0	5	10
Mvmt Flow	1	17	46	15	25	4	38	434	16	2	537	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1086	1079	548	1102	1082	442	560	0	0	450	0	0
Stage 1	553	553	-	518	518	-	-	-	-	-	-	-
Stage 2	533	526	-	584	564	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.76	6.32	6.9	6.34	6.1	4.4	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.054	3.1	3	4.036	3.1	3.1	-	-	3	-	-
Pot Cap-1 Maneuver	202	202	557	222	229	660	738	-	-	841	-	-
Stage 1	569	492	-	632	545	-	-	-	-	-	-	-
Stage 2	585	507	-	582	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	176	191	557	182	217	660	738	-	-	841	-	-
Mov Cap-2 Maneuver	176	191	-	182	217	-	-	-	-	-	-	-
Stage 1	540	491	-	599	517	-	-	-	-	-	-	-
Stage 2	525	481	-	514	520	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.2	25.8	0.8	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	738	-	-	358	217	841	-	-
HCM Lane V/C Ratio	0.052	-	-	0.179	0.205	0.003	-	-
HCM Control Delay (s)	10.1	-	-	17.2	25.8	9.3	-	-
HCM Lane LOS	B	-	-	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.7	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	9	25	10	474	681	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.900				0.997	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1794	0	1636	1625	1664	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1794	0	1636	1625	1664	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	6%	5%	18%
Adj. Flow (vph)	9	26	10	494	709	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	10	494	727	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	9	25	10	474	681	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	6	5	18
Mvmt Flow	9	26	10	494	709	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1233	718	727	0	-	0
Stage 1	718	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Critical Hdwy	6.8	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	187	434	671	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	184	434	671	-	-	-
Mov Cap-2 Maneuver	338	-	-	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	634	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	671	-	404	-	-
HCM Lane V/C Ratio	0.016	-	0.088	-	-
HCM Control Delay (s)	10.5	-	14.8	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	5	31	14	460	673	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883				0.999	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1727	0	1645	1562	1755	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1727	0	1645	1562	1755	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	7%	0%	6%
Adj. Flow (vph)	5	32	15	479	701	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	15	479	706	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	31	14	460	673	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	7	0	6
Mvmt Flow	5	32	15	479	701	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1212	704	706	0	-	0
Stage 1	704	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	207	452	683	-	-	-
Stage 1	531	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	202	452	683	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	531	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	683	-	436	-	-
HCM Lane V/C Ratio	0.021	-	0.086	-	-
HCM Control Delay (s)	10.4	-	14	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	82	20	33	69	175	13	295	49	244	470	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.915			0.979			0.997	
Flt Protected		0.990			0.994		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1682	0	1636	1678	0	1629	1814	0
Flt Permitted		0.823			0.952		0.480			0.398		
Satd. Flow (perm)	0	1521	0	0	1611	0	827	1678	0	682	1814	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			121			13			2	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	4%	1%	5%	6%	7%	3%	0%	8%	4%	2%	6%	10%
Adj. Flow (vph)	27	85	21	34	72	182	14	307	51	254	490	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	133	0	0	288	0	14	358	0	254	500	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	27.0	27.0		27.0	27.0		33.0	33.0		13.0	46.0	
Total Split (%)	37.0%	37.0%		37.0%	37.0%		45.2%	45.2%		17.8%	63.0%	
Maximum Green (s)	21.0	21.0		21.0	21.0		27.0	27.0		7.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 64.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	82	20	33	69	175	13	295	49	244	470	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1840	1881	1881	1803	1881	1782	1725	1853	1774	1774	1881
Adj Flow Rate, veh/h	27	85	21	34	72	182	14	307	51	254	490	10
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	7	7	7	0	8	8	2	6	6
Cap, veh/h	110	293	63	87	109	233	489	608	101	590	1068	22
Arrive On Green	0.22	0.23	0.22	0.22	0.23	0.22	0.42	0.42	0.41	0.12	0.62	0.60
Sat Flow, veh/h	191	1258	272	113	470	1001	903	1443	240	1689	1732	35
Grp Volume(v), veh/h	133	0	0	288	0	0	14	0	358	254	0	500
Grp Sat Flow(s),veh/h/ln	1721	0	0	1584	0	0	903	0	1683	1689	0	1767
Q Serve(g_s), s	0.0	0.0	0.0	5.9	0.0	0.0	0.6	0.0	10.4	4.9	0.0	10.1
Cycle Q Clear(g_c), s	4.1	0.0	0.0	11.5	0.0	0.0	0.6	0.0	10.4	4.9	0.0	10.1
Prop In Lane	0.20		0.16	0.12		0.63	1.00		0.14	1.00		0.02
Lane Grp Cap(c), veh/h	440	0	0	405	0	0	489	0	709	590	0	1090
V/C Ratio(X)	0.30	0.00	0.00	0.71	0.00	0.00	0.03	0.00	0.51	0.43	0.00	0.46
Avail Cap(c_a), veh/h	598	0	0	559	0	0	489	0	709	590	0	1090
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	0.0	0.0	24.3	0.0	0.0	11.4	0.0	14.2	8.6	0.0	6.8
Incr Delay (d2), s/veh	0.4	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.6	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	0.0	0.0	9.2	0.0	0.0	0.4	0.0	8.5	4.3	0.0	8.6
LnGrp Delay(d),s/veh	21.7	0.0	0.0	26.8	0.0	0.0	11.5	0.0	14.8	9.1	0.0	7.1
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		133			288			372			754	
Approach Delay, s/veh		21.7			26.8			14.7			7.8	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	13.0	33.0		20.5		46.0		20.5
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	27.0		21.0		40.0		21.0
Max Q Clear Time (g_c+I1), s	7.4	12.4		6.1		12.1		13.5
Green Ext Time (p_c), s	0.0	2.1		1.4		2.3		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	46	58	7	26	6	62	548	8	9	469	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.938			0.980			0.998			0.986	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1861	0	0	1757	0	1534	1719	0	1670	1733	0
Flt Permitted		0.991			0.991		0.950			0.950		
Satd. Flow (perm)	0	1861	0	0	1757	0	1534	1719	0	1670	1733	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	24	48	61	7	27	6	65	577	8	9	494	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	133	0	0	40	0	65	585	0	9	546	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	23	46	58	7	26	6	62	548	8	9	469	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	0	0	0	3	0	0	0	0	0
Mvmt Flow	24	48	61	7	27	6	65	577	8	9	494	52

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1266	1254	519	1305	1276	581	545	0	0	585	0	0
Stage 1	538	538	-	712	712	-	-	-	-	-	-	-
Stage 2	728	716	-	593	564	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.33	6.9	6.3	6.1	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Follow-up Hdwy	3	4	3.1	3	4	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	149	162	578	161	181	551	779	-	-	754	-	-
Stage 1	581	510	-	495	457	-	-	-	-	-	-	-
Stage 2	448	420	-	575	528	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	147	578	100	164	551	779	-	-	754	-	-
Mov Cap-2 Maneuver	119	147	-	100	164	-	-	-	-	-	-	-
Stage 1	533	504	-	454	419	-	-	-	-	-	-	-
Stage 2	379	385	-	459	522	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	48.5	34.4	1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	779	-	-	209	163	754	-	-
HCM Lane V/C Ratio	0.084	-	-	0.64	0.252	0.013	-	-
HCM Control Delay (s)	10	-	-	48.5	34.4	9.8	-	-
HCM Lane LOS	B	-	-	E	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	3.8	1	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	12	18	16	634	503	28
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.919				0.993	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1762	0	1636	1706	1707	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1762	0	1636	1706	1707	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	8%	0%	0%	1%	2%	7%
Adj. Flow (vph)	12	18	16	640	508	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	30	0	16	640	536	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	12	18	16	634	503	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	8	0	0	1	2	7
Mvmt Flow	12	18	16	640	508	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1195	522	536	0	-	0
Stage 1	522	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Critical Hdwy	6.88	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.1	3.1	3	-	-	-
Pot Cap-1 Maneuver	189	570	784	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	185	570	784	-	-	-
Mov Cap-2 Maneuver	335	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.7	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	784	-	445	-	-
HCM Lane V/C Ratio	0.021	-	0.068	-	-
HCM Control Delay (s)	9.7	-	13.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	16	42	36	619	476	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.902				0.996	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1754	0	1645	1655	1713	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1754	0	1645	1655	1713	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	2%	8%
Adj. Flow (vph)	16	43	37	632	486	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	0	37	632	499	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	42	36	619	476	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	2	8
Mvmt Flow	16	43	37	632	486	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1197	492	499	0	-	0
Stage 1	492	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	211	602	808	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	530	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	201	602	808	-	-	-
Mov Cap-2 Maneuver	354	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	506	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	808	-	505	-	-
HCM Lane V/C Ratio	0.045	-	0.117	-	-
HCM Control Delay (s)	9.7	-	13.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

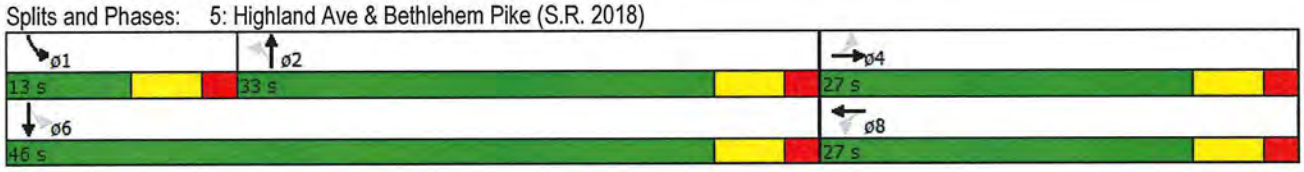
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	79	12	51	107	236	24	396	34	179	307	27
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.919			0.988			0.988	
Flt Protected		0.994			0.994		0.950			0.950		
Satd. Flow (prot)	0	1875	0	0	1747	0	1636	1786	0	1629	1889	0
Flt Permitted		0.919			0.943		0.556			0.306		
Satd. Flow (perm)	0	1733	0	0	1658	0	958	1786	0	525	1889	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			106			7			10	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	2%	0%	2%	1%	0%
Adj. Flow (vph)	13	81	12	52	109	241	24	404	35	183	313	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	106	0	0	402	0	24	439	0	183	341	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	27.0	27.0		27.0	27.0		33.0	33.0		13.0	46.0	
Total Split (%)	37.0%	37.0%		37.0%	37.0%		45.2%	45.2%		17.8%	63.0%	
Maximum Green (s)	21.0	21.0		21.0	21.0		27.0	27.0		7.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 68.9
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	79	12	51	107	236	24	396	34	179	307	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1867	1881	1881	1865	1881	1782	1820	1853	1774	1864	1881
Adj Flow Rate, veh/h	13	81	12	52	109	241	24	404	35	183	313	28
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	0	2	2	2	1	1
Cap, veh/h	85	422	57	99	147	281	518	656	57	477	965	86
Arrive On Green	0.27	0.29	0.27	0.27	0.29	0.27	0.40	0.40	0.38	0.10	0.57	0.56
Sat Flow, veh/h	98	1476	201	143	513	983	1045	1651	143	1689	1687	151
Grp Volume(v), veh/h	106	0	0	402	0	0	24	0	439	183	0	341
Grp Sat Flow(s),veh/h/ln	1775	0	0	1640	0	0	1045	0	1795	1689	0	1838
Q Serve(g_s), s	0.0	0.0	0.0	10.6	0.0	0.0	1.0	0.0	13.8	4.0	0.0	6.9
Cycle Q Clear(g_c), s	3.1	0.0	0.0	16.6	0.0	0.0	1.0	0.0	13.8	4.0	0.0	6.9
Prop In Lane	0.12		0.11	0.13		0.60	1.00		0.08	1.00		0.08
Lane Grp Cap(c), veh/h	539	0	0	503	0	0	518	0	713	477	0	1052
V/C Ratio(X)	0.20	0.00	0.00	0.80	0.00	0.00	0.05	0.00	0.62	0.38	0.00	0.32
Avail Cap(c_a), veh/h	584	0	0	546	0	0	518	0	713	493	0	1069
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.2	0.0	0.0	24.2	0.0	0.0	13.2	0.0	17.0	10.8	0.0	7.9
Incr Delay (d2), s/veh	0.2	0.0	0.0	7.7	0.0	0.0	0.0	0.0	1.6	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.9	0.0	0.0	13.6	0.0	0.0	0.7	0.0	11.4	3.5	0.0	6.2
LnGrp Delay(d),s/veh	19.3	0.0	0.0	31.9	0.0	0.0	13.2	0.0	18.6	11.3	0.0	8.1
LnGrp LOS	B			C			B		B	B		A
Approach Vol, veh/h		106			402			463			524	
Approach Delay, s/veh		19.3			31.9			18.3			9.2	
Approach LOS		B			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.3	33.0		25.1		45.3		25.1
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	27.0		21.0		40.0		21.0
Max Q Clear Time (g_c+I1), s	6.5	15.8		5.1		8.9		18.6
Green Ext Time (p_c), s	0.0	1.8		1.8		2.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	18.8
HCM 2010 LOS	B

APPENDIX G

2018 Future without Development Capacity/Level-of-Service Analysis and Intersection Volume Worksheets

INTERSECTION VOLUME SUMMARY
Enter Only Access/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening] **Weekday 7-9 AM**
2018 Opening Year

Traffic Component		EASTBOUND Lindenwold Ave			NORTHBOUND Enter Only Access			WESTBOUND Lindenwold Ave			SOUTHBOUND Enter Only Access		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		0	29	0	0	0	0	0	39	0	0	0	0
2014 to 2016 Growth Factor	1.022	0	30	0	0	0	0	0	40	0	0	0	0
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**0**	**30**	**0**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**
Background Growth	1.28 %	0	0	0	0	0	0	0	1	0	0	0	0
EXISTING W/ BACKGROUND		0	30	0	0	0	0	0	41	0	0	0	0
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**0**	**30**	**0**	**0**	**0**	**0**	**0**	**41**	**0**	**0**	**0**	**0**
TOTAL "NEW" SITE TRAFFIC		**0**	**3**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Single Family Attached Twins		0	1	0	0	0	0	0	0	0	0	0	0
Single Family Attached Townhomes		0	1	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**0**	**33**	**1**	**0**	**0**	**0**	**1**	**41**	**0**	**0**	**0**	**0**
"New" Site Traffic % of Total	####	0.0	9.1	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Enter Only Access/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening Y **Weekday 4-6 PM**
2018 Opening Year

Traffic Component		EASTBOUND Lindenwold Ave			NORTHBOUND Enter Only Access			WESTBOUND Lindenwold Ave			SOUTHBOUND Enter Only Access		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		0	62	0	0	0	0	0	59	0	0	0	0
2014 to 2016 Growth Factor	1.022	0	63	0	0	0	0	0	60	0	0	0	0
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**0**	**63**	**0**	**0**	**0**	**0**	**0**	**60**	**0**	**0**	**0**	**0**
Background Growth	1.28 %	0	1	0	0	0	0	0	1	0	0	0	0
EXISTING W/ BACKGROUND		0	64	0	0	0	0	0	61	0	0	0	0
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**0**	**64**	**0**	**0**	**0**	**0**	**0**	**61**	**0**	**0**	**0**	**0**
TOTAL "NEW" SITE TRAFFIC		**0**	**1**	**3**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**
Single Family Attached Twins		0	0	1	0	0	0	0	0	0	0	0	0
Single Family Attached Townhomes		0	0	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**0**	**65**	**3**	**0**	**0**	**0**	**2**	**61**	**0**	**0**	**0**	**0**
"New" Site Traffic % of Total	0.0%	0.0	1.5	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 7-9 AM**
2018 Opening Year

		EASTBOUND Lindenwold Ave			NORTHBOUND Bethlehem Pike (S.R. 2018)			WESTBOUND Lindenwold Ave			SOUTHBOUND Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		1	16	42	35	398	15	14	23	4	2	494	21
Seasonal Adjustment Factor	1.000	1	16	42	35	399	15	14	23	4	2	494	21
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**1**	**16**	**42**	**35**	**399**	**15**	**14**	**23**	**4**	**2**	**494**	**21**
Background Growth	1.28 %	0	0	1	0	5	0	0	0	0	0	6	0
EXISTING W/ BACKGROUND		1	16	43	35	404	15	14	23	4	2	500	21
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**1**	**16**	**43**	**35**	**404**	**15**	**14**	**23**	**4**	**2**	**500**	**21**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**1**	**5**	**27**	**3**	**0**	**0**	**0**	**1**	**9**	**0**
Single Family Attached Twins		0	0	0	1	5	1	0	0	0	0	1	0
Single Family Attached Townhomes		0	0	0	2	11	1	0	0	0	0	2	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	1	2	11	1	0	0	0	0	5	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**1**	**16**	**44**	**40**	**431**	**18**	**14**	**23**	**4**	**3**	**509**	**21**
"New" Site Traffic % of Total	*0.0%*	0.0	0.0	2.3	12.5	6.3	16.7	0.0	0.0	0.0	33.3	1.8	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 4-6 PM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Lindenwold Ave			Bethlehem Pike (S.R. 2018)			Lindenwold Ave			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		23	46	58	62	548	8	7	26	6	9	469	49
Seasonal Adjustment Factor	1.000	23	46	58	62	548	8	7	26	6	9	469	49
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**23**	**46**	**58**	**62**	**548**	**8**	**7**	**26**	**6**	**9**	**469**	**49**
Background Growth	1.28 %	0	1	1	1	7	0	0	0	0	0	6	1
EXISTING W/ BACKGROUND		23	47	59	63	555	8	7	26	6	9	475	50
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**23**	**47**	**59**	**63**	**555**	**8**	**7**	**26**	**6**	**9**	**475**	**50**
TOTAL "NEW" SITE TRAFFIC		**0**	**1**	**5**	**3**	**17**	**1**	**0**	**0**	**0**	**2**	**24**	**0**
Single Family Attached Twins		0	0	1	1	3	0	0	0	0	0	5	0
Single Family Attached Townhomes		0	1	2	1	5	0	0	0	0	1	9	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	2	2	9	1	0	0	0	1	10	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**23**	**48**	**64**	**66**	**572**	**9**	**7**	**26**	**6**	**11**	**499**	**50**
"New" Site Traffic % of Total	0.0%	0.0	2.1	7.8	4.5	3.0	11.1	0.0	0.0	0.0	18.2	4.8	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Mattison Ave/Access

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 7-9 AM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Mattison Ave/Access			Bethlehem Pike (S.R. 2018)			Mattison Ave/Access			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		9	0	24	10	464	0	0	0	0	0	666	17
2014 to 2016 Growth Factor	1.022	9	0	25	10	474	0	0	0	0	0	681	17
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**9**	**0**	**25**	**10**	**474**	**0**	**0**	**0**	**0**	**0**	**681**	**17**
Background Growth	1.28 %	0	0	0	0	6	0	0	0	0	0	9	0
EXISTING W/ BACKGROUND		9	0	25	10	480	0	0	0	0	0	690	17
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**9**	**0**	**25**	**10**	**480**	**0**	**0**	**0**	**0**	**0**	**690**	**17**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**0**	**10**	**48**	**0**	**35**	**10**	**0**	**0**
Single Family Attached Twins		0	0	0	0	0	2	10	0	7	1	0	0
Single Family Attached Townhomes		0	0	0	0	0	3	19	0	14	2	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	0	6	19	0	14	6	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**9**	**0**	**25**	**10**	**480**	**10**	**48**	**0**	**35**	**10**	**690**	**17**
"New" Site Traffic % of Total	####	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Mattison Ave/Access

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 4-6 PM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Mattison Ave/Access			Bethlehem Pike (S.R. 2018)			Mattison Ave/Access			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		12	0	18	16	620	0	0	0	0	0	492	27
2014 to 2016 Growth Factor	1.022	12	0	18	16	634	0	0	0	0	0	503	28
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**12**	**0**	**18**	**16**	**634**	**0**	**0**	**0**	**0**	**0**	**503**	**28**
Background Growth	1.28 %	0	0	0	0	8	0	0	0	0	0	6	0
EXISTING W/ BACKGROUND		12	0	18	16	642	0	0	0	0	0	509	28
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**12**	**0**	**18**	**16**	**642**	**0**	**0**	**0**	**0**	**0**	**509**	**28**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**0**	**31**	**31**	**0**	**21**	**29**	**0**	**0**
Single Family Attached Twins		0	0	0	0	0	6	5	0	3	6	0	0
Single Family Attached Townhomes		0	0	0	0	0	12	9	0	6	11	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	0	13	17	0	12	12	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**12**	**0**	**18**	**16**	**642**	**31**	**31**	**0**	**21**	**29**	**509**	**28**
"New" Site Traffic % of Total	#####	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Church St/Enter Only Access

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 7-9 AM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Church St/Enter Only Acc			Bethlehem Pike (S.R. 2018)			Church St/Enter Only Acc			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		5	0	30	14	450	0	0	0	0	0	659	5
2014 to 2016 Growth Factor	1.022	5	0	31	14	460	0	0	0	0	0	673	5
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**5**	**0**	**31**	**14**	**460**	**0**	**0**	**0**	**0**	**0**	**673**	**5**
Background Growth	1.28 %	0	0	0	0	6	0	0	0	0	0	9	0
EXISTING W/ BACKGROUND		5	0	31	14	466	0	0	0	0	0	682	5
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**5**	**0**	**31**	**14**	**466**	**0**	**0**	**0**	**0**	**0**	**682**	**5**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**10**	**6**	**0**	**0**	**0**	**0**	**48**	**0**
Single Family Attached Twins		0	0	0	0	2	1	0	0	0	0	10	0
Single Family Attached Townhomes		0	0	0	0	3	1	0	0	0	0	19	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	6	3	0	0	0	0	19	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**5**	**0**	**31**	**14**	**476**	**6**	**0**	**0**	**0**	**0**	**730**	**5**
"New" Site Traffic % of Total	####	0.0	0.0	0.0	0.0	2.1	100.0	0.0	0.0	0.0	0.0	6.6	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Church St/Enter Only Access

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 4-6 PM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Church St/Enter Only Ac			Bethlehem Pike (S.R. 2018)			Church St/Enter Only Ac			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		16	0	41	35	606	0	0	0	0	0	466	13
2014 to 2016 Growth Factor	1.022	16	0	42	36	619	0	0	0	0	0	476	13
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**16**	**0**	**42**	**36**	**619**	**0**	**0**	**0**	**0**	**0**	**476**	**13**
Background Growth	1.28 %	0	0	1	0	8	0	0	0	0	0	6	0
EXISTING W/ BACKGROUND		16	0	43	36	627	0	0	0	0	0	482	13
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**16**	**0**	**43**	**36**	**627**	**0**	**0**	**0**	**0**	**0**	**482**	**13**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**31**	**16**	**0**	**0**	**0**	**0**	**31**	**0**
Single Family Attached Twins		0	0	0	0	6	3	0	0	0	0	5	0
Single Family Attached Townhomes		0	0	0	0	12	6	0	0	0	0	9	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	13	7	0	0	0	0	17	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**16**	**0**	**43**	**36**	**658**	**16**	**0**	**0**	**0**	**0**	**513**	**13**
"New" Site Traffic % of Total	#####	0.0	0.0	0.0	0.0	4.7	100.0	0.0	0.0	0.0	0.0	6.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Highland Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 7-9 AM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Highland Ave			Bethlehem Pike (S.R. 2018)			Highland Ave			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		25	80	20	13	289	48	32	68	171	239	460	10
2014 to 2016 Growth Factor	1.022	26	82	20	13	295	49	33	69	175	244	470	10
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**26**	**82**	**20**	**13**	**295**	**49**	**33**	**69**	**175**	**244**	**470**	**10**
Background Growth	1.28 %	0	1	0	0	4	1	0	1	2	3	6	0
EXISTING W/ BACKGROUND		26	83	20	13	299	50	33	70	177	247	476	10
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**26**	**83**	**20**	**13**	**299**	**50**	**33**	**70**	**177**	**247**	**476**	**10**
TOTAL "NEW" SITE TRAFFIC		**1**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**7**	**16**	**23**	**7**
Single Family Attached Twins		0	0	0	0	1	0	0	0	0	4	5	1
Single Family Attached Townhomes		1	0	0	0	2	0	0	0	2	7	9	3
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		1	0	0	0	5	0	0	0	4	7	9	3
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**27**	**83**	**20**	**13**	**307**	**50**	**33**	**70**	**184**	**265**	**499**	**17**
"New" Site Traffic % of Total	*0.0%*	3.7	0.0	0.0	0.0	2.6	0.0	0.0	0.0	3.8	6.8	4.6	41.2

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Highland Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2018 Opening **Weekday 4-6 PM**
2018 Opening Year

		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Highland Ave			Bethlehem Pike (S.R. 2018)			Highland Ave			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		13	77	12	23	388	33	50	105	231	175	300	26
2014 to 2016 Growth Factor	1.022	13	79	12	24	396	34	51	107	236	179	307	27
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**13**	**79**	**12**	**24**	**396**	**34**	**51**	**107**	**236**	**179**	**307**	**27**
Background Growth	1.28 %	0	1	0	0	5	0	1	1	3	2	4	0
EXISTING W/ BACKGROUND		13	80	12	24	401	34	52	108	239	181	311	27
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**13**	**80**	**12**	**24**	**401**	**34**	**52**	**108**	**239**	**181**	**311**	**27**
TOTAL "NEW" SITE TRAFFIC		**7**	**0**	**0**	**0**	**22**	**0**	**0**	**0**	**18**	**11**	**15**	**5**
Single Family Attached Twins		1	0	0	0	4	0	0	0	4	2	2	1
Single Family Attached Townhomes		2	0	0	0	9	0	0	0	7	3	4	1
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		3	0	0	0	10	0	0	0	7	6	8	2
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**20**	**80**	**12**	**24**	**423**	**34**	**52**	**108**	**257**	**192**	**326**	**32**
"New" Site Traffic % of Total	#####	35.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	7.0	5.7	4.6	15.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	16	43	14	23	4	35	404	15	2	500	21
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.902			0.988			0.995			0.994	
Flt Protected		0.999			0.983		0.950			0.950		
Satd. Flow (prot)	0	1776	0	0	1718	0	1423	1635	0	1670	1660	0
Flt Permitted		0.999			0.983		0.950			0.950		
Satd. Flow (perm)	0	1776	0	0	1718	0	1423	1635	0	1670	1660	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	2%	0%	4%	0%	11%	5%	0%	0%	5%	10%
Adj. Flow (vph)	1	17	47	15	25	4	38	439	16	2	543	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	65	0	0	44	0	38	455	0	2	566	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	16	43	14	23	4	35	404	15	2	500	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	2	0	4	0	11	5	0	0	5	10
Mvmt Flow	1	17	47	15	25	4	38	439	16	2	543	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1097	1091	555	1114	1094	447	566	0	0	455	0	0
Stage 1	559	559	-	523	523	-	-	-	-	-	-	-
Stage 2	538	532	-	591	571	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.76	6.32	6.9	6.34	6.1	4.4	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.054	3.1	3	4.036	3.1	3.1	-	-	3	-	-
Pot Cap-1 Maneuver	198	199	551	218	225	656	735	-	-	837	-	-
Stage 1	564	489	-	628	543	-	-	-	-	-	-	-
Stage 2	581	504	-	577	518	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	172	188	551	178	213	656	735	-	-	837	-	-
Mov Cap-2 Maneuver	172	188	-	178	213	-	-	-	-	-	-	-
Stage 1	535	488	-	596	515	-	-	-	-	-	-	-
Stage 2	521	478	-	508	517	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.4	26.3	0.8	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	735	-	-	355	213	837	-	-
HCM Lane V/C Ratio	0.052	-	-	0.184	0.209	0.003	-	-
HCM Control Delay (s)	10.2	-	-	17.4	26.3	9.3	-	-
HCM Lane LOS	B	-	-	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0.8	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	9	25	10	480	690	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.900				0.997	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1794	0	1636	1625	1664	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1794	0	1636	1625	1664	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	6%	5%	18%
Adj. Flow (vph)	9	26	10	500	719	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	10	500	737	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	9	25	10	480	690	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	6	5	18
Mvmt Flow	9	26	10	500	719	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1249	728	736	0	-	0
Stage 1	728	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Critical Hdwy	6.8	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	182	428	666	-	-	-
Stage 1	495	-	-	-	-	-
Stage 2	639	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	179	428	666	-	-	-
Mov Cap-2 Maneuver	333	-	-	-	-	-
Stage 1	495	-	-	-	-	-
Stage 2	629	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.9	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	666	-	398	-	-
HCM Lane V/C Ratio	0.016	-	0.089	-	-
HCM Control Delay (s)	10.5	-	14.9	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	5	31	14	466	682	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883				0.999	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1727	0	1645	1562	1755	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1727	0	1645	1562	1755	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	7%	0%	6%
Adj. Flow (vph)	5	32	15	485	710	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	15	485	715	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	31	14	466	682	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	7	0	6
Mvmt Flow	5	32	15	485	710	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1228	713	716	0	-	0
Stage 1	713	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.1	3.1	3	-	-	-
Pot Cap-1 Maneuver	198	446	677	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	194	446	677	-	-	-
Mov Cap-2 Maneuver	345	-	-	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	631	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	677	-	429	-	-
HCM Lane V/C Ratio	0.022	-	0.087	-	-
HCM Control Delay (s)	10.4	-	14.2	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

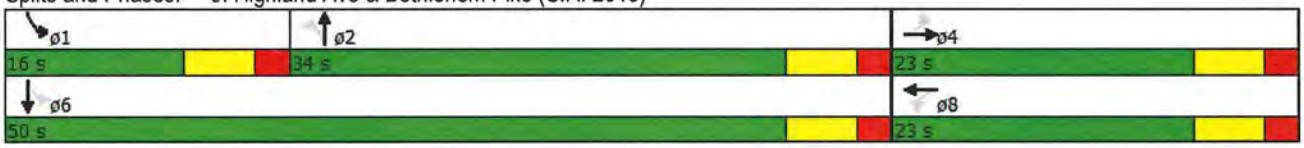
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	83	20	33	70	177	13	299	50	247	476	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.915			0.979			0.997	
Flt Protected		0.990			0.994		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1682	0	1636	1678	0	1629	1814	0
Flt Permitted		0.805			0.953		0.478			0.386		
Satd. Flow (perm)	0	1488	0	0	1612	0	823	1678	0	662	1814	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			113			14			3	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	4%	1%	5%	6%	7%	3%	0%	8%	4%	2%	6%	10%
Adj. Flow (vph)	27	86	21	34	73	184	14	311	52	257	496	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	134	0	0	291	0	14	363	0	257	506	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	23.0	23.0		23.0	23.0		34.0	34.0		16.0	50.0	
Total Split (%)	31.5%	31.5%		31.5%	31.5%		46.6%	46.6%		21.9%	68.5%	
Maximum Green (s)	17.0	17.0		17.0	17.0		28.0	28.0		10.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 66.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	83	20	33	70	177	13	299	50	247	476	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1840	1881	1881	1803	1881	1782	1725	1853	1774	1774	1881
Adj Flow Rate, veh/h	27	86	21	34	73	184	14	311	52	257	496	10
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	7	7	7	0	8	8	2	6	6
Cap, veh/h	108	287	61	86	108	229	483	603	101	596	1077	22
Arrive On Green	0.21	0.23	0.21	0.21	0.23	0.21	0.42	0.42	0.40	0.13	0.62	0.61
Sat Flow, veh/h	189	1255	268	112	470	1001	898	1442	241	1689	1732	35
Grp Volume(v), veh/h	134	0	0	291	0	0	14	0	363	257	0	506
Grp Sat Flow(s),veh/h/ln	1712	0	0	1584	0	0	898	0	1683	1689	0	1767
Q Serve(g_s), s	0.0	0.0	0.0	6.3	0.0	0.0	0.6	0.0	10.7	5.0	0.0	10.2
Cycle Q Clear(g_c), s	4.2	0.0	0.0	11.8	0.0	0.0	0.6	0.0	10.7	5.0	0.0	10.2
Prop In Lane	0.20		0.16	0.12		0.63	1.00		0.14	1.00		0.02
Lane Grp Cap(c), veh/h	431	0	0	399	0	0	483	0	703	596	0	1099
V/C Ratio(X)	0.31	0.00	0.00	0.73	0.00	0.00	0.03	0.00	0.52	0.43	0.00	0.46
Avail Cap(c_a), veh/h	495	0	0	461	0	0	497	0	729	655	0	1188
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.7	0.0	0.0	24.8	0.0	0.0	11.6	0.0	14.5	8.5	0.0	6.7
Incr Delay (d2), s/veh	0.4	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.6	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.9	0.0	0.0	9.8	0.0	0.0	0.4	0.0	8.8	4.4	0.0	8.7
LnGrp Delay(d),s/veh	22.1	0.0	0.0	29.7	0.0	0.0	11.7	0.0	15.1	9.1	0.0	7.0
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		134			291			377			763	
Approach Delay, s/veh		22.1			29.7			15.0			7.7	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	13.6	33.0		20.3		46.6		20.3
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	10.0	28.0		17.0		44.0		17.0
Max Q Clear Time (g_c+I1), s	7.5	12.7		6.2		12.2		13.8
Green Ext Time (p_c), s	0.2	2.2		1.2		2.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	47	59	7	26	6	63	555	8	9	475	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.938			0.980			0.998			0.986	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1861	0	0	1757	0	1534	1719	0	1670	1733	0
Flt Permitted		0.991			0.991		0.950			0.950		
Satd. Flow (perm)	0	1861	0	0	1757	0	1534	1719	0	1670	1733	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	24	49	62	7	27	6	66	584	8	9	500	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	40	0	66	592	0	9	553	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	23	47	59	7	26	6	63	555	8	9	475	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	0	0	0	3	0	0	0	0	0
Mvmt Flow	24	49	62	7	27	6	66	584	8	9	500	53

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1283	1270	526	1322	1293	588	553	0	0	593	0	0
Stage 1	545	545	-	721	721	-	-	-	-	-	-	-
Stage 2	738	725	-	601	572	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.33	6.9	6.3	6.1	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Follow-up Hdwy	3	4	3.1	3	4	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	145	158	573	157	177	546	774	-	-	749	-	-
Stage 1	575	506	-	490	453	-	-	-	-	-	-	-
Stage 2	442	416	-	570	524	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	116	143	573	95	160	546	774	-	-	749	-	-
Mov Cap-2 Maneuver	116	143	-	95	160	-	-	-	-	-	-	-
Stage 1	526	500	-	448	414	-	-	-	-	-	-	-
Stage 2	373	381	-	452	518	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	51.5	35.6	1	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	774	-	-	205	158	749	-	-
HCM Lane V/C Ratio	0.086	-	-	0.662	0.26	0.013	-	-
HCM Control Delay (s)	10.1	-	-	51.5	35.6	9.9	-	-
HCM Lane LOS	B	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	4	1	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	12	18	16	642	509	28
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.919				0.993	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1762	0	1636	1706	1707	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1762	0	1636	1706	1707	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	8%	0%	0%	1%	2%	7%
Adj. Flow (vph)	12	18	16	648	514	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	30	0	16	648	542	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	12	18	16	642	509	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	8	0	0	1	2	7
Mvmt Flow	12	18	16	648	514	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1209	528	542	0	-	0
Stage 1	528	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Critical Hdwy	6.88	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.1	3.1	3	-	-	-
Pot Cap-1 Maneuver	185	565	781	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	181	565	781	-	-	-
Mov Cap-2 Maneuver	331	-	-	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	495	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	781	-	440	-	-
HCM Lane V/C Ratio	0.021	-	0.069	-	-
HCM Control Delay (s)	9.7	-	13.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	16	43	36	627	482	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.901				0.997	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1752	0	1645	1655	1715	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1752	0	1645	1655	1715	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	2%	8%
Adj. Flow (vph)	16	44	37	640	492	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	37	640	505	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	43	36	627	482	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	2	8
Mvmt Flow	16	44	37	640	492	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1211	498	505	0	-	0
Stage 1	498	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	207	597	804	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	197	597	804	-	-	-
Mov Cap-2 Maneuver	350	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	501	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	804	-	501	-	-
HCM Lane V/C Ratio	0.046	-	0.12	-	-
HCM Control Delay (s)	9.7	-	13.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

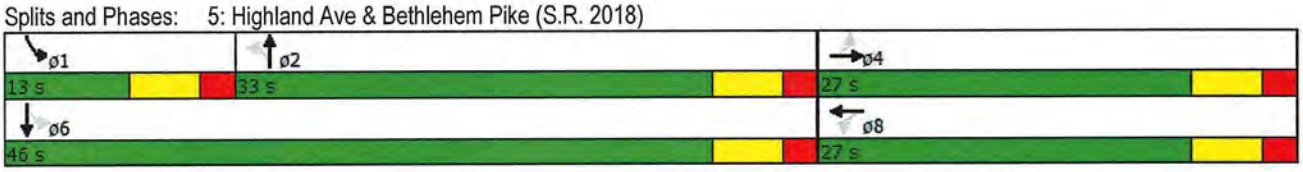
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	80	12	52	108	239	24	401	34	181	311	27
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.919			0.988			0.988	
Flt Protected		0.994			0.994		0.950			0.950		
Satd. Flow (prot)	0	1875	0	0	1747	0	1636	1786	0	1629	1889	0
Flt Permitted		0.920			0.942		0.554			0.301		
Satd. Flow (perm)	0	1735	0	0	1656	0	954	1786	0	516	1889	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			106			7			10	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	2%	0%	2%	1%	0%
Adj. Flow (vph)	13	82	12	53	110	244	24	409	35	185	317	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	0	0	407	0	24	444	0	185	345	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	27.0	27.0		27.0	27.0		33.0	33.0		13.0	46.0	
Total Split (%)	37.0%	37.0%		37.0%	37.0%		45.2%	45.2%		17.8%	63.0%	
Maximum Green (s)	21.0	21.0		21.0	21.0		27.0	27.0		7.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 69.1
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	80	12	52	108	239	24	401	34	181	311	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1867	1881	1881	1865	1881	1782	1820	1853	1774	1864	1881
Adj Flow Rate, veh/h	13	82	12	53	110	244	24	409	35	185	317	28
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	0	2	2	2	1	1
Cap, veh/h	85	426	57	99	147	283	514	654	56	471	964	85
Arrive On Green	0.27	0.29	0.27	0.27	0.29	0.27	0.40	0.40	0.38	0.10	0.57	0.56
Sat Flow, veh/h	97	1477	199	145	511	983	1042	1653	141	1689	1689	149
Grp Volume(v), veh/h	107	0	0	407	0	0	24	0	444	185	0	345
Grp Sat Flow(s),veh/h/ln	1773	0	0	1639	0	0	1042	0	1795	1689	0	1838
Q Serve(g_s), s	0.0	0.0	0.0	10.9	0.0	0.0	1.0	0.0	14.1	4.0	0.0	7.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	16.9	0.0	0.0	1.0	0.0	14.1	4.0	0.0	7.0
Prop In Lane	0.12		0.11	0.13		0.60	1.00		0.08	1.00		0.08
Lane Grp Cap(c), veh/h	543	0	0	507	0	0	514	0	710	471	0	1049
V/C Ratio(X)	0.20	0.00	0.00	0.80	0.00	0.00	0.05	0.00	0.63	0.39	0.00	0.33
Avail Cap(c_a), veh/h	581	0	0	543	0	0	514	0	710	485	0	1064
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.2	0.0	0.0	24.2	0.0	0.0	13.3	0.0	17.2	11.0	0.0	8.1
Incr Delay (d2), s/veh	0.2	0.0	0.0	8.1	0.0	0.0	0.0	0.0	1.7	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.0	0.0	0.0	13.8	0.0	0.0	0.7	0.0	11.7	3.6	0.0	6.5
LnGrp Delay(d),s/veh	19.3	0.0	0.0	32.3	0.0	0.0	13.4	0.0	19.0	11.6	0.0	8.2
LnGrp LOS	B			C			B		B	B		A
Approach Vol, veh/h		107			407			468			530	
Approach Delay, s/veh		19.3			32.3			18.7			9.4	
Approach LOS		B			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.4	33.0		25.4		45.4		25.4
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	27.0		21.0		40.0		21.0
Max Q Clear Time (g_c+I1), s	6.5	16.1		5.2		9.0		18.9
Green Ext Time (p_c), s	0.0	1.8		1.8		2.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

APPENDIX H

2018 Future with Development Capacity/Level-of-Service Analysis Worksheets

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	33	1	1	41	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	0%			-1%	0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					
Flt Protected				0.999		
Satd. Flow (prot)	1758	0	0	1772	1765	0
Flt Permitted				0.999		
Satd. Flow (perm)	1758	0	0	1772	1765	0
Link Speed (mph)	30			25	25	
Link Distance (ft)	956			64	298	
Travel Time (s)	21.7			1.7	8.1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	37	1	1	46	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	0	0	47	0	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	33	1	1	41	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-1	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	1	1	46	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	38	0	85	37
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	48	-
Critical Hdwy	-	-	4.3	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	3	-	3	3.1
Pot Cap-1 Maneuver	-	-	1165	-	1068	1107
Stage 1	-	-	-	-	1153	-
Stage 2	-	-	-	-	1139	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1165	-	1067	1107
Mov Cap-2 Maneuver	-	-	-	-	1067	-
Stage 1	-	-	-	-	1153	-
Stage 2	-	-	-	-	1138	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1165	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s)	0	-	-	8.1	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	16	44	14	23	4	40	431	18	3	509	21
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.902			0.988			0.994			0.994	
Flt Protected		0.999			0.983		0.950			0.950		
Satd. Flow (prot)	0	1776	0	0	1718	0	1423	1634	0	1670	1661	0
Flt Permitted		0.999			0.983		0.950			0.950		
Satd. Flow (perm)	0	1776	0	0	1718	0	1423	1634	0	1670	1661	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			956			734			414	
Travel Time (s)		28.4			26.1			12.5			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	2%	0%	4%	0%	11%	5%	0%	0%	5%	10%
Adj. Flow (vph)	1	17	48	15	25	4	43	468	20	3	553	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	66	0	0	44	0	43	488	0	3	576	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	16	44	14	23	4	40	431	18	3	509	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	2	0	4	0	11	5	0	0	5	10
Mvmt Flow	1	17	48	15	25	4	43	468	20	3	553	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1151	1146	565	1169	1148	478	576	0	0	488	0	0
Stage 1	571	571	-	565	565	-	-	-	-	-	-	-
Stage 2	580	575	-	604	583	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.76	6.32	6.9	6.34	6.1	4.4	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.054	3.1	3	4.036	3.1	3.1	-	-	3	-	-
Pot Cap-1 Maneuver	181	184	544	200	210	630	729	-	-	815	-	-
Stage 1	555	483	-	596	521	-	-	-	-	-	-	-
Stage 2	548	481	-	568	512	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	155	173	544	160	197	630	729	-	-	815	-	-
Mov Cap-2 Maneuver	155	173	-	160	197	-	-	-	-	-	-	-
Stage 1	522	481	-	561	490	-	-	-	-	-	-	-
Stage 2	486	453	-	497	510	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.2	28.8	0.8	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	729	-	-	339	195	815	-	-
HCM Lane V/C Ratio	0.06	-	-	0.196	0.229	0.004	-	-
HCM Control Delay (s)	10.3	-	-	18.2	28.8	9.4	-	-
HCM Lane LOS	B	-	-	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0.8	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	25	48	0	35	10	480	10	10	690	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	50		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.900			0.850			0.997			0.996	
Flt Protected		0.987		0.950			0.950			0.950		
Satd. Flow (prot)	0	1794	0	1676	1500	0	1636	1622	0	1637	1662	0
Flt Permitted		0.987		0.950			0.950			0.950		
Satd. Flow (perm)	0	1794	0	1676	1500	0	1636	1622	0	1637	1662	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			413			515			734	
Travel Time (s)		20.5			11.3			8.8			12.5	
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	6%	2%	2%	5%	18%
Adj. Flow (vph)	9	0	26	53	0	39	10	500	11	11	719	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	0	53	39	0	10	511	0	11	737	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	0	25	48	0	35	10	480	10	10	690	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	50	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	0	-	-	2	-	-	-2	-
Peak Hour Factor	96	90	96	90	90	90	96	96	90	90	96	96
Heavy Vehicles, %	0	2	0	2	2	2	0	6	2	2	5	18
Mvmt Flow	9	0	26	53	0	39	10	500	11	11	719	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1290	1271	728	1284	1280	500	736	0	0	500	0	0
Stage 1	750	750	-	521	521	-	-	-	-	-	-	-
Stage 2	540	521	-	763	759	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.92	6.4	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.5	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	133	146	428	154	166	602	666	-	-	808	-	-
Stage 1	417	385	-	610	532	-	-	-	-	-	-	-
Stage 2	562	502	-	443	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	122	142	428	141	161	602	666	-	-	808	-	-
Mov Cap-2 Maneuver	122	142	-	141	161	-	-	-	-	-	-	-
Stage 1	411	380	-	601	524	-	-	-	-	-	-	-
Stage 2	518	494	-	410	409	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.2	31	0.2	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	666	-	-	257	141	602	808	-	-
HCM Lane V/C Ratio	0.016	-	-	0.138	0.378	0.065	0.014	-	-
HCM Control Delay (s)	10.5	-	-	21.2	45.3	11.4	9.5	-	-
HCM Lane LOS	B	-	-	C	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	1.6	0.2	0	-	-

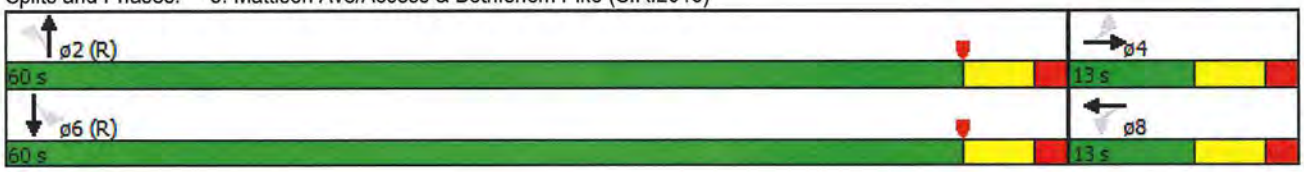
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	25	48	0	35	10	480	10	10	690	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	50		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.900			0.850			0.997			0.996	
Flt Protected		0.987		0.950			0.950			0.950		
Satd. Flow (prot)	0	1794	0	1676	1500	0	1636	1622	0	1637	1662	0
Flt Permitted		0.900		0.734			0.342			0.467		
Satd. Flow (perm)	0	1636	0	1295	1500	0	589	1622	0	805	1662	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			457			4			5	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			413			515			734	
Travel Time (s)		20.5			11.3			8.8			12.5	
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	6%	2%	2%	5%	18%
Adj. Flow (vph)	9	0	26	53	0	39	10	500	11	11	719	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	0	53	39	0	10	511	0	11	737	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.13	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	13.0	13.0		13.0	13.0		60.0	60.0		60.0	60.0	
Total Split (%)	17.8%	17.8%		17.8%	17.8%		82.2%	82.2%		82.2%	82.2%	
Maximum Green (s)	7.0	7.0		7.0	7.0		54.0	54.0		54.0	54.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		6.7		6.7	6.7		57.8	57.8		57.8	57.8	
Actuated g/C Ratio		0.09		0.09	0.09		0.79	0.79		0.79	0.79	
v/c Ratio		0.18		0.45	0.07		0.02	0.40		0.02	0.56	
Control Delay		10.8		43.8	0.3		2.7	4.3		2.6	6.0	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		10.8		43.8	0.3		2.7	4.3		2.6	6.0	
LOS		B		D	A		A	A		A	A	
Approach Delay		10.8			25.3			4.3			5.9	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 73
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 6.7 Intersection LOS: A
Intersection Capacity Utilization 58.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Mattison Ave/Access & Bethlehem Pike (S.R.2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	0	25	48	0	35	10	480	10	10	690	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1853	1853	1853	1765	1765	1800	1782	1682	1782	1782	1726	1818
Adj Flow Rate, veh/h	9	0	26	53	0	39	10	500	0	11	719	18
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	0	6	6	2	5	5
Cap, veh/h	74	6	53	186	0	84	544	1311	0	718	1307	33
Arrive On Green	0.06	0.00	0.06	0.06	0.00	0.06	0.78	0.78	0.00	0.78	0.78	0.78
Sat Flow, veh/h	218	109	944	1379	0	1500	725	1682	0	903	1677	42
Grp Volume(v), veh/h	35	0	0	53	0	39	10	500	0	11	0	737
Grp Sat Flow(s),veh/h/ln	1270	0	0	1379	0	1500	725	1682	0	903	0	1719
Q Serve(g_s), s	0.5	0.0	0.0	0.0	0.0	1.8	0.4	6.8	0.0	0.3	0.0	12.1
Cycle Q Clear(g_c), s	2.3	0.0	0.0	2.2	0.0	1.8	12.5	6.8	0.0	7.1	0.0	12.1
Prop In Lane	0.26		0.74	1.00		1.00	1.00		0.00	1.00		0.02
Lane Grp Cap(c), veh/h	133	0	0	186	0	84	544	1311	0	718	0	1340
V/C Ratio(X)	0.26	0.00	0.00	0.29	0.00	0.46	0.02	0.38	0.00	0.02	0.00	0.55
Avail Cap(c_a), veh/h	194	0	0	241	0	144	544	1311	0	718	0	1340
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	0.0	33.6	0.0	33.4	5.5	2.5	0.0	3.6	0.0	3.1
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.8	0.0	3.9	0.1	0.8	0.0	0.0	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.3	0.0	0.0	2.0	0.0	1.5	0.2	6.1	0.0	0.1	0.0	10.2
LnGrp Delay(d),s/veh	34.5	0.0	0.0	34.4	0.0	37.3	5.6	3.4	0.0	3.7	0.0	4.7
LnGrp LOS	C			C		D	A	A		A		A
Approach Vol, veh/h		35			92			510			748	
Approach Delay, s/veh		34.5			35.6			3.4			4.7	
Approach LOS		C			D			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		62.9		10.1		62.9		10.1
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		54.0		7.0		54.0		7.0
Max Q Clear Time (g_c+I1), s		14.5		4.3		14.1		4.2
Green Ext Time (p_c), s		10.4		0.1		10.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	7.0
HCM 2010 LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	31	0	0	0	14	476	6	0	730	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	15	12	12	12	11	10	10	11	11	10
Grade (%)		1%			0%			1%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.883						0.998			0.999	
Flt Protected		0.993					0.950					
Satd. Flow (prot)	0	1727	0	0	0	0	1645	1560	0	1723	1755	0
Flt Permitted		0.993					0.950					
Satd. Flow (perm)	0	1727	0	0	0	0	1645	1560	0	1723	1755	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		323			435			582			515	
Travel Time (s)		8.8			11.9			9.9			8.8	
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	7%	2%	2%	0%	6%
Adj. Flow (vph)	5	0	32	0	0	0	15	496	7	0	760	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	37	0	0	0	0	15	503	0	0	765	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	0	31	0	0	0	14	476	6	0	730	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-2	-
Peak Hour Factor	96	90	96	90	90	90	96	96	90	90	96	96
Heavy Vehicles, %	0	2	0	2	2	2	0	7	2	2	0	6
Mvmt Flow	5	0	32	0	0	0	15	496	7	0	760	5

Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	1291	1295	763				766	0	0	503	0	0
Stage 1	763	763	-				-	-	-	-	-	-
Stage 2	528	532	-				-	-	-	-	-	-
Critical Hdwy	6.6	6.72	6.3				4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	5.6	5.72	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.6	5.72	-				-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1				3	-	-	3	-	-
Pot Cap-1 Maneuver	184	151	417				650	-	-	806	-	-
Stage 1	495	396	-				-	-	-	-	-	-
Stage 2	652	510	-				-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	180	0	417				650	-	-	806	-	-
Mov Cap-2 Maneuver	180	0	-				-	-	-	-	-	-
Stage 1	495	0	-				-	-	-	-	-	-
Stage 2	637	0	-				-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.4	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	650	-	-	353	806	-	-
HCM Lane V/C Ratio	0.022	-	-	0.106	-	-	-
HCM Control Delay (s)	10.7	-	-	16.4	0	-	-
HCM Lane LOS	B	-	-	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0	-	-

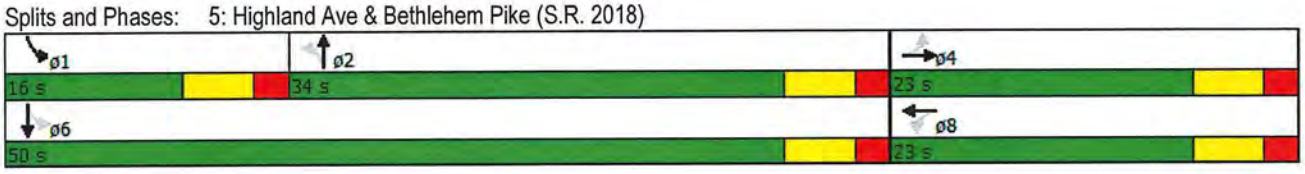
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	83	20	33	70	184	13	307	50	265	499	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.913			0.979			0.995	
Flt Protected		0.990			0.994		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1679	0	1636	1678	0	1629	1809	0
Flt Permitted		0.791			0.954		0.464			0.377		
Satd. Flow (perm)	0	1461	0	0	1611	0	799	1678	0	646	1809	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			117			13			4	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	4%	1%	5%	6%	7%	3%	0%	8%	4%	2%	6%	10%
Adj. Flow (vph)	28	86	21	34	73	192	14	320	52	276	520	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	299	0	14	372	0	276	538	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	23.0	23.0		23.0	23.0		34.0	34.0		16.0	50.0	
Total Split (%)	31.5%	31.5%		31.5%	31.5%		46.6%	46.6%		21.9%	68.5%	
Maximum Green (s)	17.0	17.0		17.0	17.0		28.0	28.0		10.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 67.2
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	83	20	33	70	184	13	307	50	265	499	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1840	1881	1881	1803	1881	1782	1725	1853	1774	1773	1881
Adj Flow Rate, veh/h	28	86	21	34	73	192	14	320	52	276	520	18
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	7	7	7	0	8	8	2	6	6
Cap, veh/h	109	287	61	84	106	236	465	596	97	589	1057	37
Arrive On Green	0.22	0.23	0.22	0.22	0.23	0.22	0.41	0.41	0.40	0.13	0.62	0.61
Sat Flow, veh/h	194	1237	264	109	458	1017	872	1448	235	1689	1703	59
Grp Volume(v), veh/h	135	0	0	299	0	0	14	0	372	276	0	538
Grp Sat Flow(s),veh/h/ln	1694	0	0	1583	0	0	872	0	1683	1689	0	1762
Q Serve(g_s), s	0.0	0.0	0.0	6.6	0.0	0.0	0.7	0.0	11.4	5.5	0.0	11.3
Cycle Q Clear(g_c), s	4.3	0.0	0.0	12.3	0.0	0.0	0.7	0.0	11.4	5.5	0.0	11.3
Prop In Lane	0.21		0.16	0.11		0.64	1.00		0.14	1.00		0.03
Lane Grp Cap(c), veh/h	433	0	0	404	0	0	465	0	693	589	0	1094
V/C Ratio(X)	0.31	0.00	0.00	0.74	0.00	0.00	0.03	0.00	0.54	0.47	0.00	0.49
Avail Cap(c_a), veh/h	485	0	0	454	0	0	478	0	718	634	0	1167
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.8	0.0	0.0	25.1	0.0	0.0	12.1	0.0	15.2	8.9	0.0	7.1
Incr Delay (d2), s/veh	0.4	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.7	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	0.0	10.2	0.0	0.0	0.4	0.0	9.2	4.8	0.0	9.3
LnGrp Delay(d),s/veh	22.2	0.0	0.0	30.7	0.0	0.0	12.1	0.0	15.9	9.6	0.0	7.4
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		135			299			386			814	
Approach Delay, s/veh		22.2			30.7			15.8			8.1	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	14.2	33.0		20.8		47.2		20.8
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	10.0	28.0		17.0		44.0		17.0
Max Q Clear Time (g_c+I1), s	8.0	13.4		6.3		13.3		14.3
Green Ext Time (p_c), s	0.2	2.3		1.2		2.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.2
HCM 2010 LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	65	3	2	61	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	0%			-1%	0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995					
Flt Protected				0.999		
Satd. Flow (prot)	1756	0	0	1772	1765	0
Flt Permitted				0.999		
Satd. Flow (perm)	1756	0	0	1772	1765	0
Link Speed (mph)	30			25	25	
Link Distance (ft)	951			112	450	
Travel Time (s)	21.6			3.1	12.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	72	3	2	68	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	75	0	0	70	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	65	3	2	61	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-1	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	72	3	2	68	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	76	0	146	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	-	-	4.3	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	3	-	3	3.1
Pot Cap-1 Maneuver	-	-	1131	-	982	1055
Stage 1	-	-	-	-	1107	-
Stage 2	-	-	-	-	1109	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1131	-	980	1055
Mov Cap-2 Maneuver	-	-	-	-	980	-
Stage 1	-	-	-	-	1107	-
Stage 2	-	-	-	-	1107	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1131	-
HCM Lane V/C Ratio	-	-	-	0.002	-
HCM Control Delay (s)	0	-	-	8.2	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	48	64	7	26	6	66	572	9	11	499	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.980			0.998			0.986	
Flt Protected		0.992			0.991		0.950			0.950		
Satd. Flow (prot)	0	1858	0	0	1757	0	1534	1719	0	1670	1733	0
Flt Permitted		0.992			0.991		0.950			0.950		
Satd. Flow (perm)	0	1858	0	0	1757	0	1534	1719	0	1670	1733	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			951			734			414	
Travel Time (s)		28.4			25.9			12.5			7.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	24	51	67	7	27	6	69	602	9	12	525	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	142	0	0	40	0	69	611	0	12	578	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	23	48	64	7	26	6	66	572	9	11	499	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	0	0	0	3	0	0	0	0	0
Mvmt Flow	24	51	67	7	27	6	69	602	9	12	525	53

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1338	1326	552	1380	1347	607	578	0	0	612	0	0
Stage 1	575	575	-	746	746	-	-	-	-	-	-	-
Stage 2	763	751	-	634	601	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.33	6.9	6.3	6.1	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Follow-up Hdwy	3	4	3.1	3	4	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	132	146	553	143	164	533	758	-	-	737	-	-
Stage 1	552	490	-	474	441	-	-	-	-	-	-	-
Stage 2	427	404	-	547	509	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	103	131	553	81	147	533	758	-	-	737	-	-
Mov Cap-2 Maneuver	103	131	-	81	147	-	-	-	-	-	-	-
Stage 1	502	482	-	431	401	-	-	-	-	-	-	-
Stage 2	357	367	-	423	501	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	64.4	40.4	1	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	758	-	-	191	142	737	-	-
HCM Lane V/C Ratio	0.092	-	-	0.744	0.289	0.016	-	-
HCM Control Delay (s)	10.2	-	-	64.4	40.4	10	-	-
HCM Lane LOS	B	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	4.9	1.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	0	18	31	0	21	16	642	31	29	509	28
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	50		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.919			0.850			0.993			0.992	
Flt Protected		0.980		0.950			0.950			0.950		
Satd. Flow (prot)	0	1762	0	1676	1500	0	1636	1693	0	1637	1705	0
Flt Permitted		0.980		0.950			0.950			0.950		
Satd. Flow (perm)	0	1762	0	1676	1500	0	1636	1693	0	1637	1705	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			575			515			734	
Travel Time (s)		20.5			15.7			8.8			12.5	
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Heavy Vehicles (%)	8%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	12	0	18	34	0	23	16	648	34	32	514	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	34	23	0	16	682	0	32	542	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.13	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	0	18	31	0	21	16	642	31	29	509	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	50	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	0	-	-	2	-	-	-2	-
Peak Hour Factor	99	90	99	90	90	90	99	99	90	90	99	99
Heavy Vehicles, %	8	2	0	2	2	2	0	1	2	2	2	7
Mvmt Flow	12	0	18	34	0	23	16	648	34	32	514	28

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1285	1274	528	1283	1288	648	542	0	0	648	0	0
Stage 1	593	593	-	681	681	-	-	-	-	-	-	-
Stage 2	692	681	-	602	607	-	-	-	-	-	-	-
Critical Hdwy	7.58	6.92	6.4	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.58	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.58	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.1	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	128	145	565	154	164	495	781	-	-	716	-	-
Stage 1	502	462	-	494	450	-	-	-	-	-	-	-
Stage 2	435	417	-	548	486	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	116	136	565	142	153	495	781	-	-	716	-	-
Mov Cap-2 Maneuver	116	136	-	142	153	-	-	-	-	-	-	-
Stage 1	492	441	-	484	441	-	-	-	-	-	-	-
Stage 2	406	408	-	507	464	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	23.8	27.9	0.2	0.6
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	781	-	-	222	142	495	716	-	-
HCM Lane V/C Ratio	0.021	-	-	0.137	0.243	0.047	0.045	-	-
HCM Control Delay (s)	9.7	-	-	23.8	38.3	12.6	10.3	-	-
HCM Lane LOS	A	-	-	C	E	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.9	0.1	0.1	-	-

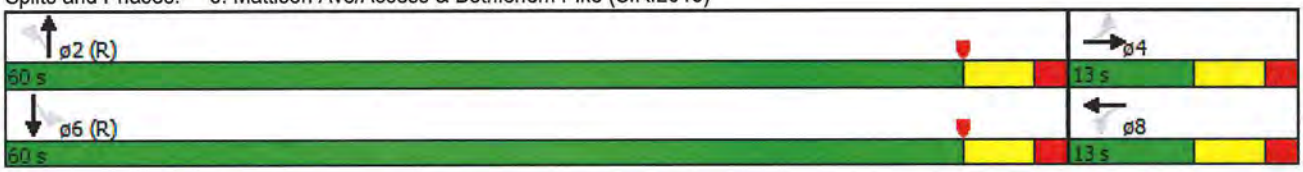
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	0	18	31	0	21	16	642	31	29	509	28
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	50		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.919			0.850			0.993			0.992	
Flt Protected		0.980		0.950			0.950			0.950		
Satd. Flow (prot)	0	1762	0	1676	1500	0	1636	1693	0	1637	1705	0
Flt Permitted		0.859		0.952			0.454			0.378		
Satd. Flow (perm)	0	1545	0	1680	1500	0	782	1693	0	651	1705	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			351			10			10	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			575			515			734	
Travel Time (s)		20.5			15.7			8.8			12.5	
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Heavy Vehicles (%)	8%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	12	0	18	34	0	23	16	648	34	32	514	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	34	23	0	16	682	0	32	542	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.13	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	13.0	13.0		13.0	13.0		60.0	60.0		60.0	60.0	
Total Split (%)	17.8%	17.8%		17.8%	17.8%		82.2%	82.2%		82.2%	82.2%	
Maximum Green (s)	7.0	7.0		7.0	7.0		54.0	54.0		54.0	54.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		6.4		6.5	6.5		61.6	61.6		61.6	61.6	
Actuated g/C Ratio		0.09		0.09	0.09		0.84	0.84		0.84	0.84	
v/c Ratio		0.17		0.23	0.05		0.02	0.48		0.06	0.38	
Control Delay		9.1		34.5	0.2		2.6	4.4		2.8	3.5	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		9.1		34.5	0.2		2.6	4.4		2.8	3.5	
LOS		A		C	A		A	A		A	A	
Approach Delay		9.1			20.7			4.4			3.5	
Approach LOS		A			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 73
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 4.8 Intersection LOS: A
Intersection Capacity Utilization 56.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Mattison Ave/Access & Bethlehem Pike (S.R.2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	0	18	31	0	21	16	642	31	29	509	28
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1853	1796	1853	1765	1765	1800	1782	1763	1782	1782	1778	1818
Adj Flow Rate, veh/h	12	0	18	34	0	23	16	648	0	32	514	28
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	0	1	1	2	2	2
Cap, veh/h	88	4	34	172	0	71	702	1390	0	623	1317	72
Arrive On Green	0.05	0.00	0.05	0.05	0.00	0.05	0.79	0.79	0.00	0.79	0.79	0.79
Sat Flow, veh/h	405	78	725	1389	0	1500	869	1763	0	788	1671	91
Grp Volume(v), veh/h	30	0	0	34	0	23	16	648	0	32	0	542
Grp Sat Flow(s),veh/h/ln	1208	0	0	1389	0	1500	869	1763	0	788	0	1762
Q Serve(g_s), s	1.0	0.0	0.0	0.0	0.0	1.1	0.4	9.0	0.0	1.0	0.0	6.9
Cycle Q Clear(g_c), s	2.1	0.0	0.0	1.4	0.0	1.1	7.3	9.0	0.0	10.0	0.0	6.9
Prop In Lane	0.40		0.60	1.00		1.00	1.00		0.00	1.00		0.05
Lane Grp Cap(c), veh/h	126	0	0	172	0	71	702	1390	0	623	0	1389
V/C Ratio(X)	0.24	0.00	0.00	0.20	0.00	0.33	0.02	0.47	0.00	0.05	0.00	0.39
Avail Cap(c_a), veh/h	198	0	0	240	0	144	702	1390	0	623	0	1389
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.2	0.0	0.0	33.8	0.0	33.7	3.5	2.6	0.0	4.3	0.0	2.4
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.6	0.0	2.6	0.1	1.1	0.0	0.2	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.1	0.0	0.0	1.3	0.0	0.9	0.2	8.1	0.0	0.4	0.0	6.3
LnGrp Delay(d),s/veh	35.2	0.0	0.0	34.4	0.0	36.3	3.5	3.7	0.0	4.4	0.0	3.2
LnGrp LOS	D			C		D	A	A		A		A
Approach Vol, veh/h		30			57			664			574	
Approach Delay, s/veh		35.2			35.1			3.7			3.3	
Approach LOS		D			D			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		63.6		9.4		63.6		9.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		54.0		7.0		54.0		7.0
Max Q Clear Time (g_c+I1), s		11.0		4.1		12.0		3.4
Green Ext Time (p_c), s		10.0		0.1		10.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	0	43	0	0	0	36	658	16	0	513	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	15	12	12	12	11	10	10	11	11	10
Grade (%)		1%			0%			1%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.901						0.996			0.996	
Flt Protected		0.987					0.950					
Satd. Flow (prot)	0	1752	0	0	0	0	1645	1648	0	1723	1714	0
Flt Permitted		0.987					0.950					
Satd. Flow (perm)	0	1752	0	0	0	0	1645	1648	0	1723	1714	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		323			564			582			515	
Travel Time (s)		8.8			15.4			9.9			8.8	
Peak Hour Factor	0.98	0.90	0.98	0.90	0.90	0.90	0.98	0.98	0.90	0.90	0.98	0.98
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	8%
Adj. Flow (vph)	16	0	44	0	0	0	37	671	18	0	523	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	0	0	37	689	0	0	536	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.95	0.95	0.95	1.07	1.07	1.07	1.13	1.18	1.18	1.11	1.11	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	0	43	0	0	0	36	658	16	0	513	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-2	-
Peak Hour Factor	98	90	98	90	90	90	98	98	90	90	98	98
Heavy Vehicles, %	0	2	0	2	2	2	0	1	2	2	2	8
Mvmt Flow	16	0	44	0	0	0	37	671	18	0	523	13

Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	1284	1293	530				537	0	0	689	0	0
Stage 1	530	530	-				-	-	-	-	-	-
Stage 2	754	763	-				-	-	-	-	-	-
Critical Hdwy	6.6	6.72	6.3				4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	5.6	5.72	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.6	5.72	-				-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1				3	-	-	3	-	-
Pot Cap-1 Maneuver	186	151	572				784	-	-	693	-	-
Stage 1	651	511	-				-	-	-	-	-	-
Stage 2	500	396	-				-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	177	0	572				784	-	-	693	-	-
Mov Cap-2 Maneuver	177	0	-				-	-	-	-	-	-
Stage 1	651	0	-				-	-	-	-	-	-
Stage 2	476	0	-				-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.2	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	784	-	-	356	693	-	-
HCM Lane V/C Ratio	0.047	-	-	0.169	-	-	-
HCM Control Delay (s)	9.8	-	-	17.2	0	-	-
HCM Lane LOS	A	-	-	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0	-	-

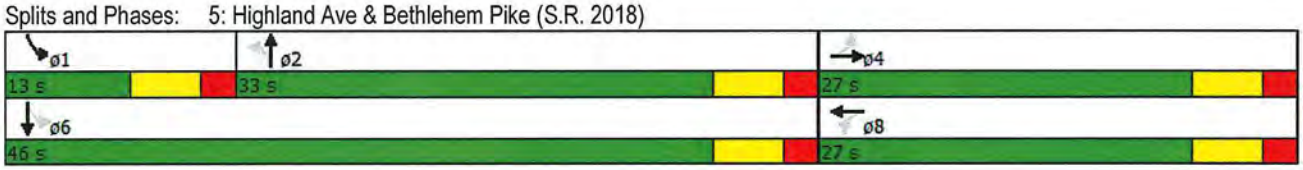
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	80	12	52	108	257	24	423	34	192	326	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986			0.917			0.989			0.986	
Flt Protected		0.991			0.994		0.950			0.950		
Satd. Flow (prot)	0	1872	0	0	1744	0	1636	1788	0	1629	1885	0
Flt Permitted		0.856			0.944		0.543			0.278		
Satd. Flow (perm)	0	1617	0	0	1656	0	935	1788	0	477	1885	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			113			6			11	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	2%	0%	2%	1%	0%
Adj. Flow (vph)	20	82	12	53	110	262	24	432	35	196	333	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	0	425	0	24	467	0	196	366	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	27.0	27.0		27.0	27.0		33.0	33.0		13.0	46.0	
Total Split (%)	37.0%	37.0%		37.0%	37.0%		45.2%	45.2%		17.8%	63.0%	
Maximum Green (s)	21.0	21.0		21.0	21.0		27.0	27.0		7.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 69.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	80	12	52	108	257	24	423	34	192	326	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1868	1881	1881	1865	1881	1782	1820	1853	1774	1864	1881
Adj Flow Rate, veh/h	20	82	12	53	110	262	24	432	35	196	333	33
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	0	2	2	2	1	1
Cap, veh/h	106	386	51	97	145	299	496	645	52	449	944	94
Arrive On Green	0.28	0.30	0.28	0.28	0.30	0.28	0.39	0.39	0.37	0.11	0.57	0.55
Sat Flow, veh/h	159	1305	172	139	489	1009	1022	1661	135	1689	1670	165
Grp Volume(v), veh/h	114	0	0	425	0	0	24	0	467	196	0	366
Grp Sat Flow(s),veh/h/ln	1637	0	0	1637	0	0	1022	0	1796	1689	0	1835
Q Serve(g_s), s	0.0	0.0	0.0	11.8	0.0	0.0	1.1	0.0	15.5	4.4	0.0	7.8
Cycle Q Clear(g_c), s	3.4	0.0	0.0	18.1	0.0	0.0	1.1	0.0	15.5	4.4	0.0	7.8
Prop In Lane	0.18		0.11	0.12		0.62	1.00		0.07	1.00		0.09
Lane Grp Cap(c), veh/h	520	0	0	518	0	0	496	0	697	449	0	1038
V/C Ratio(X)	0.22	0.00	0.00	0.82	0.00	0.00	0.05	0.00	0.67	0.44	0.00	0.35
Avail Cap(c_a), veh/h	535	0	0	532	0	0	496	0	697	454	0	1043
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.2	0.0	0.0	24.5	0.0	0.0	13.9	0.0	18.3	11.8	0.0	8.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	9.7	0.0	0.0	0.0	0.0	2.5	0.7	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.2	0.0	0.0	14.8	0.0	0.0	0.7	0.0	12.8	3.9	0.0	7.1
LnGrp Delay(d),s/veh	19.4	0.0	0.0	34.3	0.0	0.0	14.0	0.0	20.8	12.5	0.0	8.7
LnGrp LOS	B			C			B		C	B		A
Approach Vol, veh/h		114			425			491			562	
Approach Delay, s/veh		19.4			34.3			20.5			10.1	
Approach LOS		B			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.8	33.0		26.4		45.8		26.4
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	27.0		21.0		40.0		21.0
Max Q Clear Time (g_c+I1), s	6.9	17.5		5.4		9.8		20.1
Green Ext Time (p_c), s	0.0	1.8		1.9		2.3		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.4
HCM 2010 LOS	C

APPENDIX I

2023 Future without Development Capacity/Level-of-Service Analysis and Intersection Volume Worksheets

INTERSECTION VOLUME SUMMARY
Enter Only Access/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2023 Design Ye **Weekday 7-9 AM**
2023 Design Year

Traffic Component		EASTBOUND Lindenwold Ave			NORTHBOUND Enter Only Access			WESTBOUND Lindenwold Ave			SOUTHBOUND Enter Only Access		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		0	29	0	0	0	0	0	39	0	0	0	0
2014 to 2016 Growth Factor	1.022	0	30	0	0	0	0	0	40	0	0	0	0
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**0**	**30**	**0**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**
Background Growth	4.57 %	0	1	0	0	0	0	0	2	0	0	0	0
EXISTING W/ BACKGROUND		0	31	0	0	0	0	0	42	0	0	0	0
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**0**	**31**	**0**	**0**	**0**	**0**	**0**	**42**	**0**	**0**	**0**	**0**
TOTAL "NEW" SITE TRAFFIC		**0**	**3**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Single Family Attached Twins		0	1	0	0	0	0	0	0	0	0	0	0
Single Family Attached Townhomes		0	1	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**0**	**34**	**1**	**0**	**0**	**0**	**1**	**42**	**0**	**0**	**0**	**0**
"New" Site Traffic % of Total	####	0.0	8.8	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Enter Only Access/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2023 Design Ye **Weekday 4-6 PM**
2023 Design Year

Traffic Component		EASTBOUND Lindenwold Ave			NORTHBOUND Enter Only Access			WESTBOUND Lindenwold Ave			SOUTHBOUND Enter Only Access		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		0	62	0	0	0	0	0	59	0	0	0	0
2014 to 2016 Growth Factor	1.022	0	63	0	0	0	0	0	60	0	0	0	0
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**0**	**63**	**0**	**0**	**0**	**0**	**0**	**60**	**0**	**0**	**0**	**0**
Background Growth	4.57 %	0	3	0	0	0	0	0	3	0	0	0	0
EXISTING W/ BACKGROUND		0	66	0	0	0	0	0	63	0	0	0	0
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**0**	**66**	**0**	**0**	**0**	**0**	**0**	**63**	**0**	**0**	**0**	**0**
TOTAL "NEW" SITE TRAFFIC		**0**	**1**	**3**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**
Single Family Attached Twins		0	0	1	0	0	0	0	0	0	0	0	0
Single Family Attached Townhomes		0	0	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	1	0	0	0	1	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**0**	**67**	**3**	**0**	**0**	**0**	**2**	**63**	**0**	**0**	**0**	**0**
"New" Site Traffic % of Total	*0.0%*	0.0	1.5	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2023 Design Y&**Weekday 7-9 AM**
2023 Design Year

Traffic Component		EASTBOUND Lindenwold Ave L	S	R	NORTHBOUND Bethlehem Pike (S.R. 2018) L	S	R	WESTBOUND Lindenwold Ave L	S	R	SOUTHBOUND Bethlehem Pike (S.R. 2018) L	S	R
EXISTING TRAFFIC		1	16	42	35	399	15	14	23	4	2	494	21
Seasonal Adjustment Factor	1.000	1	16	42	35	399	15	14	23	4	2	494	21
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**1**	**16**	**42**	**35**	**399**	**15**	**14**	**23**	**4**	**2**	**494**	**21**
Background Growth	4.57 %	0	1	2	2	18	1	1	1	0	0	23	1
EXISTING W/ BACKGROUND		1	17	44	37	417	16	15	24	4	2	517	22
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**1**	**17**	**44**	**37**	**417**	**16**	**15**	**24**	**4**	**2**	**517**	**22**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**1**	**5**	**27**	**3**	**0**	**0**	**0**	**1**	**9**	**0**
Single Family Attached Twins		0	0	0	1	5	1	0	0	0	0	1	0
Single Family Attached Townhomes		0	0	0	2	11	1	0	0	0	0	2	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	1	2	11	1	0	0	0	0	5	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**1**	**17**	**45**	**42**	**444**	**19**	**15**	**24**	**4**	**3**	**526**	**22**
"New" Site Traffic % of Total	*0.0%*	0.0	0.0	2.2	11.9	6.1	15.8	0.0	0.0	0.0	33.3	1.7	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Lindenwold Ave

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2023 Design Ye**Weekday 4-6 PM**
2023 Design Year

Traffic Component		EASTBOUND Lindenwold Ave			NORTHBOUND Bethlehem Pike (S.R. 2018)			WESTBOUND Lindenwold Ave			SOUTHBOUND Bethlehem Pike (S.R. 2018)		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		23	46	58	62	548	8	7	26	6	9	469	49
Seasonal Adjustment Factor	1.000	23	46	58	62	548	8	7	26	6	9	469	49
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**23**	**46**	**58**	**62**	**548**	**8**	**7**	**26**	**6**	**9**	**469**	**49**
Background Growth	4.57 %	1	2	3	3	25	0	0	1	0	0	21	2
EXISTING W/ BACKGROUND		24	48	61	65	573	8	7	27	6	9	490	51
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**24**	**48**	**61**	**65**	**573**	**8**	**7**	**27**	**6**	**9**	**490**	**51**
TOTAL "NEW" SITE TRAFFIC		**0**	**1**	**5**	**3**	**17**	**1**	**0**	**0**	**0**	**2**	**24**	**0**
Single Family Attached Twins		0	0	1	1	3	0	0	0	0	0	5	0
Single Family Attached Townhomes		0	1	2	1	5	0	0	0	0	1	9	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	1	2	2	9	1	0	0	0	1	10	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**24**	**49**	**66**	**68**	**590**	**9**	**7**	**27**	**6**	**11**	**514**	**51**
"New" Site Traffic % of Total	*0.0%*	0.0	2.0	7.6	4.4	2.9	11.1	0.0	0.0	0.0	18.2	4.7	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Mattison Ave/Access

St. Mary's Villa Residential Redevelopment
A:\813468 - St. Mary's Villa\Traffic\Analysis\May 2016\SDS\[SDS 2023 Design Ye**Weekday 7-9 AM**
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		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Mattison Ave/Access			Bethlehem Pike (S.R. 2018)			Mattison Ave/Access			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		9	0	24	10	464	0	0	0	0	0	666	17
2014 to 2016 Growth Factor	1.022	9	0	25	10	474	0	0	0	0	0	681	17
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**9**	**0**	**25**	**10**	**474**	**0**	**0**	**0**	**0**	**0**	**681**	**17**
Background Growth	4.57 %	0	0	1	0	22	0	0	0	0	0	31	1
EXISTING W/ BACKGROUND		9	0	26	10	496	0	0	0	0	0	712	18
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**9**	**0**	**26**	**10**	**496**	**0**	**0**	**0**	**0**	**0**	**712**	**18**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**0**	**10**	**48**	**0**	**35**	**10**	**0**	**0**
Single Family Attached Twins		0	0	0	0	0	2	10	0	7	1	0	0
Single Family Attached Townhomes		0	0	0	0	0	3	19	0	14	2	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	0	6	19	0	14	6	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**9**	**0**	**26**	**10**	**496**	**10**	**48**	**0**	**35**	**10**	**712**	**18**
"New" Site Traffic % of Total	####	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Mattison Ave/Access

St. Mary's Villa Residential Redevelopment
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		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Mattison Ave/Access			Bethlehem Pike (S.R. 2018)			Mattison Ave/Access			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		12	0	18	16	620	0	0	0	0	0	492	27
2014 to 2016 Growth Factor	1.022	12	0	18	16	634	0	0	0	0	0	503	28
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**12**	**0**	**18**	**16**	**634**	**0**	**0**	**0**	**0**	**0**	**503**	**28**
Background Growth	4.57 %	1	0	1	1	29	0	0	0	0	0	23	1
EXISTING W/ BACKGROUND		13	0	19	17	663	0	0	0	0	0	526	29
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**13**	**0**	**19**	**17**	**663**	**0**	**0**	**0**	**0**	**0**	**526**	**29**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**0**	**31**	**31**	**0**	**21**	**29**	**0**	**0**
Single Family Attached Twins		0	0	0	0	0	6	5	0	3	6	0	0
Single Family Attached Townhomes		0	0	0	0	0	12	9	0	6	11	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	0	13	17	0	12	12	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**13**	**0**	**19**	**17**	**663**	**31**	**31**	**0**	**21**	**29**	**526**	**29**
"New" Site Traffic % of Total	#####	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Church St/Enter Only Access

St. Mary's Villa Residential Redevelopment
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		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Church St/Enter Only Acc			Bethlehem Pike (S.R. 20			Church St/Enter Only Acc			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		5	0	30	14	450	0	0	0	0	0	659	5
2014 to 2016 Growth Factor	1.022	5	0	31	14	460	0	0	0	0	0	673	5
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**5**	**0**	**31**	**14**	**460**	**0**	**0**	**0**	**0**	**0**	**673**	**5**
Background Growth	4.57 %	0	0	1	1	21	0	0	0	0	0	31	0
EXISTING W/ BACKGROUND		5	0	32	15	481	0	0	0	0	0	704	5
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**5**	**0**	**32**	**15**	**481**	**0**	**0**	**0**	**0**	**0**	**704**	**5**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**10**	**6**	**0**	**0**	**0**	**0**	**48**	**0**
Single Family Attached Twins		0	0	0	0	2	1	0	0	0	0	10	0
Single Family Attached Townhomes		0	0	0	0	3	1	0	0	0	0	19	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	6	3	0	0	0	0	19	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**5**	**0**	**32**	**15**	**491**	**6**	**0**	**0**	**0**	**0**	**752**	**5**
"New" Site Traffic % of Total	*0.0%*	0.0	0.0	0.0	0.0	2.0	100.0	0.0	0.0	0.0	0.0	6.4	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Church St/Enter Only Access

St. Mary's Villa Residential Redevelopment
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		EASTBOUND			NORTHBOUND			WESTBOUND			SOUTHBOUND		
		Church St/Enter Only Ac			Bethlehem Pike (S.R. 2018)			Church St/Enter Only Ac			Bethlehem Pike (S.R. 2018)		
Traffic Component		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		16	0	41	35	606	0	0	0	0	0	466	13
2014 to 2016 Growth Factor	1.022	16	0	42	36	619	0	0	0	0	0	476	13
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**16**	**0**	**42**	**36**	**619**	**0**	**0**	**0**	**0**	**0**	**476**	**13**
Background Growth	4.57 %	1	0	2	2	28	0	0	0	0	0	22	1
EXISTING W/ BACKGROUND		17	0	44	38	647	0	0	0	0	0	498	14
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**17**	**0**	**44**	**38**	**647**	**0**	**0**	**0**	**0**	**0**	**498**	**14**
TOTAL "NEW" SITE TRAFFIC		**0**	**0**	**0**	**0**	**31**	**16**	**0**	**0**	**0**	**0**	**31**	**0**
Single Family Attached Twins		0	0	0	0	6	3	0	0	0	0	5	0
Single Family Attached Townhomes		0	0	0	0	12	6	0	0	0	0	9	0
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		0	0	0	0	13	7	0	0	0	0	17	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**17**	**0**	**44**	**38**	**678**	**16**	**0**	**0**	**0**	**0**	**529**	**14**
"New" Site Traffic % of Total	#####	0.0	0.0	0.0	0.0	4.6	100.0	0.0	0.0	0.0	0.0	5.9	0.0

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Highland Ave

St. Mary's Villa Residential Redevelopment
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Traffic Component		EASTBOUND Highland Ave			NORTHBOUND Bethlehem Pike (S.R. 2018)			WESTBOUND Highland Ave			SOUTHBOUND Bethlehem Pike (S.R. 2018)		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		25	80	20	13	289	48	32	68	171	239	460	10
2014 to 2016 Growth Factor	1.022	26	82	20	13	295	49	33	69	175	244	470	10
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**26**	**82**	**20**	**13**	**295**	**49**	**33**	**69**	**175**	**244**	**470**	**10**
Background Growth	4.57 %	1	4	1	1	13	2	2	3	8	11	21	0
EXISTING W/ BACKGROUND		27	86	21	14	308	51	35	72	183	255	491	10
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**27**	**86**	**21**	**14**	**308**	**51**	**35**	**72**	**183**	**255**	**491**	**10**
TOTAL "NEW" SITE TRAFFIC		**1**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**7**	**18**	**23**	**7**
Single Family Attached Twins		0	0	0	0	1	0	0	0	0	4	5	1
Single Family Attached Townhomes		1	0	0	0	2	0	0	0	2	7	9	3
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		1	0	0	0	5	0	0	0	4	7	9	3
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**28**	**86**	**21**	**14**	**316**	**51**	**35**	**72**	**190**	**273**	**514**	**17**
"New" Site Traffic % of Total	*0.0%*	3.6	0.0	0.0	0.0	2.5	0.0	0.0	0.0	3.7	6.6	4.5	41.2

INTERSECTION VOLUME SUMMARY
Bethlehem Pike (S.R. 2018)/Highland Ave

St. Mary's Villa Residential Redevelopment
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Traffic Component		EASTBOUND Highland Ave			NORTHBOUND Bethlehem Pike (S.R. 2018)			WESTBOUND Highland Ave			SOUTHBOUND Bethlehem Pike (S.R. 2018)		
		L	S	R	L	S	R	L	S	R	L	S	R
EXISTING TRAFFIC		13	77	12	23	388	33	50	105	231	175	300	26
2014 to 2016 Growth Factor	1.022	13	79	12	24	396	34	51	107	236	179	307	27
Balancing Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING TRAFFIC		**13**	**79**	**12**	**24**	**396**	**34**	**51**	**107**	**236**	**179**	**307**	**27**
Background Growth	4.57 %	1	4	1	1	18	2	2	5	11	8	14	1
EXISTING W/ BACKGROUND		14	83	13	25	414	36	53	112	247	187	321	28
TOTAL "OTHER" DEVELOPMENTS		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/O PROJECT		**14**	**83**	**13**	**25**	**414**	**36**	**53**	**112**	**247**	**187**	**321**	**28**
TOTAL "NEW" SITE TRAFFIC		**7**	**0**	**0**	**0**	**22**	**0**	**0**	**0**	**18**	**11**	**15**	**5**
Single Family Attached Twins		1	0	0	0	4	0	0	0	4	2	2	1
Single Family Attached Townhomes		2	0	0	0	9	0	0	0	7	3	4	1
		0	0	0	0	0	0	0	0	0	0	0	0
Senior Living Apartments		3	0	0	0	10	0	0	0	7	6	8	2
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Traffic		0	0	0	0	0	0	0	0	0	0	0	0
Other Adjustments		0	0	0	0	0	0	0	0	0	0	0	0
FUTURE TRAFFIC W/ PROJECT		**21**	**83**	**13**	**25**	**436**	**36**	**53**	**112**	**265**	**198**	**336**	**33**
"New" Site Traffic % of Total	*0.0%*	33.3	0.0	0.0	0.0	5.0	0.0	0.0	0.0	6.8	5.6	4.5	15.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	17	44	15	24	4	37	417	16	2	517	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.903			0.988			0.995			0.994	
Flt Protected		0.999			0.983		0.950			0.950		
Satd. Flow (prot)	0	1777	0	0	1718	0	1423	1635	0	1670	1660	0
Flt Permitted		0.999			0.983		0.950			0.950		
Satd. Flow (perm)	0	1777	0	0	1718	0	1423	1635	0	1670	1660	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	2%	0%	4%	0%	11%	5%	0%	0%	5%	10%
Adj. Flow (vph)	1	18	48	16	26	4	40	453	17	2	562	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	0	0	46	0	40	470	0	2	586	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	17	44	15	24	4	37	417	16	2	517	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	2	0	4	0	11	5	0	0	5	10
Mvmt Flow	1	18	48	16	26	4	40	453	17	2	562	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1136	1129	574	1153	1132	462	586	0	0	471	0	0
Stage 1	578	578	-	542	542	-	-	-	-	-	-	-
Stage 2	558	551	-	611	590	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.76	6.32	6.9	6.34	6.1	4.4	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.054	3.1	3	4.036	3.1	3.1	-	-	3	-	-
Pot Cap-1 Maneuver	185	188	537	205	214	643	723	-	-	827	-	-
Stage 1	550	479	-	613	533	-	-	-	-	-	-	-
Stage 2	565	494	-	563	508	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	158	177	537	164	202	643	723	-	-	827	-	-
Mov Cap-2 Maneuver	158	177	-	164	202	-	-	-	-	-	-	-
Stage 1	520	478	-	579	504	-	-	-	-	-	-	-
Stage 2	503	467	-	492	507	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.4	28.6	0.8	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	723	-	-	336	199	827	-	-
HCM Lane V/C Ratio	0.056	-	-	0.201	0.235	0.003	-	-
HCM Control Delay (s)	10.3	-	-	18.4	28.6	9.4	-	-
HCM Lane LOS	B	-	-	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0.9	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	9	26	10	496	712	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.899				0.997	
Flt Protected	0.988		0.950			
Satd. Flow (prot)	1794	0	1636	1625	1664	0
Flt Permitted	0.988		0.950			
Satd. Flow (perm)	1794	0	1636	1625	1664	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	6%	5%	18%
Adj. Flow (vph)	9	27	10	517	742	19
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	0	10	517	761	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	9	26	10	496	712	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	6	5	18
Mvmt Flow	9	27	10	517	742	19

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1289	751	760	0	-	0
Stage 1	751	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Critical Hdwy	6.8	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	172	415	653	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	415	653	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	653	-	386	-	-
HCM Lane V/C Ratio	0.016	-	0.094	-	-
HCM Control Delay (s)	10.6	-	15.3	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	5	32	15	481	704	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883				0.999	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1727	0	1645	1562	1755	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1727	0	1645	1562	1755	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	7%	0%	6%
Adj. Flow (vph)	5	33	16	501	733	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	0	16	501	738	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	32	15	481	704	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	7	0	6
Mvmt Flow	5	33	16	501	733	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1268	736	739	0	-	0
Stage 1	736	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	190	432	665	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	185	432	665	-	-	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	633	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.5	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	665	-	417	-	-
HCM Lane V/C Ratio	0.023	-	0.092	-	-
HCM Control Delay (s)	10.5	-	14.5	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

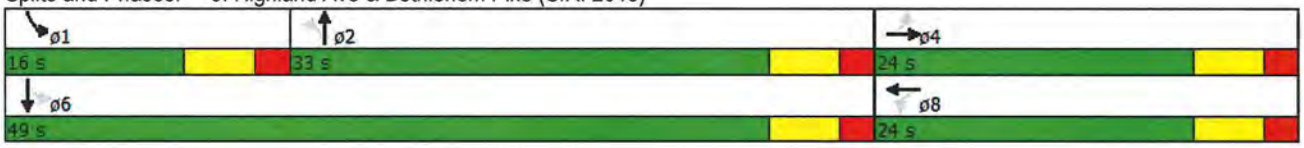
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	86	21	35	72	183	14	308	51	255	491	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.915			0.979			0.997	
Flt Protected		0.990			0.994		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1682	0	1636	1678	0	1629	1814	0
Flt Permitted		0.804			0.952		0.471			0.373		
Satd. Flow (perm)	0	1486	0	0	1611	0	811	1678	0	639	1814	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			115			13			2	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	4%	1%	5%	6%	7%	3%	0%	8%	4%	2%	6%	10%
Adj. Flow (vph)	28	90	22	36	75	191	15	321	53	266	511	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	140	0	0	302	0	15	374	0	266	521	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	24.0	24.0		24.0	24.0		33.0	33.0		16.0	49.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		45.2%	45.2%		21.9%	67.1%	
Maximum Green (s)	18.0	18.0		18.0	18.0		27.0	27.0		10.0	43.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 67.4
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	86	21	35	72	183	14	308	51	255	491	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1840	1881	1881	1803	1881	1782	1725	1853	1774	1774	1881
Adj Flow Rate, veh/h	28	90	22	36	75	191	15	321	53	266	511	10
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	7	7	7	0	8	8	2	6	6
Cap, veh/h	107	294	63	87	110	236	470	594	98	582	1070	21
Arrive On Green	0.22	0.24	0.22	0.22	0.24	0.22	0.41	0.41	0.40	0.13	0.62	0.60
Sat Flow, veh/h	186	1247	267	116	466	1001	886	1444	238	1689	1734	34
Grp Volume(v), veh/h	140	0	0	302	0	0	15	0	374	266	0	521
Grp Sat Flow(s),veh/h/ln	1701	0	0	1582	0	0	886	0	1683	1689	0	1768
Q Serve(g_s), s	0.0	0.0	0.0	6.8	0.0	0.0	0.7	0.0	11.5	5.3	0.0	10.9
Cycle Q Clear(g_c), s	4.5	0.0	0.0	12.4	0.0	0.0	0.7	0.0	11.5	5.3	0.0	10.9
Prop In Lane	0.20		0.16	0.12		0.63	1.00		0.14	1.00		0.02
Lane Grp Cap(c), veh/h	440	0	0	409	0	0	470	0	692	582	0	1091
V/C Ratio(X)	0.32	0.00	0.00	0.74	0.00	0.00	0.03	0.00	0.54	0.46	0.00	0.48
Avail Cap(c_a), veh/h	509	0	0	477	0	0	470	0	693	632	0	1143
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.7	0.0	0.0	24.9	0.0	0.0	12.1	0.0	15.2	9.0	0.0	7.1
Incr Delay (d2), s/veh	0.4	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.8	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.1	0.0	0.0	10.1	0.0	0.0	0.5	0.0	9.3	4.6	0.0	9.1
LnGrp Delay(d),s/veh	22.1	0.0	0.0	30.0	0.0	0.0	12.2	0.0	16.1	9.6	0.0	7.4
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		140			302			389			787	
Approach Delay, s/veh		22.1			30.0			15.9			8.1	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	14.0	33.0		21.1		47.0		21.1
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	10.0	27.0		18.0		43.0		18.0
Max Q Clear Time (g_c+I1), s	7.8	13.5		6.5		12.9		14.4
Green Ext Time (p_c), s	0.2	2.2		1.3		2.5		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	48	61	7	27	6	65	573	8	9	490	51
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.938			0.980			0.998			0.986	
Flt Protected		0.991			0.992		0.950			0.950		
Satd. Flow (prot)	0	1861	0	0	1759	0	1534	1719	0	1670	1733	0
Flt Permitted		0.991			0.992		0.950			0.950		
Satd. Flow (perm)	0	1861	0	0	1759	0	1534	1719	0	1670	1733	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			913			734			414	
Travel Time (s)		28.4			24.9			12.5			7.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	25	51	64	7	28	6	68	603	8	9	516	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	140	0	0	41	0	68	611	0	9	570	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.19	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	48	61	7	27	6	65	573	8	9	490	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	0	0	0	3	0	0	0	0	0
Mvmt Flow	25	51	64	7	28	6	68	603	8	9	516	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1324	1310	543	1363	1332	607	569	0	0	612	0	0
Stage 1	562	562	-	744	744	-	-	-	-	-	-	-
Stage 2	762	748	-	619	588	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.33	6.9	6.3	6.1	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Follow-up Hdwy	3	4	3.1	3	4	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	135	149	560	147	168	533	764	-	-	737	-	-
Stage 1	562	497	-	476	442	-	-	-	-	-	-	-
Stage 2	427	405	-	557	516	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	106	134	560	85	151	533	764	-	-	737	-	-
Mov Cap-2 Maneuver	106	134	-	85	151	-	-	-	-	-	-	-
Stage 1	512	491	-	434	403	-	-	-	-	-	-	-
Stage 2	357	369	-	437	510	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	62.1	39	1	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	764	-	-	192	147	737	-	-
HCM Lane V/C Ratio	0.09	-	-	0.729	0.286	0.013	-	-
HCM Control Delay (s)	10.2	-	-	62.1	39	9.9	-	-
HCM Lane LOS	B	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	4.7	1.1	0	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	13	19	17	663	526	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	11	11	11	11
Grade (%)	2%			2%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.920				0.993	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1764	0	1636	1706	1707	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1764	0	1636	1706	1707	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	752			515	734	
Travel Time (s)	20.5			8.8	12.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	8%	0%	0%	1%	2%	7%
Adj. Flow (vph)	13	19	17	670	531	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	32	0	17	670	560	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.92	0.92	1.13	1.13	1.11	1.11
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	19	17	663	526	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	2	-2	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	8	0	0	1	2	7
Mvmt Flow	13	19	17	670	531	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1250	546	561	0	-	0
Stage 1	546	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Critical Hdwy	6.88	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.1	3.1	3	-	-	-
Pot Cap-1 Maneuver	174	551	769	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	490	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	170	551	769	-	-	-
Mov Cap-2 Maneuver	319	-	-	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	479	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	769	-	425	-	-
HCM Lane V/C Ratio	0.022	-	0.076	-	-
HCM Control Delay (s)	9.8	-	14.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	17	44	38	647	498	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	11	10	11	10
Grade (%)	1%			1%	-2%	
Storage Length (ft)	0	0	75			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.902				0.996	
Flt Protected	0.986		0.950			
Satd. Flow (prot)	1752	0	1645	1655	1713	0
Flt Permitted	0.986		0.950			
Satd. Flow (perm)	1752	0	1645	1655	1713	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	323			582	515	
Travel Time (s)	8.8			9.9	8.8	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	2%	8%
Adj. Flow (vph)	17	45	39	660	508	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	62	0	39	660	522	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	15			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	0.95	0.95	1.13	1.18	1.11	1.16
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	17	44	38	647	498	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-2	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	2	8
Mvmt Flow	17	45	39	660	508	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1253	515	522	0	-	0
Stage 1	515	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	194	584	793	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	184	584	793	-	-	-
Mov Cap-2 Maneuver	337	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	485	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.5	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	793	-	485	-	-
HCM Lane V/C Ratio	0.049	-	0.128	-	-
HCM Control Delay (s)	9.8	-	13.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

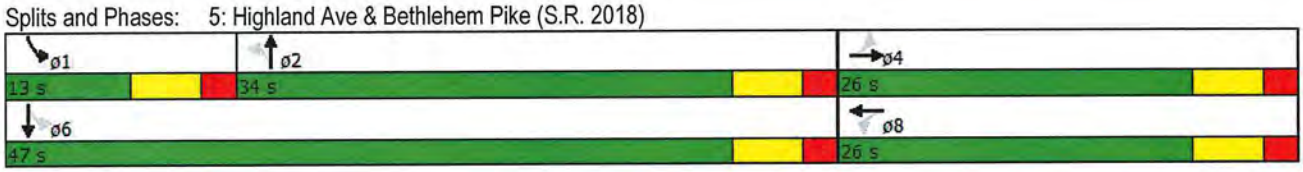
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	83	13	53	112	247	25	414	36	187	321	28
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.919			0.988			0.988	
Flt Protected		0.994			0.994		0.950			0.950		
Satd. Flow (prot)	0	1873	0	0	1747	0	1636	1786	0	1629	1889	0
Flt Permitted		0.911			0.942		0.548			0.287		
Satd. Flow (perm)	0	1717	0	0	1656	0	944	1786	0	492	1889	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			104			7			10	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	2%	0%	2%	1%	0%
Adj. Flow (vph)	14	85	13	54	114	252	26	422	37	191	328	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	112	0	0	420	0	26	459	0	191	357	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.98	0.98	0.98	0.98	0.98	0.98	1.13	1.04	1.04	1.11	0.98	0.98
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	26.0	26.0		26.0	26.0		34.0	34.0		13.0	47.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		46.6%	46.6%		17.8%	64.4%	
Maximum Green (s)	20.0	20.0		20.0	20.0		28.0	28.0		7.0	41.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 69.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	83	13	53	112	247	25	414	36	187	321	28
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1867	1881	1881	1865	1881	1782	1820	1853	1774	1864	1881
Adj Flow Rate, veh/h	14	85	13	54	114	252	26	422	37	191	328	29
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	0	2	2	2	1	1
Cap, veh/h	86	422	59	99	149	286	505	647	57	458	960	85
Arrive On Green	0.28	0.29	0.28	0.28	0.29	0.28	0.39	0.39	0.38	0.11	0.57	0.55
Sat Flow, veh/h	101	1450	204	144	511	983	1030	1650	145	1689	1689	149
Grp Volume(v), veh/h	112	0	0	420	0	0	26	0	459	191	0	357
Grp Sat Flow(s),veh/h/ln	1754	0	0	1639	0	0	1030	0	1794	1689	0	1838
Q Serve(g_s), s	0.0	0.0	0.0	11.7	0.0	0.0	1.1	0.0	14.9	4.2	0.0	7.4
Cycle Q Clear(g_c), s	3.3	0.0	0.0	17.7	0.0	0.0	1.1	0.0	14.9	4.2	0.0	7.4
Prop In Lane	0.12		0.12	0.13		0.60	1.00		0.08	1.00		0.08
Lane Grp Cap(c), veh/h	543	0	0	511	0	0	505	0	704	458	0	1045
V/C Ratio(X)	0.21	0.00	0.00	0.82	0.00	0.00	0.05	0.00	0.65	0.42	0.00	0.34
Avail Cap(c_a), veh/h	548	0	0	516	0	0	519	0	729	467	0	1081
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.2	0.0	0.0	24.5	0.0	0.0	13.6	0.0	17.8	11.4	0.0	8.3
Incr Delay (d2), s/veh	0.2	0.0	0.0	10.2	0.0	0.0	0.0	0.0	2.0	0.6	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.2	0.0	0.0	14.7	0.0	0.0	0.7	0.0	12.4	3.8	0.0	6.9
LnGrp Delay(d),s/veh	19.4	0.0	0.0	34.7	0.0	0.0	13.7	0.0	19.8	12.1	0.0	8.5
LnGrp LOS	B			C			B		B	B		A
Approach Vol, veh/h		112			420			485			548	
Approach Delay, s/veh		19.4			34.7			19.4			9.7	
Approach LOS		B			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.6	33.0		25.8		45.6		25.8
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	28.0		20.0		41.0		20.0
Max Q Clear Time (g_c+I1), s	6.7	16.9		5.3		9.4		19.7
Green Ext Time (p_c), s	0.0	1.8		1.8		2.2		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

APPENDIX J

2023 Future with Development Capacity/Level-of-Service Analysis Worksheets

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	34	1	1	42	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	0%			-1%	0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					
Flt Protected				0.999		
Satd. Flow (prot)	1759	0	0	1772	1765	0
Flt Permitted				0.999		
Satd. Flow (perm)	1759	0	0	1772	1765	0
Link Speed (mph)	30			25	25	
Link Distance (ft)	956			64	298	
Travel Time (s)	21.7			1.7	8.1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	1	1	47	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	0	48	0	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	34	1	1	42	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-1	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	1	1	47	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	39	0	87	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.3	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	3	-	3	3.1
Pot Cap-1 Maneuver	-	-	1164	-	1065	1105
Stage 1	-	-	-	-	1151	-
Stage 2	-	-	-	-	1138	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1164	-	1064	1105
Mov Cap-2 Maneuver	-	-	-	-	1064	-
Stage 1	-	-	-	-	1151	-
Stage 2	-	-	-	-	1137	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1164	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s)	0	-	-	8.1	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	17	45	15	24	4	42	444	19	3	526	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.903			0.988			0.994			0.994	
Flt Protected		0.999			0.983		0.950			0.950		
Satd. Flow (prot)	0	1777	0	0	1718	0	1423	1634	0	1670	1660	0
Flt Permitted		0.999			0.983		0.950			0.950		
Satd. Flow (perm)	0	1777	0	0	1718	0	1423	1634	0	1670	1660	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			956			734			414	
Travel Time (s)		28.4			26.1			12.5			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	2%	0%	4%	0%	11%	5%	0%	0%	5%	10%
Adj. Flow (vph)	1	18	49	16	26	4	46	483	21	3	572	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	68	0	0	46	0	46	504	0	3	596	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	17	45	15	24	4	42	444	19	3	526	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	2	0	4	0	11	5	0	0	5	10
Mvmt Flow	1	18	49	16	26	4	46	483	21	3	572	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1189	1185	584	1208	1186	493	596	0	0	503	0	0
Stage 1	590	590	-	584	584	-	-	-	-	-	-	-
Stage 2	599	595	-	624	602	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.76	6.32	6.9	6.34	6.1	4.4	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.76	-	5.9	5.34	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.054	3.1	3	4.036	3.1	3.1	-	-	3	-	-
Pot Cap-1 Maneuver	170	174	530	188	200	618	717	-	-	806	-	-
Stage 1	541	473	-	582	511	-	-	-	-	-	-	-
Stage 2	534	470	-	553	502	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	143	162	530	148	186	618	717	-	-	806	-	-
Mov Cap-2 Maneuver	143	162	-	148	186	-	-	-	-	-	-	-
Stage 1	506	471	-	545	478	-	-	-	-	-	-	-
Stage 2	469	440	-	480	500	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.3	31.5	0.9	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	717	-	-	320	182	806	-	-
HCM Lane V/C Ratio	0.064	-	-	0.214	0.257	0.004	-	-
HCM Control Delay (s)	10.4	-	-	19.3	31.5	9.5	-	-
HCM Lane LOS	B	-	-	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.8	1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	26	48	0	35	10	496	10	10	712	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	50		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.899			0.850			0.997			0.996	
Flt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	1794	0	1676	1500	0	1636	1621	0	1637	1662	0
Flt Permitted		0.988		0.950			0.950			0.950		
Satd. Flow (perm)	0	1794	0	1676	1500	0	1636	1621	0	1637	1662	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			413			515			734	
Travel Time (s)		20.5			11.3			8.8			12.5	
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	6%	2%	2%	5%	18%
Adj. Flow (vph)	9	0	27	53	0	39	10	517	11	11	742	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	53	39	0	10	528	0	11	761	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	0	26	48	0	35	10	496	10	10	712	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	50	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	0	-	-	2	-	-	-2	-
Peak Hour Factor	96	90	96	90	90	90	96	96	90	90	96	96
Heavy Vehicles, %	0	2	0	2	2	2	0	6	2	2	5	18
Mvmt Flow	9	0	27	53	0	39	10	517	11	11	742	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1330	1311	751	1325	1321	517	760	0	0	517	0	0
Stage 1	773	773	-	538	538	-	-	-	-	-	-	-
Stage 2	557	538	-	787	783	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.92	6.4	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.5	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	124	137	415	144	157	589	653	-	-	797	-	-
Stage 1	403	375	-	597	522	-	-	-	-	-	-	-
Stage 2	549	492	-	429	404	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	113	133	415	132	152	589	653	-	-	797	-	-
Mov Cap-2 Maneuver	113	133	-	132	152	-	-	-	-	-	-	-
Stage 1	397	370	-	588	514	-	-	-	-	-	-	-
Stage 2	505	484	-	395	398	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.2	33.5	0.2	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	653	-	-	246	132	589	797	-	-
HCM Lane V/C Ratio	0.016	-	-	0.148	0.404	0.066	0.014	-	-
HCM Control Delay (s)	10.6	-	-	22.2	49.6	11.5	9.6	-	-
HCM Lane LOS	B	-	-	C	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	1.7	0.2	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	19	31	0	21	17	663	31	29	526	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920			0.850			0.993			0.992	
Flt Protected		0.980		0.950			0.950			0.950		
Satd. Flow (prot)	0	1764	0	1676	1500	0	1636	1693	0	1637	1705	0
Flt Permitted		0.857		0.952			0.444			0.367		
Satd. Flow (perm)	0	1542	0	1680	1500	0	765	1693	0	632	1705	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			337			10			10	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			575			515			734	
Travel Time (s)		20.5			15.7			8.8			12.5	
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Heavy Vehicles (%)	8%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	13	0	19	34	0	23	17	670	34	32	531	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	34	23	0	17	704	0	32	560	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.13	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	13.0	13.0		13.0	13.0		60.0	60.0		60.0	60.0	
Total Split (%)	17.8%	17.8%		17.8%	17.8%		82.2%	82.2%		82.2%	82.2%	
Maximum Green (s)	7.0	7.0		7.0	7.0		54.0	54.0		54.0	54.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		6.4		6.5	6.5		61.6	61.6		61.6	61.6	
Actuated g/C Ratio		0.09		0.09	0.09		0.84	0.84		0.84	0.84	
v/c Ratio		0.18		0.23	0.05		0.03	0.49		0.06	0.39	
Control Delay		10.1		34.5	0.2		2.6	4.6		2.8	3.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		10.1		34.5	0.2		2.6	4.6		2.8	3.6	
LOS		B		C	A		A	A		A	A	
Approach Delay		10.1			20.7			4.5			3.6	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 73
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 4.9 Intersection LOS: A
Intersection Capacity Utilization 57.5% ICU Level of Service B
Analysis Period (min) 15
Description: s

Splits and Phases: 3: Mattison Ave/Access & Bethlehem Pike (S.R.2018)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	19	31	0	21	17	663	31	29	526	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1853	1795	1853	1765	1765	1800	1782	1764	1782	1782	1778	1818
Adj Flow Rate, veh/h	13	0	19	34	0	23	17	670	0	32	531	29
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	0	1	1	2	2	2
Cap, veh/h	89	4	35	174	0	73	687	1388	0	606	1315	72
Arrive On Green	0.05	0.00	0.05	0.05	0.00	0.05	0.79	0.79	0.00	0.79	0.79	0.79
Sat Flow, veh/h	416	81	726	1388	0	1500	854	1764	0	772	1671	91
Grp Volume(v), veh/h	32	0	0	34	0	23	17	670	0	32	0	560
Grp Sat Flow(s),veh/h/ln	1223	0	0	1388	0	1500	854	1764	0	772	0	1762
Q Serve(g_s), s	1.1	0.0	0.0	0.0	0.0	1.1	0.5	9.5	0.0	1.1	0.0	7.2
Cycle Q Clear(g_c), s	2.2	0.0	0.0	1.4	0.0	1.1	7.7	9.5	0.0	10.6	0.0	7.2
Prop In Lane	0.41		0.59	1.00		1.00	1.00		0.00	1.00		0.05
Lane Grp Cap(c), veh/h	129	0	0	174	0	73	687	1388	0	606	0	1387
V/C Ratio(X)	0.25	0.00	0.00	0.19	0.00	0.32	0.02	0.48	0.00	0.05	0.00	0.40
Avail Cap(c_a), veh/h	199	0	0	240	0	144	687	1388	0	606	0	1387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.2	0.0	0.0	33.7	0.0	33.6	3.6	2.7	0.0	4.5	0.0	2.4
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.5	0.0	2.5	0.1	1.2	0.0	0.2	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	0.0	0.0	1.2	0.0	0.9	0.2	8.6	0.0	0.5	0.0	6.8
LnGrp Delay(d),s/veh	35.2	0.0	0.0	34.3	0.0	36.0	3.7	3.9	0.0	4.6	0.0	3.3
LnGrp LOS	D			C		D	A	A		A		A
Approach Vol, veh/h		32			57			687			592	
Approach Delay, s/veh		35.2			35.0			3.9			3.4	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		63.5		9.5		63.5		9.5
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		54.0		7.0		54.0		7.0
Max Q Clear Time (g_c+I1), s		11.5		4.2		12.6		3.4
Green Ext Time (p_c), s		10.6		0.1		10.5		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	5.7
HCM 2010 LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	32	0	0	0	15	491	6	0	752	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	15	12	12	12	11	10	10	11	11	10
Grade (%)		1%			0%			1%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.883						0.998			0.999	
Flt Protected		0.993					0.950					
Satd. Flow (prot)	0	1727	0	0	0	0	1645	1560	0	1723	1755	0
Flt Permitted		0.993					0.950					
Satd. Flow (perm)	0	1727	0	0	0	0	1645	1560	0	1723	1755	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		323			435			582			515	
Travel Time (s)		8.8			11.9			9.9			8.8	
Peak Hour Factor	0.96	0.90	0.96	0.90	0.90	0.90	0.96	0.96	0.90	0.90	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	7%	2%	2%	0%	6%
Adj. Flow (vph)	5	0	33	0	0	0	16	511	7	0	783	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	0	0	16	518	0	0	788	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	0	32	0	0	0	15	491	6	0	752	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-2	-
Peak Hour Factor	96	90	96	90	90	90	96	96	90	90	96	96
Heavy Vehicles, %	0	2	0	2	2	2	0	7	2	2	0	6
Mvmt Flow	5	0	33	0	0	0	16	511	7	0	783	5

Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	1332	1335	786				789	0	0	518	0	0
Stage 1	786	786	-				-	-	-	-	-	-
Stage 2	546	549	-				-	-	-	-	-	-
Critical Hdwy	6.6	6.72	6.3				4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	5.6	5.72	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.6	5.72	-				-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1				3	-	-	3	-	-
Pot Cap-1 Maneuver	173	143	404				638	-	-	796	-	-
Stage 1	482	386	-				-	-	-	-	-	-
Stage 2	639	501	-				-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	169	0	404				638	-	-	796	-	-
Mov Cap-2 Maneuver	169	0	-				-	-	-	-	-	-
Stage 1	482	0	-				-	-	-	-	-	-
Stage 2	623	0	-				-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	638	-	-	340	796	-	-
HCM Lane V/C Ratio	0.024	-	-	0.113	-	-	-
HCM Control Delay (s)	10.8	-	-	16.9	0	-	-
HCM Lane LOS	B	-	-	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0	-	-

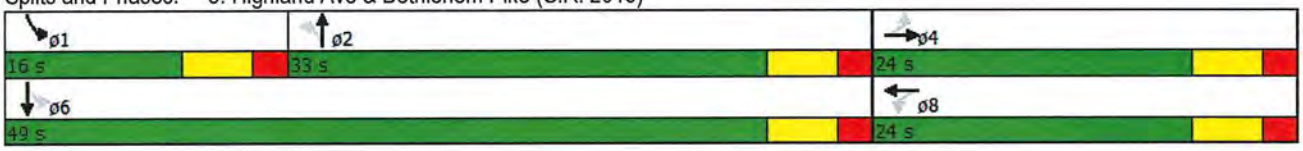
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	86	21	35	72	190	14	316	51	273	514	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.913			0.979			0.995	
Flt Protected		0.990			0.994		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1679	0	1636	1678	0	1629	1809	0
Flt Permitted		0.792			0.953		0.457			0.364		
Satd. Flow (perm)	0	1463	0	0	1609	0	787	1678	0	624	1809	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			119			13			4	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	4%	1%	5%	6%	7%	3%	0%	8%	4%	2%	6%	10%
Adj. Flow (vph)	29	90	22	36	75	198	15	329	53	284	535	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	141	0	0	309	0	15	382	0	284	553	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	24.0	24.0		24.0	24.0		33.0	33.0		16.0	49.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		45.2%	45.2%		21.9%	67.1%	
Maximum Green (s)	18.0	18.0		18.0	18.0		27.0	27.0		10.0	43.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 67.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	28	86	21	35	72	190	14	316	51	273	514	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1840	1881	1881	1803	1881	1782	1725	1853	1774	1773	1881
Adj Flow Rate, veh/h	29	90	22	36	75	198	15	329	53	284	535	18
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	7	7	7	0	8	8	2	6	6
Cap, veh/h	109	293	63	85	109	242	453	588	95	576	1050	35
Arrive On Green	0.22	0.24	0.22	0.22	0.24	0.22	0.41	0.41	0.39	0.14	0.62	0.60
Sat Flow, veh/h	193	1225	262	113	455	1013	860	1450	234	1689	1705	57
Grp Volume(v), veh/h	141	0	0	309	0	0	15	0	382	284	0	553
Grp Sat Flow(s),veh/h/ln	1680	0	0	1581	0	0	860	0	1684	1689	0	1763
Q Serve(g_s), s	0.0	0.0	0.0	7.1	0.0	0.0	0.7	0.0	12.0	5.9	0.0	12.1
Cycle Q Clear(g_c), s	4.5	0.0	0.0	12.9	0.0	0.0	0.7	0.0	12.0	5.9	0.0	12.1
Prop In Lane	0.21		0.16	0.12		0.64	1.00		0.14	1.00		0.03
Lane Grp Cap(c), veh/h	440	0	0	413	0	0	453	0	683	576	0	1086
V/C Ratio(X)	0.32	0.00	0.00	0.75	0.00	0.00	0.03	0.00	0.56	0.49	0.00	0.51
Avail Cap(c_a), veh/h	498	0	0	470	0	0	453	0	683	613	0	1124
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.9	0.0	0.0	25.2	0.0	0.0	12.5	0.0	15.8	9.4	0.0	7.4
Incr Delay (d2), s/veh	0.4	0.0	0.0	5.7	0.0	0.0	0.0	0.0	1.0	0.7	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.2	0.0	0.0	10.6	0.0	0.0	0.5	0.0	9.6	5.1	0.0	10.0
LnGrp Delay(d),s/veh	22.3	0.0	0.0	30.9	0.0	0.0	12.6	0.0	16.8	10.1	0.0	7.8
LnGrp LOS	C			C			B		B	B		A
Approach Vol, veh/h		141			309			397			837	
Approach Delay, s/veh		22.3			30.9			16.7			8.6	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	14.5	33.0		21.5		47.5		21.5
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	10.0	27.0		18.0		43.0		18.0
Max Q Clear Time (g_c+I1), s	8.4	14.0		6.5		14.1		14.9
Green Ext Time (p_c), s	0.2	2.3		1.3		2.6		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	67	3	2	63	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	0%			-1%	0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995					
Flt Protected				0.999		
Satd. Flow (prot)	1756	0	0	1772	1765	0
Flt Permitted				0.999		
Satd. Flow (perm)	1756	0	0	1772	1765	0
Link Speed (mph)	30			25	25	
Link Distance (ft)	951			112	450	
Travel Time (s)	21.6			3.1	12.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	74	3	2	70	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	0	72	0	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	67	3	2	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-1	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	3	2	70	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	150	76
Stage 1	-	-	-	-	76	-
Stage 2	-	-	-	-	74	-
Critical Hdwy	-	-	4.3	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	3	-	3	3.1
Pot Cap-1 Maneuver	-	-	1129	-	977	1052
Stage 1	-	-	-	-	1105	-
Stage 2	-	-	-	-	1107	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1129	-	975	1052
Mov Cap-2 Maneuver	-	-	-	-	975	-
Stage 1	-	-	-	-	1105	-
Stage 2	-	-	-	-	1105	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1129	-
HCM Lane V/C Ratio	-	-	-	0.002	-
HCM Control Delay (s)	0	-	-	8.2	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	49	66	7	27	6	68	590	9	11	514	51
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	10	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.980			0.998			0.986	
Flt Protected		0.992			0.992		0.950			0.950		
Satd. Flow (prot)	0	1858	0	0	1759	0	1534	1719	0	1670	1733	0
Flt Permitted		0.992			0.992		0.950			0.950		
Satd. Flow (perm)	0	1858	0	0	1759	0	1534	1719	0	1670	1733	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1041			951			734			414	
Travel Time (s)		28.4			25.9			12.5			7.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	25	52	69	7	28	6	72	621	9	12	541	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	146	0	0	41	0	72	630	0	12	595	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	49	66	7	27	6	68	590	9	11	514	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	-	2	-	-	-2	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	3	0	0	0	3	0	0	0	0	0
Mvmt Flow	25	52	69	7	28	6	72	621	9	12	541	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1377	1365	568	1421	1387	626	595	0	0	631	0	0
Stage 1	591	591	-	769	769	-	-	-	-	-	-	-
Stage 2	786	774	-	652	618	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.33	6.9	6.3	6.1	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	5.9	5.3	-	-	-	-	-	-	-
Follow-up Hdwy	3	4	3.1	3	4	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	124	138	541	134	156	520	748	-	-	726	-	-
Stage 1	540	482	-	461	431	-	-	-	-	-	-	-
Stage 2	413	394	-	534	501	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	95	123	541	72	139	520	748	-	-	726	-	-
Mov Cap-2 Maneuver	95	123	-	72	139	-	-	-	-	-	-	-
Stage 1	488	474	-	417	390	-	-	-	-	-	-	-
Stage 2	342	356	-	408	493	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	78.2	44.6	1.1	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	748	-	-	180	132	726	-	-
HCM Lane V/C Ratio	0.096	-	-	0.813	0.319	0.016	-	-
HCM Control Delay (s)	10.3	-	-	78.2	44.6	10	-	-
HCM Lane LOS	B	-	-	F	E	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-	5.6	1.3	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	19	31	0	21	17	663	31	29	526	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920			0.850			0.993			0.992	
Flt Protected		0.980		0.950			0.950			0.950		
Satd. Flow (prot)	0	1764	0	1676	1500	0	1636	1693	0	1637	1705	0
Flt Permitted		0.980		0.950			0.950			0.950		
Satd. Flow (perm)	0	1764	0	1676	1500	0	1636	1693	0	1637	1705	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			575			515			734	
Travel Time (s)		20.5			15.7			8.8			12.5	
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Heavy Vehicles (%)	8%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	13	0	19	34	0	23	17	670	34	32	531	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	34	23	0	17	704	0	32	560	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	0	19	31	0	21	17	663	31	29	526	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	0	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	0	-	-	2	-	-	-2	-
Peak Hour Factor	99	90	99	90	90	90	99	99	90	90	99	99
Heavy Vehicles, %	8	2	0	2	2	2	0	1	2	2	2	7
Mvmt Flow	13	0	19	34	0	23	17	670	34	32	531	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1326	1314	546	1324	1329	670	561	0	0	670	0	0
Stage 1	610	610	-	704	704	-	-	-	-	-	-	-
Stage 2	716	704	-	620	625	-	-	-	-	-	-	-
Critical Hdwy	7.58	6.92	6.4	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.58	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.58	5.92	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.1	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	119	137	551	144	155	480	769	-	-	703	-	-
Stage 1	490	453	-	479	440	-	-	-	-	-	-	-
Stage 2	420	406	-	536	477	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	107	128	551	132	145	480	769	-	-	703	-	-
Mov Cap-2 Maneuver	107	128	-	132	145	-	-	-	-	-	-	-
Stage 1	479	432	-	468	430	-	-	-	-	-	-	-
Stage 2	391	397	-	494	455	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.8	30	0.2	0.6
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	769	-	-	205	132	480	703	-	-
HCM Lane V/C Ratio	0.022	-	-	0.158	0.261	0.049	0.046	-	-
HCM Control Delay (s)	9.8	-	-	25.8	41.6	12.9	10.4	-	-
HCM Lane LOS	A	-	-	D	E	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	1	0.2	0.1	-	-

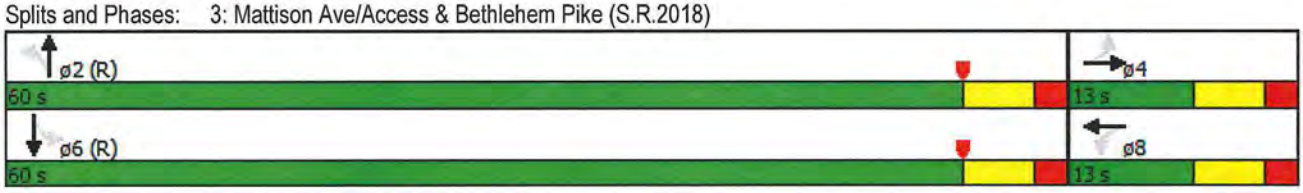
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	19	31	0	21	17	663	31	29	526	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	16	16	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920			0.850			0.993			0.992	
Flt Protected		0.980		0.950			0.950			0.950		
Satd. Flow (prot)	0	1764	0	1676	1500	0	1636	1693	0	1637	1705	0
Flt Permitted		0.857		0.952			0.444			0.367		
Satd. Flow (perm)	0	1542	0	1680	1500	0	765	1693	0	632	1705	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			337			10			10	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		752			575			515			734	
Travel Time (s)		20.5			15.7			8.8			12.5	
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Heavy Vehicles (%)	8%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	13	0	19	34	0	23	17	670	34	32	531	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	34	23	0	17	704	0	32	560	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	0.92	0.92	0.92	1.07	1.07	1.07	1.13	1.13	1.13	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	13.0	13.0		13.0	13.0		60.0	60.0		60.0	60.0	
Total Split (%)	17.8%	17.8%		17.8%	17.8%		82.2%	82.2%		82.2%	82.2%	
Maximum Green (s)	7.0	7.0		7.0	7.0		54.0	54.0		54.0	54.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		6.4		6.5	6.5		61.6	61.6		61.6	61.6	
Actuated g/C Ratio		0.09		0.09	0.09		0.84	0.84		0.84	0.84	
v/c Ratio		0.18		0.23	0.05		0.03	0.49		0.06	0.39	
Control Delay		10.1		34.5	0.2		2.6	4.6		2.8	3.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		10.1		34.5	0.2		2.6	4.6		2.8	3.6	
LOS		B		C	A		A	A		A	A	
Approach Delay		10.1			20.7			4.5			3.6	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 73
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 4.9 Intersection LOS: A
Intersection Capacity Utilization 57.5% ICU Level of Service B
Analysis Period (min) 15
Description: s

Splits and Phases: 3: Mattison Ave/Access & Bethlehem Pike (S.R.2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	0	19	31	0	21	17	663	31	29	526	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1853	1795	1853	1765	1765	1800	1782	1764	1782	1782	1778	1818
Adj Flow Rate, veh/h	13	0	19	34	0	23	17	670	0	32	531	29
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.99	0.90	0.99	0.90	0.90	0.90	0.99	0.99	0.90	0.90	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	0	1	1	2	2	2
Cap, veh/h	89	4	35	174	0	73	687	1388	0	606	1315	72
Arrive On Green	0.05	0.00	0.05	0.05	0.00	0.05	0.79	0.79	0.00	0.79	0.79	0.79
Sat Flow, veh/h	416	81	726	1388	0	1500	854	1764	0	772	1671	91
Grp Volume(v), veh/h	32	0	0	34	0	23	17	670	0	32	0	560
Grp Sat Flow(s),veh/h/ln	1223	0	0	1388	0	1500	854	1764	0	772	0	1762
Q Serve(g_s), s	1.1	0.0	0.0	0.0	0.0	1.1	0.5	9.5	0.0	1.1	0.0	7.2
Cycle Q Clear(g_c), s	2.2	0.0	0.0	1.4	0.0	1.1	7.7	9.5	0.0	10.6	0.0	7.2
Prop In Lane	0.41		0.59	1.00		1.00	1.00		0.00	1.00		0.05
Lane Grp Cap(c), veh/h	129	0	0	174	0	73	687	1388	0	606	0	1387
V/C Ratio(X)	0.25	0.00	0.00	0.19	0.00	0.32	0.02	0.48	0.00	0.05	0.00	0.40
Avail Cap(c_a), veh/h	199	0	0	240	0	144	687	1388	0	606	0	1387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.2	0.0	0.0	33.7	0.0	33.6	3.6	2.7	0.0	4.5	0.0	2.4
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.5	0.0	2.5	0.1	1.2	0.0	0.2	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	0.0	0.0	1.2	0.0	0.9	0.2	8.6	0.0	0.5	0.0	6.8
LnGrp Delay(d),s/veh	35.2	0.0	0.0	34.3	0.0	36.0	3.7	3.9	0.0	4.6	0.0	3.3
LnGrp LOS	D			C		D	A	A		A		A
Approach Vol, veh/h		32			57			687			592	
Approach Delay, s/veh		35.2			35.0			3.9			3.4	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		63.5		9.5		63.5		9.5
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		54.0		7.0		54.0		7.0
Max Q Clear Time (g_c+I1), s		11.5		4.2		12.6		3.4
Green Ext Time (p_c), s		10.6		0.1		10.5		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	5.7
HCM 2010 LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	0	44	0	0	0	38	678	16	0	529	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	15	15	15	12	12	12	11	10	10	11	11	10
Grade (%)		1%			0%			1%			-2%	
Storage Length (ft)	0		0	0		0	75		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.902						0.996			0.996	
Flt Protected		0.986					0.950					
Satd. Flow (prot)	0	1752	0	0	0	0	1645	1648	0	1723	1714	0
Flt Permitted		0.986					0.950					
Satd. Flow (perm)	0	1752	0	0	0	0	1645	1648	0	1723	1714	0
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		323			564			582			515	
Travel Time (s)		8.8			15.4			9.9			8.8	
Peak Hour Factor	0.98	0.90	0.98	0.90	0.90	0.90	0.98	0.98	0.90	0.90	0.98	0.98
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	8%
Adj. Flow (vph)	17	0	45	0	0	0	39	692	18	0	540	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	0	0	0	0	39	710	0	0	554	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	0	44	0	0	0	38	678	16	0	529	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-2	-
Peak Hour Factor	98	90	98	90	90	90	98	98	90	90	98	98
Heavy Vehicles, %	0	2	0	2	2	2	0	1	2	2	2	8
Mvmt Flow	17	0	45	0	0	0	39	692	18	0	540	14

Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	1325	1334	547				554	0	0	710	0	0
Stage 1	547	547	-				-	-	-	-	-	-
Stage 2	778	787	-				-	-	-	-	-	-
Critical Hdwy	6.6	6.72	6.3				4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	5.6	5.72	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.6	5.72	-				-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1				3	-	-	3	-	-
Pot Cap-1 Maneuver	175	143	559				773	-	-	681	-	-
Stage 1	638	502	-				-	-	-	-	-	-
Stage 2	486	386	-				-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	166	0	559				773	-	-	681	-	-
Mov Cap-2 Maneuver	166	0	-				-	-	-	-	-	-
Stage 1	638	0	-				-	-	-	-	-	-
Stage 2	461	0	-				-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.1	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	773	-	-	337	681	-	-
HCM Lane V/C Ratio	0.05	-	-	0.185	-	-	-
HCM Control Delay (s)	9.9	-	-	18.1	0	-	-
HCM Lane LOS	A	-	-	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0	-	-

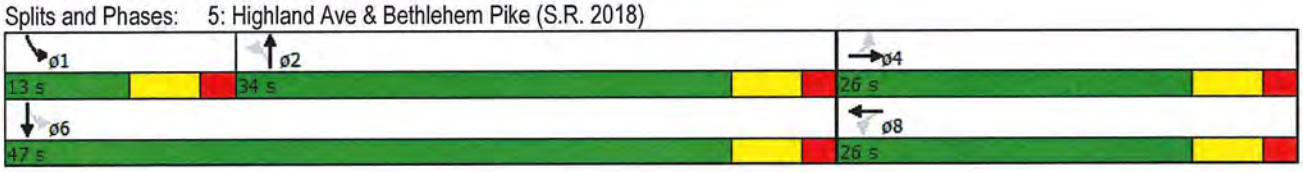
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	83	13	53	112	265	25	436	36	198	336	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	14	14	14	14	11	13	13	11	14	14
Grade (%)		-1%			-1%			2%			-1%	
Storage Length (ft)	0		0	0		0	125		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.917			0.988			0.986	
Flt Protected		0.991			0.994		0.950			0.950		
Satd. Flow (prot)	0	1870	0	0	1744	0	1636	1786	0	1629	1885	0
Flt Permitted		0.843			0.943		0.538			0.266		
Satd. Flow (perm)	0	1591	0	0	1654	0	927	1786	0	456	1885	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			111			7			12	
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		830			753			301			582	
Travel Time (s)		16.2			14.7			5.1			9.9	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	2%	0%	2%	1%	0%
Adj. Flow (vph)	21	85	13	54	114	270	26	445	37	202	343	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	119	0	0	438	0	26	482	0	202	377	0
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	35		20	35		6	6		35	6	
Trailing Detector (ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Position(ft)	0	-5		0	-5		0	0		-5	0	
Detector 1 Size(ft)	20	40		20	40		6	6		40	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		27.0	27.0		3.0	27.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		33.0	33.0		9.0	33.0	
Total Split (s)	26.0	26.0		26.0	26.0		34.0	34.0		13.0	47.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		46.6%	46.6%		17.8%	64.4%	
Maximum Green (s)	20.0	20.0		20.0	20.0		28.0	28.0		7.0	41.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 73
Actuated Cycle Length: 69.9
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 5: Highland Ave & Bethlehem Pike (S.R. 2018)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	83	13	53	112	265	25	436	36	198	336	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	1	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1868	1881	1881	1865	1881	1782	1820	1853	1774	1864	1881
Adj Flow Rate, veh/h	21	85	13	54	114	270	26	445	37	202	343	34
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	0	2	2	2	1	1
Cap, veh/h	104	373	51	97	143	294	494	645	54	444	950	94
Arrive On Green	0.28	0.29	0.28	0.28	0.29	0.28	0.39	0.39	0.38	0.11	0.57	0.56
Sat Flow, veh/h	154	1277	176	138	489	1009	1011	1658	138	1689	1670	166
Grp Volume(v), veh/h	119	0	0	438	0	0	26	0	482	202	0	377
Grp Sat Flow(s),veh/h/ln	1607	0	0	1636	0	0	1011	0	1795	1689	0	1835
Q Serve(g_s), s	0.0	0.0	0.0	12.8	0.0	0.0	1.2	0.0	16.1	4.6	0.0	8.0
Cycle Q Clear(g_c), s	3.6	0.0	0.0	19.0	0.0	0.0	1.2	0.0	16.1	4.6	0.0	8.0
Prop In Lane	0.18		0.11	0.12		0.62	1.00		0.08	1.00		0.09
Lane Grp Cap(c), veh/h	506	0	0	511	0	0	494	0	699	444	0	1044
V/C Ratio(X)	0.24	0.00	0.00	0.86	0.00	0.00	0.05	0.00	0.69	0.46	0.00	0.36
Avail Cap(c_a), veh/h	506	0	0	511	0	0	508	0	724	445	0	1072
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	0.0	25.0	0.0	0.0	13.9	0.0	18.4	11.9	0.0	8.4
Incr Delay (d2), s/veh	0.2	0.0	0.0	13.5	0.0	0.0	0.0	0.0	2.7	0.7	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.4	0.0	0.0	15.9	0.0	0.0	0.7	0.0	13.2	4.0	0.0	7.3
LnGrp Delay(d),s/veh	19.6	0.0	0.0	38.5	0.0	0.0	13.9	0.0	21.0	12.7	0.0	8.6
LnGrp LOS	B			D			B		C	B		A
Approach Vol, veh/h		119			438			508			579	
Approach Delay, s/veh		19.6			38.5			20.7			10.1	
Approach LOS		B			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.9	33.0		26.0		45.9		26.0
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	7.0	28.0		20.0		41.0		20.0
Max Q Clear Time (g_c+I1), s	7.1	18.1		5.6		10.0		21.0
Green Ext Time (p_c), s	0.0	1.9		1.9		2.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	21.6
HCM 2010 LOS	C

APPENDIX K

Traffic Signal Warrants

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Northbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/17/16	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	**2**	204	50	5	**23**	**3**	**3**	3	**13**	0	0	0	0	306
13:00	0	190	55	2	17	0	0	**7**	11	1	0	0	1	284
14:00	0	230	63	**9**	22	3	0	7	10	0	0	0	0	344
15:00	1	330	**83**	7	21	3	0	4	7	**2**	0	0	0	458
16:00	0	388	75	1	21	1	0	5	9	0	0	0	0	500
17:00	1	**429**	72	0	11	0	0	6	6	0	0	0	0	**525**
18:00	1	269	53	2	10	0	0	0	9	0	0	0	0	344
19:00	1	186	24	0	8	0	0	3	1	0	0	0	0	223
20:00	0	144	26	0	3	0	0	0	8	0	0	0	0	181
21:00	1	106	18	0	2	0	0	0	10	0	0	0	0	137
22:00	1	80	10	0	0	0	0	0	1	0	0	0	0	92
23:00	0	50	8	1	2	0	0	0	6	0	0	0	**2**	69
Total	8	2606	537	27	140	10	3	35	91	3	0	0	3	3463
Percent	0.2%	75.3%	15.5%	0.8%	4.0%	0.3%	0.1%	1.0%	2.6%	0.1%	0.0%	0.0%	0.1%	
AM Peak Vol.														
PM Peak Vol.	12:00 2	17:00 429	15:00 83	14:00 9	12:00 23	12:00 3	12:00 3	13:00 7	12:00 13	15:00 2			23:00 2	17:00 525

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Northbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/18/16	0	42	8	1	1	0	0	0	7	0	0	0	0	59
01:00	0	22	2	1	1	0	0	0	4	0	0	0	0	30
02:00	0	16	1	1	0	1	**1**	0	9	0	0	0	0	29
03:00	1	17	2	3	5	1	0	0	7	0	0	0	0	36
04:00	0	33	10	4	6	0	0	1	6	0	0	0	0	60
05:00	0	86	20	3	9	1	0	1	8	0	0	0	0	128
06:00	0	205	39	2	12	2	1	0	8	1	0	0	0	270
07:00	1	**228**	39	**6**	**20**	**7**	0	6	7	0	0	0	**1**	**315**
08:00	**2**	207	**60**	6	16	3	0	5	13	1	0	0	0	313
09:00	1	181	51	6	17	6	0	1	11	0	0	0	0	274
10:00	1	137	41	4	19	3	0	4	13	0	0	0	0	222
11:00	1	161	51	5	14	4	0	**8**	**23**	**3**	0	0	0	270
12 PM	0	193	49	5	20	3	0	8	12	0	0	0	0	290
13:00	**1**	209	57	2	**24**	3	1	6	11	0	0	0	**2**	316
14:00	0	245	60	4	20	**7**	**2**	**10**	**14**	0	0	0	1	363
15:00	0	339	**79**	**10**	19	2	2	4	7	**1**	0	0	2	465
16:00	0	394	79	1	18	3	0	4	4	0	0	0	0	**503**
17:00	0	**406**	55	2	9	1	0	0	2	0	0	0	2	477
18:00	1	301	42	1	15	0	0	1	3	0	0	0	0	364
19:00	1	185	30	0	11	1	0	0	8	1	0	0	0	237
20:00	0	155	28	0	2	0	0	1	2	0	0	0	0	188
21:00	0	135	28	0	2	0	0	0	4	0	0	0	0	169
22:00	0	108	13	0	2	1	0	0	2	0	0	0	0	126
23:00	0	69	9	2	0	0	0	0	7	0	0	0	0	87
Total	10	4074	853	69	262	49	7	60	192	7	0	0	8	5591
Percent	0.2%	72.9%	15.3%	1.2%	4.7%	0.9%	0.1%	1.1%	3.4%	0.1%	0.0%	0.0%	0.1%	
AM Peak	08:00	07:00	08:00	07:00	07:00	07:00	02:00	11:00	11:00	11:00			07:00	07:00
Vol.	2	228	60	6	20	7	1	8	23	3			1	315
PM Peak	13:00	17:00	15:00	15:00	13:00	14:00	14:00	14:00	14:00	15:00			13:00	16:00
Vol.	1	406	79	10	24	7	2	10	14	1			2	503

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Northbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/19/16	0	43	8	2	2	0	0	1	3	0	0	0	0	59
01:00	0	24	7	1	1	0	0	1	4	**1**	0	0	0	39
02:00	0	24	1	1	0	0	0	0	12	1	0	0	0	39
03:00	0	17	2	2	3	0	0	0	11	0	0	0	0	35
04:00	0	34	9	1	8	1	0	1	8	1	0	0	0	63
05:00	**2**	89	23	4	10	1	1	1	4	0	0	0	0	135
06:00	0	198	43	1	15	4	1	1	3	0	0	0	0	266
07:00	1	**242**	41	5	**18**	**7**	1	4	8	1	0	0	0	**328**
08:00	0	192	**55**	**7**	17	2	**2**	**8**	11	0	0	0	1	295
09:00	1	170	54	4	18	1	0	7	12	1	0	0	**2**	270
10:00	2	158	45	6	12	2	0	3	15	0	0	0	0	243
11:00	0	187	53	7	17	3	0	6	**20**	0	0	0	0	293
12 PM	0	**222**	**50**	**3**	**26**	0	**1**	**6**	**14**	0	0	0	**1**	**323**
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	6	1600	391	44	147	21	6	39	125	5	0	0	4	2388
Percent	0.3%	67.0%	16.4%	1.8%	6.2%	0.9%	0.3%	1.6%	5.2%	0.2%	0.0%	0.0%	0.2%	
AM Peak	05:00	07:00	08:00	08:00	07:00	07:00	08:00	08:00	11:00	01:00			09:00	07:00
Vol.	2	242	55	7	18	7	2	8	20	1			2	328
PM Peak		12:00	12:00	12:00	12:00		12:00	12:00	12:00				12:00	12:00
Vol.		222	50	3	26		1	6	14				1	323
Grand Total	24	8280	1781	140	549	80	16	134	408	15	0	0	15	11442
Percent	0.2%	72.4%	15.6%	1.2%	4.8%	0.7%	0.1%	1.2%	3.6%	0.1%	0.0%	0.0%	0.1%	

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Southbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/17/16	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	1	183	31	3	17	**4**	0	3	11	1	0	0	0	254
13:00	1	161	39	2	**20**	1	1	4	**13**	0	0	0	0	242
14:00	0	173	35	**7**	12	0	0	2	12	0	0	0	0	241
15:00	3	226	**45**	6	17	3	**2**	**8**	6	1	0	0	0	317
16:00	1	256	35	2	16	0	0	3	10	**3**	0	0	**3**	329
17:00	**4**	**275**	43	2	6	0	0	2	3	0	0	0	0	**335**
18:00	0	216	26	2	2	0	0	1	2	0	0	0	0	249
19:00	2	141	21	0	5	1	0	0	3	0	0	0	0	173
20:00	0	136	16	0	5	0	0	2	3	0	0	0	0	162
21:00	3	76	12	1	4	0	0	0	6	0	0	0	0	102
22:00	0	62	6	0	0	0	0	0	3	0	0	0	0	71
23:00	1	45	10	0	1	0	0	0	6	0	0	0	0	63
Total	16	1950	319	25	105	9	3	25	78	5	0	0	3	2538
Percent	0.6%	76.8%	12.6%	1.0%	4.1%	0.4%	0.1%	1.0%	3.1%	0.2%	0.0%	0.0%	0.1%	
AM Peak Vol.														
PM Peak	17:00	17:00	15:00	14:00	13:00	12:00	15:00	15:00	13:00	16:00			16:00	17:00
Vol.	4	275	45	7	20	4	2	8	13	3			3	335

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Southbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/18/16	0	19	6	2	0	0	0	0	4	0	0	0	0	31
01:00	0	19	6	0	0	0	0	0	2	0	0	0	0	27
02:00	0	22	3	3	3	0	0	0	3	0	0	0	0	34
03:00	2	31	8	2	7	2	0	0	5	0	0	0	0	57
04:00	1	61	11	5	2	1	0	0	8	0	0	0	0	89
05:00	0	123	31	1	**19**	**6**	0	3	9	0	0	0	0	192
06:00	0	193	58	5	14	2	0	4	7	0	0	0	0	283
07:00	1	**315**	**66**	6	17	0	0	2	6	0	0	0	0	**413**
08:00	2	216	42	5	9	2	**1**	6	15	**1**	0	0	**2**	301
09:00	**5**	161	35	4	13	3	0	2	8	1	0	0	1	233
10:00	1	166	32	**8**	16	2	0	3	11	0	0	0	0	239
11:00	3	181	41	8	18	5	0	**7**	**23**	0	0	0	0	286
12 PM	**2**	222	39	**4**	16	2	0	**9**	11	0	0	0	1	306
13:00	1	162	34	2	15	3	**2**	7	**13**	0	0	0	0	239
14:00	2	191	41	3	**17**	**6**	0	5	11	**1**	0	0	**3**	280
15:00	2	222	40	1	13	3	0	6	8	0	0	0	1	296
16:00	1	252	**46**	4	13	1	0	5	5	1	0	0	1	329
17:00	1	**286**	41	2	11	0	1	3	5	1	0	0	0	**351**
18:00	0	209	28	1	3	0	0	5	2	0	0	0	0	248
19:00	0	161	26	0	3	0	0	4	3	0	0	0	0	197
20:00	0	146	22	0	5	0	0	0	4	1	0	0	0	178
21:00	0	86	15	1	3	0	0	0	4	0	0	0	0	109
22:00	0	86	13	0	2	0	0	0	4	0	0	0	0	105
23:00	0	54	12	0	3	0	0	1	1	0	0	0	0	71
Total	24	3584	696	67	222	38	4	72	172	6	0	0	9	4894
Percent	0.5%	73.2%	14.2%	1.4%	4.5%	0.8%	0.1%	1.5%	3.5%	0.1%	0.0%	0.0%	0.2%	
AM Peak	09:00	07:00	07:00	10:00	05:00	05:00	08:00	11:00	11:00	08:00			08:00	07:00
Vol.	5	315	66	8	19	6	1	7	23	1			2	413
PM Peak	12:00	17:00	16:00	12:00	14:00	14:00	13:00	12:00	13:00	14:00			14:00	17:00
Vol.	2	286	46	4	17	6	2	9	13	1			3	351

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately
100 feet north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Southbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/19/16	1	17	2	2	0	0	0	0	4	0	0	0	0	26
01:00	0	18	6	0	1	0	0	0	4	0	0	0	0	29
02:00	1	20	2	2	4	1	0	0	6	**2**	0	0	0	38
03:00	2	30	4	1	3	1	0	0	8	0	0	0	0	49
04:00	**3**	57	11	4	4	1	1	1	7	0	0	0	0	89
05:00	0	132	34	4	16	0	1	4	3	0	0	0	0	194
06:00	0	222	**61**	**7**	15	2	0	1	8	0	0	0	0	316
07:00	0	**311**	60	5	**19**	1	**3**	1	14	0	0	0	0	**414**
08:00	0	242	50	7	13	1	1	**5**	**17**	0	0	0	**1**	337
09:00	2	148	40	7	9	1	2	5	12	1	0	0	1	228
10:00	2	146	31	0	16	**3**	0	3	14	0	0	0	0	215
11:00	2	199	43	6	17	2	1	2	14	0	0	0	0	286
12 PM	**3**	**202**	**34**	**5**	**22**	**2**	**2**	**4**	**14**	0	0	**1**	**1**	**290**
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	16	1744	378	50	139	15	11	26	125	3	0	1	3	2511
Percent	0.6%	69.5%	15.1%	2.0%	5.5%	0.6%	0.4%	1.0%	5.0%	0.1%	0.0%	0.0%	0.1%	
AM Peak	04:00	07:00	06:00	06:00	07:00	10:00	07:00	08:00	08:00	02:00			08:00	07:00
Vol.	3	311	61	7	19	3	3	5	17	2			1	414
PM Peak	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00			12:00	12:00	12:00
Vol.	3	202	34	5	22	2	2	4	14			1	1	290
Grand Total	56	7278	1393	142	466	62	18	123	375	14	0	1	15	9943
Percent	0.6%	73.2%	14.0%	1.4%	4.7%	0.6%	0.2%	1.2%	3.8%	0.1%	0.0%	0.0%	0.2%	

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately 100 feet
north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Northbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/17/16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	0	2	10	37	146	91	14	2	0	0	0	0	0	302	38	40
13:00	0	1	14	42	137	74	13	**4**	0	0	0	0	0	285	38	41
14:00	0	2	12	**53**	149	98	27	1	0	0	0	0	0	342	38	42
15:00	0	**6**	**16**	45	174	187	26	3	0	0	0	0	0	457	38	41
16:00	0	2	8	49	205	198	34	3	0	0	0	0	0	499	39	41
17:00	0	2	6	50	**211**	**219**	**35**	2	0	0	0	0	0	**525**	39	41
18:00	0	1	9	22	148	142	19	3	0	0	0	0	0	344	38	41
19:00	0	0	1	17	98	86	19	2	0	0	0	0	0	223	39	42
20:00	0	2	6	13	74	74	12	2	0	0	0	0	0	183	39	42
21:00	0	2	8	15	47	51	12	2	0	0	0	0	0	137	39	42
22:00	0	0	2	12	36	36	7	1	0	0	0	0	0	94	39	42
23:00	0	3	6	12	26	20	2	1	0	0	0	0	0	70	38	39
Total	0	23	98	367	1451	1276	220	26	0	0	0	0	0	3461		
Percent	0.0%	0.7%	2.8%	10.6%	41.9%	36.9%	6.4%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak Vol.																
PM Peak Vol.		15:00 6	15:00 16	14:00 53	17:00 211	17:00 219	17:00 35	13:00 4						17:00 525		

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Bethlehem Pike approximately 100 feet
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Northbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/18/16	0	2	4	6	28	14	4	0	0	0	0	0	0	58	38	41
01:00	0	0	0	13	11	6	2	0	0	0	0	0	0	32	37	41
02:00	0	2	7	4	9	6	2	0	0	0	0	0	0	30	37	41
03:00	0	2	6	9	12	6	2	0	0	0	0	0	0	37	37	40
04:00	0	1	6	15	21	14	6	0	0	0	0	0	0	63	38	42
05:00	0	3	6	21	63	27	7	1	0	0	0	0	0	128	37	41
06:00	0	4	6	38	120	83	17	1	0	0	0	0	0	269	38	41
07:00	0	3	4	41	**138**	**103**	20	**3**	0	0	0	0	0	**312**	38	41
08:00	0	4	16	**56**	135	81	16	1	0	0	0	0	0	309	38	40
09:00	0	0	15	42	104	86	**22**	1	0	0	0	0	0	270	38	42
10:00	0	5	**23**	38	85	60	10	0	0	0	0	0	0	221	38	39
11:00	0	**20**	19	54	88	69	18	1	0	0	0	0	0	269	38	41
12 PM	0	4	21	**62**	122	66	11	3	0	0	0	0	0	289	37	39
13:00	0	4	12	50	134	98	15	1	0	0	0	0	0	314	38	40
14:00	0	2	**22**	51	136	118	25	**6**	0	0	0	0	0	360	39	42
15:00	0	5	13	62	188	172	23	1	0	0	0	0	0	464	38	40
16:00	0	**8**	16	43	**232**	181	18	1	0	0	0	0	0	**499**	38	39
17:00	0	2	7	39	202	**187**	**36**	1	0	0	0	0	0	474	39	41
18:00	0	0	4	26	163	150	19	1	0	0	0	0	0	363	38	40
19:00	0	1	7	29	100	88	12	0	0	0	0	0	0	237	38	40
20:00	0	1	2	15	90	65	16	2	0	0	0	0	0	191	39	42
21:00	0	0	2	14	65	74	14	0	0	0	0	0	0	169	39	41
22:00	0	1	3	13	53	44	11	1	0	0	0	0	0	126	39	42
23:00	0	0	4	15	36	25	7	0	0	0	0	0	0	87	38	41
Total	0	74	225	756	2335	1823	333	25	0	0	0	0	0	5571		
Percent	0.0%	1.3%	4.0%	13.6%	41.9%	32.7%	6.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		11:00	10:00	08:00	07:00	07:00	09:00	07:00						07:00		
Vol.		20	23	56	138	103	22	3						312		
PM Peak		16:00	14:00	12:00	16:00	17:00	17:00	14:00						16:00		
Vol.		8	22	62	232	187	36	6						499		

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Bethlehem Pike approximately 100 feet
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Northbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/19/16	0	1	2	9	32	14	2	0	0	0	0	0	0	60	37	39
01:00	0	0	4	11	15	12	0	0	0	0	0	0	0	42	37	39
02:00	0	0	7	8	15	9	2	0	0	0	0	0	0	41	37	39
03:00	0	2	5	11	11	4	2	1	0	0	0	0	0	36	37	43
04:00	0	2	10	15	16	17	6	0	0	0	0	0	0	66	38	42
05:00	0	3	6	21	57	39	8	0	0	0	0	0	0	134	38	40
06:00	0	1	1	40	122	91	13	1	0	0	0	0	0	269	38	40
07:00	0	3	10	39	**127**	**113**	**29**	**5**	0	0	0	0	0	**326**	39	43
08:00	0	1	**19**	48	96	98	27	4	0	0	0	0	0	293	39	43
09:00	0	2	16	32	121	78	15	3	0	0	0	0	0	267	38	41
10:00	0	0	16	42	99	66	15	0	0	0	0	0	0	238	38	41
11:00	0	**4**	17	**52**	120	80	16	2	0	0	0	0	0	291	38	41
12 PM	0	**5**	**20**	**62**	**122**	**89**	**20**	**5**	0	0	0	0	0	**323**	38	42
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	0	24	133	390	953	710	155	21	0	0	0	0	0	2386		
Percent	0.0%	1.0%	5.6%	16.3%	39.9%	29.8%	6.5%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		11:00	08:00	11:00	07:00	07:00	07:00	07:00						07:00		
Vol.		4	19	52	127	113	29	5						326		
PM Peak		12:00	12:00	12:00	12:00	12:00	12:00	12:00						12:00		
Vol.		5	20	62	122	89	20	5						323		
Grand Total	0	121	456	1513	4739	3809	708	72	0	0	0	0	0	11418		
Percent	0.0%	1.1%	4.0%	13.3%	41.5%	33.4%	6.2%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 28 MPH
50th Percentile : 33 MPH
85th Percentile : 38 MPH
95th Percentile : 41 MPH

Statistics

10 MPH Pace Speed : 31-40 MPH
Number in Pace : 8548
Percent in Pace : 74.9%
Number of Vehicles > 55 MPH : 0
Percent of Vehicles > 55 MPH : 0.0%

McMahon Associates Inc.

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Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
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Bethlehem Pike approximately 100 feet
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Latitude: 0' 0.0000 Undefined

Southbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/17/16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	0	1	**10**	47	116	77	13	**3**	0	0	0	0	0	267	38	41
13:00	0	2	10	47	110	65	18	3	0	0	0	0	0	255	38	42
14:00	0	7	6	47	100	83	13	2	0	0	0	0	0	258	38	40
15:00	0	2	4	**49**	138	117	21	1	0	0	0	0	0	332	38	41
16:00	0	**13**	7	47	145	112	**24**	1	0	0	0	0	0	349	38	41
17:00	0	0	4	36	**167**	**130**	17	0	0	0	0	0	0	**354**	38	39
18:00	0	0	5	22	108	111	16	0	0	0	0	0	0	262	38	40
19:00	0	0	3	18	79	65	17	0	0	0	0	0	0	182	39	42
20:00	0	0	2	18	57	77	15	2	0	0	0	0	0	171	39	42
21:00	0	4	7	11	36	37	10	3	0	0	0	0	0	108	39	43
22:00	0	0	0	6	39	24	5	0	0	0	0	0	0	74	38	41
23:00	0	0	3	9	28	19	5	0	0	0	0	0	0	64	38	41
Total	0	29	61	357	1123	917	174	15	0	0	0	0	0	2676		
Percent	0.0%	1.1%	2.3%	13.3%	42.0%	34.3%	6.5%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak Vol.																
PM Peak Vol.		16:00 13	12:00 10	15:00 49	17:00 167	17:00 130	16:00 24	12:00 3						17:00 354		

McMahon Associates Inc.

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Bethlehem Pike approximately 100 feet
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Latitude: 0' 0.0000 Undefined

Southbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/18/16	0	0	0	8	12	9	1	0	0	0	0	0	0	30	38	39
01:00	0	0	1	4	9	10	5	0	0	0	0	0	0	29	40	43
02:00	0	0	0	8	9	14	4	1	0	0	0	0	0	36	39	44
03:00	0	0	2	9	21	19	6	0	0	0	0	0	0	57	39	42
04:00	0	0	1	17	38	29	6	1	0	0	0	0	0	92	38	41
05:00	0	2	9	30	89	62	9	1	0	0	0	0	0	202	38	39
06:00	0	1	9	40	130	96	18	0	0	0	0	0	0	294	38	40
07:00	0	2	3	56	**181**	**155**	**38**	**4**	0	0	0	0	0	**439**	39	42
08:00	0	7	**25**	**68**	110	90	18	1	0	0	0	0	0	319	38	40
09:00	0	5	8	33	109	69	20	1	0	0	0	0	0	245	38	42
10:00	0	7	13	51	97	67	11	2	0	0	0	0	0	248	38	40
11:00	0	**12**	23	56	124	74	11	1	0	0	0	0	0	301	37	39
12 PM	0	10	18	**66**	143	75	11	0	0	0	0	0	0	323	37	39
13:00	0	8	16	46	83	78	19	0	0	0	0	0	0	250	38	41
14:00	0	**13**	**19**	61	98	85	17	2	0	0	0	0	0	295	38	41
15:00	0	4	14	43	127	100	**23**	2	0	0	0	0	0	313	38	42
16:00	0	6	14	54	153	102	13	**6**	0	0	0	0	0	348	38	40
17:00	0	0	6	45	**183**	**121**	13	2	0	0	0	0	0	**370**	38	39
18:00	0	0	3	24	126	93	15	0	0	0	0	0	0	261	38	40
19:00	0	1	5	15	92	81	15	1	0	0	0	0	0	210	39	41
20:00	0	3	4	28	80	63	7	1	0	0	0	0	0	186	38	39
21:00	0	0	2	16	49	39	8	1	0	0	0	0	0	115	38	42
22:00	0	0	4	11	55	34	8	0	0	0	0	0	0	112	38	41
23:00	0	0	0	6	34	23	10	0	0	0	0	0	0	73	39	43
Total	0	81	199	795	2152	1588	306	27	0	0	0	0	0	5148		
Percent	0.0%	1.6%	3.9%	15.4%	41.8%	30.8%	5.9%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		11:00	08:00	08:00	07:00	07:00	07:00	07:00						07:00		
Vol.		12	25	68	181	155	38	4						439		
PM Peak		14:00	14:00	12:00	17:00	17:00	15:00	16:00						17:00		
Vol.		13	19	66	183	121	23	6						370		

McMahon Associates Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Upper Dublin Township
Comments: None
Weather: Clear
ATR # / Operator: NDB

Site Code: 00000000000000000000
Station ID: 00000000000000000000
Bethlehem Pike approximately 100 feet
north of Mattison Avenue
Latitude: 0' 0.0000 Undefined

Southbound

Start Time	0 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	Total	85th Percent	95th Percent
08/19/16	0	1	2	6	12	5	1	0	0	0	0	0	0	27	36	39
01:00	0	2	0	6	14	8	0	1	0	0	0	0	0	31	37	39
02:00	0	0	0	10	13	11	3	0	0	0	0	0	0	37	38	41
03:00	0	0	3	8	15	17	4	0	0	0	0	0	0	47	39	42
04:00	0	0	5	16	35	27	7	0	0	0	0	0	0	90	38	41
05:00	0	1	8	14	89	78	13	2	0	0	0	0	0	205	38	41
06:00	0	1	8	31	149	119	20	2	0	0	0	0	0	330	38	41
07:00	0	1	14	49	**186**	**150**	30	**8**	0	0	0	0	0	**438**	39	42
08:00	0	**4**	**25**	49	98	130	**43**	6	0	0	0	0	0	355	39	43
09:00	0	2	15	52	90	71	11	1	0	0	0	0	0	242	38	39
10:00	0	4	9	30	85	81	17	2	0	0	0	0	0	228	39	42
11:00	0	2	6	**58**	129	92	14	0	0	0	0	0	0	301	38	39
12 PM	0	**3**	**19**	**58**	**127**	**79**	**13**	**4**	0	0	0	0	0	**303**	38	40
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	0	21	114	387	1042	868	176	26	0	0	0	0	0	2634		
Percent	0.0%	0.8%	4.3%	14.7%	39.6%	33.0%	6.7%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		08:00	08:00	11:00	07:00	07:00	08:00	07:00						07:00		
Vol.		4	25	58	186	150	43	8						438		
PM Peak		12:00	12:00	12:00	12:00	12:00	12:00	12:00						12:00		
Vol.		3	19	58	127	79	13	4						303		
Grand Total	0	131	374	1539	4317	3373	656	68	0	0	0	0	0	10458		
Percent	0.0%	1.3%	3.6%	14.7%	41.3%	32.3%	6.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%			

15th Percentile :	28 MPH
50th Percentile :	33 MPH
85th Percentile :	38 MPH
95th Percentile :	41 MPH

Statistics

10 MPH Pace Speed :	31-40 MPH
Number in Pace :	7690
Percent in Pace :	73.5%
Number of Vehicles > 55 MPH :	0
Percent of Vehicles > 55 MPH :	0.0%

Existing 2016 Traffic Signal Warrants
Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Lindenwold Terrace

Traffic Signal Warrant Analysis Workbook

STUDY AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/29/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Agency/Company Name:	McMahon

Analysis Information

Data Collection Date:	3/31/2016
Day of the Week:	Thursday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Bethlehem Pike (S.R. 2018)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	1	LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street:	38	MPH

Minor Street Information

Minor Street Name and Route Number:	Lindenwold Avenue/Lindenwold Terrace
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	W-Bound

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	Yes	No
Warrant 3, Peak Hour	Yes	No
Warrant 4, Pedestrian Volume	No	N/A
Warrant 5, School Crossing	No	N/A
Warrant 6, Coordinated Signal System	No	N/A
Warrant 7, Crash Experience	No	N/A
Warrant 8, Roadway Network	No	N/A
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	No	N/A
Warrant PA-2, Midblock and Trail Crossings	No	N/A

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM			0		
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM	385	495	880	48	31
8:00 AM	8:14 AM			0		
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM	432	454	886	62	37
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM			0		
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM			0		
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM			0		
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM	556	498	1054	101	35
5:00 PM	5:14 PM			0		
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM	618	527	1145	127	39
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
Approach Totals:		1991	1974	3965	338	142

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

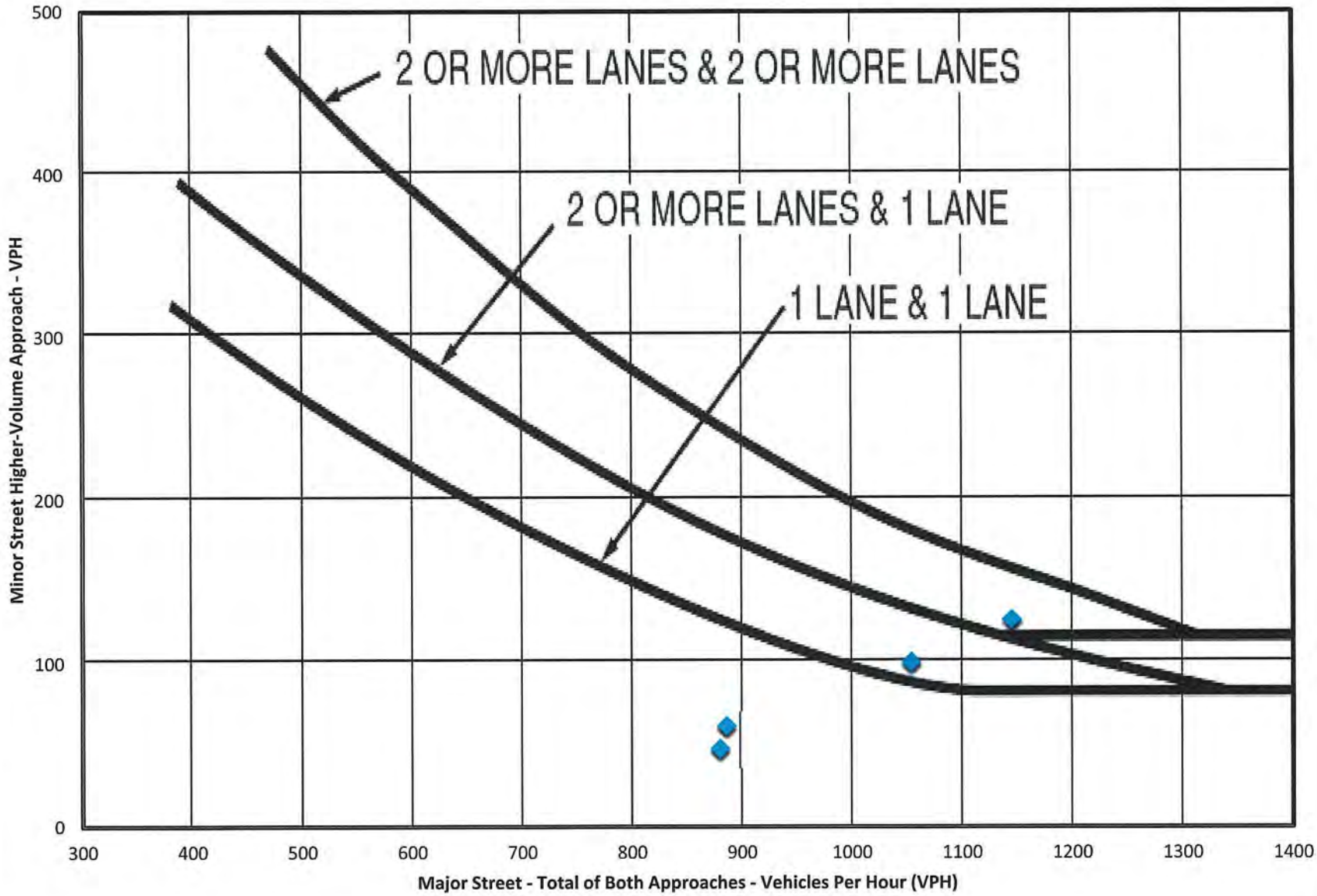
Total Number of Unique Hours Met On Figure 4C-1
2

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	880	48	
7:15 AM	880	48	
7:30 AM	880	48	
7:45 AM	880	48	
8:00 AM	886	62	
8:15 AM	886	62	
8:30 AM	886	62	
8:45 AM	886	62	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1054	101	Met
4:15 PM	1054	101	Met
4:30 PM	1054	101	Met
4:45 PM	1054	101	Met
5:00 PM	1145	127	Met
5:15 PM	1145	127	Met
5:30 PM	1145	127	Met
5:45 PM	1145	127	Met
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

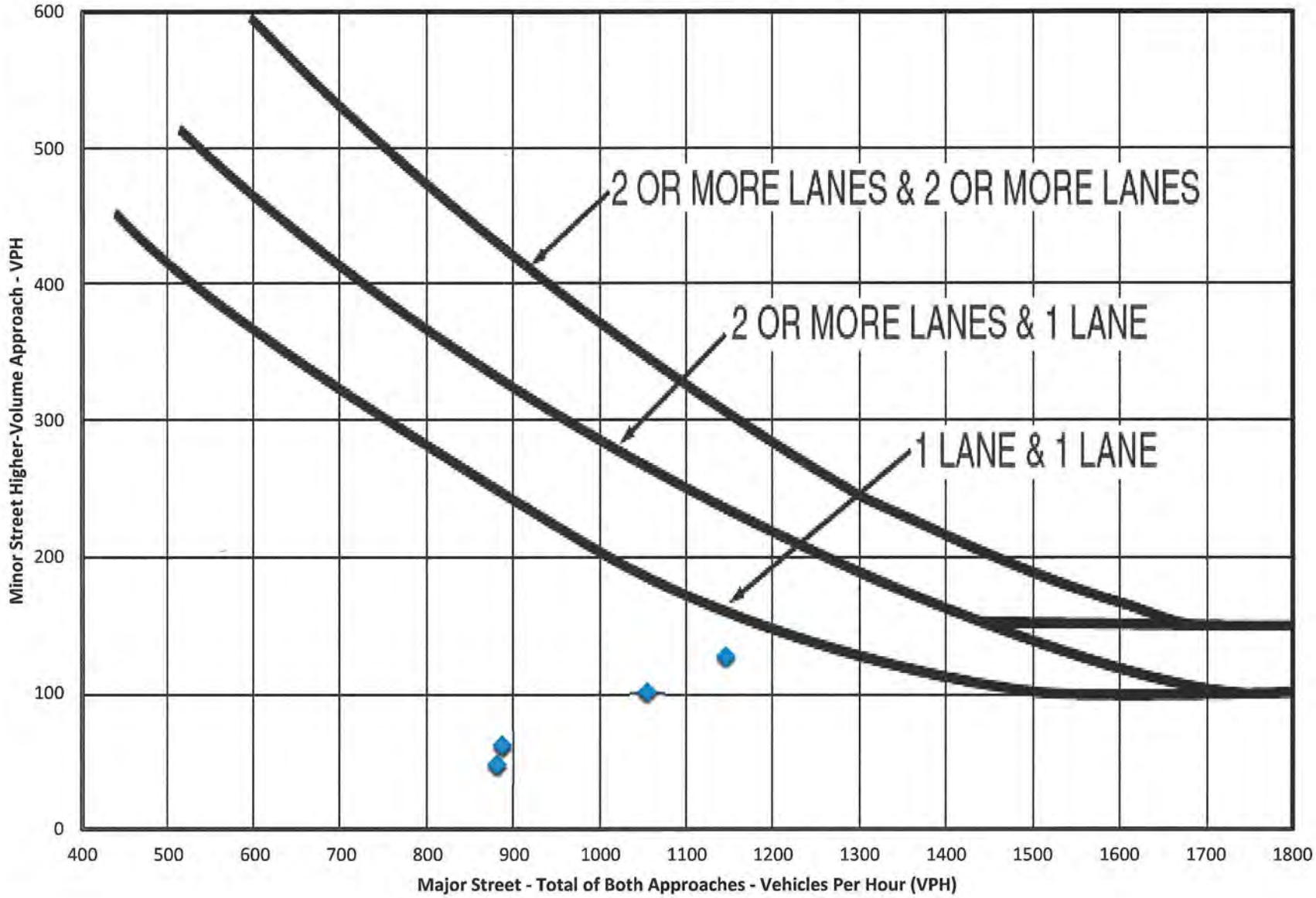
Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	N/A
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	Yes
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
0

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	880	48	
7:15 AM	880	48	
7:30 AM	880	48	
7:45 AM	880	48	
8:00 AM	886	62	
8:15 AM	886	62	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
8:30 AM	886	62	
8:45 AM	886	62	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1054	101	
4:15 PM	1054	101	
4:30 PM	1054	101	
4:45 PM	1054	101	
5:00 PM	1145	127	
5:15 PM	1145	127	
5:30 PM	1145	127	
5:45 PM	1145	127	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-3. Warrant 3, Peak Hour



Future 2023 Traffic Signal Warrants
Bethlehem Pike (S.R. 2018) and Lindenwold Avenue/Lindenwold Terrace

Traffic Signal Warrant Analysis Workbook

10/3/2016

STUDY AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/29/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Agency/Company Name:	McMahon

Analysis Information

Data Collection Date:	3/31/2016
Day of the Week:	Thursday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Bethlehem Pike (S.R. 2018)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	1	LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street:	38	MPH

Minor Street Information

Minor Street Name and Route Number:	Lindenwold Avenue/Lindenwold Terrace
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	W-Bound

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	Yes	No
Warrant 3, Peak Hour	Yes	No
Warrant 4, Pedestrian Volume	No	N/A
Warrant 5, School Crossing	No	N/A
Warrant 6, Coordinated Signal System	No	N/A
Warrant 7, Crash Experience	No	N/A
Warrant 8, Roadway Network	No	N/A
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	No	N/A
Warrant PA-2, Midblock and Trail Crossings	No	N/A

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM			0		
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM	431	528	959	51	32
8:00 AM	8:14 AM			0		
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM	488	487	975	66	39
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM			0		
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM			0		
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM			0		
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM	600	545	1145	106	37
5:00 PM	5:14 PM			0		
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM	669	578	1247	139	40
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		2188	2138	4326	362	148

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

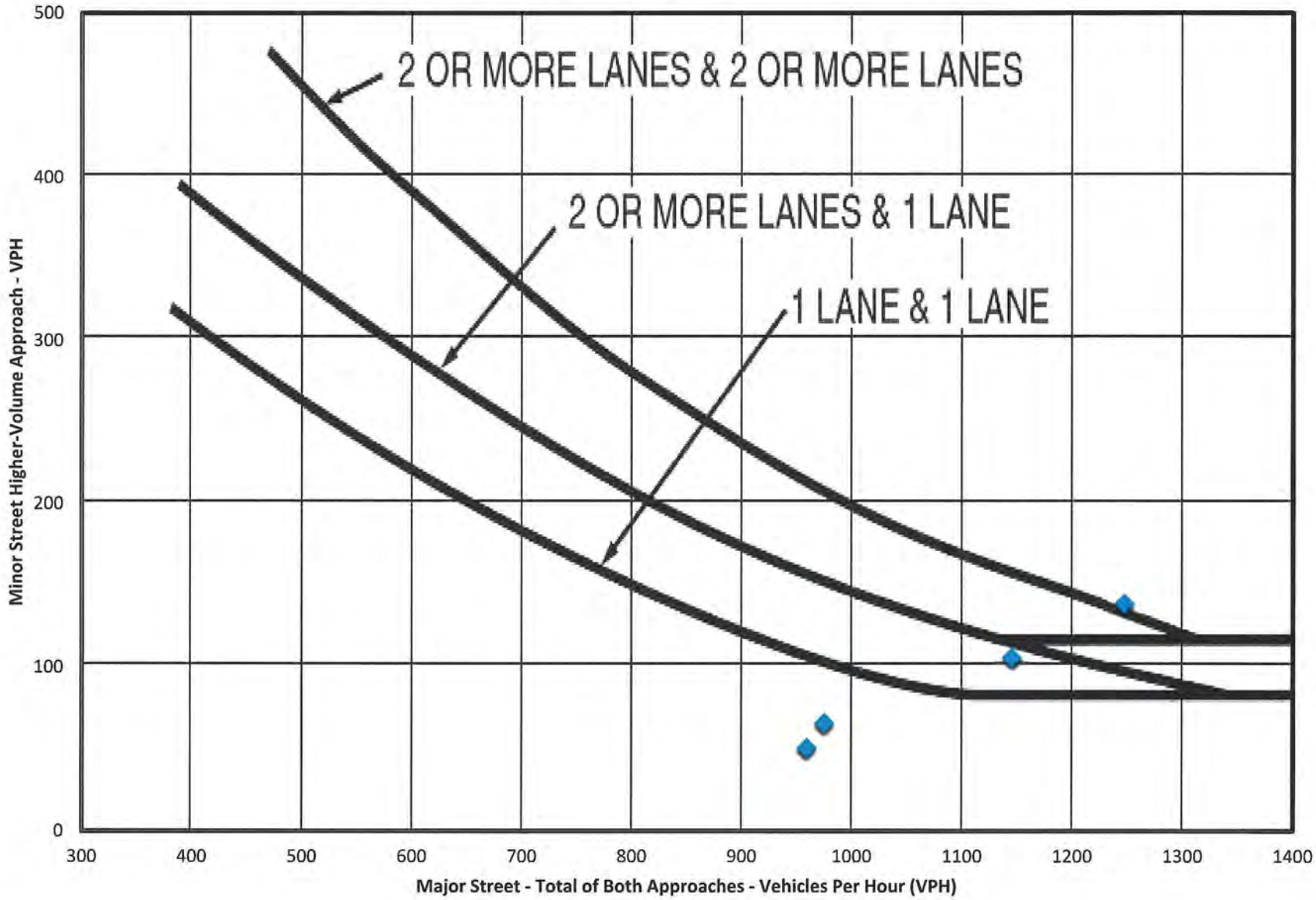
Total Number of Unique Hours Met On Figure 4C-1
2

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	959	51	
7:15 AM	959	51	
7:30 AM	959	51	
7:45 AM	959	51	
8:00 AM	975	66	
8:15 AM	975	66	
8:30 AM	975	66	
8:45 AM	975	66	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1145	106	Met
4:15 PM	1145	106	Met
4:30 PM	1145	106	Met
4:45 PM	1145	106	Met
5:00 PM	1247	139	Met
5:15 PM	1247	139	Met
5:30 PM	1247	139	Met
5:45 PM	1247	139	Met
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

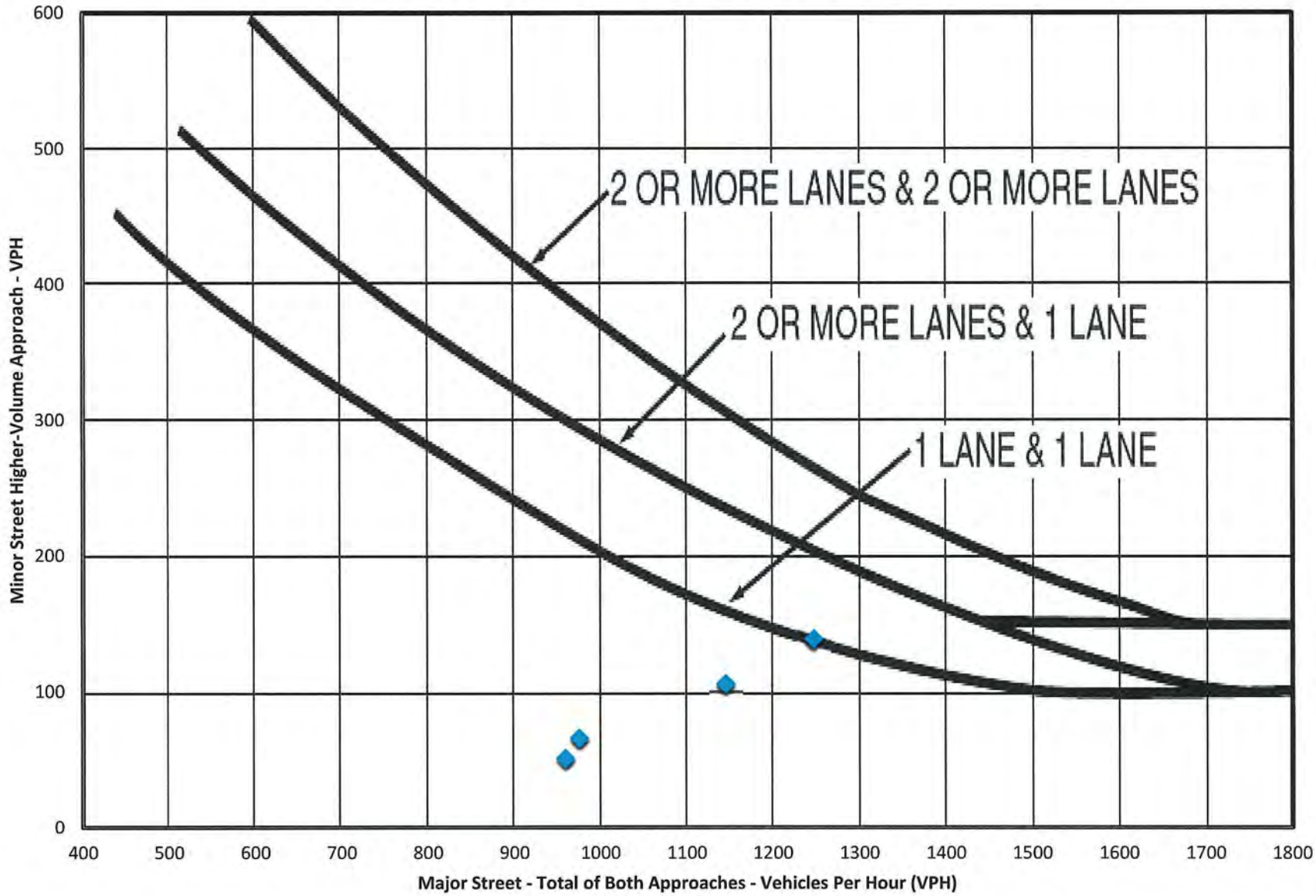
Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	N/A
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	Yes
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
0

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	959	51	
7:15 AM	959	51	
7:30 AM	959	51	
7:45 AM	959	51	
8:00 AM	975	66	
8:15 AM	975	66	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
8:30 AM	975	66	
8:45 AM	975	66	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1145	106	
4:15 PM	1145	106	
4:30 PM	1145	106	
4:45 PM	1145	106	
5:00 PM	1247	139	
5:15 PM	1247	139	
5:30 PM	1247	139	
5:45 PM	1247	139	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-3. Warrant 3, Peak Hour



Future 2023 Traffic Signal Warrants
Bethlehem Pike (S.R. 2018) and
Mattison Avenue/Proposed Site Access

Traffic Signal Warrant Analysis Workbook

10/3/2016

STUDY AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/29/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Agency/Company Name:	McMahon

Analysis Information

Data Collection Date:	3/5/2014
Day of the Week:	Wednesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Bethlehem Pike (S.R. 2018)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	1	LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street:	38	MPH

Minor Street Information

Minor Street Name and Route Number:	Mattison Avenue/Proposed Site Access
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	W-Bound

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	Yes	No
Warrant 3, Peak Hour	Yes	No
Warrant 4, Pedestrian Volume	No	N/A
Warrant 5, School Crossing	No	N/A
Warrant 6, Coordinated Signal System	No	N/A
Warrant 7, Crash Experience	No	N/A
Warrant 8, Roadway Network	No	N/A
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	No	N/A
Warrant PA-2, Midblock and Trail Crossings	No	N/A

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM			0		
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM	447	730	1177	43	83
8:00 AM	8:14 AM			0		
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM	515	652	1167	45	75
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM			0		
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM			0		
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM			0		
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM	672	531	1203	23	47
5:00 PM	5:14 PM			0		
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM	714	586	1300	32	52
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		2348	2499	4847	143	257

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

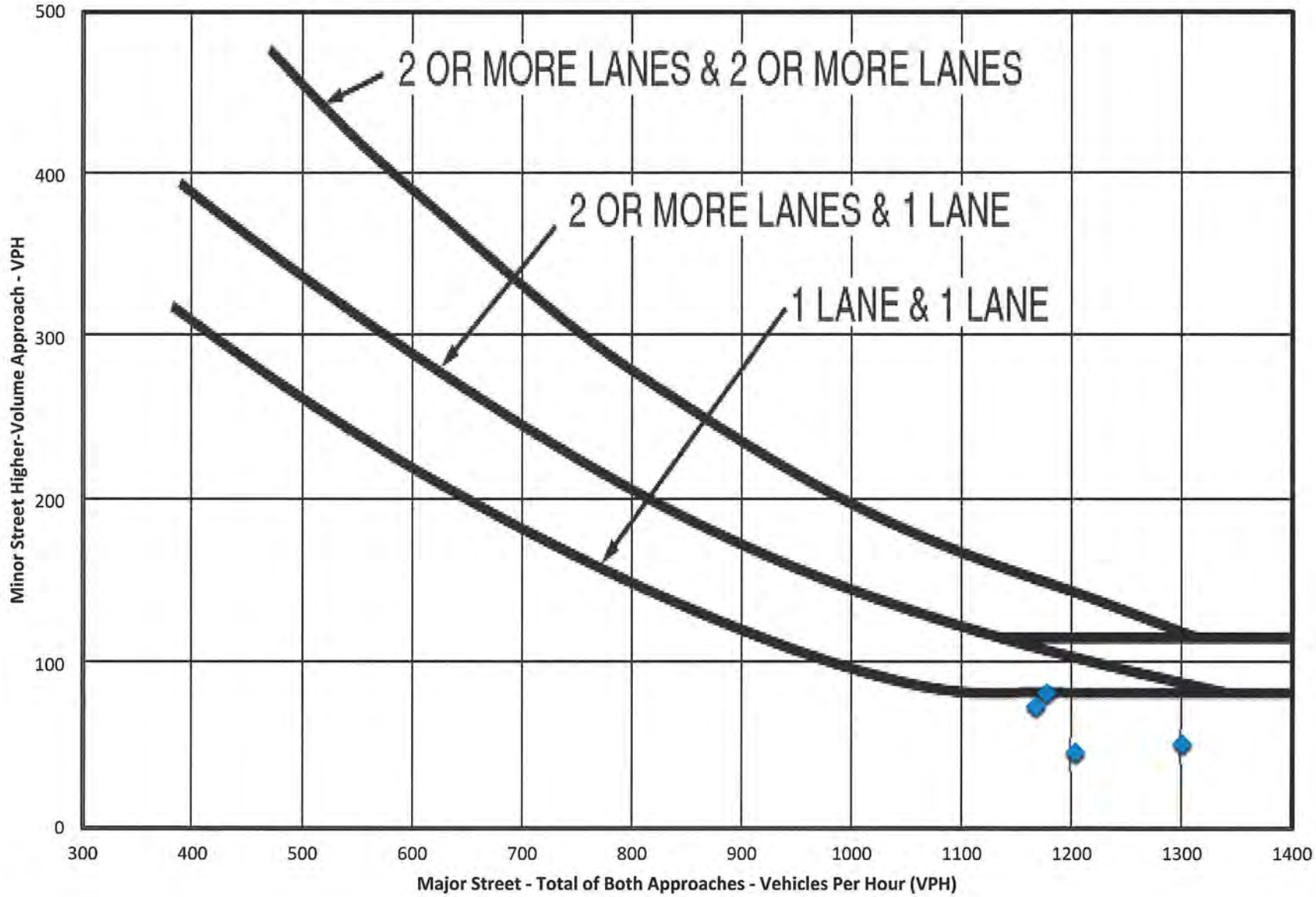
Total Number of Unique Hours Met On Figure 4C-1
1

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	1177	83	Met
7:15 AM	1177	83	Met
7:30 AM	1177	83	Met
7:45 AM	1177	83	Met
8:00 AM	1167	75	
8:15 AM	1167	75	
8:30 AM	1167	75	
8:45 AM	1167	75	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1203	47	
4:15 PM	1203	47	
4:30 PM	1203	47	
4:45 PM	1203	47	
5:00 PM	1300	52	
5:15 PM	1300	52	
5:30 PM	1300	52	
5:45 PM	1300	52	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

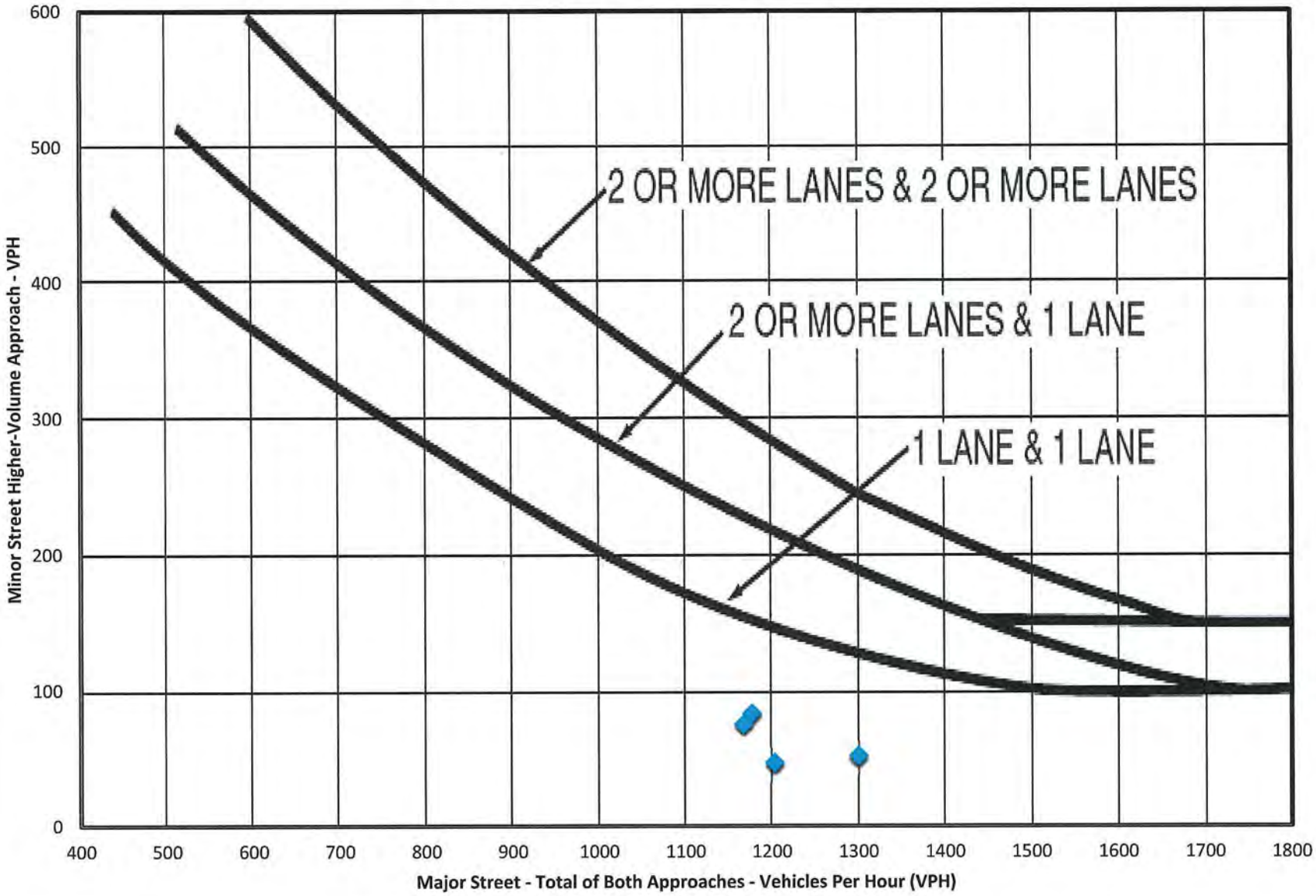
Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	N/A
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	Yes
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
0

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	0	0	
6:30 AM	0	0	
6:45 AM	0	0	
7:00 AM	1177	83	
7:15 AM	1177	83	
7:30 AM	1177	83	
7:45 AM	1177	83	
8:00 AM	1167	75	
8:15 AM	1167	75	

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
8:30 AM	1167	75	
8:45 AM	1167	75	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
11:30 AM	0	0	
11:45 AM	0	0	
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	0	0	
3:30 PM	0	0	
3:45 PM	0	0	
4:00 PM	1203	47	
4:15 PM	1203	47	
4:30 PM	1203	47	
4:45 PM	1203	47	
5:00 PM	1300	52	
5:15 PM	1300	52	
5:30 PM	1300	52	
5:45 PM	1300	52	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-3. Warrant 3, Peak Hour



APPENDIX L

Auxiliary Turn Lane Warrant Worksheets

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/26/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Checked By:	
		Agency/Company Name:	McMahon Associates

Intersection & Approach Description: Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access - Northbound Right-turn from Bethlehem Pike (S.R. 2018) onto Proposed Site Access

Analysis Period:	2023 Build	Number of Approach Lanes:	1
Design Hour:	AM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40		Type of Analysis
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A

Advancing Volume:	N/A
Opposing Volume:	N/A
Left Turn Volume:	N/A
% Left Turns in Advancing Volume:	N/A

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	0.0%	10
	Through	-	496	6.3%	543
	Right	-	10	2.0%	11

Advancing Volume:	564
Right Turn Volume:	11

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 9**

Warrant Met?: **No**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	11
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

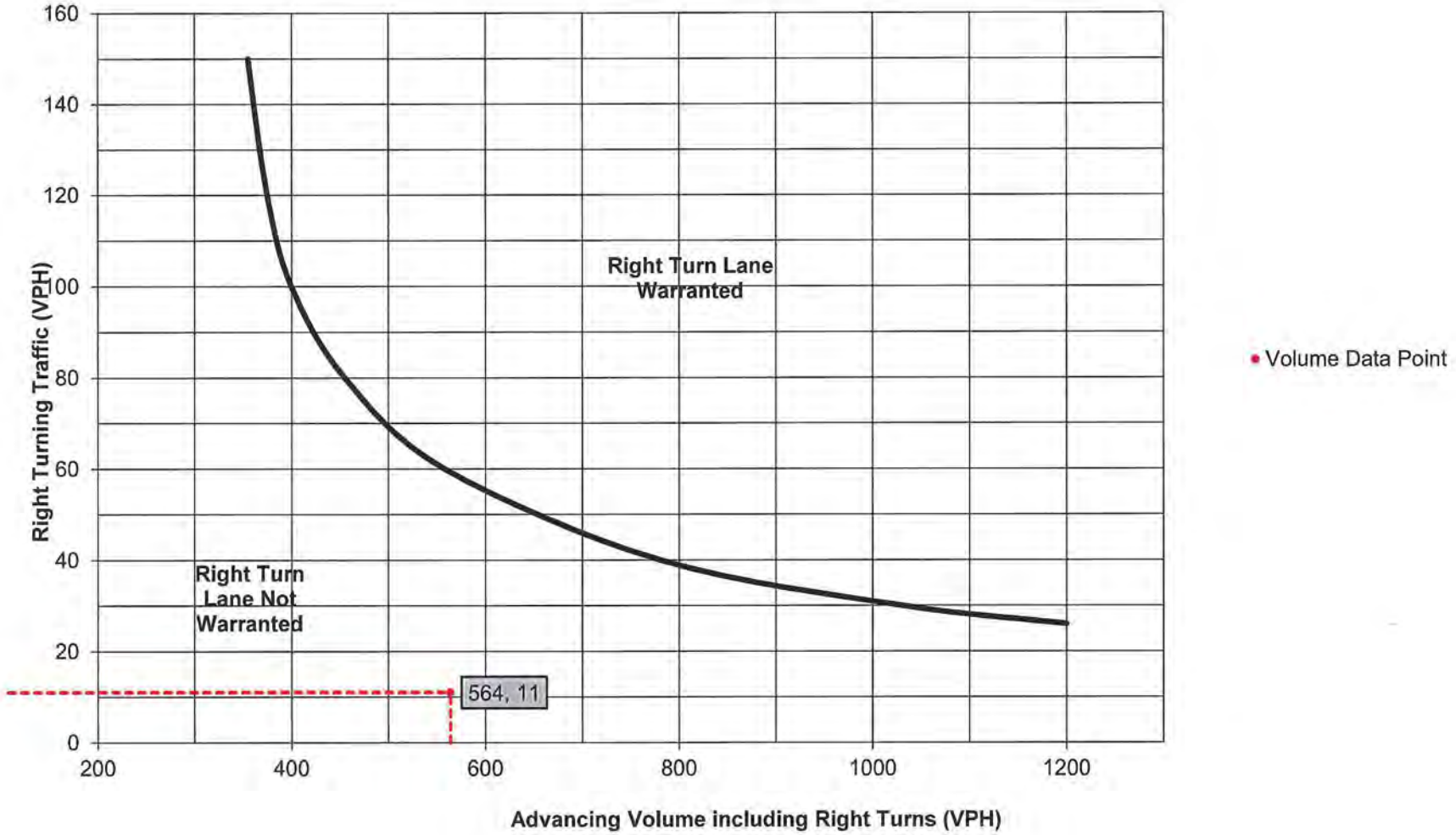
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 9. Warrant for right turn lanes on two-lane roadways (40 mph or lower speeds, unsignalized and signalized intersections)



Turn Lane Warrant and Length Analysis Workbook

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Municipality:	Upper Dublin	Analysis Date:	9/26/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Checked By:	
		Agency/Company Name:	McMahon Associates

Intersection & Approach Description: Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access - Northbound Right-turn from Bethlehem Pike (S.R. 2018) onto Proposed Site Access

Analysis Period:	2023 Build	Number of Approach Lanes:	1
Design Hour:	PM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40		Type of Analysis
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A

Advancing Volume:	N/A
Opposing Volume:	N/A
Left Turn Volume:	N/A
% Left Turns in Advancing Volume:	N/A

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	17	0.0%	17
	Through	-	663	1.3%	676
	Right	-	31	2.0%	32

Advancing Volume:	725
Right Turn Volume:	32

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 9**

Warrant Met?: **No**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	32
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

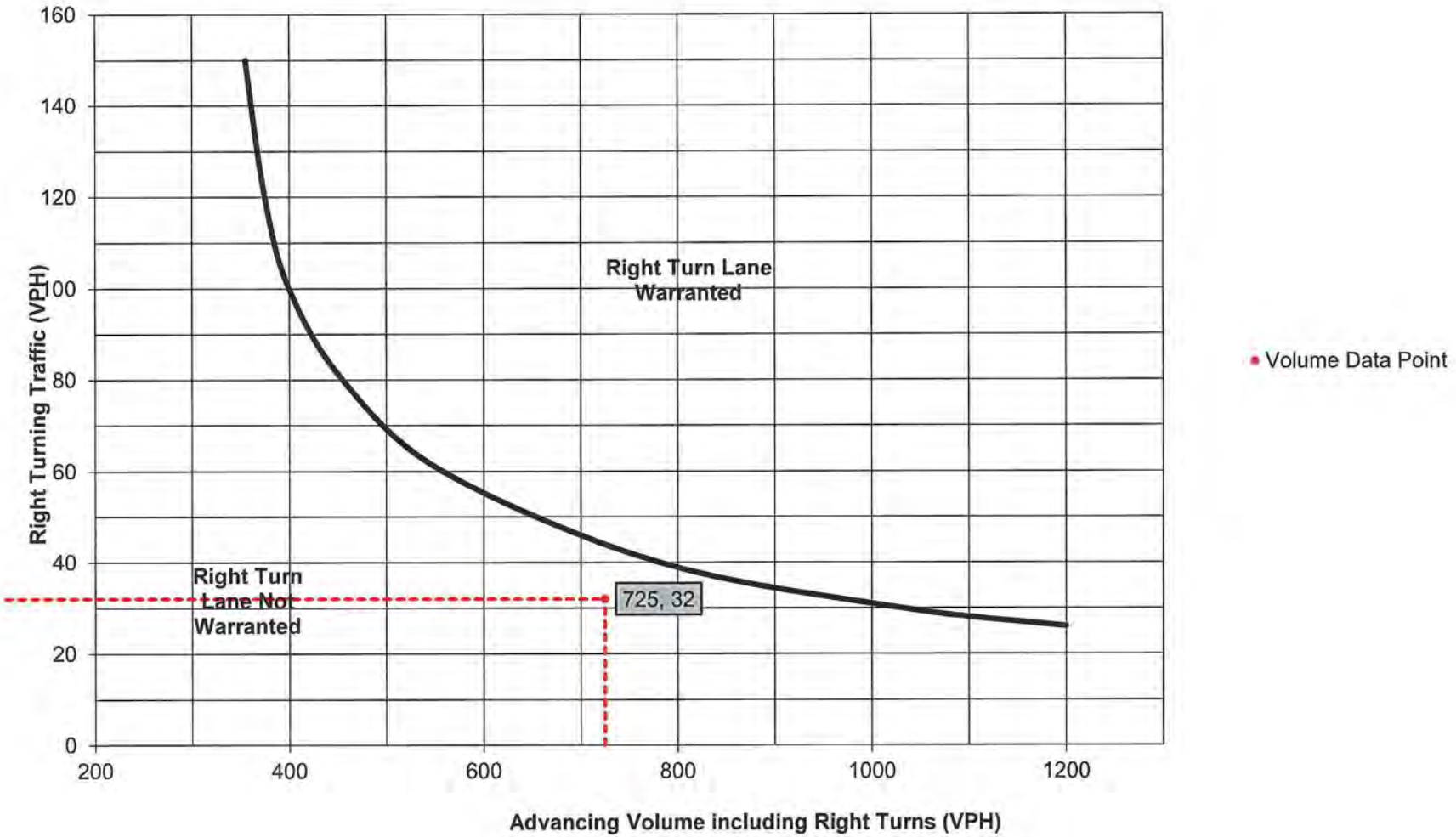
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	**N/A**	Feet
Condition B:	**N/A**	Feet
Condition C:	**N/A**	Feet
Required Right Turn Lane Storage Length:	**N/A**	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 9. Warrant for right turn lanes on two-lane roadways (40 mph or lower speeds, unsignalized and signalized intersections)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/26/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Checked By:	
		Agency/Company Name:	McMahon Associates

Intersection & Approach Description: Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access - Southbound Left-turn from Bethlehem Pike (S.R. 2018) onto Proposed Site Access

Analysis Period:	2023 Build	Number of Approach Lanes:	1
Design Hour:	AM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40		Type of Analysis
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	2.0%	11
	Through	-	712	5.1%	767
	Right	Yes	18	17.6%	23
Opposing	Left	Yes	10	0.0%	10
	Through	-	496	6.3%	543
	Right	Yes	10	2.0%	11

Advancing Volume:	801
Opposing Volume:	564
Left Turn Volume:	11
% Left Turns in Advancing Volume:	1.37%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

Advancing Volume:	N/A
Right Turn Volume:	N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 2**

Warrant Met?: **Yes**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	11
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

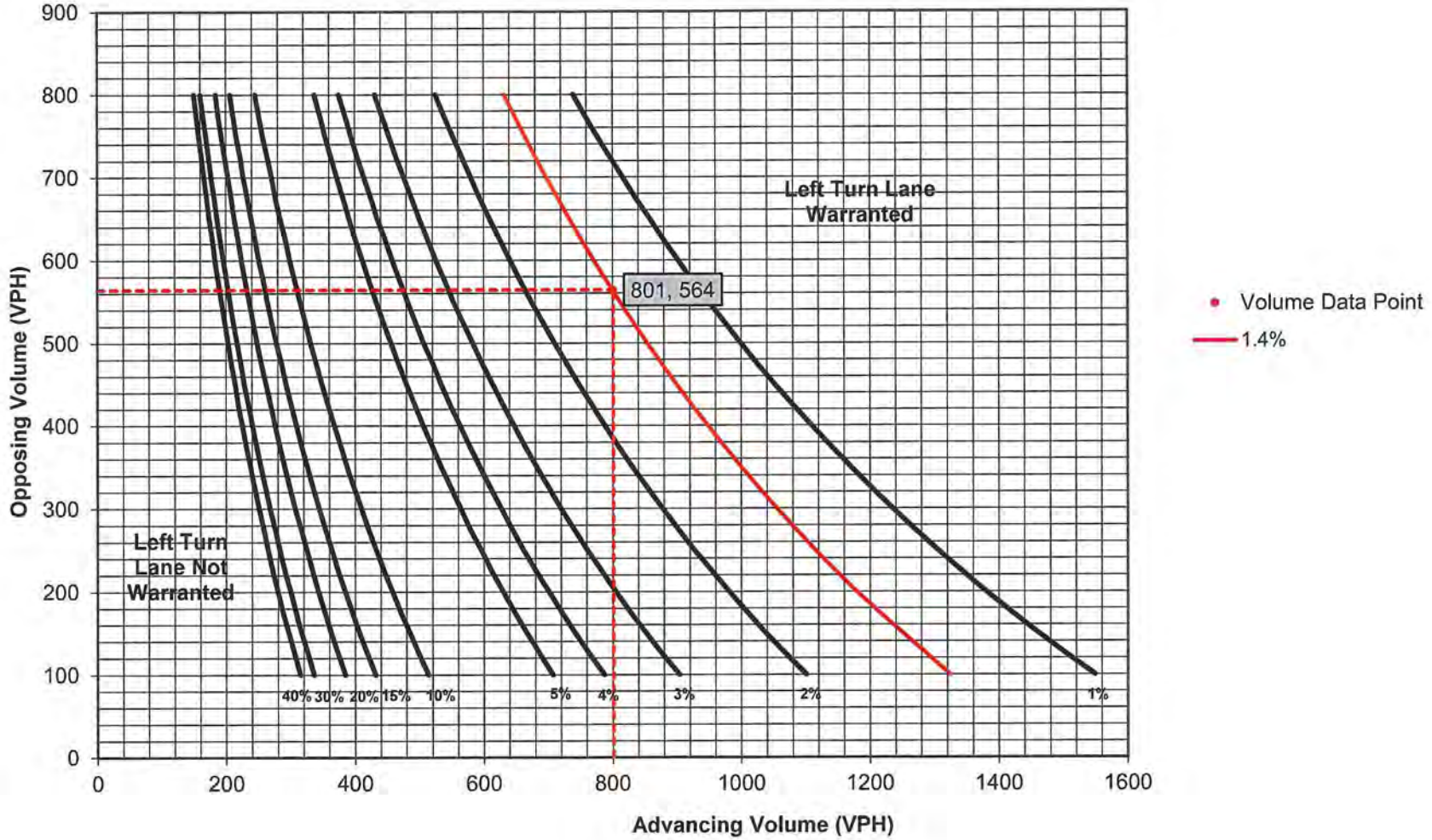
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	75	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 2. Warrant for left turn lanes on two-lane highways (40 mph speed, unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Upper Dublin	Analysis Date:	9/26/2016
County:	Montgomery County	Conducted By:	TDK
PennDOT Engineering District:	6	Checked By:	
		Agency/Company Name:	McMahon Associates

Intersection & Approach Description: Bethlehem Pike (S.R. 2018) and Mattison Avenue/Proposed Site Access - Southbound Left-turn from Bethlehem Pike (S.R. 2018) onto Proposed Site Access

Analysis Period:	2023 Build	Number of Approach Lanes:	1
Design Hour:	PM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40		Type of Analysis
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	29	2.0%	30
	Through	-	526	2.0%	542
	Right	Yes	29	7.4%	33
Opposing	Left	Yes	17	0.0%	17
	Through	-	663	6.3%	726
	Right	Yes	31	2.0%	32

Advancing Volume:	605
Opposing Volume:	775
Left Turn Volume:	30
% Left Turns in Advancing Volume:	4.96%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

Advancing Volume:	N/A
Right Turn Volume:	N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 2**

Warrant Met?: **Yes**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	30
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

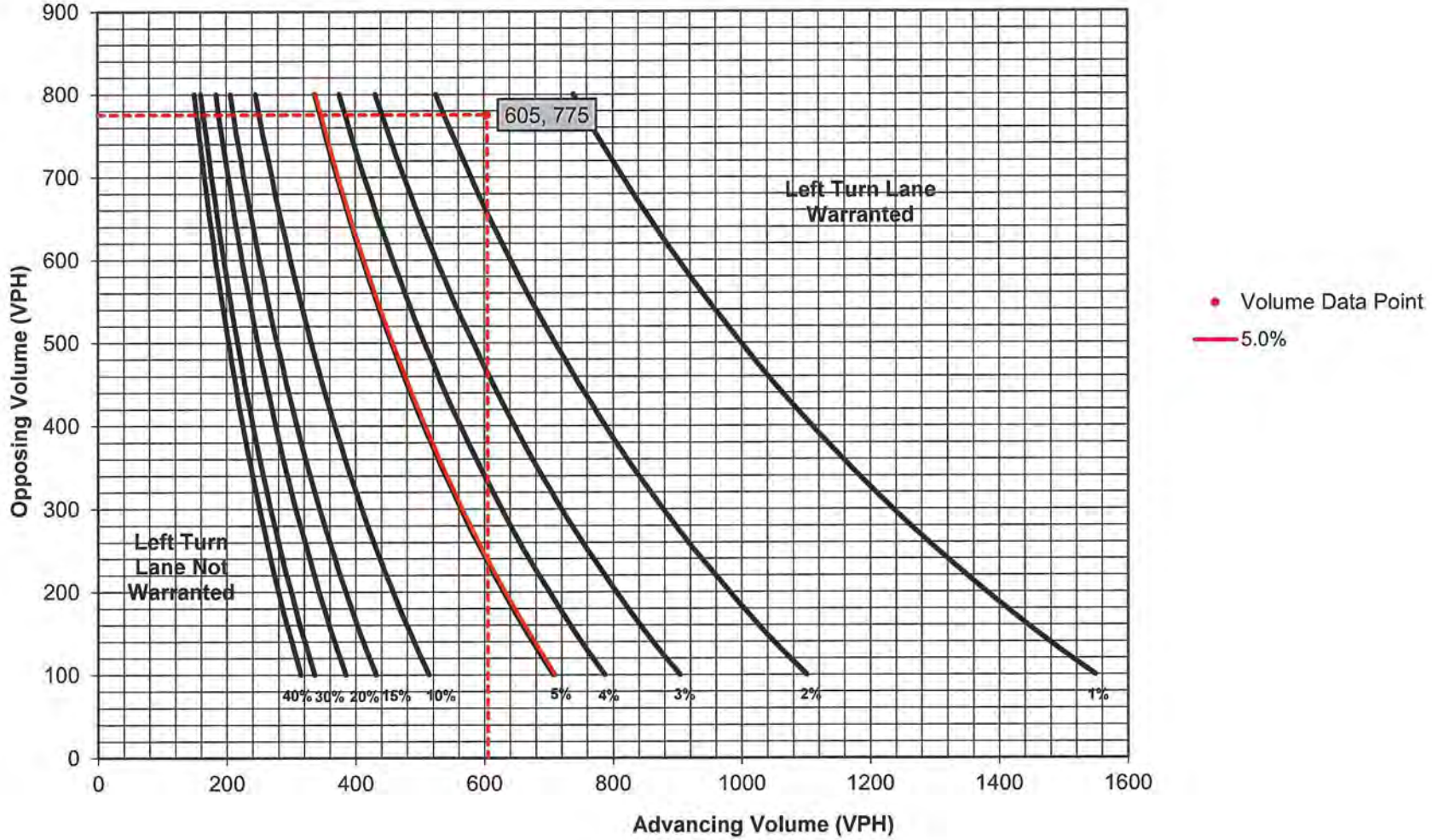
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	75	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 2. Warrant for left turn lanes on two-lane highways (40 mph speed, unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)



APPENDIX M

Roundabout Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	26	48	0	35	10	496	10	10	712	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.899			0.943			0.997			0.997	
Flt Protected		0.988			0.972			0.999			0.999	
Satd. Flow (prot)	0	1583	0	0	1618	0	0	1621	0	0	1490	0
Flt Permitted		0.988			0.972			0.999			0.999	
Satd. Flow (perm)	0	1583	0	0	1618	0	0	1621	0	0	1490	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		603			637			565			445	
Travel Time (s)		13.7			14.5			12.8			10.1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	6%	2%	2%	18%	5%
Adj. Flow (vph)	9	0	27	50	0	36	10	517	10	10	742	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	86	0	0	537	0	0	771	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	
Intersection Capacity Utilization 63.1%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	36	86	537	771
Demand Flow Rate, veh/h	36	88	568	906
Vehicles Circulating, veh/h	937	567	19	61
Vehicles Exiting, veh/h	30	20	954	594
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.6	5.9	6.9	13.9
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.973	4.973	4.973	4.973
Entry Flow, veh/h	36	88	568	906
Cap Entry Lane, veh/h	531	774	1353	1297
Entry HV Adj Factor	1.000	0.977	0.945	0.851
Flow Entry, veh/h	36	86	537	771
Cap Entry, veh/h	531	757	1279	1104
V/C Ratio	0.068	0.114	0.420	0.699
Control Delay, s/veh	7.6	5.9	6.9	13.9
LOS	A	A	A	B
95th %tile Queue, veh	0	0	2	6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	17	45	15	24	4	42	444	19	3	526	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	11	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.904			0.989			0.995			0.995	
Flt Protected		0.999			0.983			0.996				
Satd. Flow (prot)	0	1506	0	0	1720	0	0	1605	0	0	1666	0
Flt Permitted		0.999			0.983			0.996				
Satd. Flow (perm)	0	1506	0	0	1720	0	0	1605	0	0	1666	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		644			664			432			384	
Travel Time (s)		14.6			15.1			9.8			8.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	20%	0%	10%	0%	4%	0%	13%	6%	0%	0%	5%	4%
Adj. Flow (vph)	1	19	50	17	27	4	47	493	21	3	584	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	70	0	0	48	0	0	561	0	0	611	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
Control Type: Roundabout
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	70	48	561	611
Demand Flow Rate, veh/h	75	49	597	641
Vehicles Circulating, veh/h	633	577	23	98
Vehicles Exiting, veh/h	106	43	685	528
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.5	5.5	7.3	8.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.973	4.973	4.973	4.973
Entry Flow, veh/h	75	49	597	641
Cap Entry Lane, veh/h	724	766	1348	1249
Entry HV Adj Factor	0.933	0.978	0.940	0.953
Flow Entry, veh/h	70	48	561	611
Cap Entry, veh/h	676	750	1267	1190
V/C Ratio	0.104	0.064	0.443	0.513
Control Delay, s/veh	6.5	5.5	7.3	8.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	2	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	19	31	0	21	17	663	31	29	528	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	11	11	11	11	11	11
Grade (%)		2%			0%			2%			-2%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920			0.945			0.994			0.993	
Flt Protected		0.980			0.971			0.999			0.998	
Satd. Flow (prot)	0	1607	0	0	1619	0	0	1693	0	0	1703	0
Flt Permitted		0.980			0.971			0.999			0.998	
Satd. Flow (perm)	0	1607	0	0	1619	0	0	1693	0	0	1703	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		603			637			565			445	
Travel Time (s)		13.7			14.5			12.8			10.1	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	1%	2%	2%	2%	7%
Adj. Flow (vph)	13	0	19	31	0	21	17	670	31	29	533	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	0	52	0	0	718	0	0	591	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
Control Type: Roundabout
Intersection Capacity Utilization 57.7% ICU Level of Service B
Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	32	52	718	591
Demand Flow Rate, veh/h	32	53	726	605
Vehicles Circulating, veh/h	606	707	43	49
Vehicles Exiting, veh/h	48	62	595	711
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.3	6.3	8.8	7.5
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.973	4.973	4.973	4.973
Entry Flow, veh/h	32	53	726	605
Cap Entry Lane, veh/h	744	671	1321	1313
Entry HV Adj Factor	1.000	0.981	0.989	0.977
Flow Entry, veh/h	32	52	718	591
Cap Entry, veh/h	744	659	1307	1283
V/C Ratio	0.043	0.079	0.550	0.461
Control Delay, s/veh	5.3	6.3	8.8	7.5
LOS	A	A	A	A
95th %tile Queue, veh	0	0	3	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	49	66	7	27	6	68	590	9	11	514	51
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	11	11	11	11	11	11
Grade (%)		1%			-1%			2%			-2%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.980			0.998			0.988	
Flt Protected		0.991			0.992			0.995			0.999	
Satd. Flow (prot)	0	1615	0	0	1738	0	0	1687	0	0	1712	0
Flt Permitted		0.991			0.992			0.995			0.999	
Satd. Flow (perm)	0	1615	0	0	1738	0	0	1687	0	0	1712	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		730			866			512			324	
Travel Time (s)		16.6			19.7			11.6			7.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	6%	7%	0%	0%	5%	1%	0%	0%	1%	5%
Adj. Flow (vph)	25	51	69	7	28	6	71	615	9	11	535	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	41	0	0	695	0	0	599	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other
Control Type: Roundabout
Intersection Capacity Utilization 90.8% ICU Level of Service E
Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

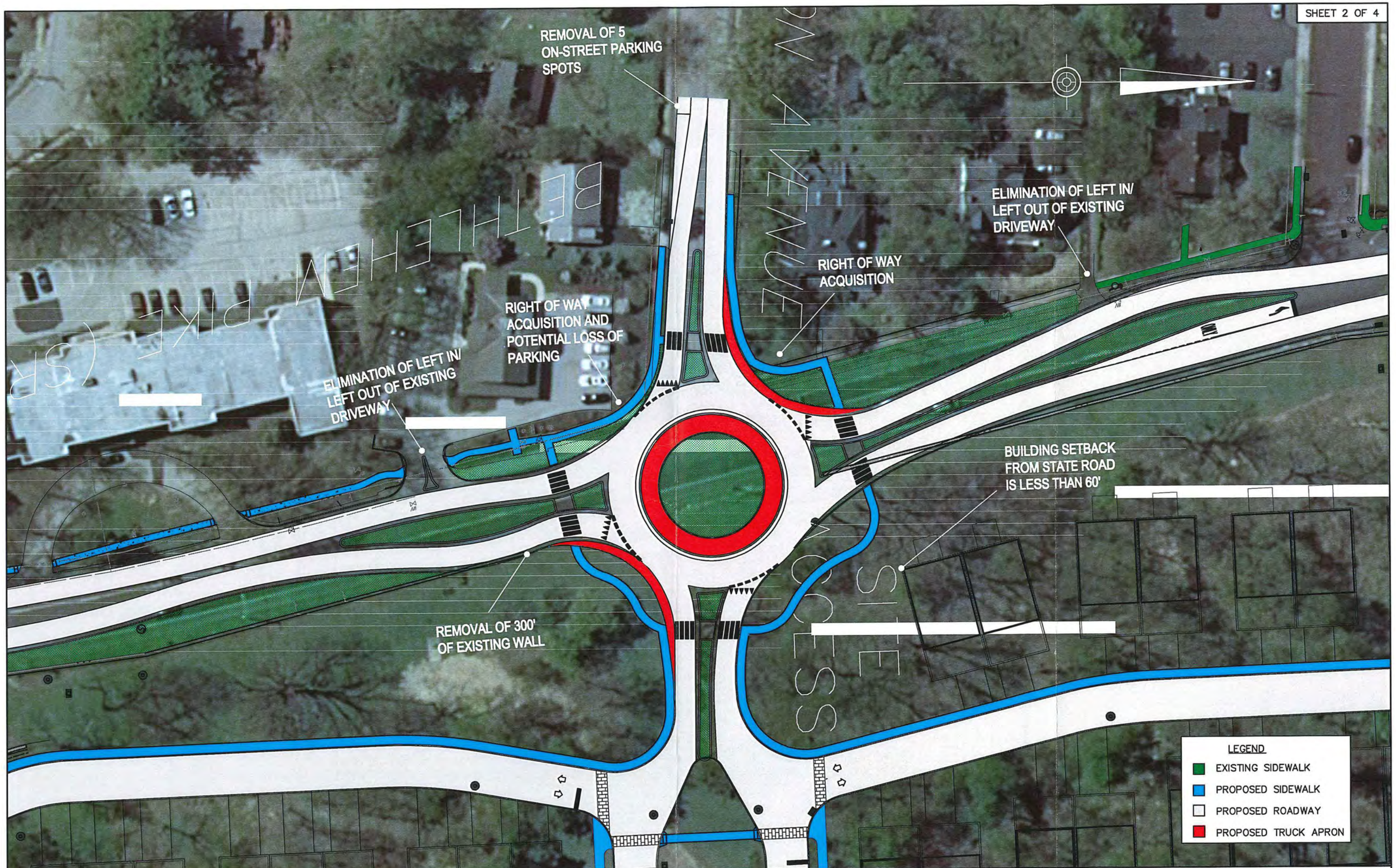
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	145	41	695	599
Demand Flow Rate, veh/h	149	41	705	607
Vehicles Circulating, veh/h	558	721	87	110
Vehicles Exiting, veh/h	159	71	620	652
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.8	6.1	9.3	8.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.973	4.973	4.973	4.973
Entry Flow, veh/h	149	41	705	607
Cap Entry Lane, veh/h	781	662	1263	1234
Entry HV Adj Factor	0.973	1.000	0.986	0.986
Flow Entry, veh/h	145	41	695	599
Cap Entry, veh/h	760	662	1245	1217
V/C Ratio	0.191	0.062	0.558	0.492
Control Delay, s/veh	6.8	6.1	9.3	8.3
LOS	A	A	A	A
95th %tile Queue, veh	1	0	4	3

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

75' 0 75'

DESIGN BY: TDK	JOB NO: 813468	LINDENWOLD RESIDENTIAL ASSOCIATES, LLC 630 SENTRY PARKWAY SUITE 300 BLUE BELL, PA 19422	PRELIMINARY CONCEPTUAL ANALYSIS BETHLEHEM PIKE (SR 2018) AND MATTISON AVENUE
DRAWN BY: TDK	DWG: CONCEPT		
CHECKED BY: KK	DATE: 5/26/16		UPPER DUBLIN TOWNSHIP MONTGOMERY COUNTY



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

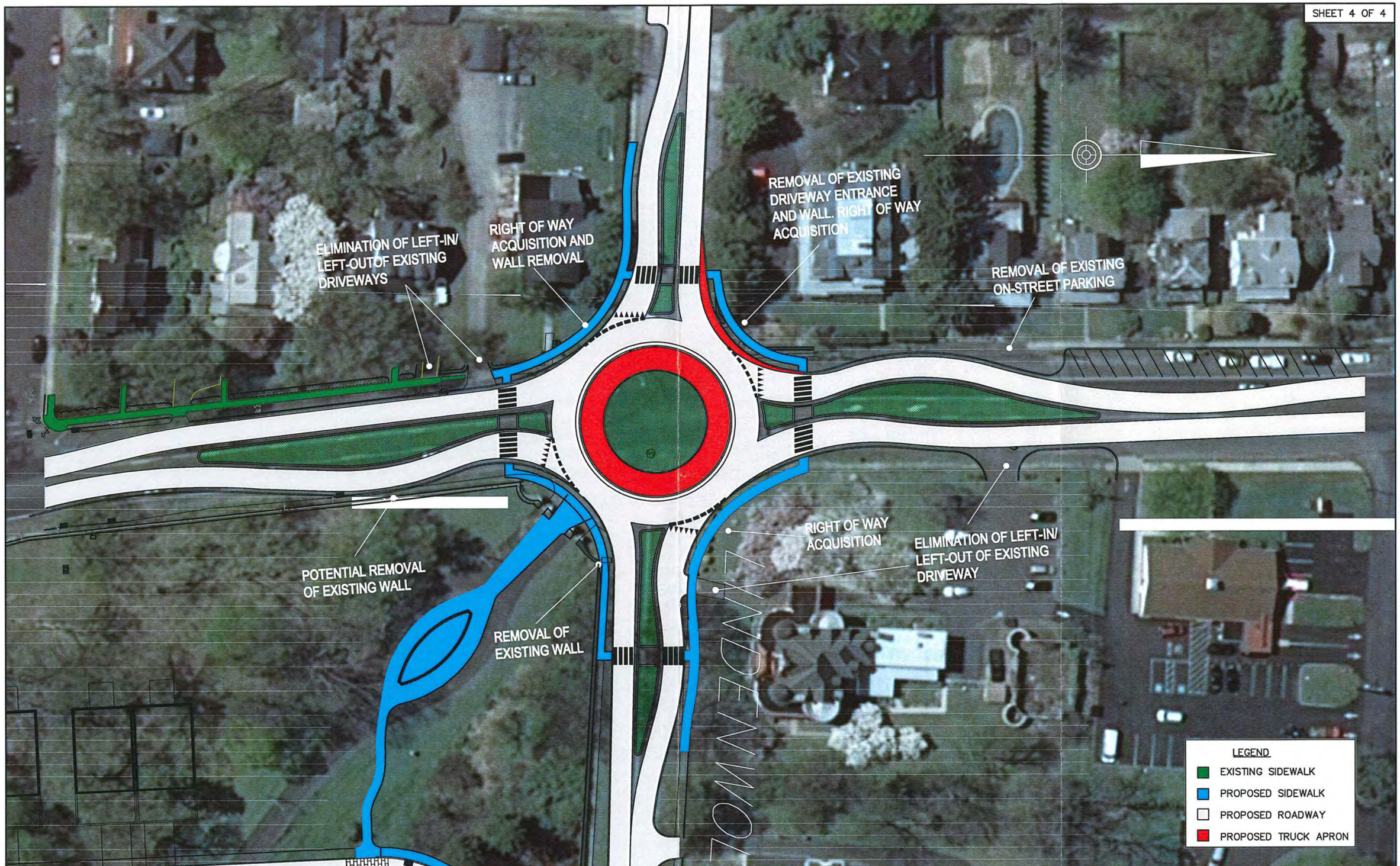
25' 0 25'

DESIGN BY: TDK	JOB NO: 813468	LINDENWOLD RESIDENTIAL ASSOCIATES, LLC	PRELIMINARY CONCEPTUAL ANALYSIS
DRAWN BY: TDK	DWG: CONCEPT	630 SENTRY PARKWAY SUITE 300 BLUE BELL, PA 19422	BETHLEHEM PIKE (SR 2018) AND MATTISON AVENUE
CHECKED BY: KK	DATE: 5/26/16		UPPER DUBLIN TOWNSHIP — MONTGOMERY COUNTY

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

75' 0 75'

DESIGN BY: TDK	JOB NO: 813468	LINDENWOLD RESIDENTIAL ASSOCIATES, LLC 630 SENTRY PARKWAY SUITE 300 BLUE BELL, PA 19422	PRELIMINARY CONCEPTUAL ANALYSIS BETHLEHEM PIKE (SR 2018) AND MATTISON AVENUE
DRAWN BY: TDK	DWG: CONCEPT		UPPER DUBLIN TOWNSHIP — MONTGOMERY COUNTY
CHECKED BY: KK	DATE: 9/30/16		



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

25' 0 25'

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CHECKED BY: KK	DATE: 9/30/16		