McMAHON ASSOCIATES, INC.
425 Commerce Drive, Suite 200
Fort Washington, PA 19034
p 215-283-9444 | f 215-283-9447

PRINCIPALS
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
Casey A. Moore, P.E.
Gary R. McNaughton, P.E., PTOE
Christopher J. Williams, P.E.

ASSOCIATES
John J. Mitchell, P.E.
R. Trent Ebersole, P.E.
Matthew M. Kozsuch, P.E.
Maureen Chlebek, P.E., PTOE
Dean A. Carr, P.E.
Jason T. Adams, P.E., PTOE
Christopher K. Bauer, P.E., PTOE

FOUNDER
Joseph W. McMahon, P.E.

April 14, 2020

Mr. Michael Taylor
Township Manager
Springfield Township
1510 Paper Mill Road
Wyndmoor, PA 19038

RE: **Intersection Evaluation**
Bethlehem Pike (SR 2018) and Gordon Lane
Springfield Township, Montgomery County, PA
McMahon Project No. 819045.3A

Dear Mr. Taylor:

As requested by the Township, McMahon Associates, Inc. has completed an engineering study to determine the need for the installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane in Springfield Township, Montgomery County, Pennsylvania and the subsequent impact of the installation of a traffic signal on the project intersection and the surrounding roadway network **(Figure 1)**.

Existing Transportation Setting

The intersection of Bethlehem Pike (SR 2018) and Gordon Lane is a "T"-intersection with Bethlehem Pike being uncontrolled and Gordon Lane being stop-controlled. Bethlehem Pike (SR 2018) provides two lanes on both the northbound and southbound approaches while Gordon Lane provides a single lane on the eastbound approach. The posted speed limit on Bethlehem Pike (SR 2018) is 35 miles per hour and the posted speed limit on Gordon Lane is 25 miles per hour.

To the north of the project intersection the closest traffic signal is located approximately 516-feet away at the intersection of Bethlehem Pike (SR 2018) and Montgomery Avenue. To the south of the project intersection the closes traffic signal is located approximately 1,964-feet away at the intersection of Bethlehem Pike (SR 2018) and Stenton Avenue (SR 3003/SR 4002)/Paper Mill Road (SR 2032).

Project Intersection Crash Summary

A crash analysis was performed at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane utilizing crash data received from PennDOT and Springfield Township. Based on the crash data obtained, there were a total of eight crashes between January 1, 2014 and December 31, 2018. Four of the crashes were reportable and four were nonreportable. A reportable crash is defined as crashes in which personal injuries occur or the vehicle must be towed from the scene.

Table 1 provides a summary of the number of crashes that occurred per year during the five-year period along with the average frequency of crashes per year.

Table 1. Crash Frequency at Study Area Intersection (2014-2018)

Frequency of Crashes (Number per Year)						Average Per Year
2014	2015	2016	2017	2018	Total	
3	2	1	1	1	8	1.6

Table 2 provides a summary of the types of crashes that occurred during the five-year period.

Table 2. Crash Types at Study Area Intersection (2014-2018)

Angle	Sideswipe	Hit Fixed Object	Head On	Non-Collision	Total
2	1	2	2	1	8

Table 3 provides a summary of the severity of the incidents that occurred during the five-year period.

Table 3. Crash Severity at Study Area Intersection (2014-2018)

Unknown Severity	Unknown If Injured	Property Damage Only	Total
4	1	3	8

Table 4 provides a summary of the causes of the incidents that occurred during the five-year period.

Table 4. Crash Causation due to Driver Actions at Study Area Intersection (2014-2018)

Over/Under Compensate Curve	No Contributing Action	Other Improper Driving	Affected Physical Condition	Improper/Careless Turn	Too Fast for Condition	Failed to Maintain Proper Speed	Diver Inexperienced	Speeding	Total
4	5	1	1	1	3	1	1	3	20

The crash information used in this analysis is confidential pursuant to 75 Pa. C.S. §3754 and 23 U.S.C. §409 and may not be published, reproduced, released, or discussed without the written permission of the PA Department of Transportation. Therefore, copies of the engineering extract and summary sheets are not provided within this evaluation.

Reviewing the information received, it can be seen that a majority of the crashes were caused by improper driving. Gordon Lane is located along a horizontal curve on Bethlehem Pike and at the bottom of a steep downgrade from the northbound Bethlehem Pike approach. Therefore, many of the accidents occur due to driver's losing control of their vehicles at this curve due to speeding or aggressive driving. These types of accidents would not be corrected with the installation of a traffic signal. In summary, there is not a significant crash history at the intersection to necessitate installation of safety measures.

Traffic Signal Warrant Analysis

A traffic signal warrant analysis was conducted in accordance with PennDOT criteria contained in the Department's *Publication 212, Official Traffic Control Devices*, which is based on the guidelines contained in the Federal Highway Administration's, *Manual on Uniform Traffic Control Devices (MUTCD)*. Based upon existing traffic volumes, the intersection of Bethlehem Pike (SR 2018) and Gordon Lane satisfies warrants for the installation of a traffic signal based on meeting the Four-Hour Warrant. The traffic signal warrant analysis is contained in **Attachment A.**

However, the project intersection satisfying one warrant for the installation of a traffic signal does not justify the installation of a signal. The intersection should further be studied to determine if a signal would improve the overall safety and operation of the intersection.

Existing Transportation Setting at Adjacent Intersections

In order to analyze the impact of installing a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane on adjacent intersections, the intersections of Bethlehem Pike (SR 2018)/Montgomery Avenue and Stenton Avenue (SR 3003)/Gordon Lane were also included in this evaluation.

The intersection of Bethlehem Pike (SR 2018) and Montgomery Avenue is a "T"-intersection controlled by a multi-phase, actuated-coordinated traffic signal. Bethlehem Pike (SR 2018) provides two lanes on both the northbound and southbound approaches while Montgomery Avenue provides a single lane on the westbound approach. The posted speed limit on Bethlehem Pike (SR 2018) is 35 miles per hour and the posted speed limit on Montgomery Avenue is 25 miles per hour.

The intersection of Stenton Avenue (SR 3003) and Gordon Lane is a "T"-intersection with Stenton Avenue being uncontrolled and Gordon Lane being stop-controlled. Stenton Avenue (SR 3003) provides one lane on both the eastbound and westbound approaches while Gordon Lane provides a single lane on the southbound approach. The posted speed limit on Stenton Avenue (SR 3003) is 35 miles per hour and the posted speed limit on Gordon Lane is 25 miles per hour.

Evaluation of Existing Operations

Manual turning movement traffic counts were conducted in May 2017, October 2018, and September 2019 during the weekday morning (7:00 AM to 9:00 AM), weekday midday (11:00 AM to 2:00 PM), and weekday afternoon (4:00 PM to 6:00 PM) peak periods at the following intersections. The results of these traffic counts are tabulated by 15-minute intervals in **Attachment B**.

- Bethlehem Pike (SR 2018) and Gordon Lane
- Bethlehem Pike (SR 2018) and Montgomery Avenue
- Stenton Avenue (SR 3003) and Gordon Lane

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 resultant weekday morning, weekday midday, and weekday afternoon peak hour volumes are depicted in **Figure 2**. It should be noted that the manual turning movement counts conducted in 2017 and 2018 were increased by 0.28 percent per year (most current PennDOT growth rate for urban non-interstates in Montgomery County) to reflect 2019 conditions and all traffic volumes were conservatively balanced to within five percent between intersections.

The peak hour traffic volumes were analyzed to determine the existing conditions, both without and with signalization, 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 **Attachment C** for both signalized and unsignalized intersections, as well as the correlation between average total control delay and the respective level-of-service (LOS) criteria for each intersection type.

Under existing conditions, the intersection of Bethlehem Pike (SR 2018) and Gordon Lane operates at overall LOS A during the weekday morning, weekday midday, and weekday afternoon peak hours with all movements operating at LOS C or better with the exception of the Gordon Lane approach (LOS F) during the weekday morning and weekday afternoon peak hours. The intersection of Bethlehem Pike (SR 2018) and Montgomery Avenue operates at overall LOS A during the weekday morning, weekday midday, and weekday afternoon peak hours with all movements operating at LOS D or better during all three peak hours. The intersection of Stenton Avenue (SR 3003) and Gordon Lane operates at overall LOS A during the weekday morning, weekday midday, and weekday afternoon peak hours with all movements operating at LOS B or better during all three peak hours. The results of the capacity/level-of-service analyses are illustrated in **Figure 3** for the existing peak hour traffic conditions, and detailed capacity/level-of-service analysis worksheets are contained in **Attachment D**.

Evaluation of Future Operations

The impact of installing a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane on the project intersection and surrounding roadway network was analyzed. With installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane, traffic could potentially divert from other area intersections to use the signal at this intersection. Traffic diversions were calculated based upon review of traffic counts at the intersection of Bethlehem Pike (SR 2018) and Stenton Avenue (SR 3003)/Paper Mill Road and potential area diversion routes. With the installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane, an additional 50 vehicles or less are expected to travel along Gordon Lane, from Stenton Avenue (SR 3003) to Bethlehem Pike (SR 2018) during all three peak hours, while only a minimal amount of additional traffic is expected to travel along Gordon Lane, from Bethlehem Pike (SR 2018) to Stenton Avenue (SR 3003) during all three peak hours. The traffic diversions expected with the installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018)

and Gordon Lane are contained in **Attachment E.** The resultant peak hour traffic volumes with signalization of the intersection of Bethlehem Pike (SR 2018) and Gordon Lane are depicted in **Figure 4** for the weekday morning, weekday midday, and weekday afternoon peak hours.

Analysis was then completed at the study intersections to determine the impact of installing a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane. Based on the analysis results, the intersection of Bethlehem Pike (SR 2018) and Gordon Lane will operate at overall LOS B or better with all movements operating at LOS D or better during all three peak hours. The intersection of Bethlehem Pike (SR 2018) and Montgomery Avenue will operate at overall LOS A with all movements operating at LOS D or better during all three peak hours. The intersection of Stenton Avenue (SR 3003) and Gordon Lane will operate at overall LOS A with all movements operating at LOS B or better during all three peak hours. The results of the capacity/level-of-service analyses for the peak hour conditions with signalization are shown in **Figure 5** and detailed capacity/level-of-service analysis worksheets are contained in **Attachment F.**

Surrounding Roadway Network

Table 5 provides a level-of-service matrix table comparing the Overall operation at the study intersections both without and with the signalization of Bethlehem Pike (SR 2018) and Gordon Lane.

Table 5. Study Intersections Overall Level-of-Service Matrix Table

Time Period	Weekday Morning Peak Hour		Weekday Midday Peak Hour		Weekday Afternoon Peak Hour	
Design Year	2019		2019		2019	
Condition	Without Signalization	With Signalization	Without Signalization	With Signalization	Without Signalization	With Signalization
Stenton Avenue (SR 3003) and Gordon Lane	A 3.4	A 4.1	A 2.5	A 3.1	A 3.0	A 3.6
Bethlehem Pike (SR 2018) and Montgomery Avenue	A 8.3	A 6.6	A 6.7	A 5.5	A 6.0	A 4.9
Bethlehem Pike (SR 2018) and Gordon Lane	A 5.2	A 6.5	A 1.4	B 10.4	A 9.0	A 9.4

Reviewing the operations of the study intersections, it can be seen that the installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane is expected to have minimal impact on the adjacent intersections of Bethlehem Pike (SR 2018)/Montgomery Avenue and Stenton Avenue (SR 3003)/Gordon Lane, as these intersections will operate with the same levels-of-service both without and with signalization at Bethlehem Pike (SR 2018) and Gordon Lane.

Study Intersection

Table 6 provides a level-of-service matrix table comparing the full intersection operation at Bethlehem Pike (SR 2018) and Gordon Lane, both without and with signalization.

Table 5. Bethlehem Pike (SR 2018) and Gordon Lane Level-of-Service Matrix Table

Time Period			Weekday Morning Peak Hour		Weekday Midday Peak Hour		Weekday Afternoon Peak Hour	
Design Year			2019		2019		2019	
Condition			Without Signalization	With Signalization	Without Signalization	With Signalization	Without Signalization	With Signalization
Gordan Lane	EB	Left/Right	F 59.7	D 42.9	C 19.3	D 44.4	F 58.1	D 39.1
Bethlehem Pike (S.R. 2018)	NB	Left/Thru	A 1.7	A 3.9	A 0.2	A 2.5	A 0.2	A 6.1
		Thru	(1)	A 4.0	(1)	A 2.5	(1)	A 6.2
	SB	Thru	(1)	A 0.5	(1)	B 11.4	(1)	A 0.7
		Thru/Right	(1)	A 0.5	(1)	B 11.5	(1)	A 0.7
Overall			A 5.2	A 6.5	A 1.4	B 10.4	A 9.0	A 9.4

(1) Movement operates at free-flow.

Conclusions

A majority of the crashes that occurred within the most recent five-years at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane were caused by improper driving and roadway geometry. Gordon Lane is located along a horizontal curve on Bethlehem Pike and at the bottom of a steep downgrade from the

northbound Bethlehem Pike approach. Therefore, many of the accidents occur at this curve due to driver's losing control of their vehicles due to speeding. These types of accidents would not be corrected with the installation of a traffic signal.

The intersection of Bethlehem Pike (SR 2018) and Gordon Lane meets volume warrants for the installation of a traffic signal based upon Warrant 2: Four-Hour Vehicular Volume. Under current conditions the intersection of Bethlehem Pike (SR 2018) and Gordon Lane operates at overall LOS A, and with signalization, the intersection delay will slightly increase and is expected to operate at overall LOS B.

Additionally, the installation of a traffic signal at the intersection of Bethlehem Pike (SR 2018) and Gordon Lane is expected to have a minimal impact on the adjacent studied intersections, as these intersections will operate with the same levels-of-service both without and with signalization at Bethlehem Pike (SR 2018) and Gordon Lane.

In conclusion, it has not been determined that the installation of a traffic signal would improve the overall safety and operation of the intersection of Bethlehem Pike and Gordon Lane. The intersection level of service is not significantly improved with the installation of the traffic signal. Additionally, there is a potential for an increase in crashes at the intersection due to the horizontal curve and downgrade on the northbound Bethlehem Pike approach. McMahon recommends further coordination between the Township and PennDOT to discuss the results of the intersection evaluation.

We trust that this letter provides the Township with information regarding the operations of the subject intersection. If you have any questions, or require further clarification, please do not hesitate to contact Rebekah Landis at 215-283-9444 or rlandis@mcmahonassociates.com or me at 215-283-9444 or akuhner@mcmahonassociates.com.

Sincerely,

Anton K. Kuhner, P.E., PTOE
Senior Project Manager

RAL/

Attachments

I:\eng\SPRINTO1\819045-BethGrdSig\TRAFFIC\REPORT\2020-04-14 Bethlehem Pike_Gordon Lane Letter.docx

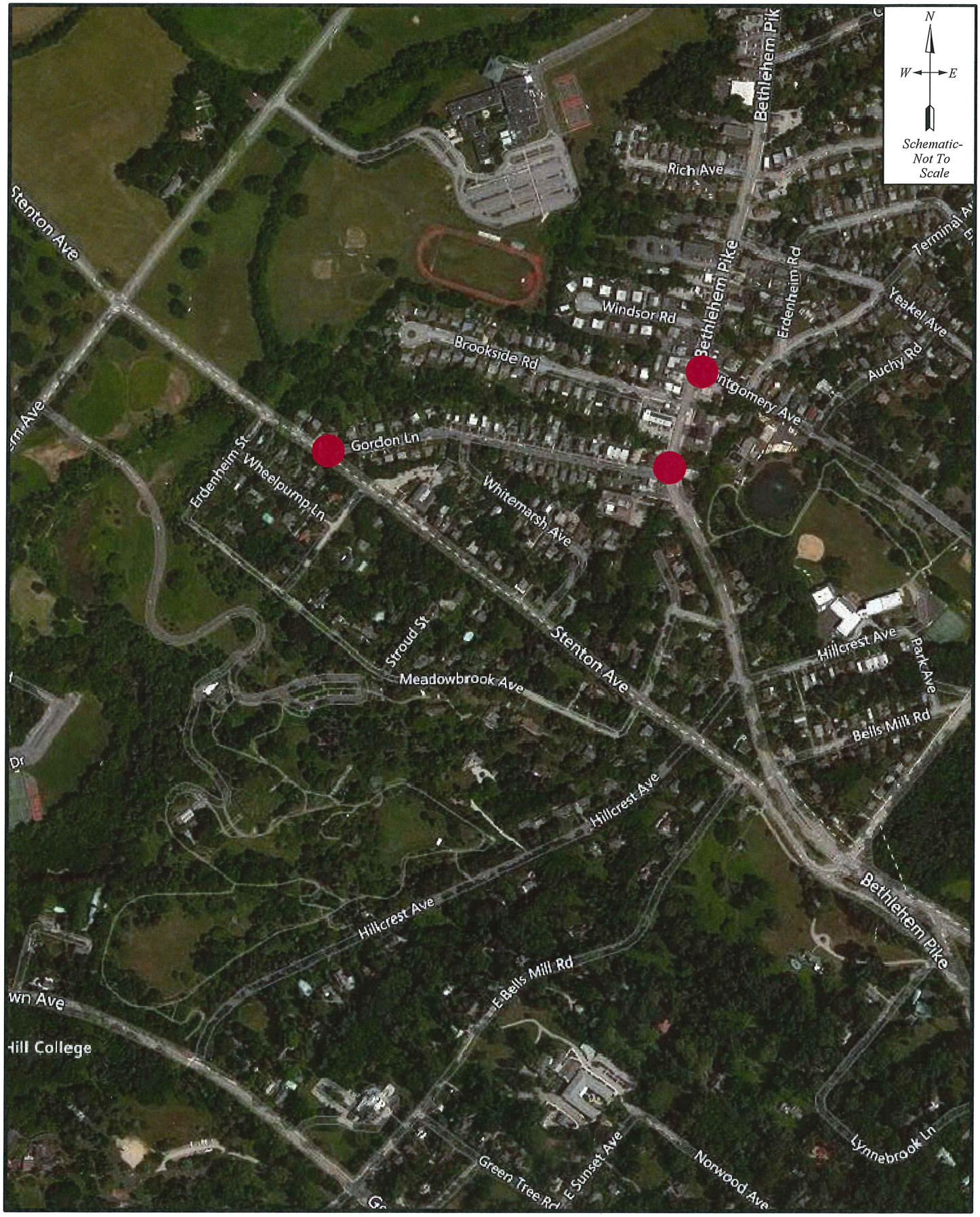


FIGURE 1

Site Area Intersections

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

I:\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Figure 1.dwg

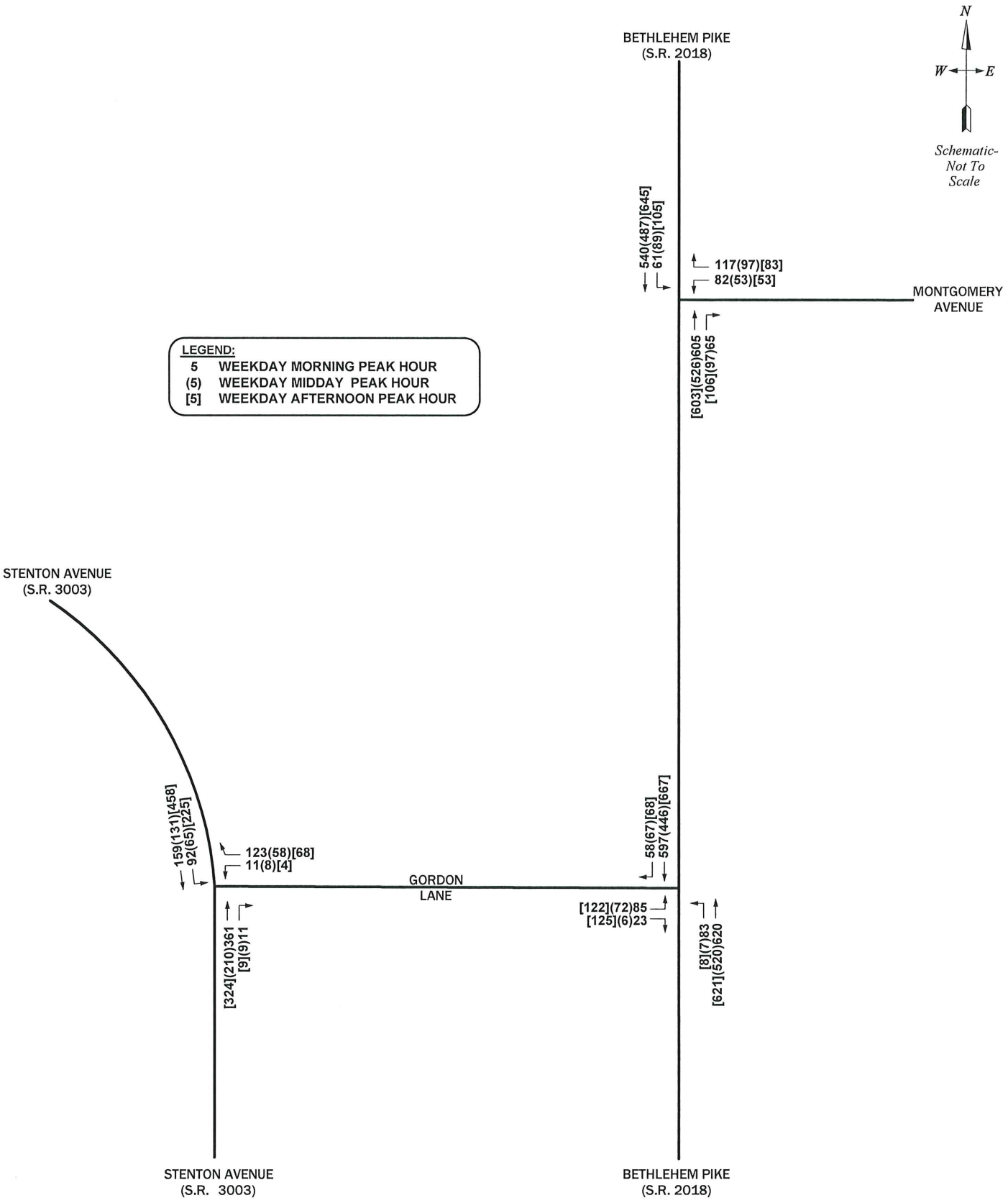


FIGURE 2

2019 Existing Peak Hour Traffic Volumes

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

\\fhwfs\mcm\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Figure 2

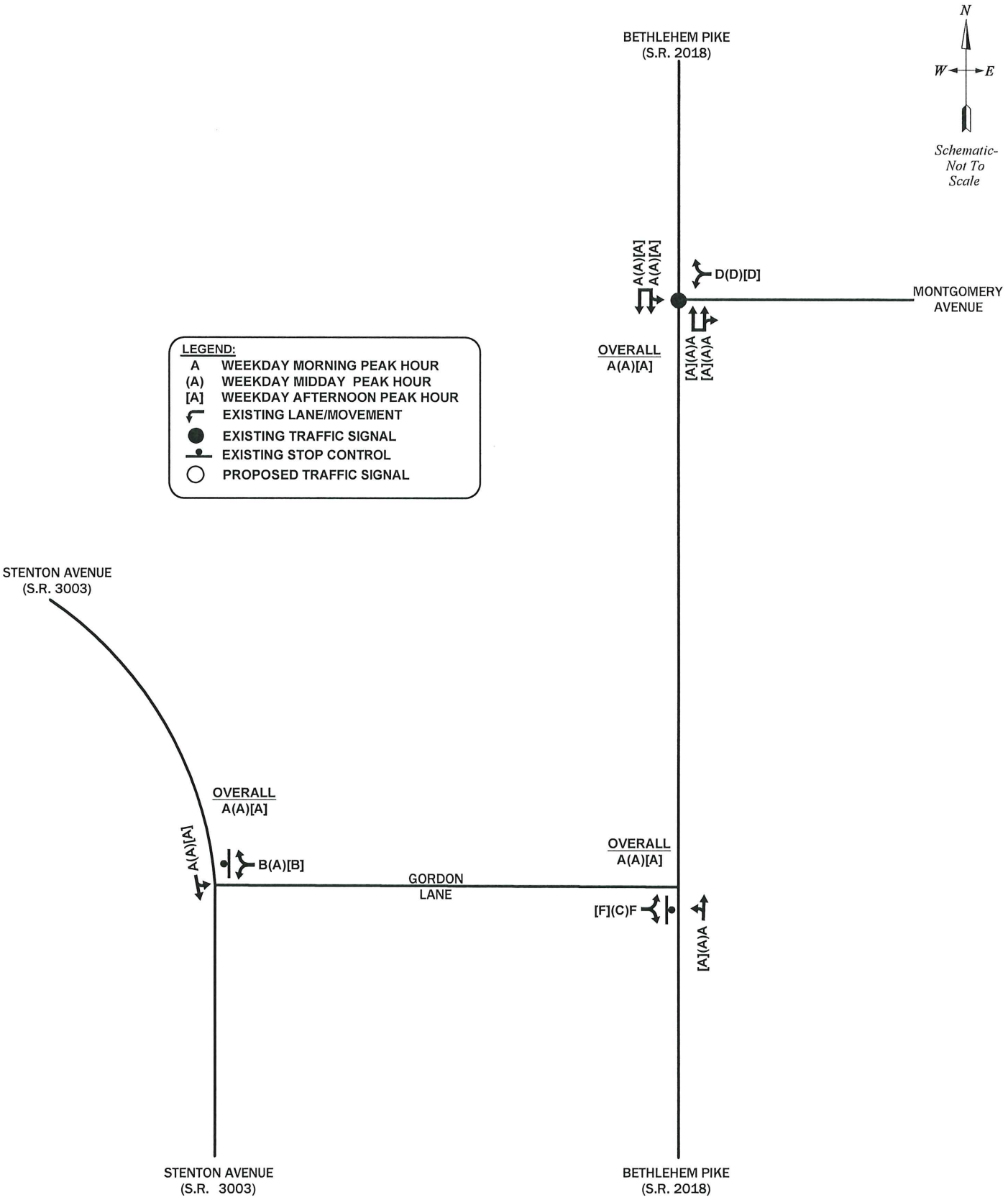


FIGURE 3

2019 Existing Peak Hour Levels-of-Service

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

I:\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Figure 3.dwg

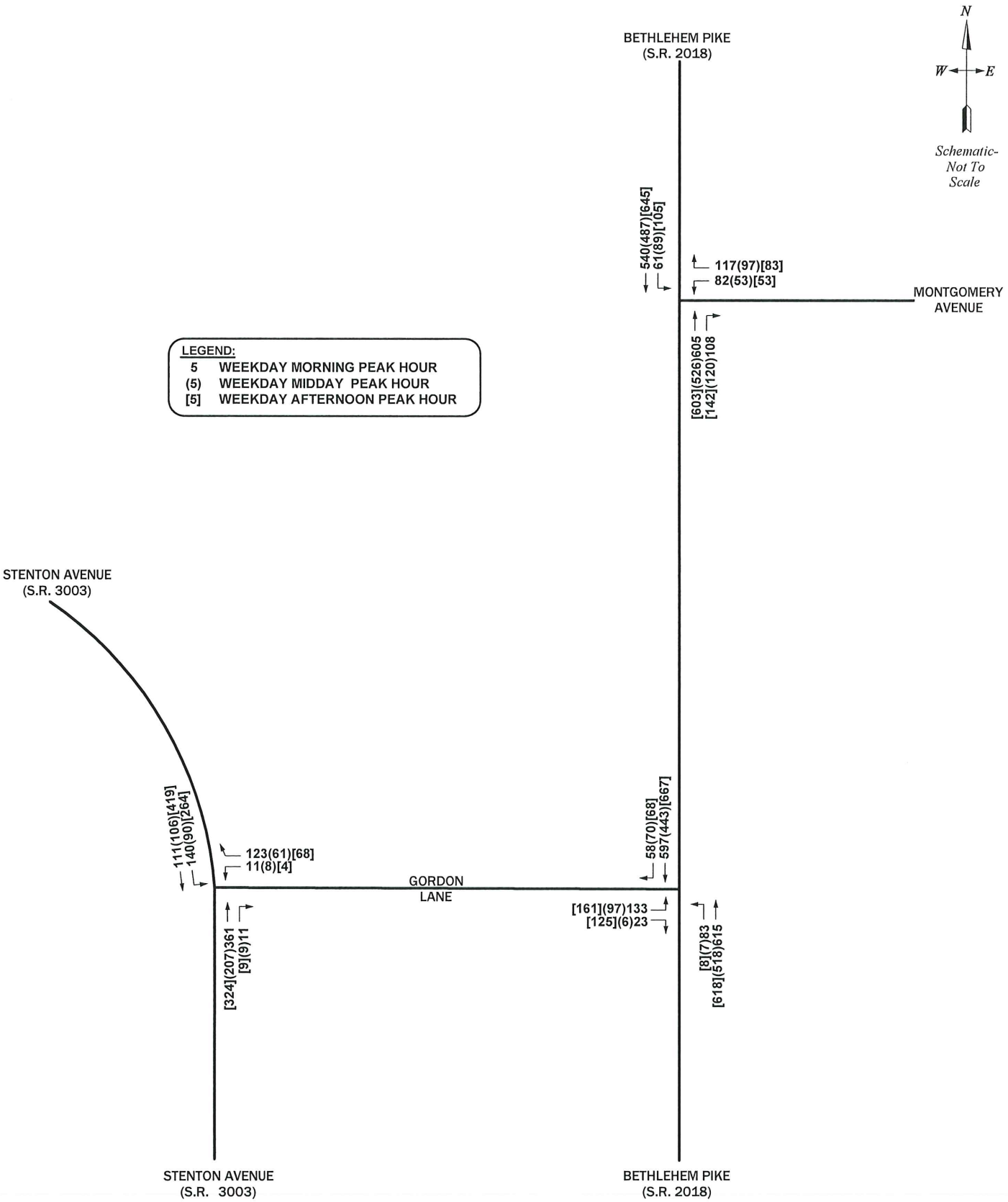


FIGURE 4

2019 Existing Peak Hour Traffic Volumes With Signalization

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

I:\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Figure 4.dwg

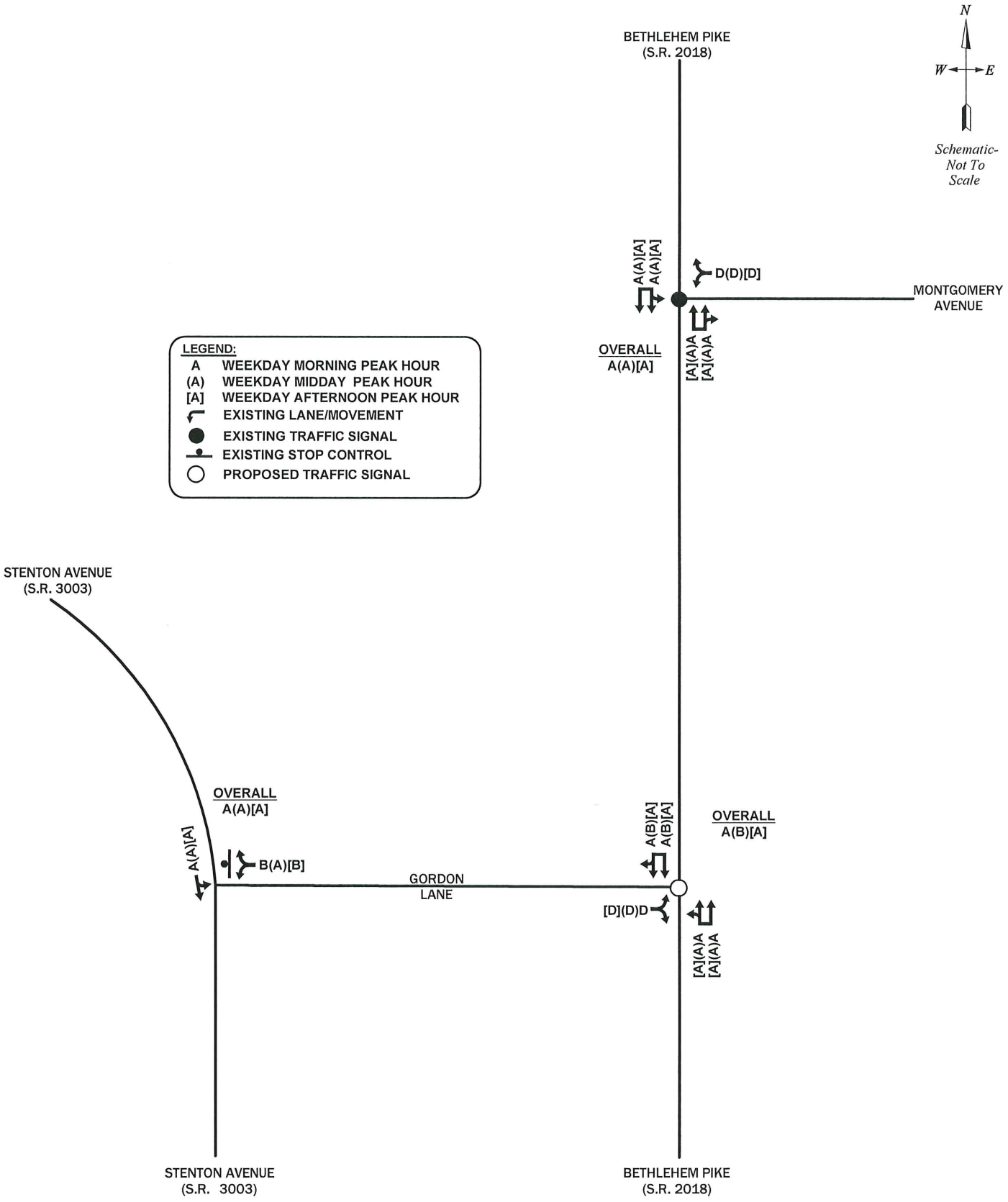


FIGURE 5

2019 Existing Peak Hour Levels-of-Service with Signalization

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

I:\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Figure 5.dwg

ATTACHMENT A

Traffic Signal Warrant Analysis

Traffic Signal Warrant Analysis Workbook

STUDY AND ANALYSIS INFORMATION

Municipality:	Springfield Township	**Analysis Date:**	5/10/2019
County:	Montgomery County	**Conducted By:**	EJR
PennDOT Engineering District:	6	**Agency/Company Name:**	PennDOT 6-0

Analysis Information

Data Collection Date:	10/16/2018
Day of the Week:	Tuesday

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 (SR 2018)
Major Street Approach #1 Direction:	S-Bound
Major Street Approach #2 Direction:	N-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	2	**LANE(S)**
Speed Limit or 85th Percentile Speed on the Major Street:	35	**MPH**

Minor Street Information

Minor Street Name and Route Number:	Gordon Lane
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	

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	**Yes**	**No**
Warrant 2, Four-Hour Vehicular Volume	**Yes**	**Yes**
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**

MUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	2 or More Lanes
Minor Street:	1 Lane

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

Combination of Conditions A and B Necessary?*: No

**Only applicable for Warrant 1 if after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems. See Section 4C.02 of the 2009 MUTCD for application.*

Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	**Minor Street**	**100%**	**80%**	**70%**	**56%**	**100%**	**80%**	**70%**	**56%**
1	**1**	500	400	350	280	150	120	105	84
2 or More	**1**	600	480	420	336	150	120	105	84
2 or More	**2 or More**	600	480	420	336	200	160	140	112
1	**2 or More**	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	**Minor Street**	**100%**	**80%**	**70%**	**56%**	**100%**	**80%**	**70%**	**56%**
1	**1**	750	600	525	420	75	60	53	42
2 or More	**1**	900	720	630	504	75	60	53	42
2 or More	**2 or More**	900	720	630	504	100	80	70	56
1	**2 or More**	750	600	525	420	100	80	70	56

Condition A Evaluation

Number of Unique Hours Met: **2** **Condition A Satisfied?** **No**

Condition B Evaluation

Number of Unique Hours Met: **5** **Condition B Satisfied?** **No**

Combination of Condition A and Condition B Evaluation

Number of Unique Hours Met for Condition A: **N/A**

Number of Unique Hours Met for Condition B: **N/A**

Combination of Condition A and Condition B Satisfied? **N/A**

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	2 or More Lanes
Minor Street:	1 Lane

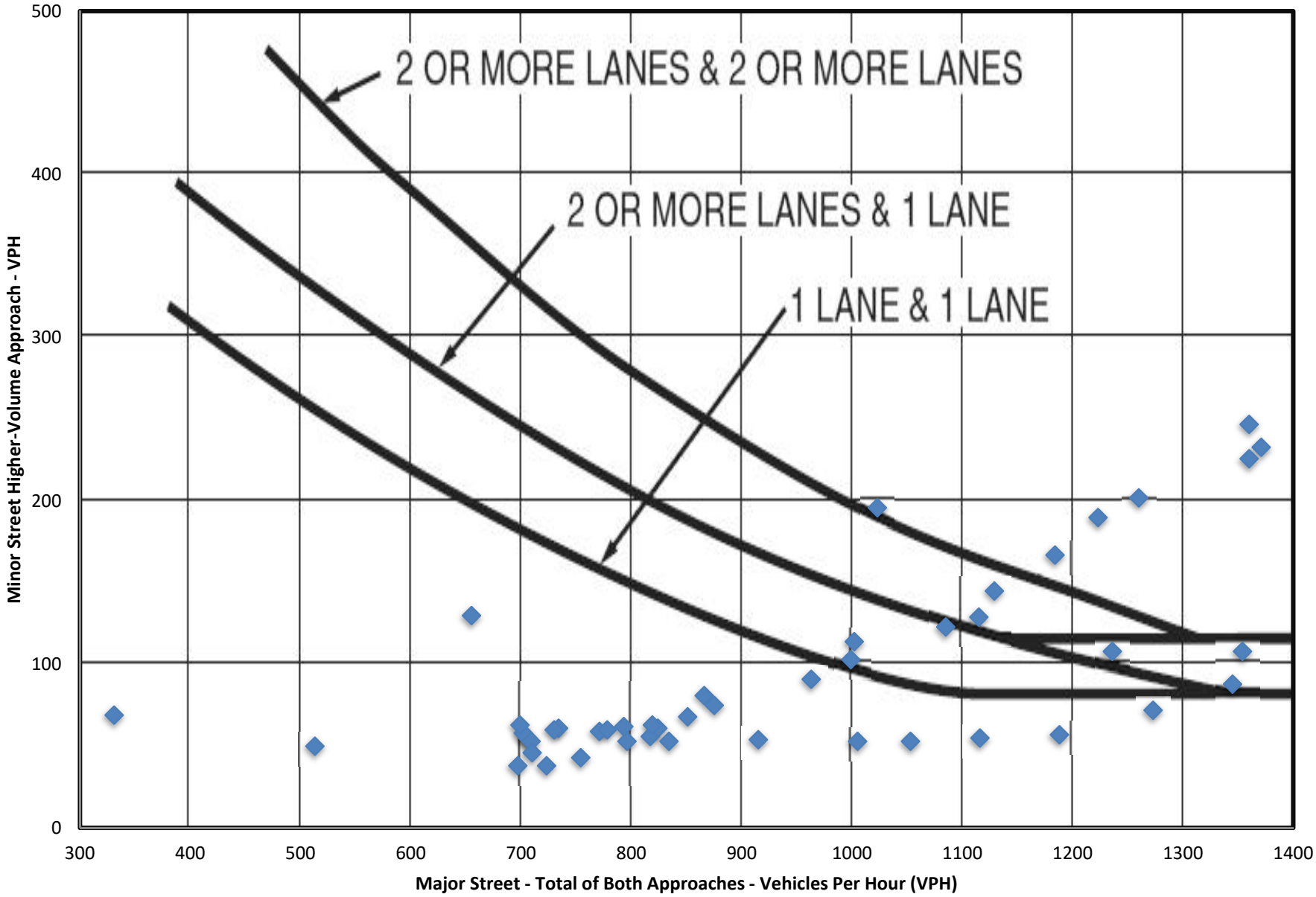
Total Number of Unique Hours Met On Figure 4C-1
4

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	218	15	
6:30 AM	513	50	
6:45 AM	866	81	
7:00 AM	1236	108	Met
7:15 AM	1354	108	Met
7:30 AM	1345	88	Met
7:45 AM	1273	72	
8:00 AM	1188	57	
8:15 AM	1116	55	
8:30 AM	1053	53	
8:45 AM	1005	53	
9:00 AM	915	54	
9:15 AM	834	53	
9:30 AM	771	59	
9:45 AM	706	55	
10:00 AM	702	58	
10:15 AM	699	63	
10:30 AM	734	61	
10:45 AM	730	60	
11:00 AM	709	53	
11:15 AM	710	46	
11:30 AM	697	38	
11:45 AM	723	38	

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	754	43	
12:15 PM	796	53	
12:30 PM	817	56	
12:45 PM	824	61	
1:00 PM	819	63	
1:15 PM	778	60	
1:30 PM	793	62	
1:45 PM	851	68	
2:00 PM	875	75	
2:15 PM	963	91	
2:30 PM	999	103	
2:45 PM	1002	114	
3:00 PM	1085	123	
3:15 PM	1115	129	Met
3:30 PM	1129	145	Met
3:45 PM	1184	167	Met
4:00 PM	1223	190	Met
4:15 PM	1260	202	Met
4:30 PM	1360	226	Met
4:45 PM	1371	233	Met
5:00 PM	1360	247	Met
5:15 PM	1023	196	Met
5:30 PM	655	130	
5:45 PM	331	69	
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:	2 or More Lanes
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

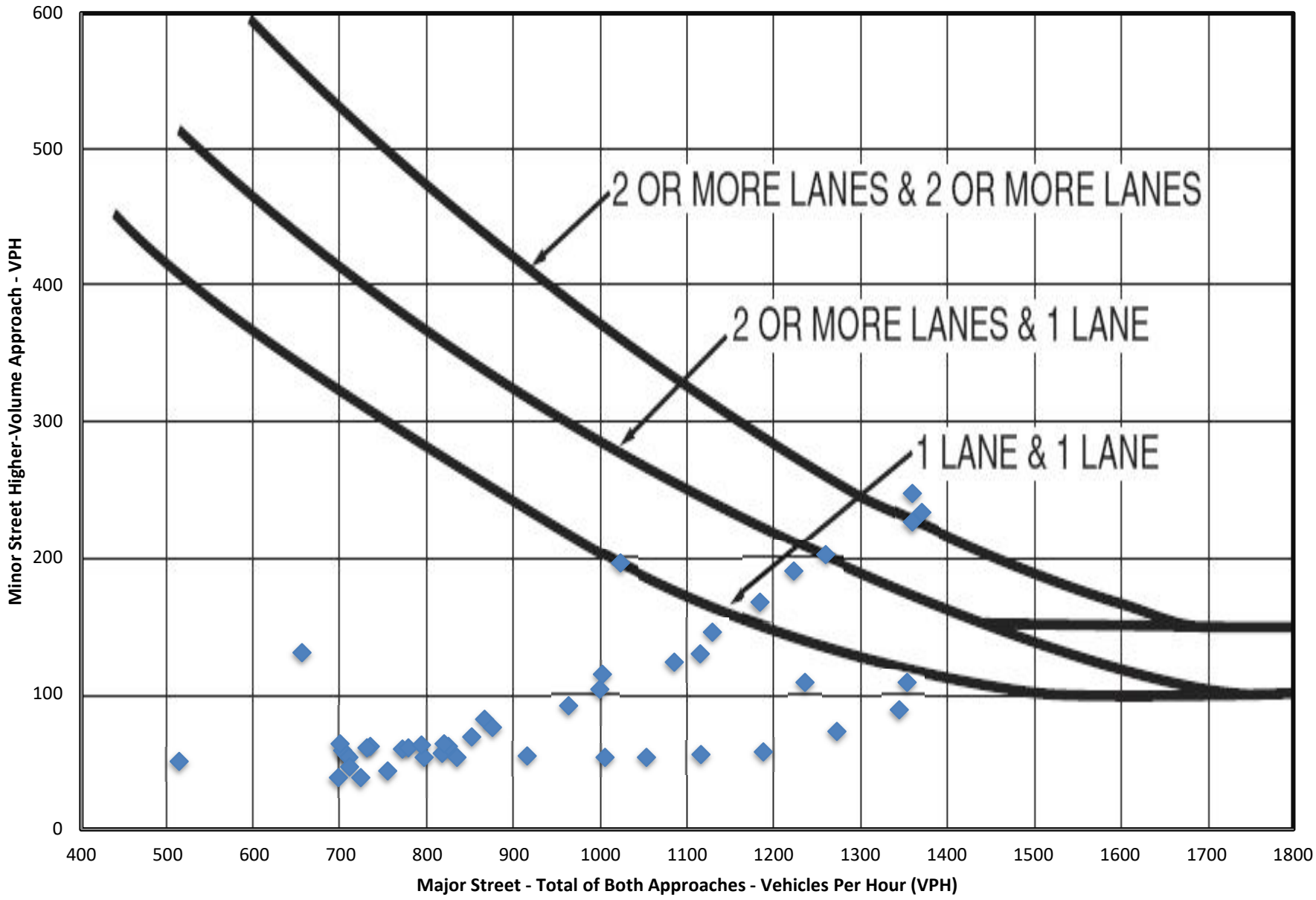
Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 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?	N/A
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?	N/A
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
1

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	218	15	
6:30 AM	513	50	
6:45 AM	866	81	
7:00 AM	1236	108	
7:15 AM	1354	108	
7:30 AM	1345	88	
7:45 AM	1273	72	
8:00 AM	1188	57	
8:15 AM	1116	55	

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	1053	53	
8:45 AM	1005	53	
9:00 AM	915	54	
9:15 AM	834	53	
9:30 AM	771	59	
9:45 AM	706	55	
10:00 AM	702	58	
10:15 AM	699	63	
10:30 AM	734	61	
10:45 AM	730	60	
11:00 AM	709	53	
11:15 AM	710	46	
11:30 AM	697	38	
11:45 AM	723	38	
12:00 PM	754	43	
12:15 PM	796	53	
12:30 PM	817	56	
12:45 PM	824	61	
1:00 PM	819	63	
1:15 PM	778	60	
1:30 PM	793	62	
1:45 PM	851	68	
2:00 PM	875	75	
2:15 PM	963	91	
2:30 PM	999	103	
2:45 PM	1002	114	
3:00 PM	1085	123	
3:15 PM	1115	129	
3:30 PM	1129	145	
3:45 PM	1184	167	
4:00 PM	1223	190	
4:15 PM	1260	202	
4:30 PM	1360	226	Met
4:45 PM	1371	233	Met
5:00 PM	1360	247	Met
5:15 PM	1023	196	
5:30 PM	655	130	
5:45 PM	331	69	
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



ATTACHMENT B

Manual Turning Movement (MTM) Counts

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017

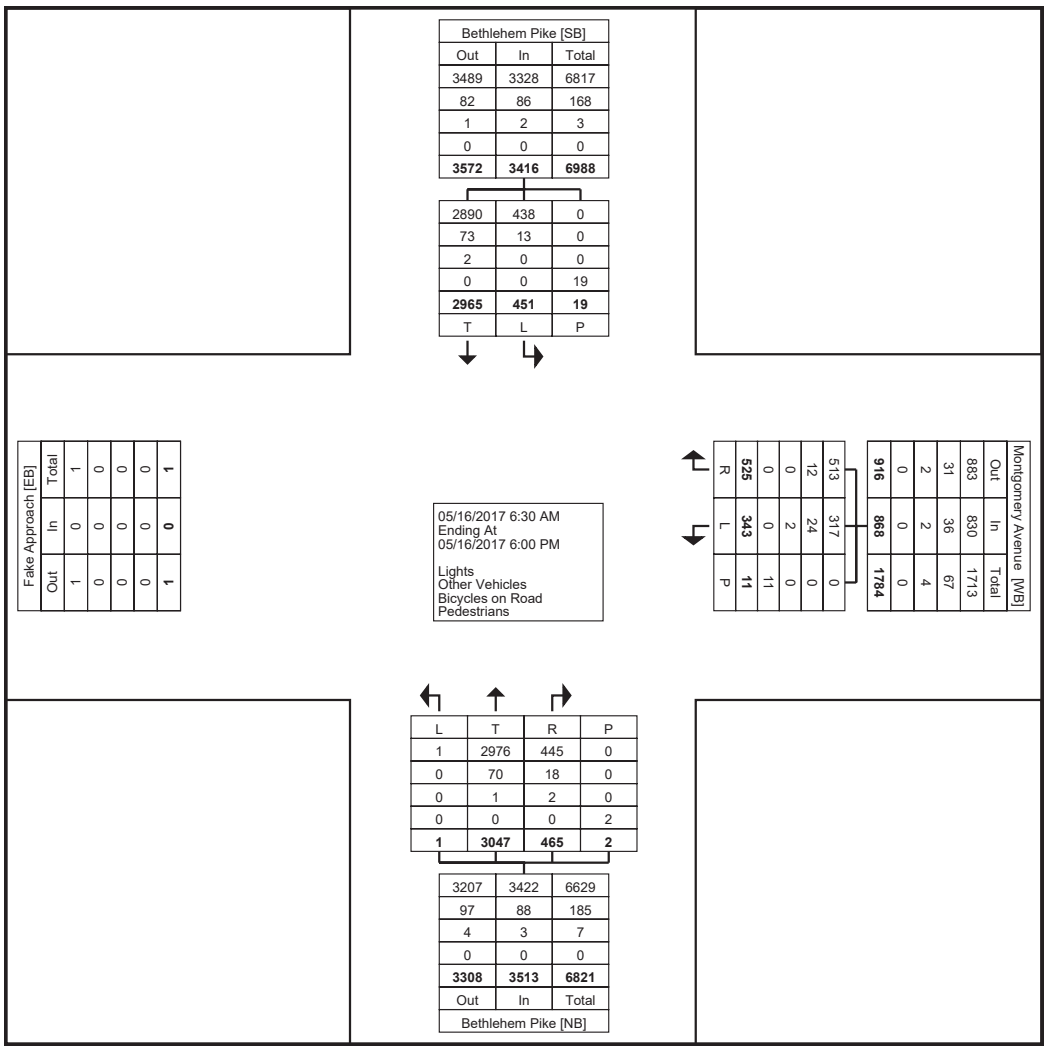
Turning Movement Data

Start Time	Montgomery Avenue Westbound					Bethlehem Pike Northbound						Bethlehem Pike Southbound				
	Left	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
6:30 AM	8	5	7	0	20	0	51	5	1	1	57	11	73	3	84	161
6:45 AM	5	5	7	0	17	0	77	10	0	0	87	9	88	1	97	201
Hourly Total	13	10	14	0	37	0	128	15	1	1	144	20	161	4	181	362
7:00 AM	25	11	2	1	38	0	80	14	4	0	98	7	107	0	114	250
7:15 AM	16	6	7	1	29	0	100	22	6	1	128	15	115	0	130	287
7:30 AM	18	26	10	1	54	0	136	20	2	0	158	12	147	1	159	371
7:45 AM	22	20	7	0	49	0	144	16	2	0	162	20	136	2	156	367
Hourly Total	81	63	26	3	170	0	460	72	14	1	546	54	505	3	559	1275
8:00 AM	18	23	9	2	50	0	133	14	3	0	150	15	123	0	138	338
8:15 AM	17	12	9	0	38	0	185	6	1	0	192	14	84	2	98	328
8:30 AM	15	12	7	0	34	1	141	11	2	0	155	14	105	1	119	308
8:45 AM	11	18	7	1	36	0	123	8	2	0	133	13	86	1	99	268
Hourly Total	61	65	32	3	158	1	582	39	8	0	630	56	398	4	454	1242
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	12	11	8	0	31	0	126	7	4	0	137	30	106	1	136	304
2:45 PM	17	24	5	1	46	0	117	9	2	0	128	18	140	0	158	332
Hourly Total	29	35	13	1	77	0	243	16	6	0	265	48	246	1	294	636
3:00 PM	10	10	12	0	32	0	125	19	1	0	145	19	143	0	162	339
3:15 PM	17	17	7	1	41	0	125	20	0	0	145	23	124	0	147	333
3:30 PM	8	11	13	1	32	0	149	27	1	0	177	19	124	0	143	352
3:45 PM	15	21	8	0	44	0	116	21	2	0	139	32	113	1	145	328
Hourly Total	50	59	40	2	149	0	515	87	4	0	606	93	504	1	597	1352
4:00 PM	13	15	4	2	32	0	133	23	2	0	158	15	123	3	138	328
4:15 PM	16	14	0	0	30	0	135	19	3	0	157	17	134	1	151	338
4:30 PM	11	18	10	0	39	0	144	11	6	0	161	28	142	0	170	370
4:45 PM	18	15	4	0	37	0	128	15	9	0	152	29	139	0	168	357
Hourly Total	58	62	18	2	138	0	540	68	20	0	628	89	538	4	627	1393
5:00 PM	14	13	9	0	36	0	139	29	1	0	169	22	147	0	169	374
5:15 PM	9	5	9	0	23	0	189	32	2	0	223	25	166	0	191	437
5:30 PM	18	16	8	0	42	0	127	24	0	0	151	19	149	1	168	361
5:45 PM	10	19	9	0	38	0	124	25	2	0	151	25	151	1	176	365
Hourly Total	51	53	35	0	139	0	579	110	5	0	694	91	613	2	704	1537
Grand Total	343	347	178	11	868	1	3047	407	58	2	3513	451	2965	19	3416	7797
Approach %	39.5	40.0	20.5	-	-	0.0	86.7	11.6	1.7	-	-	13.2	86.8	-	-	-
Total %	4.4	4.5	2.3	-	11.1	0.0	39.1	5.2	0.7	-	45.1	5.8	38.0	-	43.8	-
Lights	317	340	173	-	830	1	2976	387	58	-	3422	438	2890	-	3328	7580
% Lights	92.4	98.0	97.2	-	95.6	100.0	97.7	95.1	100.0	-	97.4	97.1	97.5	-	97.4	97.2
Other Vehicles	24	7	5	-	36	0	70	18	0	-	88	13	73	-	86	210
% Other Vehicles	7.0	2.0	2.8	-	4.1	0.0	2.3	4.4	0.0	-	2.5	2.9	2.5	-	2.5	2.7
Bicycles on Road	2	0	0	-	2	0	1	2	0	-	3	0	2	-	2	7
% Bicycles on Road	0.6	0.0	0.0	-	0.2	0.0	0.0	0.5	0.0	-	0.1	0.0	0.1	-	0.1	0.1
Pedestrians	-	-	-	11	-	-	-	-	-	2	-	-	-	19	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	100.0	-	-

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017



Turning Movement Data Plot

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017

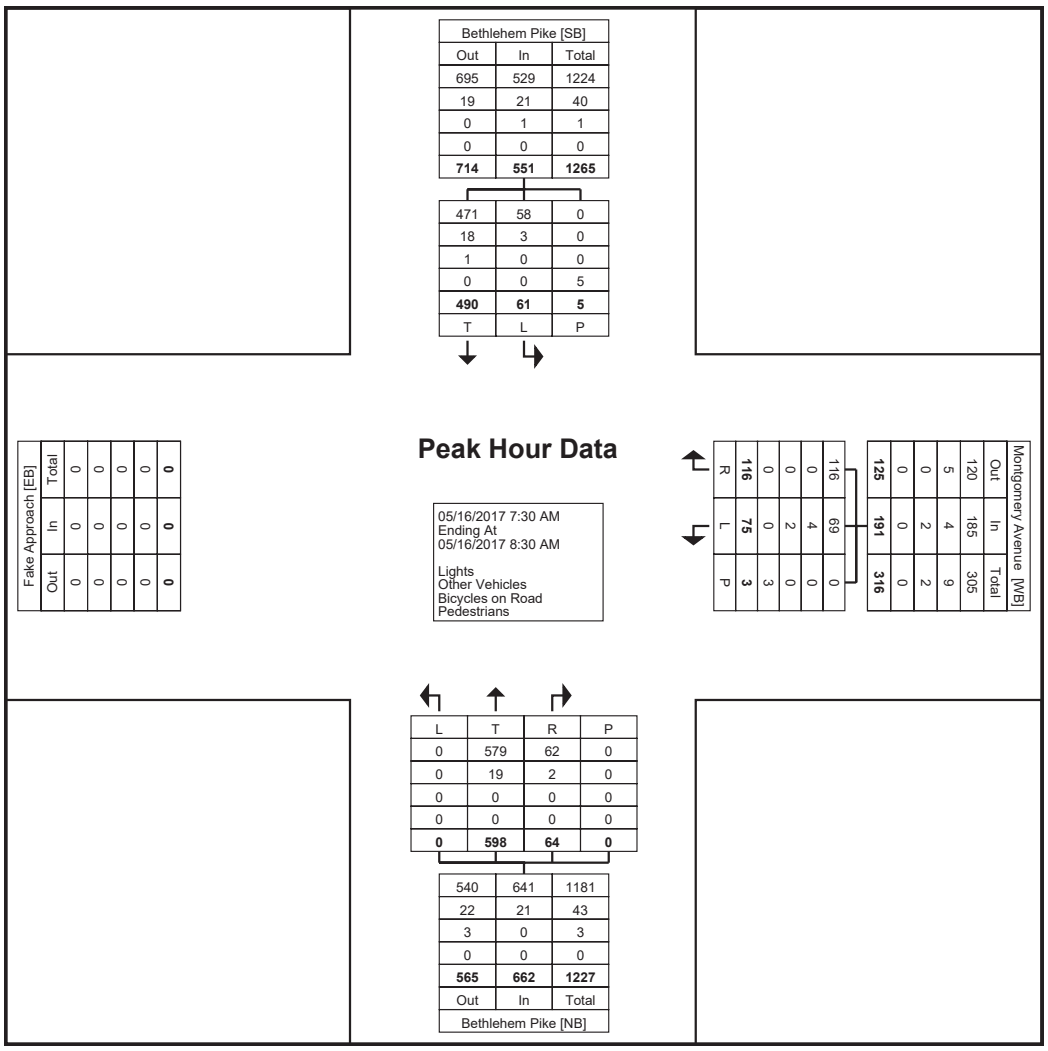
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Montgomery Avenue Westbound					Bethlehem Pike Northbound						Bethlehem Pike Southbound				
	Left	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
7:30 AM	18	26	10	1	54	0	136	20	2	0	158	12	147	1	159	371
7:45 AM	22	20	7	0	49	0	144	16	2	0	162	20	136	2	156	367
8:00 AM	18	23	9	2	50	0	133	14	3	0	150	15	123	0	138	338
8:15 AM	17	12	9	0	38	0	185	6	1	0	192	14	84	2	98	328
Total	75	81	35	3	191	0	598	56	8	0	662	61	490	5	551	1404
Approach %	39.3	42.4	18.3	-	-	0.0	90.3	8.5	1.2	-	-	11.1	88.9	-	-	-
Total %	5.3	5.8	2.5	-	13.6	0.0	42.6	4.0	0.6	-	47.2	4.3	34.9	-	39.2	-
PHF	0.852	0.779	0.875	-	0.884	0.000	0.808	0.700	0.667	-	0.862	0.763	0.833	-	0.866	0.946
Lights	69	81	35	-	185	0	579	54	8	-	641	58	471	-	529	1355
% Lights	92.0	100.0	100.0	-	96.9	-	96.8	96.4	100.0	-	96.8	95.1	96.1	-	96.0	96.5
Other Vehicles	4	0	0	-	4	0	19	2	0	-	21	3	18	-	21	46
% Other Vehicles	5.3	0.0	0.0	-	2.1	-	3.2	3.6	0.0	-	3.2	4.9	3.7	-	3.8	3.3
Bicycles on Road	2	0	0	-	2	0	0	0	0	-	0	0	1	-	1	3
% Bicycles on Road	2.7	0.0	0.0	-	1.0	-	0.0	0.0	0.0	-	0.0	0.0	0.2	-	0.2	0.2
Pedestrians	-	-	-	3	-	-	-	-	-	0	-	-	-	5	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017



Turning Movement Peak Hour Data Plot (7:30 AM)

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017

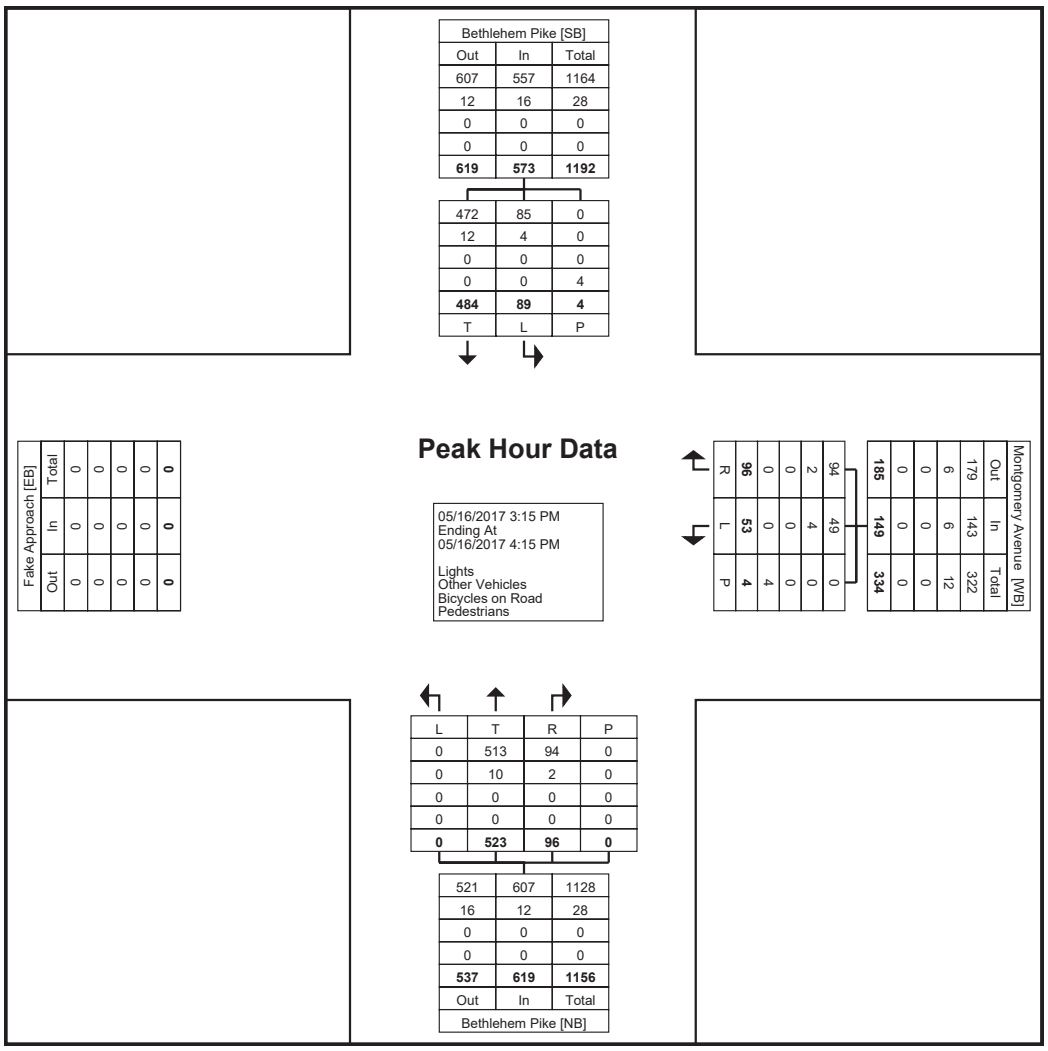
Turning Movement Peak Hour Data (3:15 PM)

Start Time	Montgomery Avenue Westbound					Bethlehem Pike Northbound						Bethlehem Pike Southbound				
	Left	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
3:15 PM	17	17	7	1	41	0	125	20	0	0	145	23	124	0	147	333
3:30 PM	8	11	13	1	32	0	149	27	1	0	177	19	124	0	143	352
3:45 PM	15	21	8	0	44	0	116	21	2	0	139	32	113	1	145	328
4:00 PM	13	15	4	2	32	0	133	23	2	0	158	15	123	3	138	328
Total	53	64	32	4	149	0	523	91	5	0	619	89	484	4	573	1341
Approach %	35.6	43.0	21.5	-	-	0.0	84.5	14.7	0.8	-	-	15.5	84.5	-	-	-
Total %	4.0	4.8	2.4	-	11.1	0.0	39.0	6.8	0.4	-	46.2	6.6	36.1	-	42.7	-
PHF	0.779	0.762	0.615	-	0.847	0.000	0.878	0.843	0.625	-	0.874	0.695	0.976	-	0.974	0.952
Lights	49	63	31	-	143	0	513	89	5	-	607	85	472	-	557	1307
% Lights	92.5	98.4	96.9	-	96.0	-	98.1	97.8	100.0	-	98.1	95.5	97.5	-	97.2	97.5
Other Vehicles	4	1	1	-	6	0	10	2	0	-	12	4	12	-	16	34
% Other Vehicles	7.5	1.6	3.1	-	4.0	-	1.9	2.2	0.0	-	1.9	4.5	2.5	-	2.8	2.5
Bicycles on Road	0	0	0	-	0	0	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	-	4	-	-	-	-	-	0	-	-	-	4	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017



Turning Movement Peak Hour Data Plot (3:15 PM)

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017

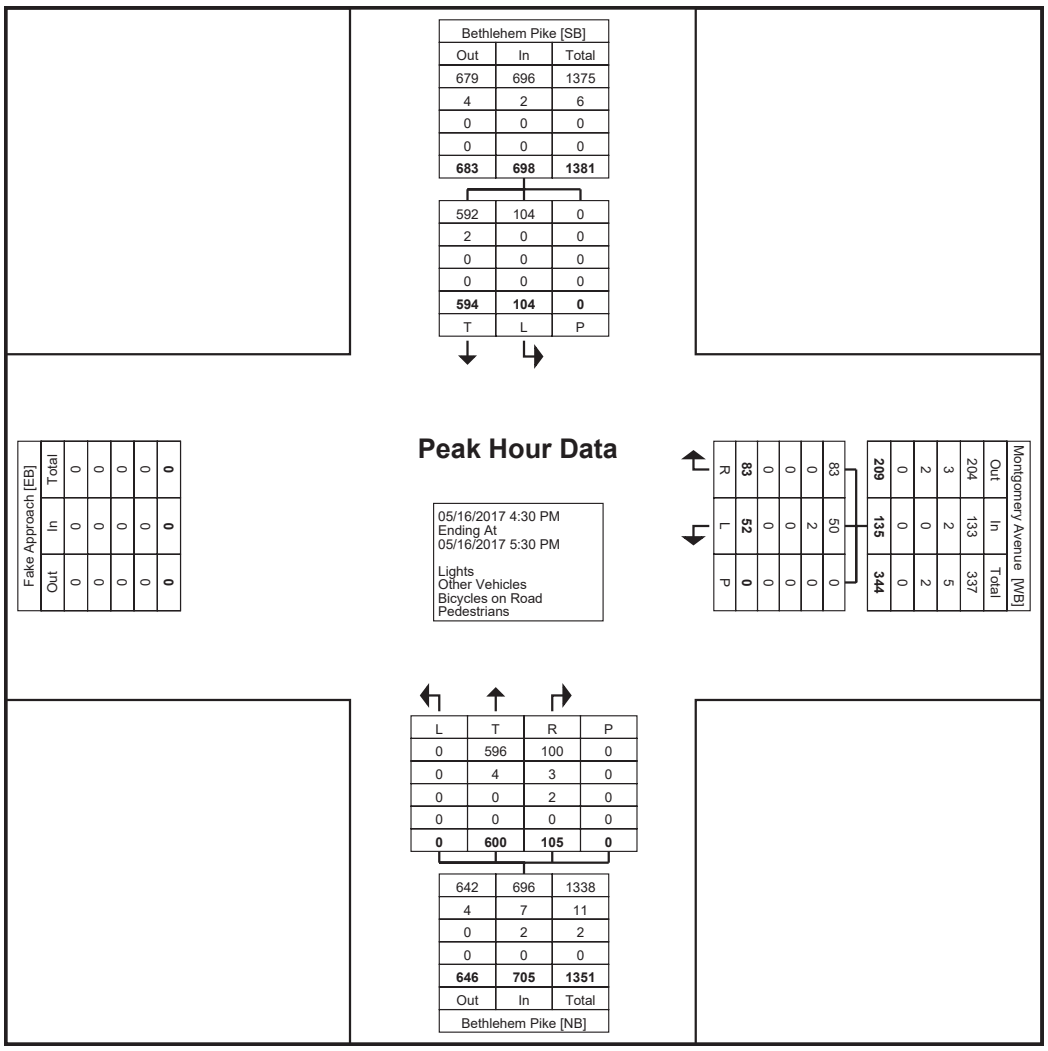
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Montgomery Avenue Westbound					Bethlehem Pike Northbound						Bethlehem Pike Southbound				
	Left	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
4:30 PM	11	18	10	0	39	0	144	11	6	0	161	28	142	0	170	370
4:45 PM	18	15	4	0	37	0	128	15	9	0	152	29	139	0	168	357
5:00 PM	14	13	9	0	36	0	139	29	1	0	169	22	147	0	169	374
5:15 PM	9	5	9	0	23	0	189	32	2	0	223	25	166	0	191	437
Total	52	51	32	0	135	0	600	87	18	0	705	104	594	0	698	1538
Approach %	38.5	37.8	23.7	-	-	0.0	85.1	12.3	2.6	-	-	14.9	85.1	-	-	-
Total %	3.4	3.3	2.1	-	8.8	0.0	39.0	5.7	1.2	-	45.8	6.8	38.6	-	45.4	-
PHF	0.722	0.708	0.800	-	0.865	0.000	0.794	0.680	0.500	-	0.790	0.897	0.895	-	0.914	0.880
Lights	50	51	32	-	133	0	596	82	18	-	696	104	592	-	696	1525
% Lights	96.2	100.0	100.0	-	98.5	-	99.3	94.3	100.0	-	98.7	100.0	99.7	-	99.7	99.2
Other Vehicles	2	0	0	-	2	0	4	3	0	-	7	0	2	-	2	11
% Other Vehicles	3.8	0.0	0.0	-	1.5	-	0.7	3.4	0.0	-	1.0	0.0	0.3	-	0.3	0.7
Bicycles on Road	0	0	0	-	0	0	0	2	0	-	2	0	0	-	0	2
% Bicycles on Road	0.0	0.0	0.0	-	0.0	-	0.0	2.3	0.0	-	0.3	0.0	0.0	-	0.0	0.1
Pedestrians	-	-	-	0	-	-	-	-	-	0	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 jfunk@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather:Clear:

Count Name: Montgomery Avenue and Bethlehem Pike Am/Pm
Site Code:
Start Date: 05/16/2017



Turning Movement Peak Hour Data Plot (4:30 PM)

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
07:00	109	18	0	7	84	0	13	2	0	233
07:15	114	10	0	18	153	0	29	6	0	330
07:30	178	19	0	19	137	0	28	3	0	384
07:45	174	15	0	25	156	0	16	11	0	397
Total	575	62	0	69	530	0	86	22	0	1344
08:00	129	14	0	21	172	0	12	3	0	351
08:15	97	10	0	14	165	0	13	2	0	301
08:30	121	12	0	15	133	0	15	0	0	296
08:45	122	13	0	6	144	0	9	3	0	297
Total	469	49	0	56	614	0	49	8	0	1245
09:00	113	14	0	3	134	0	9	4	0	277
09:15	109	8	0	4	102	0	12	1	0	236
09:30	115	18	0	3	97	0	14	1	0	248
09:45	89	4	0	1	101	0	12	1	0	208
Total	426	44	0	11	434	0	47	7	0	969
10:00	93	10	0	3	77	0	9	3	0	195
10:15	75	17	0	1	67	0	19	0	0	179
10:30	73	7	0	0	88	0	11	0	0	179
10:45	78	15	0	3	95	0	13	3	0	207
Total	319	49	0	7	327	0	52	6	0	760
11:00	75	14	0	1	90	0	15	2	0	197
11:15	105	8	0	2	80	0	12	5	0	212
11:30	80	6	0	1	77	0	9	1	0	174
11:45	75	9	0	0	86	0	8	1	0	179
Total	335	37	0	4	333	0	44	9	0	762
12:00	87	10	0	2	82	0	8	2	0	191
12:15	98	13	0	0	71	0	9	0	0	191
12:30	92	11	0	5	82	0	9	1	0	200
12:45	85	8	0	3	105	0	12	2	0	215
Total	362	42	0	10	340	0	38	5	0	797
13:00	110	22	0	0	91	0	20	0	0	243
13:15	86	15	0	3	99	0	10	2	0	215
13:30	83	10	0	1	103	0	13	2	0	212
13:45	105	10	0	0	81	0	14	2	0	212
Total	384	57	0	4	374	0	57	6	0	882
14:00	86	7	0	0	89	0	16	1	0	199
14:15	107	13	0	2	96	0	14	0	0	232
14:30	103	9	0	2	141	0	19	2	0	276
14:45	97	21	0	0	102	0	19	4	0	243
Total	393	50	0	4	428	0	68	7	0	950
15:00	127	20	0	2	121	0	27	6	0	303
15:15	108	8	0	2	136	0	19	7	0	280

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
15:30	113	13	0	7	125	0	23	9	0	290
15:45	133	10	0	2	158	0	24	8	0	335
Total	481	51	0	13	540	0	93	30	0	1208
16:00	133	21	0	3	143	0	29	10	0	339
16:15	127	8	0	3	130	0	22	20	0	310
16:30	164	13	0	2	134	0	35	19	0	367
16:45	164	12	0	3	163	0	28	27	0	397
Total	588	54	0	11	570	0	114	76	0	1413
17:00	160	18	0	3	156	0	29	22	0	388
17:15	185	16	0	1	166	0	35	31	0	434
17:30	150	15	0	1	158	0	30	31	0	385
17:45	170	19	0	3	139	0	28	41	0	400
Total	665	68	0	8	619	0	122	125	0	1607
Grand Total	4997	563	0	197	5109	0	770	301	0	11937
Apprch %	89.9	10.1	0	3.7	96.3	0	71.9	28.1	0	
Total %	41.9	4.7	0	1.7	42.8	0	6.5	2.5	0	
Passenger Vehicles	4833	553	0	187	4979	0	742	287	0	11581
% Passenger Vehicles	96.7	98.2	0	94.9	97.5	0	96.4	95.3	0	97
Heavy Vehicles	164	10	0	10	130	0	28	14	0	356
% Heavy Vehicles	3.3	1.8	0	5.1	2.5	0	3.6	4.7	0	3

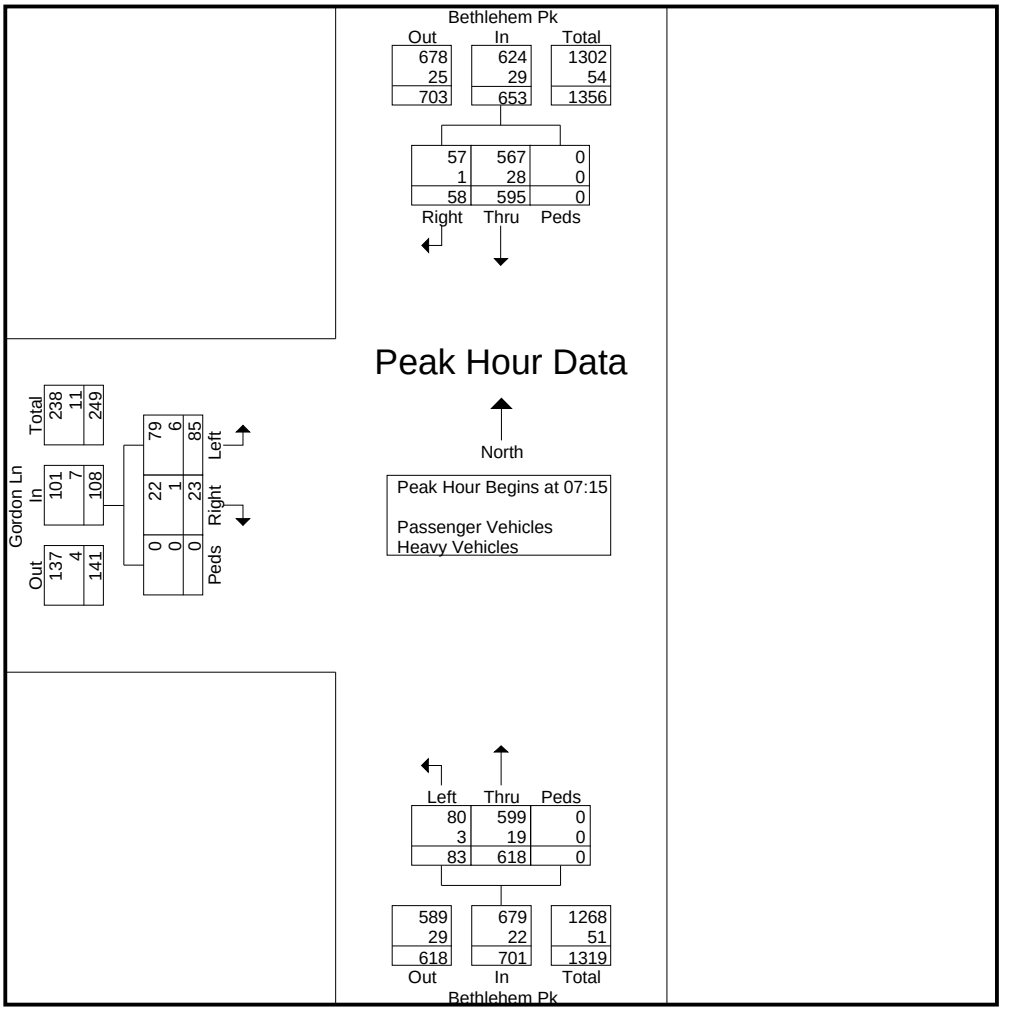
McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 3

	Bethlehem Pk Southbound				Bethlehem Pk Northbound				Gordon Ln Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 09:45 - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15													
07:15	114	10	0	124	18	153	0	171	**29**	6	0	**35**	330
07:30	**178**	**19**	0	**197**	19	137	0	156	28	3	0	31	384
07:45	174	15	0	189	**25**	156	0	181	16	**11**	0	27	**397**
08:00	129	14	0	143	21	**172**	0	**193**	12	3	0	15	351
Total Volume	595	58	0	653	83	618	0	701	85	23	0	108	1462
% App. Total	91.1	8.9	0		11.8	88.2	0		78.7	21.3	0		
PHF	.836	.763	.000	.829	.830	.898	.000	.908	.733	.523	.000	.771	.921
Passenger Vehicles	567	57	0	624	80	599	0	679	79	22	0	101	1404
% Passenger Vehicles	95.3	98.3	0	95.6	96.4	96.9	0	96.9	92.9	95.7	0	93.5	96.0
Heavy Vehicles	28	1	0	29	3	19	0	22	6	1	0	7	58
% Heavy Vehicles	4.7	1.7	0	4.4	3.6	3.1	0	3.1	7.1	4.3	0	6.5	4.0



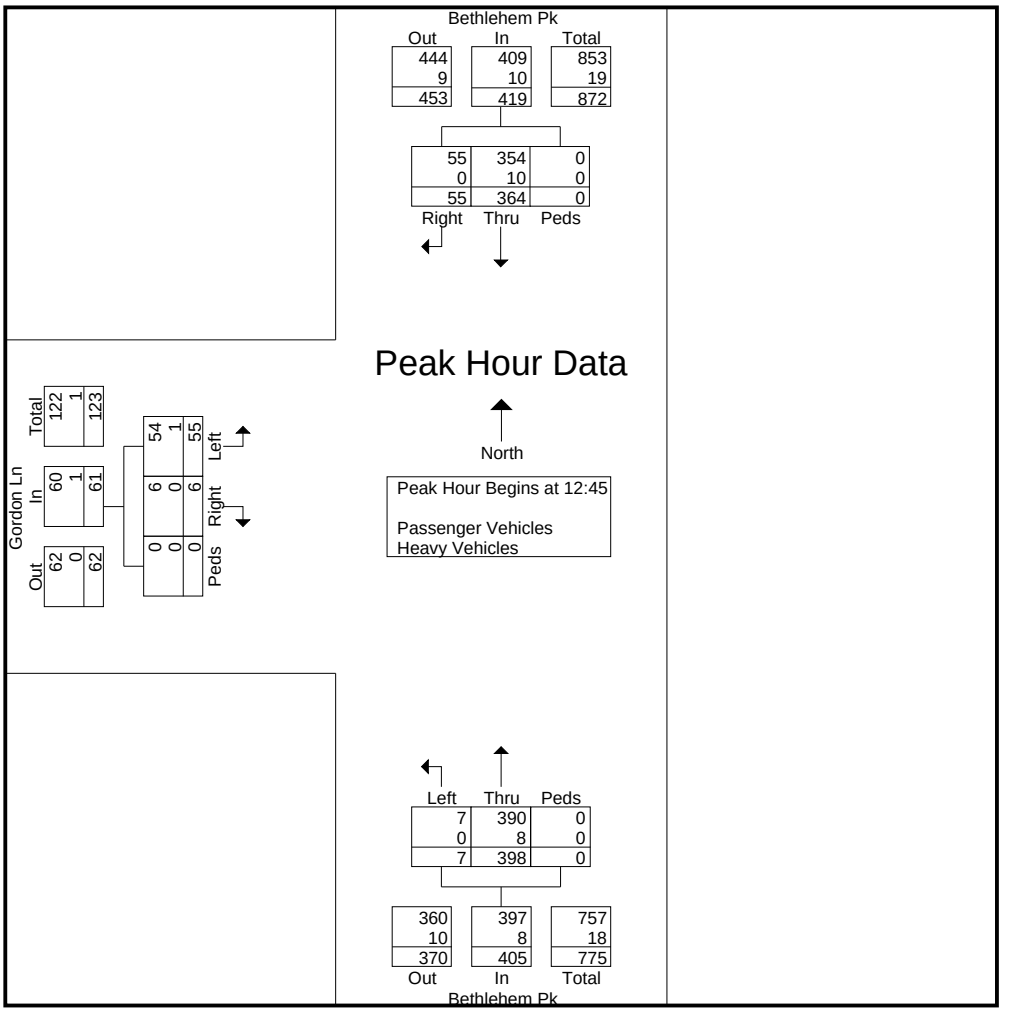
McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 4

	Bethlehem Pk Southbound				Bethlehem Pk Northbound				Gordon Ln Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 to 13:45 - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:45													
12:45	85	8	0	93	**3**	**105**	0	**108**	12	**2**	0	14	215
13:00	**110**	**22**	0	**132**	0	91	0	91	**20**	0	0	**20**	**243**
13:15	86	15	0	101	3	99	0	102	10	2	0	12	215
13:30	83	10	0	93	1	103	0	104	13	2	0	15	212
Total Volume	364	55	0	419	7	398	0	405	55	6	0	61	885
% App. Total	86.9	13.1	0		1.7	98.3	0		90.2	9.8	0		
PHF	.827	.625	.000	.794	.583	.948	.000	.938	.688	.750	.000	.763	.910
Passenger Vehicles	354	55	0	409	7	390	0	397	54	6	0	60	866
% Passenger Vehicles	97.3	100	0	97.6	100	98.0	0	98.0	98.2	100	0	98.4	97.9
Heavy Vehicles	10	0	0	10	0	8	0	8	1	0	0	1	19
% Heavy Vehicles	2.7	0	0	2.4	0	2.0	0	2.0	1.8	0	0	1.6	2.1



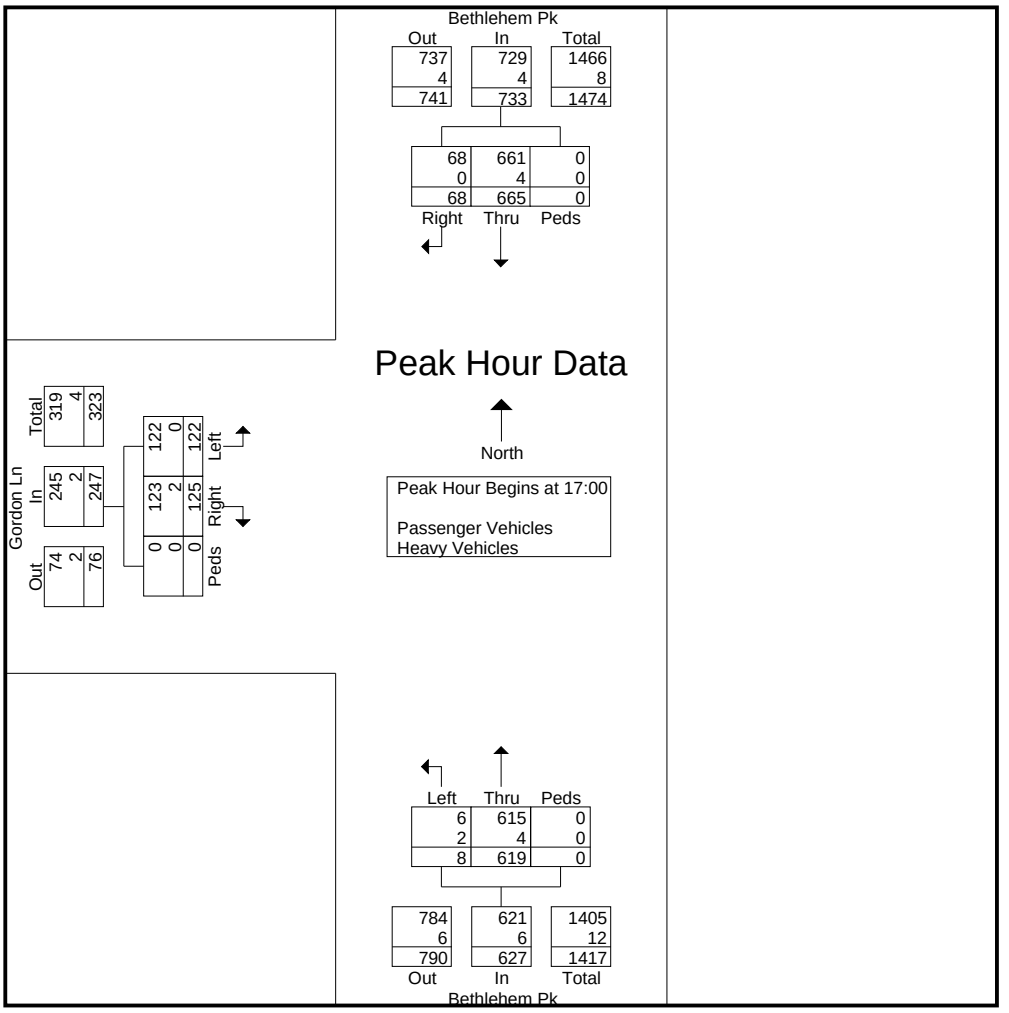
McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 5

	Bethlehem Pk Southbound				Bethlehem Pk Northbound				Gordon Ln Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 17:00													
17:00	160	18	0	178	**3**	156	0	159	29	22	0	51	388
17:15	**185**	16	0	**201**	1	**166**	0	**167**	**35**	31	0	66	**434**
17:30	150	15	0	165	1	158	0	159	30	31	0	61	385
17:45	170	**19**	0	189	3	139	0	142	28	**41**	0	**69**	400
Total Volume	665	68	0	733	8	619	0	627	122	125	0	247	1607
% App. Total	90.7	9.3	0		1.3	98.7	0		49.4	50.6	0		
PHF	.899	.895	.000	.912	.667	.932	.000	.939	.871	.762	.000	.895	.926
Passenger Vehicles	661	68	0	729	6	615	0	621	122	123	0	245	1595
% Passenger Vehicles	99.4	100	0	99.5	75.0	99.4	0	99.0	100	98.4	0	99.2	99.3
Heavy Vehicles	4	0	0	4	2	4	0	6	0	2	0	2	12
% Heavy Vehicles	0.6	0	0	0.5	25.0	0.6	0	1.0	0	1.6	0	0.8	0.7



McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 1

Groups Printed- Passenger Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
07:00	101	17	0	6	80	0	13	1	0	218
07:15	109	9	0	18	148	0	26	6	0	316
07:30	171	19	0	17	132	0	28	2	0	369
07:45	167	15	0	24	152	0	14	11	0	383
Total	548	60	0	65	512	0	81	20	0	1286
08:00	120	14	0	21	167	0	11	3	0	336
08:15	95	10	0	14	162	0	12	2	0	295
08:30	117	12	0	15	131	0	14	0	0	289
08:45	120	13	0	6	139	0	7	3	0	288
Total	452	49	0	56	599	0	44	8	0	1208
09:00	109	14	0	3	133	0	9	4	0	272
09:15	107	8	0	4	100	0	12	1	0	232
09:30	108	18	0	2	95	0	12	1	0	236
09:45	85	4	0	1	98	0	10	1	0	199
Total	409	44	0	10	426	0	43	7	0	939
10:00	90	10	0	3	74	0	9	3	0	189
10:15	70	17	0	1	65	0	19	0	0	172
10:30	69	7	0	0	85	0	11	0	0	172
10:45	76	15	0	3	91	0	11	3	0	199
Total	305	49	0	7	315	0	50	6	0	732
11:00	69	13	0	1	83	0	15	2	0	183
11:15	99	7	0	2	76	0	12	5	0	201
11:30	75	6	0	1	72	0	8	1	0	163
11:45	74	9	0	0	83	0	8	1	0	175
Total	317	35	0	4	314	0	43	9	0	722
12:00	86	10	0	2	78	0	8	2	0	186
12:15	95	13	0	0	68	0	9	0	0	185
12:30	88	11	0	5	80	0	8	1	0	193
12:45	84	8	0	3	105	0	11	2	0	213
Total	353	42	0	10	331	0	36	5	0	777
13:00	104	22	0	0	86	0	20	0	0	232
13:15	84	15	0	3	98	0	10	2	0	212
13:30	82	10	0	1	101	0	13	2	0	209
13:45	100	10	0	0	79	0	14	2	0	205
Total	370	57	0	4	364	0	57	6	0	858
14:00	84	7	0	0	88	0	15	1	0	195
14:15	101	11	0	1	92	0	14	0	0	219
14:30	93	9	0	2	137	0	19	1	0	261
14:45	96	20	0	0	99	0	19	4	0	238
Total	374	47	0	3	416	0	67	6	0	913
15:00	118	20	0	1	117	0	25	5	0	286
15:15	103	8	0	2	131	0	19	5	0	268

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018

Groups Printed- Passenger Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
15:30	109	13	0	6	122	0	22	6	0	278
15:45	131	10	0	2	151	0	23	7	0	324
Total	461	51	0	11	521	0	89	23	0	1156
16:00	131	18	0	3	142	0	27	10	0	331
16:15	126	8	0	3	129	0	20	19	0	305
16:30	163	13	0	2	134	0	35	18	0	365
16:45	163	12	0	3	161	0	28	27	0	394
Total	583	51	0	11	566	0	110	74	0	1395
17:00	160	18	0	2	156	0	29	22	0	387
17:15	184	16	0	1	164	0	35	31	0	431
17:30	149	15	0	0	157	0	30	30	0	381
17:45	168	19	0	3	138	0	28	40	0	396
Total	661	68	0	6	615	0	122	123	0	1595
Grand Total	4833	553	0	187	4979	0	742	287	0	11581
Apprch %	89.7	10.3	0	3.6	96.4	0	72.1	27.9	0	
Total %	41.7	4.8	0	1.6	43	0	6.4	2.5	0	

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 1

Groups Printed- Heavy Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
07:00	8	1	0	1	4	0	0	1	0	15
07:15	5	1	0	0	5	0	3	0	0	14
07:30	7	0	0	2	5	0	0	1	0	15
07:45	7	0	0	1	4	0	2	0	0	14
Total	27	2	0	4	18	0	5	2	0	58
08:00	9	0	0	0	5	0	1	0	0	15
08:15	2	0	0	0	3	0	1	0	0	6
08:30	4	0	0	0	2	0	1	0	0	7
08:45	2	0	0	0	5	0	2	0	0	9
Total	17	0	0	0	15	0	5	0	0	37
09:00	4	0	0	0	1	0	0	0	0	5
09:15	2	0	0	0	2	0	0	0	0	4
09:30	7	0	0	1	2	0	2	0	0	12
09:45	4	0	0	0	3	0	2	0	0	9
Total	17	0	0	1	8	0	4	0	0	30
10:00	3	0	0	0	3	0	0	0	0	6
10:15	5	0	0	0	2	0	0	0	0	7
10:30	4	0	0	0	3	0	0	0	0	7
10:45	2	0	0	0	4	0	2	0	0	8
Total	14	0	0	0	12	0	2	0	0	28
11:00	6	1	0	0	7	0	0	0	0	14
11:15	6	1	0	0	4	0	0	0	0	11
11:30	5	0	0	0	5	0	1	0	0	11
11:45	1	0	0	0	3	0	0	0	0	4
Total	18	2	0	0	19	0	1	0	0	40
12:00	1	0	0	0	4	0	0	0	0	5
12:15	3	0	0	0	3	0	0	0	0	6
12:30	4	0	0	0	2	0	1	0	0	7
12:45	1	0	0	0	0	0	1	0	0	2
Total	9	0	0	0	9	0	2	0	0	20
13:00	6	0	0	0	5	0	0	0	0	11
13:15	2	0	0	0	1	0	0	0	0	3
13:30	1	0	0	0	2	0	0	0	0	3
13:45	5	0	0	0	2	0	0	0	0	7
Total	14	0	0	0	10	0	0	0	0	24
14:00	2	0	0	0	1	0	1	0	0	4
14:15	6	2	0	1	4	0	0	0	0	13
14:30	10	0	0	0	4	0	0	1	0	15
14:45	1	1	0	0	3	0	0	0	0	5
Total	19	3	0	1	12	0	1	1	0	37
15:00	9	0	0	1	4	0	2	1	0	17
15:15	5	0	0	0	5	0	0	2	0	12

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018

Groups Printed- Heavy Vehicles

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
15:30	4	0	0	1	3	0	1	3	0	12
15:45	2	0	0	0	7	0	1	1	0	11
Total	20	0	0	2	19	0	4	7	0	52
16:00	2	3	0	0	1	0	2	0	0	8
16:15	1	0	0	0	1	0	2	1	0	5
16:30	1	0	0	0	0	0	0	1	0	2
16:45	1	0	0	0	2	0	0	0	0	3
Total	5	3	0	0	4	0	4	2	0	18
17:00	0	0	0	1	0	0	0	0	0	1
17:15	1	0	0	0	2	0	0	0	0	3
17:30	1	0	0	1	1	0	0	1	0	4
17:45	2	0	0	0	1	0	0	1	0	4
Total	4	0	0	2	4	0	0	2	0	12
Grand Total	164	10	0	10	130	0	28	14	0	356
Apprch %	94.3	5.7	0	7.1	92.9	0	66.7	33.3	0	
Total %	46.1	2.8	0	2.8	36.5	0	7.9	3.9	0	

McMahon Associates, Inc.

425 Commerce Drive, Suite 200
Fort Washington, PA 19034
Transportation Engineers and Planners

Municipality: Springfield Township
Location: Bethlehem Pike
& Gordon Lane
Counter: M

File Name : gordon01w
Site Code :
Start Date : 10/16/2018
Page No : 1

Groups Printed- Pedestrians

	Bethlehem Pk Southbound			Bethlehem Pk Northbound			Gordon Ln Eastbound			
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Int. Total
07:30	0	0	1	0	0	0	0	0	0	1
07:45	0	0	1	0	0	1	0	0	1	3
Total	0	0	2	0	0	1	0	0	1	4
09:15	0	0	0	0	0	0	0	0	1	1
09:30	0	0	2	0	0	0	0	0	0	2
Total	0	0	2	0	0	0	0	0	1	3
11:00	0	0	1	0	0	0	0	0	1	2
11:15	0	0	0	0	0	0	0	0	1	1
Total	0	0	1	0	0	0	0	0	2	3
13:15	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	1	1
14:15	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	1	0	0	1	2
15:00	0	0	0	0	0	0	0	0	1	1
15:15	0	0	1	0	0	1	0	0	1	3
Total	0	0	1	0	0	1	0	0	2	4
16:15	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	1	1
Grand Total	0	0	6	0	0	3	0	0	9	18
Apprch %	0	0	100	0	0	100	0	0	100	
Total %	0	0	33.3	0	0	16.7	0	0	50	

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:00	0	7	50	0	8	12	77
06:15	2	12	72	0	4	15	105
06:30	0	5	62	0	5	31	103
06:45	0	16	90	0	3	32	141
Total	2	40	274	0	20	90	426
07:00	1	14	87	3	11	27	143
07:15	1	17	87	0	9	38	152
07:30	0	18	84	1	6	38	147
07:45	2	23	104	0	9	38	176
Total	4	72	362	4	35	141	618
08:00	2	16	78	0	10	40	146
08:15	1	11	91	2	7	37	149
08:30	1	15	88	2	5	44	155
08:45	2	10	87	0	9	29	137
Total	6	52	344	4	31	150	587
11:00	1	5	47	0	5	28	86
11:15	0	3	55	1	9	34	102
11:30	1	8	46	0	6	29	90
11:45	0	12	44	0	10	27	93
Total	2	28	192	1	30	118	371
12:00	2	11	50	2	6	32	103
12:15	0	9	46	2	13	38	108
12:30	2	5	57	0	12	28	104
12:45	1	10	57	2	12	33	115
Total	5	35	210	6	43	131	430
13:00	0	11	56	1	4	26	98
13:15	1	6	55	0	3	33	98
13:30	0	8	49	1	7	29	94
13:45	0	10	63	1	10	36	120
Total	1	35	223	3	24	124	410
16:00	0	8	61	2	12	61	144
16:15	2	9	54	2	26	85	178
16:30	0	7	64	0	22	77	170
16:45	0	13	61	1	25	81	181
Total	2	37	240	5	85	304	673
17:00	0	10	82	2	26	85	205
17:15	0	10	88	2	25	106	231
17:30	1	5	62	2	20	127	217
17:45	0	12	95	1	34	123	265
Total	1	37	327	7	105	441	918

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 2

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
18:00	1	10	79	0	28	102	220
18:15	2	11	79	1	22	102	217
18:30	1	9	62	0	22	95	189
18:45	0	5	58	1	20	95	179
Total	4	35	278	2	92	394	805
Grand Total	27	371	2450	32	465	1893	5238
Apprch %	6.8	93.2	98.7	1.3	19.7	80.3	
Total %	0.5	7.1	46.8	0.6	8.9	36.1	
Passenger Vehicles	25	359	2378	26	453	1834	5075
% Passenger Vehicles	92.6	96.8	97.1	81.2	97.4	96.9	96.9
Heavy Vehicles	2	12	72	6	12	59	163
% Heavy Vehicles	7.4	3.2	2.9	18.8	2.6	3.1	3.1

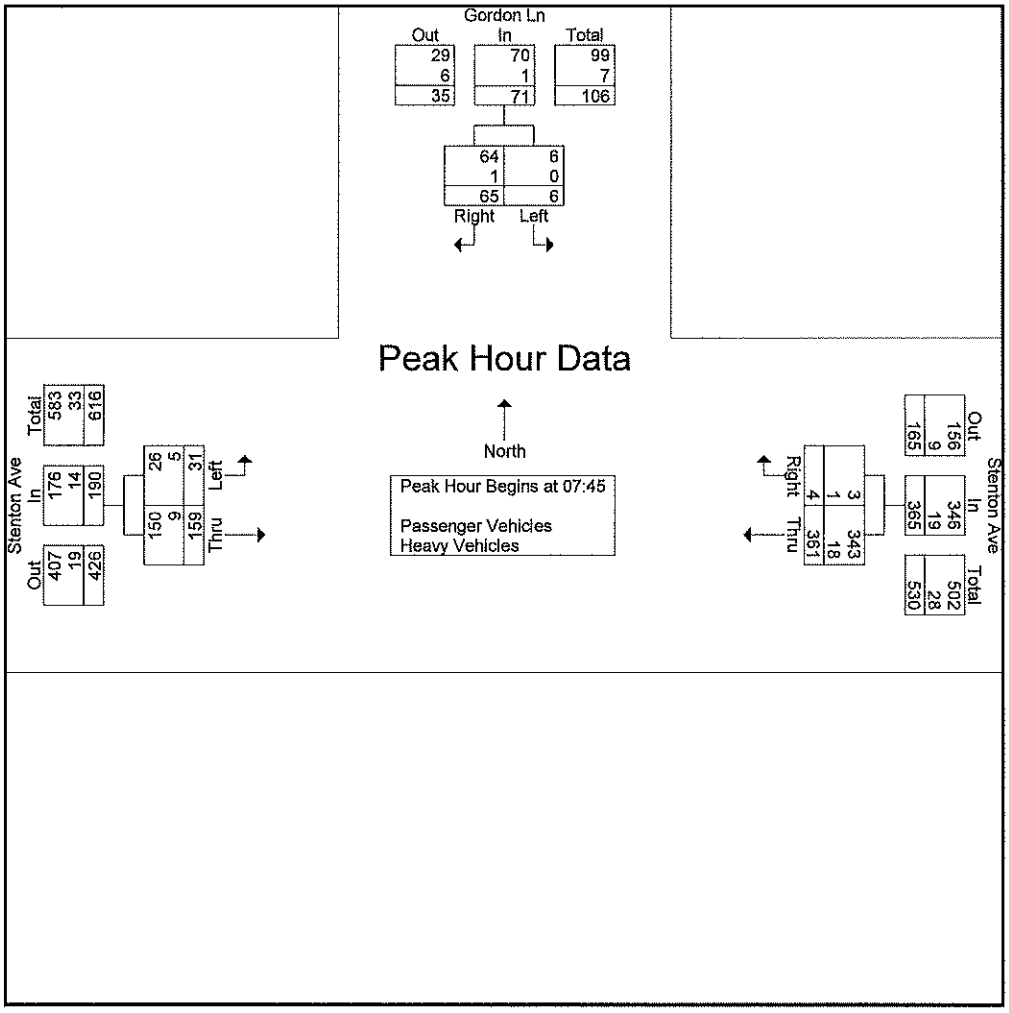
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 3

	Gordon Ln Southbound			Stenton Ave Westbound			Stenton Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	**2**	**23**	**25**	**104**	0	**104**	9	38	47	**176**
08:00	2	16	18	78	0	78	**10**	40	**50**	146
08:15	1	11	12	91	**2**	93	7	37	44	149
08:30	1	15	16	88	2	90	5	**44**	49	155
Total Volume	6	65	71	361	4	365	31	159	190	626
% App. Total	8.5	91.5		98.9	1.1		16.3	83.7		
PHF	.750	.707	.710	.868	.500	.877	.775	.903	.950	.889
Passenger Vehicles	6	64	70	343	3	346	26	150	176	592
% Passenger Vehicles	100	98.5	98.6	95.0	75.0	94.8	83.9	94.3	92.6	94.6
Heavy Vehicles	0	1	1	18	1	19	5	9	14	34
% Heavy Vehicles	0	1.5	1.4	5.0	25.0	5.2	16.1	5.7	7.4	5.4



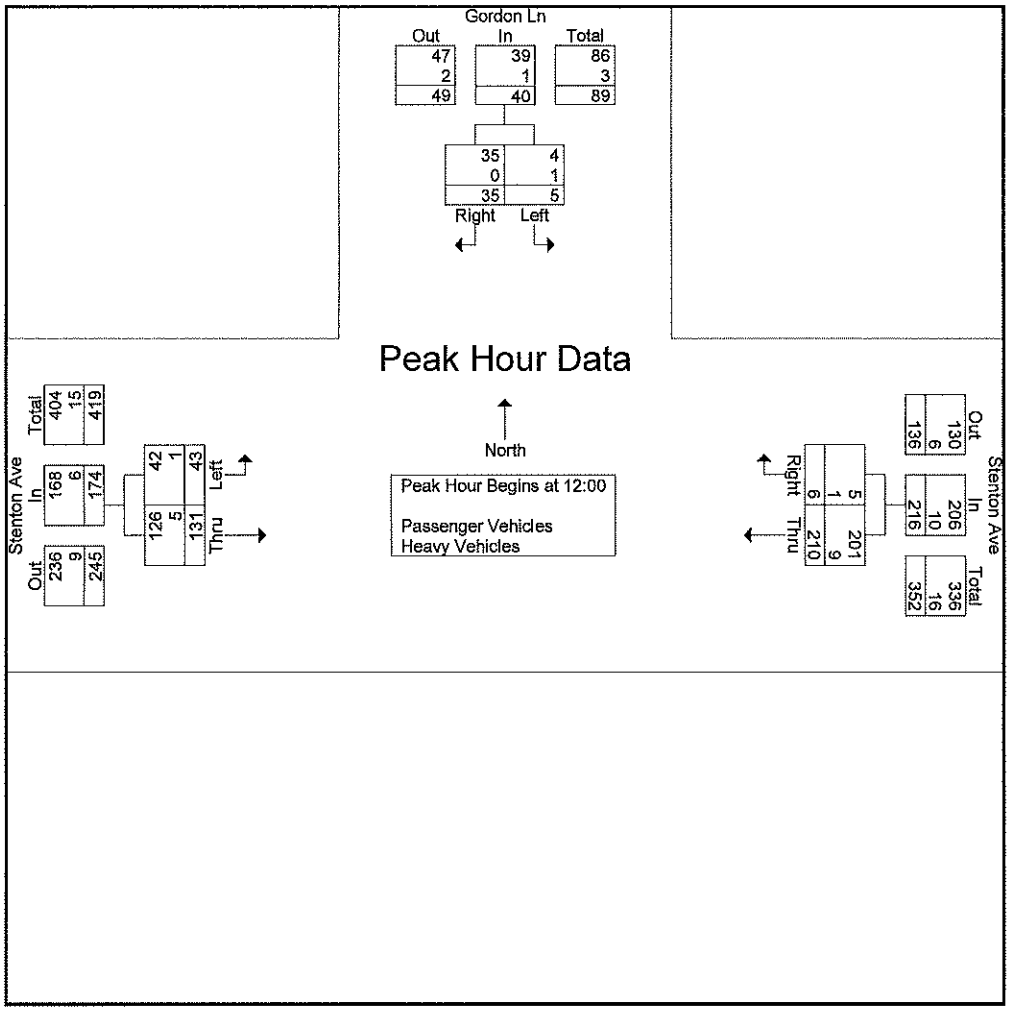
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 4

	Gordon Ln Southbound			Stenton Ave Westbound			Stenton Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00										
12:00	**2**	**11**	**13**	50	**2**	52	6	32	38	103
12:15	0	9	9	46	2	48	**13**	**38**	**51**	108
12:30	2	5	7	**57**	0	57	12	28	40	104
12:45	1	10	11	57	2	**59**	12	33	45	**115**
Total Volume	5	35	40	210	6	216	43	131	174	430
% App. Total	12.5	87.5		97.2	2.8		24.7	75.3		
PHF	.625	.795	.769	.921	.750	.915	.827	.862	.853	.935
Passenger Vehicles	4	35	39	201	5	206	42	126	168	413
% Passenger Vehicles	80.0	100	97.5	95.7	83.3	95.4	97.7	96.2	96.6	96.0
Heavy Vehicles	1	0	1	9	1	10	1	5	6	17
% Heavy Vehicles	20.0	0	2.5	4.3	16.7	4.6	2.3	3.8	3.4	4.0



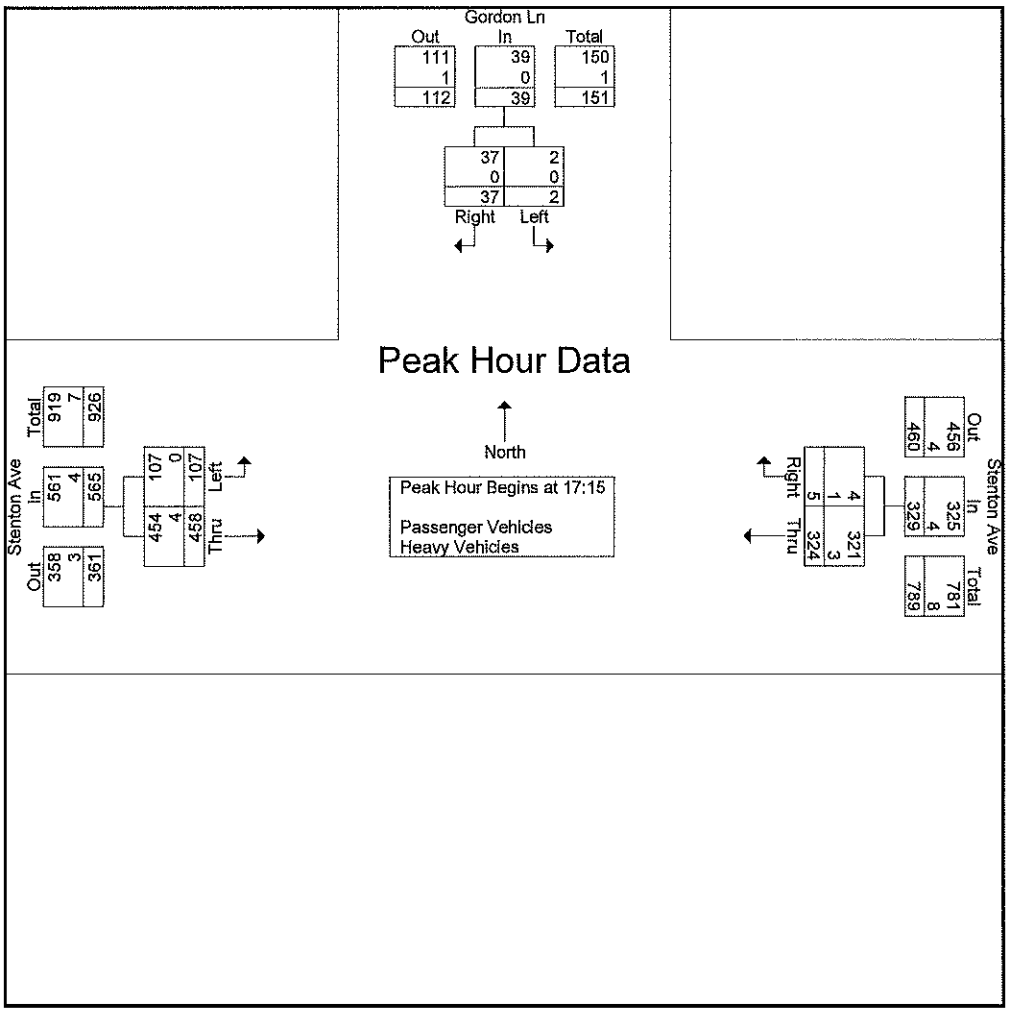
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 5

	Gordon Ln Southbound			Stenton Ave Westbound			Stenton Ave Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 18:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:15										
17:15	0	10	10	88	**2**	90	25	106	131	231
17:30	**1**	5	6	62	2	64	20	**127**	147	217
17:45	0	**12**	**12**	**95**	1	**96**	**34**	123	**157**	**265**
18:00	1	10	11	79	0	79	28	102	130	220
Total Volume	2	37	39	324	5	329	107	458	565	933
% App. Total	5.1	94.9		98.5	1.5		18.9	81.1		
PHF	.500	.771	.813	.853	.625	.857	.787	.902	.900	.880
Passenger Vehicles	2	37	39	321	4	325	107	454	561	925
% Passenger Vehicles	100	100	100	99.1	80.0	98.8	100	99.1	99.3	99.1
Heavy Vehicles	0	0	0	3	1	4	0	4	4	8
% Heavy Vehicles	0	0	0	0.9	20.0	1.2	0	0.9	0.7	0.9



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Passenger Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:00	0	7	48	0	8	10	73
06:15	2	11	71	0	4	15	103
06:30	0	4	62	0	5	30	101
06:45	0	15	88	0	3	32	138
Total	2	37	269	0	20	87	415
07:00	1	14	81	1	10	21	128
07:15	0	15	83	0	8	33	139
07:30	0	18	80	0	6	36	140
07:45	2	22	97	0	8	37	166
Total	3	69	341	1	32	127	573
08:00	2	16	76	0	9	37	140
08:15	1	11	86	2	5	32	137
08:30	1	15	84	1	4	44	149
08:45	2	10	85	0	9	25	131
Total	6	52	331	3	27	138	557
11:00	1	3	46	0	5	25	80
11:15	0	3	54	1	9	32	99
11:30	1	7	46	0	6	27	87
11:45	0	12	42	0	10	26	90
Total	2	25	188	1	30	110	356
12:00	1	11	48	2	6	32	100
12:15	0	9	42	2	13	36	102
12:30	2	5	55	0	11	27	100
12:45	1	10	56	1	12	31	111
Total	4	35	201	5	42	126	413
13:00	0	10	54	1	4	25	94
13:15	1	5	54	0	3	33	96
13:30	0	7	49	1	7	28	92
13:45	0	10	62	1	9	34	116
Total	1	32	219	3	23	120	398
16:00	0	8	61	2	12	59	142
16:15	2	9	50	2	24	85	172
16:30	0	7	62	0	21	75	165
16:45	0	13	60	1	25	80	179
Total	2	37	233	5	82	299	658
17:00	0	10	79	2	26	84	201
17:15	0	10	86	2	25	105	228
17:30	1	5	62	1	20	127	216
17:45	0	12	94	1	34	121	262
Total	1	37	321	6	105	437	907

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 2

Groups Printed- Passenger Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
18:00	1	10	79	0	28	101	219
18:15	2	11	77	1	22	100	213
18:30	1	9	61	0	22	95	188
18:45	0	5	58	1	20	94	178
Total	4	35	275	2	92	390	798
Grand Total	25	359	2378	26	453	1834	5075
Apprch %	6.5	93.5	98.9	1.1	19.8	80.2	
Total %	0.5	7.1	46.9	0.5	8.9	36.1	

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
06:00	0	0	2	0	0	2	4
06:15	0	1	1	0	0	0	2
06:30	0	1	0	0	0	1	2
06:45	0	1	2	0	0	0	3
Total	0	3	5	0	0	3	11
07:00	0	0	6	2	1	6	15
07:15	1	2	4	0	1	5	13
07:30	0	0	4	1	0	2	7
07:45	0	1	7	0	1	1	10
Total	1	3	21	3	3	14	45
08:00	0	0	2	0	1	3	6
08:15	0	0	5	0	2	5	12
08:30	0	0	4	1	1	0	6
08:45	0	0	2	0	0	4	6
Total	0	0	13	1	4	12	30
11:00	0	2	1	0	0	3	6
11:15	0	0	1	0	0	2	3
11:30	0	1	0	0	0	2	3
11:45	0	0	2	0	0	1	3
Total	0	3	4	0	0	8	15
12:00	1	0	2	0	0	0	3
12:15	0	0	4	0	0	2	6
12:30	0	0	2	0	1	1	4
12:45	0	0	1	1	0	2	4
Total	1	0	9	1	1	5	17
13:00	0	1	2	0	0	1	4
13:15	0	1	1	0	0	0	2
13:30	0	1	0	0	0	1	2
13:45	0	0	1	0	1	2	4
Total	0	3	4	0	1	4	12
16:00	0	0	0	0	0	2	2
16:15	0	0	4	0	2	0	6
16:30	0	0	2	0	1	2	5
16:45	0	0	1	0	0	1	2
Total	0	0	7	0	3	5	15
17:00	0	0	3	0	0	1	4
17:15	0	0	2	0	0	1	3
17:30	0	0	0	1	0	0	1
17:45	0	0	1	0	0	2	3
Total	0	0	6	1	0	4	11

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 2

Groups Printed- Heavy Vehicles

	Gordon Ln Southbound		Stenton Ave Westbound		Stenton Ave Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
18:00	0	0	0	0	0	1	1
18:15	0	0	2	0	0	2	4
18:30	0	0	1	0	0	0	1
18:45	0	0	0	0	0	1	1
Total	0	0	3	0	0	4	7
Grand Total	2	12	72	6	12	59	163
Apprch %	14.3	85.7	92.3	7.7	16.9	83.1	
Total %	1.2	7.4	44.2	3.7	7.4	36.2	

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Gordon Lane
Counter: M

File Name : springfieldsig01w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Pedestrians

Start Time	Gordon Ln Southbound E/W	Stenton Ave Westbound N/S	Stenton Ave Eastbound N/S	Int. Total
12:00	1	0	0	1
Total	1	0	0	1
13:00	1	0	0	1
Total	1	0	0	1
Grand Total	2	0	0	2
Apprch %	100	0	0	
Total %	100	0	0	

ATTACHMENT C

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

ATTACHMENT D

2019 Existing Capacity/Levels-of-Service Analysis Worksheets

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	82	117	605	65	61	540
Future Volume (vph)	82	117	605	65	61	540
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.921		0.986			
Flt Protected	0.980					0.995
Satd. Flow (prot)	1653	0	3162	0	0	3160
Flt Permitted	0.980					0.815
Satd. Flow (perm)	1653	0	3162	0	0	2588
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	75		27			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	3%	4%	5%	4%
Adj. Flow (vph)	86	123	637	68	64	568
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	705	0	0	632
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 32 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

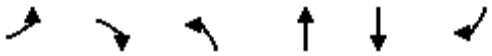
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	82	117	605	65	61	540
Future Volume (veh/h)	82	117	605	65	61	540
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1758	1758	1744	1744
Adj Flow Rate, veh/h	86	86	637	60	64	568
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	3	3	4	4
Cap, veh/h	112	112	2354	221	238	2031
Arrive On Green	0.14	0.13	0.76	0.75	0.75	0.76
Sat Flow, veh/h	819	819	3173	290	249	2741
Grp Volume(v), veh/h	173	0	344	353	310	322
Grp Sat Flow(s),veh/h/ln	1648	0	1670	1706	1403	1508
Q Serve(g_s), s	9.1	0.0	5.5	5.6	0.0	5.8
Cycle Q Clear(g_c), s	9.1	0.0	5.5	5.6	4.7	5.8
Prop In Lane	0.50	0.50		0.17	0.21	
Lane Grp Cap(c), veh/h	226	0	1274	1301	1103	1150
V/C Ratio(X)	0.77	0.00	0.27	0.27	0.28	0.28
Avail Cap(c_a), veh/h	385	0	1274	1301	1103	1150
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	0.0	3.2	3.2	3.1	3.2
Incr Delay (d2), s/veh	5.4	0.0	0.5	0.5	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.2	0.0	2.5	2.6	2.5	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	43.1	0.0	3.7	3.7	3.7	3.8
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	173		697			632
Approach Delay, s/veh	43.1		3.7			3.8
Approach LOS	D		A			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	73.7			73.7	16.3
Change Period (Y+Rc), s	6.0			6.0	5.0
Max Green Setting (Gmax), s	59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s	7.6			7.8	11.1
Green Ext Time (p_c), s	1.8			1.8	0.4

Intersection Summary	
HCM 6th Ctrl Delay	8.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	85	23	83	620	597	58
Future Volume (vph)	85	23	83	620	597	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.971				0.987	
Flt Protected	0.962			0.994		
Satd. Flow (prot)	1650	0	0	3314	3116	0
Flt Permitted	0.962			0.994		
Satd. Flow (perm)	1650	0	0	3314	3116	0
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	4%	4%	3%	5%	2%
Adj. Flow (vph)	92	25	90	674	649	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	0	0	764	712	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	85	23	83	620	597	58
Future Vol, veh/h	85	23	83	620	597	58
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-8	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	4	4	3	5	2
Mvmt Flow	92	25	90	674	649	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1198	356	712	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	517	-	-	-	-	-
Critical Hdwy	7.3	7	3.9	-	-	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	2.4	-	-	-
Pot Cap-1 Maneuver	174	715	871	-	-	-
Stage 1	581	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	715	871	-	-	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	705	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	59.7	1.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	871	-	175	-	-
HCM Lane V/C Ratio	0.104	-	0.671	-	-
HCM Control Delay (s)	9.6	0.6	59.7	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	3.9	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	123	361	11	92	159
Future Volume (vph)	11	123	361	11	92	159
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876		0.996			
Flt Protected	0.996					0.982
Satd. Flow (prot)	1661	0	1617	0	0	1497
Flt Permitted	0.996					0.982
Satd. Flow (perm)	1661	0	1617	0	0	1497
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	2%	5%	25%	16%	6%
Adj. Flow (vph)	12	138	406	12	103	179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	150	0	418	0	0	282
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	123	361	11	92	159
Future Vol, veh/h	11	123	361	11	92	159
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	2	5	25	16	6
Mvmt Flow	12	138	406	12	103	179

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	797	412	0	0	418	0
Stage 1	412	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Critical Hdwy	6	6.02	-	-	4.3	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	435	693	-	-	863	-
Stage 1	800	-	-	-	-	-
Stage 2	822	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	377	693	-	-	863	-
Mov Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	713	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	3.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	648	863	-
HCM Lane V/C Ratio	-	-	0.232	0.12	-
HCM Control Delay (s)	-	-	12.2	9.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0.4	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	53	97	526	97	89	487
Future Volume (vph)	53	97	526	97	89	487
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.913		0.977			
Flt Protected	0.983					0.992
Satd. Flow (prot)	1611	0	3167	0	0	3174
Flt Permitted	0.983					0.757
Satd. Flow (perm)	1611	0	3167	0	0	2422
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	95		50			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	8%	2%	2%	2%	5%	3%
Adj. Flow (vph)	56	102	554	102	94	513
Shared Lane Traffic (%)						
Lane Group Flow (vph)	158	0	656	0	0	607
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 79 (88%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

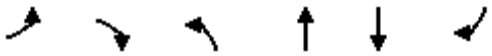
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	53	97	526	97	89	487
Future Volume (veh/h)	53	97	526	97	89	487
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1772	1772	1758	1758
Adj Flow Rate, veh/h	56	68	554	97	94	513
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	2	2	3	3
Cap, veh/h	77	94	2270	396	356	1899
Arrive On Green	0.11	0.10	0.79	0.78	0.78	0.79
Sat Flow, veh/h	717	870	2954	500	383	2476
Grp Volume(v), veh/h	125	0	325	326	284	323
Grp Sat Flow(s),veh/h/ln	1600	0	1683	1682	1259	1520
Q Serve(g_s), s	6.8	0.0	4.5	4.6	0.2	5.0
Cycle Q Clear(g_c), s	6.8	0.0	4.5	4.6	4.7	5.0
Prop In Lane	0.45	0.54		0.30	0.33	
Lane Grp Cap(c), veh/h	172	0	1334	1333	1037	1204
V/C Ratio(X)	0.73	0.00	0.24	0.24	0.27	0.27
Avail Cap(c_a), veh/h	373	0	1334	1333	1037	1204
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.1	0.0	2.4	2.5	2.4	2.5
Incr Delay (d2), s/veh	5.7	0.0	0.4	0.4	0.7	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.3	0.0	1.8	1.8	1.8	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.9	0.0	2.8	2.9	3.0	3.0
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	125		651			607
Approach Delay, s/veh	44.9		2.9			3.0
Approach LOS	D		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		76.3			76.3	13.7
Change Period (Y+Rc), s		6.0			6.0	5.0
Max Green Setting (Gmax), s		59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s		6.6			7.0	8.8
Green Ext Time (p_c), s		1.7			1.8	0.3

Intersection Summary	
HCM 6th Ctrl Delay	6.7
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	72	6	7	520	446	67
Future Volume (vph)	72	6	7	520	446	67
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.989				0.980	
Flt Protected	0.956			0.999		
Satd. Flow (prot)	1744	0	0	3368	3158	0
Flt Permitted	0.956			0.999		
Satd. Flow (perm)	1744	0	0	3368	3158	0
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	2%	3%	0%
Adj. Flow (vph)	79	7	8	571	490	74
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	0	0	579	564	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	72	6	7	520	446	67
Future Vol, veh/h	72	6	7	520	446	67
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-8	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	0	0	2	3	0
Mvmt Flow	79	7	8	571	490	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	829	282	564	0	-	0
Stage 1	527	-	-	-	-	-
Stage 2	302	-	-	-	-	-
Critical Hdwy	7.3	7	3.9	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	2.4	-	-	-
Pot Cap-1 Maneuver	325	802	977	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	914	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	802	977	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	699	-	-	-	-	-
Stage 2	914	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	977	-	337	-	-
HCM Lane V/C Ratio	0.008	-	0.254	-	-
HCM Control Delay (s)	8.7	0.1	19.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	1	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	58	210	9	65	131
Future Volume (vph)	8	58	210	9	65	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.882		0.994			
Flt Protected	0.994					0.984
Satd. Flow (prot)	1658	0	1629	0	0	1592
Flt Permitted	0.994					0.984
Satd. Flow (perm)	1658	0	1629	0	0	1592
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	20%	0%	4%	17%	2%	4%
Adj. Flow (vph)	9	62	223	10	69	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	0	233	0	0	208
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	58	210	9	65	131
Future Vol, veh/h	8	58	210	9	65	131
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	20	0	4	17	2	4
Mvmt Flow	9	62	223	10	69	139

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	505	228	0	0	233	0
Stage 1	228	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.2	6	-	-	4.3	-
Critical Hdwy Stg 1	5.2	-	-	-	-	-
Critical Hdwy Stg 2	5.2	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	616	875	-	-	1000	-
Stage 1	948	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	570	875	-	-	1000	-
Mov Cap-2 Maneuver	570	-	-	-	-	-
Stage 1	948	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	822	1000	-
HCM Lane V/C Ratio	-	-	0.085	0.069	-
HCM Control Delay (s)	-	-	9.8	8.9	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	53	83	603	106	105	645
Future Volume (vph)	53	83	603	106	105	645
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.918		0.978			
Flt Protected	0.981					0.993
Satd. Flow (prot)	1658	0	3192	0	0	3283
Flt Permitted	0.981					0.717
Satd. Flow (perm)	1658	0	3192	0	0	2370
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	82		47			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	0%	1%	3%	0%	0%
Adj. Flow (vph)	60	94	685	120	119	733
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	0	805	0	0	852
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 22 (24%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

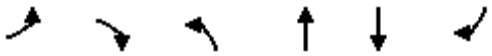
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	53	83	603	106	105	645
Future Volume (veh/h)	53	83	603	106	105	645
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1786	1786	1800	1800
Adj Flow Rate, veh/h	60	58	685	100	119	733
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	1	1	0	0
Cap, veh/h	84	82	2375	346	329	1949
Arrive On Green	0.10	0.09	0.80	0.79	0.79	0.80
Sat Flow, veh/h	839	811	3061	433	347	2521
Grp Volume(v), veh/h	119	0	391	394	383	469
Grp Sat Flow(s),veh/h/ln	1664	0	1697	1708	1229	1556
Q Serve(g_s), s	6.2	0.0	5.4	5.5	1.4	7.8
Cycle Q Clear(g_c), s	6.2	0.0	5.4	5.5	6.9	7.8
Prop In Lane	0.50	0.49		0.25	0.31	
Lane Grp Cap(c), veh/h	168	0	1356	1365	1021	1244
V/C Ratio(X)	0.71	0.00	0.29	0.29	0.38	0.38
Avail Cap(c_a), veh/h	388	0	1356	1365	1021	1244
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.4	0.0	2.4	2.4	2.4	2.6
Incr Delay (d2), s/veh	5.5	0.0	0.5	0.5	1.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.1	0.0	2.1	2.2	2.5	2.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.9	0.0	2.9	2.9	3.5	3.5
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	119		785			852
Approach Delay, s/veh	44.9		2.9			3.5
Approach LOS	D		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		76.9			76.9	13.1
Change Period (Y+Rc), s		6.0			6.0	5.0
Max Green Setting (Gmax), s		59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s		7.5			9.8	8.2
Green Ext Time (p_c), s		2.0			2.8	0.3

Intersection Summary	
HCM 6th Ctrl Delay	6.0
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	122	125	8	621	667	68
Future Volume (vph)	122	125	8	621	667	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.932				0.986	
Flt Protected	0.976			0.999		
Satd. Flow (prot)	1692	0	0	3390	3230	0
Flt Permitted	0.976			0.999		
Satd. Flow (perm)	1692	0	0	3390	3230	0
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	25%	1%	1%	0%
Adj. Flow (vph)	131	134	9	668	717	73
Shared Lane Traffic (%)						
Lane Group Flow (vph)	265	0	0	677	790	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	122	125	8	621	667	68
Future Vol, veh/h	122	125	8	621	667	68
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-8	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	2	25	1	1	0
Mvmt Flow	131	134	9	668	717	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1106	395	790	0	-	0
Stage 1	754	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Critical Hdwy	7.3	7	3.9	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	2.4	-	-	-
Pot Cap-1 Maneuver	204	672	820	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	867	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	201	672	820	-	-	-
Mov Cap-2 Maneuver	201	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	867	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	58.1	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	820	-	311	-	-
HCM Lane V/C Ratio	0.01	-	0.854	-	-
HCM Control Delay (s)	9.4	0.1	58.1	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	7.5	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	68	324	9	225	458
Future Volume (vph)	4	68	324	9	225	458
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.873		0.996			
Flt Protected	0.997					0.984
Satd. Flow (prot)	1688	0	1681	0	0	1634
Flt Permitted	0.997					0.984
Satd. Flow (perm)	1688	0	1681	0	0	1634
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	20%	0%	1%
Adj. Flow (vph)	5	77	368	10	256	520
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	378	0	0	776
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	68	324	9	225	458
Future Vol, veh/h	4	68	324	9	225	458
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	1	20	0	1
Mvmt Flow	5	77	368	10	256	520

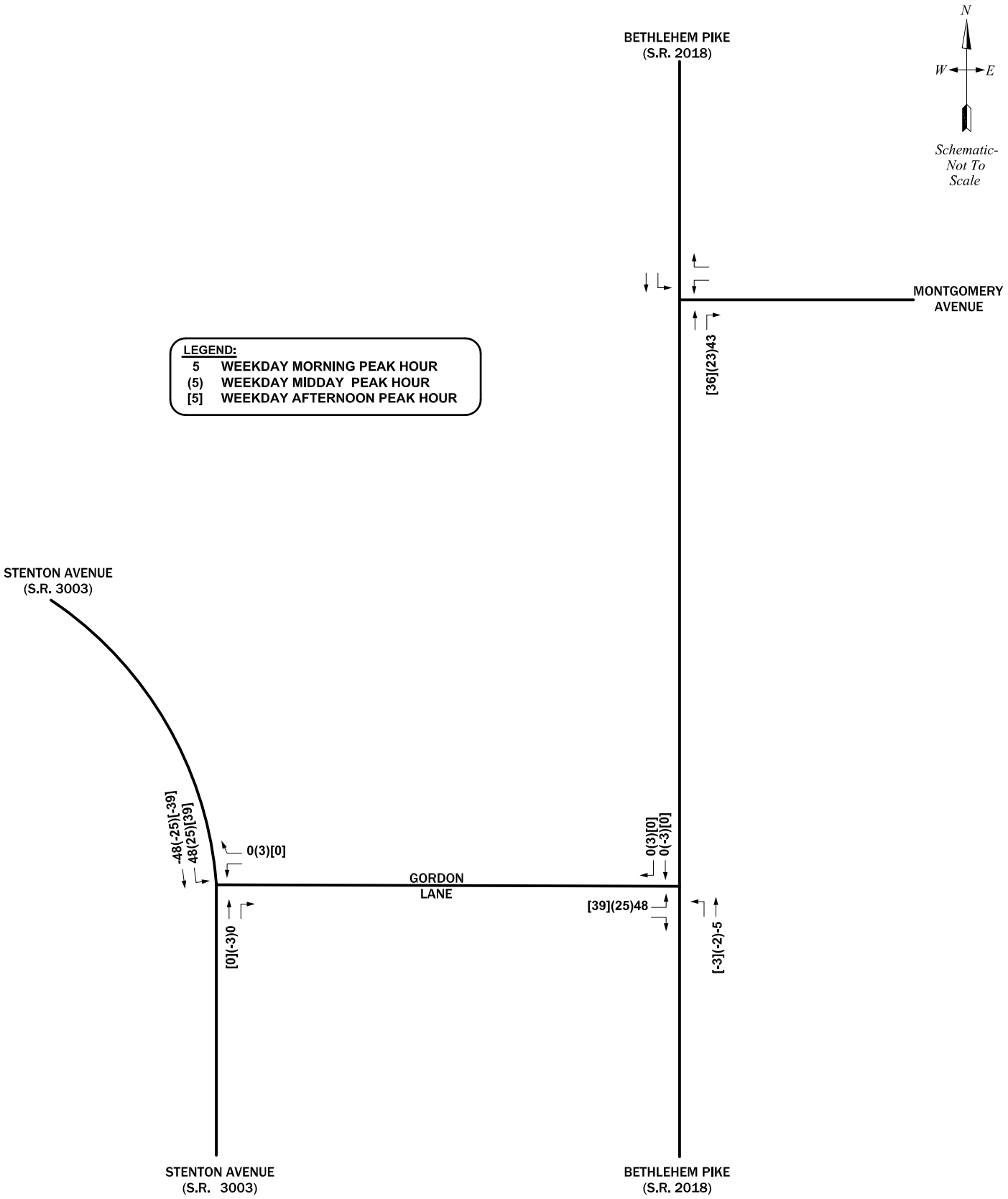
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1405	373	0	0	378	0
Stage 1	373	-	-	-	-	-
Stage 2	1032	-	-	-	-	-
Critical Hdwy	6	6	-	-	4.3	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	196	729	-	-	891	-
Stage 1	832	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	729	-	-	891	-
Mov Cap-2 Maneuver	117	-	-	-	-	-
Stage 1	832	-	-	-	-	-
Stage 2	254	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	3.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	565	891	-
HCM Lane V/C Ratio	-	-	0.145	0.287	-
HCM Control Delay (s)	-	-	12.4	10.7	0
HCM Lane LOS	-	-	B	B	A
HCM 95th %tile Q(veh)	-	-	0.5	1.2	-

ATTACHMENT E

Traffic Diversions



Traffic Diversions with Signal Installation

BETHLEHEM PIKE (S.R. 2018) AND GORDON LANE INTERSECTION EVALUATION

SPRINGFIELD TOWNSHIP, MONTGOMERY COUNTY, PA

McMAHON TRANSPORTATION ENGINEERS & PLANNERS

I:\eng\SPRINTO1\819045-BethGrdSig\DWG\FIGURES\Traffic Diversions.dwg

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
06:00	62	42	2	59	23	22	0	40	11	1	0	38	0	300
06:15	61	63	5	98	49	32	1	59	22	7	2	37	0	436
06:30	78	76	6	91	67	45	0	75	32	8	1	62	1	542
06:45	92	110	9	108	81	41	0	95	56	6	2	57	1	658
Total	293	291	22	356	220	140	1	269	121	22	5	194	2	1936
07:00	100	154	13	92	99	62	0	111	51	12	4	91	0	789
07:15	69	154	14	107	151	77	1	126	50	11	3	106	0	869
07:30	94	166	20	93	196	48	2	104	60	10	3	107	0	903
07:45	103	150	32	103	231	73	3	92	51	15	5	140	0	998
Total	366	624	79	395	677	260	6	433	212	48	15	444	0	3559
08:00	92	151	16	90	173	70	3	104	49	15	4	101	1	869
08:15	83	133	12	106	132	65	1	98	41	11	4	78	1	765
08:30	70	143	10	86	132	64	3	97	53	6	0	69	2	735
08:45	89	151	11	99	126	67	1	101	53	10	1	90	1	800
Total	334	578	49	381	563	266	8	400	196	42	9	338	5	3169
11:00	50	59	13	45	91	60	1	65	43	7	0	74	1	509
11:15	47	57	7	62	83	41	2	52	44	11	5	57	2	470
11:30	48	62	7	54	100	47	0	53	38	3	0	90	0	502
11:45	58	44	13	54	71	43	1	51	43	10	3	86	3	480
Total	203	222	40	215	345	191	4	221	168	31	8	307	6	1961
12:00	29	71	7	43	66	45	2	65	43	6	6	82	0	465
12:15	48	55	11	49	86	45	0	71	51	0	5	77	0	498
12:30	37	46	10	75	83	50	1	70	40	12	5	69	2	500
12:45	39	48	6	70	94	43	2	52	40	2	2	89	1	488
Total	153	220	34	237	329	183	5	258	174	20	18	317	3	1951
13:00	33	62	5	56	89	47	1	52	46	4	2	73	0	470
13:15	42	56	7	58	84	48	2	56	56	8	3	72	2	494
13:30	33	58	11	52	89	58	1	60	52	5	3	80	2	504
13:45	47	56	11	64	75	55	0	63	52	6	3	79	1	512
Total	155	232	34	230	337	208	4	231	206	23	11	304	5	1980
16:00	69	119	7	70	95	75	0	104	86	4	8	111	0	748
16:15	65	114	6	57	134	70	1	98	135	12	11	131	0	834
16:30	58	127	9	73	108	77	2	99	124	9	4	137	0	827
16:45	63	118	16	49	123	79	0	93	126	14	7	143	2	833
Total	255	478	38	249	460	301	3	394	471	39	30	522	2	3242
17:00	62	127	14	88	132	91	0	99	128	12	7	148	1	909
17:15	73	130	17	72	138	79	0	92	120	9	6	159	0	895
17:30	76	136	13	46	133	68	0	83	146	18	6	159	0	884
17:45	76	133	9	83	123	69	6	85	156	21	10	128	0	899
Total	287	526	53	289	526	307	6	359	550	60	29	594	1	3587

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
18:00	64	110	15	61	109	66	0	93	154	14	8	126	0	820
18:15	65	87	11	60	105	78	0	80	128	13	13	128	1	769
18:30	75	74	14	52	97	69	0	102	118	18	7	142	0	768
18:45	55	64	22	46	91	62	0	86	120	15	3	80	0	644
Total	259	335	62	219	402	275	0	361	520	60	31	476	1	3001
Grand Total	2305	3506	411	2571	3859	2131	37	2926	2618	345	156	3496	25	24386
Apprch %	37	56.3	6.6	30	45.1	24.9	0.6	49.4	44.2	5.8	4.2	95.1	0.7	
Total %	9.5	14.4	1.7	10.5	15.8	8.7	0.2	12	10.7	1.4	0.6	14.3	0.1	
Passenger Vehicles	2261	3441	380	2520	3797	2065	35	2872	2588	340	152	3408	23	23882
% Passenger Vehicles	98.1	98.1	92.5	98	98.4	96.9	94.6	98.2	98.9	98.6	97.4	97.5	92	97.9
Heavy Vehicles	44	65	31	51	62	66	2	54	30	5	4	88	2	504
% Heavy Vehicles	1.9	1.9	7.5	2	1.6	3.1	5.4	1.8	1.1	1.4	2.6	2.5	8	2.1

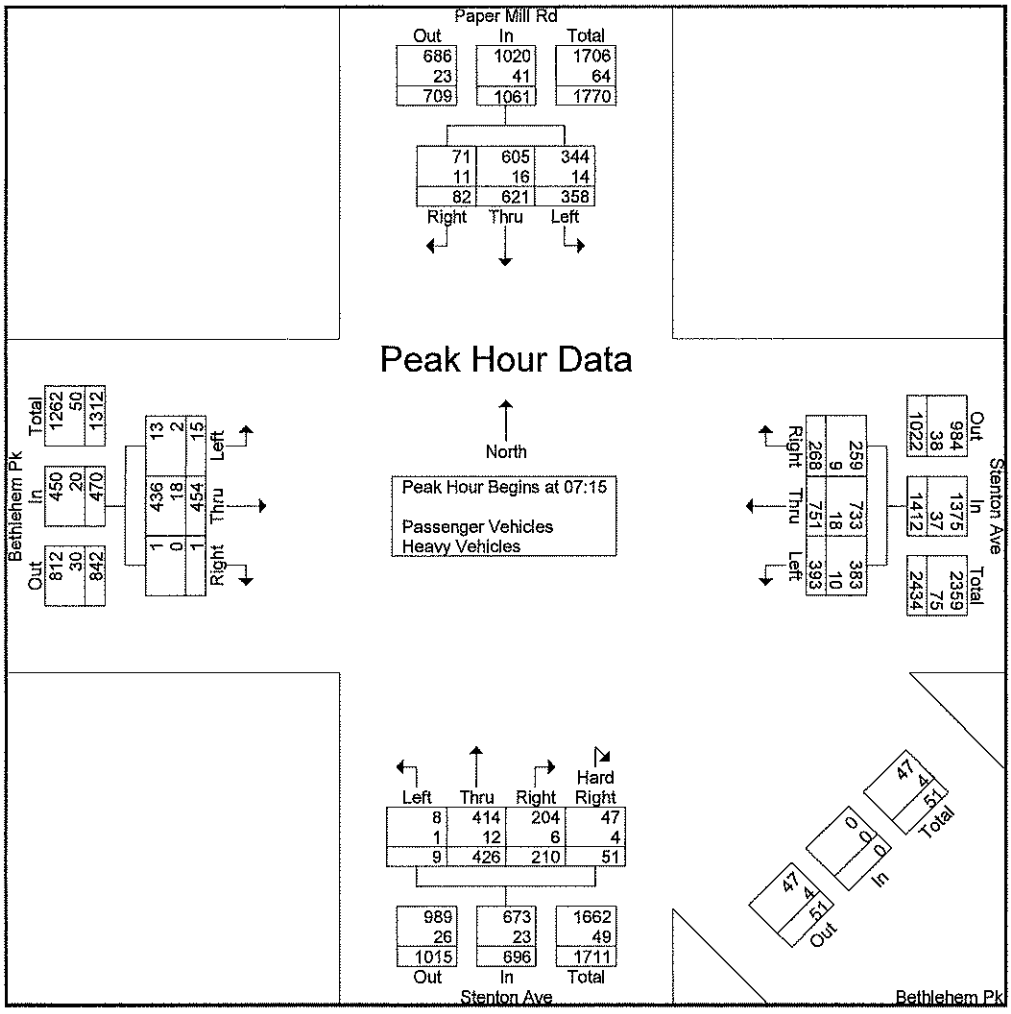
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 3

	Paper Mill Rd Southbound				Stenton Ave Westbound				Stenton Ave Northbound					Bethlehem Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:15																		
07:15	69	154	14	237	**107**	151	**77**	335	1	**126**	50	11	**188**	3	106	0	109	869
07:30	94	**166**	20	280	93	196	48	337	2	104	**60**	10	176	3	107	0	110	903
07:45	**103**	150	**32**	**285**	103	**231**	73	**407**	**3**	92	51	**15**	161	**5**	**140**	0	**145**	**998**
08:00	92	151	16	259	90	173	70	333	3	104	49	15	171	4	101	**1**	106	869
Total Volume	358	621	82	1061	393	751	268	1412	9	426	210	51	696	15	454	1	470	3639
% App. Total	33.7	58.5	7.7		27.8	53.2	19		1.3	61.2	30.2	7.3		3.2	96.6	0.2		
PHF	.869	.935	.641	.931	.918	.813	.870	.867	.750	.845	.875	.850	.926	.750	.811	.250	.810	.912
Passenger Vehicles	344	605	71	1020	383	733	259	1375	8	414	204	47	673	13	436	1	450	3518
% Passenger Vehicles	96.1	97.4	86.6	96.1	97.5	97.6	96.6	97.4	88.9	97.2	97.1	92.2	96.7	86.7	96.0	100	95.7	96.7
Heavy Vehicles	14	16	11	41	10	18	9	37	1	12	6	4	23	2	18	0	20	121
% Heavy Vehicles	3.9	2.6	13.4	3.9	2.5	2.4	3.4	2.6	11.1	2.8	2.9	7.8	3.3	13.3	4.0	0	4.3	3.3



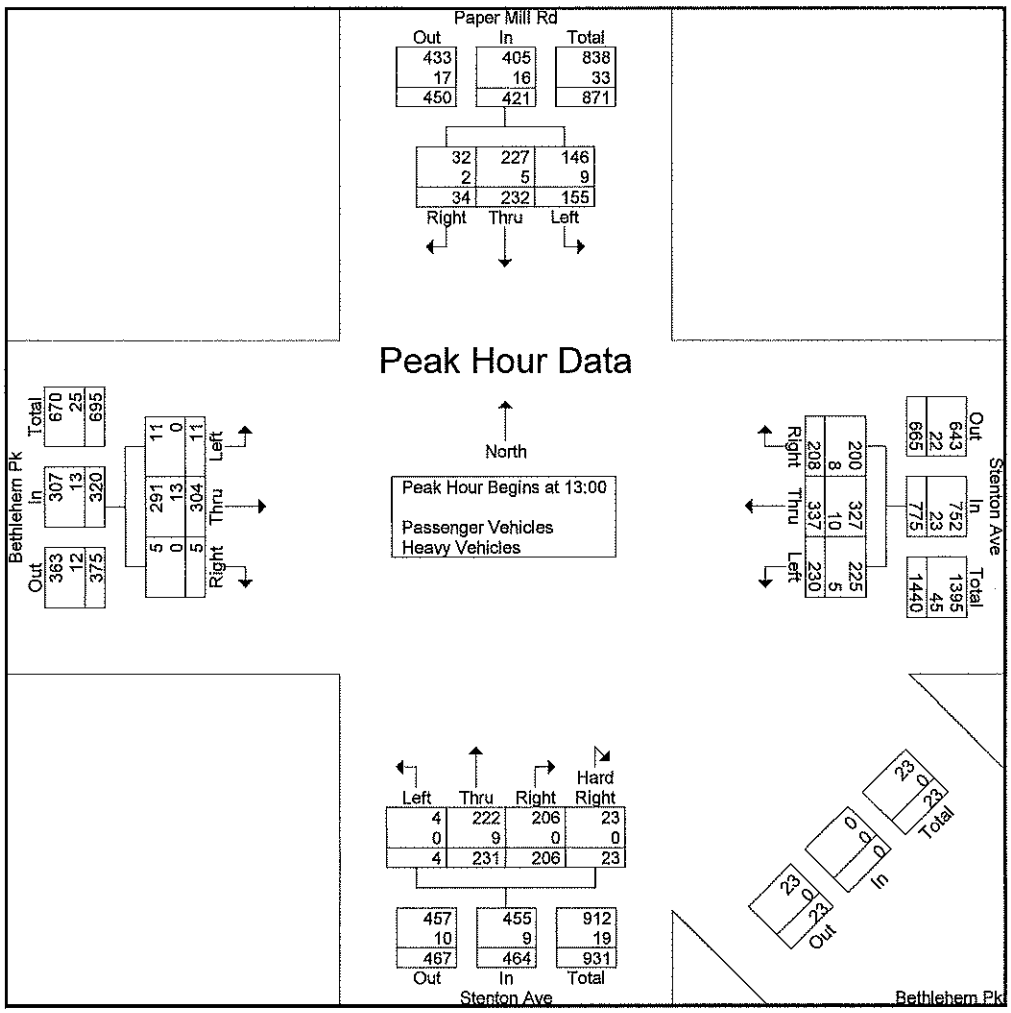
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 4

	Paper Mill Rd Southbound				Stenton Ave Westbound				Stenton Ave Northbound					Bethlehem Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 to 13:45 - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 13:00																		
13:00	33	**62**	5	100	56	**89**	47	192	1	52	46	4	103	2	73	0	75	470
13:15	42	56	7	105	58	84	48	190	**2**	56	**56**	**8**	**122**	**3**	72	**2**	77	494
13:30	33	58	**11**	102	52	89	**58**	**199**	1	60	52	5	118	3	**80**	2	**85**	504
13:45	**47**	56	11	**114**	**64**	75	55	194	0	**63**	52	6	121	3	79	1	83	**512**
Total Volume	155	232	34	421	230	337	208	775	4	231	206	23	464	11	304	5	320	1980
% App. Total	36.8	55.1	8.1		29.7	43.5	26.8		0.9	49.8	44.4	5		3.4	95	1.6		
PHF	.824	.935	.773	.923	.898	.947	.897	.974	.500	.917	.920	.719	.951	.917	.950	.625	.941	.967
Passenger Vehicles	146	227	32	405	225	327	200	752	4	222	206	23	455	11	291	5	307	1919
% Passenger Vehicles	94.2	97.8	94.1	96.2	97.8	97.0	96.2	97.0	100	96.1	100	100	98.1	100	95.7	100	95.9	96.9
Heavy Vehicles	9	5	2	16	5	10	8	23	0	9	0	0	9	0	13	0	13	61
% Heavy Vehicles	5.8	2.2	5.9	3.8	2.2	3.0	3.8	3.0	0	3.9	0	0	1.9	0	4.3	0	4.1	3.1



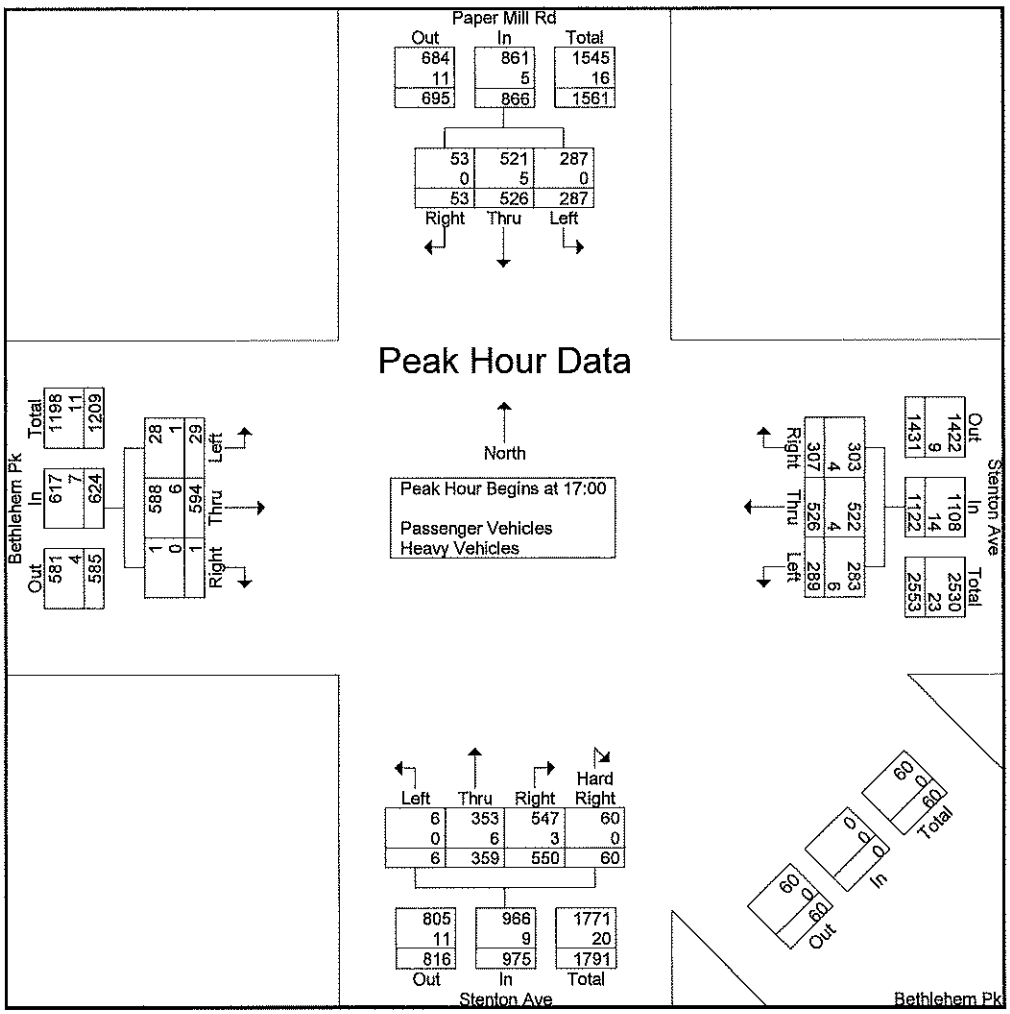
McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 5

	Paper Mill Rd Southbound				Stenton Ave Westbound				Stenton Ave Northbound					Bethlehem Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 18:45 - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 17:00																		
17:00	62	127	14	203	**88**	132	**91**	**311**	0	**99**	128	12	239	7	148	**1**	156	**909**
17:15	73	130	**17**	220	72	**138**	79	289	0	92	120	9	221	6	**159**	0	**165**	895
17:30	**76**	**136**	13	**225**	46	133	68	247	0	83	146	18	247	6	159	0	165	884
17:45	76	133	9	218	83	123	69	275	**6**	85	**156**	**21**	**268**	**10**	128	0	138	899
Total Volume	287	526	53	866	289	526	307	1122	6	359	550	60	975	29	594	1	624	3587
% App. Total	33.1	60.7	6.1		25.8	46.9	27.4		0.6	36.8	56.4	6.2		4.6	95.2	0.2		
PHF	.944	.967	.779	.962	.821	.953	.843	.902	.250	.907	.881	.714	.910	.725	.934	.250	.945	.987
Passenger Vehicles	287	521	53	861	283	522	303	1108	6	353	547	60	966	28	588	1	617	3552
% Passenger Vehicles	100	99.0	100	99.4	97.9	99.2	98.7	98.8	100	98.3	99.5	100	99.1	96.6	99.0	100	98.9	99.0
Heavy Vehicles	0	5	0	5	6	4	4	14	0	6	3	0	9	1	6	0	7	35
% Heavy Vehicles	0	1.0	0	0.6	2.1	0.8	1.3	1.2	0	1.7	0.5	0	0.9	3.4	1.0	0	1.1	1.0



McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Passenger Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
06:00	61	41	1	57	23	19	0	39	9	1	0	37	0	288
06:15	60	63	4	98	49	30	1	59	21	7	2	37	0	431
06:30	76	74	6	91	66	45	0	75	32	8	1	60	1	535
06:45	91	109	6	107	81	38	0	95	56	6	1	56	0	646
Total	288	287	17	353	219	132	1	268	118	22	4	190	1	1900
07:00	97	152	12	88	98	62	0	110	49	12	4	88	0	772
07:15	66	152	12	105	147	74	1	124	48	8	2	101	0	840
07:30	90	162	16	88	192	48	2	101	58	10	3	101	0	871
07:45	99	141	28	101	225	70	3	88	51	14	5	138	0	963
Total	352	607	68	382	662	254	6	423	206	44	14	428	0	3446
08:00	89	150	15	89	169	67	2	101	47	15	3	96	1	844
08:15	79	128	11	105	126	64	1	92	40	11	4	77	1	739
08:30	70	138	9	83	128	63	3	97	52	6	0	63	2	714
08:45	88	145	10	99	126	63	1	101	51	10	1	89	1	785
Total	326	561	45	376	549	257	7	391	190	42	8	325	5	3082
11:00	46	59	12	44	89	56	1	65	42	7	0	70	1	492
11:15	46	57	5	60	82	38	1	50	42	11	5	53	2	452
11:30	46	61	7	54	98	47	0	52	37	3	0	85	0	490
11:45	58	43	12	51	68	38	1	50	42	10	3	83	3	462
Total	196	220	36	209	337	179	3	217	163	31	8	291	6	1896
12:00	29	67	7	42	66	42	2	64	43	5	6	79	0	452
12:15	48	53	10	47	85	44	0	67	50	0	5	75	0	484
12:30	37	44	9	74	81	48	1	65	39	12	5	67	1	483
12:45	39	48	4	69	93	42	2	52	37	2	2	88	1	479
Total	153	212	30	232	325	176	5	248	169	19	18	309	2	1898
13:00	31	60	4	54	88	46	1	50	46	4	2	69	0	455
13:15	39	55	7	57	80	46	2	54	56	8	3	69	2	478
13:30	30	58	11	50	85	56	1	59	52	5	3	77	2	489
13:45	46	54	10	64	74	52	0	59	52	6	3	76	1	497
Total	146	227	32	225	327	200	4	222	206	23	11	291	5	1919
16:00	69	118	7	66	95	73	0	103	86	4	8	109	0	738
16:15	65	111	5	56	133	69	1	97	135	12	11	130	0	825
16:30	57	125	9	72	108	75	2	98	123	9	4	135	0	817
16:45	63	118	16	48	122	78	0	92	126	14	7	141	2	827
Total	254	472	37	242	458	295	3	390	470	39	30	515	2	3207
17:00	62	125	14	87	131	91	0	99	127	12	7	148	1	904
17:15	73	129	17	70	136	77	0	88	119	9	6	158	0	882
17:30	76	134	13	45	132	68	0	82	146	18	5	156	0	875
17:45	76	133	9	81	123	67	6	84	155	21	10	126	0	891
Total	287	521	53	283	522	303	6	353	547	60	28	588	1	3552

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 2

Groups Printed- Passenger Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
18:00	64	110	15	60	107	62	0	92	154	14	8	124	0	810
18:15	65	86	11	60	105	78	0	80	127	13	13	128	1	767
18:30	75	74	14	52	95	68	0	102	118	18	7	140	0	763
18:45	55	64	22	46	91	61	0	86	120	15	3	79	0	642
Total	259	334	62	218	398	269	0	360	519	60	31	471	1	2982
Grand Total	2261	3441	380	2520	3797	2065	35	2872	2588	340	152	3408	23	23882
Apprch %	37.2	56.6	6.2	30.1	45.3	24.6	0.6	49.2	44.4	5.8	4.2	95.1	0.6	
Total %	9.5	14.4	1.6	10.6	15.9	8.6	0.1	12	10.8	1.4	0.6	14.3	0.1	

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
06:00	1	1	1	2	0	3	0	1	2	0	0	1	0	12
06:15	1	0	1	0	0	2	0	0	1	0	0	0	0	5
06:30	2	2	0	0	1	0	0	0	0	0	0	2	0	7
06:45	1	1	3	1	0	3	0	0	0	0	1	1	1	12
Total	5	4	5	3	1	8	0	1	3	0	1	4	1	36
07:00	3	2	1	4	1	0	0	1	2	0	0	3	0	17
07:15	3	2	2	2	4	3	0	2	2	3	1	5	0	29
07:30	4	4	4	5	4	0	0	3	2	0	0	6	0	32
07:45	4	9	4	2	6	3	0	4	0	1	0	2	0	35
Total	14	17	11	13	15	6	0	10	6	4	1	16	0	113
08:00	3	1	1	1	4	3	1	3	2	0	1	5	0	25
08:15	4	5	1	1	6	1	0	6	1	0	0	1	0	26
08:30	0	5	1	3	4	1	0	0	1	0	0	6	0	21
08:45	1	6	1	0	0	4	0	0	2	0	0	1	0	15
Total	8	17	4	5	14	9	1	9	6	0	1	13	0	87
11:00	4	0	1	1	2	4	0	0	1	0	0	4	0	17
11:15	1	0	2	2	1	3	1	2	2	0	0	4	0	18
11:30	2	1	0	0	2	0	0	1	1	0	0	5	0	12
11:45	0	1	1	3	3	5	0	1	1	0	0	3	0	18
Total	7	2	4	6	8	12	1	4	5	0	0	16	0	65
12:00	0	4	0	1	0	3	0	1	0	1	0	3	0	13
12:15	0	2	1	2	1	1	0	4	1	0	0	2	0	14
12:30	0	2	1	1	2	2	0	5	1	0	0	2	1	17
12:45	0	0	2	1	1	1	0	0	3	0	0	1	0	9
Total	0	8	4	5	4	7	0	10	5	1	0	8	1	53
13:00	2	2	1	2	1	1	0	2	0	0	0	4	0	15
13:15	3	1	0	1	4	2	0	2	0	0	0	3	0	16
13:30	3	0	0	2	4	2	0	1	0	0	0	3	0	15
13:45	1	2	1	0	1	3	0	4	0	0	0	3	0	15
Total	9	5	2	5	10	8	0	9	0	0	0	13	0	61
16:00	0	1	0	4	0	2	0	1	0	0	0	2	0	10
16:15	0	3	1	1	1	1	0	1	0	0	0	1	0	9
16:30	1	2	0	1	0	2	0	1	1	0	0	2	0	10
16:45	0	0	0	1	1	1	0	1	0	0	0	2	0	6
Total	1	6	1	7	2	6	0	4	1	0	0	7	0	35
17:00	0	2	0	1	1	0	0	0	1	0	0	0	0	5
17:15	0	1	0	2	2	2	0	4	1	0	0	1	0	13
17:30	0	2	0	1	1	0	0	1	0	0	1	3	0	9
17:45	0	0	0	2	0	2	0	1	1	0	0	2	0	8
Total	0	5	0	6	4	4	0	6	3	0	1	6	0	35

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 2

Groups Printed- Heavy Vehicles

	Paper Mill Rd Southbound			Stenton Ave Westbound			Stenton Ave Northbound				Bethlehem Pk Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Hard Right	Left	Thru	Right	Int. Total
18:00	0	0	0	1	2	4	0	1	0	0	0	2	0	10
18:15	0	1	0	0	0	0	0	0	1	0	0	0	0	2
18:30	0	0	0	0	2	1	0	0	0	0	0	2	0	5
18:45	0	0	0	0	0	1	0	0	0	0	0	1	0	2
Total	0	1	0	1	4	6	0	1	1	0	0	5	0	19
Grand Total	44	65	31	51	62	66	2	54	30	5	4	88	2	504
Apprch %	31.4	46.4	22.1	28.5	34.6	36.9	2.2	59.3	33	5.5	4.3	93.6	2.1	
Total %	8.7	12.9	6.2	10.1	12.3	13.1	0.4	10.7	6	1	0.8	17.5	0.4	

McMahon Associates, Inc.

Transportation Engineers and Planners
425 Commerce Drive, Suite 200
Fort Washington, PA 19034

Municipality: Springfield Township
Location: Stenton Avenue &
Bethlehem Pike & Paper Mill Road
Counter: M

File Name : springfieldsig02w
Site Code :
Start Date : 9/17/2019
Page No : 1

Groups Printed- Pedestrians

	Paper Mill Rd Southbound	Stenton Ave Westbound	Stenton Ave Northbound	Bethlehem Pk Eastbound	
Start Time	E/W	N/S	E/W	N/S	Int. Total
06:15	1	0	0	0	1
Total	1	0	0	0	1
08:00	0	0	1	1	2
Total	0	0	1	1	2
11:00	0	0	1	0	1
11:15	0	0	1	0	1
11:30	0	0	1	0	1
11:45	0	0	2	0	2
Total	0	0	5	0	5
12:00	1	0	0	0	1
12:15	1	0	0	0	1
12:30	0	0	1	0	1
12:45	1	0	0	0	1
Total	3	0	1	0	4
13:15	0	0	1	1	2
Total	0	0	1	1	2
16:15	0	0	1	1	2
16:45	1	0	0	0	1
Total	1	0	1	1	3
18:30	3	0	1	1	5
Total	3	0	1	1	5
Grand Total	8	0	10	4	22
Apprch %	100	0	100	100	
Total %	36.4	0	45.5	18.2	

ATTACHMENT F

2019 Existing Capacity/Levels-of-Service Analysis Worksheets With Signalization

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	82	117	605	108	61	540
Future Volume (vph)	82	117	605	108	61	540
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.921		0.977			
Flt Protected	0.980					0.995
Satd. Flow (prot)	1653	0	3131	0	0	3160
Flt Permitted	0.980					0.808
Satd. Flow (perm)	1653	0	3131	0	0	2566
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	75		49			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	3%	4%	5%	4%
Adj. Flow (vph)	86	123	637	114	64	568
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	751	0	0	632
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 32 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

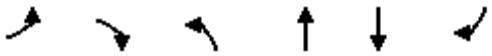
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	82	117	605	108	61	540
Future Volume (veh/h)	82	117	605	108	61	540
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1758	1758	1744	1744
Adj Flow Rate, veh/h	86	86	637	106	64	568
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	3	3	4	4
Cap, veh/h	112	112	2187	363	236	2016
Arrive On Green	0.14	0.13	1.00	1.00	0.75	0.76
Sat Flow, veh/h	819	819	2954	476	247	2721
Grp Volume(v), veh/h	173	0	371	372	308	324
Grp Sat Flow(s),veh/h/ln	1648	0	1670	1672	1381	1508
Q Serve(g_s), s	9.1	0.0	0.0	0.0	0.0	5.8
Cycle Q Clear(g_c), s	9.1	0.0	0.0	0.0	4.6	5.8
Prop In Lane	0.50	0.50		0.28	0.21	
Lane Grp Cap(c), veh/h	226	0	1274	1276	1087	1150
V/C Ratio(X)	0.77	0.00	0.29	0.29	0.28	0.28
Avail Cap(c_a), veh/h	385	0	1274	1276	1087	1150
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	37.7	0.0	0.0	0.0	3.1	3.2
Incr Delay (d2), s/veh	5.4	0.0	0.5	0.5	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.2	0.0	0.3	0.3	2.5	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	43.1	0.0	0.5	0.5	3.8	3.8
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	173		743			632
Approach Delay, s/veh	43.1		0.5			3.8
Approach LOS	D		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		73.7			73.7	16.3
Change Period (Y+Rc), s		6.0			6.0	5.0
Max Green Setting (Gmax), s		59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s		2.0			7.8	11.1
Green Ext Time (p_c), s		1.9			1.8	0.4

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

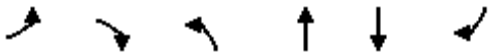


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	133	23	83	615	597	58
Future Volume (vph)	133	23	83	615	597	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.980				0.987	
Flt Protected	0.959			0.994		
Satd. Flow (prot)	1657	0	0	3314	3116	0
Flt Permitted	0.959			0.775		
Satd. Flow (perm)	1657	0	0	2584	3116	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	9				24	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	4%	4%	3%	5%	2%
Adj. Flow (vph)	145	25	90	668	649	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	0	0	758	712	0
Number of Detectors	1		1	1	1	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (ft)	35		20	5	5	
Trailing Detector (ft)	-5		0	0	0	
Detector 1 Position(ft)	-5		0	0	0	
Detector 1 Size(ft)	40		20	5	5	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	7.0		30.0	30.0	30.0	
Minimum Split (s)	13.0		36.0	36.0	36.0	
Total Split (s)	25.0		65.0	65.0	65.0	
Total Split (%)	27.8%		72.2%	72.2%	72.2%	
Maximum Green (s)	19.0		59.0	59.0	59.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	
Total Lost Time (s)	5.0			5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 41 (46%), Referenced to phase 2:NBTL and 6:SBT, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 2: Bethlehem Pike & Gordon Lane



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	133	23	83	615	597	58
Future Volume (veh/h)	133	23	83	615	597	58
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1950	1950	2055	2055	1730	1730
Adj Flow Rate, veh/h	145	25	90	668	649	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	3	3	5	5
Cap, veh/h	192	33	313	2273	2294	222
Arrive On Green	0.13	0.12	0.75	0.76	1.00	1.00
Sat Flow, veh/h	1465	253	347	3093	3113	293
Grp Volume(v), veh/h	171	0	360	398	352	360
Grp Sat Flow(s),veh/h/ln	1727	0	1569	1777	1643	1677
Q Serve(g_s), s	8.6	0.0	0.0	6.3	0.0	0.0
Cycle Q Clear(g_c), s	8.6	0.0	4.7	6.3	0.0	0.0
Prop In Lane	0.85	0.15	0.25			0.17
Lane Grp Cap(c), veh/h	226	0	1222	1347	1246	1271
V/C Ratio(X)	0.76	0.00	0.29	0.30	0.28	0.28
Avail Cap(c_a), veh/h	384	0	1222	1347	1246	1271
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.33	1.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.92	0.92
Uniform Delay (d), s/veh	37.8	0.0	3.2	3.4	0.0	0.0
Incr Delay (d2), s/veh	5.1	0.0	0.6	0.6	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.1	0.0	2.9	3.1	0.3	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	42.9	0.0	3.9	4.0	0.5	0.5
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	171			758	712	
Approach Delay, s/veh	42.9			3.9	0.5	
Approach LOS	D			A	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		73.2		16.8		73.2
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		59.0		19.0		59.0
Max Q Clear Time (g_c+I1), s		8.3		10.6		2.0
Green Ext Time (p_c), s		2.3		0.3		1.8

Intersection Summary	
HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

3: Stenton Avenue & Gordon Lane

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	123	361	11	140	111
Future Volume (vph)	11	123	361	11	140	111
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876		0.996			
Flt Protected	0.996					0.973
Satd. Flow (prot)	1661	0	1617	0	0	1458
Flt Permitted	0.996					0.973
Satd. Flow (perm)	1661	0	1617	0	0	1458
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	2%	5%	25%	16%	6%
Adj. Flow (vph)	12	138	406	12	157	125
Shared Lane Traffic (%)						
Lane Group Flow (vph)	150	0	418	0	0	282
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	123	361	11	140	111
Future Vol, veh/h	11	123	361	11	140	111
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	2	5	25	16	6
Mvmt Flow	12	138	406	12	157	125

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	851	412	0	0	418	0
Stage 1	412	-	-	-	-	-
Stage 2	439	-	-	-	-	-
Critical Hdwy	6	6.02	-	-	4.3	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	406	693	-	-	863	-
Stage 1	800	-	-	-	-	-
Stage 2	779	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	327	693	-	-	863	-
Mov Cap-2 Maneuver	327	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	627	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	5.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	635	863	-
HCM Lane V/C Ratio	-	-	0.237	0.182	-
HCM Control Delay (s)	-	-	12.4	10.1	0
HCM Lane LOS	-	-	B	B	A
HCM 95th %tile Q(veh)	-	-	0.9	0.7	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	53	97	526	120	89	487
Future Volume (vph)	53	97	526	120	89	487
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.913		0.972			
Flt Protected	0.983					0.992
Satd. Flow (prot)	1611	0	3150	0	0	3174
Flt Permitted	0.983					0.751
Satd. Flow (perm)	1611	0	3150	0	0	2403
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	95		65			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	8%	2%	2%	2%	5%	3%
Adj. Flow (vph)	56	102	554	126	94	513
Shared Lane Traffic (%)						
Lane Group Flow (vph)	158	0	680	0	0	607
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 79 (88%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

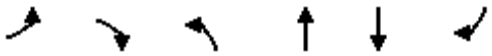
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	53	97	526	120	89	487
Future Volume (veh/h)	53	97	526	120	89	487
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1772	1772	1758	1758
Adj Flow Rate, veh/h	56	68	554	121	94	513
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	2	2	3	3
Cap, veh/h	77	94	2178	474	357	1893
Arrive On Green	0.11	0.10	1.00	1.00	0.78	0.79
Sat Flow, veh/h	717	870	2838	598	383	2470
Grp Volume(v), veh/h	125	0	338	337	283	324
Grp Sat Flow(s),veh/h/ln	1600	0	1683	1664	1253	1520
Q Serve(g_s), s	6.8	0.0	0.0	0.0	0.0	5.1
Cycle Q Clear(g_c), s	6.8	0.0	0.0	0.0	3.7	5.1
Prop In Lane	0.45	0.54		0.36	0.33	
Lane Grp Cap(c), veh/h	172	0	1334	1319	1032	1204
V/C Ratio(X)	0.73	0.00	0.25	0.26	0.27	0.27
Avail Cap(c_a), veh/h	373	0	1334	1319	1032	1204
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.97	0.97	1.00	1.00
Uniform Delay (d), s/veh	39.1	0.0	0.0	0.0	2.4	2.5
Incr Delay (d2), s/veh	5.7	0.0	0.4	0.5	0.7	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.3	0.0	0.3	0.3	1.8	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.9	0.0	0.4	0.5	3.0	3.0
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	125		675			607
Approach Delay, s/veh	44.9		0.4			3.0
Approach LOS	D		A			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	76.3			76.3	13.7
Change Period (Y+Rc), s	6.0			6.0	5.0
Max Green Setting (Gmax), s	59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s	2.0			7.1	8.8
Green Ext Time (p_c), s	1.7			1.9	0.3

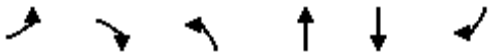
Intersection Summary	
HCM 6th Ctrl Delay	5.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



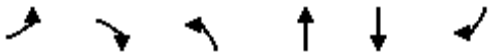
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	97	6	7	518	443	70
Future Volume (vph)	97	6	7	518	443	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.992				0.980	
Flt Protected	0.955			0.999		
Satd. Flow (prot)	1747	0	0	3368	3158	0
Flt Permitted	0.955			0.948		
Satd. Flow (perm)	1747	0	0	3196	3158	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4				38	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	2%	3%	0%
Adj. Flow (vph)	107	7	8	569	487	77
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	0	0	577	564	0
Number of Detectors	1		1	1	1	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (ft)	35		20	5	5	
Trailing Detector (ft)	-5		0	0	0	
Detector 1 Position(ft)	-5		0	0	0	
Detector 1 Size(ft)	40		20	5	5	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	7.0		30.0	30.0	30.0	
Minimum Split (s)	13.0		36.0	36.0	36.0	
Total Split (s)	28.0		62.0	62.0	62.0	
Total Split (%)	31.1%		68.9%	68.9%	68.9%	
Maximum Green (s)	22.0		56.0	56.0	56.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	
Total Lost Time (s)	5.0			5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBT, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 2: Bethlehem Pike & Gordon Lane



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	97	6	7	518	443	70
Future Volume (veh/h)	97	6	7	518	443	70
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1950	1950	2070	2070	1758	1758
Adj Flow Rate, veh/h	107	7	8	569	487	77
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	2	2	3	3
Cap, veh/h	157	10	56	3041	2301	362
Arrive On Green	0.09	0.08	0.78	0.80	0.26	0.26
Sat Flow, veh/h	1689	111	19	3914	2979	455
Grp Volume(v), veh/h	115	0	308	269	280	284
Grp Sat Flow(s),veh/h/ln	1816	0	2049	1789	1670	1676
Q Serve(g_s), s	5.5	0.0	0.0	3.2	11.8	11.9
Cycle Q Clear(g_c), s	5.5	0.0	3.2	3.2	11.8	11.9
Prop In Lane	0.93	0.06	0.03			0.27
Lane Grp Cap(c), veh/h	169	0	1650	1424	1329	1334
V/C Ratio(X)	0.68	0.00	0.19	0.19	0.21	0.21
Avail Cap(c_a), veh/h	464	0	1650	1424	1329	1334
HCM Platoon Ratio	1.00	1.00	1.00	1.00	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.93	0.93
Uniform Delay (d), s/veh	39.6	0.0	2.2	2.2	11.1	11.2
Incr Delay (d2), s/veh	4.8	0.0	0.3	0.3	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.8	0.0	1.7	1.3	8.9	9.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.4	0.0	2.5	2.5	11.4	11.5
LnGrp LOS	D	A	A	A	B	B
Approach Vol, veh/h	115			577	564	
Approach Delay, s/veh	44.4			2.5	11.5	
Approach LOS	D			A	B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		76.6		13.4		76.6
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		56.0		22.0		56.0
Max Q Clear Time (g_c+I1), s		5.2		7.5		13.9
Green Ext Time (p_c), s		1.4		0.3		1.4

Intersection Summary		
HCM 6th Ctrl Delay	10.4	
HCM 6th LOS	B	

Notes

User approved volume balancing among the lanes for turning movement.

3: Stenton Avenue & Gordon Lane

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	61	207	9	90	106
Future Volume (vph)	8	61	207	9	90	106
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.881		0.994			
Flt Protected	0.994					0.978
Satd. Flow (prot)	1658	0	1629	0	0	1586
Flt Permitted	0.994					0.978
Satd. Flow (perm)	1658	0	1629	0	0	1586
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	20%	0%	4%	17%	2%	4%
Adj. Flow (vph)	9	65	220	10	96	113
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	0	230	0	0	209
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	61	207	9	90	106
Future Vol, veh/h	8	61	207	9	90	106
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	20	0	4	17	2	4
Mvmt Flow	9	65	220	10	96	113

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	530	225	0	0	230	0
Stage 1	225	-	-	-	-	-
Stage 2	305	-	-	-	-	-
Critical Hdwy	6.2	6	-	-	4.3	-
Critical Hdwy Stg 1	5.2	-	-	-	-	-
Critical Hdwy Stg 2	5.2	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	596	878	-	-	1002	-
Stage 1	951	-	-	-	-	-
Stage 2	875	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	535	878	-	-	1002	-
Mov Cap-2 Maneuver	535	-	-	-	-	-
Stage 1	951	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	4.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	817	1002	-
HCM Lane V/C Ratio	-	-	0.09	0.096	-
HCM Control Delay (s)	-	-	9.8	9	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.3	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	53	83	603	142	105	645
Future Volume (vph)	53	83	603	142	105	645
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-1%		0%			0%
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.918		0.971			
Flt Protected	0.981					0.993
Satd. Flow (prot)	1658	0	3166	0	0	3283
Flt Permitted	0.981					0.708
Satd. Flow (perm)	1658	0	3166	0	0	2341
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	82		68			
Link Speed (mph)	25		35			35
Link Distance (ft)	792		500			535
Travel Time (s)	21.6		9.7			10.4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	0%	1%	3%	0%	0%
Adj. Flow (vph)	60	94	685	161	119	733
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	0	846	0	0	852
Number of Detectors	1		1		1	1
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	30		5		20	5
Trailing Detector (ft)	-10		0		0	0
Detector 1 Position(ft)	-10		0		0	0
Detector 1 Size(ft)	40		5		20	5
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	7.0		30.0		30.0	30.0
Minimum Split (s)	12.0		36.0		36.0	36.0
Total Split (s)	25.0		65.0		65.0	65.0
Total Split (%)	27.8%		72.2%		72.2%	72.2%
Maximum Green (s)	20.0		59.0		59.0	59.0
Yellow Time (s)	3.0		4.0		4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0
Lost Time Adjust (s)	-1.0		-1.0			-1.0
Total Lost Time (s)	4.0		5.0			5.0
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 22 (24%), Referenced to phase 2:NBT and 6:SBTL, Start of 1st Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bethlehem Pike & Montgomery Avenue

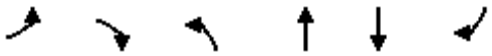
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	53	83	603	142	105	645
Future Volume (veh/h)	53	83	603	142	105	645
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1911	1911	1786	1786	1800	1800
Adj Flow Rate, veh/h	60	58	685	141	119	733
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	1	1	0	0
Cap, veh/h	84	82	2240	461	331	1939
Arrive On Green	0.10	0.09	1.00	1.00	0.79	0.80
Sat Flow, veh/h	839	811	2892	576	348	2508
Grp Volume(v), veh/h	119	0	414	412	379	473
Grp Sat Flow(s),veh/h/ln	1664	0	1697	1682	1218	1556
Q Serve(g_s), s	6.2	0.0	0.0	0.0	1.0	7.9
Cycle Q Clear(g_c), s	6.2	0.0	0.0	0.0	5.3	7.9
Prop In Lane	0.50	0.49		0.34	0.31	
Lane Grp Cap(c), veh/h	168	0	1356	1345	1013	1244
V/C Ratio(X)	0.71	0.00	0.31	0.31	0.37	0.38
Avail Cap(c_a), veh/h	388	0	1356	1345	1013	1244
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	39.4	0.0	0.0	0.0	2.4	2.6
Incr Delay (d2), s/veh	5.5	0.0	0.5	0.5	1.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.1	0.0	0.4	0.4	2.5	2.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.9	0.0	0.5	0.5	3.4	3.5
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	119		826			852
Approach Delay, s/veh	44.9		0.5			3.5
Approach LOS	D		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		76.9			76.9	13.1
Change Period (Y+Rc), s		6.0			6.0	5.0
Max Green Setting (Gmax), s		59.0			59.0	20.0
Max Q Clear Time (g_c+I1), s		2.0			9.9	8.2
Green Ext Time (p_c), s		2.2			2.9	0.3

Intersection Summary	
HCM 6th Ctrl Delay	4.9
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

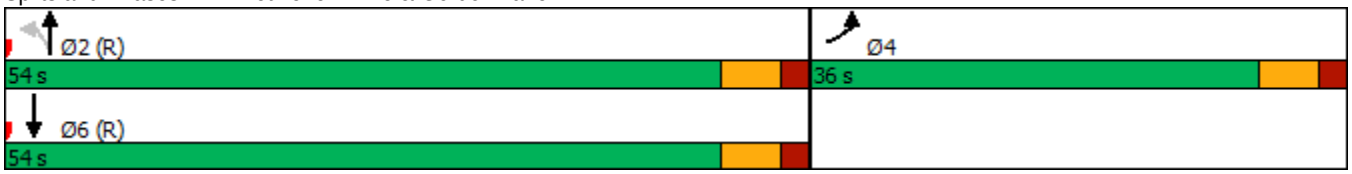


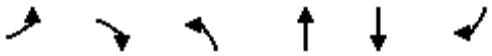
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	161	125	8	618	667	68
Future Volume (vph)	161	125	8	618	667	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	13	11	11	11	11
Grade (%)	-2%			-8%	0%	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.941				0.986	
Flt Protected	0.973			0.999		
Satd. Flow (prot)	1705	0	0	3390	3230	0
Flt Permitted	0.973			0.944		
Satd. Flow (perm)	1705	0	0	3203	3230	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	47				19	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1540			450	500	
Travel Time (s)	42.0			8.8	9.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	25%	1%	1%	0%
Adj. Flow (vph)	173	134	9	665	717	73
Shared Lane Traffic (%)						
Lane Group Flow (vph)	307	0	0	674	790	0
Number of Detectors	1		1	1	1	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (ft)	35		20	5	5	
Trailing Detector (ft)	-5		0	0	0	
Detector 1 Position(ft)	-5		0	0	0	
Detector 1 Size(ft)	40		20	5	5	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	7.0		30.0	30.0	30.0	
Minimum Split (s)	13.0		36.0	36.0	36.0	
Total Split (s)	36.0		54.0	54.0	54.0	
Total Split (%)	40.0%		60.0%	60.0%	60.0%	
Maximum Green (s)	30.0		48.0	48.0	48.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	
Total Lost Time (s)	5.0			5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 34 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of 1st Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	

Splits and Phases: 2: Bethlehem Pike & Gordon Lane





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	125	8	618	667	68
Future Volume (veh/h)	161	125	8	618	667	68
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1950	1950	2084	2084	1786	1786
Adj Flow Rate, veh/h	173	134	9	665	717	73
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	209	162	51	2606	2107	214
Arrive On Green	0.21	0.20	0.67	0.68	1.00	1.00
Sat Flow, veh/h	990	767	15	3940	3199	316
Grp Volume(v), veh/h	308	0	360	314	391	399
Grp Sat Flow(s),veh/h/ln	1762	0	2059	1801	1697	1729
Q Serve(g_s), s	15.1	0.0	0.0	6.1	0.0	0.0
Cycle Q Clear(g_c), s	15.1	0.0	6.1	6.1	0.0	0.0
Prop In Lane	0.56	0.44	0.03			0.18
Lane Grp Cap(c), veh/h	372	0	1414	1221	1150	1172
V/C Ratio(X)	0.83	0.00	0.25	0.26	0.34	0.34
Avail Cap(c_a), veh/h	607	0	1414	1221	1150	1172
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.87	0.87
Uniform Delay (d), s/veh	34.1	0.0	5.7	5.7	0.0	0.0
Incr Delay (d2), s/veh	5.0	0.0	0.4	0.5	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.2	0.0	4.4	3.7	0.4	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.1	0.0	6.1	6.2	0.7	0.7
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	308			674	790	
Approach Delay, s/veh	39.1			6.1	0.7	
Approach LOS	D			A	A	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	66.0	24.0	66.0
Change Period (Y+Rc), s	6.0	6.0	6.0
Max Green Setting (Gmax), s	48.0	30.0	48.0
Max Q Clear Time (g_c+I1), s	8.1	17.1	2.0
Green Ext Time (p_c), s	1.7	1.0	2.0

Intersection Summary	
HCM 6th Ctrl Delay	9.4
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

3: Stenton Avenue & Gordon Lane

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	68	324	9	264	419
Future Volume (vph)	4	68	324	9	264	419
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	14	14	10	10	10	10
Grade (%)	-2%		-4%			1%
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.873		0.996			
Flt Protected	0.997					0.981
Satd. Flow (prot)	1688	0	1681	0	0	1630
Flt Permitted	0.997					0.981
Satd. Flow (perm)	1688	0	1681	0	0	1630
Link Speed (mph)	25		35			35
Link Distance (ft)	1540		431			547
Travel Time (s)	42.0		8.4			10.7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	20%	0%	1%
Adj. Flow (vph)	5	77	368	10	300	476
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	378	0	0	776
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	68	324	9	264	419
Future Vol, veh/h	4	68	324	9	264	419
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-2	-	-4	-	-	1
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	1	20	0	1
Mvmt Flow	5	77	368	10	300	476

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1449	373	0	0	378	0
Stage 1	373	-	-	-	-	-
Stage 2	1076	-	-	-	-	-
Critical Hdwy	6	6	-	-	4.3	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	185	729	-	-	891	-
Stage 1	832	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	100	729	-	-	891	-
Mov Cap-2 Maneuver	100	-	-	-	-	-
Stage 1	832	-	-	-	-	-
Stage 2	221	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	4.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	540	891	-
HCM Lane V/C Ratio	-	-	0.152	0.337	-
HCM Control Delay (s)	-	-	12.9	11.1	0
HCM Lane LOS	-	-	B	B	A
HCM 95th %tile Q(veh)	-	-	0.5	1.5	-