

Bowman

Traffic Impact Study

Oakwood Apartments Expansion

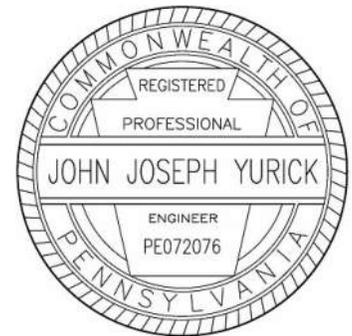
Phoenixville Borough, Chester County, PA



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Prepared for
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Executive Summary

The applicant proposes to expand the Oakwood Apartments, including 30 units, to be located the on the southern corner of Bridge Street and Deger Avenue in Phoenixville Borough, Chester County, Pennsylvania (**Figure 1**). Access to the site is proposed to continue to be provided via two full-movement accesses on Bridge Street. A site plan, prepared by Bercek & Associates and dated April 2023 is shown in **Figure 2**.

A copy of a scoping memo that was found to be satisfactory by the Borough is included in **Appendix A**. The scope of this Transportation Impact Study is generally based on PennDOT's guidelines, per the Department's Publication 282, Appendix A Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits, dated July 2017, and the requirements of the Borough's Subdivision and Land Development Ordinance (Section 22-602).

The purpose of this Transportation Impact Study is to evaluate the traffic impacts of the proposed development. The scope of this study includes an evaluation of the existing weekday morning and weekday afternoon peak hours, as well as the future 2026 build-out year, both without and with the development at the following study intersections:

- Bridge Street and Oakwood Manor Southern Access
- Bridge Street and Oakwood Manor Northern Access
- Bridge Street and Deger Avenue

Based on trip generation data compiled for Multifamily Housing (Low-Rise) (ITE Land Use Code 220) contained in the Institute of Transportation Engineers (ITE) publication entitled, *Trip Generation Manual, 11th Edition*, the proposed development will generate a total of approximately 32 "new" trips during the weekday morning peak hour and 33 "new" trips during the weekday afternoon peak.

The traffic analyses contained herein reveal that efficient access to and from the existing apartments can be provided upon completion of the expansion. Furthermore, site-generated traffic can be accommodated at the nearby study area intersections.

The following pedestrian related improvements should be provided as part of the proposed redevelopment:

- Each of the mid-block pedestrian crossing locations along the Bridge Street site frontage should provide consistent pedestrian warning signs that include Pedestrian Warning (W11-2A) signs with Downward Pointing Arrow (W16-7P) plaques at the location of the crossing facing both directions of traffic.
- The plans should show a direct sidewalk connection between the existing parking lot and the Bridge Street frontage sidewalk in the vicinity of the two midblock pedestrian crossings.
- At the southern Bridge Street crosswalk location, the applicant should consider removal of the existing tree located immediately south of the crossing on the east side of Bridge Street in order to provide better sight lines for pedestrians.

- The existing overhead lighting along the Bridge Street corridor should be evaluated to ensure that the current lighting is adequate for the crosswalk locations and does not create any glare issues for drivers to see pedestrians during nighttime conditions.

Existing Transportation Settings and Conditions

The development expansion will be located along Bridge Street, on the southern corner of its intersection with Deger Avenue in Phoenixville Borough, Chester County, Pennsylvania (**Figure 1**). The existing roadways and intersections in the vicinity of the site, which comprise the study area roadway network, are described in this section.

Roadway Characteristics

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

Table 1. Existing Roadway Characteristics

Roadway Name (Jurisdiction)	Average Daily Traffic Volumes (vehicles per day)	Roadway Classification		Travel Lanes (per direction)	Posted Speed Limit (mph)
		PennDOT Roadway Typologies ⁽¹⁾	PennDOT/ Township ⁽²⁾		
Bridge Street (PennDOT – SR 1019)	8,208 ⁽³⁾	Neighborhood Collector	Major Collector	1	35
Deger Avenue (Local)	n/a	Local	Local	1	25

(1) Based on Table 1.2 – Roadway Typologies in the PennDOT *Publication 13M, Design Manual Part 2*.

(2) Based on the roadway classifications provided on PennDOT's Traffic Information Repository (TIRe) website.

(3) Based on traffic data from PennDOT's Traffic Information Repository (TIRe) website.

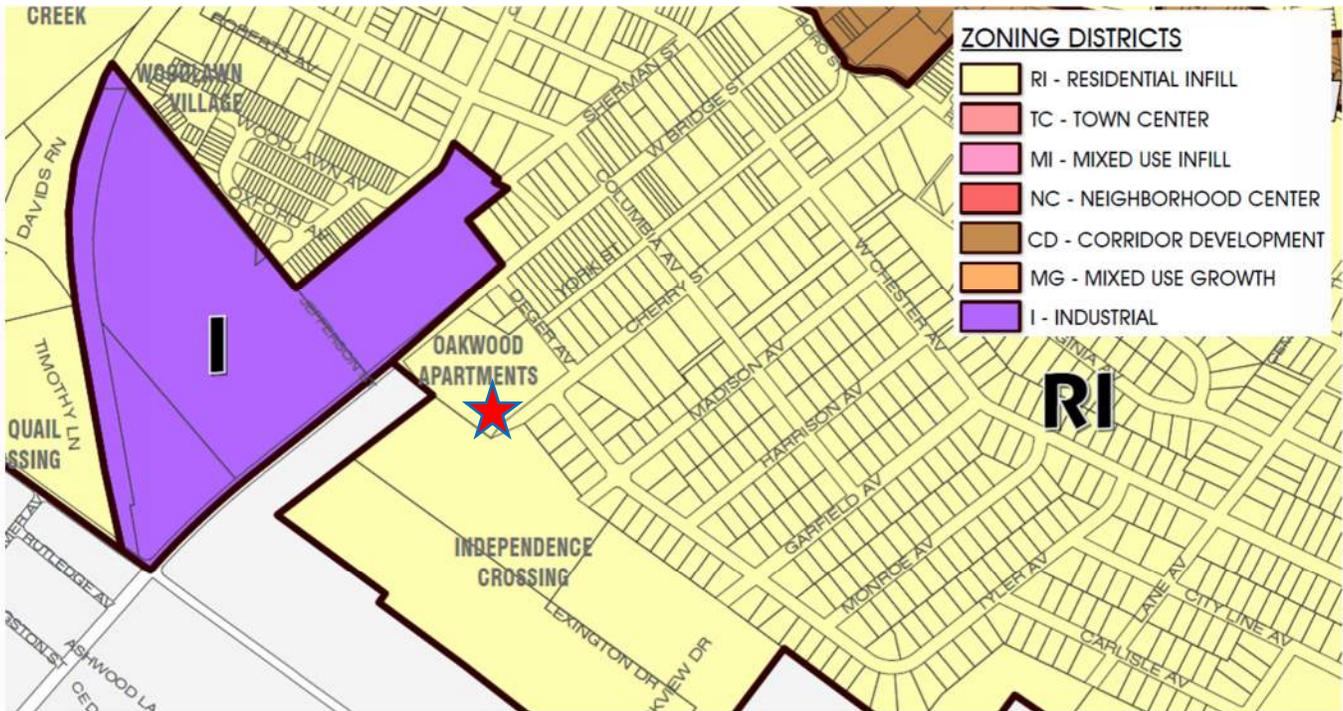
The following key intersections in the vicinity of the site comprise the study area:

- Bridge Street and Oakwood Manor Southern Access
- Bridge Street and Oakwood Manor Northern Access
- Bridge Street and Deger Avenue

The study intersections were reviewed and agreed upon by Phoenixville Borough.

Land Use Context

The proposed development is located in Phoenixville Borough, within the Residential Infill zoning district as seen in the Phoenixville Borough Zoning Map below. Residential Uses are permitted by right in this zoning district.



Source: Phoenixville Borough Zoning Map

Area Transit Services

No are no fixed-route or regional rail transit services within the immediate vicinity of the site.

Pedestrian-Bicycle Facilities

Sidewalk is currently provided on Bridge Street, Deger Avenue, and Cherry Street along the site frontage. The sidewalk on the west side of Bridge Street continues towards the north and towards the south, however the sidewalk on the east side of Bridge Street continues only to the east. There are also two midblock crosswalks along Bridge Street that is aligned with the commercial building on the opposite side of Bridge Street from the Oakwood Apartments site. There is also a designated crosswalk of Bridge Street at the Deger Avenue intersection.

Traffic Count Data

Daily traffic counts were obtained from PennDOT’s Traffic Information Repository (TIRe) website. The traffic count data is provided in **Appendix B**.

Manual turning movement traffic counts, as well as queue observations at the signalized intersections, were conducted in October 2022 during the weekday morning (6:00 AM – 10:00 AM) and weekday afternoon (3:00 PM – 7:00 PM) peak periods. The results of these traffic counts are tabulated by 15-minute intervals in **Appendix C**. 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 peak hour traffic volumes are depicted in **Figure 3A** for the weekday morning and weekday afternoon peak hours. The traffic volumes in Figure 3A were then analyzed to determine the existing operating conditions, and the results of this analysis are shown in **Figure 3B**. Specific details regarding the analysis results and traffic operations are provided later in this report.

Crash Summary

Reportable crash data for the five-year period between January 1, 2018 and December 31, 2022 was obtained from PennDOT at the study intersections. PennDOT defines a reportable crash as any crash that involves the following:

- Injury to or death of any person, or
- Damage to any vehicle involved to the extent that it cannot be driven under its own power in its customary manner without further damage or hazard to the vehicle, other traffic elements, or the roadway, and therefore requires towing.

PennDOT considers a crash occurrence of five reportable, correctable crashes over a continuous 12-month period to be a threshold value. If there are five or more reportable, correctable crashes, it may be appropriate to examine whether corrective improvements are necessary to reduce crashes. Within the entire study area only one reportable crash had occurred, a midblock crash on Bridge Street between the two site accesses that only involved one vehicle.

Site Characteristics

This section presents the details regarding the proposed site, including the incremental increase in traffic volumes generated by the development during the peak hours and the distribution of site traffic to the study area roadways, as well as the proposed site access configuration, traffic control, and sight distance requirements.

Trip Generation

Traffic volumes generated by the proposed development were prepared based on trip generation data compiled from numerous studies contained in the Institute of Transportation Engineers (ITE) publication, *Trip Generation, 11th Edition*. **Tables 2A and 2B** presents the anticipated vehicular trip generation for the proposed development.

Table 2A. Trip Generation Methodology

Land Use	Land Use Code	Daily	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour	
			Method	Enter/Exit	Method	Enter/Exit
Multifamily Housing (Low-Rise)	220	T = 6.41 (X) +75.31	T = 0.31 (x) + 22.85	24%/76%	T = 0.43 (x) +20.55	63%/37%

X = Independent Variable (units) | T = Trips

Table 2B. Vehicular Trip Generation

Land Use	Size	Daily	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Apartment Expansion ⁽¹⁾	30 Units	269	8	24	32	21	12	33

(1) ITE Land Use Code 220 for Multifamily Housing (Low-Rise).

Trip Distribution and Assignment

Site-generated traffic will approach and depart the site via different routes depending on factors such as the existing traffic patterns, location of major roadways, and the location of the development's site access. The distribution percentages for the anticipated directions of approach and departure and traffic assignment percentages are illustrated in **Figure 4A**. Application of the percentages illustrated in Figure 4A to the new peak hour trips contained in Table 2B, provides an estimate of site traffic to be added to the study area. The site-generated traffic is also shown in **Figure 4B** for the weekday morning and weekday afternoon.

Site Access Configuration and Traffic Control

Access to the site is to remain via the two existing unsignalized driveways located along Bridge Street, one approximately 135 feet north of Jefferson Street and the other approximately 155 feet south of Deger Avenue.

The potential need for left- and right-turn deceleration lanes was based on the current PennDOT guidelines in accordance with *Publication 46, Chapter 11 – Traffic Studies*. **Table 3** summarizes the results of the auxiliary turn lane warrants for the site access intersections along Bridge Street.

Table 3 – Turn Lane Warrant Summary

Intersection	Auxiliary Lane Warrant	Warrant Satisfied? ⁽¹⁾	Required Lane Length ⁽¹⁾
Bridge Street and North Site Access	Northbound Right	NO	Not Required
	Southbound Left	NO	Not Required
Bridge Street and South Site Access	Northbound Right	NO	Not Required
	Southbound Left	NO	Not Required

(1) Based on PennDOT Publication 46, *Traffic Engineering Manual*, Chapter 11.16

The various warrant/guideline analysis worksheets are contained in **Appendix D**.

Additionally, the geometric design of the proposed site accesses were preliminarily evaluated based on guidelines contained in the *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads*, as well as local PennDOT District policies.

Based on the results of this evaluation, no changes to the site accesses are required.

Future Traffic Conditions

This section presents the 2026 future build-out year traffic conditions, both without and with the proposed development, which is anticipated to be completed and occupied by 2026. The future 2026 build-out year without-development traffic volumes were estimated by increasing the existing 2022 traffic volumes to account for regional growth, as described below. The incremental increase due to the anticipated trip generation for the site was then added, resulting in the future 2026 build-out year with-development traffic volumes.

Regional Traffic Growth

To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 0.54 percent per year compounded for 4 years to 2026, or 2.18 percent total to 2026. This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2022 and July 2023* for similar, Urban Non-Interstate roadways in Chester County.

Local Traffic Growth

To account for local traffic growth, Phoenixville Borough, Schuylkill Township, and East Pikeland Township were contacted to identify any other nearby future developments. Based upon coordination with these municipalities, the existing traffic volumes were also increased to include the traffic to be generated by nearby approved developments. A total of 17 nearby developments were included in the future traffic projections.

Information regarding the nearby approved developments, obtained from Phoenixville Borough, Schuylkill Township, and East Pikeland Township, and detailed traffic volume projection worksheets are provided in **Appendix E**.

Planned Roadway Improvements

There are no known roadway improvements which would affect operations within the study area.

Future Traffic Conditions

The total background growth and nearby approved development traffic volumes were then added to the existing 2022 traffic volumes, resulting in the future 2026 without-development traffic volumes. Next, the site generated traffic volumes, as shown in Figure 4B, were added to the future 2026 without-development traffic volumes, resulting in the future 2026 with-development traffic volumes.

The resultant future 2026 peak hour traffic volumes without development are illustrated in **Figure 5A**, and the future 2026 with-development peak hour traffic volumes are illustrated in **Figure 5D** for the weekday morning and weekday afternoon peak hours. These traffic volumes were then analyzed to determine the future 2026 without and with development traffic operating conditions, and the results of this analysis are shown in **Figures 5C and 5D**.

Detailed traffic volume projection worksheets are provided in **Appendix F**.

Capacity/Level-of-Service Results

The peak hour traffic volumes were analyzed to determine the existing and future traffic operating conditions, both without and with the proposed development expansion, in accordance with the standard techniques contained in the current *Highway Capacity Manual (6th Edition)* for both signalized and unsignalized intersections. The HCM 6th Edition Methodology within Synchro 11.1 (build 3, rev. 34) traffic analysis software was utilized in the traffic analyses.

These standard capacity/level-of-service analysis techniques, which calculate total control delay, are described in **Appendix G** 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.

According to PennDOT's Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permit Plans, the following procedures and assumptions were utilized:

- For signalized intersections, the Pennsylvania base saturation flow rate (Exhibit 10-9) and Pennsylvania traffic signal control calibration parameters (Exhibit 10-10) outlined in PennDOT's Publication 46, Traffic Engineering Manual, were used.
- For unsignalized intersections, the base critical headways at TWSC intersections (Exhibit 10-11) and base follow-up headways at TWSC intersections (Exhibit 10-12) outlined in PennDOT's Publication 46, Traffic Engineering Manual, were used.
- All traffic signal timings at signalized intersections were optimized in without-development conditions.
- If the evaluation of without-development to with-development conditions indicates that the overall intersection level-of-service has dropped, mitigation will be required if the increase in delay is greater than 10 seconds. If the overall intersection delay increase is less than or equal to 10 seconds, mitigation of the intersection will not be required.

The existing and future 2026 build-out year traffic conditions, both without and with the proposed development expansion, are summarized in **Figures 3B, 5C, and 5D**, respectively while the detailed capacity/level-of-service analysis worksheets are provided in **Appendices H, I, and J**.

As illustrated in **Figures 3B, 5C, and 5D**, with the proposed site and with the site related improvement recommendations, all study intersections will satisfy PennDOT's level-of-service criteria. **Table 4 and Table 5** below summarizes the overall levels of service for the study.

**Table 4. Overall Intersection Levels-of-Service
2026 Future Weekday Morning Peak Hour**

Intersection	Overall Level-of-Service (Delay in Seconds)		Delay Increase	Requires Mitigation ⁽²⁾	Overall Level-of-Service (Delay in Seconds)
	Without Development	With Development ⁽¹⁾			With Development and Mitigation Improvements
Bridge Street & South Site Access	A (0.2)	A (0.4)	+0.2	NO	n/a
Bridge Street & North Site Access	A (0.2)	A (0.5)	+0.3	NO	n/a
Bridge Street & Deger Avenue	A (1.0)	A (1.0)	+/- 0.0	NO	n/a

**Table 5. Overall Intersection Levels-of-Service
2026 Future Weekday Afternoon Peak Hour**

Intersection	Overall Level-of-Service (Delay in Seconds)		Delay Increase	Requires Mitigation ⁽²⁾	Overall Level-of-Service (Delay in Seconds)
	Without Development	With Development ⁽¹⁾			With Development and Mitigation Improvements
Bridge Street & South Site Access	A (0.2)	A (0.3)	+0.1	NO	n/a
Bridge Street & North Site Access	A (0.2)	A (0.5)	+0.3	NO	n/a
Bridge Street & Deger Avenue	A (0.6)	A (0.6)	+/- 0.0	NO	n/a

(1) With-development base conditions without improvements.

(2) Based on the difference in delay from without-development to with-development conditions, in accordance with PennDOT's level of service requirements.

Queuing Analysis

A queuing analysis was completed at the study intersections based on the HCM 6th Edition methodology. Overall, no queuing issues occur at the study intersections. The maximum queue expected at each of the study intersections is approximately one vehicle, which will not lead to queue build ups along Bridge Street or within the site.

Multimodal and Parking Considerations

As traffic and congestion increase throughout the region, it is critical that Phoenixville plan to encourage non-vehicular travel within the borough. As such, the section discusses existing multimodal conditions, potential impacts due to the proposed development, and recommendations to maintain a highly walkable environment, encourage non-vehicular travel, and provide access to nearby transit. In addition, parking for the site is also addressed below.

Parking Evaluation

The required parking supply for the proposed apartment expansion should continue to be based on coordination with the Borough Engineer. In addition, the applicant should consider bicycle parking/storage to further encourage alternative modes of transportation for its residents and visitors.

Multimodal Facilities

The site plans indicate that the existing sidewalk will remain along the site frontage. The current sidewalk provides access to the other pedestrian facilities that are not on the site frontage with curb ramps and crosswalks, which allows for access further north and south on Bridge Street. With regard to the existing marked crosswalks along Bridge Street, we recommend that each of the crossing locations provide consistent pedestrian warning signs that include Pedestrian Warning (W11-2A) signs with Downward Pointing Arrow (W16-7P) plaques at the location of the crossing facing both directions of traffic. In addition, we recommend the applicant should provide a direct sidewalk connection between the existing parking lot and the frontage sidewalk in the vicinity of the two midblock pedestrian crossings. We also note that we have concerns about the location of the southern crosswalk since a pedestrian on the east (Oakwood site) side could be blocked by the adjacent tree planted within the sidewalk buffer and should be considered for removal. Also, we recommend that the existing overhead lighting along the corridor be evaluated to ensure that the current lighting is adequate for the crosswalk locations and does not create any glare issues for drivers to see pedestrians during nighttime conditions.

As previously mentioned, there are no fixed-route transit or regional rail service routes.

Conclusions and Recommendations

Overall, the proposed expansion of the Oakwood Apartments will not have a significant traffic impact on the study intersections. The planned expansion does not increase the number of trips entering or exiting the site accesses that would result in any noticeable delay or queuing issues. As such, there are no site access or off-site improvements are necessary to keep the intersections operating at high levels of service. We do recommend improvements at the existing pedestrian crosswalks.

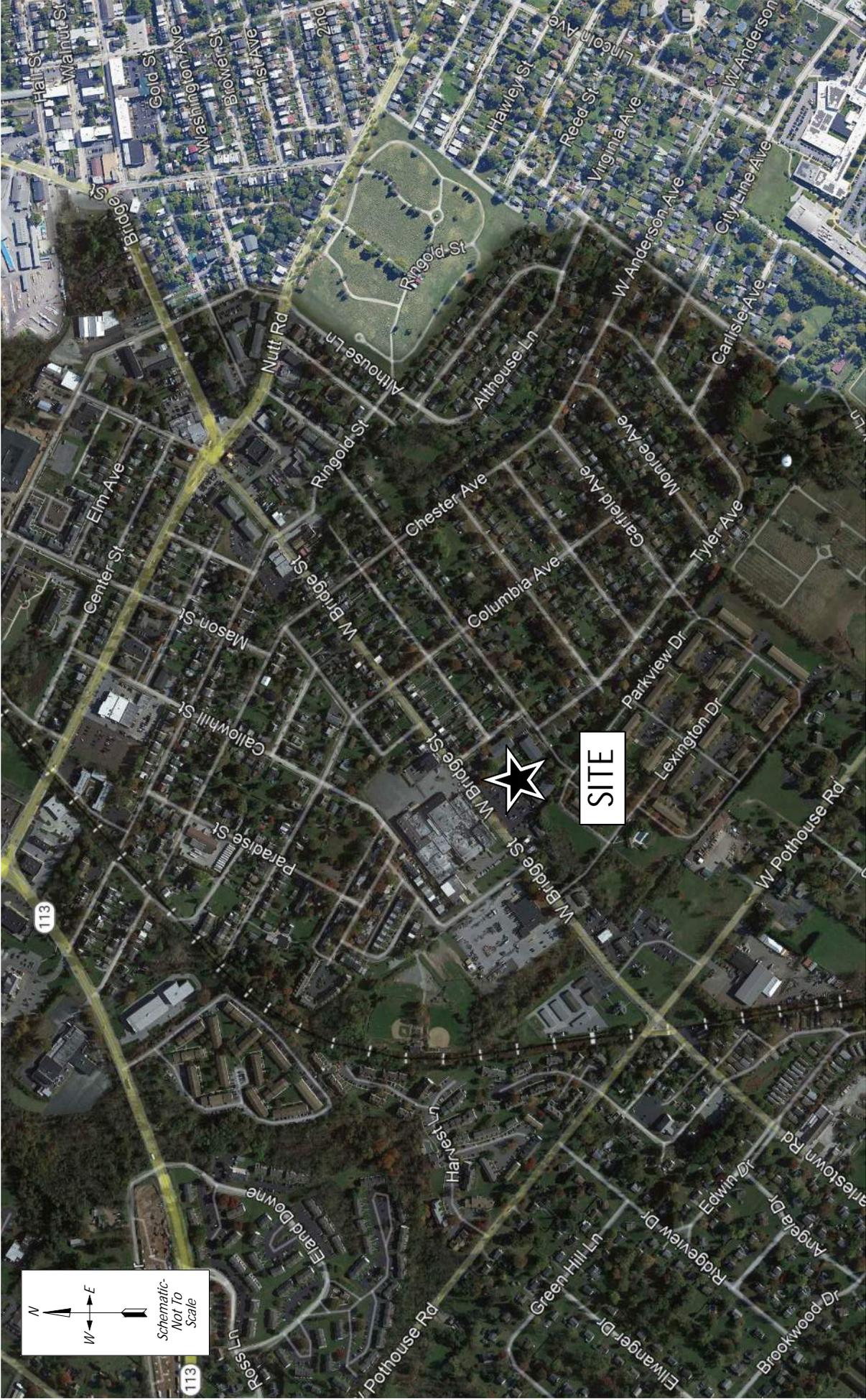
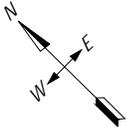
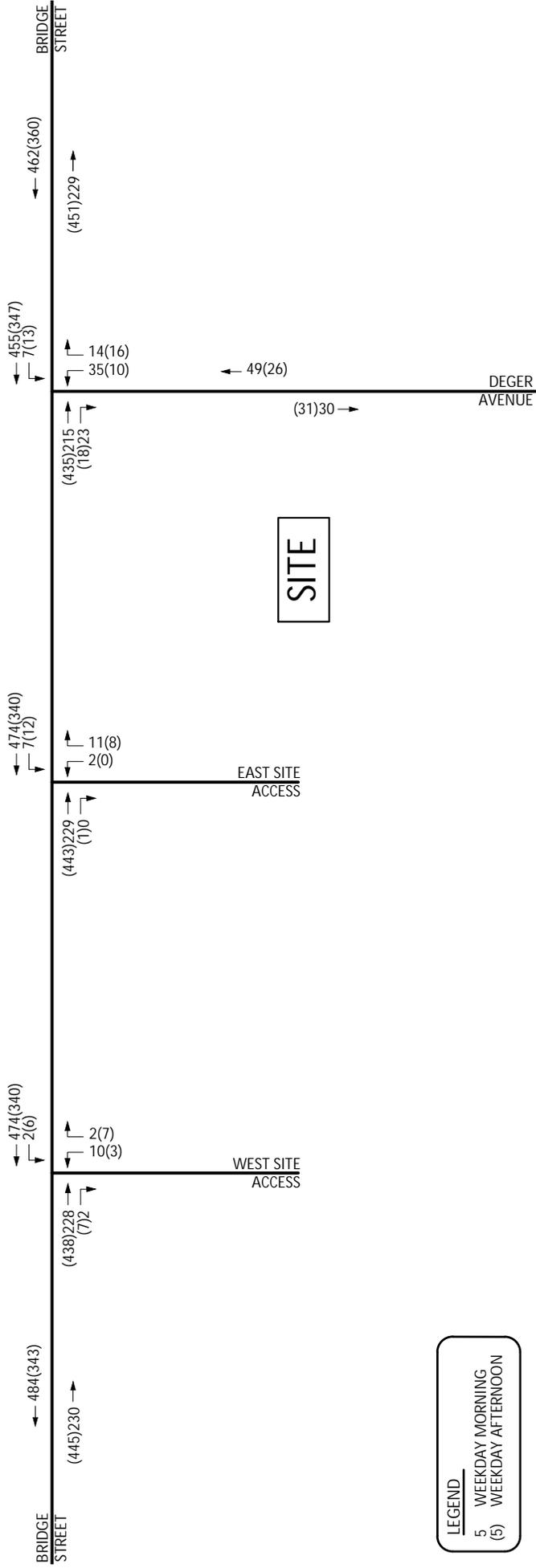


FIGURE 1
 Location Map
OAKWOOD APARTMENTS
 PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA

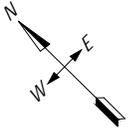


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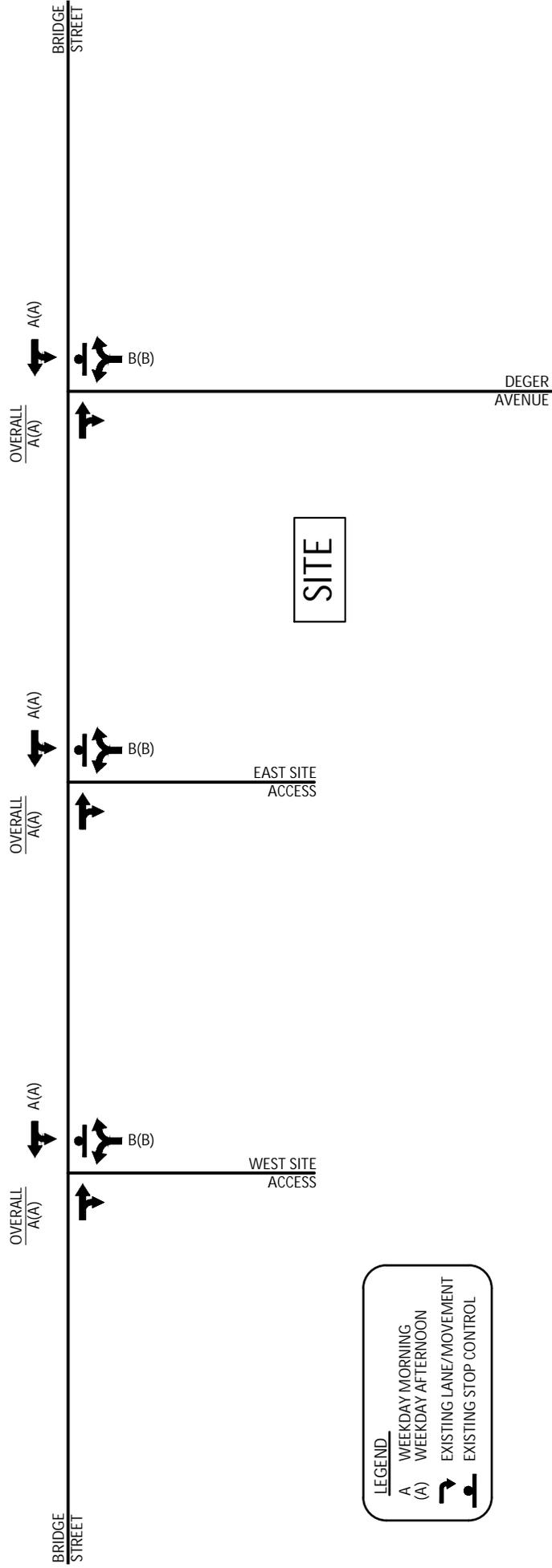


LEGEND
 5 WEEKDAY MORNING
 (6) WEEKDAY AFTERNOON

FIGURE 3A
 2022 Existing Peak Hour Volumes
OAKWOOD APARTMENTS
 PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA



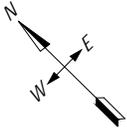
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LEGEND

- A WEEKDAY MORNING
- (A) WEEKDAY AFTERNOON
- EXISTING LANE/MOVEMENT
- EXISTING STOP CONTROL

FIGURE 3B
2022 Existing Peak Hour Levels of Service
OAKWOOD APARTMENTS
PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA



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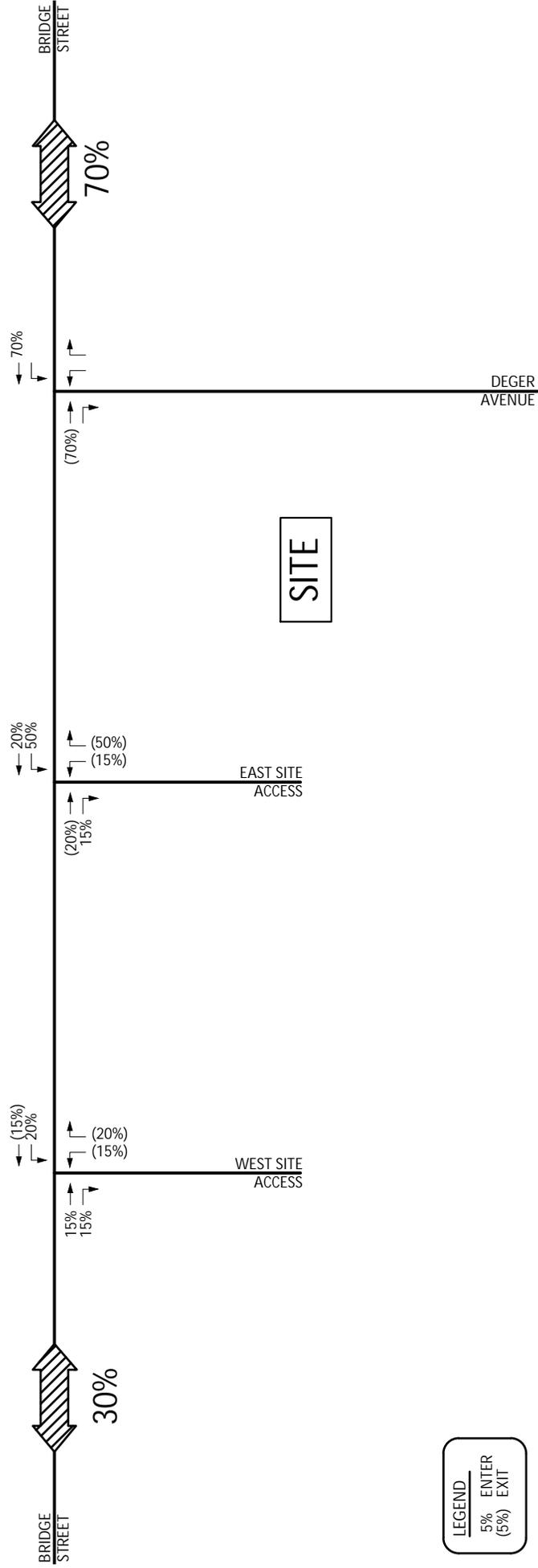
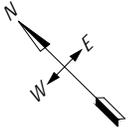


FIGURE 4A

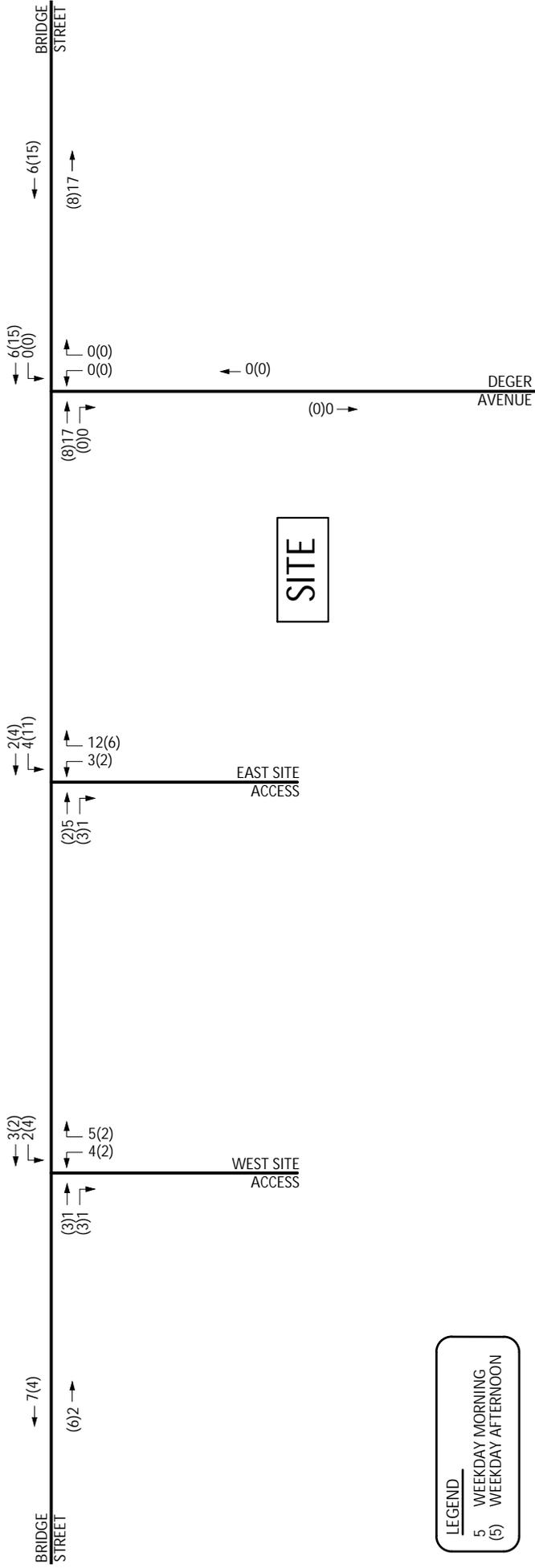
New Trip Distribution

OAKWOOD APARTMENTS

PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA

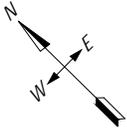


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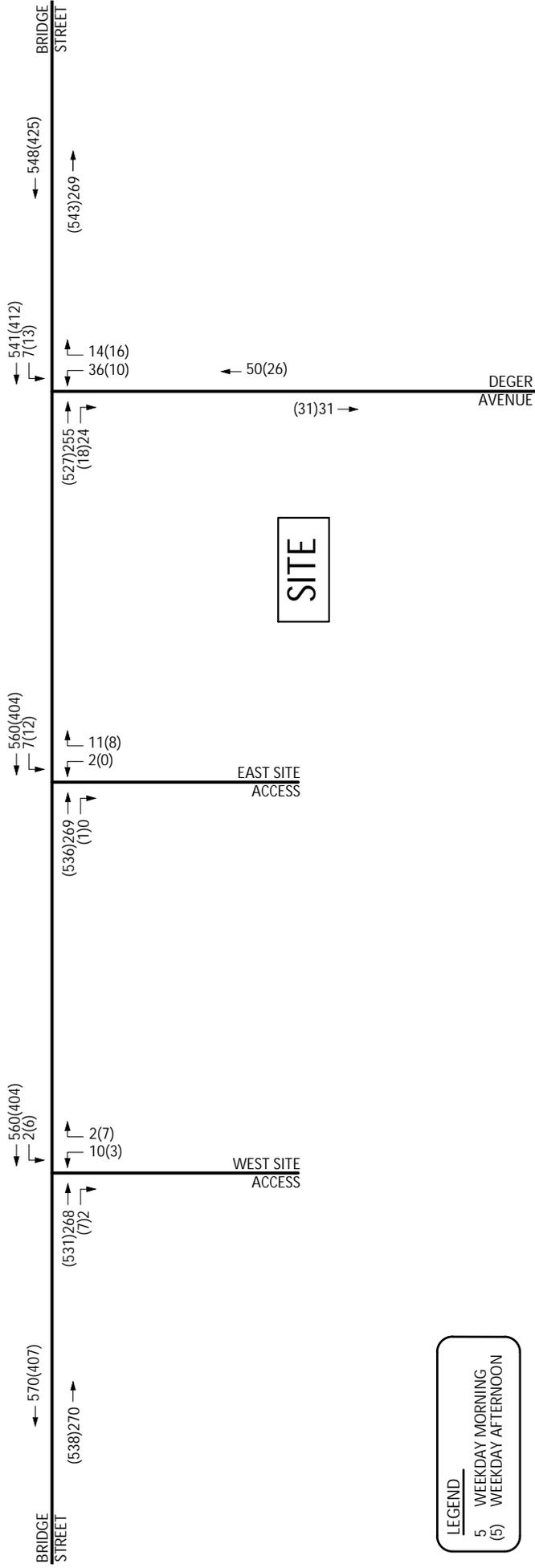


LEGEND	
5	WEEKDAY MORNING
(6)	WEEKDAY AFTERNOON

FIGURE 4B
New Trip Assignment
OAKWOOD APARTMENTS
PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA



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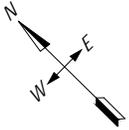
LEGEND
 5 WEEKDAY MORNING
 (6) WEEKDAY AFTERNOON

FIGURE 5A
 2026 Future Peak Hour Traffic Volumes - without Development

OAKWOOD APARTMENTS

PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA





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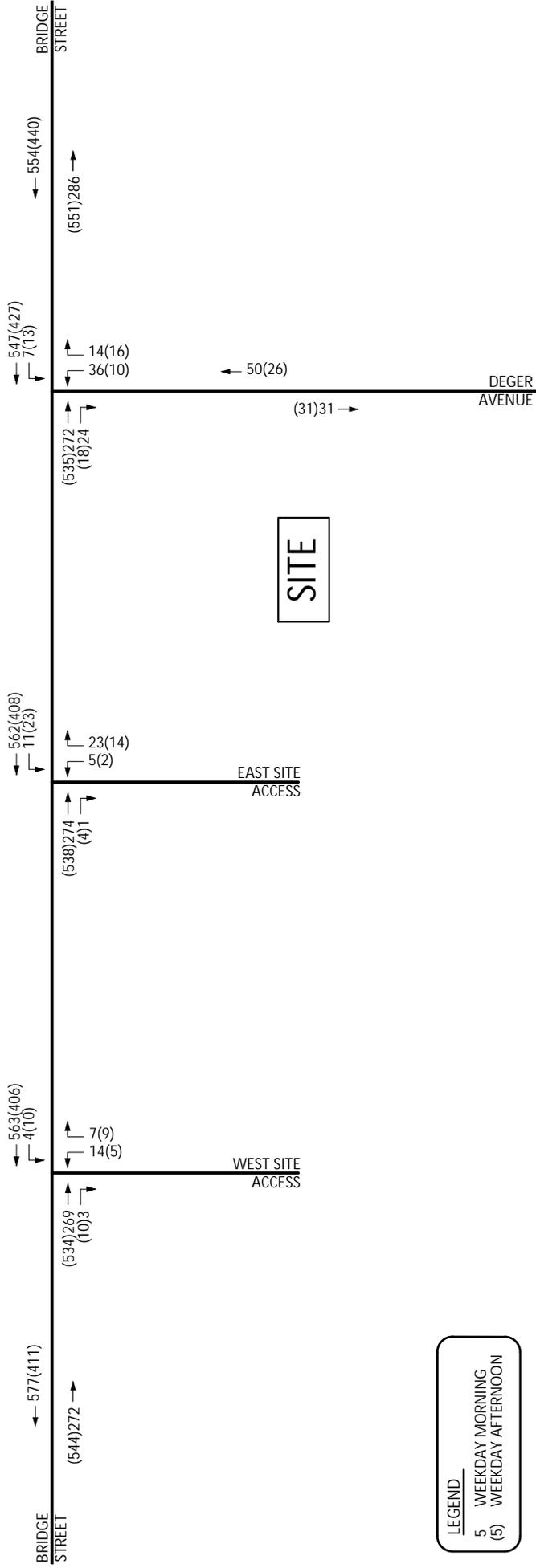
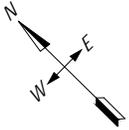


FIGURE 5B
2026 Future Peak Hour Traffic Volumes - with Development
OAKWOOD APARTMENTS
PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA



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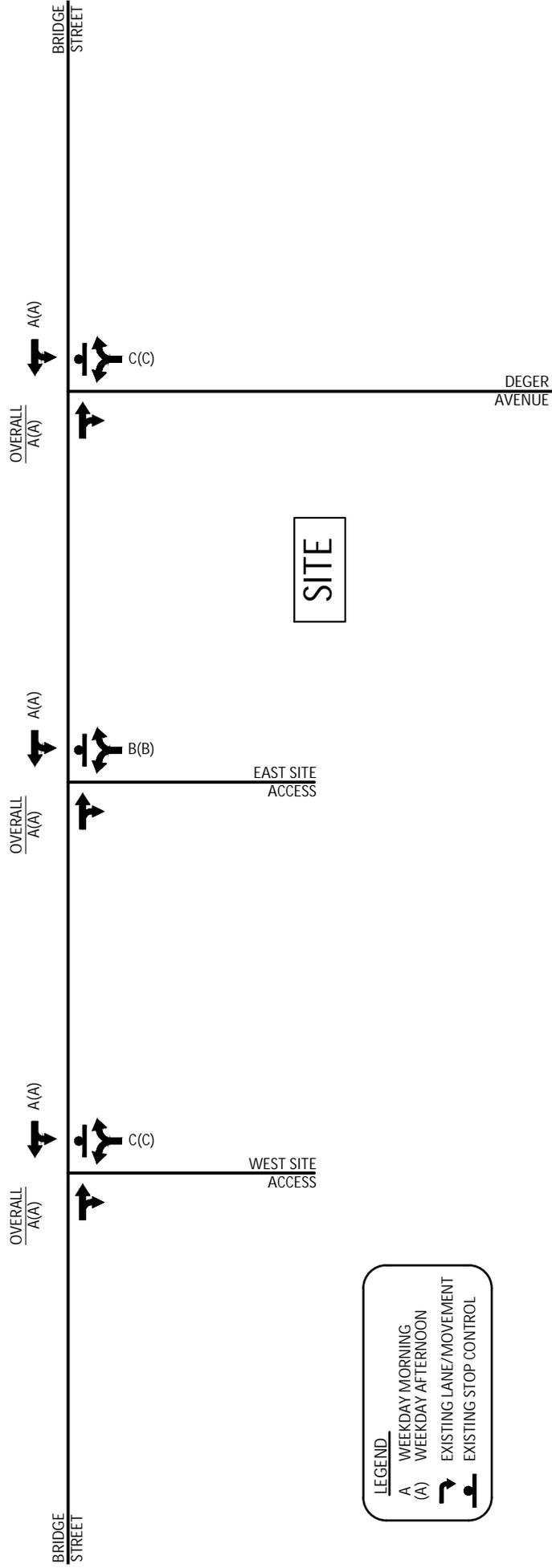
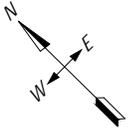


FIGURE 5C
2026 Future Peak Hour Levels of Service - without Development

OAKWOOD APARTMENTS

PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA



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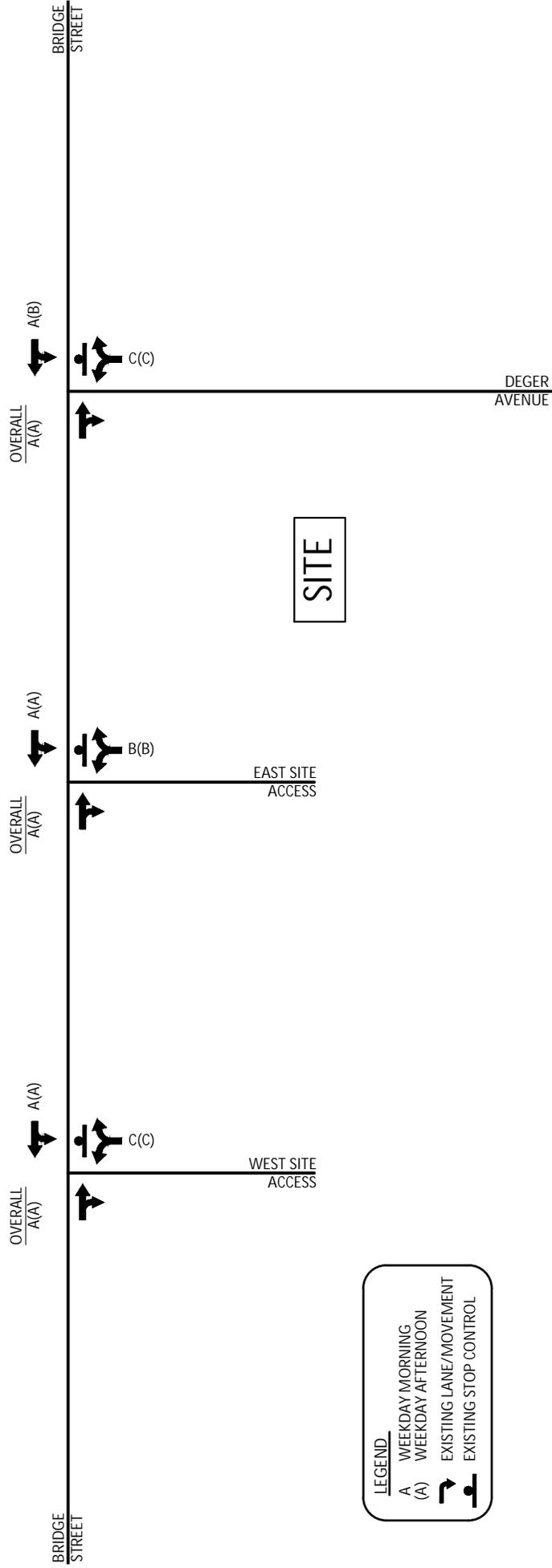


FIGURE 5D
2026 Future Peak Hour Levels of Service - with Development

OAKWOOD APARTMENTS

PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA

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APPENDIX A
CORRESPONDENCE

MEMORANDUM

TO: Jean Krack, Manager
Phoenixville Borough

FROM: John J. Yurick, P.E., PTOE, PTP, Borough Traffic Engineer
McMahon Associates, Inc.

SUBJECT: Oakwoods Apartments
Parking & Traffic Impact Study Scoping Memorandum

DATE: April 14, 2022

McMahon Associates, Inc. has prepared this scoping memorandum for the proposed Oakwoods Apartments residential expansion, presently situated along West Bridge Street. The proposed number of new units will be determined based on the results of a parking study of the existing complex. As such, **Phase 1** will include a parking study to determine the maximum number of new units that can be accommodated by the site. **Phase 2** will include a traffic impact study to evaluate the traffic impact of the site on surrounding roadways, as well as determine appropriate access to the redeveloped property.

In order to complete the transportation impact study and satisfy Borough requirements, we propose the scope described herein, which satisfies the Borough requirements (SALDO Section 22-602).

Phase 1 – Parking Study Scope

The parking study will include the following tasks in order to determine the number of allowable apartment units on site:

1. Conduct an inventory of the existing parking lot for the apartment complex to document the existing parking spaces on site and any special parking regulations (handicap, visitor, etc.). Permitted on-street parking surrounding the site will be noted but not included in the parking inventory. Due to the shared parking arrangement, parking at the 1039-1041 Corporate Complex will also be inventoried separately.
2. Conduct parking demand counts at the above parking lots on two separate weekdays during the weekday morning period (between 10:00 AM and noon), weekday afternoon period (between 2:00 PM and 4:00 PM), and weekday evening period (between 7:00 PM and 9:00 PM). Saturday midday demand counts will be taken once on a typical midday period (between 11:00 AM and 3:00 PM) and one evening (between 7:00 PM and 9:00 PM).
3. Calculate the peak parking demands for each of the time periods and determine the parking surplus at the apartment complex.
4. Calculate the parking demand using data contained in the Institute of Transportation Engineers, *Parking*, 3rd Edition manual.
5. Provide a brief letter report detailing the parking study findings and recommendations.

Phase 2 – Transportation Impact Study Scope

In order to evaluate the transportation impacts of the proposed redevelopment project and address the study requirements of the borough and PennDOT, the following scope is proposed:

Study Intersections

- West Bridge Street and Deger Avenue
- West Bridge Street and Oakwoods Northern Site Access
- West Bridge Street and Oakwoods Southern Site Access

Upon determination of the number of units to be proposed as part of the expansion and review of a completed site plan, the scope of study and number of study intersections will be confirmed.

Traffic Data Collection

Conduct intersection turning movement traffic counts at the above intersections during the study peak periods.

Study Peak Periods

- Weekday morning commuter peak period (6:00 AM to 10:00 AM)
- Weekday afternoon commuter peak period (3:00 PM to 7:00 PM)

1. Establish existing traffic volumes utilizing recent traffic count data and other resources, if necessary for the above study intersections during both peak periods.
2. Identify existing or proposed pedestrian facilities, bicycle facilities, and public transit facilities within the study area, and any potential development impacts to such facilities.
3. Evaluate the existing traffic operating conditions, including detailed capacity/level-of-service and queuing analysis for the two peak hours for the study intersections.
4. Review available crash data from PennDOT and the Borough Police Department for the study area intersections and summarize any potential trends or appropriate countermeasures to address any adverse conditions.
5. Forecast peak hour traffic volumes without-development for the future build-out year based upon PennDOT traffic growth data for the study area roadways and traffic generated by any other proposed developments located within the vicinity of the study area. Borough staff will provide information regarding area developments for consideration in the traffic study. The applicant must verify the anticipated build-out year for this project prior to commencement of the study.
6. Identify area roadway improvements proposed in conjunction with other developments or by PennDOT, if any.
7. Evaluate future build-out design year traffic conditions without-development, including detailed capacity/level-of-service and queuing analysis at the study intersections for both peak hours.
8. Estimate the daily and peak hour site trip generation based on the new Institute of Transportation Engineers publication, *Trip Generation, 11th Edition*.

Note: Our office will confirm the specific characteristics of the site with the applicant in order to confirm the appropriate trip generation assumptions.

9. Prepare site trip distributions based on existing traffic patterns and the locations of the site accesses, and assign the development-generated traffic to the study area roadway network for the peak hours, resulting in future with-development traffic volumes.
10. Evaluate future build-out traffic conditions with-development, including detailed capacity/level-of-service and queuing analysis at the study intersections and site accesses for both peak hours. Identify recommended improvements to achieve acceptable levels of service or mitigate the traffic impact of the development at the study intersection, per Borough requirements.
11. Evaluate the site access intersections and provide design recommendations (in narrative format), including auxiliary turn lane analyses and sight distance requirements. It is noted that the study will evaluate one site access scenario, and that additional scenarios can be evaluated as an additional service.
12. Complete a review of the internal site layout with regard to traffic operations.
13. Prepare a transportation impact study containing our analysis results, major findings, conclusions/ recommendations in accordance with Section 22-602 of the borough's Subdivision and Land Development Ordinance. The report, inclusive of traffic count data and other technical appendices, will be provided in electronic format to all parties. The applicant will be responsible to make submissions to outside agencies, as necessary.

Exclusions

Supplemental services not specifically described above, including but not limited to, additional data collection, additional traffic analysis, study scope changes, changes to the traffic study assumptions, development staging, response to review comments, conceptual improvements plans and cost estimates, and meetings/ hearings, etc. are not included in the scope, but will be provided, as necessary and as authorized, on a time-and-materials basis, as necessary and as authorized based on our attached *Standard Provisions for Professional Services*. It is reminded that the applicant will also be responsible for all electronic submissions to PennDOT, if necessary, and addressing agency review comments are not part of this scope or fee.

The applicant's consultants will be responsible for all PennDOT submissions, as may be necessary, since West Bridge Street is a State roadway.

Schedule

At this time, we are ready to begin field work upon written notice to proceed by the borough. We anticipate that the Phase 1 Parking Study can be completed within two to three weeks from notice to proceed, assuming all necessary information is provided in a timely manner and there are no weather interruptions to the data collection effort.

Please contact our office if you have any questions regarding this scoping memorandum.

cc: Owen Hyne, P.E., CEA, Remington & Vernick

The top of the page features a dark green triangular shape on the left containing the word "Bowman" in white. To the right is an aerial photograph of a roundabout with a central tree island, overlaid with white geometric lines.

Bowman

APPENDIX B

PENNDOT TIR_e DATA

Bridge Street

AADT >= 2,000 < 10,000



Result: 1 of 2



OBJECTID: 2837536

State Route: 1019

County Code: 15 - CHESTER

District: 06 - District 06

Jurisdiction: 1 - STATE

Segment: 0070

Length (ft): 3611

Sequence Number: 150013000

Sub Route: 10

Year Built: 1944

Year Resurfaced Last: 2015

Segment Direction: B - BOTH

Facility Type: 2 - TWO_WAY

Roadway Width: 30

Surface Type: 62 - BITUMINOUS PAVEMENT ON PCC B
ASE

Lane Count: 2

Parking Lanes:

Divisor Type: 0

Divisor Width: 0

Condition Date: 2023-10-1

IRI: 124

Pavement Condition Rate:

AADT: 8208

Access Control: 3 - NO ACCESS CONTROL

Toll Indicator: 0

Street Name: BRIDGE ST

Route Number Prefix:

Traffic Route Number: 000

Route Number Suffix:

Beginning Description: BROOKWOOD RD

Ending Description: SHERMAN ST

The top of the page features a dark green triangular shape on the left containing the word "Bowman" in white. To the right, a white-bordered triangular shape contains an aerial photograph of a city street intersection with a roundabout and a building with arches.

Bowman

APPENDIX C

TURNING MOVEMENT COUNTS



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 1

Turning Movement Data

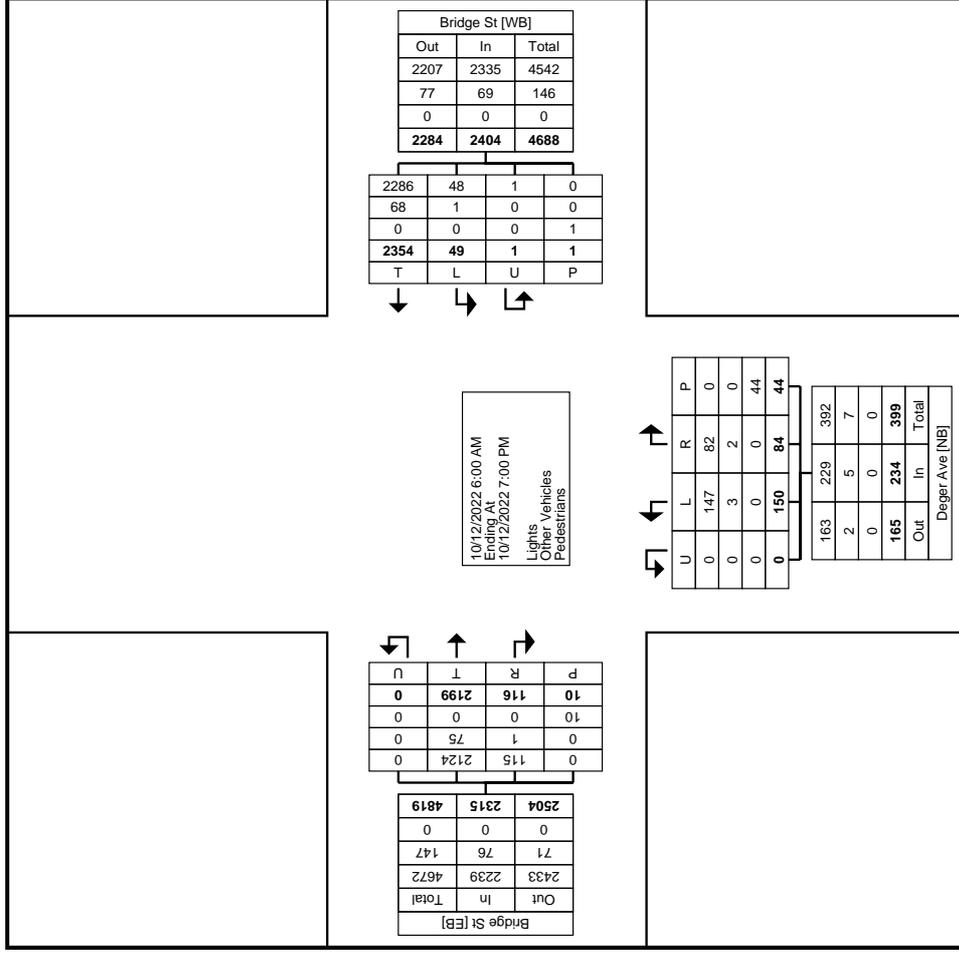
Start Time	Bridge St Westbound				Deger Ave Northbound				Bridge St Eastbound				
	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
6:00 AM	0	31	0	31	1	1	0	2	25	0	0	25	58
6:15 AM	0	41	0	41	1	2	0	3	18	0	0	18	62
6:30 AM	0	44	0	44	6	1	0	7	25	2	0	27	78
6:45 AM	1	64	0	65	4	2	0	6	32	0	0	32	103
Hourly Total	1	180	0	181	12	6	0	18	100	2	0	102	301
7:00 AM	1	71	0	72	4	3	0	7	38	1	0	39	118
7:15 AM	0	85	0	85	5	6	0	11	47	8	0	55	151
7:30 AM	3	99	0	102	4	2	0	6	68	8	0	76	184
7:45 AM	2	111	0	113	16	6	0	22	53	12	0	65	200
Hourly Total	6	366	0	372	29	17	0	46	206	29	0	235	653
8:00 AM	2	134	0	136	8	2	0	10	51	2	0	53	199
8:15 AM	0	111	0	111	7	4	0	11	43	1	0	44	166
8:30 AM	0	108	1	109	6	3	0	9	45	1	0	46	164
8:45 AM	1	92	0	93	6	2	0	8	83	2	0	85	186
Hourly Total	3	445	1	449	27	11	0	38	222	6	0	228	715
9:00 AM	2	65	0	67	3	2	0	5	59	4	0	63	135
9:15 AM	0	45	0	45	2	1	0	3	74	3	0	77	125
9:30 AM	2	40	0	42	1	3	0	4	40	4	0	44	90
9:45 AM	1	55	0	56	3	1	0	4	43	3	0	46	106
Hourly Total	5	205	0	210	9	7	0	16	216	14	0	230	456
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	70	0	70	13	3	0	16	65	3	0	68	154
3:15 PM	1	64	0	65	7	3	0	10	88	6	0	94	169
3:30 PM	1	63	0	64	3	0	0	3	75	3	0	78	145
3:45 PM	1	80	0	81	5	1	0	6	82	5	0	87	174
Hourly Total	3	277	0	280	28	7	0	35	310	17	0	327	642
4:00 PM	1	75	0	76	8	3	0	11	108	5	0	113	200
4:15 PM	2	76	0	78	0	3	0	3	119	8	0	127	208
4:30 PM	5	69	0	74	3	2	0	5	99	4	0	103	182
4:45 PM	3	85	0	88	4	5	0	9	98	7	0	105	202
Hourly Total	11	305	0	316	15	13	0	28	424	24	0	448	792
5:00 PM	4	81	0	85	3	2	0	5	100	1	0	101	191
5:15 PM	2	94	0	96	1	5	0	6	120	8	0	128	230
5:30 PM	4	87	0	91	2	4	0	6	117	2	0	119	216

5:45 PM	1	69	0	0	70	5	1	0	1	6	83	2	0	0	85	161
Hourly Total	11	331	0	0	342	11	12	0	5	23	420	13	0	4	433	798
6:00 PM	3	63	0	0	66	2	2	0	1	4	73	4	0	0	77	147
6:15 PM	2	62	0	0	64	13	4	0	0	17	72	3	0	0	75	156
6:30 PM	2	59	0	0	61	1	2	0	1	3	77	3	0	0	80	144
6:45 PM	2	61	0	0	63	3	3	0	1	6	79	1	0	2	80	149
Hourly Total	9	245	0	0	254	19	11	0	3	30	301	11	0	2	312	596
Grand Total	49	2354	1	1	2404	150	84	0	44	234	2199	116	0	10	2315	4953
Approach %	2.0	97.9	0.0	-	-	64.1	35.9	0.0	-	-	95.0	5.0	0.0	-	-	-
Total %	1.0	47.5	0.0	-	48.5	3.0	1.7	0.0	-	4.7	44.4	2.3	0.0	-	46.7	-
Lights	48	2286	1	-	2335	147	82	0	-	229	2124	115	0	-	2239	4803
% Lights	98.0	97.1	100.0	-	97.1	98.0	97.6	-	-	97.9	96.6	99.1	-	-	96.7	97.0
Other Vehicles	1	68	0	-	69	3	2	0	-	5	75	1	0	-	76	150
% Other Vehicles	2.0	2.9	0.0	-	2.9	2.0	2.4	-	-	2.1	3.4	0.9	-	-	3.3	3.0
Pedestrians	-	-	-	1	-	-	-	-	44	-	-	-	-	-	10	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	100.0	-



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 3



Turning Movement Data Plot



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 4

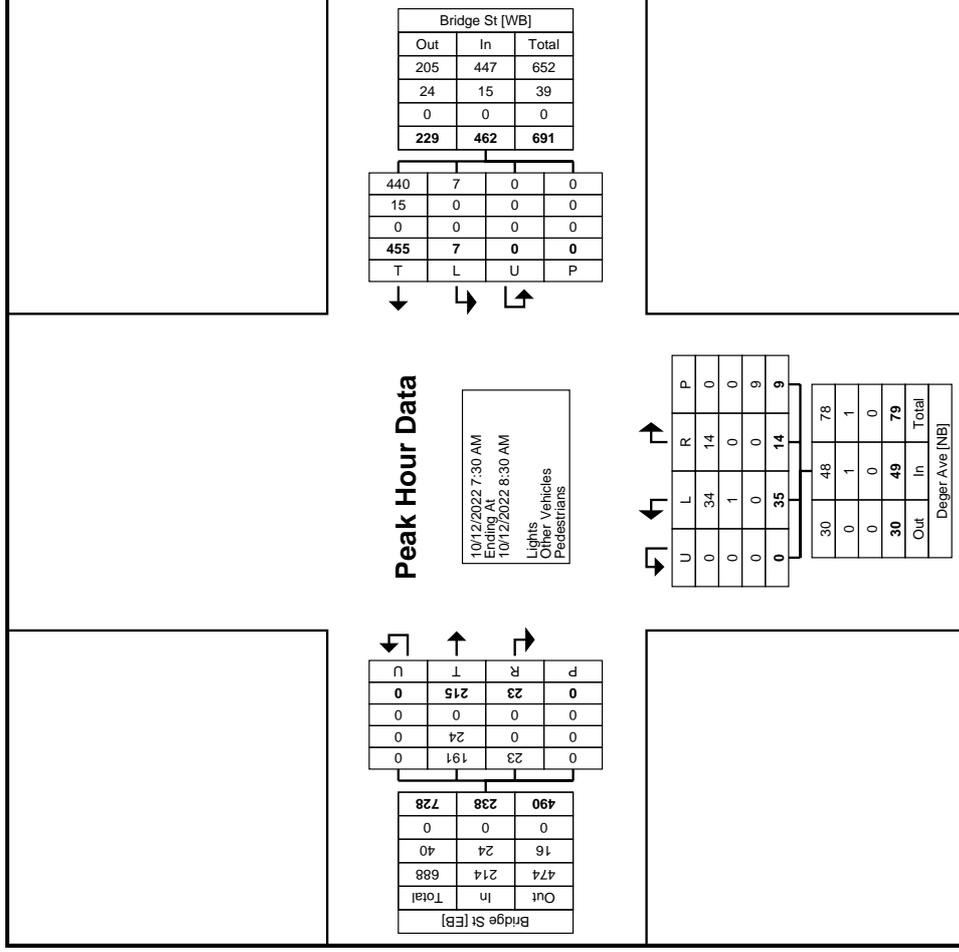
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Bridge St Westbound				Deger Ave Northbound				Bridge St Eastbound				
	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	3	99	0	102	4	2	0	6	68	8	0	76	184
7:45 AM	2	111	0	113	16	6	0	22	53	12	0	65	200
8:00 AM	2	134	0	136	8	2	0	10	51	2	0	53	199
8:15 AM	0	111	0	111	7	4	0	11	43	1	0	44	166
Total	7	455	0	462	35	14	0	49	215	23	0	238	749
Approach %	1.5	98.5	0.0	-	71.4	28.6	0.0	-	90.3	9.7	0.0	-	-
Total %	0.9	60.7	0.0	61.7	4.7	1.9	0.0	6.5	28.7	3.1	0.0	31.8	-
PHF	0.583	0.849	0.000	0.849	0.547	0.583	0.000	0.557	0.790	0.479	0.000	0.783	0.936
Lights	7	440	0	447	34	14	0	48	191	23	0	214	709
% Lights	100.0	96.7	-	96.8	97.1	100.0	-	98.0	88.8	100.0	-	89.9	94.7
Other Vehicles	0	15	0	15	1	0	0	1	24	0	0	24	40
% Other Vehicles	0.0	3.3	-	3.2	2.9	0.0	-	2.0	11.2	0.0	-	10.1	5.3
Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-
% Pedestrians	-	-	-	-	-	-	-	100.0	-	-	-	-	-



Transportation Engineers & Planners
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Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 5



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



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

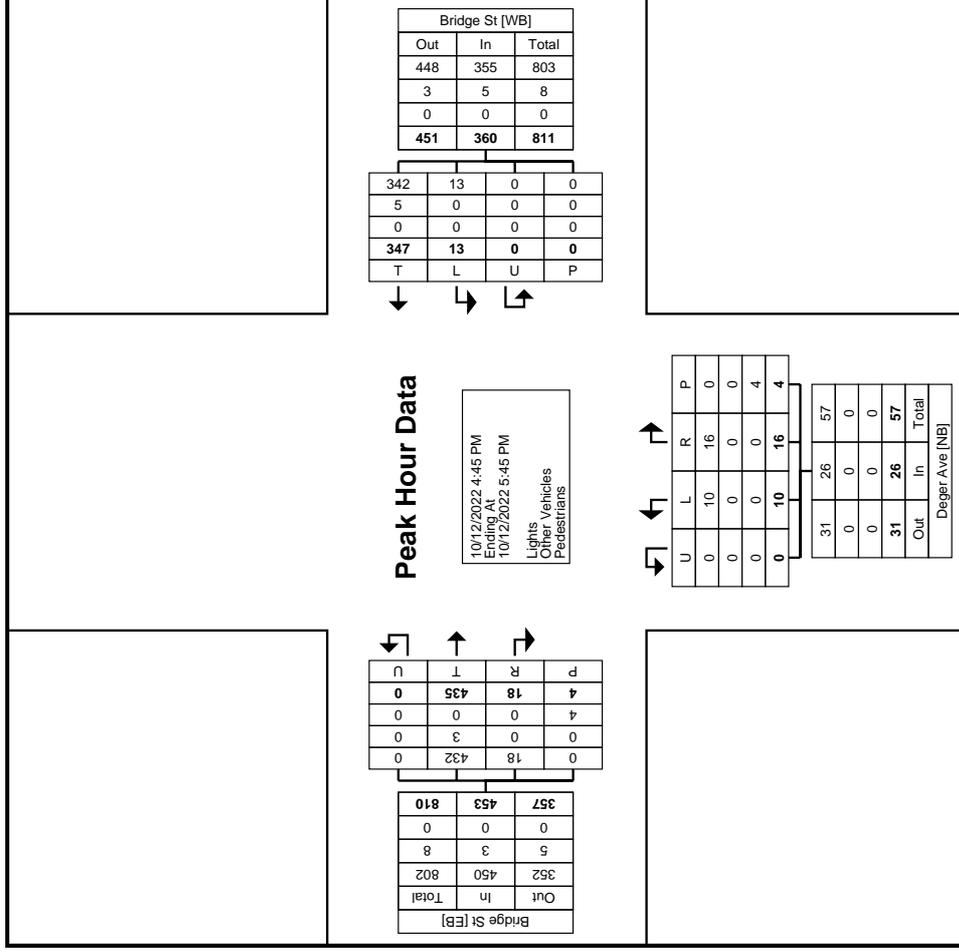
Start Time	Bridge St Westbound				Deger Ave Northbound				Bridge St Eastbound							
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:45 PM	3	85	0	0	88	4	5	0	0	9	98	7	0	0	105	202
5:00 PM	4	81	0	0	85	3	2	0	3	5	100	1	0	4	101	191
5:15 PM	2	94	0	0	96	1	5	0	0	6	120	8	0	0	128	230
5:30 PM	4	87	0	0	91	2	4	0	1	6	117	2	0	0	119	216
Total	13	347	0	0	360	10	16	0	4	26	435	18	0	4	453	839
Approach %	3.6	96.4	0.0	-	-	38.5	61.5	0.0	-	-	96.0	4.0	0.0	-	-	-
Total %	1.5	41.4	0.0	-	42.9	1.2	1.9	0.0	-	3.1	51.8	2.1	0.0	-	54.0	-
PHF	0.813	0.923	0.000	-	0.938	0.625	0.800	0.000	-	0.722	0.906	0.563	0.000	-	0.885	0.912
Lights	13	342	0	-	355	10	16	0	-	26	432	18	0	-	450	831
% Lights	100.0	98.6	-	-	98.6	100.0	100.0	-	-	100.0	99.3	100.0	-	-	99.3	99.0
Other Vehicles	0	5	0	-	5	0	0	0	-	0	3	0	0	-	3	8
% Other Vehicles	0.0	1.4	-	-	1.4	0.0	0.0	-	-	0.0	0.7	0.0	-	-	0.7	1.0
Pedestrians	-	-	-	0	-	-	-	-	4	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Transportation Engineers & Planners
425 Commerce Drive, Suite 200

Fort Washington, Pennsylvania, United States 19034
215-283-9444

Count Name: 822348.11 Oakwoods
Site Code:
Start Date: 10/12/2022
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Turning Movement Peak Hour Data Plot (4:45 PM)



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 1

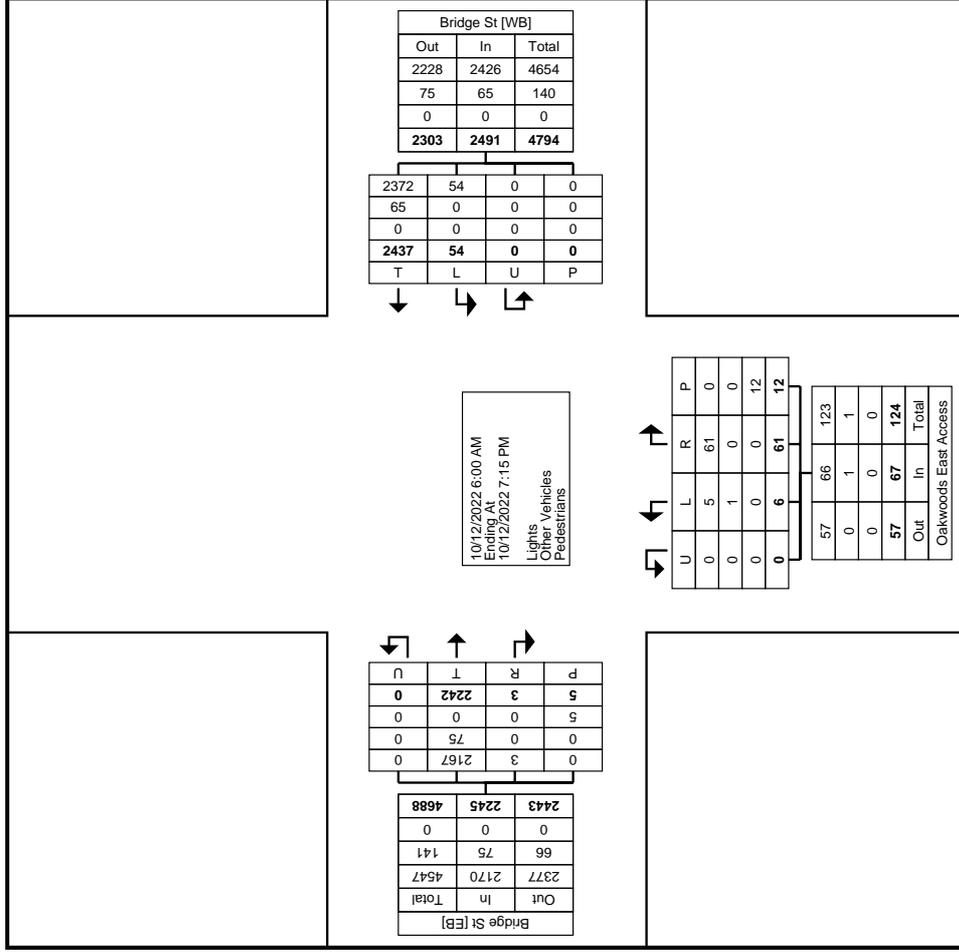
Turning Movement Data

Start Time	Bridge St Westbound					Oakwoods East Access Northbound					Bridge St Eastbound					
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
6:00 AM	0	34	0	0	34	0	1	0	0	1	23	0	0	0	23	58
6:15 AM	1	39	0	0	40	0	0	0	0	0	19	0	0	0	19	59
6:30 AM	0	51	0	0	51	0	2	0	1	2	22	0	0	0	22	75
6:45 AM	1	64	0	0	65	0	2	0	0	2	31	0	0	0	31	98
Hourly Total	2	188	0	0	190	0	5	0	1	5	95	0	0	0	95	290
7:00 AM	1	76	0	0	77	0	2	0	0	2	38	0	0	0	38	117
7:15 AM	3	77	0	0	80	0	7	0	5	7	44	0	0	1	44	131
7:30 AM	4	104	0	0	108	1	4	0	1	5	74	0	0	0	74	187
7:45 AM	0	117	0	0	117	1	4	0	0	5	63	0	0	0	63	185
Hourly Total	8	374	0	0	382	2	17	0	6	19	219	0	0	1	219	620
8:00 AM	3	130	0	0	133	0	1	0	1	1	48	0	0	0	48	182
8:15 AM	0	123	0	0	123	0	2	0	0	2	44	0	0	0	44	169
8:30 AM	0	114	0	0	114	0	2	0	0	2	43	0	0	0	43	159
8:45 AM	0	103	0	0	103	0	0	0	0	0	85	0	0	0	85	188
Hourly Total	3	470	0	0	473	0	5	0	1	5	220	0	0	0	220	698
9:00 AM	1	68	0	0	69	1	1	0	0	2	62	0	0	0	62	133
9:15 AM	2	45	0	0	47	0	3	0	0	3	74	0	0	0	74	124
9:30 AM	0	43	0	0	43	1	0	0	0	1	46	0	0	0	46	90
9:45 AM	1	53	0	0	54	0	1	0	1	1	45	0	0	1	45	100
Hourly Total	4	209	0	0	213	2	5	0	1	7	227	0	0	1	227	447
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	2	83	0	0	85	0	1	0	0	1	57	0	0	0	57	143
3:15 PM	0	70	0	0	70	0	1	0	0	1	97	0	0	0	97	168
3:30 PM	2	65	0	0	67	0	0	0	0	0	76	1	0	0	77	144
3:45 PM	2	85	0	0	87	0	0	0	1	0	89	0	0	1	89	176
Hourly Total	6	303	0	0	309	0	2	0	1	2	319	1	0	1	320	631
4:00 PM	4	79	0	0	83	0	3	0	0	3	113	0	0	0	113	199
4:15 PM	3	77	0	0	80	1	2	0	0	3	117	0	0	0	117	200
4:30 PM	2	70	0	0	72	0	4	0	0	4	101	0	0	0	101	177
4:45 PM	4	79	0	0	83	0	2	0	1	2	103	0	0	0	103	188
Hourly Total	13	305	0	0	318	1	11	0	1	12	434	0	0	0	434	764
5:00 PM	3	80	0	0	83	0	5	0	0	5	95	0	0	0	95	183
5:15 PM	2	88	0	0	90	0	0	0	0	0	126	0	0	0	126	216
5:30 PM	3	93	0	0	96	0	1	0	1	1	119	1	0	1	120	217



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 3



Turning Movement Data Plot



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

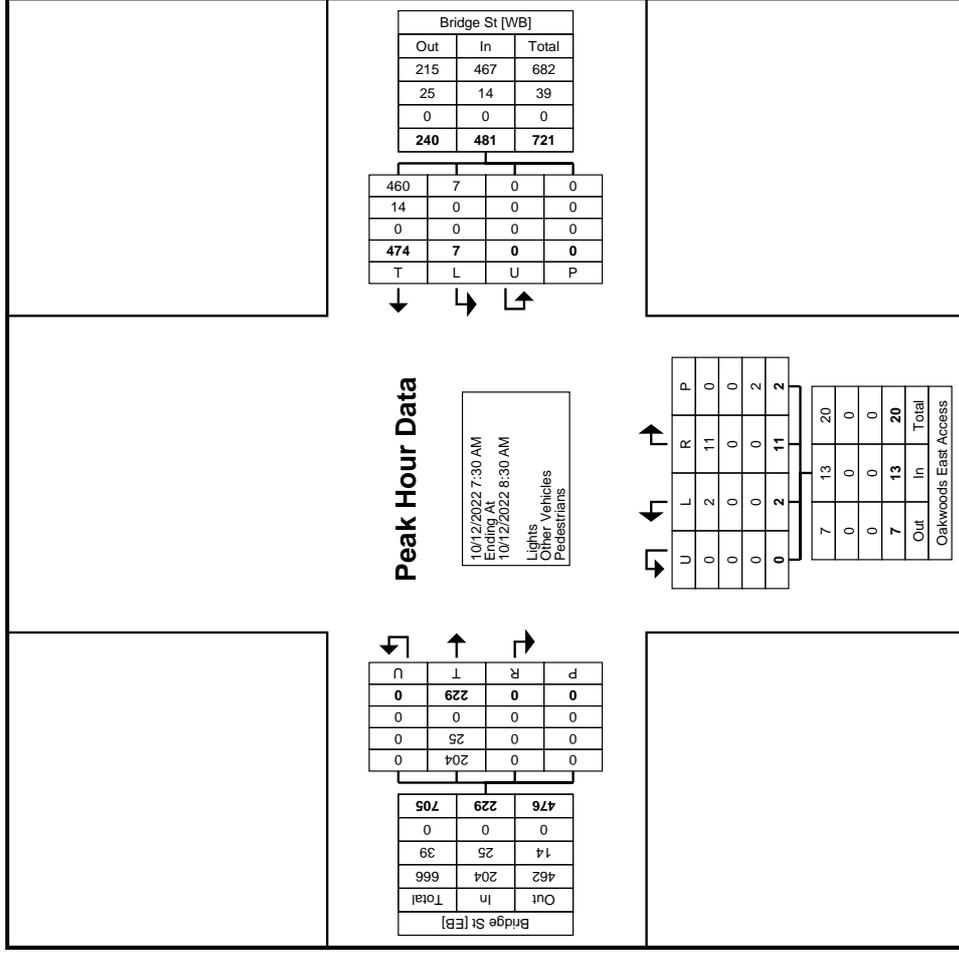
Start Time	Bridge St Westbound				Oakwoods East Access Northbound				Bridge St Eastbound							
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	4	104	0	0	108	1	4	0	1	5	74	0	0	0	74	187
7:45 AM	0	117	0	0	117	1	4	0	0	5	63	0	0	0	63	185
8:00 AM	3	130	0	0	133	0	1	0	1	1	48	0	0	0	48	182
8:15 AM	0	123	0	0	123	0	2	0	0	2	44	0	0	0	44	169
Total	7	474	0	0	481	2	11	0	2	13	229	0	0	0	229	723
Approach %	1.5	98.5	0.0	-	-	15.4	84.6	0.0	-	-	100.0	0.0	0.0	-	-	-
Total %	1.0	65.6	0.0	-	66.5	0.3	1.5	0.0	-	1.8	31.7	0.0	0.0	-	31.7	-
PHF	0.438	0.912	0.000	-	0.904	0.500	0.688	0.000	-	0.650	0.774	0.000	0.000	-	0.774	0.967
Lights	7	460	0	-	467	2	11	0	-	13	204	0	0	-	204	684
% Lights	100.0	97.0	-	-	97.1	100.0	100.0	-	-	100.0	89.1	-	-	-	89.1	94.6
Other Vehicles	0	14	0	-	14	0	0	0	-	0	25	0	0	-	25	39
% Other Vehicles	0.0	3.0	-	-	2.9	0.0	0.0	-	-	0.0	10.9	-	-	-	10.9	5.4
Pedestrians	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



Transportation Engineers & Planners
425 Commerce Drive, Suite 200

Fort Washington, Pennsylvania, United States 19034
215-283-9444

Count Name: 822348.11 Oakwoods
Site Code:
Start Date: 10/12/2022
Page No: 5



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



Transportation Engineers & Planners
 425 Commerce Drive, Suite 200
 Fort Washington, Pennsylvania, United States 19034
 215-283-9444

Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Bridge St Westbound				Oakwoods East Access Northbound				Bridge St Eastbound				Int. Total		
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right		U-Turn	Peds
4:45 PM	4	79	0	0	83	0	2	0	1	2	103	0	0	0	103
5:00 PM	3	80	0	0	83	0	5	0	0	5	95	0	0	0	95
5:15 PM	2	88	0	0	90	0	0	0	0	0	126	0	0	0	126
5:30 PM	3	93	0	0	96	0	1	0	1	1	119	1	0	1	120
Total	12	340	0	0	352	0	8	0	2	8	443	1	0	1	444
Approach %	3.4	96.6	0.0	-	-	0.0	100.0	0.0	-	-	99.8	0.2	0.0	-	-
Total %	1.5	42.3	0.0	-	43.8	0.0	1.0	0.0	-	1.0	55.1	0.1	0.0	-	55.2
PHF	0.750	0.914	0.000	-	0.917	0.000	0.400	0.000	-	0.400	0.879	0.250	0.000	-	0.881
Lights	12	334	0	-	346	0	8	0	-	8	441	1	0	-	442
% Lights	100.0	98.2	-	-	99.3	-	100.0	-	-	100.0	99.5	100.0	-	-	99.5
Other Vehicles	0	6	0	-	6	0	0	0	-	0	2	0	0	-	2
% Other Vehicles	0.0	1.8	-	-	1.7	-	0.0	-	-	0.0	0.5	0.0	-	-	0.5
Pedestrians	-	-	-	0	-	-	-	-	2	-	-	-	-	1	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-



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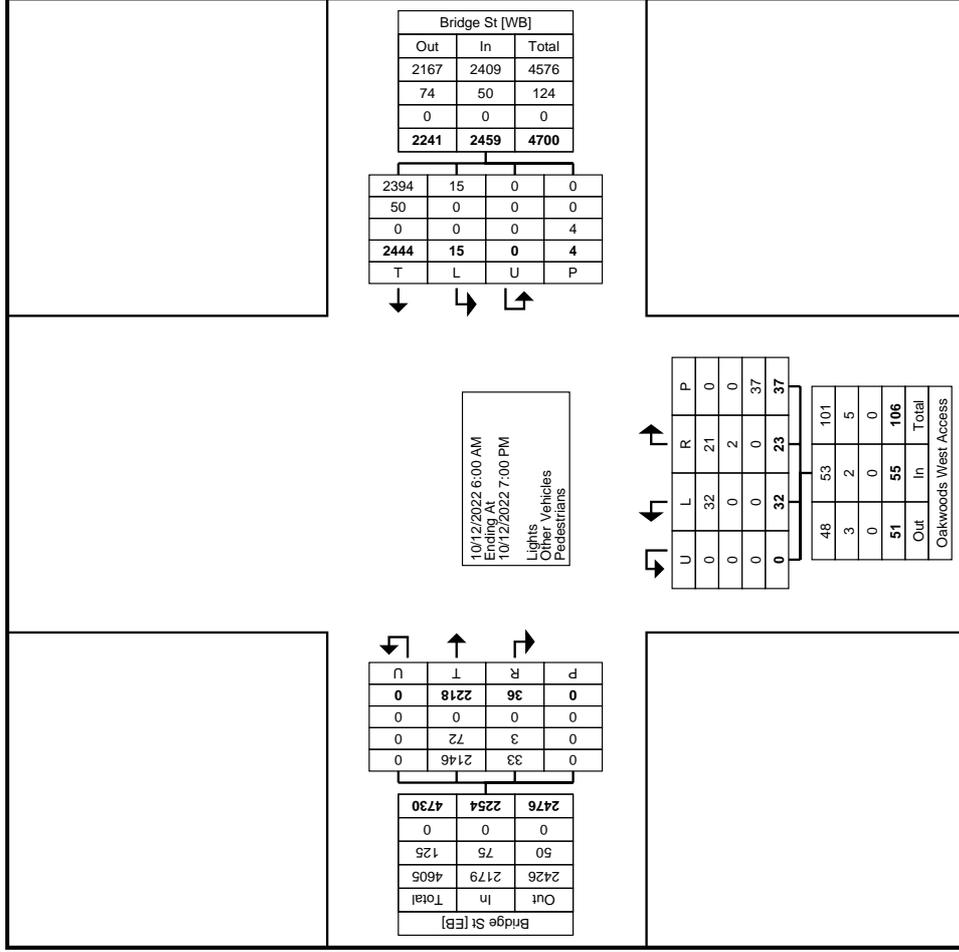
Turning Movement Data

Start Time	Bridge St Westbound				Oakwoods West Access Northbound				Bridge St Eastbound				Int. Total		
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right		U-Turn	Peds
6:00 AM	0	34	0	0	34	0	0	0	0	0	23	0	0	0	23
6:15 AM	0	42	0	0	42	0	0	0	0	0	18	0	0	0	18
6:30 AM	0	51	0	0	51	1	1	0	3	2	24	0	0	0	24
6:45 AM	0	66	0	0	66	2	1	0	0	3	29	0	0	0	29
Hourly Total	0	193	0	0	193	3	2	0	3	5	94	0	0	0	94
7:00 AM	1	74	0	0	75	1	0	0	0	1	36	1	0	0	37
7:15 AM	0	85	0	4	85	3	0	0	6	3	47	2	0	0	49
7:30 AM	0	100	0	0	100	6	1	0	1	7	73	0	0	0	73
7:45 AM	1	125	0	0	126	1	0	0	5	1	61	1	0	0	62
Hourly Total	2	384	0	4	386	11	1	0	12	12	217	4	0	0	221
8:00 AM	0	134	0	0	134	1	1	0	2	2	50	1	0	0	51
8:15 AM	1	115	0	0	116	2	0	0	0	2	44	0	0	0	44
8:30 AM	0	118	0	0	118	4	0	0	0	4	45	2	0	0	47
8:45 AM	0	103	0	0	103	0	0	0	1	0	85	2	0	0	87
Hourly Total	1	470	0	0	471	7	1	0	3	8	224	5	0	0	229
9:00 AM	0	67	0	0	67	0	0	0	0	0	59	2	0	0	61
9:15 AM	0	45	0	0	45	1	1	0	1	2	73	1	0	0	74
9:30 AM	0	42	0	0	42	0	0	0	0	0	45	1	0	0	46
9:45 AM	2	54	0	0	56	1	0	0	2	1	45	0	0	0	45
Hourly Total	2	208	0	0	210	2	1	0	3	3	222	4	0	0	226
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	80	0	0	81	0	0	0	0	0	64	0	0	0	64
3:15 PM	0	72	0	0	72	0	0	0	1	0	92	1	0	0	93
3:30 PM	0	67	0	0	67	1	1	0	0	2	77	0	0	0	77
3:45 PM	1	87	0	0	88	1	1	0	3	2	88	1	0	0	89
Hourly Total	2	306	0	0	308	2	2	0	4	4	321	2	0	0	323
4:00 PM	0	75	0	0	75	0	0	0	1	0	107	1	0	0	108
4:15 PM	0	76	0	0	76	2	2	0	0	4	121	4	0	0	125
4:30 PM	0	69	0	0	69	2	2	0	0	4	95	2	0	0	97
4:45 PM	2	80	0	0	82	1	4	0	1	5	98	1	0	0	99
Hourly Total	2	300	0	0	302	5	8	0	2	13	421	8	0	0	429
5:00 PM	3	80	0	0	83	0	1	0	5	1	95	3	0	0	98
5:15 PM	0	92	0	0	92	0	0	0	3	0	129	1	0	0	130
5:30 PM	1	88	0	0	89	2	2	0	0	4	116	2	0	0	118
5:45 PM	0	74	0	0	74	0	0	0	2	0	80	2	0	0	82
Hourly Total	4	334	0	0	338	2	3	0	10	5	420	8	0	0	428



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Turning Movement Data Plot



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Count Name: 822348.11 Oakwoods
 Site Code:
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Turning Movement Peak Hour Data (7:30 AM)

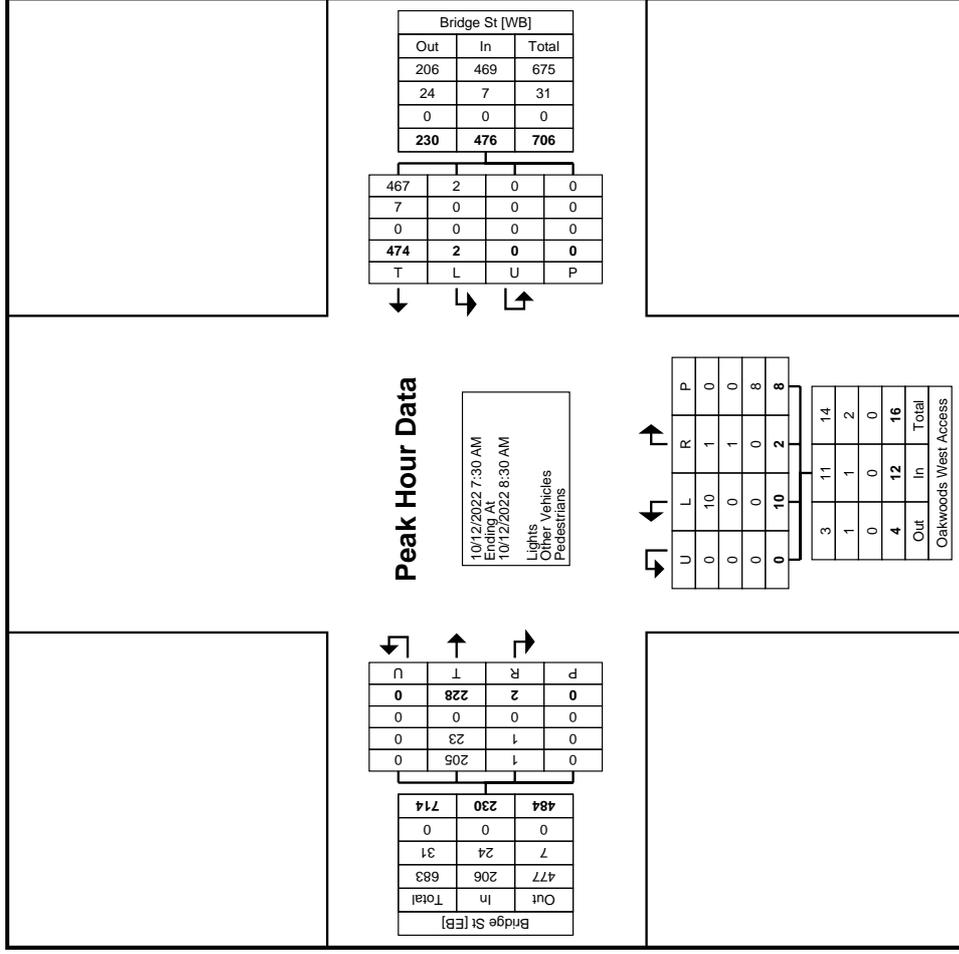
Start Time	Bridge St Westbound				Oakwoods West Access Northbound				Bridge St Eastbound							
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	0	100	0	0	100	6	1	0	1	7	73	0	0	0	73	180
7:45 AM	1	125	0	0	126	1	0	0	5	1	61	1	0	0	62	189
8:00 AM	0	134	0	0	134	1	1	0	2	2	50	1	0	0	51	187
8:15 AM	1	115	0	0	116	2	0	0	0	2	44	0	0	0	44	162
Total	2	474	0	0	476	10	2	0	8	12	228	2	0	0	230	718
Approach %	0.4	99.6	0.0	-	-	83.3	16.7	0.0	-	-	99.1	0.9	0.0	-	-	-
Total %	0.3	66.0	0.0	-	66.3	1.4	0.3	0.0	-	1.7	31.8	0.3	0.0	-	32.0	-
PHF	0.500	0.884	0.000	-	0.888	0.417	0.500	0.000	-	0.429	0.781	0.500	0.000	-	0.788	0.950
Lights	2	467	0	-	469	10	1	0	-	11	205	1	0	-	206	686
% Lights	100.0	98.5	-	-	98.5	100.0	50.0	-	-	91.7	89.9	50.0	-	-	89.6	95.5
Other Vehicles	0	7	0	-	7	0	1	0	-	1	23	1	0	-	24	32
% Other Vehicles	0.0	1.5	-	-	1.5	0.0	50.0	-	-	8.3	10.1	50.0	-	-	10.4	4.5
Pedestrians	-	-	-	0	-	-	-	-	8	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: 822348.11 Oakwoods
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Turning Movement Peak Hour Data Plot (7:30 AM)



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Count Name: 822348.11 Oakwoods
 Site Code:
 Start Date: 10/12/2022
 Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Bridge St Westbound					Oakwoods West Access Northbound					Bridge St Eastbound					
	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:45 PM	2	80	0	0	82	1	4	0	1	5	98	1	0	0	99	186
5:00 PM	3	80	0	0	83	0	1	0	5	1	95	3	0	0	98	182
5:15 PM	0	92	0	0	92	0	0	0	3	0	129	1	0	0	130	222
5:30 PM	1	88	0	0	89	2	2	0	0	4	116	2	0	0	118	211
Total	6	340	0	0	346	3	7	0	9	10	438	7	0	0	445	801
Approach %	1.7	96.3	0.0	-	-	30.0	70.0	0.0	-	-	96.4	1.6	0.0	-	-	-
Total %	0.7	42.4	0.0	-	43.2	0.4	0.9	0.0	-	1.2	54.7	0.9	0.0	-	55.6	-
PHF	0.500	0.924	0.000	-	0.940	0.375	0.438	0.000	-	0.500	0.849	0.583	0.000	-	0.856	0.902
Lights	6	335	0	-	341	3	7	0	-	10	436	7	0	-	443	794
% Lights	100.0	98.5	-	-	98.6	100.0	100.0	-	-	100.0	99.5	100.0	-	-	99.6	99.1
Other Vehicles	0	5	0	-	5	0	0	0	-	0	2	0	0	-	2	7
% Other Vehicles	0.0	1.5	-	-	1.4	0.0	0.0	-	-	0.0	0.5	0.0	-	-	0.4	0.9
Pedestrians	-	-	-	0	-	-	-	-	9	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-

The top of the page features a dark green triangular shape on the left containing the word "Bowman" in white. To the right, a collage of images is visible, including a large stone archway, a roundabout with a central tree, and a residential street with houses.

Bowman

APPENDIX D

WARRANT ANALYSIS WORKSHEETS

Bridge Street and South Access

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="1/16/2024"/> Conducted By: <input type="text" value="VSA"/> Checked By: <input type="text" value="JDG"/> Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input style="width: 100%;" type="text" value="Bridge Street and South Site Access - Northbound Right Turn"/>	
Analysis Period: <input type="text" value="2026"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Unsignalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 1px solid red; padding: 2px; display: inline-block; margin-top: 5px;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: <input type="text" value="Right Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A

Advancing Volume:	N/A
Opposing Volume:	N/A
Left Turn Volume:	N/A

% Left Turns in Advancing Volume:	N/A
-----------------------------------	-----

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	0
	Through	-	269	10.0%	283
	Right	-	3	50.0%	4

Advancing Volume:	287
Right Turn Volume:	4

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input style="width: 100%;" type="text" value="N/A"/> Warrant Met?: <input style="width: 100%;" type="text" value="N/A"/>	Applicable Warrant Figure: <input style="width: 100%;" type="text" value="Figure 9"/> Warrant Met?: <input style="width: 100%;" type="text" value="No"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	4
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	60
Average # of Vehicles/Cycle:	N/A

PennDOT Publication 46, Exhibit 11-6

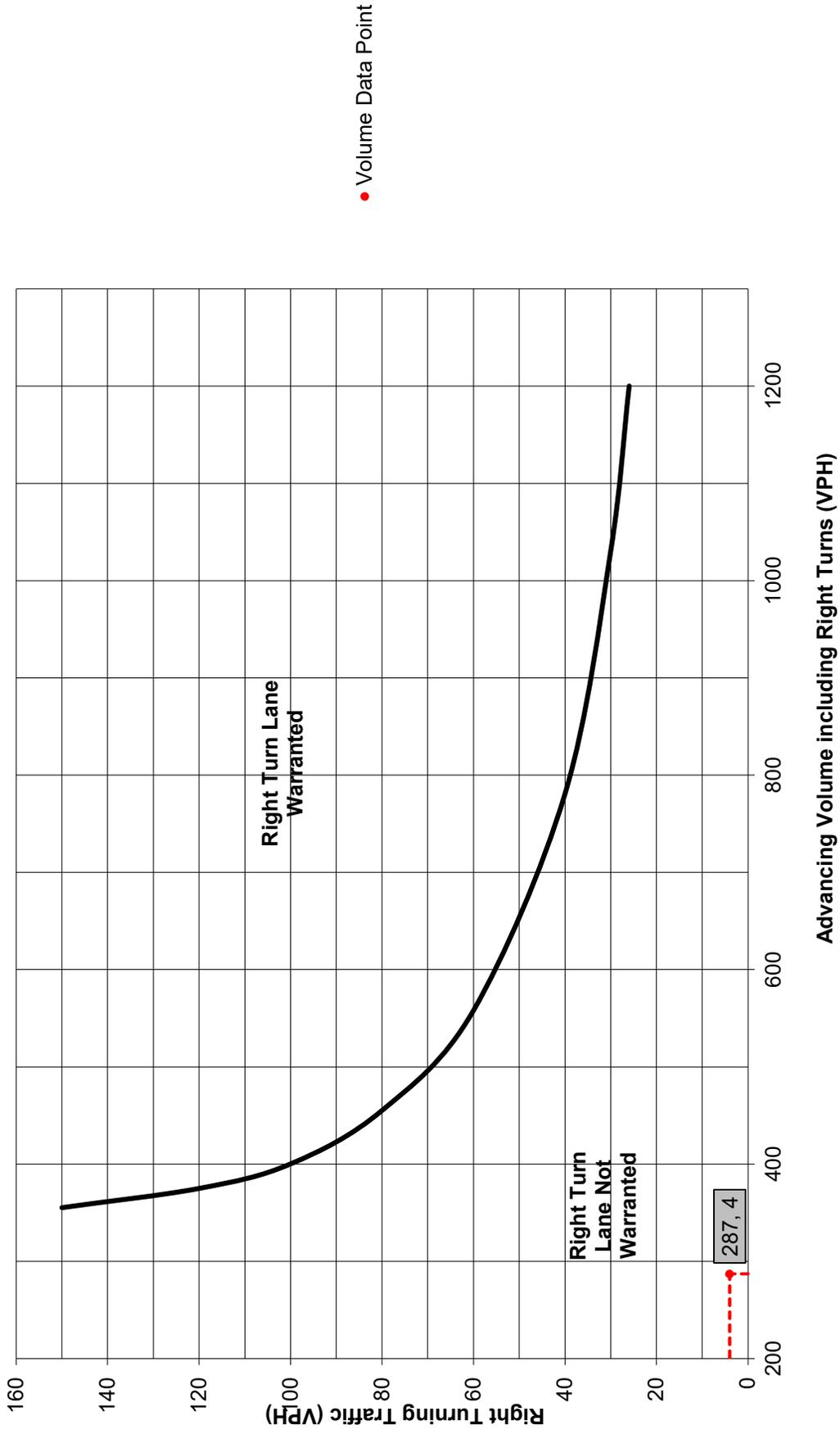
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

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

Additional Findings:

Additional Comments / Justifications:

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



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/>	Analysis Date: <input type="text" value="1/16/2024"/>
County: <input type="text" value="Chester County"/>	Conducted By: <input type="text" value="VSA"/>
PennDOT Engineering District: <input type="text" value="6"/>	Checked By: <input type="text" value="JDG"/>
	Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and South Site Access - Southbound Left Turn"/>	
Analysis Period: <input type="text" value="2026"/>	Number of Approach Lanes: <input type="text" value="1"/>
Design Hour: <input type="text" value="AM Peak Hour"/>	Undivided or Divided Highway: <input type="text" value="Undivided"/>
Intersection Control: <input type="text" value="Unsignalized"/>	Type of Analysis: <input type="text" value="Left Turn Lane"/>
Posted Speed Limit (MPH): <input type="text" value="35"/>	
Type of Terrain: <input type="text" value="Level"/>	
	Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	4	0.0%	4
	Through	-	563	2.0%	569
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	269	10.0%	283
	Right	Yes	3	50.0%	4

Advancing Volume:	<input type="text" value="573"/>
Opposing Volume:	<input type="text" value="287"/>
Left Turn Volume:	<input type="text" value="4"/>
% Left Turns in Advancing Volume: <input type="text" value="0.70%"/>	

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	-			N/A

Advancing Volume:	<input type="text" value="N/A"/>
Right Turn Volume:	<input type="text" value="N/A"/>

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 1"/>	Applicable Warrant Figure: <input type="text" value="N/A"/>
Warrant Met?: <input type="text" value="No"/>	Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
Design Hour Volume of Turning Lane: <input type="text" value="4"/>	
Cycles Per Hour (Assumed): <input type="text" value="60"/>	
Cycles Per Hour (If Known): <input type="text" value="60"/>	

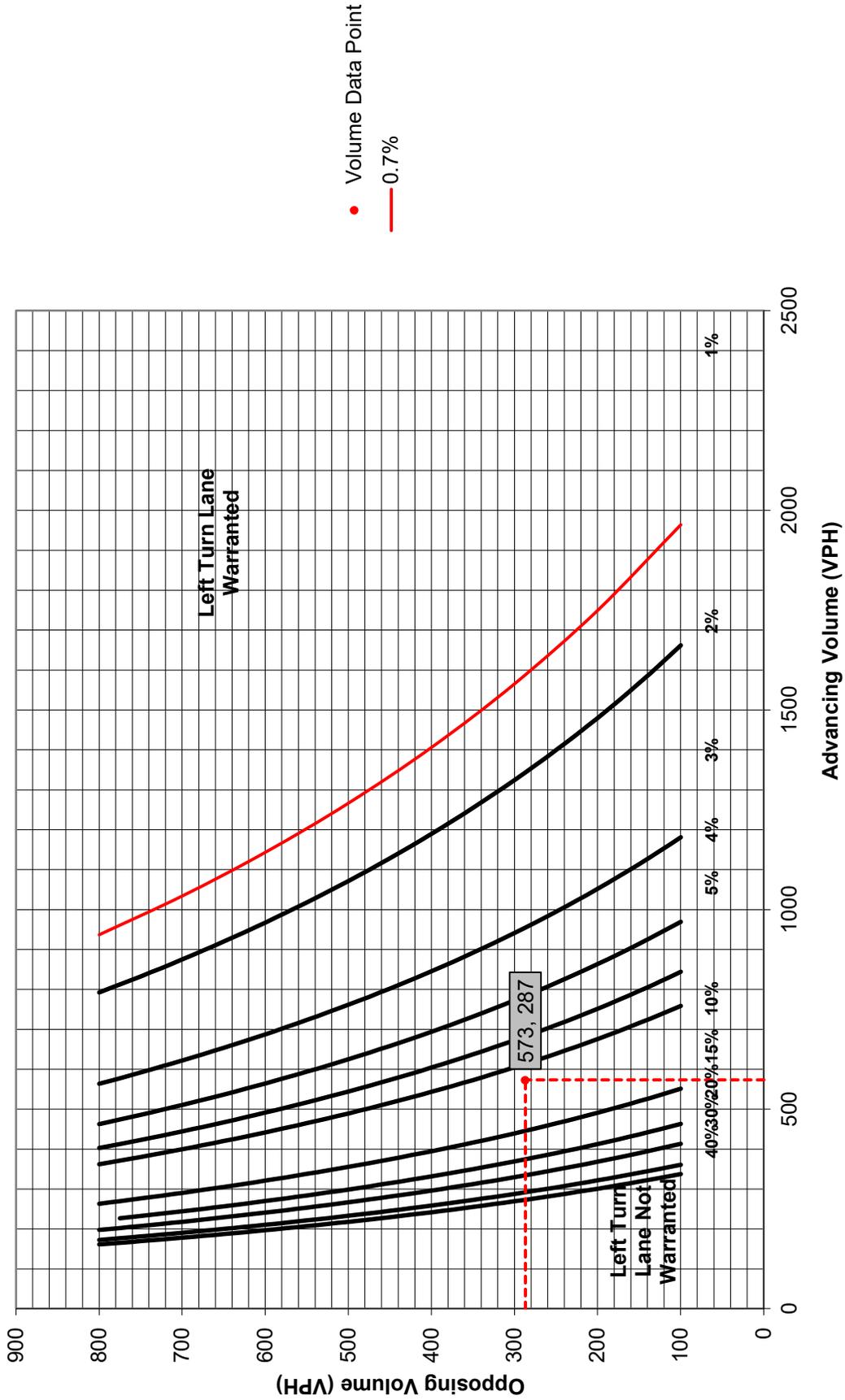
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
Turn Demand Volume						
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Left Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/>	Analysis Date: <input type="text" value="1/16/2024"/>
County: <input type="text" value="Chester County"/>	Conducted By: <input type="text" value="VSA"/>
PennDOT Engineering District: <input type="text" value="6"/>	Checked By: <input type="text" value="JDG"/>
	Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and South Site Access - Northbound Right Turn"/>	
Analysis Period: <input type="text" value="2026"/>	Number of Approach Lanes: <input type="text" value="1"/>
Design Hour: <input type="text" value="PM Peak Hour"/>	Undivided or Divided Highway: <input type="text" value="Undivided"/>
Intersection Control: <input type="text" value="Unsignalized"/>	Type of Analysis: <input type="text" value="Right Turn Lane"/>
Posted Speed Limit (MPH): <input type="text" value="35"/>	
Type of Terrain: <input type="text" value="Level"/>	
	Left or Right-Turn Lane Analysis?: <input type="text" value="Right Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A

Advancing Volume:
 Opposing Volume:
 Left Turn Volume:
 % Left Turns in Advancing Volume:

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	0
	Through	-	534	1.0%	537
	Right	-	10	0.0%	10

Advancing Volume:
 Right Turn Volume:

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="N/A"/>	Applicable Warrant Figure: <input type="text" value="Figure 9"/>
Warrant Met?: <input type="text" value="N/A"/>	Warrant Met?: <input type="text" value="No"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
Design Hour Volume of Turning Lane: <input type="text" value="10"/>	
Cycles Per Hour (Assumed): <input type="text" value="60"/>	
Cycles Per Hour (If Known): <input type="text" value="60"/>	

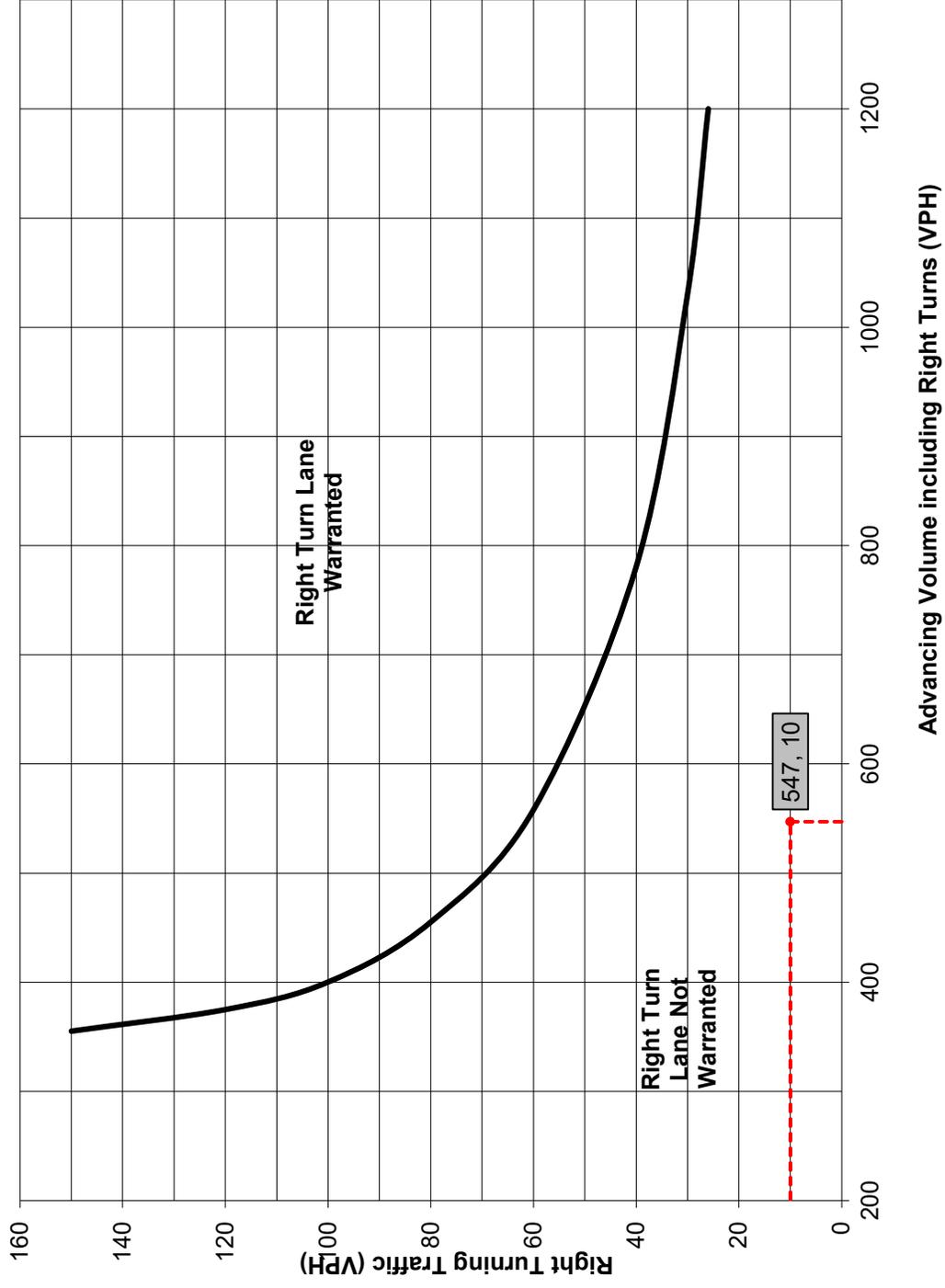
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
Turn Demand Volume						
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Right Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

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



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/>	Analysis Date: <input type="text" value="1/16/2024"/>
County: <input type="text" value="Chester County"/>	Conducted By: <input type="text" value="VSA"/>
PennDOT Engineering District: <input type="text" value="6"/>	Checked By: <input type="text" value="JDG"/>
	Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and South Site Access - Southbound Left Turn"/>	
Analysis Period: <input type="text" value="2026"/>	Number of Approach Lanes: <input type="text" value="1"/>
Design Hour: <input type="text" value="PM Peak Hour"/>	Undivided or Divided Highway: <input type="text" value="Undivided"/>
Intersection Control: <input type="text" value="Unsignalized"/>	Type of Analysis: <input type="text" value="Left Turn Lane"/>
Posted Speed Limit (MPH): <input type="text" value="35"/>	
Type of Terrain: <input type="text" value="Level"/>	
	Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	0.0%	10
	Through	-	406	2.0%	411
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	534	1.0%	537
	Right	Yes	10	0.0%	10

Advancing Volume:	<input type="text" value="421"/>
Opposing Volume:	<input type="text" value="547"/>
Left Turn Volume:	<input type="text" value="10"/>
% Left Turns in Advancing Volume: <input type="text" value="2.38%"/>	

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	-			N/A

Advancing Volume:	<input type="text" value="N/A"/>
Right Turn Volume:	<input type="text" value="N/A"/>

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 1"/>	Applicable Warrant Figure: <input type="text" value="N/A"/>
Warrant Met?: <input type="text" value="No"/>	Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/>	
Design Hour Volume of Turning Lane: <input type="text" value="10"/>	
Cycles Per Hour (Assumed): <input type="text" value="60"/>	
Cycles Per Hour (If Known): <input type="text" value="60"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>

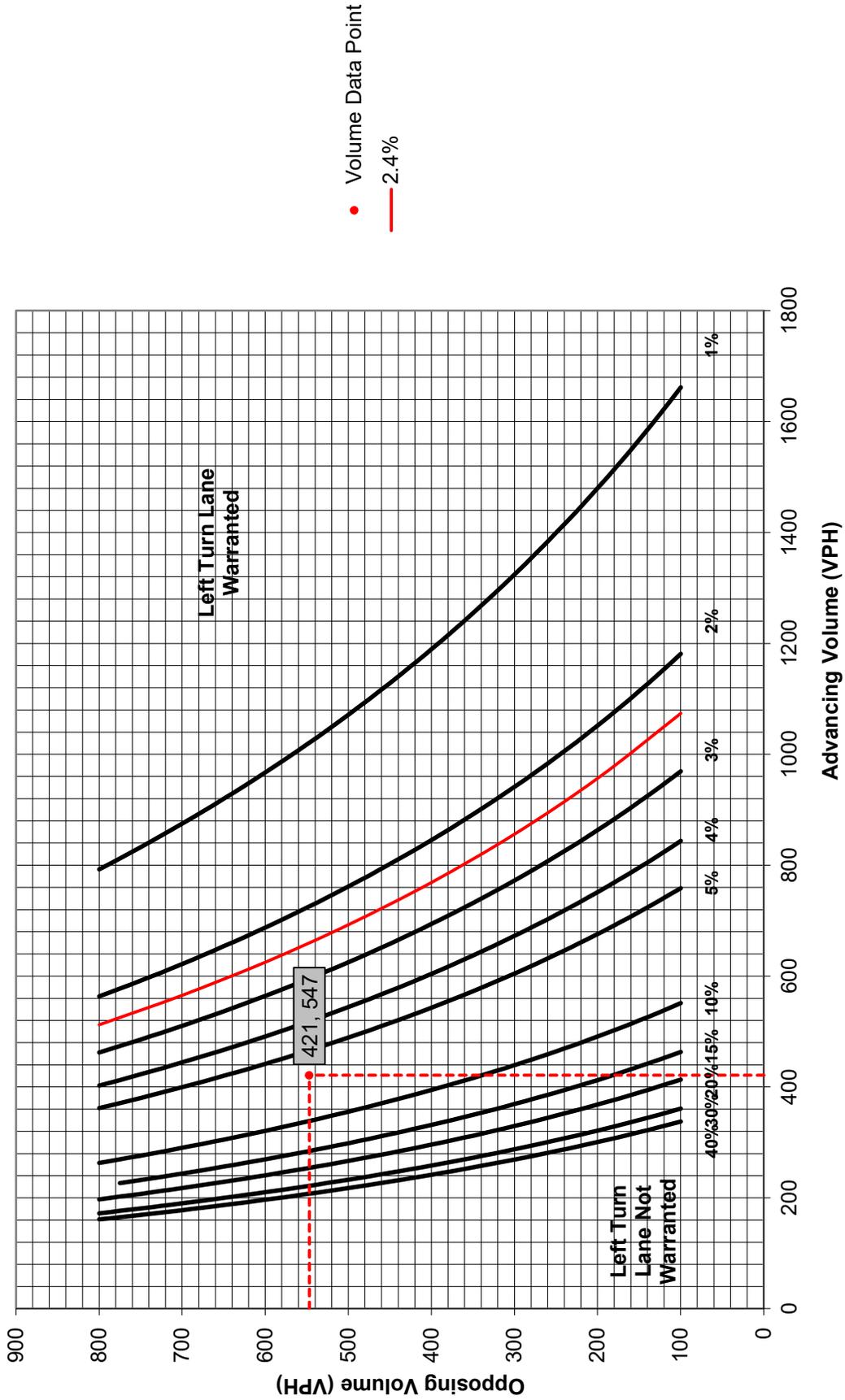
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
Turn Demand Volume						
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Left Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



• Volume Data Point
 — 2.4%

Bridge Street and North Access

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/>	Analysis Date: <input type="text" value="1/16/2024"/>
County: <input type="text" value="Chester County"/>	Conducted By: <input type="text" value="VSA"/>
PennDOT Engineering District: <input type="text" value="6"/>	Checked By: <input type="text" value="JDG"/>
	Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and North Site Access - Northbound Right Turn"/>	
Analysis Period: <input type="text" value="2026"/>	Number of Approach Lanes: <input type="text" value="1"/>
Design Hour: <input type="text" value="AM Peak Hour"/>	Undivided or Divided Highway: <input type="text" value="Undivided"/>
Intersection Control: <input type="text" value="Unsignalized"/>	Type of Analysis: <input type="text" value="Right Turn Lane"/>
Posted Speed Limit (MPH): <input type="text" value="35"/>	
Type of Terrain: <input type="text" value="Level"/>	
	Left or Right-Turn Lane Analysis?: <input type="text" value="Right Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A

Advancing Volume:
 Opposing Volume:
 Left Turn Volume:
 % Left Turns in Advancing Volume:

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	0
	Through	-	274	11.0%	290
	Right	-	1	0.0%	1

Advancing Volume:
 Right Turn Volume:

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="N/A"/>	Applicable Warrant Figure: <input type="text" value="Figure 9"/>
Warrant Met?: <input type="text" value="N/A"/>	Warrant Met?: <input type="text" value="No"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
Design Hour Volume of Turning Lane: <input type="text" value="1"/>	
Cycles Per Hour (Assumed): <input type="text" value="60"/>	
Cycles Per Hour (If Known): <input type="text" value="60"/>	

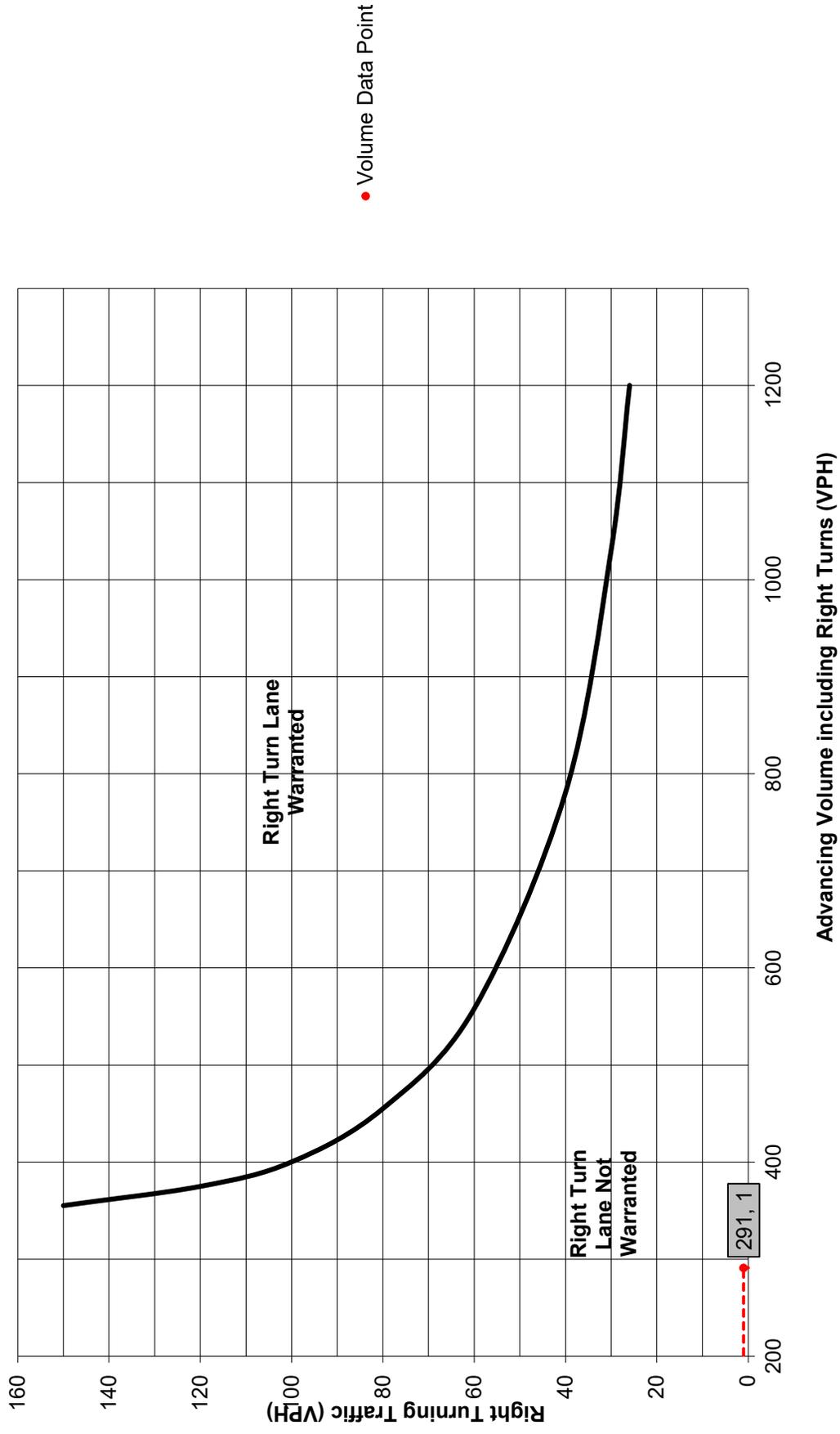
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Right Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

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



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="1/16/2024"/> Conducted By: <input type="text" value="VSA"/> Checked By: <input type="text" value="JDG"/> Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and North Site Access - Southbound Left Turn"/>	
Analysis Period: <input type="text" value="2026"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Unsignalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> Type of Analysis: Left Turn Lane Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	11	0.0%	11
	Through	-	562	3.0%	571
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	274	11.0%	290
	Right	Yes	1	0.0%	1

Advancing Volume:	<input type="text" value="582"/>
Opposing Volume:	<input type="text" value="291"/>
Left Turn Volume:	<input type="text" value="11"/>
% Left Turns in Advancing Volume: <input type="text" value="1.89%"/>	

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	-			N/A

Advancing Volume:	<input type="text" value="N/A"/>
Right Turn Volume:	<input type="text" value="N/A"/>

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 1"/> Warrant Met?: <input type="text" value="No"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/> Design Hour Volume of Turning Lane: <input type="text" value="11"/> Cycles Per Hour (Assumed): <input type="text" value="60"/> Cycles Per Hour (If Known): <input type="text" value="60"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
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PennDOT Publication 46, Exhibit 11-6

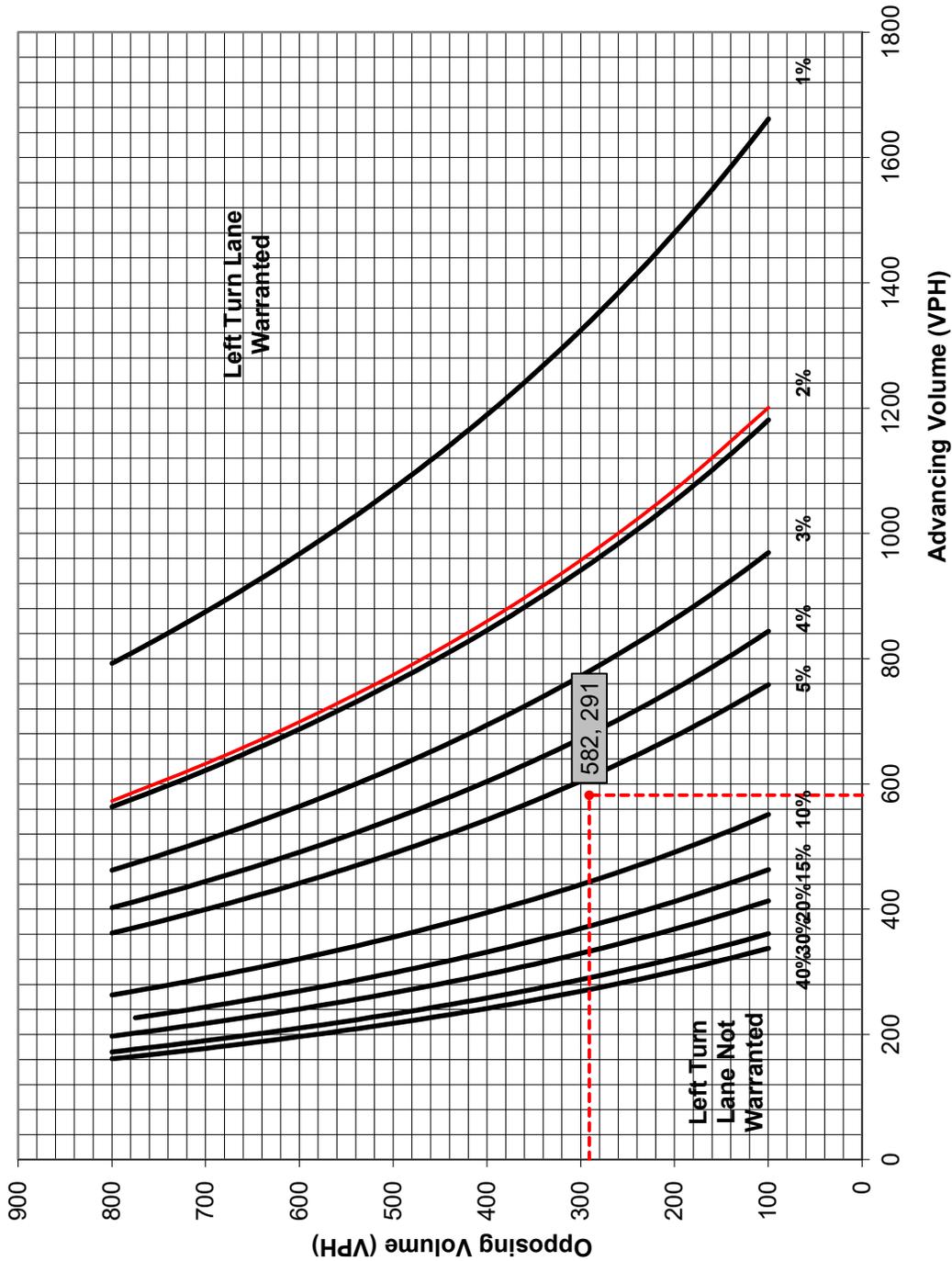
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Left Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



• Volume Data Point
 — 1.9%

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/>	Analysis Date: <input type="text" value="1/16/2024"/>
County: <input type="text" value="Chester County"/>	Conducted By: <input type="text" value="VSA"/>
PennDOT Engineering District: <input type="text" value="6"/>	Checked By: <input type="text" value="JDG"/>
	Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and North Site Access - Northbound Right Turn"/>	
Analysis Period: <input type="text" value="2026"/>	Number of Approach Lanes: <input type="text" value="1"/>
Design Hour: <input type="text" value="PM Peak Hour"/>	Undivided or Divided Highway: <input type="text" value="Undivided"/>
Intersection Control: <input type="text" value="Unsignalized"/>	Type of Analysis: <input type="text" value="Right Turn Lane"/>
Posted Speed Limit (MPH): <input type="text" value="35"/>	
Type of Terrain: <input type="text" value="Level"/>	Left or Right-Turn Lane Analysis?: <input type="text" value="Right Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A

Advancing Volume: <input type="text" value="N/A"/>
Opposing Volume: <input type="text" value="N/A"/>
Left Turn Volume: <input type="text" value="N/A"/>
% Left Turns in Advancing Volume: <input type="text" value="N/A"/>

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	0
	Through	-	538	1.0%	541
	Right	-	4	0.0%	4

Advancing Volume: <input type="text" value="545"/>
Right Turn Volume: <input type="text" value="4"/>

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="N/A"/>	Applicable Warrant Figure: <input type="text" value="Figure 9"/>
Warrant Met?: <input type="text" value="N/A"/>	Warrant Met?: <input type="text" value="No"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Unsignalized"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
Design Hour Volume of Turning Lane: <input type="text" value="4"/>	
Cycles Per Hour (Assumed): <input type="text" value="60"/>	
Cycles Per Hour (If Known): <input type="text" value="60"/>	

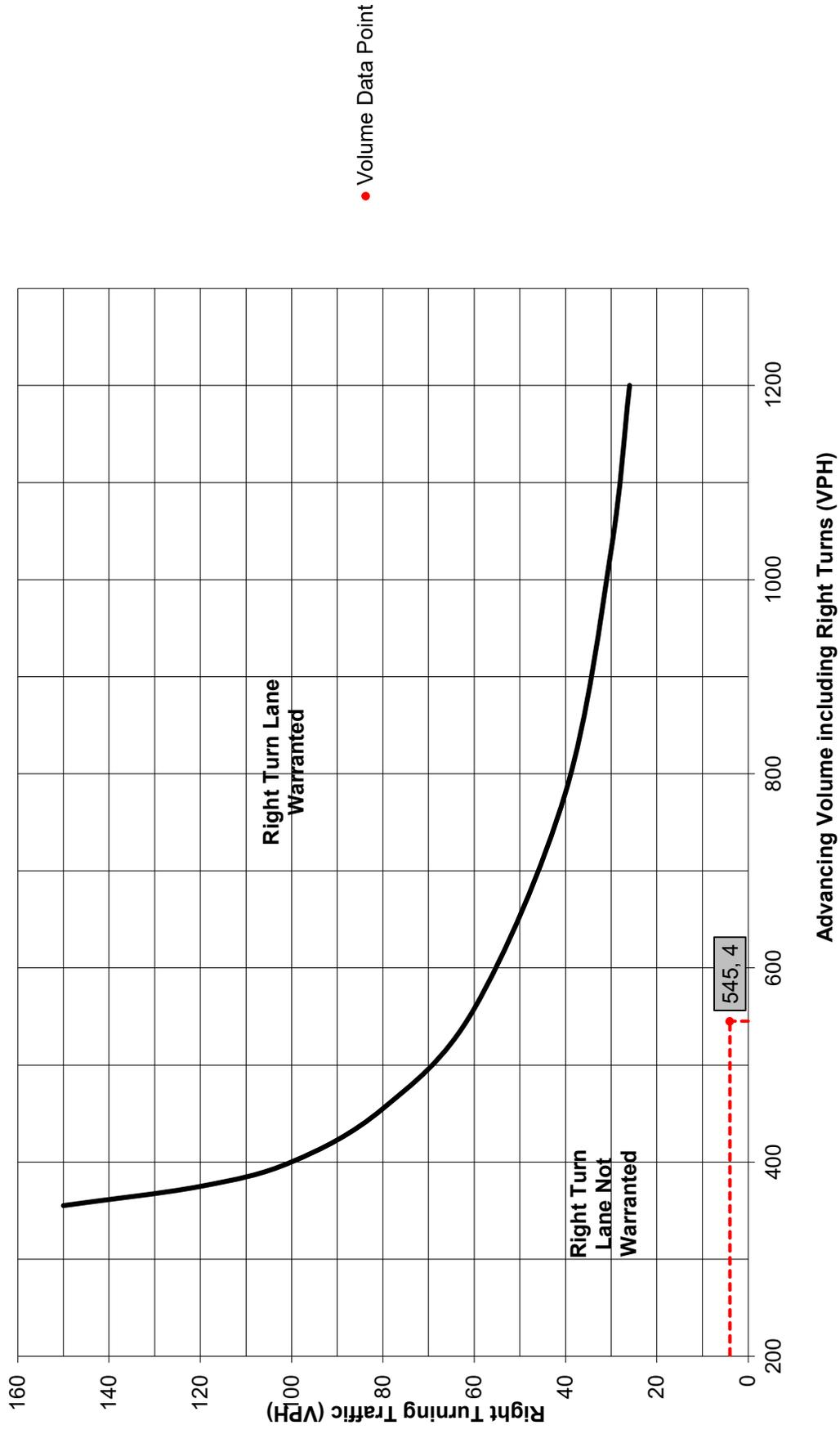
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
Turn Demand Volume						
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Right Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

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



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Phoenixville Borough"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="1/16/2024"/> Conducted By: <input type="text" value="VSA"/> Checked By: <input type="text" value="JDG"/> Agency/Company Name: <input type="text" value="Bowman"/>
Intersection & Approach Description: <input type="text" value="Bridge Street and North Site Access - Southbound Left Turn"/>	
Analysis Period: <input type="text" value="2026"/> Design Hour: <input type="text" value="PM Peak Hour"/> Intersection Control: <input type="text" value="Unsignalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	23	0.0%	23
	Through	-	408	2.0%	413
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	538	1.0%	541
	Right	Yes	4	0.0%	4

Advancing Volume:	<input type="text" value="436"/>
Opposing Volume:	<input type="text" value="545"/>
Left Turn Volume:	<input type="text" value="23"/>
% Left Turns in Advancing Volume: <input type="text" value="5.28%"/>	

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	-			N/A

Advancing Volume:	<input type="text" value="N/A"/>
Right Turn Volume:	<input type="text" value="N/A"/>

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 1"/> Warrant Met?: <input type="text" value="No"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control:	<input type="text" value="Unsignalized"/>
Design Hour Volume of Turning Lane:	<input type="text" value="23"/>
Cycles Per Hour (Assumed):	<input type="text" value="60"/>
Cycles Per Hour (If Known):	<input type="text" value="60"/>
Average # of Vehicles/Cycle:	<input type="text" value="N/A"/>

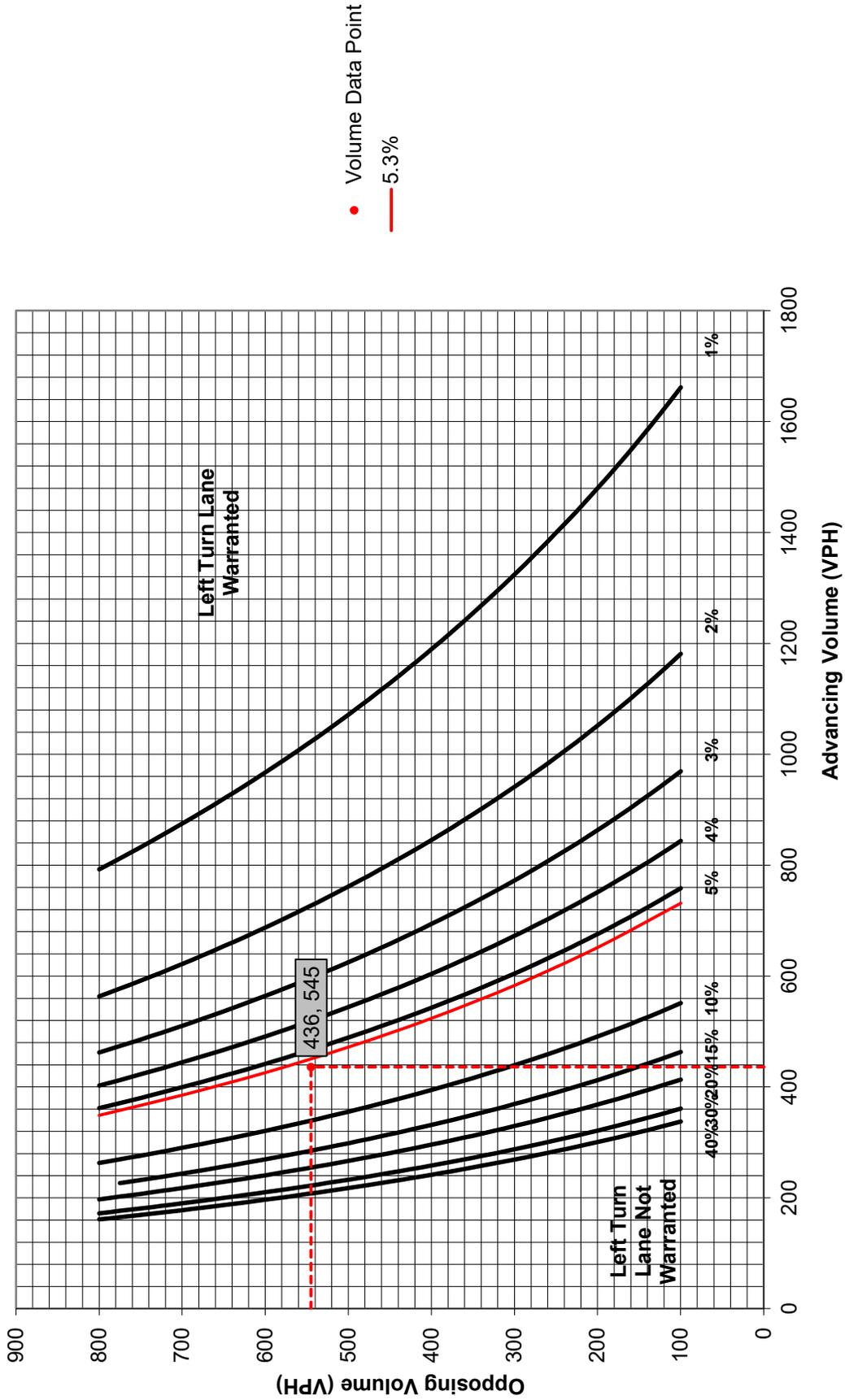
PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="N/A"/>	Feet
Condition C:	<input type="text" value="N/A"/>	Feet
Required Left Turn Lane Storage Length:	<input type="text" value="N/A"/>	Feet

Additional Findings:

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



• Volume Data Point
 — 5.3%

The top of the page features a dark green triangular shape on the left containing the word "Bowman" in white. To the right, a white diagonal line separates this from a grayscale aerial photograph of a city street intersection with a roundabout. The rest of the page is white.

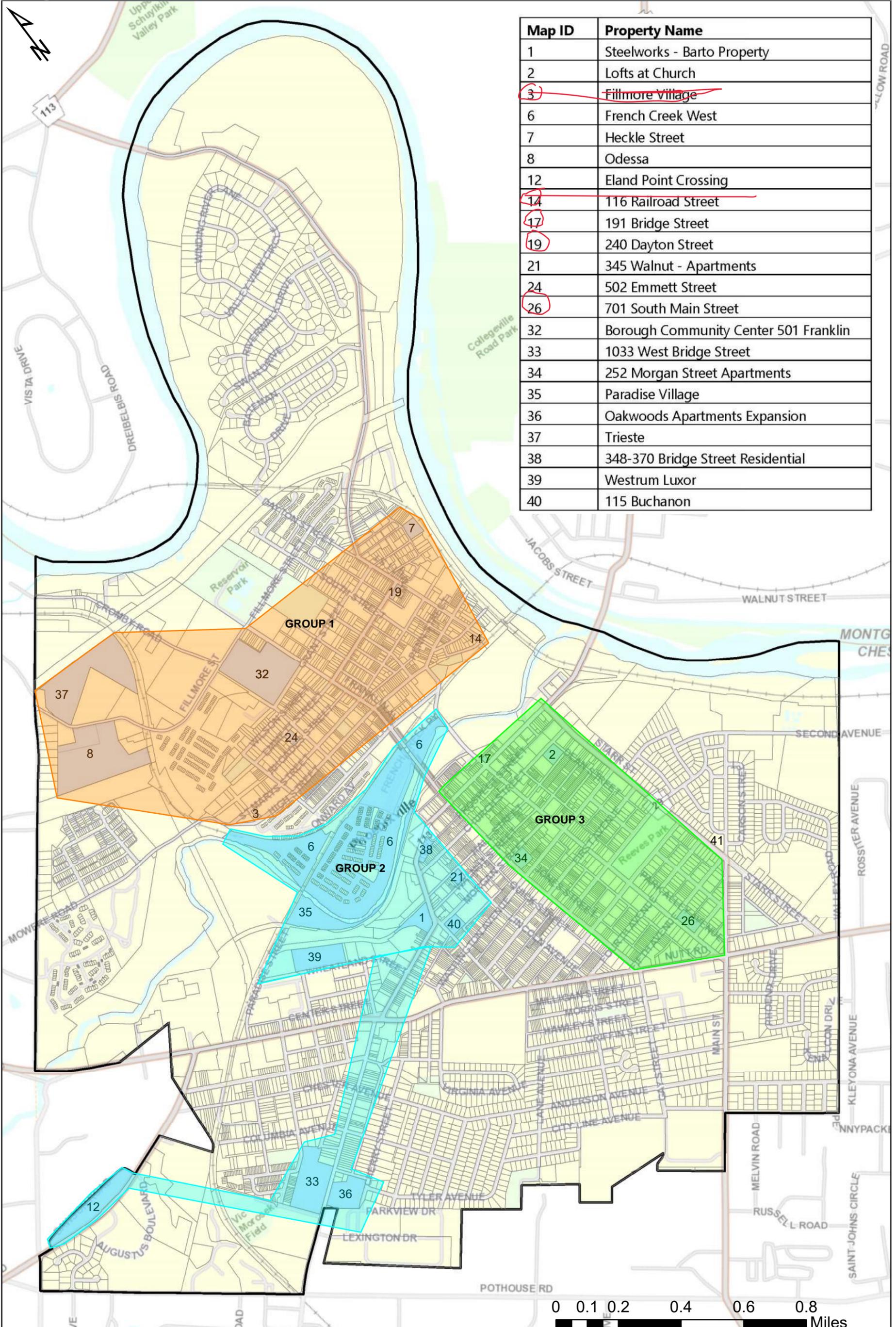
Bowman

APPENDIX E

BACKGROUND DEVELOPMENT INFORMATION

Phoenixville Borough Background Developments

August 2022



Anticipated Major Land Development Projects
 Assumed to be Completed by 2024 in Phoenixville Borough, Schuylkill Township, and East Pheasant Township

Project Information	
Project Name:	Proposed Developments
McMahon Project No:	82-1914.11
Date:	6/9/2022
City/Municipality:	Phoenixville Borough
State:	PA
Client Name:	Phoenixville Borough
Analyst's Name:	VSA
ITE Edition:	ITE-TGM 10th / 11th Edition

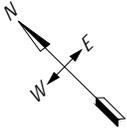
Map ID	Group ID	Property Name	Land Use Code	Trip Type	Estimated Size and Unit Type	Daily		Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour		Total			
						In	Out	In	Out	In	Out	In	Out				
01	2	Steekworks - Barto Property	221 - Multifamily Housing (Mid-Rise)	New Trips	375 apartments	706	795	1501	33	107	140	60	42	102	65	122	
			822 - Strip Plaza	Total	30,450 sf retail	989	989	1818	71	59	130	95	62	157	122	105	227
02	2	Lofts at Church	932 - HFSD Rest	- Post-By	10,150 sf restaurant	224	224	448	19	36	32	20	32	29	24	53	
			220 - Multifamily Housing (Low-Rise)	New Trips	68 apartments	685	685	1370	52	42	105	63	42	105	93	81	174
07	1	Heckle Street	220 - Multifamily Housing (Low-Rise)	New Trips	10 apartments	18	17	35	1	4	5	5	3	8	4	3	7
			215 - SP Attached	New Trips	168 townhomes	1087	1088	2175	44	123	167	167	96	263			0
08	1	Odessa	221 - Multi-Family (Mid-Rise)	Total	224 apartments	329	330	659	16	10	26	40	33	72		0	
			822 - Strip Retail Plaza	- Post-By	12,000 sf retail	89	89	178	5	3	8	16	13	29			0
12	2	Eland Point Crossing	221 - Multifamily Housing (Mid-Rise)	New Trips	108 apartments	230	231	461	11	7	18	24	20	44	0	0	
			220 - Multifamily Housing (Low-Rise)	New Trips	23 apartments	293	294	587	10	27	37	29	19	48	25	27	52
21	2	345 Walnut - Apartments	221 - Multifamily Housing (Low-Rise)	New Trips	23 apartments	111	112	223	7	23	30	19	11	30	4	5	9
			310 - Single Family Detached	New Trips	4 single family homes	19	19	38	1	2	3	3	1	4	2	2	4
32	1	Borough Community Center	495 - Recreational Community Center	New Trips	38,000 square feet	548	547	1095	44	23	67	41	47	88	22	19	41
			220 - Multifamily Housing (Low-Rise)	New Trips	12 apartments	25	25	50	1	5	6	6	3	9	4	4	8
34	3	252 Morgan Street Apartments	221 - Multi-Family Housing (Mid-Rise)	New Trips	15 apartments	12	13	25	1	5	6	4	2	6	3	6	
			221 - Multi-Family Housing (Mid-Rise)	New Trips	195 units	442	442	884	17	59	76	48	30	78	40	38	78
36	2	Oakwoods Apartments expansion	220 / 221	New Trips	551 units	1808	1808	3616	53	168	221	165	100	265	218	195	285
			210 - Single Family Detached	New Trips	168 single family homes	38	38	76	1	5	6	4	3	7	8	7	15
40	0	Kimberton Glen	251 - Senior Adult Housing - Detached	New Trips	164 senior homes	59	59	118	3	6	9	6	4	10	3	3	6
			252 - Senior Adult Housing - Attached	New Trips	149 occupied	86	86	172	3	7	10	8	6	14	10	6	16
East Pheasant Township	EP	American Heritage Credit Union SR 23 and Mowere Road	912 - Drive-In Bank	Total	3,100 square feet	155	156	311	18	13	31	32	33	65	42	40	82
			221 - Multifamily Housing (Mid-Rise)	New Trips	32 units	39	39	78	5	4	9	11	12	23	16	15	31
38	3	Bridge Street Residential - East (348-370 Bridge Street)	820 Shopping Center	New Trips	19,380 square feet	116	117	233	13	9	22	21	21	42	26	25	51
			221 - Multifamily Housing (Mid-Rise)	New Trips	561 townhomes	53	53	106	0	2	2	8	5	13	7	6	13
37	1	Trieste (Filmore St. & Top Line Road)	820 Shopping Center	Total	3205 units	366	366	732	11	7	18	35	39	74	45	42	87
			221 - Multifamily Housing (Mid-Rise)	New Trips	132 stacked townhomes	88	88	176	3	2	5	12	13	25	12	11	23
39	2	Westrum Luxor (723 Wheatland Street)	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	278	278	556	8	5	13	23	26	49	33	31	64
			821 - Shopping Plaza (40-150K) with Supermarket	New Trips	8,800 s.f.	425	425	850	16	55	71	45	29	74	39	37	76
41	3	785A Starr Street Shopping Center Expansion	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	558	558	1116	18	51	69	54	34	88	45	48	93
			821 - Shopping Plaza (40-150K) with Supermarket	Total	8,800 s.f.	416	416	832	19	12	31	37	40	77	42	39	81

* Additional multi-modal trip reductions may be appropriate.

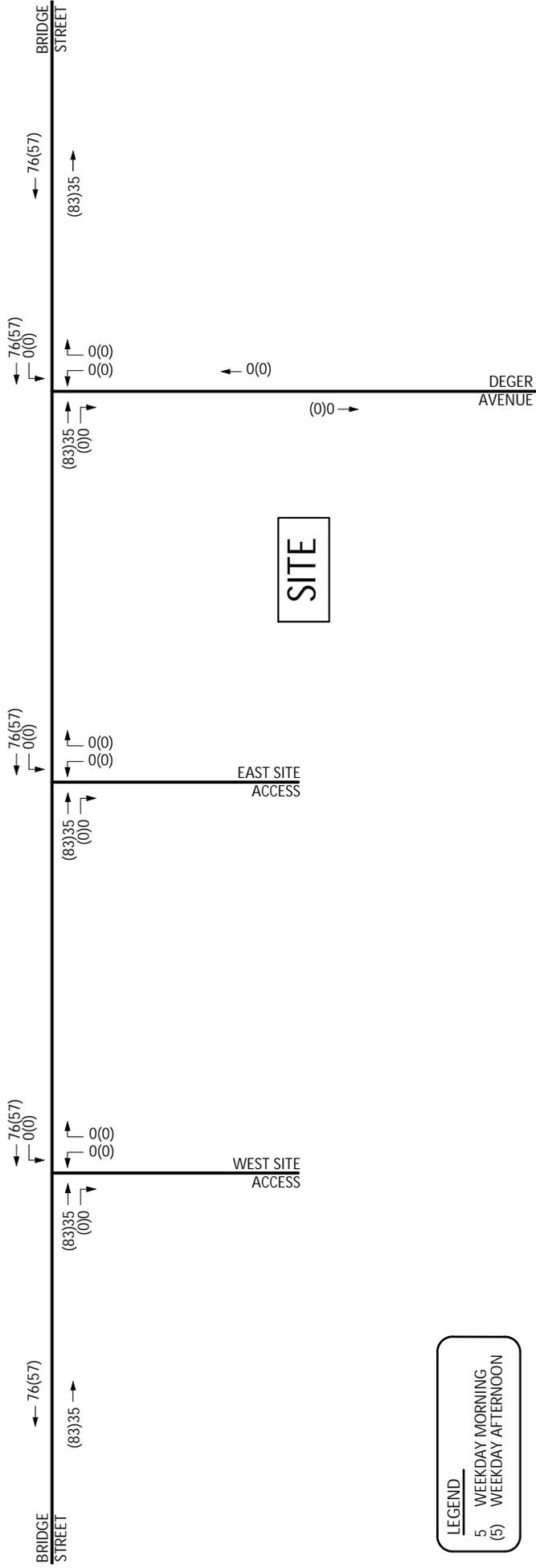
Map ID	Group ID	Property Name	Land Use Code	Trip Type	Estimated Size and Unit Type	Daily		Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour		Total			
						In	Out	In	Out	In	Out	In	Out				
38	3	Bridge Street Residential - East (348-370 Bridge Street)	820 Shopping Center	Total	19,380 square feet	116	117	233	13	9	22	21	21	42	26	25	51
			221 - Multifamily Housing (Mid-Rise)	New Trips	561 townhomes	53	53	106	0	2	2	8	5	13	7	6	13
37	1	Trieste (Filmore St. & Top Line Road)	820 Shopping Center	Total	3205 units	366	366	732	11	7	18	35	39	74	45	42	87
			221 - Multifamily Housing (Mid-Rise)	New Trips	132 stacked townhomes	88	88	176	3	2	5	12	13	25	12	11	23
39	2	Westrum Luxor (723 Wheatland Street)	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	278	278	556	8	5	13	23	26	49	33	31	64
			821 - Shopping Plaza (40-150K) with Supermarket	Total	8,800 s.f.	425	425	850	16	55	71	45	29	74	39	37	76
41	3	785A Starr Street Shopping Center Expansion	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	558	558	1116	18	51	69	54	34	88	45	48	93
			821 - Shopping Plaza (40-150K) with Supermarket	Total	8,800 s.f.	416	416	832	19	12	31	37	40	77	42	39	81

Map ID	Group ID	Property Name	Land Use Code	Trip Type	Estimated Size and Unit Type	Daily		Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour		Total			
						In	Out	In	Out	In	Out	In	Out				
38	3	Bridge Street Residential - East (348-370 Bridge Street)	820 Shopping Center	Total	19,380 square feet	116	117	233	13	9	22	21	21	42	26	25	51
			221 - Multifamily Housing (Mid-Rise)	New Trips	561 townhomes	53	53	106	0	2	2	8	5	13	7	6	13
37	1	Trieste (Filmore St. & Top Line Road)	820 Shopping Center	Total	3205 units	366	366	732	11	7	18	35	39	74	45	42	87
			221 - Multifamily Housing (Mid-Rise)	New Trips	132 stacked townhomes	88	88	176	3	2	5	12	13	25	12	11	23
39	2	Westrum Luxor (723 Wheatland Street)	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	278	278	556	8	5	13	23	26	49	33	31	64
			821 - Shopping Plaza (40-150K) with Supermarket	Total	8,800 s.f.	425	425	850	16	55	71	45	29	74	39	37	76
41	3	785A Starr Street Shopping Center Expansion	221 - Multifamily Housing (Mid-Rise)	New Trips	205 units	558	558	1116	18	51	69	54	34	88	45	48	93
			821 - Shopping Plaza (40-150K) with Supermarket	Total	8,800 s.f.	416	416	832	19	12	31	37	40	77	42	39	81

of units updated by loro



Schematic-
Not To
Scale



LEGEND	
5	WEEKDAY MORNING
(5)	WEEKDAY AFTERNOON

FIGURE OD
Other Development Trip Assignment
OAKWOODS
PHOENIXVILLE BOROUGH, CHESTER COUNTY, PA

The top of the page features a dark green background on the left with the word "Bowman" in white. To the right, a white diagonal line separates this from an aerial photograph of a complex road interchange with a roundabout and several cars. The rest of the page is white.

Bowman

APPENDIX F

DETAILED TRAFFIC VOLUME PROJECTION WORKSHEETS

West Bridge Street & South Site Access
INTERSECTION VOLUME PROJECTION SUMMARY
Weekday 6 AM - 10 AM

		EASTBOUND			WESTBOUND South Site Access			NORTHBOUND West Bridge Street			SOUTHBOUND West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		EXISTING VOLUMES		0	0	0	10	0	2	0	228	2	2
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	10	0	2	0	228	2	2	474	0
Background Growth to 2026	2.18%	0	0	0	0	0	0	0	5	0	0	10	0
Phoenixville Group 1	DIST IN							10%				(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	12	0	0	21	0
Phoenixville Group 2	DIST IN							10%				(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	20	0	0	50	0
Phoenixville Group 3	DIST IN							10%				(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	3	0	0	5	0
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	35	0	0	76	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	10	0	2	0	268	2	2	560	0
Multifamily Housing (Low-Rise)	DIST IN				(15%)		(20%)	15%	15%		20%	(15%)	
	DIST OUT												
	ASSIGN	0	0	0	4	0	5	0	1	1	2	3	0
Total New Site Trip Assignment		0	0	0	4	0	5	0	1	1	2	3	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	14	0	7	0	269	3	4	563	0

West Bridge Street & South Site Access
INTERSECTION VOLUME PROJECTION SUMMARY
Weekday 3 PM - 7 PM

		EASTBOUND			WESTBOUND South Site Access			NORTHBOUND West Bridge Street			SOUTHBOUND West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
EXISTING VOLUMES		0	0	0	3	0	7	0	438	7	6	340	0
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	3	0	7	0	438	7	6	340	0
Background Growth to 2026	2.18%	0	0	0	0	0	0	0	10	0	0	7	0
Phoenixville Group 1	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	29	0	0	20	0
Phoenixville Group 2	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	48	0	0	32	0
Phoenixville Group 3	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	6	0	0	5	0
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	83	0	0	57	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	3	0	7	0	531	7	6	404	0
Multifamily Housing (Low-Rise)	DIST IN								15%	15%		20%	
	DIST OUT				(15%)		(20%)					(15%)	
	ASSIGN	0	0	0	2	0	2	0	3	3	4	2	0
Total New Site Trip Assignment		0	0	0	2	0	2	0	3	3	4	2	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	5	0	9	0	534	10	10	406	0

West Bridge Street & North Site Access
INTERSECTION VOLUME PROJECTION SUMMARY
Weekday 6 AM - 10 AM

		EASTBOUND			WESTBOUND North Site Access			NORTHBOUND West Bridge Street			SOUTHBOUND West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
EXISTING VOLUMES		0	0	0	2	0	11	0	229	0	7	474	0
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	2	0	11	0	229	0	7	474	0
Background Growth to 2026	2.18%	0	0	0	0	0	0	0	5	0	0	10	0
Phoenixville Group 1	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	12	0	0	21	0
Phoenixville Group 2	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	20	0	0	50	0
Phoenixville Group 3	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	3	0	0	5	0
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	35	0	0	76	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	2	0	11	0	269	0	7	560	0
Multifamily Housing (Low-Rise)	DIST IN				(15%)		(50%)		15%		50%	20%	
	DIST OUT ASSIGN	0	0	0	3	0	12	0	5	1	4	2	0
Total New Site Trip Assignment		0	0	0	3	0	12	0	5	1	4	2	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	5	0	23	0	274	1	11	562	0

West Bridge Street & North Site Access
INTERSECTION VOLUME PROJECTION SUMMARY
Weekday 3 PM - 7 PM

		EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND		
					North Site Access			West Bridge Street			West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
EXISTING VOLUMES		0	0	0	0	0	8	0	443	1	12	340	0
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	0	0	8	0	443	1	12	340	0
Background Growth to 2026	2.18%	0	0	0	0	0	0	0	10	0	0	7	0
Phoenixville Group 1	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	29	0	0	20	0
Phoenixville Group 2	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	48	0	0	32	0
Phoenixville Group 3	DIST IN								10%			(10%)	
	DIST OUT ASSIGN	0	0	0	0	0	0	0	6	0	0	5	0
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	83	0	0	57	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	0	0	8	0	536	1	12	404	0
Multifamily Housing (Low-Rise)	DIST IN				(15%)		(50%)		15%		50%	20%	
	DIST OUT ASSIGN	0	0	0	2	0	6	0	2	3	11	4	0
Total New Site Trip Assignment		0	0	0	2	0	6	0	2	3	11	4	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	2	0	14	0	538	4	23	408	0

West Bridge Street & Deger Avenue INTERSECTION VOLUME PROJECTION SUMMARY

Weekday 6 AM - 10 AM

		EASTBOUND			WESTBOUND Deger Avenue			NORTHBOUND West Bridge Street			SOUTHBOUND West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		EXISTING VOLUMES		0	0	0	35	0	14	0	215	23	7
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	35	0	14	0	215	23	7	455	0
Background Growth to 2026	2.18%	0	0	0	1	0	0	0	5	1	0	10	0
Phoenixville Group 1	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	12	0	0	21	0
Phoenixville Group 2	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	20	0	0	50	0
Phoenixville Group 3	DIST IN								10%			(10%)	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	3	0	0	5	0
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	35	0	0	76	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	36	0	14	0	255	24	7	541	0
Multifamily Housing (Low-Rise)	DIST IN								(70%)			70%	
	DIST OUT												
	ASSIGN	0	0	0	0	0	0	0	17	0	0	6	0
Total New Site Trip Assignment		0	0	0	0	0	0	0	17	0	0	6	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	36	0	14	0	272	24	7	547	0

West Bridge Street & Deger Avenue
INTERSECTION VOLUME PROJECTION SUMMARY
Weekday 3 PM - 7 PM

		EASTBOUND			WESTBOUND Deger Avenue			NORTHBOUND West Bridge Street			SOUTHBOUND West Bridge Street		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		EXISTING VOLUMES		0	0	0	10	0	16	0	435	18	13
Seasonal Adjustment Factor	1.000	0	0	0	0	0	0	0	0	0	0	0	0
Balancing Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
Additional Adjustment		0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED EXISTING VOLUMES		0	0	0	10	0	16	0	435	18	13	347	0
Background Growth to 2026	2.18%	0	0	0	0	0	0	0	9	0	0	8	0
Phoenixville Group 1	DIST IN								10%			(10%)	
	DIST OUT ASSIGN		0	0	0	0	0	0	0	29	0	0	20
Phoenixville Group 2	DIST IN								10%			(10%)	
	DIST OUT ASSIGN		0	0	0	0	0	0	0	48	0	0	32
Phoenixville Group 3	DIST IN								10%			(10%)	
	DIST OUT ASSIGN		0	0	0	0	0	0	0	6	0	0	5
Total Other Development New Trip Assignments		0	0	0	0	0	0	0	83	0	0	57	0
Total Other Development Pass-by Trip Assignments		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITHOUT DEVELOPMENT VOLUMES		0	0	0	10	0	16	0	527	18	13	412	0
Multifamily Housing (Low-Rise)	DIST IN								(70%)			70%	
	DIST OUT ASSIGN		0	0	0	0	0	0	0	8	0	0	15
Total New Site Trip Assignment		0	0	0	0	0	0	0	8	0	0	15	0
Total Pass-by Site Trip Assignment		0	0	0	0	0	0	0	0	0	0	0	0
2026 WITH DEVELOPMENT VOLUMES		0	0	0	10	0	16	0	535	18	13	427	0

The top of the page features a dark green triangular area on the left containing the word "Bowman" in white. To the right, a white diagonal line separates this from an aerial photograph of a roundabout with a central tree island and surrounding roads.

Bowman

APPENDIX G

**CAPACITY / LEVEL-OF-SERVICE ANALYSIS
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 6th Edition*. 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)	<u>LOS by Volume-to-Capacity Ratio</u>	
	$v/c \leq 1.0$	$v/c > 1.0$
≤ 10	A	F
$> 10 - 20$	B	F
$> 20 - 35$	C	F
$> 35 - 55$	D	F
$> 55 - 80$	E	F
> 80	F	F

The top of the page features a dark green triangular shape on the left containing the word "Bowman" in white. To the right, a white-bordered triangular shape contains an aerial photograph of a city street intersection with a roundabout and a building with arches.

Bowman

APPENDIX H

EXISTING CAPACITY / LEVEL-OF-SERVICE
ANALYSIS WORKSHEETS

Weekday Morning Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	2	228	2	2	474
Future Volume (vph)	10	2	228	2	2	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979		0.999			
Flt Protected	0.959					
Satd. Flow (prot)	1656	0	1892	0	0	2049
Flt Permitted	0.959					
Satd. Flow (perm)	1656	0	1892	0	0	2049
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				8	8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	50%	10%	50%	0%	2%
Adj. Flow (vph)	11	2	240	2	2	499
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	242	0	0	501
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	2	228	2	2	474
Future Vol, veh/h	10	2	228	2	2	474
Conflicting Peds, #/hr	0	0	0	8	8	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, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	50	10	50	0	2
Mvmt Flow	11	2	240	2	2	499

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	752	249	0	0	250
Stage 1	249	-	-	-	-
Stage 2	503	-	-	-	-
Critical Hdwy	7.1	6.7	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	366	812	-	-	986
Stage 1	915	-	-	-	-
Stage 2	691	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	362	806	-	-	978
Mov Cap-2 Maneuver	362	-	-	-	-
Stage 1	908	-	-	-	-
Stage 2	689	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	399	978
HCM Lane V/C Ratio	-	-	0.032	0.002
HCM Control Delay (s)	-	-	14.3	8.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	11	229	0	7	474
Future Volume (vph)	2	11	229	0	7	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.886					
Flt Protected	0.992					0.999
Satd. Flow (prot)	1670	0	1883	0	0	2028
Flt Permitted	0.992					0.999
Satd. Flow (perm)	1670	0	1883	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	171		258			178
Travel Time (s)	4.7		5.0			3.5
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	11%	0%	0%	3%
Adj. Flow (vph)	2	11	236	0	7	489
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	236	0	0	496
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	2	11	229	0	7	474
Future Vol, veh/h	2	11	229	0	7	474
Conflicting Peds, #/hr	0	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	11	0	0	3
Mvmt Flow	2	11	236	0	7	489

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	741	238	0	0	238	0
Stage 1	238	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	373	852	-	-	996	-
Stage 1	926	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	369	850	-	-	994	-
Mov Cap-2 Maneuver	369	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	684	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	708	994
HCM Lane V/C Ratio	-	-	0.019	0.007
HCM Control Delay (s)	-	-	10.2	8.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	35	14	215	23	7	455
Future Volume (vph)	35	14	215	23	7	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.961		0.987			
Flt Protected	0.966					0.999
Satd. Flow (prot)	1727	0	1876	0	0	2028
Flt Permitted	0.966					0.999
Satd. Flow (perm)	1727	0	1876	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	0%	11%	0%	0%	3%
Adj. Flow (vph)	37	15	229	24	7	484
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	0	253	0	0	491
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		B			A
Traffic Vol, veh/h	35	14	215	23	7	455
Future Vol, veh/h	35	14	215	23	7	455
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	11	0	0	3
Mvmt Flow	37	15	229	24	7	484

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	748	250	0	0	262	0
Stage 1	250	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	369	839	-	-	977	-
Stage 1	912	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	362	832	-	-	969	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	904	-	-	-	-	-
Stage 2	685	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	432	969
HCM Lane V/C Ratio	-	-	0.121	0.008
HCM Control Delay (s)	-	-	14.5	8.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0

Weekday Afternoon Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	3	7	438	7	6	340
Future Volume (vph)	3	7	438	7	6	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.902		0.998			
Flt Protected	0.987					0.999
Satd. Flow (prot)	1692	0	2065	0	0	2048
Flt Permitted	0.987					0.999
Satd. Flow (perm)	1692	0	2065	0	0	2048
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	3	8	487	8	7	378
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	0	495	0	0	385
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	R	T	R	L	T
Traffic Vol, veh/h	3	7	438	7	6	340
Future Vol, veh/h	3	7	438	7	6	340
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	3	8	487	8	7	378

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	892	500	0	0	504	0
Stage 1	500	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	293	604	-	-	805	-
Stage 1	693	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	287	599	-	-	798	-
Mov Cap-2 Maneuver	287	-	-	-	-	-
Stage 1	687	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	452	798
HCM Lane V/C Ratio	-	-	0.025	0.008
HCM Control Delay (s)	-	-	13.2	9.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	8	443	1	12	340
Future Volume (vph)	0	8	443	1	12	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.998
Satd. Flow (prot)	1644	0	2069	0	0	2046
Flt Permitted						0.998
Satd. Flow (perm)	1644	0	2069	0	0	2046
Link Speed (mph)	25		35		35	
Link Distance (ft)	171		258		178	
Travel Time (s)	4.7		5.0		3.5	
Confl. Peds. (#/hr)	1		2		2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	0	9	476	1	13	366
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	477	0	0	379
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	443	1	12	340
Future Vol, veh/h	0	8	443	1	12	340
Conflicting Peds, #/hr	1	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	0	9	476	1	13	366

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	872	479	0	0	479
Stage 1	479	-	-	-	-
Stage 2	393	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	302	621	-	-	821
Stage 1	709	-	-	-	-
Stage 2	780	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	295	620	-	-	819
Mov Cap-2 Maneuver	295	-	-	-	-
Stage 1	708	-	-	-	-
Stage 2	764	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	620	819
HCM Lane V/C Ratio	-	-	0.014	0.016
HCM Control Delay (s)	-	-	10.9	9.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	16	435	18	13	347
Future Volume (vph)	10	16	435	18	13	347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.916		0.995			
Flt Protected	0.981					0.998
Satd. Flow (prot)	1707	0	2060	0	0	2066
Flt Permitted	0.981					0.998
Satd. Flow (perm)	1707	0	2060	0	0	2066
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)	4			4	4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	11	18	478	20	14	381
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	498	0	0	395
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	16	435	18	13	347
Future Vol, veh/h	10	16	435	18	13	347
Conflicting Peds, #/hr	4	0	0	4	4	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, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	11	18	478	20	14	381

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	905	492	0	0	502	0
Stage 1	492	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	287	611	-	-	806	-
Stage 1	699	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	278	609	-	-	803	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	742	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	418	803
HCM Lane V/C Ratio	-	-	0.068	0.018
HCM Control Delay (s)	-	-	14.2	9.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

The top of the page features a dark green triangular area on the left containing the word "Bowman" in white. To the right, a white diagonal line separates this from an aerial photograph of a roundabout with a central tree island and surrounding roads.

Bowman

APPENDIX I

2026 FUTURE WITHOUT DEVELOPMENT
CAPACITY / LEVEL-OF-SERVICE ANALYSIS
WORKSHEETS

Weekday Morning Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	2	268	2	2	560
Future Volume (vph)	10	2	268	2	2	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979		0.999			
Flt Protected	0.959					
Satd. Flow (prot)	1656	0	1893	0	0	2049
Flt Permitted	0.959					
Satd. Flow (perm)	1656	0	1893	0	0	2049
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				8	8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	50%	10%	50%	0%	2%
Adj. Flow (vph)	11	2	282	2	2	589
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	284	0	0	591
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	2	268	2	2	560
Future Vol, veh/h	10	2	268	2	2	560
Conflicting Peds, #/hr	0	0	0	8	8	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, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	50	10	50	0	2
Mvmt Flow	11	2	282	2	2	589

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	884	291	0	0	292
Stage 1	291	-	-	-	-
Stage 2	593	-	-	-	-
Critical Hdwy	7.1	6.7	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	297	764	-	-	954
Stage 1	873	-	-	-	-
Stage 2	625	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	294	758	-	-	947
Mov Cap-2 Maneuver	294	-	-	-	-
Stage 1	866	-	-	-	-
Stage 2	623	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	327	947
HCM Lane V/C Ratio	-	-	0.039	0.002
HCM Control Delay (s)	-	-	16.5	8.8
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	11	269	0	7	560
Future Volume (vph)	2	11	269	0	7	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.886					
Flt Protected	0.992					0.999
Satd. Flow (prot)	1670	0	1883	0	0	2028
Flt Permitted	0.992					0.999
Satd. Flow (perm)	1670	0	1883	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	171		258			178
Travel Time (s)	4.7		5.0			3.5
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	11%	0%	0%	3%
Adj. Flow (vph)	2	11	277	0	7	577
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	277	0	0	584
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	2	11	269	0	7	560
Future Vol, veh/h	2	11	269	0	7	560
Conflicting Peds, #/hr	0	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	11	0	0	3
Mvmt Flow	2	11	277	0	7	577

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	870	279	0	0	279
Stage 1	279	-	-	-	-
Stage 2	591	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	303	808	-	-	964
Stage 1	885	-	-	-	-
Stage 2	626	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	299	806	-	-	962
Mov Cap-2 Maneuver	299	-	-	-	-
Stage 1	883	-	-	-	-
Stage 2	619	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	639	962
HCM Lane V/C Ratio	-	-	0.021	0.008
HCM Control Delay (s)	-	-	10.8	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	36	14	255	24	7	541
Future Volume (vph)	36	14	255	24	7	541
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.962		0.988			
Flt Protected	0.965					0.999
Satd. Flow (prot)	1727	0	1877	0	0	2028
Flt Permitted	0.965					0.999
Satd. Flow (perm)	1727	0	1877	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	0%	11%	0%	0%	3%
Adj. Flow (vph)	38	15	271	26	7	576
Shared Lane Traffic (%)						
Lane Group Flow (vph)	53	0	297	0	0	583
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	36	14	255	24	7	541
Future Vol, veh/h	36	14	255	24	7	541
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	11	0	0	3
Mvmt Flow	38	15	271	26	7	576

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	883	293	0	0	306
Stage 1	293	-	-	-	-
Stage 2	590	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	297	793	-	-	943
Stage 1	869	-	-	-	-
Stage 2	624	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	291	786	-	-	935
Mov Cap-2 Maneuver	291	-	-	-	-
Stage 1	861	-	-	-	-
Stage 2	617	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	353	935
HCM Lane V/C Ratio	-	-	0.151	0.008
HCM Control Delay (s)	-	-	17	8.9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.5	0

Weekday Afternoon Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	3	7	531	7	6	404
Future Volume (vph)	3	7	531	7	6	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.902		0.998			
Flt Protected	0.987					0.999
Satd. Flow (prot)	1692	0	2065	0	0	2048
Flt Permitted	0.987					0.999
Satd. Flow (perm)	1692	0	2065	0	0	2048
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	3	8	590	8	7	449
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	0	598	0	0	456
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	3	7	531	7	6	404
Future Vol, veh/h	3	7	531	7	6	404
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	3	8	590	8	7	449

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1066	603	0	0	607	0
Stage 1	603	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	221	527	-	-	741	-
Stage 1	618	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	216	522	-	-	735	-
Mov Cap-2 Maneuver	216	-	-	-	-	-
Stage 1	612	-	-	-	-	-
Stage 2	713	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	366	735
HCM Lane V/C Ratio	-	-	0.03	0.009
HCM Control Delay (s)	-	-	15.1	9.9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	8	536	1	12	404
Future Volume (vph)	0	8	536	1	12	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.999
Satd. Flow (prot)	1644	0	2069	0	0	2048
Flt Permitted						0.999
Satd. Flow (perm)	1644	0	2069	0	0	2048
Link Speed (mph)	25		35		35	
Link Distance (ft)	171		258		178	
Travel Time (s)	4.7		5.0		3.5	
Confl. Peds. (#/hr)	1		2		2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	0	9	576	1	13	434
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	577	0	0	447
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	536	1	12	404
Future Vol, veh/h	0	8	536	1	12	404
Conflicting Peds, #/hr	1	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	0	9	576	1	13	434

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1040	579	0	0	579
Stage 1	579	-	-	-	-
Stage 2	461	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	231	544	-	-	758
Stage 1	635	-	-	-	-
Stage 2	724	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	225	543	-	-	757
Mov Cap-2 Maneuver	225	-	-	-	-
Stage 1	634	-	-	-	-
Stage 2	707	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	543	757
HCM Lane V/C Ratio	-	-	0.016	0.017
HCM Control Delay (s)	-	-	11.7	9.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0.1



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	16	527	18	13	412
Future Volume (vph)	10	16	527	18	13	412
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.916		0.995			
Flt Protected	0.981					0.999
Satd. Flow (prot)	1707	0	2060	0	0	2068
Flt Permitted	0.981					0.999
Satd. Flow (perm)	1707	0	2060	0	0	2068
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)	4			4	4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	11	18	579	20	14	453
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	599	0	0	467
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	16	527	18	13	412
Future Vol, veh/h	10	16	527	18	13	412
Conflicting Peds, #/hr	4	0	0	4	4	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, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	11	18	579	20	14	453

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1078	593	0	0	603	0
Stage 1	593	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	217	534	-	-	743	-
Stage 1	625	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	210	532	-	-	740	-
Mov Cap-2 Maneuver	210	-	-	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	684	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.7	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	335	740
HCM Lane V/C Ratio	-	-	0.085	0.019
HCM Control Delay (s)	-	-	16.7	10
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

The top of the page features a dark green background on the left with the word "Bowman" in white. To the right, a white diagonal line separates this from an aerial photograph of a city street intersection, including a roundabout with a central tree island and several cars.

Bowman

APPENDIX J

2026 FUTURE WITH DEVELOPMENT
CAPACITY / LEVEL-OF-SERVICE ANALYSIS
WORKSHEETS

Weekday Morning Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	7	269	3	4	563
Future Volume (vph)	14	7	269	3	4	563
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.957		0.999			
Flt Protected	0.967					
Satd. Flow (prot)	1517	0	1891	0	0	2049
Flt Permitted	0.967					
Satd. Flow (perm)	1517	0	1891	0	0	2049
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				8	8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	50%	10%	50%	0%	2%
Adj. Flow (vph)	15	7	283	3	4	593
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	286	0	0	597
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	14	7	269	3	4	563
Future Vol, veh/h	14	7	269	3	4	563
Conflicting Peds, #/hr	0	0	0	8	8	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, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	50	10	50	0	2
Mvmt Flow	15	7	283	3	4	593

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	894	293	0	0	294
Stage 1	293	-	-	-	-
Stage 2	601	-	-	-	-
Critical Hdwy	7.1	6.7	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	292	762	-	-	952
Stage 1	871	-	-	-	-
Stage 2	619	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	288	756	-	-	945
Mov Cap-2 Maneuver	288	-	-	-	-
Stage 1	864	-	-	-	-
Stage 2	615	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	363	945
HCM Lane V/C Ratio	-	-	0.061	0.004
HCM Control Delay (s)	-	-	15.6	8.8
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.2	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	23	274	1	11	562
Future Volume (vph)	5	23	274	1	11	562
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.888					
Flt Protected	0.991					0.999
Satd. Flow (prot)	1672	0	1884	0	0	2028
Flt Permitted	0.991					0.999
Satd. Flow (perm)	1672	0	1884	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	171		258			178
Travel Time (s)	4.7		5.0			3.5
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	11%	0%	0%	3%
Adj. Flow (vph)	5	24	282	1	11	579
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	283	0	0	590
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	5	23	274	1	11	562
Future Vol, veh/h	5	23	274	1	11	562
Conflicting Peds, #/hr	0	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	11	0	0	3
Mvmt Flow	5	24	282	1	11	579

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	886	285	0	0	285	0
Stage 1	285	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	296	802	-	-	959	-
Stage 1	879	-	-	-	-	-
Stage 2	619	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	290	800	-	-	957	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	609	957
HCM Lane V/C Ratio	-	-	0.047	0.012
HCM Control Delay (s)	-	-	11.2	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	36	14	272	24	7	547
Future Volume (vph)	36	14	272	24	7	547
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.962		0.989			
Flt Protected	0.965					0.999
Satd. Flow (prot)	1727	0	1878	0	0	2028
Flt Permitted	0.965					0.999
Satd. Flow (perm)	1727	0	1878	0	0	2028
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	0%	11%	0%	0%	3%
Adj. Flow (vph)	38	15	289	26	7	582
Shared Lane Traffic (%)						
Lane Group Flow (vph)	53	0	315	0	0	589
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	14	272	24	7	547
Future Vol, veh/h	36	14	272	24	7	547
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	11	0	0	3
Mvmt Flow	38	15	289	26	7	582

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	907	311	0	0	324	0
Stage 1	311	-	-	-	-	-
Stage 2	596	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	286	775	-	-	930	-
Stage 1	852	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	280	768	-	-	922	-
Mov Cap-2 Maneuver	280	-	-	-	-	-
Stage 1	844	-	-	-	-	-
Stage 2	613	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.5	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	341	922
HCM Lane V/C Ratio	-	-	0.156	0.008
HCM Control Delay (s)	-	-	17.5	8.9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.5	0

Weekday Afternoon Peak Hour



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	9	534	10	10	406
Future Volume (vph)	5	9	534	10	10	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.916		0.998			
Flt Protected	0.982					0.999
Satd. Flow (prot)	1709	0	2066	0	0	2048
Flt Permitted	0.982					0.999
Satd. Flow (perm)	1709	0	2066	0	0	2048
Link Speed (mph)	25		35			35
Link Distance (ft)	165		594			258
Travel Time (s)	4.5		11.6			5.0
Confl. Peds. (#/hr)				9	9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	6	10	593	11	11	451
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	0	604	0	0	462
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	9	534	10	10	406
Future Vol, veh/h	5	9	534	10	10	406
Conflicting Peds, #/hr	0	0	0	9	9	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, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	6	10	593	11	11	451

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1081	608	0	0	613	0
Stage 1	608	-	-	-	-	-
Stage 2	473	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	216	524	-	-	737	-
Stage 1	614	-	-	-	-	-
Stage 2	714	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	210	520	-	-	731	-
Mov Cap-2 Maneuver	210	-	-	-	-	-
Stage 1	608	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.1	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	340	731
HCM Lane V/C Ratio	-	-	0.046	0.015
HCM Control Delay (s)	-	-	16.1	10
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.1	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	14	538	4	23	408
Future Volume (vph)	2	14	538	4	23	408
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.881		0.999			
Flt Protected	0.994					0.997
Satd. Flow (prot)	1664	0	2067	0	0	2045
Flt Permitted	0.994					0.997
Satd. Flow (perm)	1664	0	2067	0	0	2045
Link Speed (mph)	25		35			35
Link Distance (ft)	171		258			178
Travel Time (s)	4.7		5.0			3.5
Confl. Peds. (#/hr)	1			2	2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	1%	0%	0%	2%
Adj. Flow (vph)	2	15	578	4	25	439
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	582	0	0	464
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	2	14	538	4	23	408
Future Vol, veh/h	2	14	538	4	23	408
Conflicting Peds, #/hr	1	0	0	2	2	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, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	2	15	578	4	25	439

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1072	582	0	0	584	0
Stage 1	582	-	-	-	-	-
Stage 2	490	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	219	542	-	-	754	-
Stage 1	633	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	209	541	-	-	753	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	669	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	451	753
HCM Lane V/C Ratio	-	-	0.038	0.033
HCM Control Delay (s)	-	-	13.3	9.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	16	535	18	13	427
Future Volume (vph)	10	16	535	18	13	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	15	15	15	15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.916		0.996			
Flt Protected	0.981					0.999
Satd. Flow (prot)	1707	0	2062	0	0	2068
Flt Permitted	0.981					0.999
Satd. Flow (perm)	1707	0	2062	0	0	2068
Link Speed (mph)	25		35			35
Link Distance (ft)	457		178			623
Travel Time (s)	12.5		3.5			12.1
Confl. Peds. (#/hr)	4			4	4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	11	18	588	20	14	469
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	608	0	0	483
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	16	535	18	13	427
Future Vol, veh/h	10	16	535	18	13	427
Conflicting Peds, #/hr	4	0	0	4	4	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, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	11	18	588	20	14	469

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1103	602	0	0	612	0
Stage 1	602	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	208	528	-	-	737	-
Stage 1	619	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	201	526	-	-	734	-
Mov Cap-2 Maneuver	201	-	-	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.2	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	324	734
HCM Lane V/C Ratio	-	-	0.088	0.019
HCM Control Delay (s)	-	-	17.2	10
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.3	0.1