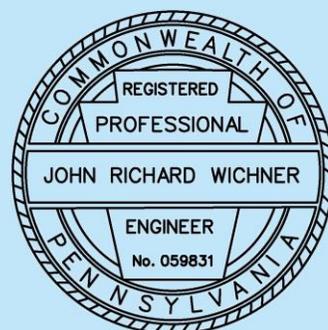


Transportation Impact Study for Tigue Property Residential Development

East Bradford Township, Chester County, PA



John R. Wichner, P.E., PTOE
License #PE059831

Prepared by



Allentown Office

840 Hamilton Street, Suite 203

Allentown, PA 18101

Phone: 610-628-2994

www.mcmahonassociates.com

Prepared for
Toll Brothers

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TABLE OF CONTENTS

	Page
Executive Summary	1
Introduction	3
Existing Transportation Setting	4
<i>Roadway Characteristics</i>	4
<i>Land Use Context</i>	4
<i>Transit Services</i>	5
<i>Pedestrian Facilities</i>	5
<i>Traffic Count Data</i>	5
<i>Capacity/Level-of-Service Analysis</i>	5
Site Characteristics	6
<i>Trip Generation</i>	6
<i>Trip Distribution and Assignment</i>	6
<i>Site Access Configuration and Traffic Control</i>	7
<i>Sight Distance</i>	8
Future Build-Out Year (2018) Traffic Conditions	10
<i>Regional and Local Growth</i>	10
<i>Future 2018 With-Development Traffic Volumes</i>	10
Future Horizon Year (2023) Traffic Conditions	11
<i>Regional and Local Growth</i>	11
<i>Future 2023 With-Development Traffic Volumes</i>	11
Capacity/Level-of-Service and Queuing Analyses	12
<i>Scenario 1</i>	12
<i>Lenape Road (S.R. 0052) and Tigue Road</i>	12
<i>Tigue Road and Access 1</i>	12
<i>Tigue Road and Access 2</i>	12
<i>Lenape Road (S.R. 0052) and Access 3</i>	12
<i>Scenario 2</i>	13
<i>Lenape Road (S.R. 0052) and Tigue Road</i>	13
<i>Tigue Road and Access 1</i>	13
<i>Tigue Road and Access 2</i>	13
Conclusion	14
Mitigation Identification and Recommendations	15

LIST OF TABLES

Number		Page
1	Existing Roadway Characteristics	4
2	Proposed Vehicular Trip Generation	6
3	Sight Distance Evaluation – Tigue Road and Access 1	8
4	Sight Distance Evaluation – Tigue Road and Access 2	8
5	Sight Distance Evaluation – Lenape Road (S.R. 0052) and Access 3	9

LIST OF FIGURES

Number	
1	Site Location Map
2	Site Plan
3A	2015 Existing Peak Hour Traffic Volumes
3B	2015 Existing Levels of Service
4A	“New” Trip Distribution (Scenario 1)
4B	“New” Trip Assignment (Scenario 1)
4C	“New” Trip Distribution (Scenario 2)
4D	“New” Trip Assignment (Scenario 2)
5A	2018 Future Peak Hour Traffic Volumes without Development
5B	2018 Future Peak Hour Traffic Volumes with Development (Scenario 1)
5C	2018 Future Peak Hour Traffic Volumes with Development (Scenario 2)
5D	2018 Future Levels of Service without Development
5E	2018 Future Levels of Service with Development (Scenario 1)
5F	2018 Future Levels of Service with Development (Scenario 2)
6A	2023 Future Peak Hour Traffic Volumes without Development

- 6B 2023 Future Peak Hour Traffic Volumes with Development (Scenario 1)
- 6C 2023 Future Peak Hour Traffic Volumes with Development (Scenario 2)
- 6D 2023 Future Levels of Service without Development
- 6E 2023 Future Levels of Service with Development (Scenario 1)
- 6F 2023 Future Levels of Service with Development (Scenario 2)

APPENDICES

- APPENDIX A** - *Level-of-Service and Queue Matrix Tables*
- APPENDIX B** - *Study Area Sketches, Photographs and Sight Distance Worksheets (M-950S)*
- APPENDIX C** - *PennDOT iTMS Traffic Counts*
- APPENDIX D** - *Manual Turning Movement (MTM) Counts*
- APPENDIX E** - *HCM Methodology*
- APPENDIX F** - *2015 Existing Capacity/Level-of-Service Analysis Worksheets*
- APPENDIX G** - *Background Growth Rate Chart*
- APPENDIX H** - *2018 Volume Spreadsheets (Scenario 1)*
- APPENDIX I** - *2018 Volume Spreadsheets (Scenario 2)*
- APPENDIX J** - *2018 Future without Development Capacity/Level of Service Analysis Worksheets*
- APPENDIX K** - *2018 Future with Development Capacity/Level of Service Analysis Worksheets (Scenario 1)*
- APPENDIX L** - *2018 Future with Development Capacity/Level of Service Analysis Worksheets (Scenario 2)*
- APPENDIX M** - *2023 Volume Spreadsheets (Scenario 1)*
- APPENDIX N** - *2023 Volume Spreadsheets (Scenario 2)*
- APPENDIX O** - *2023 Future without Development Capacity/Level of Service Analysis Worksheets*
- APPENDIX P** - *2023 Future with Development Capacity/Level of Service Analysis Worksheets*

(Scenario 1)

APPENDIX Q - *2023 Future with Development Capacity/Level of Service Analysis Worksheets
(Scenario 2)*

APPENDIX R - *Traffic Signal Warrants*

Executive Summary

Toll Brothers proposes to develop a 91-unit residential development (64 Age-Targeted carriage homes and 27 single-family detached homes, including an existing home on the property) located on a parcel bound by Lenape Road (S.R. 0052) and Tigie Road in East Bradford Township, Chester County, PA. Access to the site is proposed to be provided via two (2) full-access driveways along Tigie Road, with the option of an additional one (1) full access driveway along Lenape Road (S.R. 0052). An existing home on the property is anticipated to remain.

The purpose of this study is to determine the impact of traffic on the adjacent roadways and intersections due to the proposed development. This study focuses on the existing (2015) conditions, as well as the projected (2018) future conditions and PennDOT design year (2023) conditions both without and with the development of the site at the proposed site access and the following study intersections:

- Lenape Road (S.R. 0052) and Tigie Road
- Tigie Road and Access 1
- Tigie Road and Access 2
- Lenape Road (S.R. 0052) and Access 3

The evaluation of traffic conditions associated with the proposed redevelopment reveals the following findings and conclusions.

- **Trip Generation** – Based on trip generation data compiled for Single Family - Detached Housing and Senior Adult Housing - Attached contained in the Institute of Transportation Engineers (ITE) publication entitled, *Trip Generation, 9th Edition*, the proposed development will generate approximately 42 total “new” trips (inbound and outbound) during the weekday morning peak hour and approximately 49 total “new” trips (inbound and outbound) during the weekday afternoon peak hour.
- **Capacity/Level-of-Service Results for Off-Site Intersections** – The study intersections were evaluated to determine the operational characteristics under existing and future without- and with-development conditions.
- **Site Access Recommendations** – Access to the site will be provided via two (2) full-access driveways along Tigie Road, with the option of an additional one (1) full access driveway along Lenape Road (S.R. 0052).
- **Proposed Traffic Improvements** – Per the traffic evaluation, the following on-site and off-site traffic improvements are recommended as measures to help mitigate the proposed development impacts. Since some of these improvements are within the state’s right-of-way, coordination with PennDOT will be required to implement these improvements:

Scenario 1

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway

Access 3 (Lenape Road S.R. 0052)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway
- Remove vegetation along the site frontage of Lenape Road (S.R. 0052), and perform a detailed sight distance analysis during full engineering of the access driveway

Scenario 2

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway

The traffic analyses contained herein reveal that safe and efficient access to and from the proposed development can be provided, and furthermore, site-generated traffic can be accommodated at the access intersection with the construction of the recommended improvements. Matrix tables summarizing the results of the level-of-service and queuing analyses for each of the study area intersections are contained in **Appendix A**.

Introduction

Toll Brothers proposes to develop a 91-unit residential development (64 Age-Targeted carriage homes and 27 single-family detached homes, including an existing home on the property) located on a parcel bound by Lenape Road (S.R. 0052) and Tigue Road in East Bradford Township, Chester County, PA (**Figure 1**). Access to the site is proposed to be provided via two (2) full-access driveways along Tigue Road, with the option of an additional one (1) full access driveway along Lenape Road (S.R. 0052). A reduced version of the site plan is illustrated in **Figure 2**. An existing home on the property is anticipated to remain.

The purpose of this Transportation Impact Study is to present an evaluation of the incremental traffic impacts of the proposed development within the study area in East Bradford Township, as well as to provide recommendations regarding the proposed site access design in order to provide safe and efficient access to the site. The scope of this Transportation Impact Study is based on PennDOT guidelines entitled, *Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits*, dated January 28, 2009, revised October 21, 2013 (SOL 494-13-13).

Manual turning movement traffic counts were completed at one study intersection during the weekday morning peak period (7:00 AM to 9:00 AM) and the weekday afternoon peak period (4:00 PM to 6:00 PM). In order to assess the existing traffic conditions, these existing traffic volumes were subjected to detailed capacity/level-of-service and queuing analysis, in accordance with accepted methodologies, for the highest peak hour during each peak period, which serves as the basis for this evaluation.

Next, future traffic volumes without the proposed development were projected utilizing an annual traffic growth rate to account for regional traffic growth, as well as known development projects in the area (if applicable). The future traffic volumes were then projected to the future build-out years (2018) and PennDOT design year (2023) at the study area intersections and site access driveway. The future traffic volumes without the proposed development were then subjected to detailed capacity/level-of-service and queuing analysis.

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

Existing Transportation Setting & Conditions

The proposed development will be located on a parcel bound by Lenape Road (S.R. 0052) and Tigue Road in East Bradford Township, Chester County, PA. The existing roadways and intersections in the vicinity of the site, which comprise the study area roadway network, are described in this section.

Roadway Characteristics

The characteristics of the study roadways surrounding the parcel are described below in **Table 1**.

Table 1 - Existing Roadway Characteristics

Roadway	Average Daily Traffic Volumes (vehicles per day)	Roadway Classification		Travel Lanes (per direction)	Speed Limit (mph)	Roadway Width (ft)
		Smart Transportation ⁽¹⁾	PennDOT/Township ⁽²⁾			
Lenape Road (S.R. 0052)	9,577 ⁽³⁾	Community Arterial	Urban, Minor Arterial	1	45	22-24
Tigue Road	N/A	Local	N/A	1	25	18-20

(1) Based on Table 5.1 – Roadway Categories in the PennDOT publication, *Smart Transportation Guidebook*.

(2) Based on the roadway classifications provided on PennDOT’s internet Traffic Monitoring System (iTMS) website.

(3) Based on average daily traffic volume provided on PennDOT’s internet Traffic Monitoring System (iTMS) website.

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

- Lenape Road (S.R. 0052) and Tigue Road
- Tigue Road and Access 1
- Tigue Road and Access 2
- Lenape Road (S.R. 0052) and Access 3

The existing characteristics of the study intersections, including field sketches and photographs, are summarized in **Appendix B**.

Land Use Context

The proposed development is to be located on a parcel bound by Lenape Road (S.R. 0052) and Tigue Road. This area is within the Residential (R-2 and R-3) Zone of the Township where housing developments are permitted.

Transit Services

Transit services are not currently provided in the study area.

Pedestrian Facilities

Sidewalk is not currently provided along the site frontage along Lenape Road (S.R. 0052) and Tigue Road.

Traffic Count Data

Daily traffic counts were obtained from PennDOT's Internet Traffic Monitoring System (iTMS) website for Lenape Road (S.R. 0052) in the vicinity of the site to determine vehicular traffic volumes. The PennDOT iTMS traffic count data is provided in **Appendix C**.

Manual turning movement traffic counts were conducted at the one study intersection in September 2015 during the weekday morning peak period (7:00 AM to 9:00 AM) and the weekday afternoon peak period (4:00 PM to 6:00 PM). The results of these traffic counts are tabulated by 15-minute intervals in **Appendix D**. The four highest consecutive 15-minute peak intervals during these traffic count periods constitute the peak hours that are the basis of this traffic analysis. The resultant 2015 existing weekday morning and weekday afternoon peak hours that are the basis of this analysis are depicted in **Figure 3A**.

Capacity/Level-of-Service Analysis

The peak hour traffic volumes were analyzed to determine the existing operating conditions and future operating conditions, both without and with development of the site in accordance with the standard techniques contained in the current *Highway Capacity Manual (2010)*. These standard capacity/level-of-service analysis techniques, which calculate total control delay, are more thoroughly described in **Appendix E** for 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. The results of the capacity/level-of-service analyses are illustrated in **Figure 3B** for the existing peak hour traffic conditions, and the detailed capacity/level-of-service analysis worksheets are contained in **Appendix F**. Specific details regarding the analysis results and traffic operations are provided later in this report.

Site Characteristics

This section presents the details regarding the proposed development, including the incremental increase in traffic volumes generated by the development during the peak hours and the distribution of this 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 traffic studies in the Institute of Transportation Engineers (ITE) publication entitled, *Trip Generation, 9th Edition*. Specifically the rates for Land Use Code 210: Single-Family Detached Housing and Land Use Code 252: Senior Adult Housing - Attached were utilized.

Table 2 presents the anticipated vehicular trip generation resulting from the proposed 27 unit single-family detached housing (including existing house) and 64 unit senior adult attached housing. The proposed development will generate approximately 42 total “new” trips (inbound and outbound) during the weekday morning peak hour and approximately 49 “new” total trips (inbound and outbound) during the weekday afternoon peak hour.

Table 2 – Proposed Vehicular Trip Generation⁽¹⁾

Description	Size	Weekday Morning			Weekday Afternoon		
		In	Out	Total	In	Out	Total
Single Family Detached ⁽²⁾	27 units	7	22	29	20	12	32
Senior Adult Attached ⁽³⁾⁽⁴⁾	64 units	4	9	13	9	8	17
Total “New” Trips		11	31	42	29	20	49

(1) Based on ITE’s *Trip Generation Ninth Edition*

(2) Based on rates for ITE Land Use Code 210 – Single-Family Detached Housing

(3) Based on rates for ITE Land Use Code 252 - Senior Adult Housing – Attached

(4) It should be noted that if these units were classified as market-rate (ITE Land Use Code 230 – Residential Condominium/Townhouse), the trip generation for these units would be 28 trips during the weekday morning peak hour and 33 trips during the weekday afternoon peak hour.

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 are illustrated in **Figure 4A and 4C for each of the Scenarios**, while the application of the percentages in Figure 4A and 4C to the trip generation contained above in Table 2 for the weekday morning and weekday afternoon peak hours for the proposed site are illustrated in **Figure 4B and 4D for each of the scenarios**.

Site Access Configuration and Traffic Control

The proposed recommendations for the access design, including auxiliary turn lanes, traffic control and geometric design, were based on criteria and guidelines accepted by PennDOT.

Additionally, the geometric design of the proposed site access driveways were preliminarily evaluated based on guidelines contained in the *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveway and Local Roads*, as well as local PennDOT District polices. Based on the results of this evaluation, the following access configurations and traffic controls are recommended for the proposed driveways and are subject to detailed engineering:

Scenario 1

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway

Access 3 (Lenape Road S.R. 0052)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Scenario 2

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway

Sight Distance

Sight distance field measurements and an evaluation were performed for the proposed access intersections. Generally, the prevailing travel speeds, posted speed limit, roadway grades and profiles, and the number of travel lanes play a role in determining if safe sight distances are available for egress and ingress at a driveway. The existing sight distances at the new driveways were measured and compared to PennDOT's requirements, which are contained in the PennDOT publication *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads*. **Tables 3 through 5** summarize the available sight distance measurements, as well as the required sight distances.

**Table 3 - Sight Distance Evaluation
Tigue Road and Access 1**

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet) ⁽¹⁾		Available Sight Distance (feet)
				Desirable	Minimum	
Exiting	Looking Left	25	+4%	250	142	500+
	Looking Right	25	+5%	195	140	260
Left turn Entering	Looking Ahead	25	+4%	190	142	500+
	From the Rear	25	+5%	190	140	500+

(1) Based on posted speed limit of 25 mph along Tigue Road

As shown in Table 3, the existing available sight distance measurements exceed minimum PennDOT requirements based upon the posted speed limit.

**Table 4 - Sight Distance Evaluation
Tigue Road and Access 2**

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet) ⁽¹⁾		Available Sight Distance (feet)
				Desirable	Minimum	
Exiting	Looking Left	25	-4%	250	153	300+
	Looking Right	25	+4%	195	142	300+
Left turn Entering	Looking Ahead	25	-4%	190	153	300+
	From the Rear	25	+4%	190	142	300+

(1) Based on posted speed limit of 25 mph along Tigue Road

As shown in Table 4, the existing available sight distance measurements exceed minimum PennDOT requirements based upon the posted speed limit.

**Table 5 - Sight Distance Evaluation
Lenape Road (S.R. 0052) and Access 3**

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet) ⁽¹⁾		Available Sight Distance (feet)
				Desirable	Minimum	
Exiting	Looking Left	45	+4%	635	358	290
	Looking Right	45	+1%	570	376	700
Left turn Entering	Looking Ahead	45	+4%	445	358	258
	From the Rear	45	+1%	445	376	670

(1) Based on posted speed limit of 45 mph along Lenape Road

As shown in Table 5, the existing available sight distance measurements do not exceed minimum PennDOT requirements based upon the posted speed limit for vehicles exiting looking left and entering looking ahead. Vegetation removal is recommended along the site frontage of Lenape Road (S.R. 0052), and a detailed sight distance analysis is recommended during full engineering of the access driveway, in order to obtain minimum PennDOT sight distance requirements.

Future Build-Out Year (2018) Traffic Conditions

This section presents the future build-out year traffic conditions, both without and with the proposed development, which is anticipated to be completed by 2018. The future 2018 build-out year without-development traffic volumes were estimated by increasing the existing 2015 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 2018 build-out year with-development traffic volumes.

Regional and Local Growth

According to the traffic growth rates compiled by PennDOT's Bureau of Planning and Research *Growth Factors for August 2015 to July 2016*, the anticipated growth for urban, non-interstate, roadways in Chester County is 1.75 percent per year. To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 1.75 percent per year compounded for three years, or 5.34 percent total. This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2015 to July 2016* for similar roadways in Chester County. The growth rate table is provided in **Appendix G**.

The total background growth was then added to the existing 2015 traffic volumes. The resultant future 2018 build-out year peak hour traffic volumes are illustrated in **Figure 5A** for the weekday morning and weekday afternoon peak hours.

Future 2018 With-Development Traffic Volumes

The site generated traffic volumes, as shown in Figure 4B and 4D, were added to the future 2018 without-development traffic volumes (Figure 5A). The resultant future 2018 with-development peak hour traffic volumes are illustrated in **Figure 5B and 5C** for the weekday morning and weekday afternoon peak hours. Detailed spreadsheets summarizing the without-development regional and local growth along with the assignment of the trips associated with the redevelopment of the site for each intersection are provided in **Appendix H and I**.

The future 2018 peak hour traffic volumes, as illustrated in Figures 5A, 5B, and 5C, were then subjected to detailed capacity/level-of-service analysis. The results of the traffic analyses are illustrated in **Figures 5D, 5E, and 5F**, and the detailed capacity/level-of-service analysis worksheets are provided in **Appendices J, K, and L**. Specific details regarding the analysis results and traffic operations are provided later in this report.

Future Horizon Year (2023) Traffic Conditions

This section presents the future (5-year) build-out year traffic conditions, both without and with the proposed development, which is anticipated to be completed by 2023. The future 2023 build-out year without-development traffic volumes were estimated by increasing the existing 2015 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 2023 build-out year with-development traffic volumes.

Regional and Local Growth

According to the traffic growth rates compiled by PennDOT's Bureau of Planning and Research *Growth Factors for August 2015 to July 2016*, the anticipated growth for urban, non-interstate, roadways in Chester County is 1.75 percent per year. To account for regional traffic growth, the existing traffic volumes were increased by an annual traffic growth rate of 1.75 percent per year compounded for eight years, or 14.89 percent total. This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2015 to July 2016* for similar roadways in Chester County. The growth rate table is provided in **Appendix G**.

The total background growth was then added to the existing 2015 traffic volumes. The resultant future 2023 build-out year peak hour traffic volumes are illustrated in **Figure 6A** for the weekday morning and weekday afternoon peak hours.

Future 2023 With-Development Traffic Volumes

The site generated traffic volumes, as shown in Figure 4B and 4D, were added to the future 2023 without-development traffic volumes (Figure 6A). The resultant future 2023 with-development peak hour traffic volumes are illustrated in **Figure 6B and 6C** for the weekday morning and weekday afternoon peak hours. Detailed spreadsheets summarizing the without-development regional and local growth along with the assignment of the trips associated with the redevelopment of the site for each intersection are provided in **Appendix M and N**.

The future 2023 peak hour traffic volumes, as illustrated in Figures 6A, 6B, and 6C, were then subjected to detailed capacity/level-of-service analysis. The results of the traffic analyses are illustrated in **Figures 6D, 6E, and 6F**, and the detailed capacity/level-of-service analysis worksheets are provided in **Appendices O, P, and Q**. Specific details regarding the analysis results and traffic operations are provided later in this report.

Capacity/Level-of-Service and Queuing Analyses

This section presents a detailed summary of the traffic analysis results for the existing and future traffic conditions, both without and with the proposed development of the site, for the two peak hours at each of the site access driveways and the study area intersections.

According to PennDOT's *Policies and Procedures for Transportation Impact Studies related to Highway Occupancy Permit Plans*, no mitigation requirements are required for an overall level-of-service drop from without- to with-development conditions (i.e., LOS D to LOS E), if the increase in overall delay per vehicle is less than 10 seconds (i.e., 48.2 to 56.5 seconds per vehicle); however, PennDOT reserves the right to look at individual movements where level-of-service drops occur.

Scenario 1

Lenape Road (S.R. 0052) and Tigie Road

Under existing, future (2018), and future (2023) without-development conditions, this stop-controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours. With development of the site, the same overall levels-of-service will exist during the weekday morning and weekday afternoon peak hours.

A review of the peak hour volumes indicates that this intersection would satisfy PennDOT traffic signal warrants at this location during one peak hour only during 2015 existing conditions, 2023 future no-build conditions, and 2023 future build conditions. Traffic signal warrants are provided in **Appendix R**. No mitigation measures are recommended.

Tigie Road and Access 1

Under future (2018) and Future (2023) with-development conditions, this stop controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours.

Tigie Road and Access 2

Under future (2018) and Future (2023) with-development conditions, this stop controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours.

Lenape Road (S.R. 0052) and Access 3

Under future (2018) and Future (2023) with-development conditions, this stop controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours.

Scenario 2

Lenape Road (S.R. 0052) and Tigue Road

Under existing, future (2018), and future (2023) without-development conditions, this stop-controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours. With development of the site, the same overall levels-of-service will exist during the weekday morning and weekday afternoon peak hours.

A review of the peak hour volumes indicates that this intersection would satisfy PennDOT traffic signal warrants at this location during one peak hour only during 2015 existing conditions, 2023 future no-build conditions, and 2023 future build conditions. Traffic signal warrants are provided in **Appendix R**. No mitigation measures are recommended.

Tigue Road and Access 1

Under future (2018) and Future (2023) with-development conditions, this stop controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours.

Tigue Road and Access 2

Under future (2018) and Future (2023) with-development conditions, this stop controlled intersection operates at acceptable conditions (LOS A) overall during the weekday morning and weekday afternoon peak hours.

Conclusion

Based on the results of the capacity/level-of-service and queuing analyses discussed above, safe and efficient access to and from the proposed redevelopment can be provided, and furthermore, site-generated traffic can be accommodated at the study area intersections with implementation of the recommended roadway improvements.

Mitigation Identification and Recommendations

The following site access design is proposed to serve the development:

Scenario 1

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway

Access 3 (Lenape Road S.R. 0052)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway
- Remove vegetation along the site frontage of Lenape Road (S.R. 0052), and perform a detailed sight distance analysis during full engineering of the access driveway

Scenario 2

Access 1 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane for the site driveway

Access 2 (Tigue Road)

- Provide cartway width of 24 feet with one ingress lane and one egress lane for the driveway
- Provide appropriate corner radius length, which will be verified based on the largest vehicle anticipated to utilize the driveway
- Provide stop-control on the egress lane of the site driveway



FIGURE 1

Site Location Map

**TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA**



C:\Users\hwingard\Desktop\Allentown\815336\Figure 1.dwg

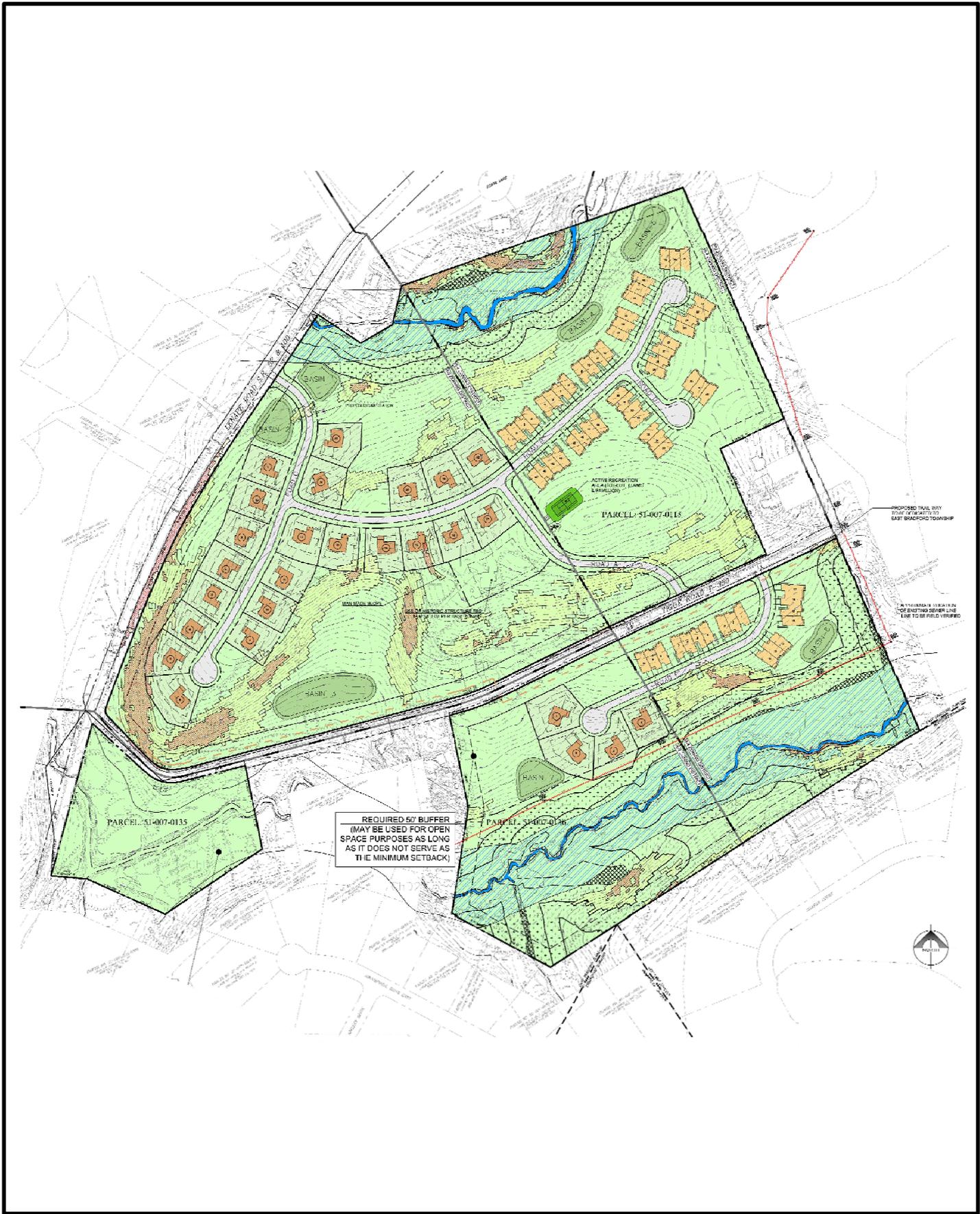


FIGURE 2

Site Plan (prepared by ESE)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA

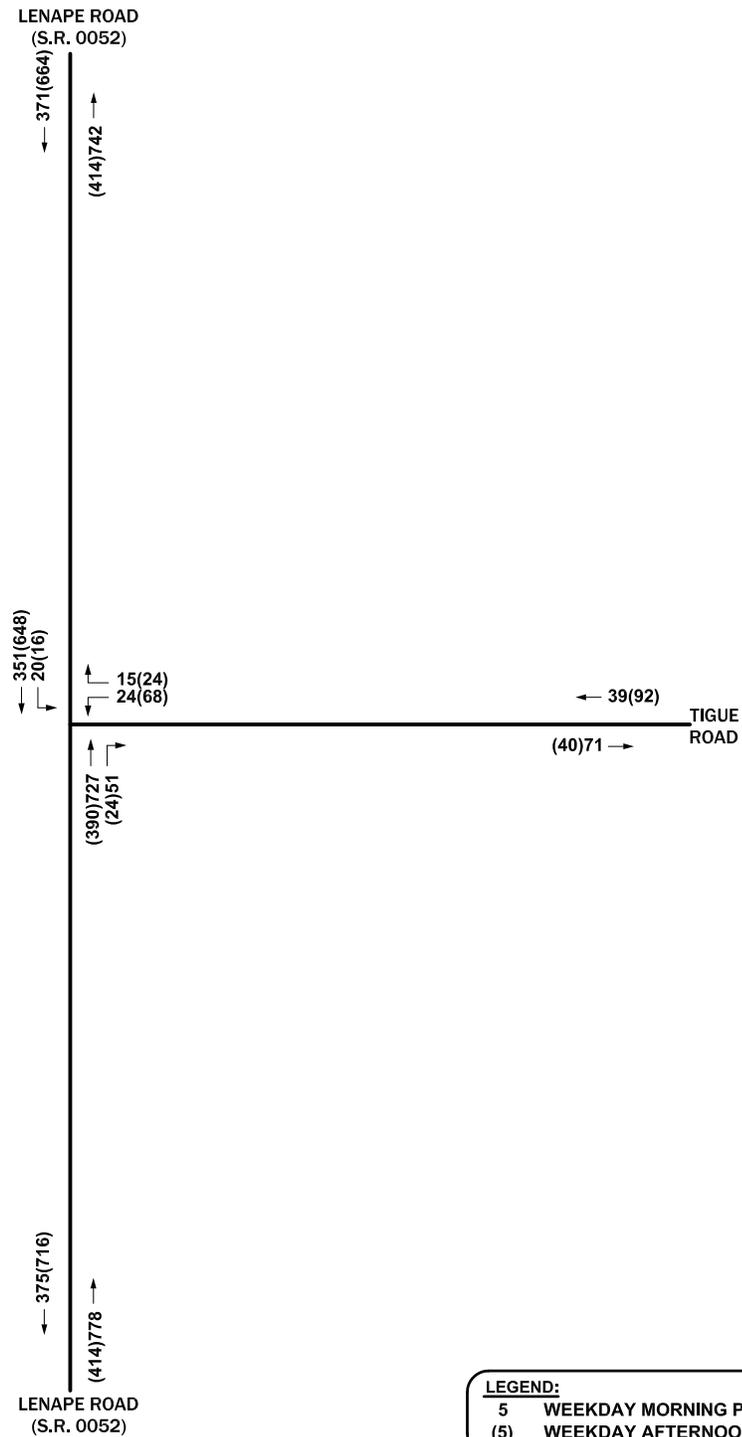
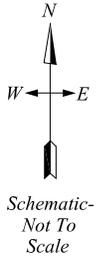
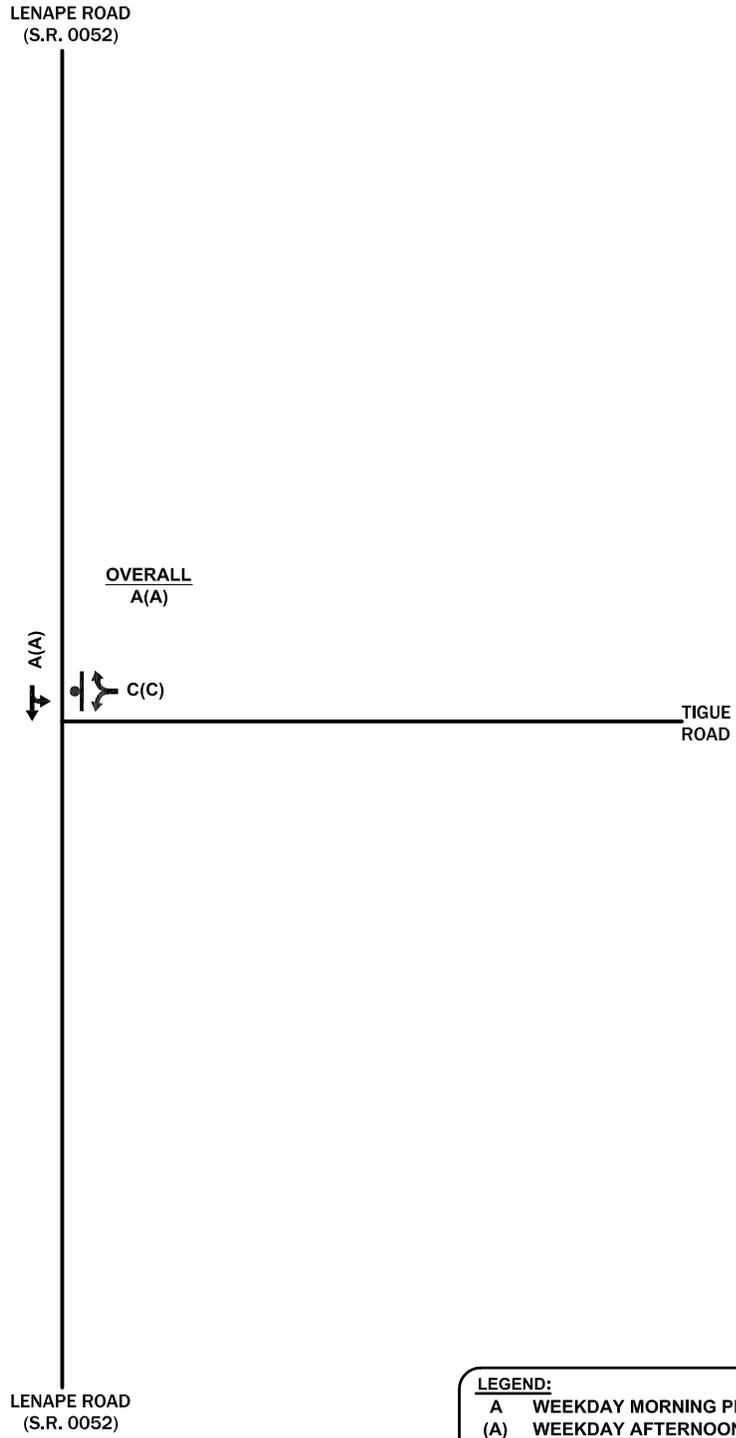
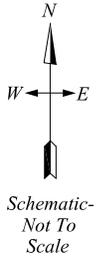


FIGURE 3A
 2015 Existing Peak Hour Traffic Volumes
TIGIE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



LEGEND:

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

FIGURE 3B
 2015 Existing Levels of Service
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



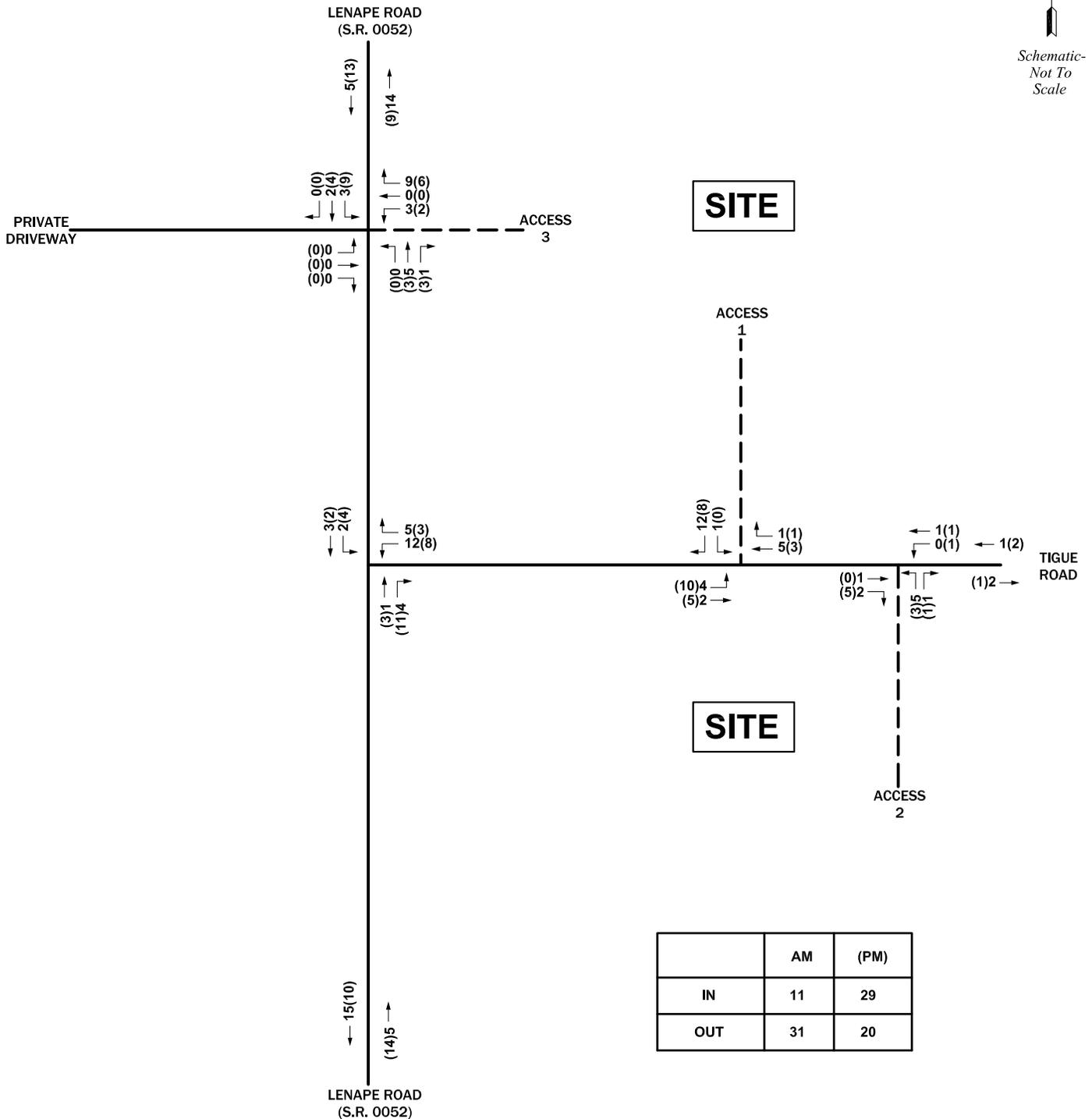
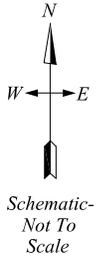


FIGURE 4B

"New" Trip Assignment (Scenario 1)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



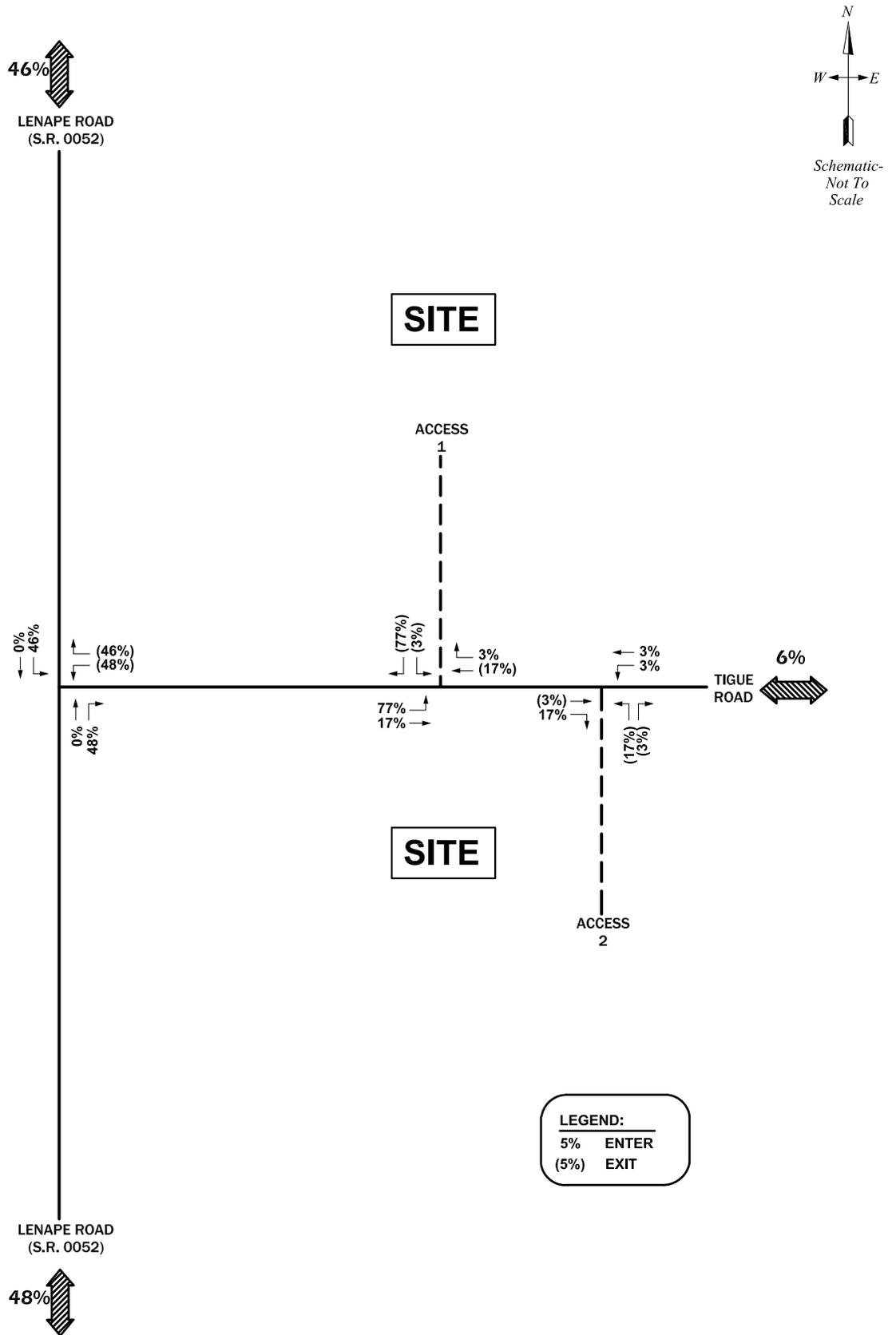


FIGURE 4C

"New" Trip Distribution (Scenario 2)

**TIGIE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA**

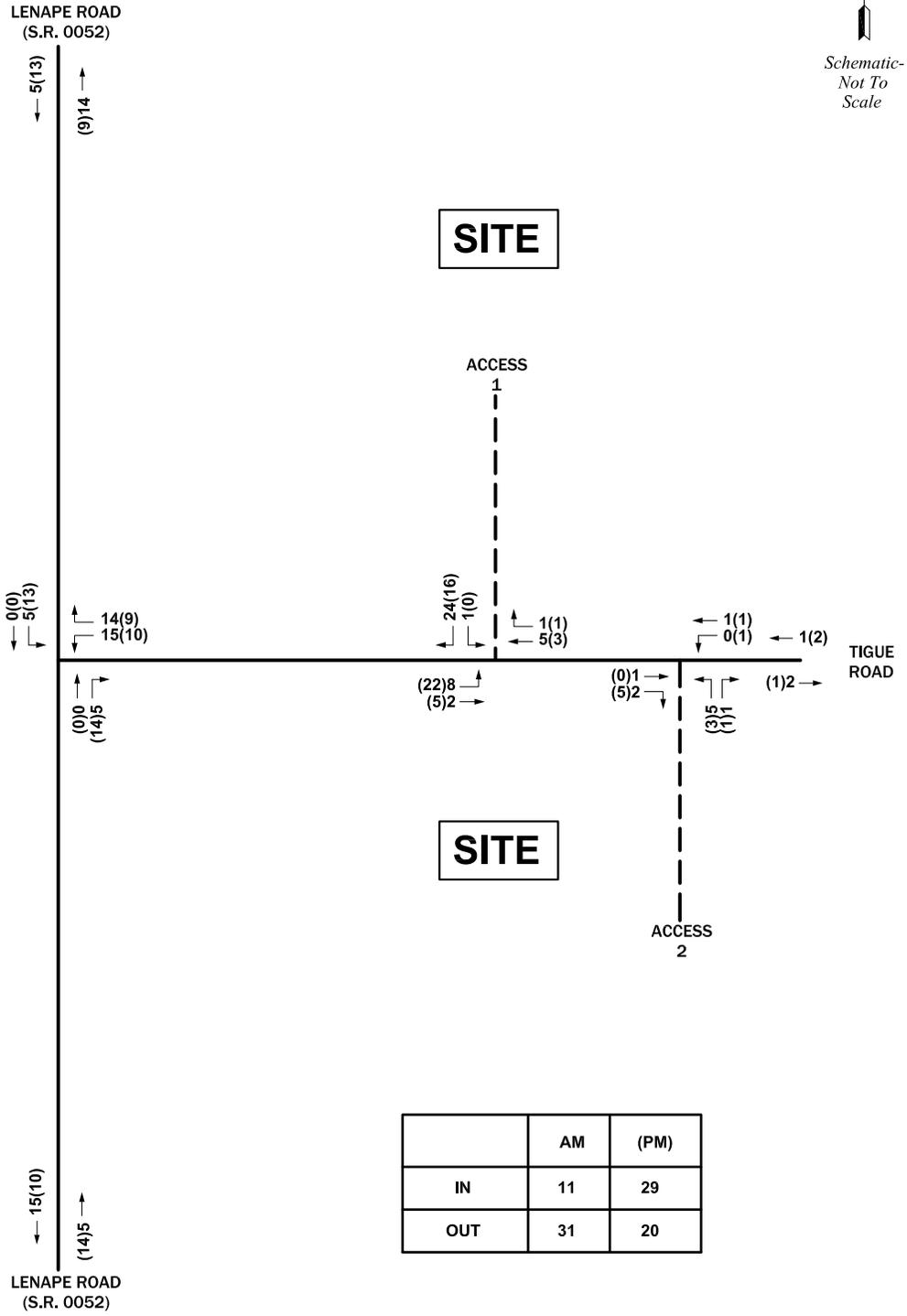
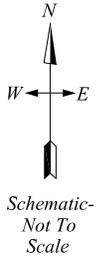


Figure 4D
 "New" Trip Assignment (Scenario 2)
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA

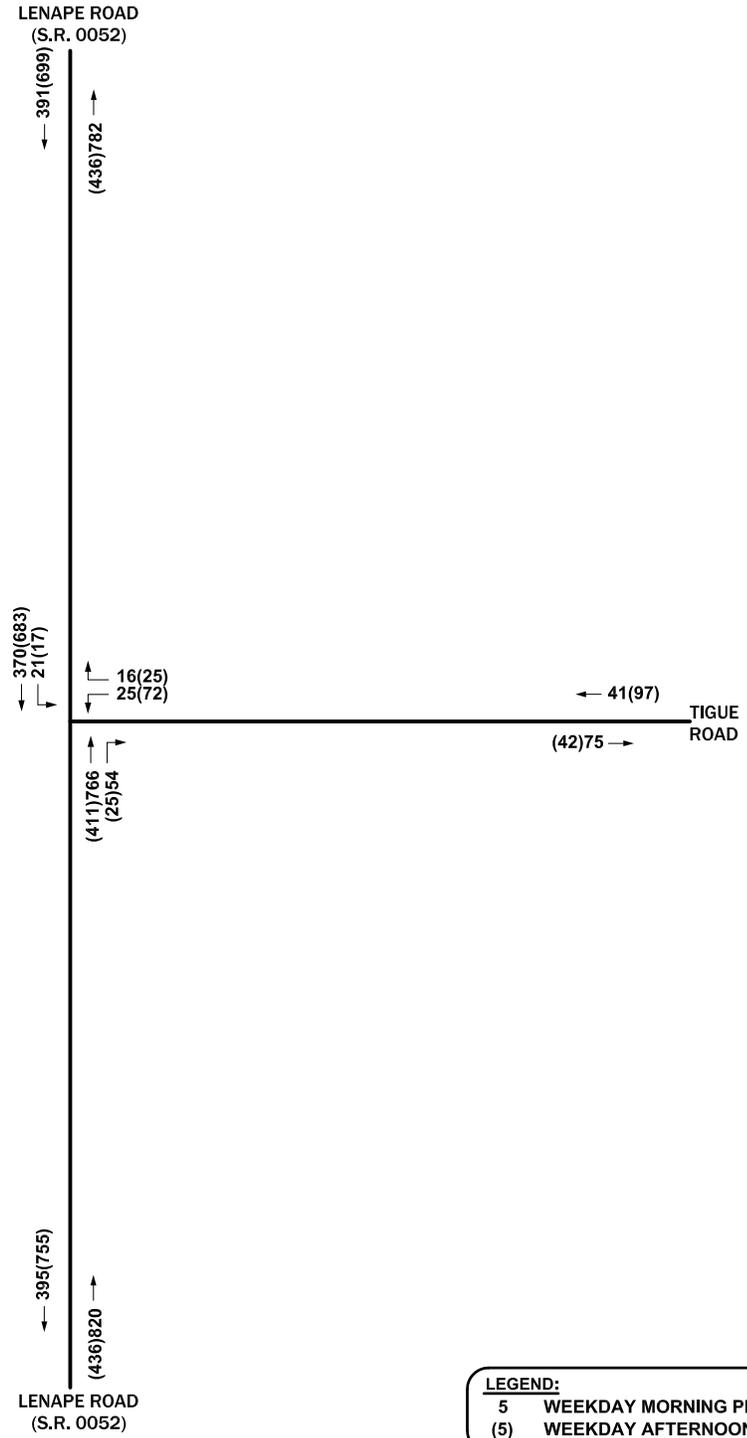
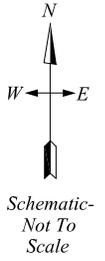
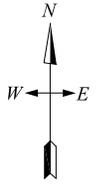


FIGURE 5A
 2018 Future Peak Hour Traffic Volumes without Development
TIGIE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



Schematic-
Not To
Scale

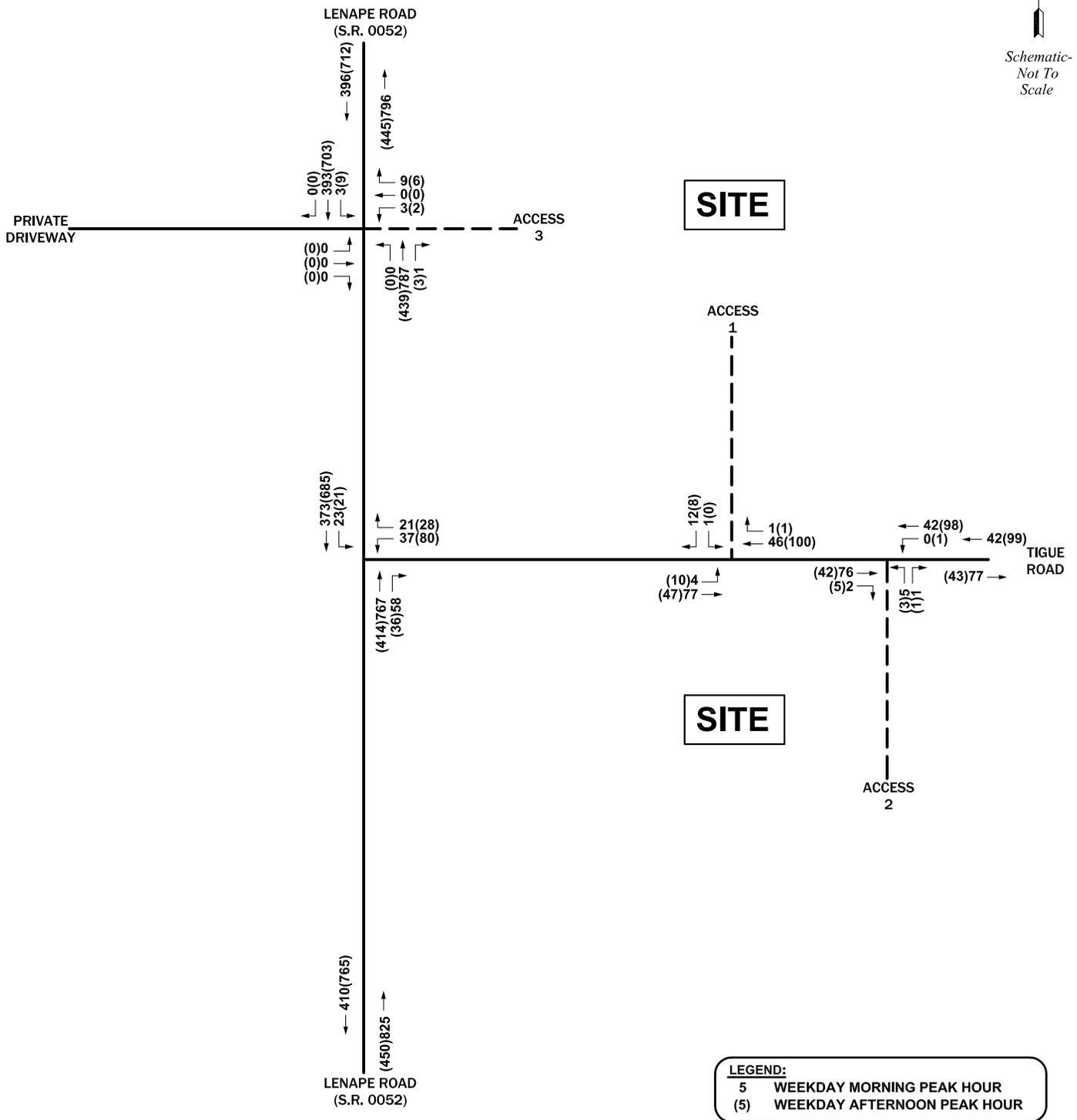


FIGURE 5B

2018 Future Peak Hour Traffic Volumes with Development (Scenario 1)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



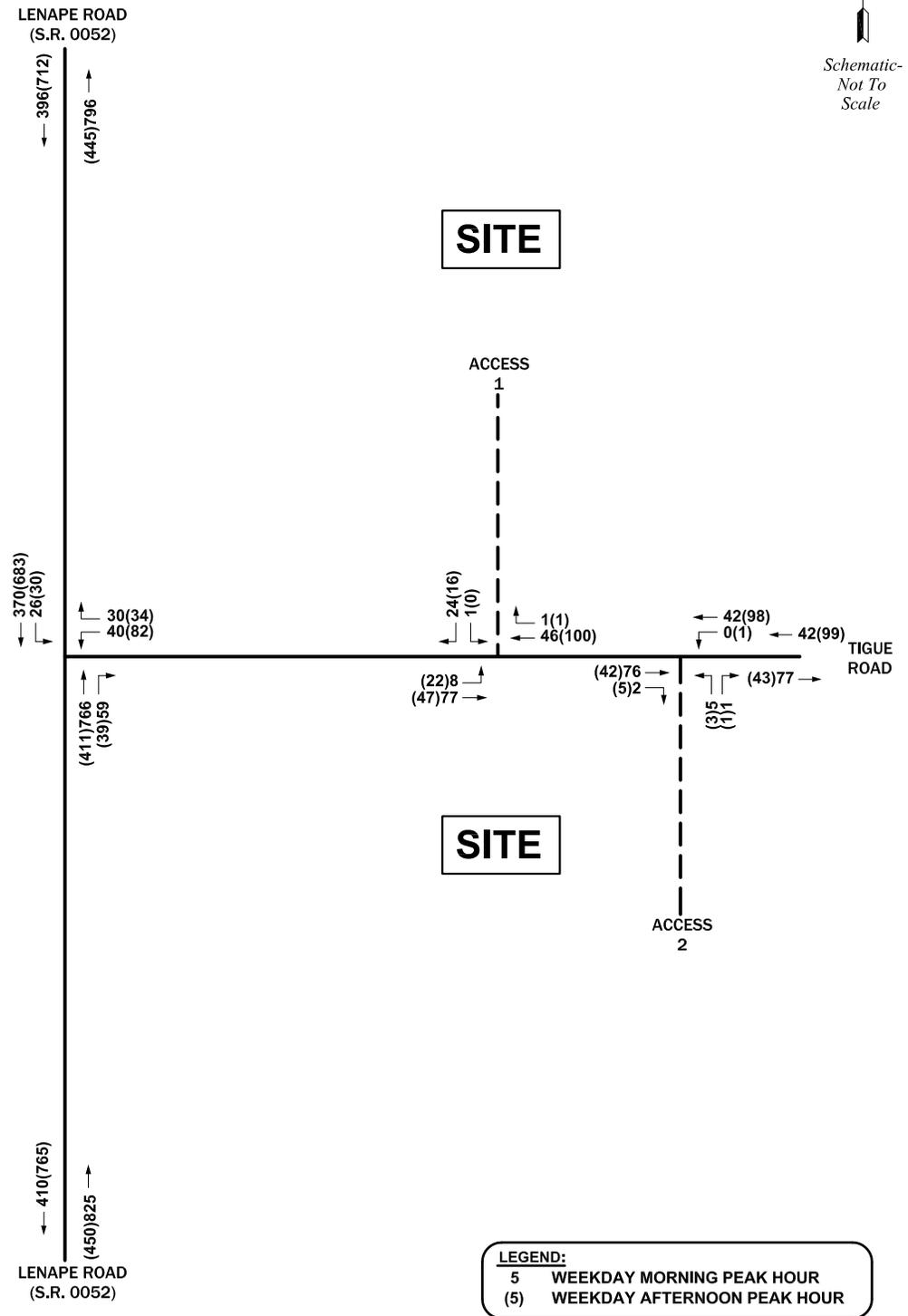
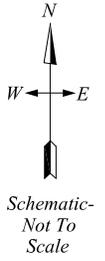


FIGURE 5C

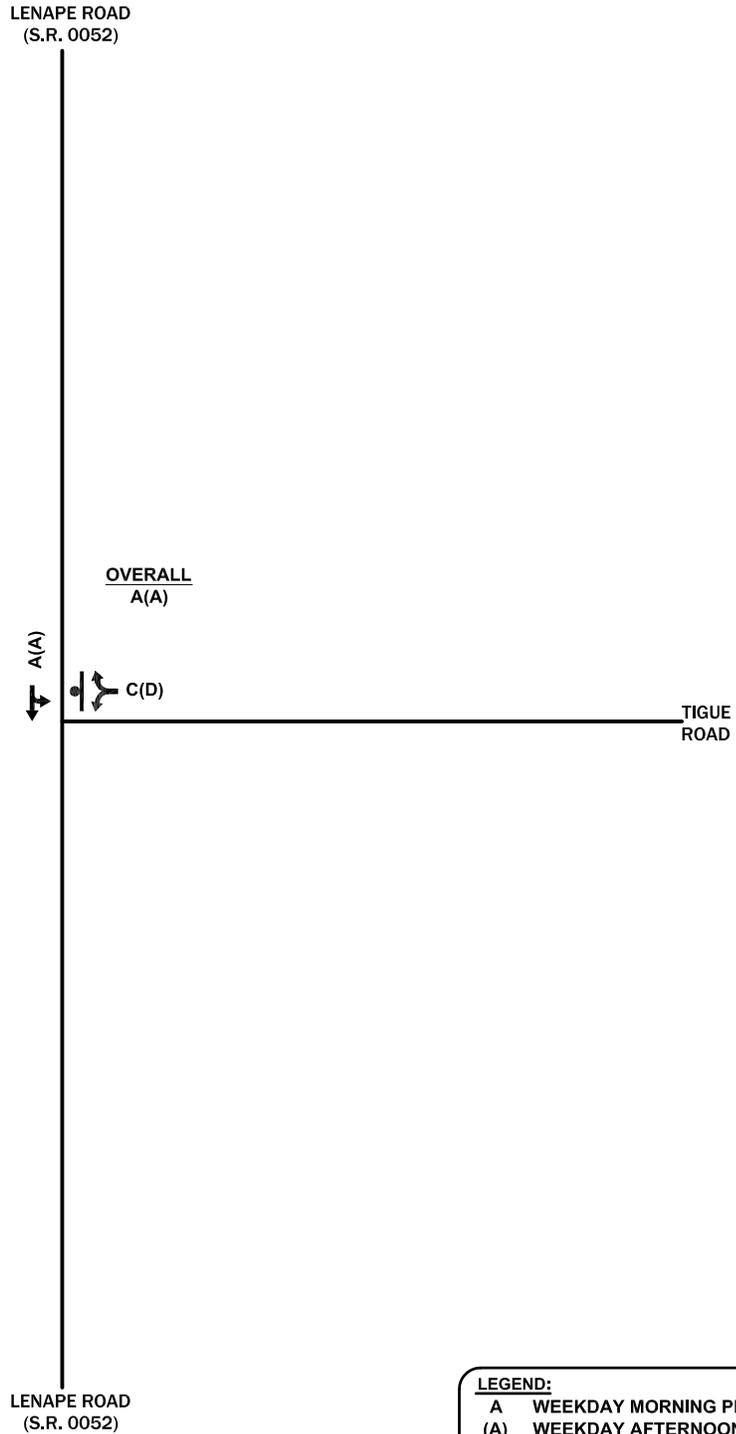
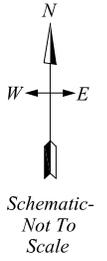
2018 Future Peak Hour Traffic Volumes with Development (Scenario 2)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA





LEGEND:

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

FIGURE 5D
 2018 Future Levels of Service without Development
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



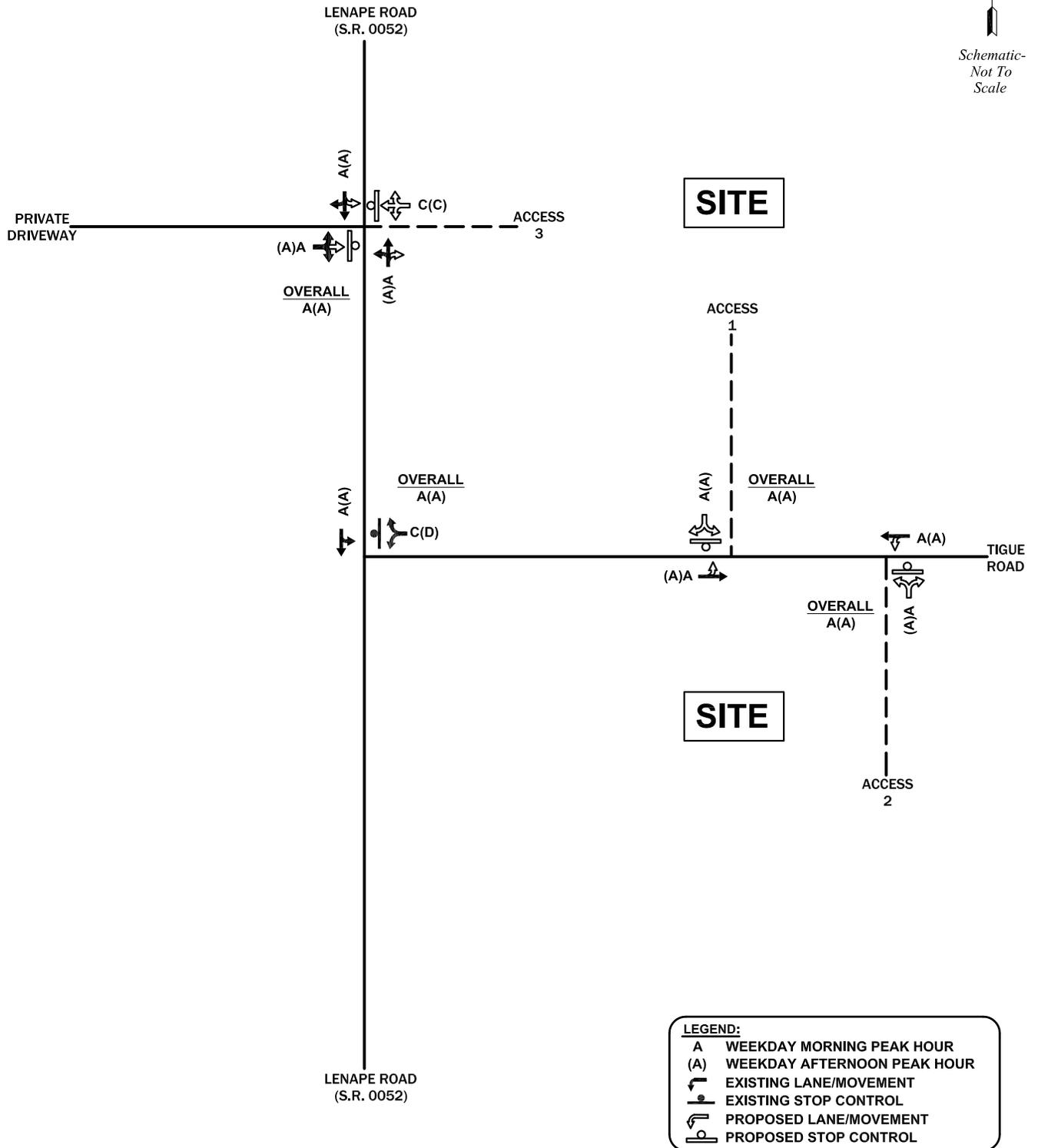
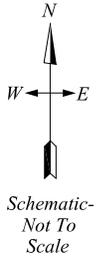


FIGURE 5E

2018 Future Levels of Service with Development (Scenario 1)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



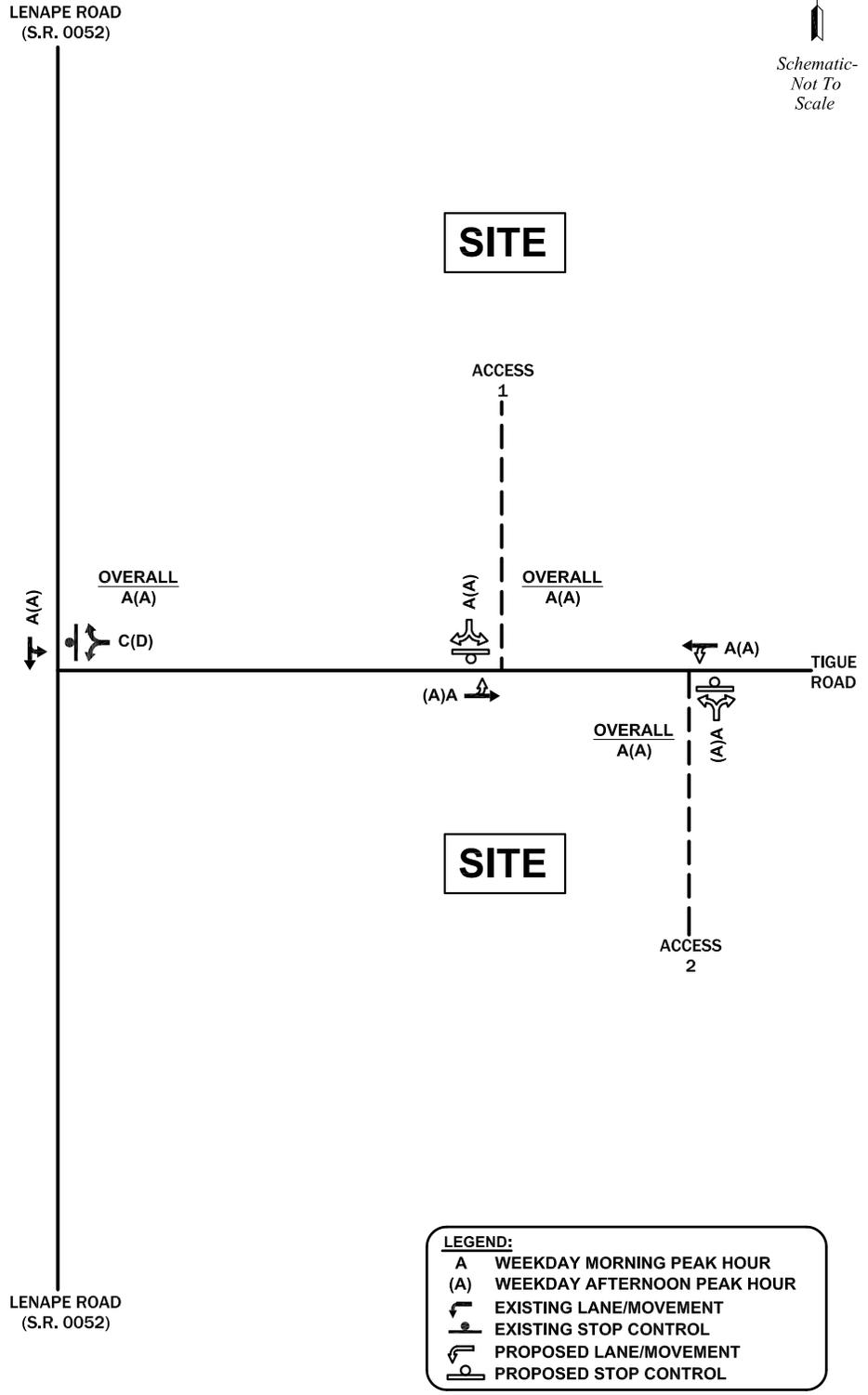
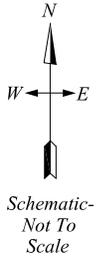


FIGURE 5F
 2018 Future Levels of Service with Development (Scenario 2)
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA

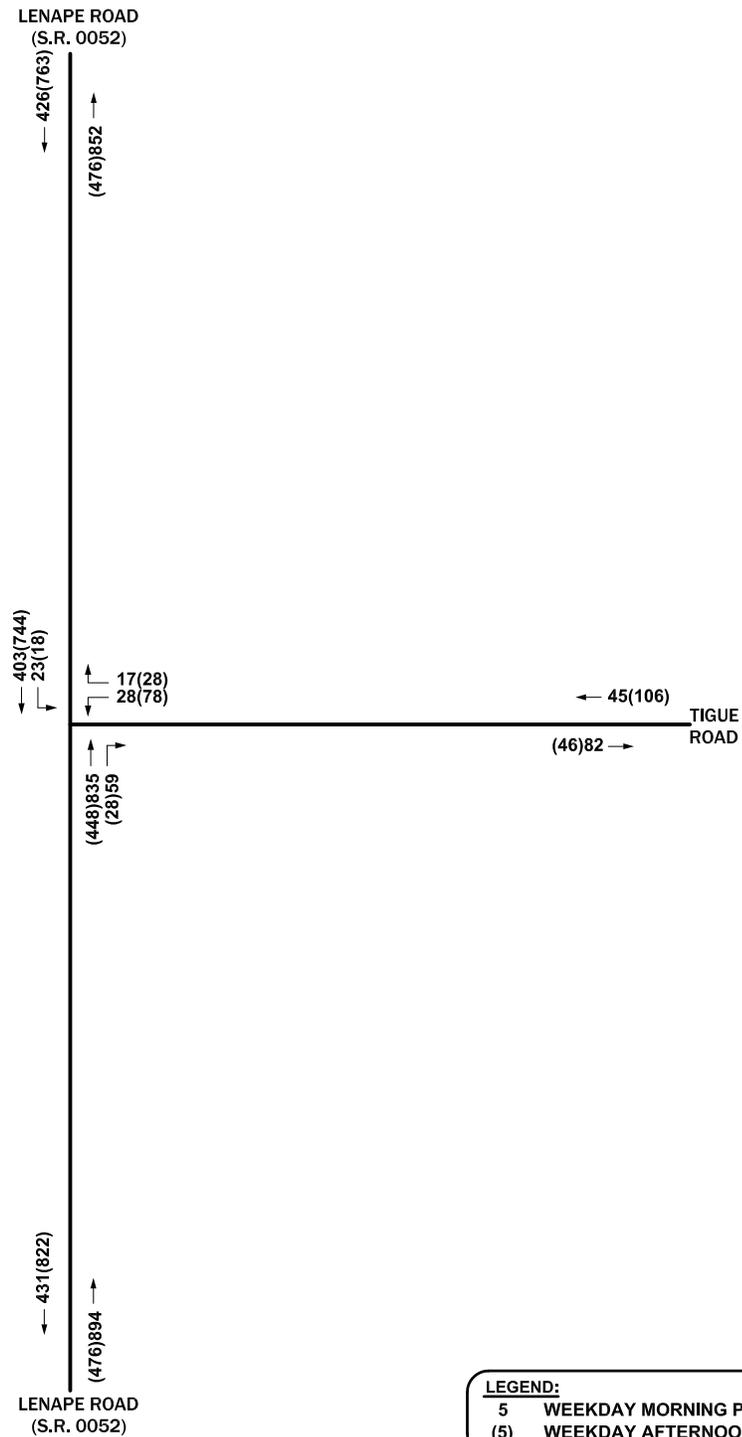
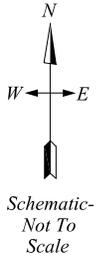


FIGURE 6A

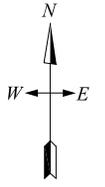
2023 Future Peak Hour Traffic Volumes without Development

TIGIE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA





Schematic-
Not To
Scale

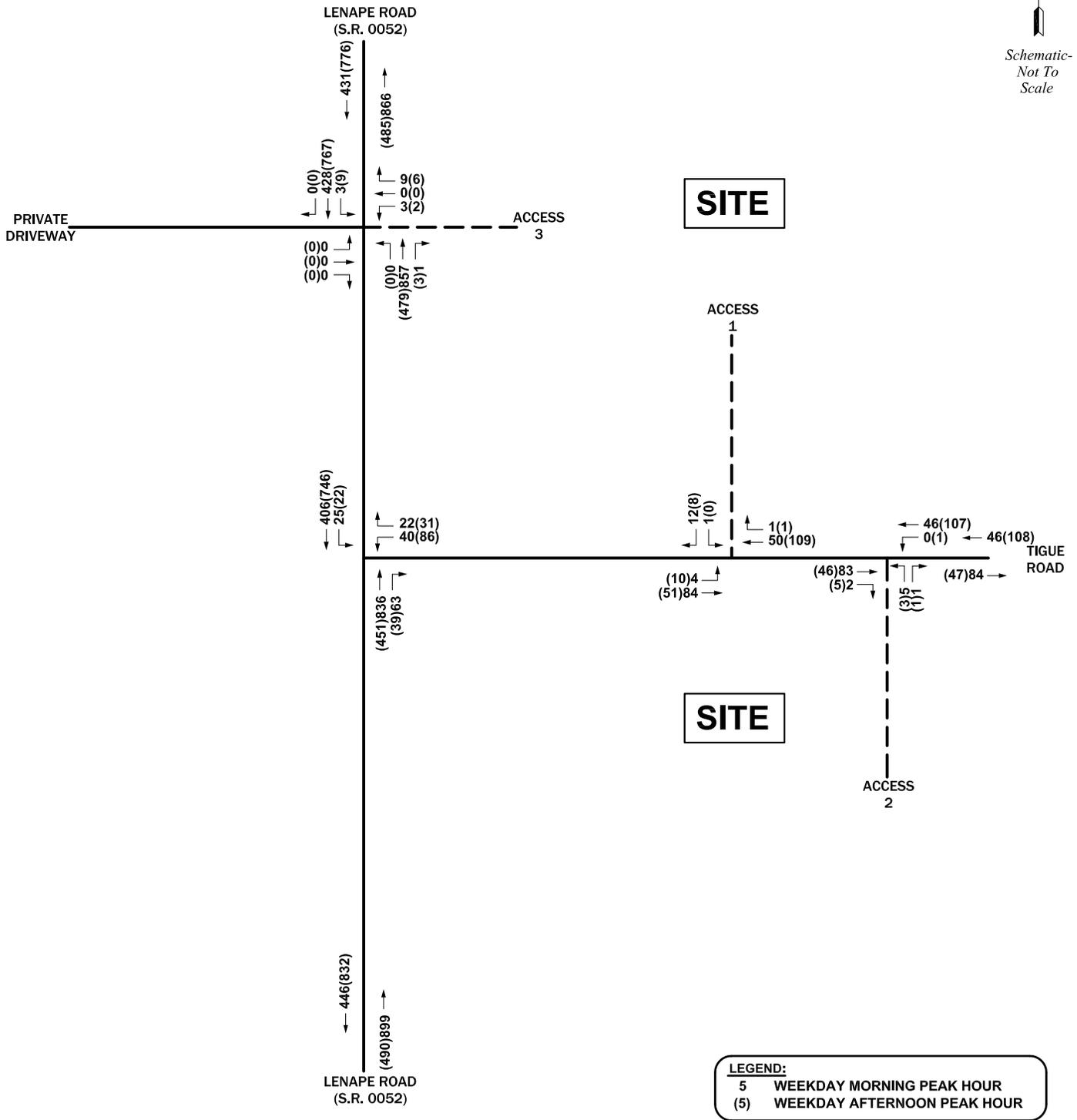


FIGURE 6B

2023 Future Peak Hour Traffic Volumes with Development (Scenario 1)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



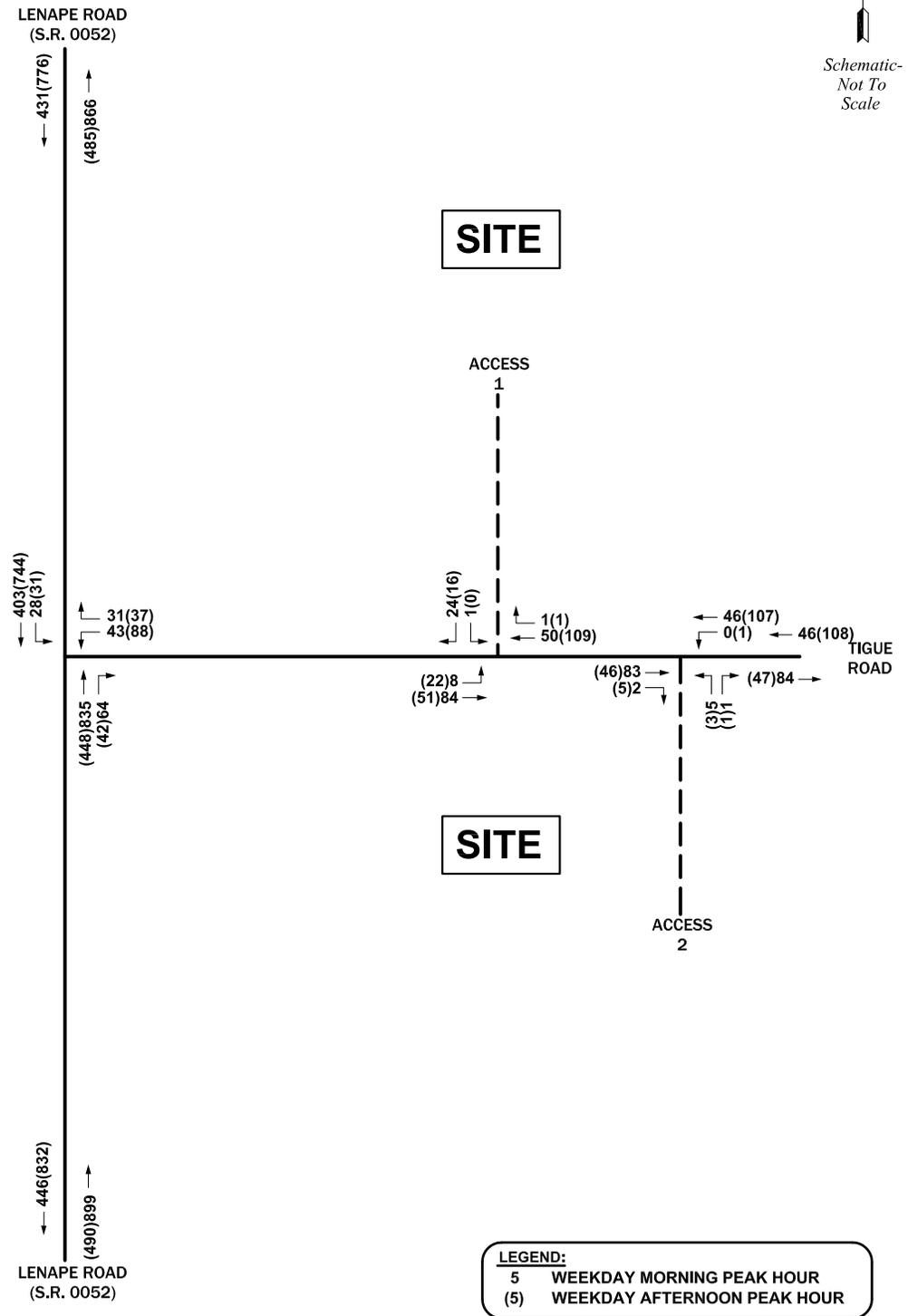
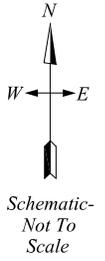


FIGURE 6C

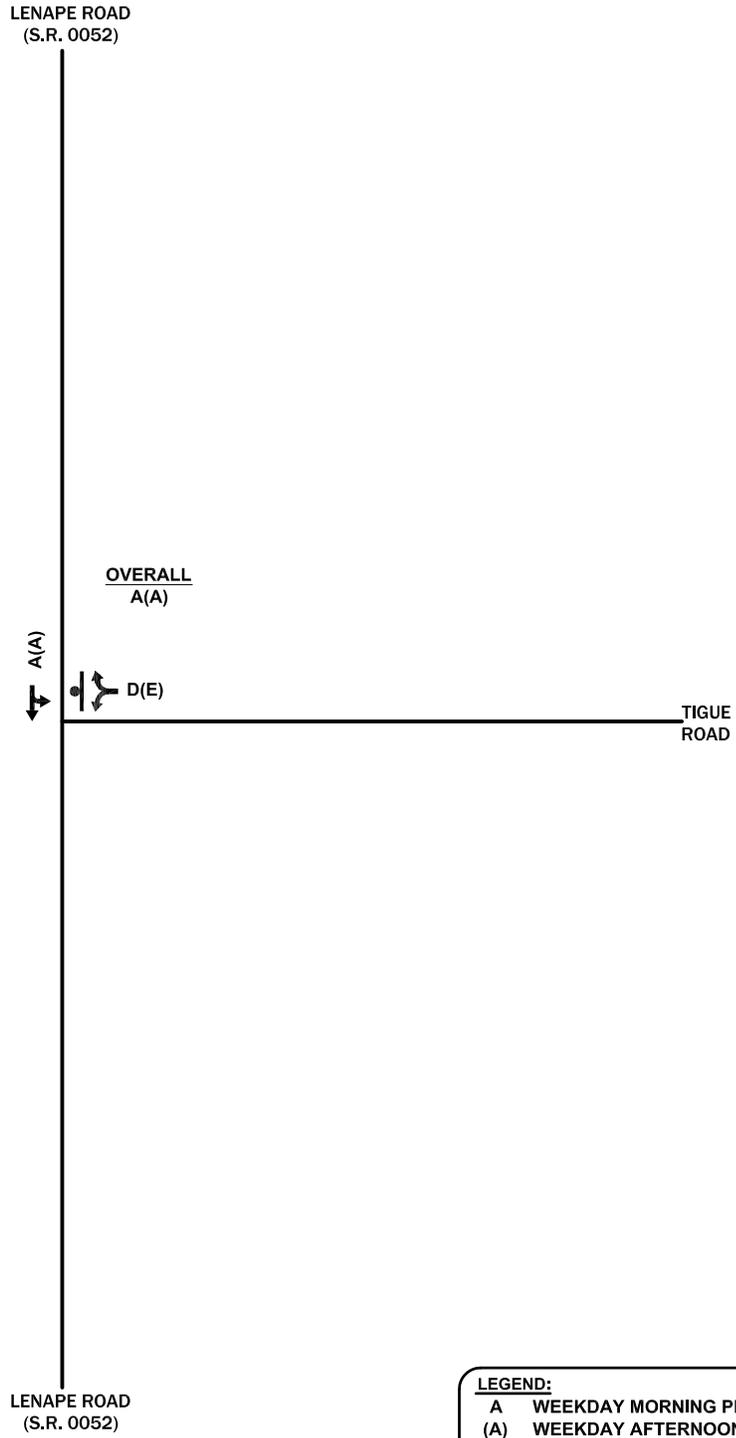
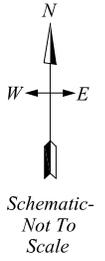
2023 Future Peak Hour Traffic Volumes with Development (Scenario 2)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA





LEGEND:

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- ← EXISTING LANE/MOVEMENT
- ⊙ EXISTING STOP CONTROL

FIGURE 6D
 2023 Future Levels of Service without Development
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA

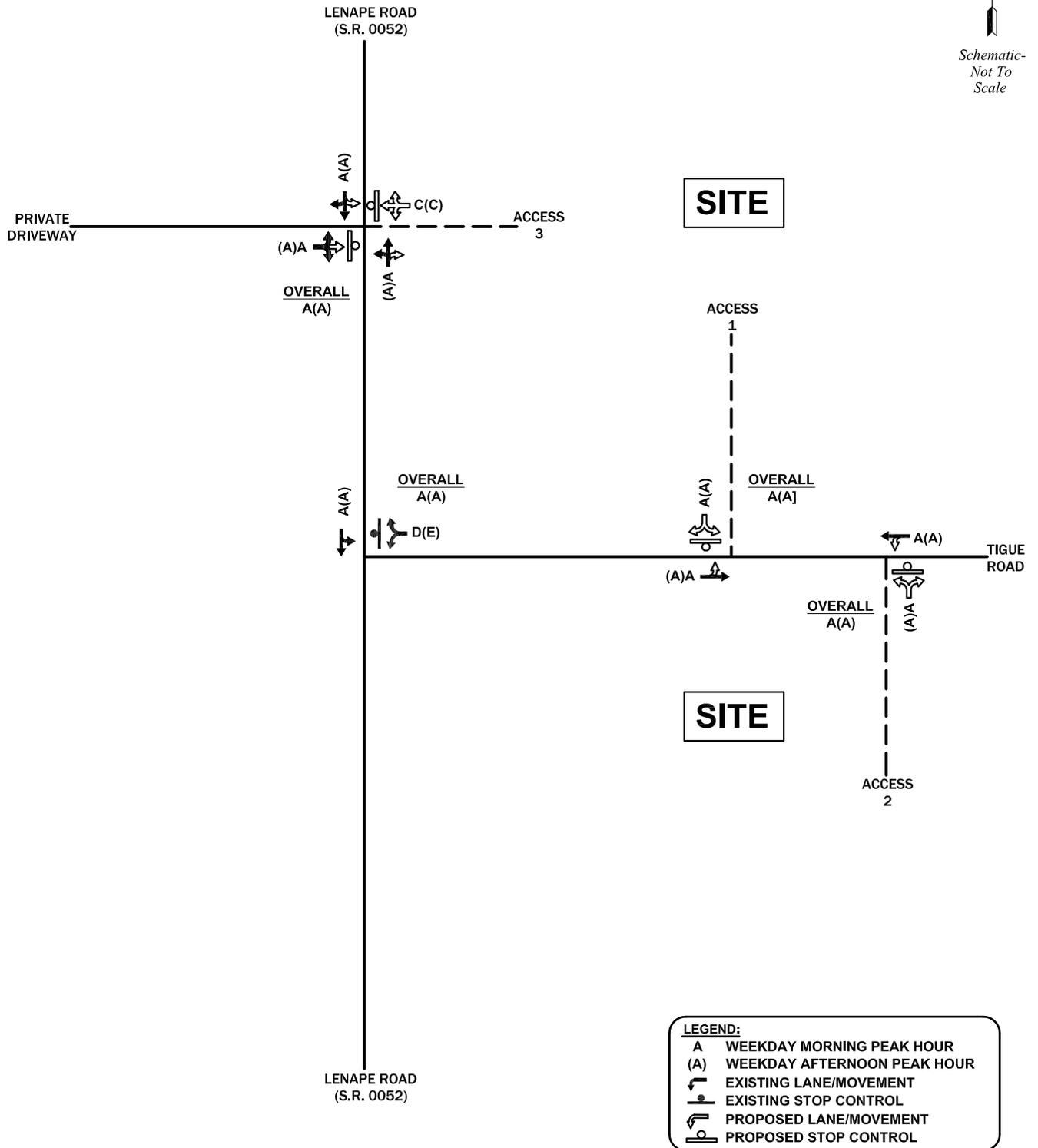
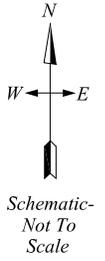


FIGURE 6E

2023 Future Levels of Service with Development (Scenario 1)

TIGUE PROPERTY

RESIDENTIAL DEVELOPMENT

EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA



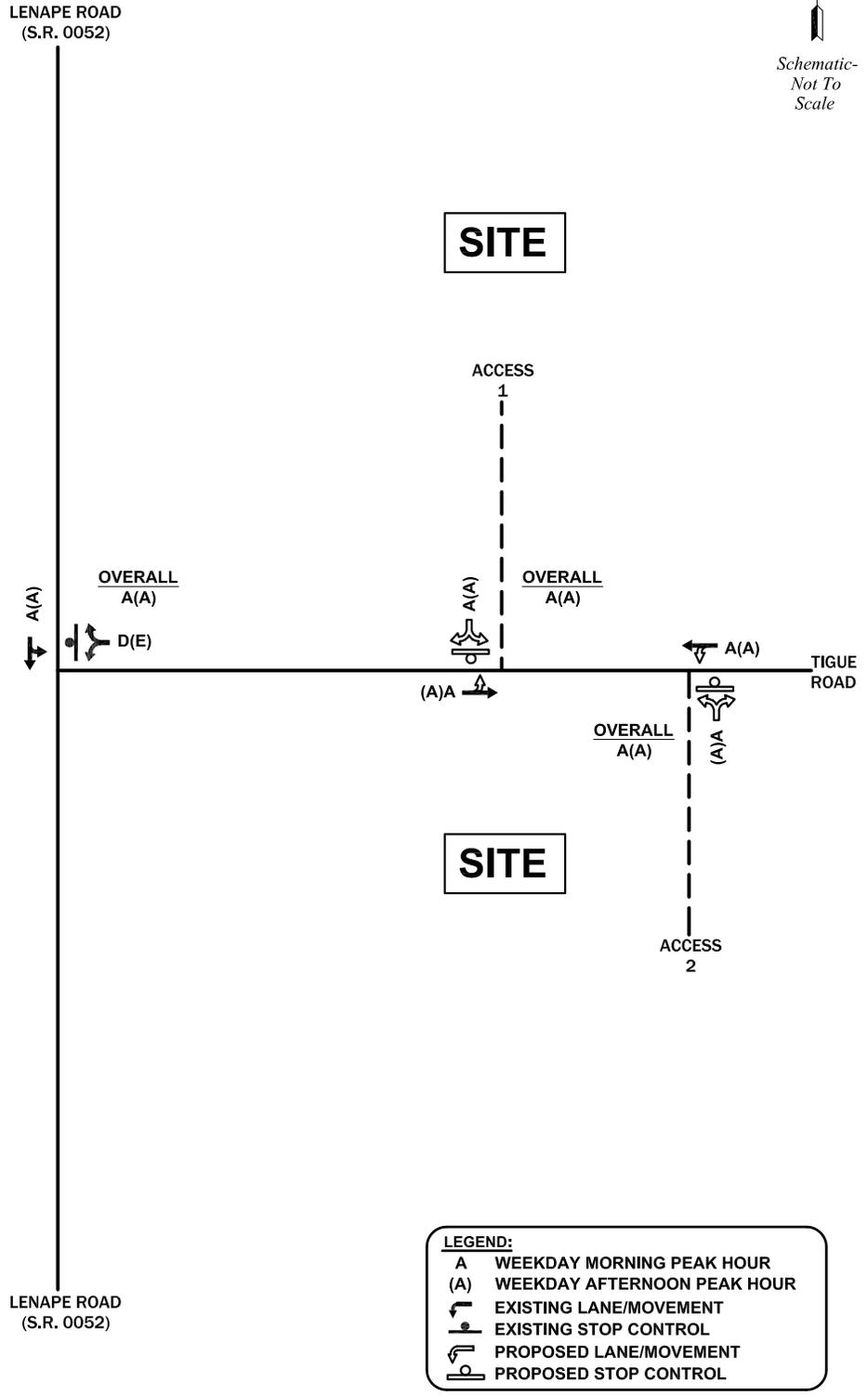
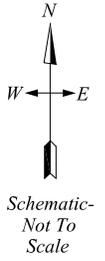


FIGURE 6F
 2023 Future Levels of Service with Development (Scenario 2)
TIGUE PROPERTY
RESIDENTIAL DEVELOPMENT
EAST BRADFORD TOWNSHIP, CHESTER COUNTY, PA