

Transportation Impact Study for the Robinson Tract Westtown Township, Chester County, PA



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Executive Summary

Toll Brothers, Inc. proposes a residential development on the Robinson Tract, located along the west side of U.S. Route 202 (Wilmington Pike), between West Pleasant Grove Road and Street Road (S.R. 0926), in Westtown Township, Chester County, Pennsylvania (**Figure 1**). The residential development consists of 319 total dwelling units, including 182 detached homes, 135 attached homes, and preservation of two existing homes on the property. With the development, a Collector Road will be constructed through the property between Street Road (S.R. 0926) and West Pleasant Grove Road. Access to the site will be provided via the Collector Road, as well as two accesses along West Pleasant Grove Road. A site plan prepared by ESE Consultants, Inc., last revised November 22, 2019, is provided in **Figure 2**.

A Scoping Meeting Application was submitted to PennDOT and Westtown Township on November 7, 2016. A scoping meeting was held at the PennDOT Engineering District's offices on December 2, 2016. PennDOT provided scoping comments in a letter dated December 6, 2016. The scope of this transportation impact study is based on those comments, PennDOT's guidelines, per the Department's publication *Policies and Procedures for Transportation Impact Studies Related to Highway Occupancy Permits*, dated July 2017, and the requirements of the Township ordinances. Correspondence is contained in **Appendix A**.

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 2025 build-out year and 2030 design year, five years beyond the anticipated build-out year, both without and with the development at the following study intersections:

- U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)
- U.S. Route 202 (Wilmington Pike) and Pleasant Grove Road
- U.S. Route 202 (Wilmington Pike) and Skiles Boulevard/Stetson School
- Street Road (S.R. 0926) and Bridlewood Boulevard/Proposed Collector Road
- Street Road (S.R. 0926) and New Street
- New Street and West Pleasant Grove Road
- West Pleasant Grove Road and Proposed Access (Road K)
- West Pleasant Grove Road and Proposed Access (Road M)
- West Pleasant Grove Road and Proposed Collector Road

Based on trip generation data compiled for Multifamily Housing – Low Rise (ITE Land Use Code 220) and Single Family Detached Housing (ITE Land Use Code 210) contained in the Institute of Transportation Engineers (ITE) publication entitled, *Trip Generation Manual, 10th Edition*, the proposed development will generate a total of approximately 198 “new” trips during the weekday morning peak hour and 259 “new” trips during the weekday afternoon peak hour.

Committed Improvements

Per the traffic evaluation, the following on-site and off-site traffic improvements are committed by the applicant to mitigate the proposed development traffic impacts, pending further coordination and approvals from the Township and PennDOT. Since some of these improvements are within the state's right-of-way, or located at traffic signals under the jurisdiction of PennDOT, coordination with PennDOT will be required to implement these improvements. All improvements will be constructed to accommodate non-motorized access/circulation and be ADA-compliant unless otherwise approved by the Department. The Township will be included in all correspondence with PennDOT.

Site Accesses and On-Site Improvements

Street Road (S.R. 0926) and Bridlewood Boulevard/Proposed Collector Road

- Collector Road is classified as a local road per PennDOT criteria.
- Provide one ingress lane for the Collector Road.
- Provide two egress lanes for the Collector Road, including a dedicated left-turn lane and a shared through/right-turn lane.
- Restripe the Bridlewood Boulevard egress approach to modify the existing right-turn lane to a shared through/right-turn lane.
- Provide a 150-foot left-turn lane along eastbound Street Road (S.R. 0926). Note that a 120-foot left-turn lane exists along westbound Street Road (S.R. 0926).
- Provide a 150-foot right-turn deceleration lane along westbound Street Road (S.R. 0926).
- Install a traffic signal.

West Pleasant Grove Road and Proposed Access (Road K)

- Access is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.

West Pleasant Grove Road and Proposed Access (Road M)

- Access is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.

West Pleasant Grove Road and Collector Road

- Collector Road is classified as a medium volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the Collector Road.
- Provide stop-control on the Collector Road egress approach.

Collector Road

- The applicant will construct the Collector Road through the property between Street Road (S.R. 0926) and West Pleasant Grove Road, which will alleviate traffic at the congested U.S. Route 202 (Wilmington Pike)/Street Road (S.R. 0926) intersection, and reroute traffic currently using West Pleasant Grove Road and New Street as an alternate

route to avoid that delay. The overall delays at several study intersections decrease in the with-development conditions versus without-development conditions, due to the diversion of traffic to the Collector Road.

- Based on the estimated Collector Road weekday peak hour traffic volumes in this report, diverted traffic constitutes approximately 70 to 80 percent of the total, while approximately 20 to 30 percent is site traffic from the Robinson Tract.

Off-Site Traffic Improvements

Street Road (S.R. 0926) and New Street

- The applicant will complete traffic signal retiming optimization and provide equipment in order to coordinate with the proposed signal to the east.
- Although not necessary to mitigate traffic impact, the applicant will provide a dedicated right-turn lane along westbound Street Road (S.R. 0926) along the Robinson Tract property frontage.
- It is noted that left turn lanes are warranted based on existing traffic volumes. Left-turn lanes along Street Road (S.R. 0926) cannot be provided within the existing right-of-way or with additional right-of-way from the Robinson Tract alone.

U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road

- The applicant will provide a dedicated right-turn lane along southbound Wilmington Pike (U.S. Route 202).

U.S. Route 202 (Wilmington Pike) and Skiles Boulevard / Stetson School

- To mitigate the Township's Collector Road traffic impact along Stetson School, the applicant will restripe the eastbound approach to provide dual left-turn lanes and a shared through/right-turn lane and complete the necessary traffic signal phasing modifications.
- Additionally, the applicant will widen westbound Skiles Boulevard to provide a dedicated right-turn lane, subject to the ability to acquire any necessary additional right-of-way.

The traffic analyses contained herein reveal that efficient access to and from the proposed development can be provided, and furthermore, site-generated traffic is mitigated at the study area intersections with the committed improvements. Detailed results of the level-of-service and queueing analysis are contained in the matrices provided in **Tables 8 and 9**.

Existing Transportation Settings and Conditions

Toll Brothers, Inc. proposes a residential development on the Robinson Tract, located along the west side of U.S. Route 202 (Wilmington Pike), between West Pleasant Grove Road and Street Road (S.R. 0926), in Westtown Township, 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)
		Smart Transportation ⁽¹⁾	PennDOT/ Township ⁽²⁾		
U.S. Route 202 (Wilmington Pike)	47,301 ⁽³⁾	Regional Arterial	Urban – Principal Arterial	2	45
Street Road (S.R. 0926 – PA)	12,952 ⁽³⁾	Community Arterial	Urban – Minor Arterial	1	45
New Street (Local)	5,056 ⁽³⁾	Neighborhood Collector	Urban – Minor Collector	1	35
West Pleasant Grove Road (Local)	n/a	Local Road	Minor Street	1	35
Bridlewood Boulevard (Local)	n/a	Local Road	Local Road	1	25

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

(2) Based on the roadway classifications provided on PennDOT’s Traffic Information Repository (TIRe) website and the Westtown Township Comprehensive Plan Update, dated 2019

(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:

- U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)
- U.S. Route 202 (Wilmington Pike) and Pleasant Grove Road
- U.S. Route 202 (Wilmington Pike) and Skiles Boulevard/Stetson School
- Street Road (S.R. 0926) and Bridlewood Boulevard/Proposed Collector Road
- Street Road (S.R. 0926) and New Street
- New Street and West Pleasant Grove Road
- West Pleasant Grove Road and Proposed Access (Road K)
- West Pleasant Grove Road and Proposed Access (Road M)
- West Pleasant Grove Road and Proposed Collector Road

The existing characteristics of the study intersections, including field sketches, and signal permit plans are provided in **Appendix B**.

Crash Summary

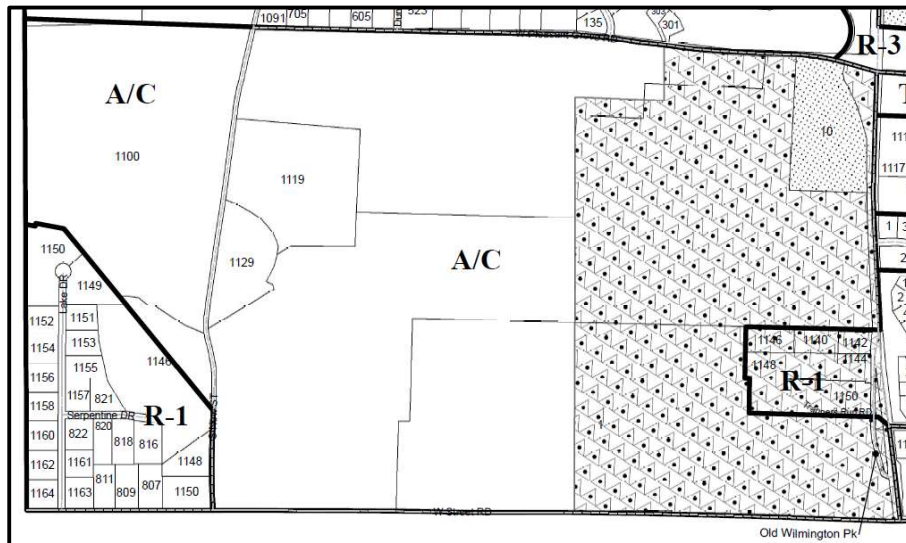
Reportable crash data was provided by the Pennsylvania Department of Transportation's Bureau of Highway Safety and Traffic Engineering for the five-year period from January 1, 2013 to December 31, 2017 throughout the study area. Reportable crashes are defined as crashes in which personal injuries occur or the vehicle must be towed from the scene. Tables summarizing the crash data by location, crashes per year, and type of crash are provided in Appendix B.

Based on the crash data, a total of 65 reportable crashes occurred at the study area intersections. The majority of the study area intersection crashes were rear-end incidents (45 crashes or 69 percent) and angle incidents (12 crashes or 17 percent). The signalized intersection of U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926) experienced twenty-six (26) crashes, with the majority of these crashes being rear-end incidents (18 crashes) occurring along both northbound (10 crashes) and southbound (8 crashes) U.S. Route 202 (Wilmington Pike). The signalized intersection of U.S. Route 202 (Wilmington Pike) and Stetson School Drive / Skiles Boulevard experienced fifteen (15) crashes, with the majority of these crashes being rear-end incidents (14 crashes) occurring along both southbound (9 crashes) and northbound (5 crashes) U.S. Route 202 (Wilmington Pike). The remaining crash was an angle incident which occurred along the eastbound approach. The unsignalized intersection of U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road experienced sixteen (16) crashes, with the majority of these crashes being rear-end incidents (10 crashes). Six (6) of the rear-end incidents occurred along southbound U.S. Route 202 (Wilmington Pike) with the remainder occurring along the eastbound Pleasant Grove Road approach.

Based on the crash data, a total of 56 reportable crashes occurred at midblock locations within the study area. The majority of the midblock crashes along U.S. Route 202 (Wilmington Pike) were rear-end incidents (25 crashes) and hit-fixed object incidents (9 crashes). Twenty-one (21) of the rear-end incidents occurred along southbound U.S. Route 202 (Wilmington Pike), which is likely associated with the congestion experienced at the signalized intersection of U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926). Seven (7) of the hit-fixed object incidents occurred along southbound U.S. Route 202 (Wilmington Pike), with vehicles striking guiderails, curbs, embankments, roadway obstructions, and utility poles. The majority of the midblock crashes along Street Road (S.R. 0926) between U.S. Route 202 (Wilmington Pike) and Bridlewood Boulevard were rear-end incidents (3 crashes) and angle incidents (2 crashes). Both of the angle incidents occurred at the existing CVS driveway along Street Road (S.R. 0926) with vehicles entering via left-turn, which is a prohibited movement. All three (3) of the rear-end incidents occurred along eastbound Street Road (S.R. 0926), which is likely associated with the congestion experienced at the signalized intersection of U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926).

Land Use Context

The proposed development is located in Westtown Township within the A/C – Agriculture/Cluster Residential District, as well as the R-1 – Rural/Suburban Residential District. The development is located along the west side of U.S. Route 202 (Wilmington Pike), between West Pleasant Grove Road and Street Road (S.R. 0926), as shown below on a portion of the Westtown Township Zoning Map. Per Westtown Township’s Zoning Ordinance, the proposed residential development is permitted through conditional use within the A/C – Agriculture/Cluster Residential District in accordance with Article V and Article IX.



Source: Westtown Township Zoning Map

Area Transit Services

Transit services are currently not provided within the study area. The nearest SEPTA bus stop (SEPTA Bus Route 92) is located just north of the S.R. 0322 (High Street) and U.S. Route 202 intersection, approximately a mile and a half north of the site.

Pedestrian-Bicycle Facilities

Currently, there are no sidewalks along U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926). The signalized intersection of U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926) has limited pedestrian crossing amenities. There are pedestrian crosswalks, signals, and pushbuttons provided to cross the eastern leg of Street Road (S.R. 0926) and the southern leg of U.S. Route 202.

Sidewalk is currently provided along the north side of Hidden Pond Way within the Arborview neighborhood and on the west side of Bridlewood Boulevard within the Bridlewood neighborhood. Pedestrian facilities are also provided on the west side of Orvis Way, which was recently completed.

Traffic Count Data

Daily traffic counts were obtained from PennDOT's Traffic Information Repository (TIRe) website. The traffic count data is provided in **Appendix C**. Manual turning movement traffic counts were conducted in accordance with Westtown Township's Ordinance Chapter 149-804.A(3)(g). The majority of the traffic counts were collected in October 2019, with the two church accesses and Dunvegan intersection along West Pleasant Grove Road being collected in August 2019. 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 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.

Existing Queue Observations

At the intersection of U.S. Route 202 (Wilmington Pike) and PA Route 926 (Street Road) under existing conditions during the weekday morning and weekday afternoon commuter peak periods, oversaturation occurs on some movements. In accordance with the methodology contained in the *Highway Capacity Manual, 6th Edition*, queue observations were completed at the beginning of the weekday morning and weekday afternoon peak hours in order to account for these initial queues. The initial queues have been included in the detailed capacity/level-of-service analyses. Documentation of the queue observations is provided in **Appendix E**.

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 configurations, 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, 10th Edition*. **Table 2** presents the anticipated vehicular trip generation, and the detailed trip generation calculations are contained in **Appendix F**.

Table 2. Vehicular Trip Generation

Land Use	Size	Daily	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Robinson Tract Residential Development ⁽¹⁾	319 units	2,802	47	151	198	163	96	259

(1) Consisting of 182 detached homes, 135 attached homes, and preserving 2 existing homes on the property.

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 accesses. The location of the dwelling units, the presence of the Collector Road, and the roadway connections throughout the proposed development were also considered within the site trip distributions. The distribution percentages for the anticipated directions of approach and departure, as well as the traffic assignment percentages at each intersection are illustrated in **Figure 4A**. Application of the percentages illustrated in **Figure 4A** to the new peak hour trips contained in Table 2, provides an estimate of site traffic to be added to the study area. The site-generated trips assignments are provided in **Figure 4B** for the weekday morning and weekday afternoon peak hours.

Site Access Configuration and Traffic Control

With the development, a Collector Road will be constructed through the property between Street Road (S.R. 0926) and West Pleasant Grove Road. The Collector Road will intersect Street Road (S.R. 0926) opposite Bridlewood Boulevard, as required by PennDOT, with installation of a traffic signal. The

Collector Road will intersect West Pleasant Grove Road near the eastern boundary of the Robinson Tract as an unsignalized intersection. Access to the site will be provided via the Collector Road, as well as two unsignalized accesses along West Pleasant Grove Road, with one located opposite Dunvegan Drive and one located approximately 625 feet west of Hidden Pond Way.

The recommendations for the proposed access designs, including auxiliary turn lanes, traffic control, and geometric design, were based on industry accepted criteria and guidelines. Specifically, the need for left- and right-turn deceleration lanes was based on the current PennDOT guidelines in accordance with *Publication 46, Chapter 11 – Traffic Studies*. In addition, a preliminary traffic signal warrant analysis was conducted in accordance with PennDOT criteria contained in the Department’s *Publication 212, Official Traffic Control Devices*, for the Four-Hour Volume Warrants, which is based on the guidelines contained in the Federal Highway Administration’s, *Manual on Uniform Traffic Control Devices (MUTCD)*. The various warrant/guideline analysis worksheets are contained in **Appendix G**.

Tables 2 and 3 below provide a summary of the traffic signal and turn lane warrant analyses.

**Table 2. Traffic Signal Warrant Analysis Summary
Street Road (S.R. 0926) and Bridlewood Boulevard / Collector Road**

Scenario	Warrant Evaluated	Warrant Met?
2025 with Collector Road Diversions Only	Four-Hour Vehicular Volume	YES (4 Hours Satisfied)
2025 with Collector Road Diversions and Site Traffic	Four-Hour Vehicular Volume	YES (4 Hours Satisfied)

Table 3. Site Access Turn Lane Warrant Analysis Summary

Intersection	Lane Evaluated	Warranted Length (ft)
W. Pleasant Grove Road and Dunvegan Road / Road K	WBL	Not Warranted
	EBR	Not Warranted
W. Pleasant Grove Road and Road M	WBL	Not Warranted
	EBR	Not Warranted
W. Pleasant Grove Road and Collector Road	WBL	Not Warranted
	EBR	Not Warranted
Street Road (S.R. 0926) and Collector Road / Bridlewood Boulevard	EBL	250
	WBR	150

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, the following access configurations and traffic controls are recommended, subject to the detailed engineering of the site accesses:

Street Road (S.R. 0926) and Bridlewood Boulevard/Proposed Collector Road

- The Average Daily Traffic for the Collector Road (site traffic and traffic diversions) is estimated as 1,432 vehicles per day, and therefore is classified as a local road per PennDOT criteria.
- Provide one ingress lane for the Collector Road.
- Provide two egress lanes for the Collector Road, including a dedicated left-turn lane and a shared through/right-turn lane.
- Restripe the Bridlewood Boulevard egress approach to modify the existing right-turn lane to a shared through/right-turn lane.
- A left-turn lane is warranted along eastbound Street Road (S.R. 0926) based on PennDOT guidelines, and therefore, provide a 150-foot long left-turn lane.
- A right-turn deceleration lane is warranted along westbound Street Road (S.R. 0926) based on PennDOT guidelines, and therefore, provide a 150-foot right-turn deceleration lane.
- Install a traffic signal, which is preliminarily warranted in the build-out year based on the criteria for Warrant 2 (Four-Hour Vehicular Volume).

West Pleasant Grove Road and Proposed Access (Road K)

- The Average Daily Traffic for the site access (Road K) is 196 vehicles per day, and therefore is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.
- A left-turn lane is not warranted based on PennDOT guidelines.
- A right-turn deceleration lane is not warranted based on PennDOT guidelines.

West Pleasant Grove Road and Proposed Access (Road M)

- The Average Daily Traffic for the site access (Road M) is 140 vehicles per day, and therefore is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.
- A left-turn lane is not warranted based on PennDOT guidelines.
- A right-turn deceleration lane is not warranted based on PennDOT guidelines.

West Pleasant Grove Road and Proposed Collector Road

- The Average Daily Traffic for the Collector Road is estimated as 1,152 vehicles per day, and therefore, is classified as a medium volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the Collector Road.
- Provide stop-control on the site access egress approach.
- A left-turn lane is not warranted based on PennDOT guidelines.
- A right-turn deceleration lane is not warranted based on PennDOT guidelines.

Sight Distance

Sight distance field measurements and an evaluation were performed at each of the proposed site accesses. Generally, the prevailing (85th percentile) travel speed, 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 the proposed accesses. The existing sight distances at the proposed accesses were measured and compared to PennDOT's sight distance requirements. These sight distance requirements are contained in *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads*. **Table 4** summarizes the available sight distance measurements, as well as PennDOT's sight distance requirements at the proposed access locations.

Table 4. Sight Distance Evaluation
Street Road (S.R. 0926) and Collector Road opposite Bridlewood Boulevard (proposed signal)

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet)		Available Sight Distance (feet)
				Desirable ¹	Acceptable ²	
Exiting	Looking Left	45	-8.0%	635'	45 mph=472'	466' with vegetation clearing
	Looking Right	45	+8.6%	570'	N/A	700'+ with vegetation clearing
Left turn Entering	Looking Ahead	45	-8.0%	445'	N/A	430' with vegetation clearing
	From the Rear	45	+8.6%	N/A	Meets over 70 mph=680'	700'+

West Pleasant Grove Road and Proposed Access (Road K)

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet)		Township Requirements (feet) ⁽³⁾	Available Sight Distance (feet)
				Desirable ¹	Acceptable ²		
Exiting	Looking Left	35	+2.6%	440'	N/A	440'	630'
	Looking Right	35	-2.2%	350'	N/A	440'	1,000'+
Left turn Entering	Looking Ahead	35	+2.6%	300'	N/A	N/A	665'
	From the Rear	35	-2.2%	N/A	Meets over 75 mph=950'	N/A	1,000'+

West Pleasant Grove Road and Proposed Access (Road M)

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet)		Township Requirements (feet) ⁽³⁾	Available Sight Distance (feet)
				Desirable ¹	Acceptable ²		
Exiting	Looking Left	35	+6.4%	440'	N/A	440'	800'+
	Looking Right	35	-3.0%	350'	N/A	440'	440'
Left turn Entering	Looking Ahead	35	+6.4%	300'	N/A	N/A	800'+
	From the Rear	35	-3.0%	N/A	Meets to 45 mph=415'	N/A	415'

West Pleasant Grove Road and Proposed Collector Road

Movement	Direction	Posted Speed (mph)	Approximate Grade	PennDOT Requirements (feet)		Township Requirements (feet) ⁽³⁾	Available Sight Distance (feet)
				Desirable ¹	Acceptable ²		
Exiting	Looking Left	35	+2.1%	440'	N/A	440'	440'
	Looking Right	35	0.0%	350'	N/A	440'	495'
Left turn Entering	Looking Ahead	35	+2.1%	300'	N/A	N/A	415'
	From the Rear	35	0.0%	N/A	Meets to 60 mph=620'	N/A	650'

- (1) Based on the desirable sight distance requirements contained in the *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads* and the posted speed limit, unless otherwise noted.
- (2) Based on the safe stopping sight distance requirements contained in the *Pennsylvania Code, Chapter 441, Access to and Occupancy of Highways by Driveways and Local Roads* and posted or travel speeds as noted.
- (3) Based on the clear sight triangle requirements per Westtown Township Code Chapter 149 Article IX Section 149 -915, and the posted speed limit.

As shown in **Table 4**, the existing available sight distances at the proposed Collector Road and site access intersections along West Pleasant Grove Road, which is a Township roadway, meet PennDOT and Township requirements for all movements. For the intersection of the Collector Road and Street Road (S.R. 0926) opposite Bridlewood Boulevard with clearing of vegetation along the Robinson Tract property frontage, the existing available sight distances for exiting looking left and left-turn looking ahead are less than PennDOT desirable criteria; however, the intersection is proposed to be signalized.

Proper landscaping must be maintained along the site frontage along Street Road (S.R. 0926) and West Pleasant Grove Road for provision of adequate sight distance according to the above tables. The actual available sight distances should be verified during detailed engineering of the site access. The PennDOT M-950S forms are completed and provided in **Appendix H** for the State road Collector Road intersection.

Off-Site Intersection Turn Lane Warrants

Turn lane warrants were completed based on existing and future with-development peak hour traffic volumes at three off-site study intersections in accordance with PennDOT guidelines. The various warrant/guideline analysis worksheets are contained in **Appendix I**.

The following turn lanes are warranted under existing conditions:

- Street Road (S.R. 0926) and New Street
 - Eastbound Street Road (S.R. 0926) left-turn lane
 - Westbound Street Road (S.R. 0926) left- and right-turn lanes
 - Southbound New Street right-turn lane
 - Legal right-of-way does not currently exist to provide the above warranted lanes along Street Road (S.R. 0926) or New Street. Additional property from the Robinson Tract alone will not accommodate dedicated left-turn lanes or the southbound New Street right-turn lane. Although not necessary to mitigate traffic impact, as demonstrated later in this report, the applicant will provide a dedicated right-turn lane along westbound Street Road (S.R. 0926) along the Robinson Tract property frontage.

- New Street and West Pleasant Grove Road
 - No turn lanes are warranted

- U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road
 - Southbound U.S. Route 202 (Wilmington Pike) right-turn lane

No additional turn lanes are warranted in the future 2030 conditions with the proposed development. A preliminary aerial exhibit and signal permit plan markup illustrating the conditions at the intersection of Street Road (S.R. 0926) and New Street is provided in Appendix I.

Table 5. Off-Site Intersection Turn Lane Warrant Analysis Summary

Intersection	Lane Evaluated	Warranted Length (ft)	
		Exiting	2030 Future with Development
Wilmington Pike (U.S. Route 202) and W. Pleasant Grove Road	SBR	225'	325'
New Street and W. Pleasant Grove Road	NBR	Not Warranted	Not Warranted
	SBL	Not Warranted	Not Warranted
	WBR	Not Warranted	Not Warranted
Street Road (S.R. 0926) and New Street	EBL	150'	175'
	EBR	Not Warranted	Not Warranted
	WBL	150'	150'
	WBR	Not Warranted	150'
	NBR	Not Warranted	Not Warranted
	NBL	Not Warranted	Not Warranted
	SBR	175'	Not Warranted (Due to Diversions)
	SBL	Not Warranted	Not Warranted

Future Traffic Conditions

With an estimated opening in 2020, a five-year build out was assumed based on the proposed development, the residential market, and past projects. This assumption equates to an average delivery of five units per month. Therefore, the traffic analysis was completed for a future build-out year of 2025 and a future design year of 2030, or five years beyond the anticipated build-out year, both without and with the proposed development. The future 2025 build-out year and 2030 design year without-development traffic volumes were estimated by increasing the existing 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 2025 build-out year and 2030 design 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 0.52 percent per year compounded for six (6) years to 2025 and 11 years to 2030, or 3.16 percent total to 2025 and 5.87 percent total to 2030. This growth rate is consistent with the traffic growth rate recommended by the PennDOT Bureau of Planning and Research *Growth Factors for August 2019 to July 2020* for similar, non-interstate urban roadways in Westtown Township.

Local Traffic Growth

To account for local traffic growth, the municipality was contacted to identify any other nearby future developments. Based upon coordination with Westtown Township, the existing traffic volumes were also increased by nearby approved developments in the vicinity of the proposed development. Specifically, the following developments were included and further information is provided in **Appendix J**:

- **The Malvern School**: 5,375 square-foot daycare/early learning center located on the northeast corner of the intersection of U.S. 202 (Wilmington Pike) and Pleasant Grove Road.
- **Arborview (Fair Share Properties)**: 16,800 square feet of office space and 10,986 square-foot daycare center located on the west side of U.S. Route 202 (Wilmington Pike) between Skiles Boulevard and Pleasant Grove Road. As part of the development, a Collector road named Orvis Way between West Pleasant Grove Road and Stetson School will be provided, which is currently under construction.
- **Condominium Development**: 39 condominiums in two buildings remain to be occupied/constructed on the west side of Gilpin Drive just north of Skiles Boulevard.

Planned Roadway Improvements

Orvis Way: West Pleasant Grove Road to Stetson School Collector Road

In conjunction with the Arborview (Fair Share Properties) development, Orvis Way is currently being constructed to connect West Pleasant Grove Road to Stetson School. In accordance with the Township approved *Arborview Transportation Impact Assessment*, prepared by Traffic Planning & Design and dated January 26, 2015, traffic in the area is anticipated to divert to utilize Orvis Way as follows:

Orvis Way Traffic Diversions

- 5 percent of the eastbound left-turns from Street Road (S.R. 0926) to northbound U.S. Route 202 (Wilmington Pike) will divert via New Street and West Pleasant Grove Road to Orvis Way.
- 10 percent of the northbound U.S. Route 202 (Wilmington Pike) jughandle volume onto Stetson School will divert via West Pleasant Grove Road to Orvis Way.
- 25 percent of the eastbound right-turns exiting Stetson School to southbound U.S. Route 202 (Wilmington Pike) to eastbound Street Road (S.R. 0926) will divert to Orvis Way and utilize West Pleasant Grove Road to New Street to eastbound Street Road (S.R. 0926). This diversion was conservatively decreased from the approved Arborview study.

The roadway improvements and associated traffic diversions for the Arborview (Fair Share Properties) development have been incorporated into the future without- and with-development conditions within this study. Details are provided in **Appendix K**.

Robinson Tract: Street Road (S.R. 0926) to West Pleasant Grove Road Collector Road

With the development of the Robinson Tract, a Collector Road will be constructed through the property between Street Road (S.R. 0926) and West Pleasant Grove Road. Access to the site will be provided via the Collector Road. Additionally, as envisioned by Westtown Township for many years, the Collector Road will alleviate traffic at the congested U.S. Route 202 (Wilmington Pike)/Street Road (S.R. 0926) intersection, and reroute traffic currently using West Pleasant Grove Road and New Street as an alternate route to avoid that delay. With Orvis Way, currently under construction, this will provide a full connected roadway network on the west side of U.S. Route 202 (Wilmington Pike from Street Road S.R. 0926) to Stetson School, which will provide drivers with access to and from U.S. Route 202 via two signalized intersections.

In this analysis, traffic diversions with the Collector Road have been included in this study based on previous studies completed and accepted by the Township, as summarized below. The traffic diversions are provided in **Appendix K**.

Collector Road Traffic Diversions

- 5 percent of the weekday morning and 25 percent of the weekday afternoon eastbound left-turns from Street Road (S.R. 0926) to northbound U.S. Route 202 (Wilmington Pike) will divert via the Collector Road to West Pleasant Grove Road to Orvis Way.
- 10 percent of the northbound U.S. Route 202 (Wilmington Pike) jughandle volume onto Stetson School will divert via West Pleasant Grove Road to Orvis Way.
- 25 percent of the eastbound right-turns exiting Stetson School to southbound U.S. Route 202 (Wilmington Pike) to eastbound Street Road (S.R. 0926) will divert to Orvis Way and utilize West Pleasant Grove Road to the Collector Road to eastbound Street Road (S.R. 0926).
- 25 percent of the southbound U.S. Route 202 (Wilmington Pike) right-turns to eastbound Street Road (S.R. 0926) will divert to Orvis Way and utilize West Pleasant Grove Road to the Collector Road to eastbound Street Road (S.R. 0926).
- 66 percent (two-thirds) of the northbound Bridlewood Boulevard right-turns will divert to the Collector Road to West Pleasant Grove to Orvis Way to northbound U.S. Route 202 (Wilmington Pike).
- 50 percent of the southbound U.S. Route 202 (Wilmington Pike) right-turns to West Pleasant Grove Road will divert to Orvis Way and utilize West Pleasant Grove Road to the Collector Road.
- 250 vehicles (approximately 16 percent) of the southbound U.S. Route 202 (Wilmington Pike) through traffic was diverted to West Pleasant Grove Road to the Collector Road to Bridlewood Boulevard back to U.S. Route 202 (Wilmington Pike) southbound. Based on a travel time comparison (without implementation of PennDOT's US 202/PA 926 intersection improvements), during the weekday afternoon peak hour in the southbound direction when U.S. Route 202 (Wilmington Pike) congestion is highest, the travel time along the Collector Road system may be shorter than staying on U.S. Route 202 (Wilmington Road).

PennDOT U.S. Route 202, Section 100

Within this section of U.S. Route 202 (Wilmington Pike), designated as Section 100, several studies completed through PennDOT and the Delaware Valley Regional Planning Commission have identified the need for additional roadway capacity. At this time, PennDOT is underway with preliminary engineering for improvements at the U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926) intersection. Based on the current State Transportation Improvement Program (TIP) and the Conceptual Intersection Layout prepared by Urban Engineers and dated June 5, 2014, the project will include improvements that will help reduce traffic congestion and increase safety at the intersection

through lane reconfigurations, striping, upgrades to the traffic signal, signal timing, and bicycle and pedestrian improvements. It is our understanding that the following roadway improvements are to be included:

- Southbound 130-foot right-turn deceleration lane on U.S. Route 202.
- Additional eastbound left-turn lane on PA Route 926, creating a double left-turn lane configuration with 380 feet of storage for each lane.
- Pedestrian and bicycle intersection improvements, including high-visibility crosswalks, ADA ramps, and sidewalk extension from the intersection east to Dalmally Drive.
- Traffic signal equipment upgrades, including pedestrian push buttons, countdown signal heads, and lighting.

Based on the TIP, the current project schedule indicates an estimated construction start date in September 2021, with a construction completion date by the end of 2022. However, this schedule is dependent on moving through the project development process, with activities such as evaluation of project effect on the Westtown Inn (eligible for the historic register), Consulting Parties consultations, approval of overall environmental document, preliminary plan approvals, utility coordination, property acquisitions, and preparation of design plans and construction bid package.

S.R. 0926 Bridge Replacement over Radley Run

Through coordination with PennDOT, the Street Road (S.R. 0926) bridge located approximately 700 feet west of Bridlewood Boulevard is scheduled to be replaced. Design activity has been completed, which is being combined with other locations in Bridge Group M (MPMS 102318). The bid was awarded in January 2019, and the entire bridge group is scheduled for estimated completion in November 2020. As with other bridge groups, there is some flexibility in scheduling any one particular bridge within the overall construction duration.

Future Traffic Conditions

The total background growth, nearby development traffic volumes, and Orvis Way traffic diversions were then added to the existing traffic volumes, resulting in the future 2025 and 2030 without-development traffic volumes. Next, the site generated traffic volumes, as shown in **Figure 4B** and the Collector Road traffic diversions were added to the future 2025 and 2030 without-development traffic volumes, resulting in the future 2025 and 2030 with-development traffic volumes.

The resultant future 2025 build-out year peak hour traffic volumes without-development are illustrated in **Figure 5A**, and the future 2025 build-out year with-development peak hour traffic volumes are illustrated in **Figure 5B**. These traffic volumes were then analyzed to determine the future 2025 without- and with-development operating conditions, and the results of this analysis are shown in **Figures 5C and 5D**. Detailed spreadsheets summarizing the 2025 traffic projections, including regional

growth, other development trip assignments, site trip assignments, and diversions for each intersection, are provided in **Appendix L**.

The resultant future 2030 design year peak hour traffic volumes without-development are illustrated in **Figure 6A**, and the future 2030 design year with-development peak hour traffic volumes are illustrated in **Figure 6B**. These traffic volumes were then analyzed to determine the future 2030 without- and with-development operating conditions, and the results of this analysis are shown in **Figures 6C and 6D**. Detailed spreadsheets summarizing the 2030 traffic projections, including regional growth, other development trip assignments, site trip assignments, and traffic diversions for each intersection, are provided in **Appendix M**.

Capacity/Level-of-Service Results

The peak hour traffic volumes were analyzed to determine the existing and future operating conditions, both without and with the proposed development, 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 10.3 (build 122, rev. 0) 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 N** 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 indicates the overall intersection level of service has dropped, the applicant will be required to mitigate the level of service if the increase 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, future build-out year (2025) and design year (2030) traffic conditions, both without and with the proposed development, are summarized in **Figures 3B, 5C, 5D, 6C and 6D** while the detailed capacity/level-of-service analysis worksheets are provided in **Appendices O through S**.

The proposed development has no traffic impact at the study area intersections. With the Collector Road and resulting traffic diversions, vehicle delays are decreased at several study intersections. **Tables 6 and 7** below summarize the overall intersection results of the level-of-service analyses for the off-site study intersections for both peak hours. Detailed results of the level-of-service and queueing analysis are contained in the matrices provided in **Tables 8 and 9**.

**Table 6. Overall Intersection Level-of-Service
Weekday Morning Peak Hour**

Intersection	Existing	Future 2030 Without Development (optimized)	Future 2030 With Development	Requires Mitigation?
U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)	F 87.4	F 113.6	F 106.8	NO
U.S. Route 202 (Wilmington Pike) and Pleasant Grove Road	A 0.3	A 0.7	A 0.8	NO
U.S. Route 202 (Wilmington Pike) and Skiles Boulevard/Stetson School	C 28.4	D 37.4	D 45.2	NO
Street Road (S.R. 0926) and New Street	C 30.8	B 17.9	B 19.1	NO
Street Road (S.R. 0926) and Bridlewood Boulevard/Collector Road	A 1.0	A 1.1	B 12.1	NO
New Street and West Pleasant Grove Road	A 5.4	A 5.7	A 4.9	NO
West Pleasant Grove Road and Dunvegan Drive	A 0.3	A 0.2	A 1.0	NO
West Pleasant Grove Road and Orvis Way	-	A 2.2	A 3.9	NO

**Table 7. Overall Intersection Level-of-Service
Weekday Afternoon Peak Hour**

Intersection	Existing	Future 2030 Without Development (optimized)	Future 2030 With Development	Requires Mitigation?
U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)	F 200.4	F 223.7	F 179.9	NO
U.S. Route 202 (Wilmington Pike) and Pleasant Grove Road	A 0.8	A 1.2	A 1.0	NO
U.S. Route 202 (Wilmington Pike) and Skiles Boulevard/Stetson School	B 16.8	C 23.4	C 30.9	NO
Street Road (S.R. 0926) and New Street	C 21.6	B 17.8	B 16.8	NO
Street Road (S.R. 0926) and Bridlewood Boulevard/Collector Road	A 0.9	A 0.9	B 19.0	NO
New Street and West Pleasant Grove Road	A 5.7	A 6.1	A 5.2	NO
West Pleasant Grove Road and Dunvegan Drive	A 0.2	A 0.2	A 0.8	NO
West Pleasant Grove Road and Orvis Way	-	A 2.0	A 7.3	NO

As shown in Tables 6 and 7 above, the proposed development does not have an overall level-of-service impact at any of the study intersections per PennDOT criteria. However, the applicant is committed to providing the following off-site intersection improvements:

Street Road (S.R. 0926) and New Street

- The applicant will complete traffic signal retiming optimization and provide equipment in order to coordinate with the proposed signal to the east.
- Although not necessary to mitigate traffic impact, the applicant will provide a dedicated right-turn lane along westbound Street Road (S.R. 0926) along the Robinson Tract property frontage.
- It is noted that left turn lanes are warranted based on existing traffic volumes. Left-turn lanes along Street Road (S.R. 0926) cannot be provided within the existing right-of-way or with additional right-of-way from the Robinson Tract alone.

U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road

- The applicant will provide a dedicated right-turn lane along southbound Wilmington Pike (U.S. Route 202).

U.S. Route 202 (Wilmington Pike) and Skiles Boulevard / Stetson School

- To mitigate the Township's Collector Road traffic impact along Stetson School, the applicant will restripe the eastbound approach to provide dual left-turn lanes and a shared through/right-turn lane and complete the necessary traffic signal phasing modifications.
- Additionally, the applicant will widen westbound Skiles Boulevard to provide a dedicated right-turn lane, subject to the ability to acquire any necessary additional right-of-way.

Collector Road Access Analysis

Traffic analysis was completed at the proposed access intersections along the Collector Road through the Robinson Tract for the future 2030 with-development conditions. As shown in **Figure 7**, all of the proposed access intersections along the Collector Road will operate at highly acceptable LOS A overall and LOS B or better for all movements during both peak hours. The detailed traffic volume projections and traffic analysis worksheets are provided in **Appendix T**.

Queuing Analysis

A queuing analysis was completed at the study intersections based on the HCM 6th Edition methodology. The detailed results of the queuing analysis are provided in **Table 7** at the end of this report. Based on the results of the queuing analysis and with the recommended site access designs, as outlined previously in this report, the queues at the site access and Collector Road intersections with Street Road (S.R. 0926) and West Pleasant Grove Road are accommodated. Additionally, the queues

are accommodated within the available lane storages at the majority of the off-site study intersections. Significant queues occur at the U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926) intersection during both peak hours. With the traffic diversions resulting from the construction of the Collector Road through the Robinson Tract as committed by the applicant, the queues are decreased at this intersection from without- to with-development conditions.

Significant queues occur along Stetson School drive at U.S. Route 202 (Wilmington Pike) due to the Collector Road traffic. These queues are accommodated with the intersection improvements the applicant is committed to providing to mitigate the Township's Collector Road traffic impact, subject to the ability to acquire any necessary additional right-of-way. A graphic illustration of the queues with the improvements is provided in **Appendix U**.

PennDOT U.S. Route 202, Section 100 Intersection Improvement Project

For informational purposes, traffic analysis has also been completed with construction of the PennDOT improvement project in preliminary engineering for the intersection of U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926). In future 2030 with-development conditions and with implementation of PennDOT's project, the intersection is anticipated to operate at overall level of service E (62.2 seconds average overall delay) during the weekday morning peak hour and overall level of service F (137.4 seconds overall delay) during the weekday afternoon peak hour. Based on this analysis, PennDOT's project will further decrease overall intersection delay by approximately 20 to 40 percent during the peak hours. The detailed capacity/level-of-service worksheets are provided in **Appendix V**.

Conclusions and Recommendations

Based on trip generation data compiled for Multifamily Housing – Low Rise (ITE Land Use Code 220) and Single Family Detached Housing (ITE Land Use Code 210) contained in the Institute of Transportation Engineers (ITE) publication entitled, *Trip Generation Manual, 10th Edition*, the proposed development will generate a total of approximately 198 “new” trips during the weekday morning peak hour and 259 “new” trips during the weekday afternoon peak hour.

Committed Improvements

Per the traffic evaluation, the following on-site and off-site traffic improvements are committed by the applicant to mitigate the proposed development traffic impacts, pending further coordination and approvals from the Township and PennDOT. Since some of these improvements are within the state’s right-of-way, or located at traffic signals under the jurisdiction of PennDOT, coordination with PennDOT will be required to implement these improvements for issuance of a Highway Occupancy Permit. The Township will be included in all correspondence with PennDOT.

Site Accesses and On-Site Improvements

Street Road (S.R. 0926) and Bridlewood Boulevard/Proposed Collector Road

- Collector Road is classified as a local road per PennDOT criteria.
- Provide one ingress lane for the Collector Road.
- Provide two egress lanes for the Collector Road, including a dedicated left-turn lane and a shared through/right-turn lane.
- Restripe the Bridlewood Boulevard egress approach to modify the existing right-turn lane to a shared through/right-turn lane.
- Provide a 150-foot left-turn lane along eastbound Street Road (S.R. 0926). Note that a 120-foot left-turn lane exists along westbound Street Road (S.R. 0926).
- Provide a 150-foot right-turn deceleration lane along westbound Street Road (S.R. 0926).
- Install a traffic signal.

West Pleasant Grove Road and Proposed Access (Road K)

- Access is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.

West Pleasant Grove Road and Proposed Access (Road M)

- Access is classified as a low volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the site access.
- Provide stop-control on the site access egress approach.

West Pleasant Grove Road and Collector Road

- Collector Road is classified as a medium volume driveway per PennDOT criteria.
- Provide one ingress lane and one egress lane for the Collector Road.

- Provide stop-control on the Collector Road egress approach.

Collector Road

- The applicant will construct the Collector Road through the property between Street Road (S.R. 0926) and West Pleasant Grove Road, which will alleviate traffic at the congested U.S. Route 202 (Wilmington Pike)/Street Road (S.R. 0926) intersection, and reroute traffic currently using West Pleasant Grove Road and New Street as an alternate route to avoid that delay. The overall delays at several study intersections decrease in the with-development conditions versus without-development conditions, due to the diversion of traffic to the Collector Road.
- Based on the estimated Collector Road weekday peak hour traffic volumes in this report, diverted traffic constitutes approximately 70 to 80 percent of the total, while approximately 20 to 30 percent is site traffic from the Robinson Tract.

Off-Site Traffic Improvements

Street Road (S.R. 0926) and New Street

- The applicant will complete traffic signal retiming optimization and provide equipment in order to coordinate with the proposed signal to the east.
- Although not necessary to mitigate traffic impact, the applicant will provide a dedicated right-turn lane along westbound Street Road (S.R. 0926) along the Robinson Tract property frontage.
- It is noted that left turn lanes are warranted based on existing traffic volumes. Left-turn lanes along Street Road (S.R. 0926) cannot be provided within the existing right-of-way or with additional right-of-way from the Robinson Tract alone.

U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road

- The applicant will provide a dedicated right-turn lane along southbound Wilmington Pike (U.S. Route 202).

U.S. Route 202 (Wilmington Pike) and Skiles Boulevard / Stetson School

- To mitigate the Township's Collector Road traffic impact along Stetson School, the applicant will restripe the eastbound approach to provide dual left-turn lanes and a shared through/right-turn lane and complete the necessary traffic signal phasing modifications.
- Additionally, the applicant will widen westbound Skiles Boulevard to provide a dedicated right-turn lane, subject to the ability to acquire any necessary additional right-of-way.

The traffic analyses contained herein reveal that efficient access to and from the proposed development can be provided, and furthermore, site-generated traffic is mitigated at the study area intersections with the committed improvements.

Table 8 - Level of Service Matricies
Street Road (S.R. 0926) and New Street

Time Period		Weekday Morning Peak Hour					Weekday Afternoon Peak Hour				
Design Year		2030 Design Year					2030 Design Year				
Development Condition		Existing	w/o Dev Base	w/o Dev ⁽¹⁾ Optimized	w/ Dev	w/ Dev w/ Impvts ⁽²⁾	Existing	w/o Dev Base	w/o Dev ⁽¹⁾ Optimized	w/ Dev	w/ Dev w/ Impvts ⁽²⁾
Street Road (S.R. 0926)	Left EB Thru Right	A 8.1	A 9.0	B 14.6	B 12.1	B 12.3	B 12.3	B 13.4	B 15.3	B 13.3	B 13.3
	Left WB Thru Right	A 5.5	A 5.6	A 8.8	B 14.1	A 2.9 A 2.2	A 8.7	A 8.9	A 9.7	A 1.1	A 0.9 A 0.1
	Left NB Thru Right	C 34.4	C 34.7	C 24.6	C 30.6	C 30.5	C 32.5	C 32.7	C 22.5	C 31.8	C 31.9
	Left SB Thru Right	F 106.9	F 130.7	C 32.3	D 37.8	D 37.1	D 48.9	D 55.0	C 29.0	D 38.9	D 39.0
Overall		C 30.8	D 36.4	B 17.9	B 19.1	B 16.0	C 21.6	C 23.7	B 17.8	B 16.8	B 16.8

(1) Future traffic signal timings have been optimized.

(2) Improvements include the provision of a dedicated westbound right-turn lane.

Table 8 - Level of Service Matrices

Street Road (S.R. 0926) and Bridlewood Boulevard / Collector Road

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
Street Road (S.R. 0926)	Left	-	-	A 0.2	-	-	A 6.1
	EB Thru	(1)	(1)	A 1.8	(1)	(1)	A 7.0
	Right	(1)	(1)	A 0.0	(1)	(1)	A 3.4
	Left	B 10.5	B 10.6	A 3.3	B 10.7	B 10.8	B 16.6
	WB Thru	(1)	(1)	A 3.8	(1)	(1)	A 8.6
	Right	-	-	A 3.2	-	-	A 7.4
Bridlewood Boulevard	Left	C 18.9	C 19.9	D 42.7	C 20.1	C 21.3	D 46.2
	NB Thru	-	-	C	-	-	C
	Right	B 13.4	B 13.7	33.4	B 13.7	B 14.0	27.0
Collector Road	Left	-	-	C 35.0	-	-	C 28.1
	SB Thru	-	-	D	-	-	D
	Right	-	-	52.1	-	-	49.9
Overall		A 1.0	A 1.1	B 12.1	A 0.9	A 0.9	B 19.0

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices

U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour			
Design Year		2030 Design Year			2030 Design Year			
Development Condition		Existing	w/o Dev ⁽¹⁾	w/ Dev	Existing	w/o Dev ⁽¹⁾	w/ Dev	
Street Road (S.R. 0926)	EB	Left	F	F	F	F	F	
		187.3	195.4	187.2	121.6	194.2	167.0	
		Thru	F	F	F	F	F	F
	WB	Right	196.8	206.9	187.3	142.9	211.2	162.5
		Left	E	F	F	E	F	E
		68.3	85.0	85.0	69.5	94.6	79.6	
U.S. Route 202 (Wilmington Pike)	NB	Thru	E	F	F	E	F	
		69.5	94.3	99.5	72.9	109.3	109.0	
		Right	E	D	D	E	D	D
	SB	Left	61.0	51.8	51.8	59.5	48.8	47.8
		Thru	F	E	E	F	E	E
		84.7	67.8	66.8	82.5	63.7	60.9	
Overall	Thru	Right	D	F	F	E	F	
		50.2	82.0	88.6	56.7	79.2	79.2	
		(v/c > 1.0)	(v/c > 1.0)	(v/c > 1.0)	25.2	20.8	20.8	
	Right	Left	C	C	C	C	C	C
		23.2	20.9	21.4	142.8	74.3	68.4	
		Thru	F	E	E	F	F	F
Right	Left	86.1	64.3	67.2	438.2	445.0	379.4	
	Thru	F	F	F	F	F	F	
	76.8	111.6	98.3	422.9	432.3	359.3		
Overall	Thru	F	F	F	F	F	F	
	83.3	125.0	103.1	200.4	223.7	179.9		
	Right	F	F	F	F	F	F	
Overall		87.4	113.6	106.8	200.4	223.7	179.9	

(1) Intersection to be equipped with traffic adaptive signal equipment which dynamically adjusts traffic signal timings and phasings based on real-time traffic demand, and therefore, traffic signal timings were optimized in each future scenario. This project is currently under construction by PennDOT.

Table 8 - Level of Service Matrices
U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road

Time Period		Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
Design Year		2030 Design Year				2030 Design Year			
Development Condition		Existing	w/o Dev	w/ Dev	w/ Dev w/ Impvts ⁽²⁾	Existing	w/o Dev	w/ Dev	w/ Dev w/ Impvts ⁽²⁾
Pleasant Grove Road	EB Right	C 20.3	C 16.0	C 15.6	C 15.6	C 20.0	C 15.6	B 12.6	B 12.6
	WB Right	C 24.8	D 27.2	D 27.2	D 27.2	C 22.1	C 24.1	C 19.7	C 19.7
U.S. Route 202 (Wilmington Pike)	Left NB Thru Thru/Right	C 18.5	B 14.5	C 15.4	C 15.4	C 17.3	B 13.7	B 14.1	B 14.1
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
	Left SB Thru Thru/Right	C 22.6	C 23.1	C 23.1	C 23.1	C 23.2	C 24.9	C 19.4	C 19.4
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Overall		A 0.3	A 0.7	A 0.8	A 0.8	A 0.8	A 1.2	A 1.0	A 1.0

(1) Movement operates at free-flow conditions.

(2) Improvements include the provision of a dedicated southbound right-turn lane.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Church Full-Movement Access

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Thru EB Right	(1)	(1)	(1)	(1)	(1)	(1)
	Left WB Thru	A 8.1	A 8.1	A 8.2	A 8.1	A 8.1	A 8.2
Church Full- Movement Access	Left NB	A 9.4	A 9.9	B 11.4	B 10.1	B 10.5	B 12.9
	Right	A 0.0	A 0.0	A 0.0	A 8.2	A 8.4	A 8.4
Overall		A 0.4	A 0.3	A 0.2	A 0.3	A 0.3	A 0.2

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Orvis Way (By Others)

Time Period		Weekday Morning Peak Hour		Weekday Afternoon Peak Hour	
Design Year		2030 Design Year		2030 Design Year	
Development Condition		w/o Dev	w/ Dev	w/o Dev	w/ Dev
West Pleasant Grove Road	Left EB Thru	A 8.9	B 10.3	A 9.0	B 10.9
	Thru WB Right	(1)	(1)	(1)	(1)
Orvis Way (By Others)	Left SB Right	B 10.0	B 14.0	B 10.6	C 17.6
Overall		A 2.2	A 3.9	A 2.0	A 7.3

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Church Egress Only Access

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	EB Thru	(1)	(1)	(1)	(1)	(1)	(1)
	WB Thru	(1)	(1)	(1)	(1)	(1)	(1)
Church Egress Only Access	Left	A	A	A	A	A	A
	NB Right	0.0	0.0	0.0	0.0	0.0	0.0
Overall		A	A	A	A	A	A
		0.0	0.0	0.0	0.0	0.0	0.0

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Collector Road

Time Period		Weekday Morning Peak Hour	Weekday Afternoon Peak Hour
Design Year		2030 Design Year	2030 Design Year
Development Condition		w/ Dev	w/ Dev
West Pleasant Grove Road	EB Thru/ Right	(1)	(1)
	WB Left/ Thru	A 9.1	B 11.3
Collector Road	Left NB Right	A 9.5	B 11.2
Overall		A 5.4	A 7.5

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Road M

Time Period		Weekday Morning Peak Hour	Weekday Afternoon Peak Hour
Design Year		2030 Design Year	2030 Design Year
Development Condition		w/ Dev	w/ Dev
West Pleasant Grove Road	EB Thru/ Right	(1)	(1)
	WB Left/ Thru	A 8.3	A 7.5
Road M	Left NB Right	A 8.7	A 9.1
Overall		A 0.6	A 0.6

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices
West Pleasant Grove Road and Dunvegan Road / Road K

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Left	A	A	A	A	A	A
	EB Thru	0.0	0.0	0.0	8.9	9.0	8.8
	Right	-	-		-	-	
	Left	-	-	A	-	-	A
	WB Thru	(1)	(1)	8.2	(1)	(1)	8.3
	Right						
Road K	Left			A			B
	NB Thru	-	-	9.7	-	-	10.0
	Right						
Dunvegan Road	Left	B	B	B	B	B	B
	SB Thru	10.0	10.5	10.4	10.0	10.3	10.1
	Right						
Overall		A	A	A	A	A	A
		0.3	0.2	1.0	0.2	0.2	0.8

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices

New Street and West Pleasant Grove Road

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Left	B	B	B	B	B	B
	WB Right	12.7	13.9	13.0	13.2	14.5	13.8
New Street	Thru NB Right	(1)	(1)	(1)	(1)	(1)	(1)
	Left SB Thru	A 8.7	A 8.9	A 8.9	A 8.5	A 8.6	A 8.7
Overall		A 5.4	A 5.7	A 4.9	A 5.7	A 6.1	A 5.2

(1) Movement operates at free-flow conditions.

Table 8 - Level of Service Matrices

U.S. Route 202 (Wilmington Pike) and Skiles Boulevard / Stetson School Drive

Time Period		Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
Design Year		2030 Design Year				2030 Design Year			
Development Condition		Existing	w/o Dev ⁽¹⁾	w/ Dev ⁽¹⁾	w/ Dev w/ Impvts ⁽²⁾	Existing	w/o Dev ⁽¹⁾	w/ Dev ⁽¹⁾	w/ Dev w/ Impvts ⁽²⁾
Stetson School Drive	Left	D	E	F	E	D	D	F	D
	EB Thru	43.5	68.9	158.4	78.5	38.2	55.0	87.4	53.9
	Right	C	D	D	D	C	D	C	D
Skiles Boulevard	Left	C	D	D		C	D	C	
	WB Thru	33.8	39.8	38.0		32.6	40.2	34.3	
	Right	C	D	D	39.6	C	D	C	36.7
U.S. Route 202 (Wilmington Pike)	Thru (2)	D	D	D	D	D	D	D	D
	NB Right	38.2	47.6	45.4	53.1	35.4	45.8	39.1	52.6
	SB Right	D	D	D	E	C	D	C	D
Overall	Thru (2)	36.6	44.0	41.4	51.8	33.4	40.8	34.9	58.2
	NB Right	F	F	F	F	B	C	C	C
	SB Right	37.9	50.3	54.0	52.2	18.1	25.5	33.5	30.6
Overall	Thru (2)	(v/c > 1.0)	(v/c > 1.0)	(v/c > 1.0)	(v/c > 1.0)	A	A	A	A
	NB Right	A	A	A	A	A	A	A	A
	SB Right	6.0	7.0	7.8	7.6	4.5	5.8	8.3	7.9
Overall	Thru (2)	B	C	C	C	B	B	C	C
	NB Right	19.1	25.1	30.0	29.2	12.7	17.2	21.7	20.5
	SB Right	A	A	A	A	A	A	B	B
Overall	Thru (2)	7.6	9.0	10.0	9.9	4.9	6.3	11.1	10.6
	NB Right	C	D	D	D	B	C	C	C
	SB Right	28.4	37.4	45.2	41.5	16.8	23.4	30.9	27.7

(1) Intersection to be equipped with traffic adaptive signal equipment which dynamically adjusts traffic signal timings and phasings based on real-time traffic demand, and therefore, traffic signal timings were optimized in each future scenario. This project is currently under construction by PennDOT.

(2) Improvements include restriping the eastbound approach to provide dual left-turn lanes and a through/right-turn lane, widening the westbound approach to provided a dedicated right-turn lane, and modifying the traffic signal phasing.

Table 9. 95th Percentile Queue Matrices

Street Road (S.R. 0926) and New Street

Time Period		Current Storage ⁽¹⁾	Future Storage ⁽¹⁾	Weekday Morning Peak Hour					Weekday Afternoon Peak Hour				
Design Year				2030 Design Year					2030 Design Year				
Development Condition				Existing	w/o Dev Base	w/o Dev ⁽²⁾ Optimized	w/ Dev	w/ Dev w/ Impvts ⁽²⁾	Existing	w/o Dev Base	w/o Dev ⁽²⁾ Optimized	w/ Dev	w/ Dev w/ Impvts ⁽²⁾
Street Road (S.R. 0926)	Left	2,200'	2,200'	230	253	325	315	318	320	353	320	343	343
	EB Thru												
	Right												
	Left	4,700'	2,350'										
WB Thru													
	Right	150'	93	100	133	285	50	140	153	133	25	25	
													0
New Street	Left	-	-	140	150	115	143	143	125	135	93	135	135
	NB Thru												
	Right												
	Left	-	-										
SB Thru													
	Right	480	563	273	275	273	383	430	278	318	318		

(1) Distance to adjacent signalized intersections shown in italics.

(2) Improvements include the provision of a dedicated westbound right-turn lane.

Table 9. 95th Percentile Queue Matrices
Street Road (S.R. 0926) and Bridlewood Boulevard / Collector Road

Time Period		Current Storage ⁽¹⁾	Future Storage ⁽¹⁾	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year				2030 Design Year			2030 Design Year		
Development Condition				Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
Street Road (S.R. 0926)	Left	-	150'	-	-	0	-	-	30
	EB Thru	<i>2,400'</i>	<i>2,400'</i>	-	-	25	-	-	120
	Right	350'	350'	-	-	0	-	-	25
	Left	120'	120'	25	25	25	25	25	25
	WB Thru	<i>2,300'</i>	<i>2,300'</i>	-	-	43	-	-	95
	Right	-	150'	-	-	25	-	-	25
Bridlewood Boulevard	Left	-	-	25	25	28	25	25	25
	NB Thru	-	-	-	-	40	-	-	45
	Right	-	-	25	25	-	25	25	-
Collector Road	Left	-	-	-	-	43	-	-	25
	SB Thru	-	-	-	-	210	-	-	415
	Right	-	-	-	-	-	-	-	-

(1) Distance to adjacent signalized intersections shown in italics.

(2) Future storage shown if different from existing conditions.

Table 9. 95th Percentile Queue Matrices

U.S. Route 202 (Wilmington Pike) and Street Road (S.R. 0926)

Time Period		Current Storage ⁽¹⁾	Future Storage ⁽²⁾	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour			
Design Year				2030 Design Year			2030 Design Year			
Development Condition				Existing	w/o Dev ⁽³⁾	w/ Dev ⁽³⁾	Existing	w/o Dev ⁽³⁾	w/ Dev ⁽³⁾	
Street Road (S.R. 0926)	Left	450'	450'	885	850	805	673	758	588	
	EB	Left	4700'	2,200'	1018	983	880	800	875	608
		Thru								
		Right								
	WB	Left	200'	200'	235	253	253	320	350	323
		Thru	680'	680'	258	288	300	358	408	430
Right		215'	215'	73	78	78	93	85	85	
U.S. Route 202 (Wilmington Pike)	NB	Left	305'	305'	25	25	38	58	48	93
		Thru	2,800'	2,800'	960	1103	1140	1035	1080	1080
		Right	170'	170'	148	128	130	125	103	103
	SB	Left	375'	375'	98	88	103	213	155	158
		Thru	4,400'	4,400'	1195	1335	1193	3165	3133	2588
		Right	4,400'	4,400'	1273	1470	1270	3193	3178	2588

(1) Distance to adjacent signalized intersections shown in italics.

(2) Future storage shown if different from existing conditions.

(3) Intersection to be equipped with traffic adaptive signal equipment which dynamically adjusts traffic signal timings and phasings based on real-time traffic demand, and therefore, traffic signal timings were optimized in each future scenario. This project is currently under construction by PennDOT.

Table 9. 95th Percentile Queue Matrices
U.S. Route 202 (Wilmington Pike) and West Pleasant Grove Road

Time Period		Current Storage ⁽¹⁾	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
Design Year			2030 Design Year				2030 Design Year			
Development Condition			Existing	w/o Dev	w/ Dev	w/ Dev w/ Impvts ⁽²⁾	Existing	w/o Dev	w/ Dev	w/ Dev w/ Impvts ⁽²⁾
West Pleasant Grove Road	EB Right	-	25	25	25	25	25	25	25	25
	WB Right	-	25	25	25	25	25	25	25	25
U.S. Route 202 (Wilmington Pike)	Left	350'	25	25	25	25	25	25	25	25
	NB Thru	<i>3,100'</i>	-	-	-	-	-	-	-	-
	Thru/Right	<i>3,100'</i>	-	-	-	-	-	-	-	-
	Left	380'	25	25	25	25	33	43	33	33
	SB Thru	<i>1,200'</i>	-	-	-	-	-	-	-	-
	Thru/Right	<i>1,200'</i>	-	-	-	-	-	-	-	-

(1) Distance to adjacent signalized intersections shown in italics.

(2) Improvements include the provision of a dedicated southbound right-turn lane.

Table 9. 95th Percentile Queue Matrices
West Pleasant Grove Road and Church Full-Movement Access

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Thru EB Right	-	-	-	-	-	-
	Left WB Thru	0	0	0	0	0	0
Church Full-Movement Access	Left NB	0	0	0	0	0	0
	Right	0	0	0	0	0	0

Table 9. 95th Percentile Queue Matrices
West Pleasant Grove Road and Orvis Way (By Others)

Time Period		Weekday Morning Peak Hour		Weekday Afternoon Peak Hour	
Design Year		2030 Design Year		2030 Design Year	
Development Condition		w/o Dev	w/ Dev	w/o Dev	w/ Dev
West Pleasant Grove Road	Left EB Thru	25	25	25	0
	Thru WB Right	-	-	-	-
Orvis Way (By Others)	Left SB Right	25	25	25	70

Table 9. 95th Percentile Queue Matrices
West Pleasant Grove Road and Church Egress Only Access

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	EB Thru	-	-	-	-	-	-
	WB Thru	-	-	-	-	-	-
Church Egress Only Access	Left NB Right	0	0	0	0	0	0

**Table 9. 95th Percentile Queue Matrices
West Pleasant Grove Road and Collector Road**

Time Period		Weekday Morning Peak Hour	Weekday Afternoon Peak Hour
Design Year		2030 Design Year	2030 Design Year
Development Condition		w/ Dev	w/ Dev
West Pleasant Grove Road	EB Thru/Right	-	-
	WB Left/Thru	25	28
Collector Road	NB Left/Right	25	70

Table 9. 95th Percentile Queue Matrices

West Pleasant Grove Road and Road M

Time Period		Weekday Morning Peak Hour	Weekday Afternoon Peak Hour
Design Year		2030 Design Year	2030 Design Year
Development Condition		w/ Dev	w/ Dev
West Pleasant Grove Road	EB Thru/ Right	-	-
	WB Left/ Thru	0	0
Road M	NB Left Right	25	0

Table 9. 95th Percentile Queue Matrices
West Pleasant Grove Road and Dunvegan Road / Road K

Time Period		Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year		2030 Design Year			2030 Design Year		
Development Condition		Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Left	0	0	0	0	0	0
	EB Thru						
	Right	-	-		-	-	
	Left	-	-		-	-	
WB Thru				0			0
	Right	-	-		-	-	
Road K	Left	-	-	25	-	-	25
	NB Thru						
Right							
	Dunvegan Road	0	0	0	0	0	0

Table 9. 95th Percentile Queue Matrices

New Street and West Pleasant Grove Road

Time Period		Current Storage ⁽¹⁾	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
Design Year			2030 Design Year			2030 Design Year		
Development Condition			Existing	w/o Dev	w/ Dev	Existing	w/o Dev	w/ Dev
West Pleasant Grove Road	Left WB	-	40	48	38	45	58	45
	Right	-						
New Street	Thru NB	<i>3,350'</i>	-	-	-	-	-	-
	Left SB	-	0	25	25	25	25	25
	Thru							

(1) Distance to adjacent signalized intersections shown in italics.

Table 9. 95th Percentile Queue Matrices

U.S. Route 202 (Wilmington Pike) and Skiles Boulevard / Stetson School Drive

Time Period		Current Storage ⁽¹⁾	Future Storage ⁽²⁾	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour				
Design Year				2030 Design Year				2030 Design Year				
Development Condition				Existing	w/o Dev ⁽³⁾	w/ Dev ⁽³⁾	w/ Dev w/ Impvts ⁽⁴⁾	Existing	w/o Dev ⁽³⁾	w/ Dev ⁽³⁾	w/ Dev w/ Impvts ⁽⁴⁾	
Stetson School Drive	Left	200'	200' (2 Lanes)									
	EB Thru	-			220				228			
	Right	200'										
Skiles Boulevard	Left	350'	350'									
	WB Thru	-			88				98			
	Right	150'										
U.S. Route 202 (Wilmington Pike)	NB Thru (2)	4,400'	4,400'		818	1115	1135	1120	505	788	868	830
	Right	220'	220'		25	25	25	25	25	25	33	33
	SB Thru (2)	4,600'	4,600'		545	775	853	843	403	628	678	655
	Right	200'	200'		93	145	163	178	33	60	203	215

(1) Distance to adjacent signalized intersections shown in italics.

(2) Future storage shown if different from existing conditions.

(3) Intersection to be equipped with traffic adaptive signal equipment which dynamically adjusts traffic signal timings and phasings based on real-time traffic demand, and therefore, traffic signal timings were optimized in each future scenario. This project is currently under construction by PennDOT.

(4) Improvements include restriping the eastbound approach to provide dual left-turn lanes and a through/right-turn lane, widening the westbound approach to provided a dedicated right-turn lane, and modifying the traffic signal phasing.

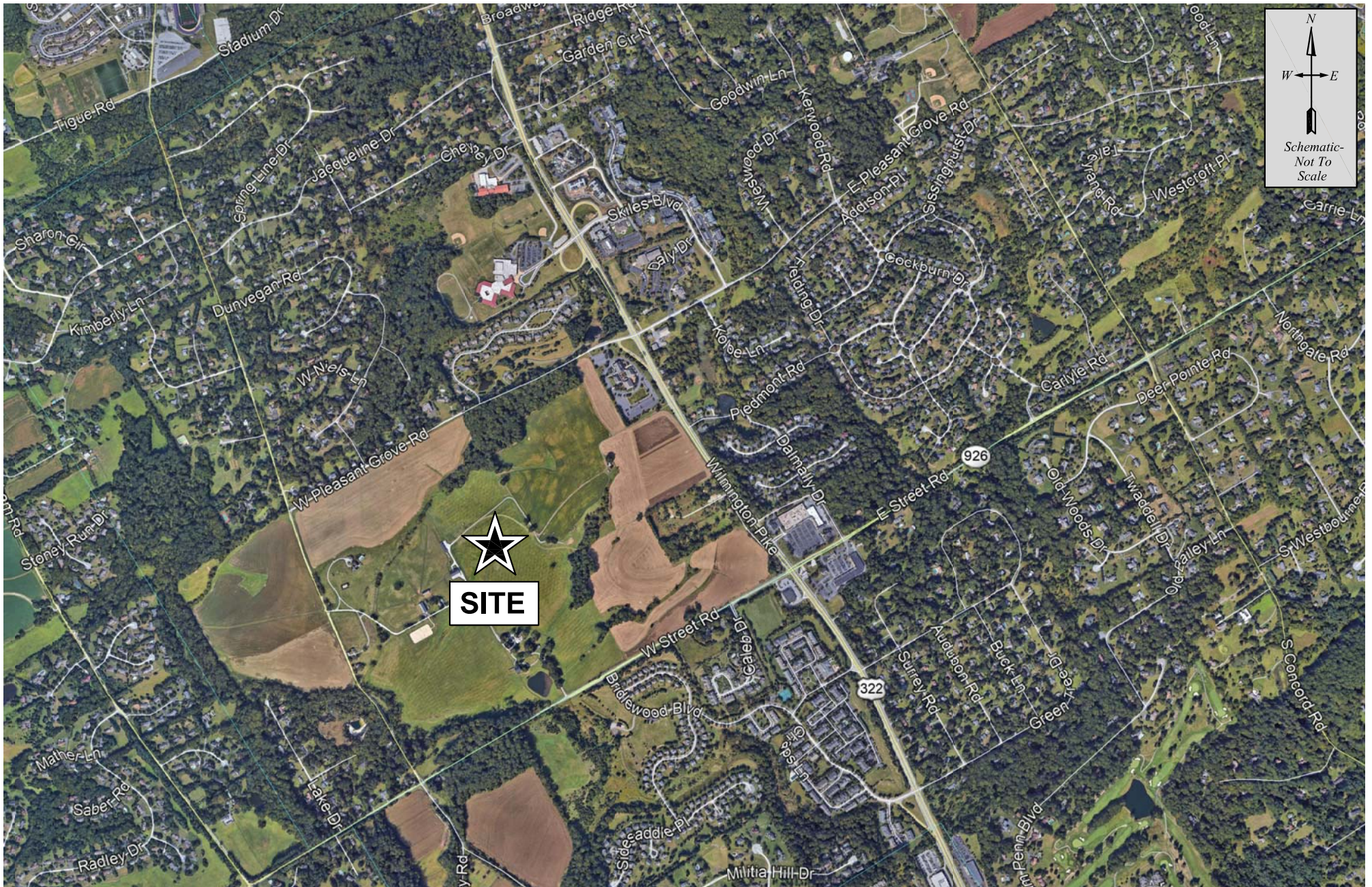


FIGURE 1
 Site Location Map
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

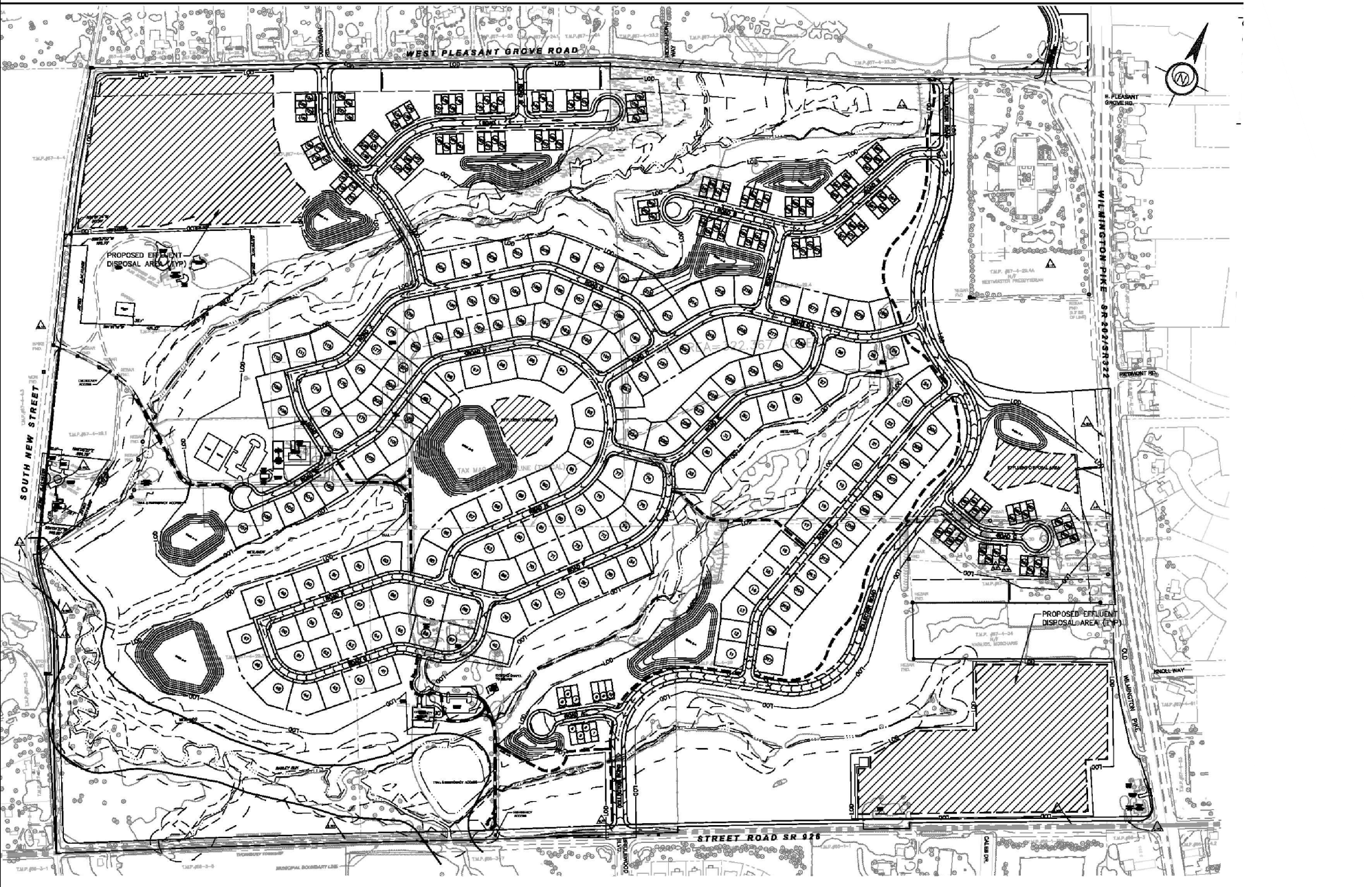


FIGURE 2
 Site Plan
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:

- 10 WEEKDAY AM PEAK HOUR
- (10) WEEKDAY PM PEAK HOUR

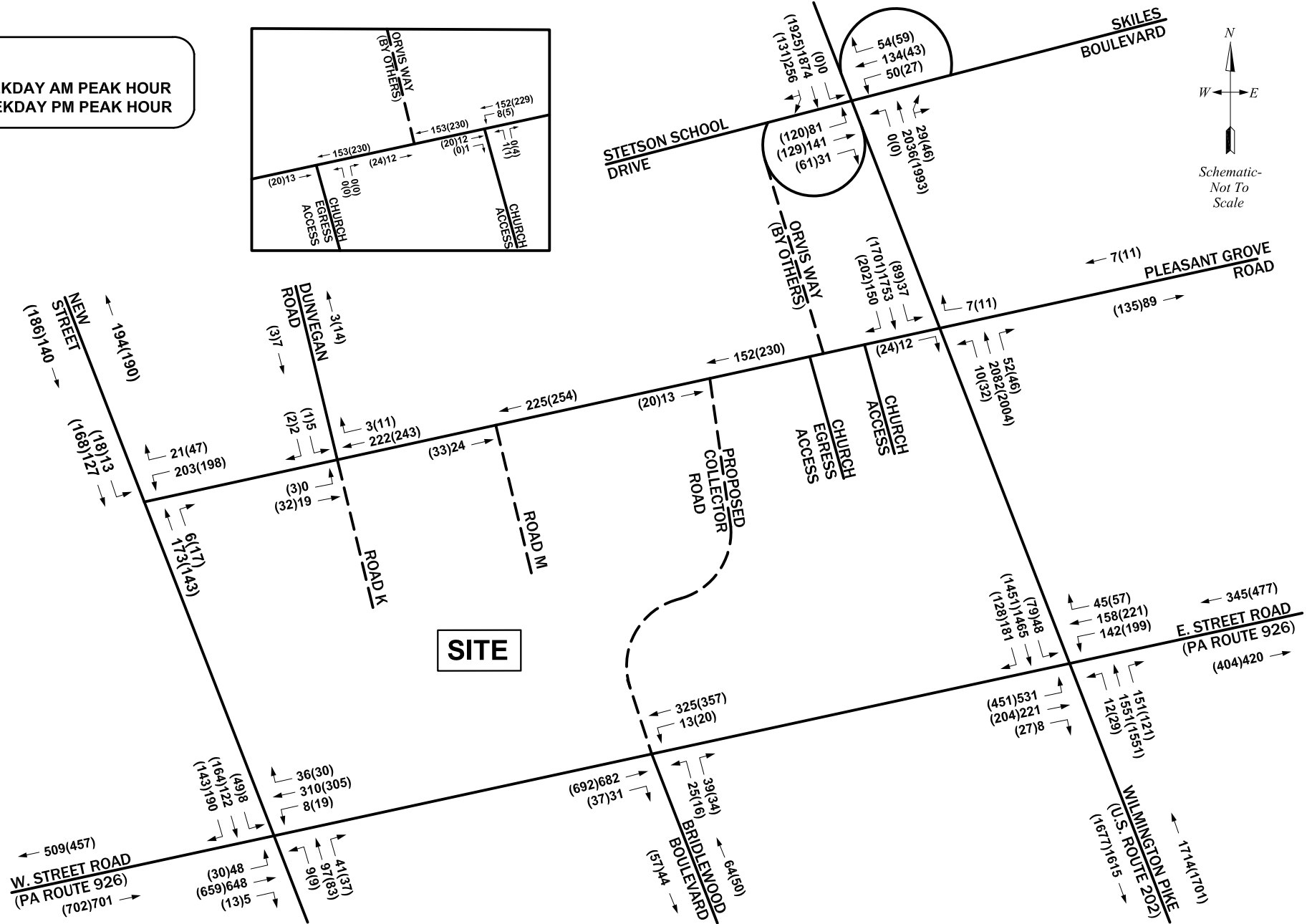


FIGURE 3A
 Existing Peak Hour Traffic Volumes
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

- LEGEND:**
- A WEEKDAY MORNING PEAK HOUR
 - (A) WEEKDAY AFTERNOON PEAK HOUR
 - EXISTING LANE/MOVEMENT
 - EXISTING TRAFFIC SIGNAL
 - EXISTING STOP CONTROL
 - * V/C RATIO > 1.0

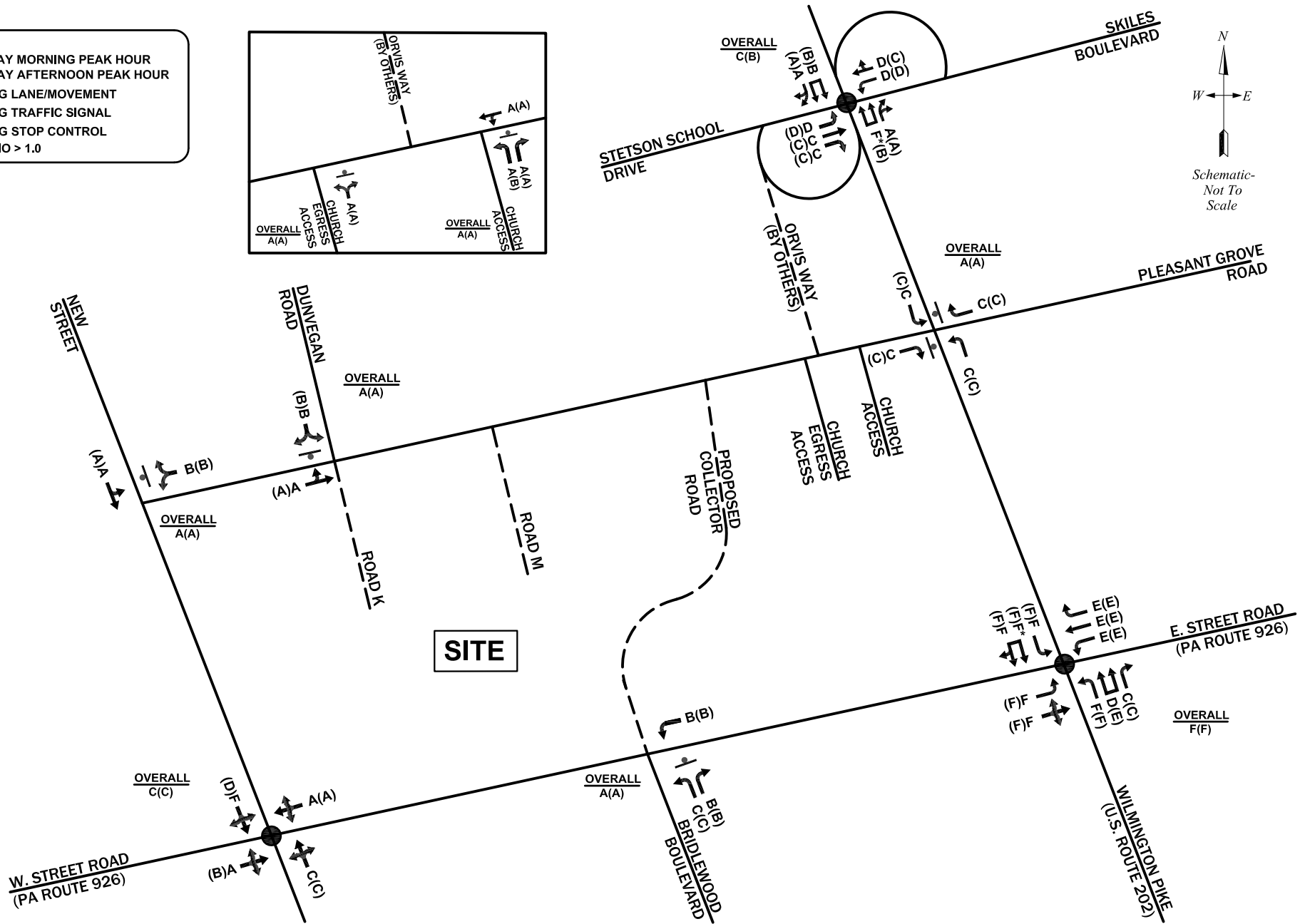


FIGURE 3B
 Existing Peak Hour Levels-of-Service
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:
 10% ENTERING
 (10%) EXITING

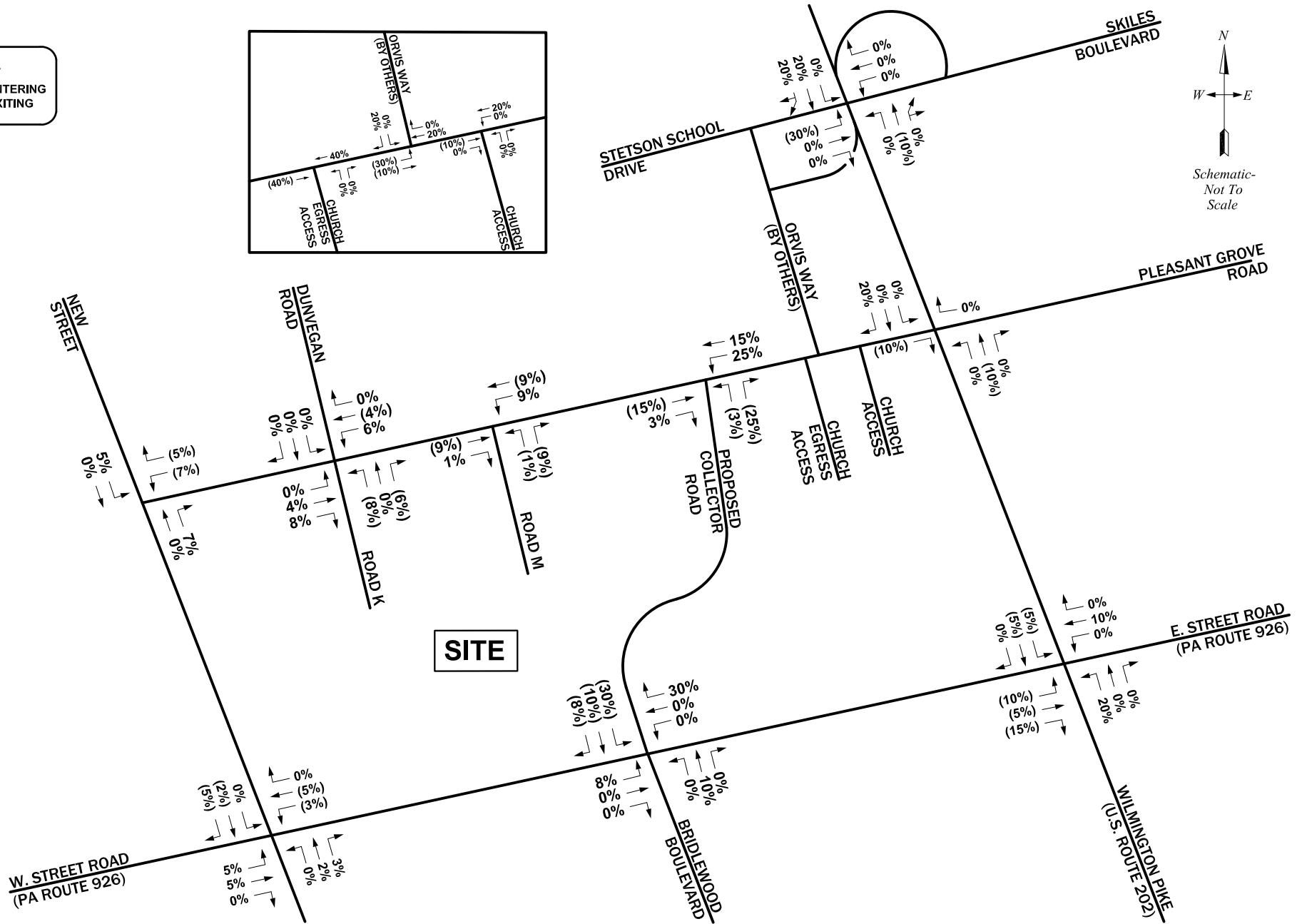


FIGURE 4A
 New Site Trip Distributions
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:

- 10 WEEKDAY AM PEAK HOUR
- (10) WEEKDAY PM PEAK HOUR

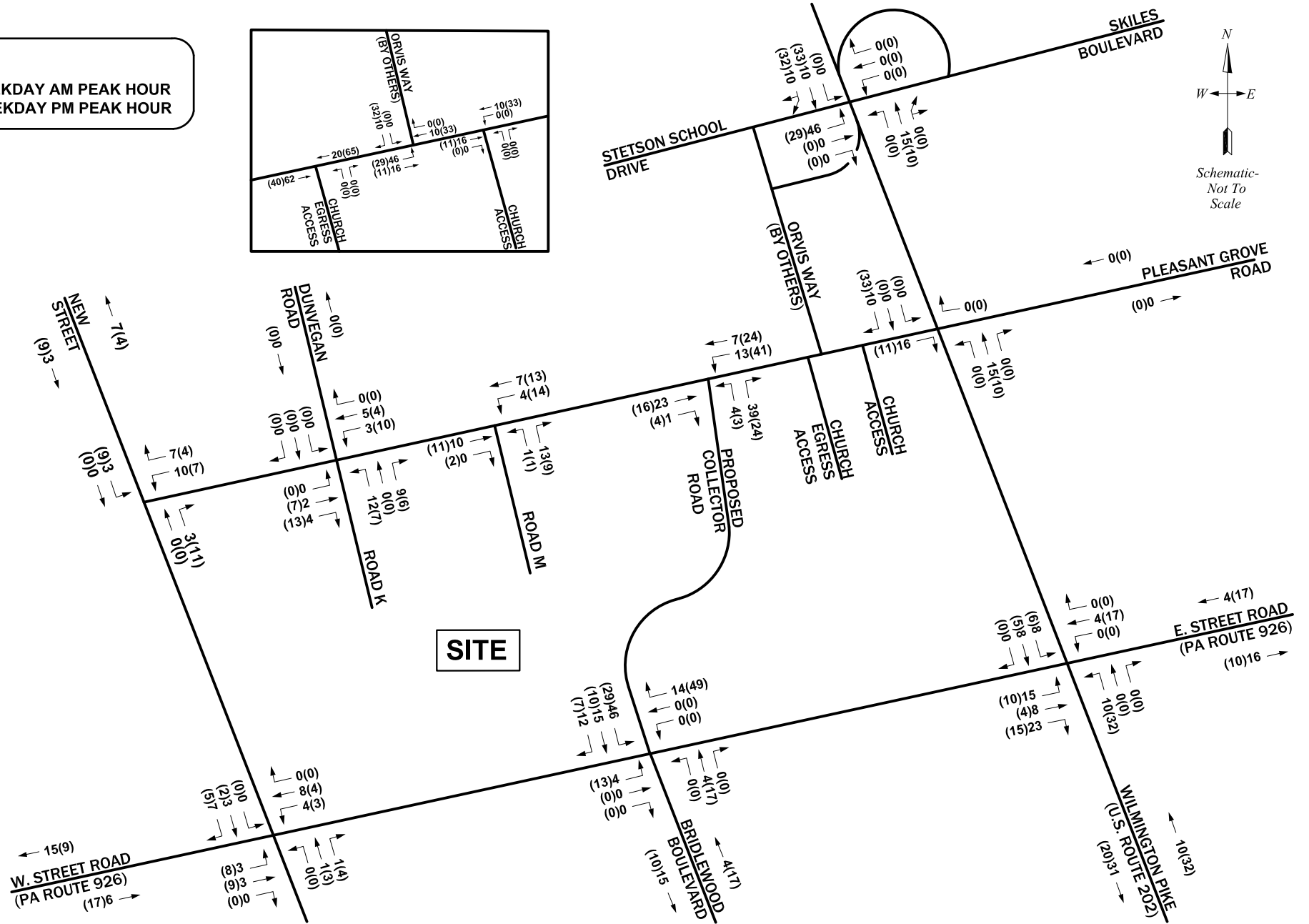


FIGURE 4B
 New Site Trip Assignments
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:
 10 WEEKDAY AM PEAK HOUR
 (10) WEEKDAY PM PEAK HOUR

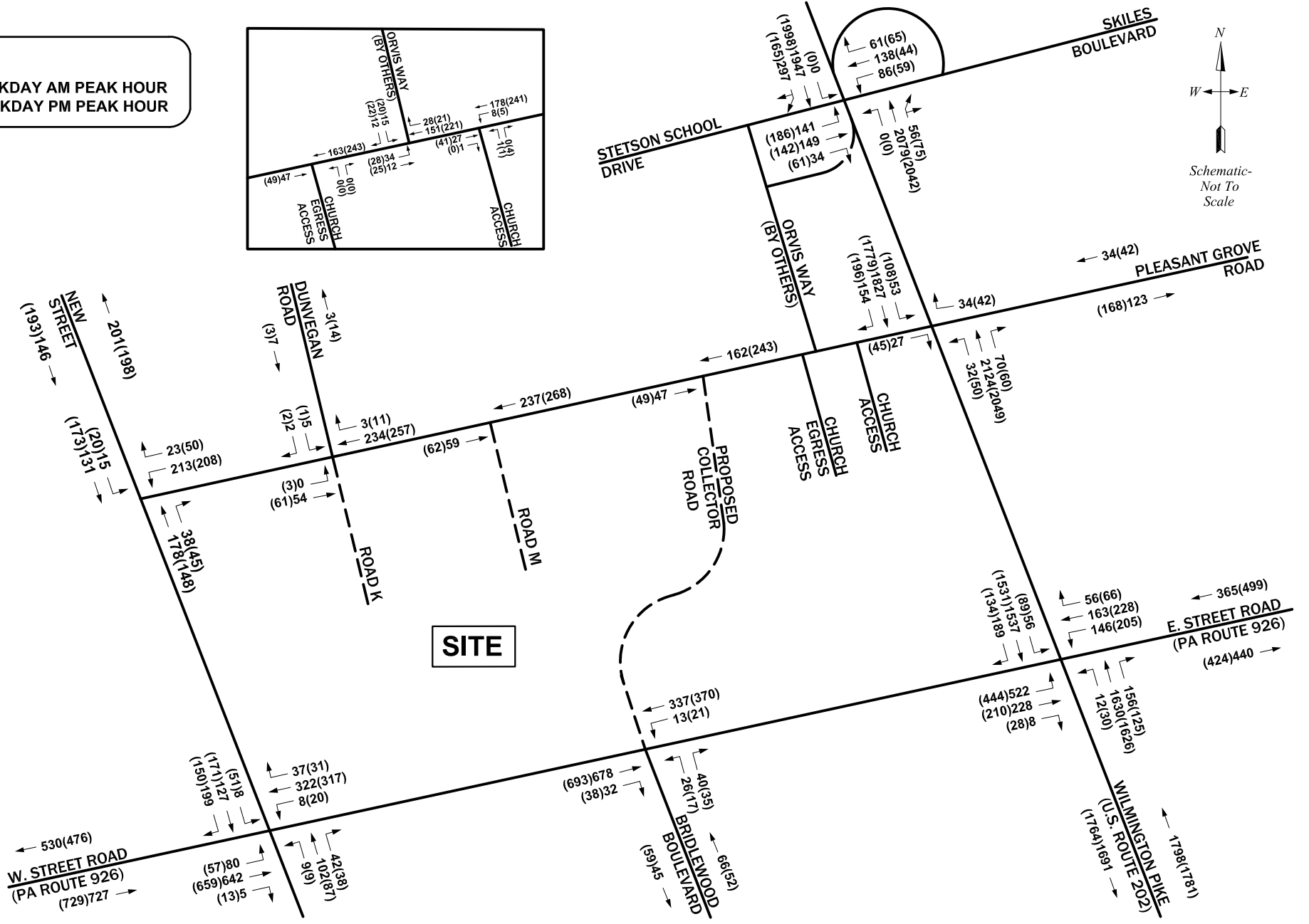
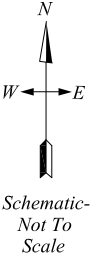
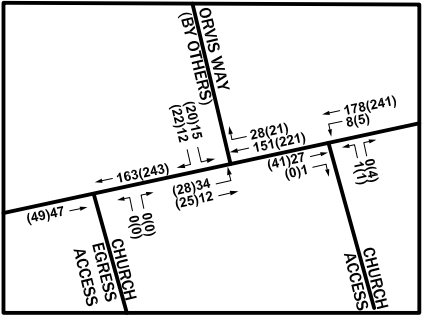


FIGURE 5A
 2025 Build-Out Year without Development Peak Hour Traffic Volumes
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA



LEGEND:
 10 WEEKDAY AM PEAK HOUR
 (10) WEEKDAY PM PEAK HOUR

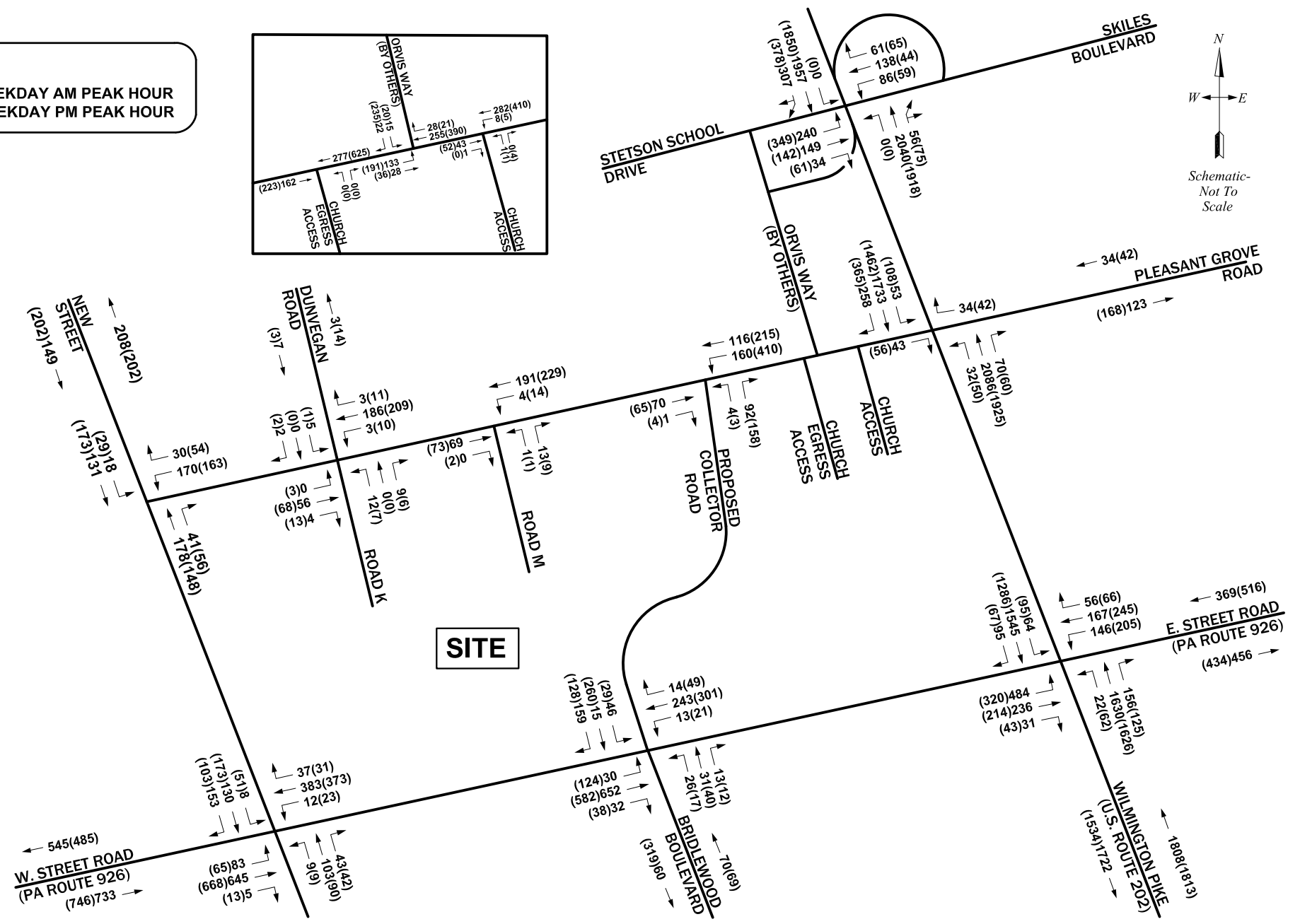
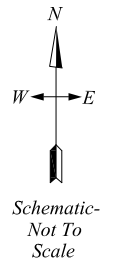
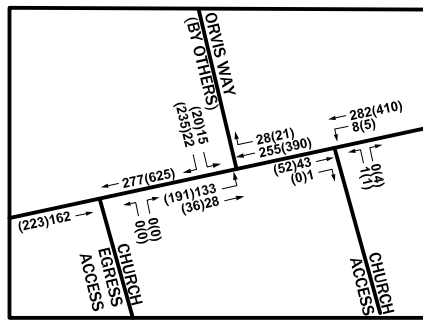


FIGURE 5B
 2025 Build-Out Year with Development Peak Hour Traffic Volumes
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

- LEGEND:**
- A WEEKDAY MORNING PEAK HOUR
 - (A) WEEKDAY AFTERNOON PEAK HOUR
 - EXISTING LANE/MOVEMENT
 - EXISTING TRAFFIC SIGNAL
 - EXISTING STOP CONTROL
 - * V/C RATIO > 1.0
 - PROPOSED LANE/MOVEMENT BY OTHERS
 - PROPOSED STOP CONTROL BY OTHERS

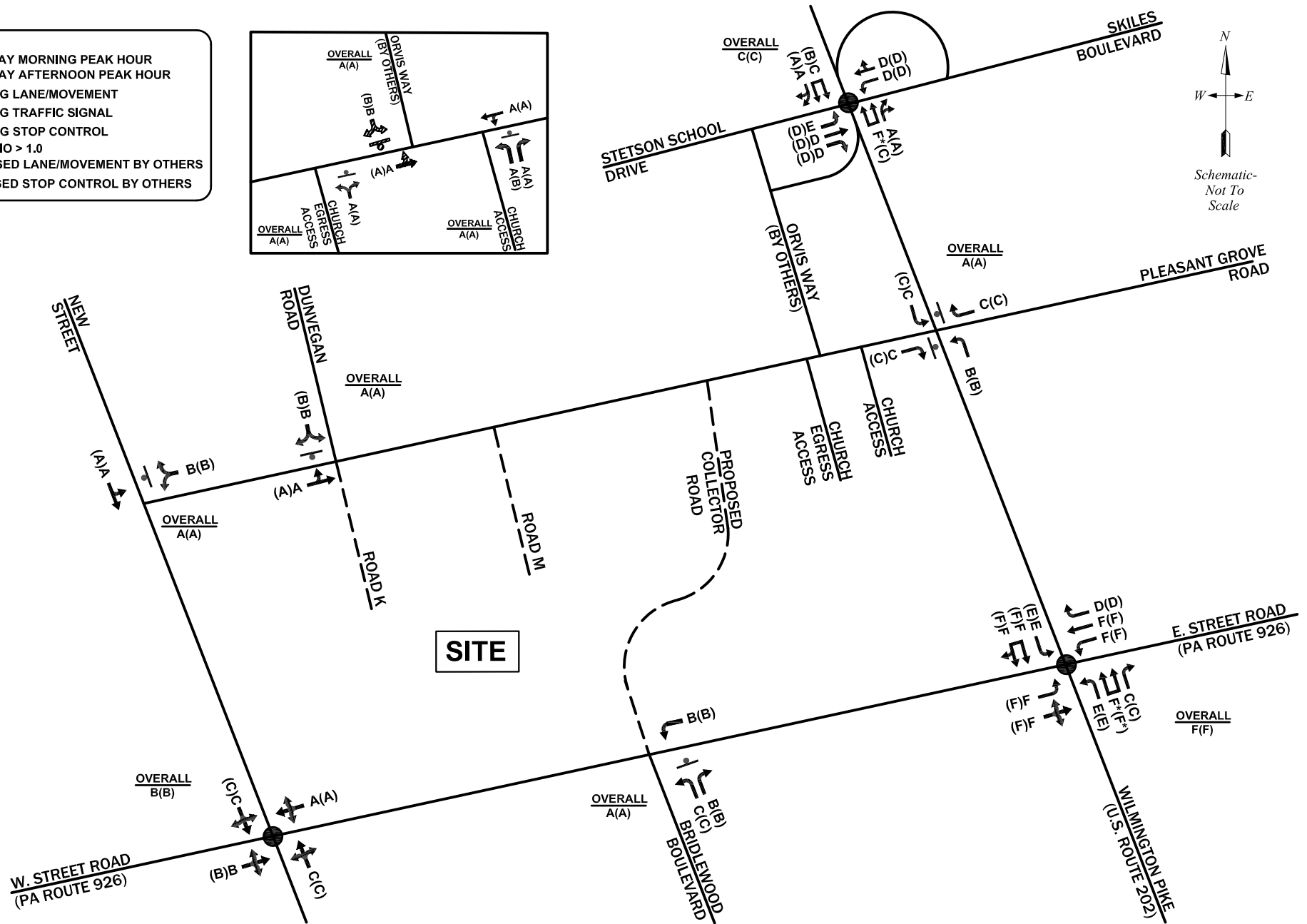


FIGURE 5C
 2025 Build-Out Year without Development Peak Hour Levels-of-Service
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- EXISTING LANE/MOVEMENT
- EXISTING TRAFFIC SIGNAL
- EXISTING STOP CONTROL
- * V/C RATIO > 1.0
- PROPOSED LANE/MOVEMENT BY OTHERS
- PROPOSED STOP CONTROL BY OTHERS
- PROPOSED LANE/MOVEMENT
- PROPOSED TRAFFIC SIGNAL
- PROPOSED STOP CONTROL

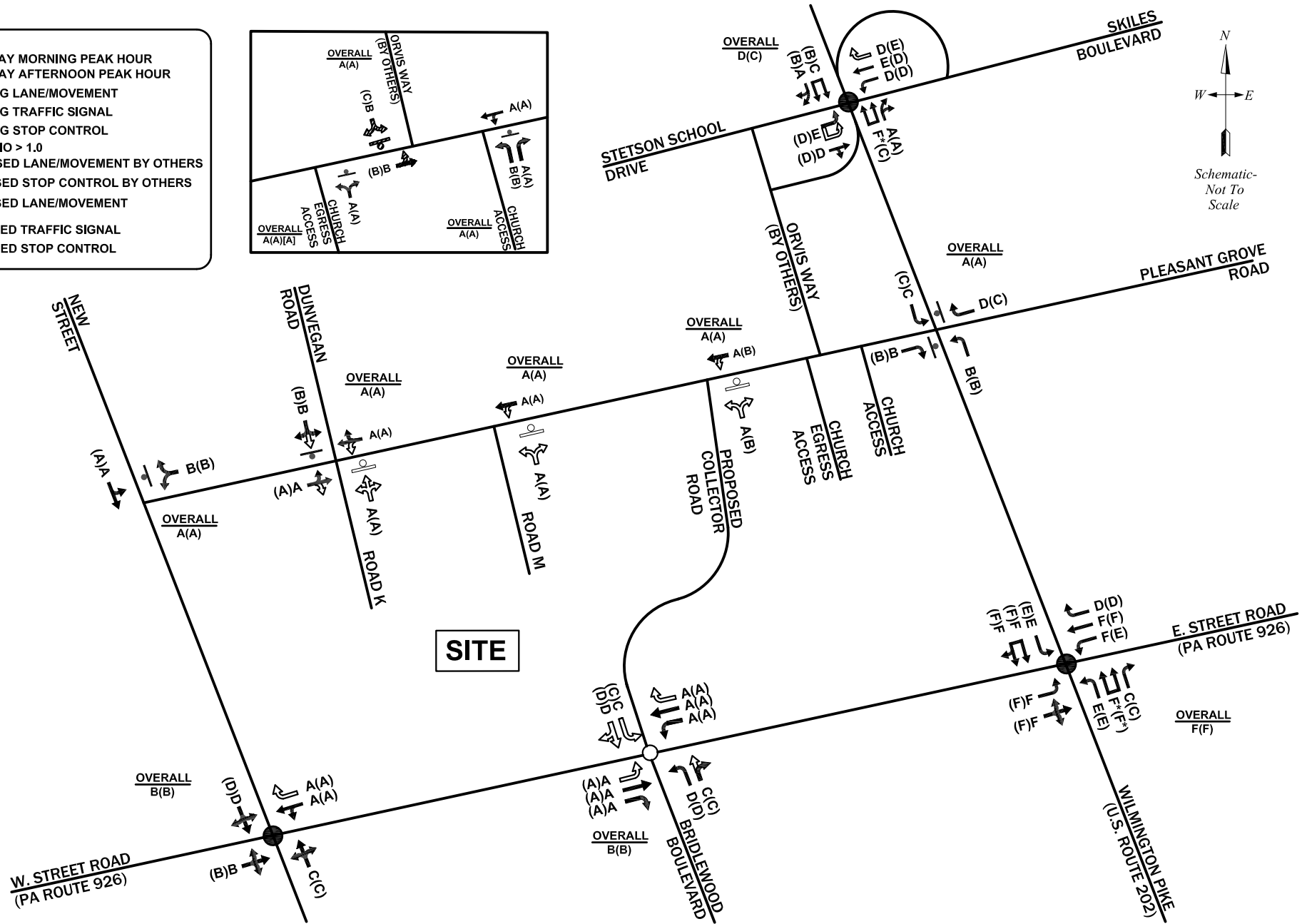


FIGURE 5D
 2025 Build-Out Year with Development Peak Hour Levels-of-Service
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:
 10 WEEKDAY AM PEAK HOUR
 (10) WEEKDAY PM PEAK HOUR

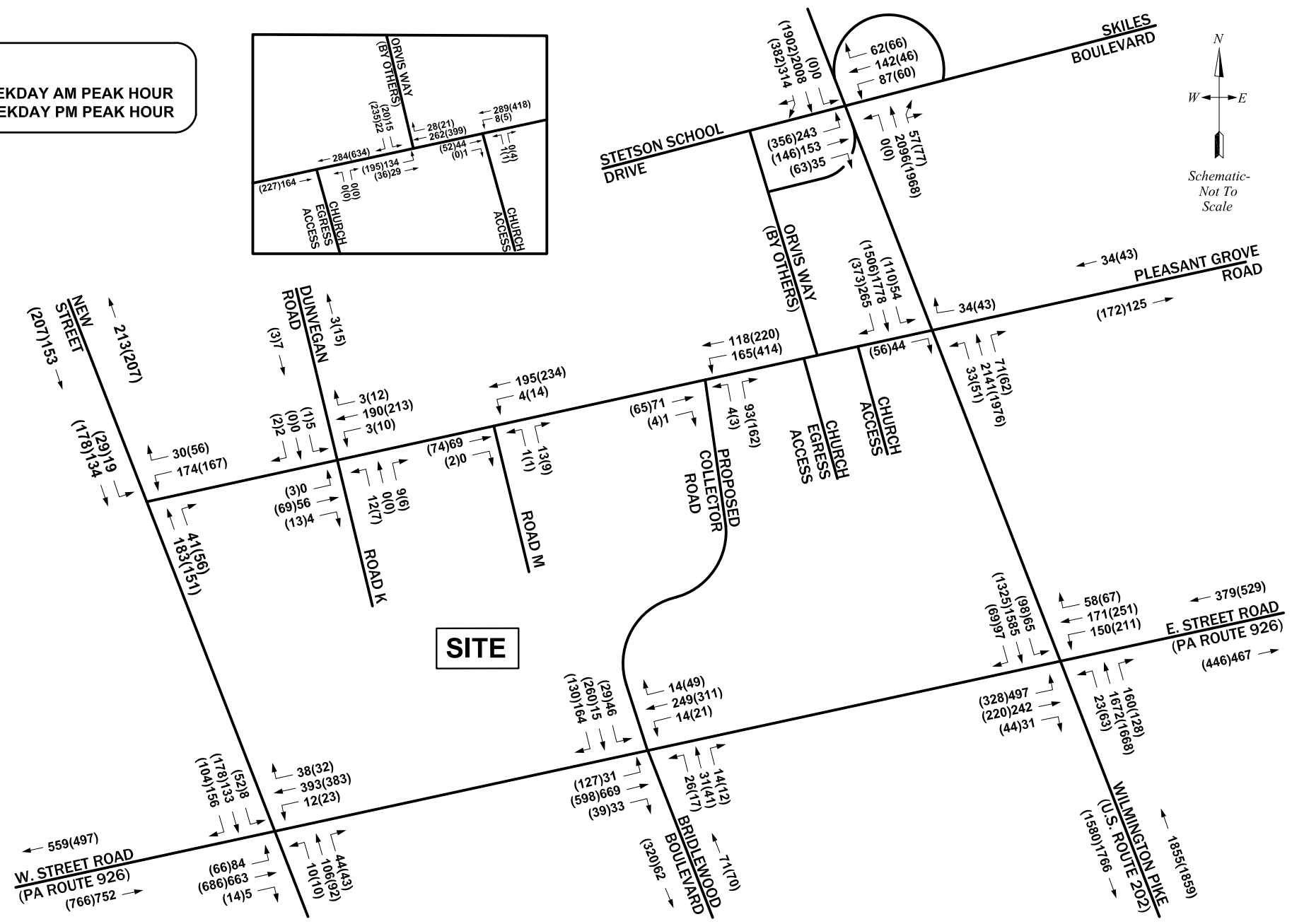
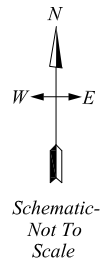
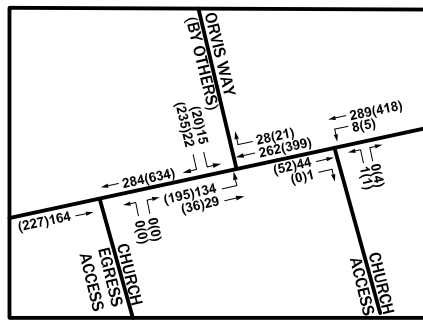


FIGURE 6B
 2030 Design Year with Development Peak Hour Traffic Volumes
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- EXISTING LANE/MOVEMENT
- EXISTING TRAFFIC SIGNAL
- EXISTING STOP CONTROL
- PROPOSED LANE/MOVEMENT BY OTHERS
- PROPOSED STOP CONTROL BY OTHERS

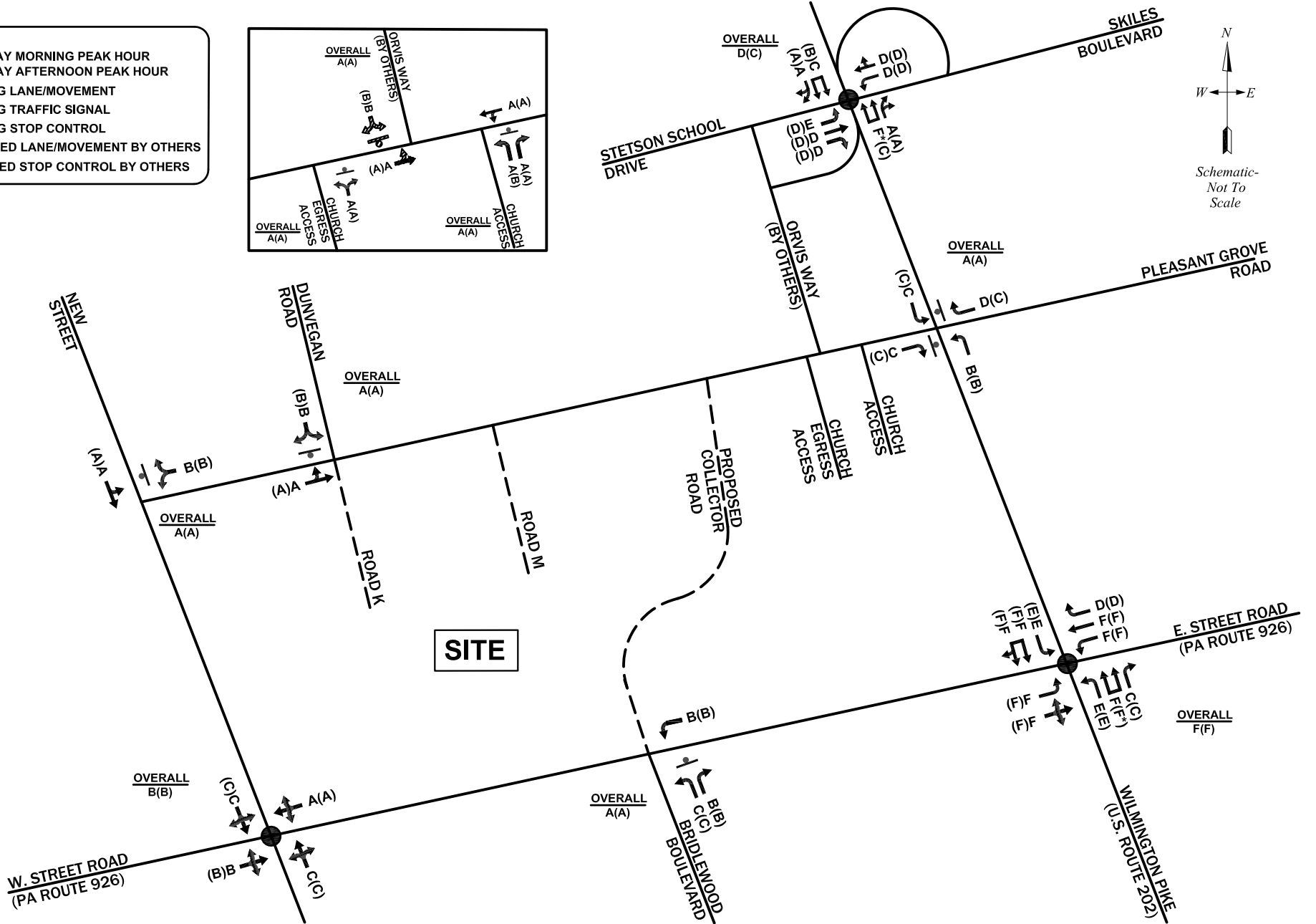
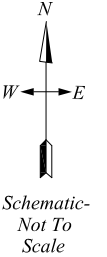
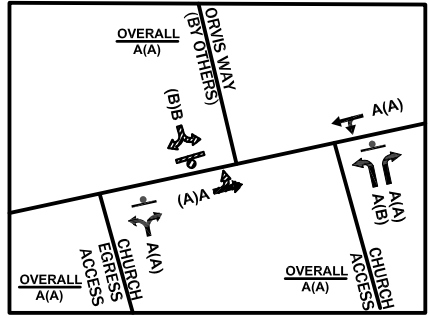


FIGURE 6C
 2030 Design Year without Development Peak Hour Levels-of-Service
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND:

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- EXISTING LANE/MOVEMENT
- EXISTING TRAFFIC SIGNAL
- EXISTING STOP CONTROL
- * V/C RATIO > 1.0
- PROPOSED LANE/MOVEMENT BY OTHERS
- PROPOSED STOP CONTROL BY OTHERS
- PROPOSED LANE/MOVEMENT
- PROPOSED TRAFFIC SIGNAL
- PROPOSED STOP CONTROL

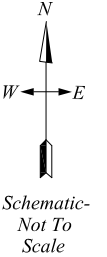
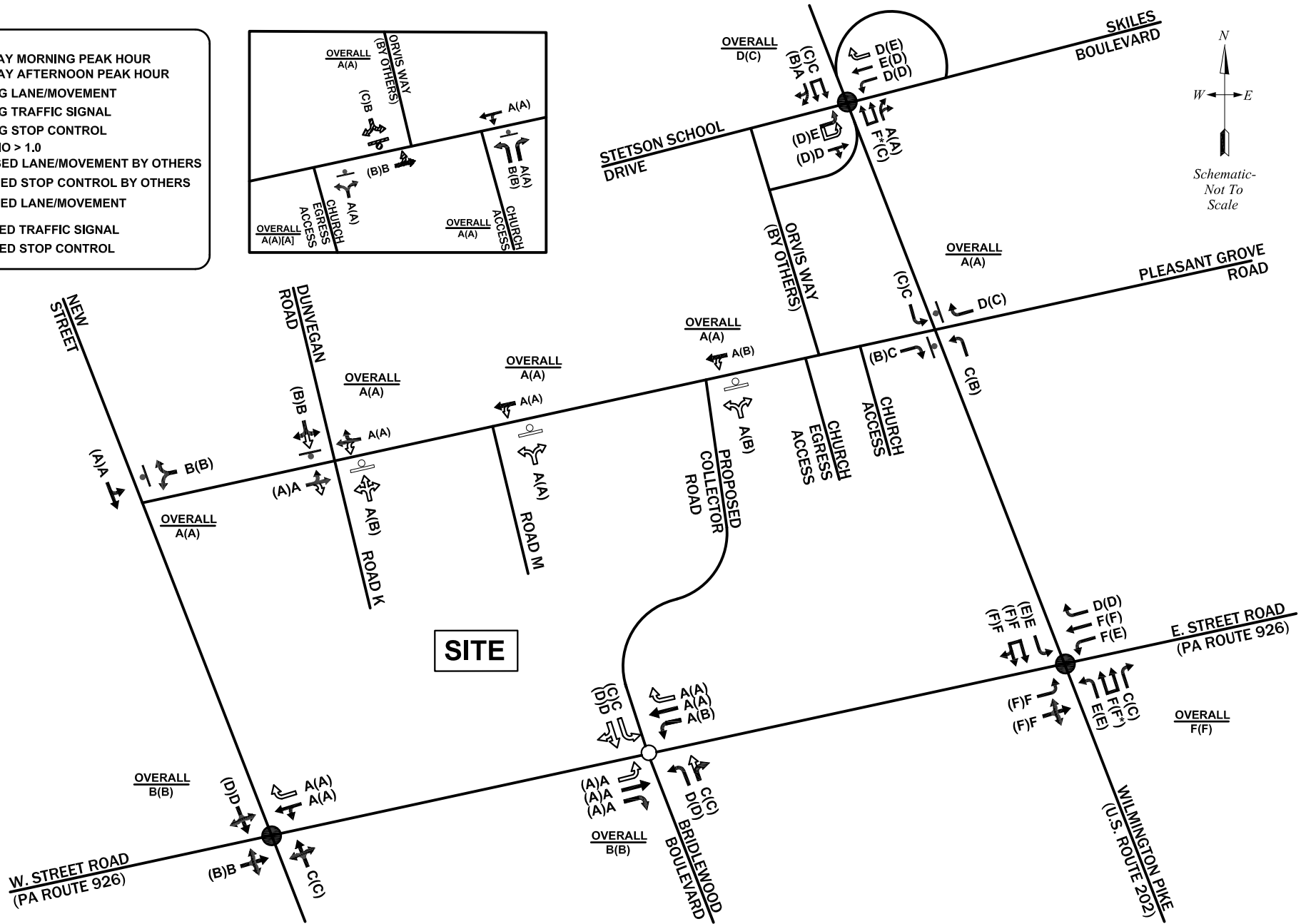


FIGURE 6D
 2030 Design Year with Development Peak Hour Levels-of-Service
ROBINSON TRACT
 WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

