

# Pennsylvania Act 209 Roadway Sufficiency Analysis

*East Coventry Township, Chester County, PA*



Prepared for  
**East Coventry Township**

Prepared by  
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TRANSPORTATION ENGINEERS & PLANNERS

February 7, 2011

McMahon Project Number 804816.11

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## Introduction

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### *Overview*

This *Roadway Sufficiency Analysis* has been prepared in accordance with the requirements set forth in Pennsylvania Act 209 on behalf of East Coventry Township, Chester County, Pennsylvania. Pennsylvania Act 209 was signed into law effective December 19, 1990. It amends the Pennsylvania Municipalities Code (Act 247 of 1968, as amended) to permit municipalities to assess transportation impact fees on new development within their boundaries, provided that they have adopted a municipal transportation impact fee ordinance in accordance with the procedures set forth in the Act. In 2002, Act 68 further modified the Pennsylvania Municipalities Code to add additional provisions and clarify existing provisions of the law.

Impact fees under Act 209 may only be used for those costs incurred for improvements designated in the adopted transportation capital improvements plan of the municipality that are attributable to new development except under certain circumstances that are defined by the legislation (Section 505-A(d)). The impact fees cannot be used for municipal, non-transportation-related capital improvements; for the repair, maintenance, or operation of existing or new municipal transportation capital improvements; or for the upgrade or replacement of existing municipal transportation capital improvements due to operational or safety deficiencies not related to new development. The Act specifically and only applies to off-site transportation capital improvements attributable to new development; it neither applies to, nor restricts the procedures or powers of the municipality to require on-site transportation improvements to remedy impacts of new development, nor is it intended to replace the municipality's ordinance requirements for submission of traffic impact studies.

All appendices supporting the *Roadway Sufficiency Analysis* referred to in this report are contained in a separate bound document entitled, *Pennsylvania Act 209 Transportation Impact Fee Study Technical Appendices, East Coventry Township, Chester County*, dated February 25, 2011.

### *Process*

The process that East Coventry Township has undertaken includes the completion of the necessary milestones pursuant to the Act 209 legislation, as follows:

1. Appointment of a Transportation Impact Fee Advisory Committee (TIFAC) and designation of the geographic area of the municipality that will be subject to the transportation impact fee ordinance. The meeting minutes of the Transportation Impact fee Advisory Committee are included in **Appendix A**.
2. Development and adoption of a Land Use Assumptions Report within the Township and the designated geographic area, the Transportation Service Area

(TSA), which together with existing development are the subject of a Roadway Sufficiency Analysis and creation of a Transportation Capital Improvement Plan.

3. Completion and approval of a Roadway Sufficiency Analysis for the Transportation Service Area, identifying traffic deficiencies and needed improvements attributable to existing traffic, future traffic not originating from within the service area (i.e., pass-through traffic), and future traffic originating from new development within the service area for a preferred level of service in terms of desired traffic operations during the designated peak hour of study.
4. Adoption of a Transportation Capital Improvement Plan, including costs, implementation priorities, and funding sources, specifically and separately addressing improvements required to remedy:
  - a. current traffic deficiencies resulting from **existing** traffic volumes and capacity limitations;
  - b. traffic deficiencies attributable to future **pass-through** traffic after existing deficiencies have been remedied; and
  - c. traffic deficiencies attributable to expected **new development** within the service area after pass-through traffic and after existing deficiencies have been remedied.
5. Adoption of a Transportation Impact Fee Ordinance based on the total cost of identified transportation improvements attributable to **new development** within the Transportation Service Area to be assessed on a “per trip” basis.

Act 209 requires a minimum future planning horizon of five years. A 10-year planning horizon has been selected for the purpose of this analysis, and the future year 2019 will be considered the design year. However, this document is not a static, “one-time” effort, as the Act 209 legislation has provisions for periodic updates of the Roadway Sufficiency Analysis, Transportation Capital Improvement Plan, and Traffic Impact Fee Ordinance, as changes in the land use assumptions, transportation improvement needs, or funding conditions occur.

### *Land Use Assumptions*

As required by Act 209, a *Land Use Assumptions Report* (dated June 14, 2010) was prepared and completed by the East Coventry Township TIFAC with the assistance of ARRO for the purposes of completing this *Roadway Sufficiency Analysis*. Subsequently, the Board of Supervisors adopted the *Land Use Assumptions Report*, as required by Act 209, on June 14, 2010. A copy of the *Land Use Assumptions Report* is provided in **Appendix B**.

The *Land Use Assumptions Report* identifies the potential anticipated ultimate development build-out, as well as the projected build-out on a development zone basis to the year 2019, and it provides figures illustrating the location of these zones. The *Land Use Assumptions Report* projections were used for projecting future development trip generation and for completing the traffic analysis contained in this study. The projected 2019 development, which is the basis of this analysis, is summarized below in **Table 1**.

**Table 1. Land Use Assumptions Report 2019 Development Summary**

<b>Land Use Classification</b>	<b>10-Year Development Projection</b>
Low-Density Residential	109 dwelling units
Medium Density Residential	149 dwelling units
Non-Residential	254,212 square feet

## Existing Transportation Network

This *Existing Transportation Network* section includes designation of the roadways and intersections selected to be evaluated as part of this *Roadway Sufficiency Analysis*, as well as an inventory of physical and operational characteristics of the existing Township transportation system required for the completion of the *Roadway Sufficiency Analysis*. This section also delineates the Transportation Service Area required by the Act 209 legislation.

### Roadway Characteristics

The East Coventry Township roadway system, as illustrated in **Figure 1**, consists primarily of two-lane, undivided highways. Major regional access to the Township is provided via the U.S. Route 422 limited access expressway, with access provided to the west along PA Route 724 (within North Coventry Township), and to the north along Linfield Road (within Limerick Township). The roadway network shown in Figure 1 constitutes the transportation roadway network analyzed pursuant to Act 209. The operating characteristics of each major roadway are summarized in **Table 2**.

**Table 2. Existing Transportation Network Summary**

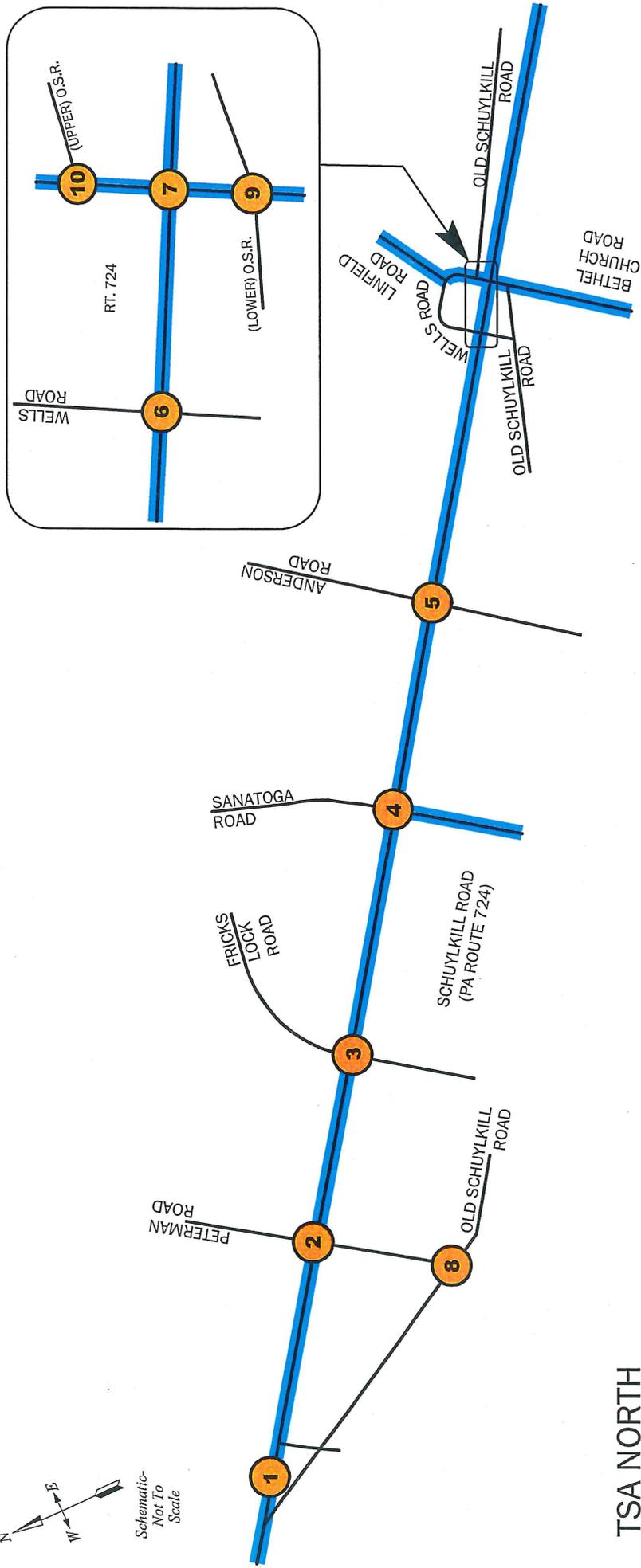
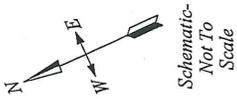
Roadway	Roadway Classification <sup>1</sup>	Roadway Ownership	Posted Speed Limit (mph)
Schuylkill Road (S.R. 0724)	Minor Arterial	State	45 to 55 (unposted)
Ridge Road (S.R. 0023)	Minor Arterial	State	50
Old Schuylkill Road	Collector	Township	35
Bethel Church Road (S.R. 1033)	Collector	State	25 to 40
Linfield Road (S.R. 1035)	Minor Arterial	State	35
Sanatoga Road (S.R. 1034)	Collector	State	35 to 40

1. Based on the *Federal Functional Class* map for Chester County, June 2, 2006.

Twelve study intersections have been selected by the Township to be evaluated and included in the *Roadway Sufficiency Analysis* and *Transportation Capital Improvements Plan*. These intersections are listed in **Table 3**.

**Table 3. Study Intersections**

Intersection Reference No.	Intersection	Current Traffic Control
1	Schuylkill Road (S.R. 0724) and Old Schuylkill Road	Stop Sign
2	Schuylkill Road (S.R. 0724) and Peterman Road	Stop Sign
3	Schuylkill Road (S.R. 0724) and Fricks Lock Road	Stop Sign
4	Schuylkill Road (S.R. 0724) and Sanatoga Road (S.R. 1034)	Stop Sign
5	Schuylkill Road (S.R. 0724) and Anderson Road	Stop Sign
6	Schuylkill Road (S.R. 0724) and Wells Road	Stop Sign
7	Schuylkill Road (S.R. 0724) and Bethel Church Road(S.R. 1033)/Linfield Road (S.R. 1035)	Traffic Signal



TSA NORTH

TSA SOUTH

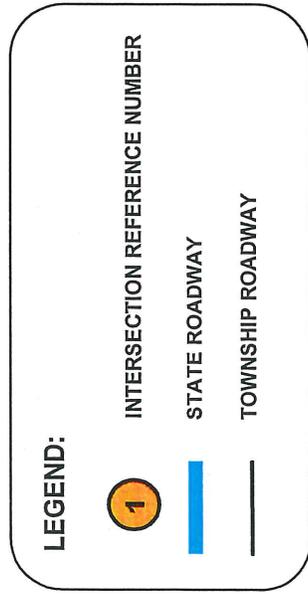


FIGURE 1

Study Area Map

# EAST COVENTRY TOWNSHIP ROADWAY SUFFICIENCY ANALYSIS CHESTER COUNTY, PENNSYLVANIA



8	Old Schuylkill Road and Peterman Road	Stop Sign
9	Old Schuylkill Road and Bethel Church Road	Stop Sign
10	Old Schuylkill Road and Linfield Road	Stop Sign
11	Ridge Road (S.R. 0023) and Porters Mill Road	Stop Sign
12	Ridge Road (S.R. 0023) and Bethel Church Road	Stop Sign

### *Existing Traffic Volumes*

Traffic operating conditions are influenced by the relationships between traffic volumes and the capacity of the roadways and intersections. In order to evaluate existing traffic conditions, manual turning movement traffic counts were conducted at each of the 12 study intersections during the weekday morning peak period (7:00 AM to 9:00 AM) and afternoon peak period (4:00 PM to 6:00 PM) on typical weekdays in January 2010. These traffic counts were tabulated by fifteen-minute periods to establish the four highest consecutive 15-minute periods, which constitute the weekday afternoon peak hour.

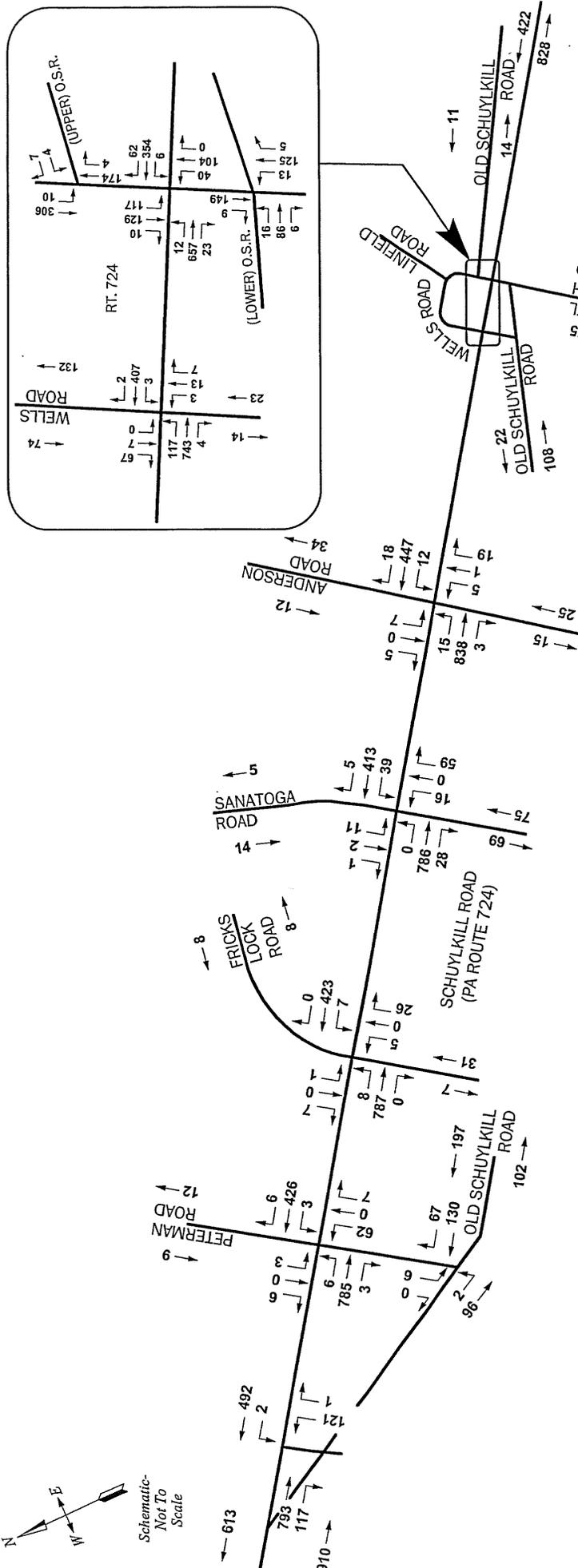
The traffic volumes were balanced upwards between intersections, where appropriate, due to traffic counts at adjacent intersections being conducted on different days. **Figures 2 and 3** illustrate the 2010 existing weekday morning and weekday afternoon peak hour traffic volumes at the study intersections. The actual traffic counts are provided in **Appendix C**.

Additionally, 24-hour Automatic Traffic Recorder (ATR) counts were conducted at five locations during January 2010 over the course of a one-week period to determine the traffic volumes typically entering and exiting the Township along the major study roadways, as well as to establish current traffic patterns along the area roadways. The average daily traffic volumes are summarized in **Figure 4** and the ATR count data is provided in **Appendix D**. The ATR counts were conducted at the following locations:

- Schuylkill Road (S.R. 0724), west of Old Schuylkill Road
- Schuylkill Road (S.R. 0724), east of Bethel Church Road/Linfield Road
- Ridge Road (S.R. 0023), west of Porters Mill Road
- Ridge Road (S.R. 0023), east of Bethel Church Road

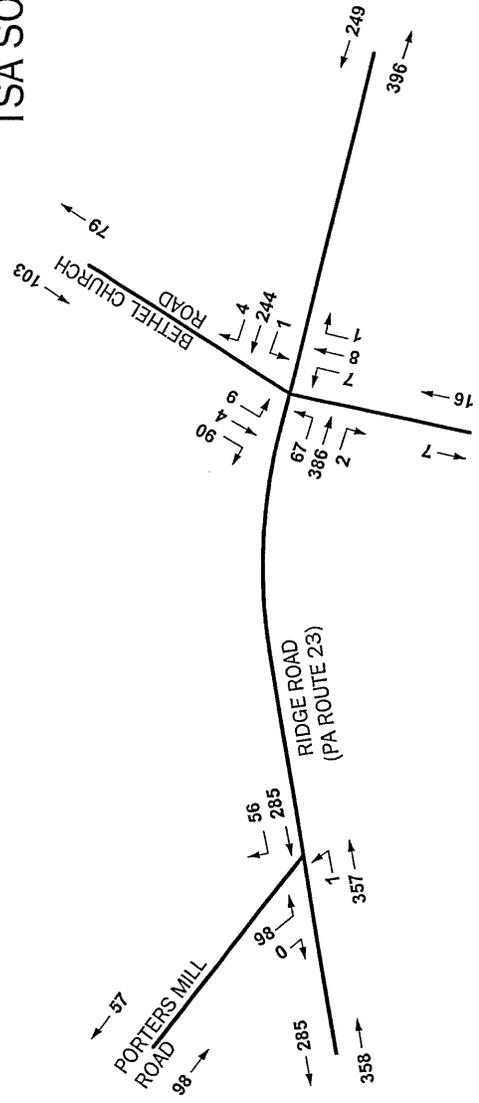
### *Transportation Service Area*

Act 209 requires the establishment of specific study boundaries, or Transportation Service Areas, for evaluation and application of transportation impact fees. By law, each transportation Service Area is required to be completely contiguous, and is limited to a maximum size of seven square miles. Moreover, Traffic Impact Fees for each Transportation Service Area are applicable only to development located within that respective service area, and therefore, development traffic from one service area is considered pass-through traffic within the other



TSA NORTH

TSA SOUTH



**FIGURE 2**

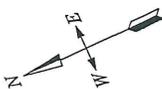
2010 Existing Weekday Morning  
Peak Hour Traffic Volumes

**EAST COVENTRY TOWNSHIP  
ROADWAY SUFFICIENCY ANALYSIS  
CHESTER COUNTY, PENNSYLVANIA**



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PETERMAN  
ROAD

FRICKS  
LOCK  
ROAD

SANATOGA  
ROAD

ANDERSON  
ROAD

SCHUYLKILL ROAD  
(PA ROUTE 724)

OLD SCHUYLKILL  
ROAD

WELLS ROAD  
LINEFIELD  
ROAD

OLD SCHUYLKILL  
ROAD

OLD SCHUYLKILL  
ROAD

BETHEL  
CHURCH  
ROAD

11,500



TSA NORTH

TSA SOUTH

PORTERS MILL  
ROAD

6,200



RIDGE ROAD  
(PA ROUTE 23)

BETHEL CHURCH  
ROAD

5,000



**FIGURE 4**  
Study Area Average Daily Traffic Volumes  
**EAST COVENTRY TOWNSHIP**  
**ROADWAY SUFFICIENCY ANALYSIS**  
**CHESTER COUNTY, PENNSYLVANIA**



service area(s). Further explanation of pass-through and development traffic will be provided in subsequent sections.

Since East Coventry Township is approximately 11 square miles in overall size, two Transportation Service Areas encompassing the entire Township were established in accordance with the requirements of Act 209. Based on the Land Use Assumptions Report, Transportation Service Area North, approximately 5.3 square miles in size, is generally located northeast of Pigeon Creek, northwest of Halteman Road, and northeast of Kulp Road in the northern half of the Township. Transportation Service Area South, approximately 5.7 square miles in size, occupies the remainder of the Township.

## Existing Transportation Conditions

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The evaluation of the existing transportation network is based on the physical (i.e., traffic control, intersection geometry, lane usage, etc.) and operational (i.e., traffic volumes, signal timing/phasing) characteristics of the study intersections and roadways during the peak operational period. The Transportation Advisory Committee has selected the weekday afternoon peak hour as the basis of this *Roadway Sufficiency Analysis*.

### *Analysis Methodology*

The weekday afternoon peak hour traffic volumes in Figure 2 were subject to detailed capacity/level-of-service analysis in accordance with the standard techniques contained in the *Highway Capacity Manual*<sup>(1)</sup>. Level of service (LOS) is the criterion utilized to evaluate the study intersections in accordance with standard traffic engineering practice and the Act 209 legislation. By definition, capacity represents “the maximum rate of flow that can reasonably be expected to pass a point on a uniform section of a lane or roadway under prevailing roadway, traffic, and control conditions.” The level of functioning of an intersection or a uniform section of a lane or roadway can be expressed in terms of levels of service. Level of service (LOS) is defined as “a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers”. Such measures include “speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.”

At unsignalized intersections, a methodology for evaluating the relative functioning of intersections controlled by stop or yield signs has been developed, and is based on several assumptions, including:

- Major street flows are not affected by the minor (stop-sign controlled) street movements.
- Left turns from the major street to the minor street are influenced only by opposing major street through flow.
- Minor street left turns are impeded by all major street traffic plus opposing minor street traffic.
- Minor street through traffic is impeded by all major street traffic.
- Minor street right turns are impeded only by the major street traffic coming from the left.

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<sup>(1)</sup> *Transportation Research Board, Special Report 209, Highway Capacity Manual, published by the Transportation Research Board, Washington, DC, Updated 2000.*

The concept of stop-controlled or yield-controlled intersection analysis is based on the estimate of average total delay on minor streets. The methodology of analysis relies on three elements: the size and distribution of gaps in the major traffic stream, the usefulness of these gaps to the minor stream drivers, and the relative priority of the various traffic streams at the intersection. The results of the analysis provide an estimate of average total delay for the various critical movements at the unsignalized intersections. Correlation between average total delay and the respective levels of service are provided for unsignalized intersections as follows:

<i>Unsignalized Intersections</i>		
<b>Level of Service</b>	<b>Description</b>	<b>Control Delay Per Vehicle (seconds)</b>
A	Little or no delay	≤ 10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Demand exceeds capacity of the lane or approach	> 50.0

At signalized intersections, an additional element must be considered: time allocation. Level of service is based primarily on the average control delay per vehicle for various movements within the intersection. Volume/capacity relationships also affect level of service. Thus, both volume/capacity and delay must be considered to evaluate the overall operation of a signalized intersection. Correlation between average delay per vehicle and the respective levels of service are provided for signalized intersections as follows:

<i>Signalized Intersections</i>		
<b>Level of Service</b>	<b>Description</b>	<b>Control Delay Per Vehicle (seconds)</b>
A	Very low delay, high quality flow	≤ 10.0
B	Low delay, good traffic flow	10.1 to 20.0
C	Average delay, stable traffic flow	20.1 to 35.0
D	Longer delay, approach capacity flow	35.1 to 55.0
E	Limit of acceptable delay, capacity flow	55.1 to 80.0
F	Unacceptable delay, forced flow	> 80.0

### *Preferred Levels of Service*

Consistent with the Act 209 legislation, the Transportation Advisory Committee has adopted preferred level-of-service criteria for the various intersections studied. The preferred level of service is considered the operational design standard by which each study intersection must

operate under existing conditions, future pass-through conditions, and future development conditions in this *Roadway Sufficiency Analysis*. Any deficient operations that do not satisfy the preferred levels of service at the study intersections must be improved for each condition.

According to Act 209, for unsignalized intersections where the preferred level of service criterion is not satisfied, most often only signalization can mitigate the traffic deficiency; however, where traffic volumes do not meet traffic signal warrant criteria, as required by PennDOT, these intersections cannot be improved through signalization. Therefore, the required signalization improvement must be waived or deferred until traffic volumes warrant signalization. As shown in **Table 4**, the Transportation Advisory Committee has adopted specific preferred level-of-service criteria for the purposes of this *Roadway Sufficiency Analysis*.

**Table 4. Preferred Level-of-Service Criteria**

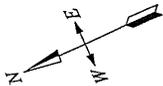
<b>Intersection/Roadway Type</b>	<b>Preferred Level of Service</b>
Signalized	LOS D all movements LOS D overall
Unsignalized	LOS D movements

For signalized intersections, the preferred levels of service indicated above apply to individual movements, as well as overall intersection operations. Conversely, for unsignalized intersections, the preferred levels of service apply only to the critical turning or through movements.

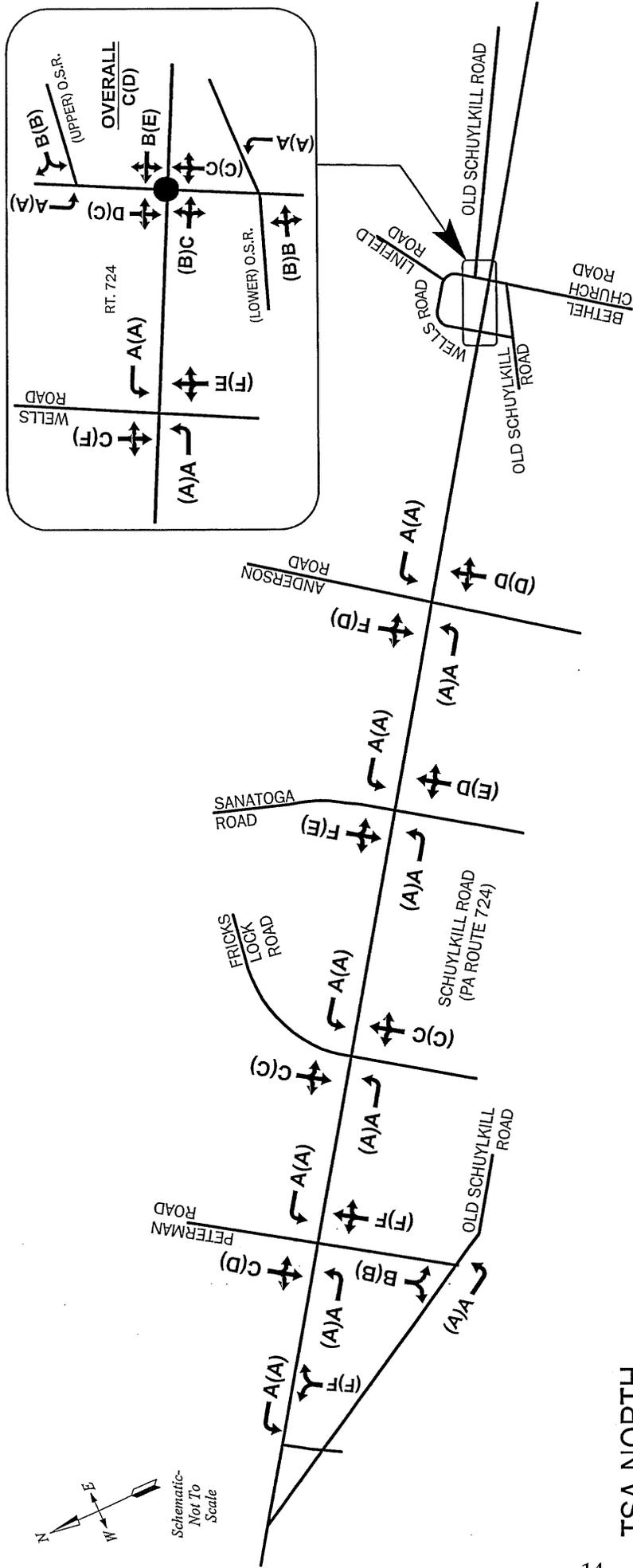
*Existing Levels of Service*

The year 2010 existing weekday afternoon peak hour traffic volumes presented in Figure 2 were subjected to the detailed capacity/level-of-service analysis methodology previously described. The results of the analysis are illustrated in **Figure 5**, and the detailed capacity/level-of-service analysis worksheets are contained in **Appendix F**.

As shown in Figure 4, of the 12 study intersections, seven presently operate at acceptable levels of service with respect to the preferred levels of service during the weekday afternoon peak hour. The remaining five study intersections, which do not satisfy the preferred levels of service criteria, are unsignalized intersections with the exception of the signalized intersection of PA Route 724 and Bethel Church Road/Linfield Road. The intersection PA Route 724 and Bethel Church Road/Linfield Road presently operates at acceptable overall LOS D during the weekday afternoon peak hour, while the westbound PA Route 724 through movement presently operates at unacceptable LOS E.



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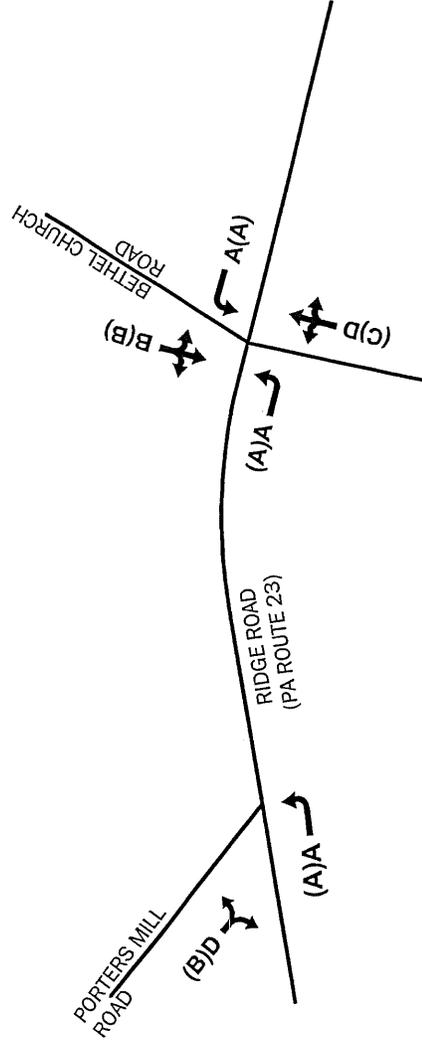


TSA NORTH

TSA SOUTH

**LEGEND:**

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- ← EXISTING LANE OR CRITICAL MOVEMENT
- EXISTING TRAFFIC SIGNAL



**FIGURE 5**

2010 Existing Weekday  
Peak Hour Levels of Service

# EAST COVENTRY TOWNSHIP ROADWAY SUFFICIENCY ANALYSIS CHESTER COUNTY, PENNSYLVANIA



The following unsignalized intersections operate at LOS F on at least one of the minor street movements:

- PA Route 724 and Old Schuylkill Road
- PA Route 724 and Peterman Road
- PA Route 724 and Sanatoga Road
- PA Route 724 and Anderson Road (during the weekday morning peak hour only)
- PA Route 724 and Wells Road

### Parker Ford Village Improvements

As outlined in the Township's *Parker Ford Village Transportation Improvements Feasibility Study*, the Township has plans for capacity and safety improvements at the PA Route 724 intersections with Linfield Road/Bethel Church Road and Wells Road, as well as the Old Schuylkill Road intersections with Bethel Church Road and Linfield Road. Ultimately, it is proposed to provide the following improvements within Parker Ford Village:

#### PA Route 724 and Linfield Road/Bethel Church Road

- Widen PA Route 724 to provide eastbound and westbound separate left-turn lanes.
- Widen northbound Bethel Church Road and southbound Linfield Road to provide separate left-turn lanes.
- Widen southbound Linfield Road to provide a separate right-turn lane.

#### PA Route 724 and Wells Road

- Widen PA Route 724 to provide eastbound and westbound separate left-turn lanes.
- Widen eastbound PA Route 724 to provide a separate right-turn lane.
- Install a traffic signal.

#### Old Schuylkill Road and Wells Road

- Terminate (lower) Old Schuylkill Road at its intersection with Bethel Church Road and eliminate the channelized right-turn area at the PA Route 724/Bethel Church Road/Linfield Road intersection and restrict movements at the intersection. In addition, Wells Road may be converted to a cul-de-sac between Linfield Road and PA Route 724.

It is noted that the full scope of the above improvements are planned to occur over the next several years; however, the Township is currently the design/construction stage of an interim improvement plan. Specifically, PennDOT will widen and restripe PA Route 724 to provide separate eastbound and westbound left-turn lanes at the PA Route 724/Linfield Road/Bethel Church Road intersection, while the Township will upgrade the signal equipment at the intersection and provide some minor geometric improvements. In addition, this project will also include restricting the (lower) Old

Schuylkill Road egress movement to right-out only operation and the channelized right-turn area at the PA Route 724/Bethel Church Road/Linfield Road intersection will be eliminated. It is expected that these improvements will be completed in the year 2011.

The various Parker Ford Village improvements identified in this section were based on analysis previously completed prior to completion of the current Act 209 study. The improvement program for the Parker Ford Village recommended by this current study was modified to fit current traffic patterns, new traffic forecasts, capacity needs, and satisfy the requirements and objectives of the Act 209 study and law.

### *Existing Improvement Program*

The improvements necessary to mitigate existing traffic deficiencies and satisfy the preferred level-of-service criteria are described in **Table 5**, and the geometric and traffic signal improvements are also illustrated in **Figure 6**. Improvements will be required at three study intersections in order to achieve the preferred level-of-service under present traffic conditions. It is noted that since the weekday afternoon peak hour traffic conditions will be the basis of the Transportation Impact Fee, the improvements will identified below are based on the weekday afternoon peak hour levels of service only, and the weekday morning peak hours levels of service are shown for informational purposes only.

The unsignalized intersections of PA Route 724/Old Schuylkill Road, PA Route 724/Sanatoga Road, PA Route 724/Anderson Road, and PA Route 724/Wells Road currently fail to achieve both the preferred level-of-service criteria during the study peak hour and PennDOT traffic signal warrant criteria, as required by PennDOT, and therefore, improvements must be deferred until such time that traffic volumes satisfy traffic signal warrant criteria.

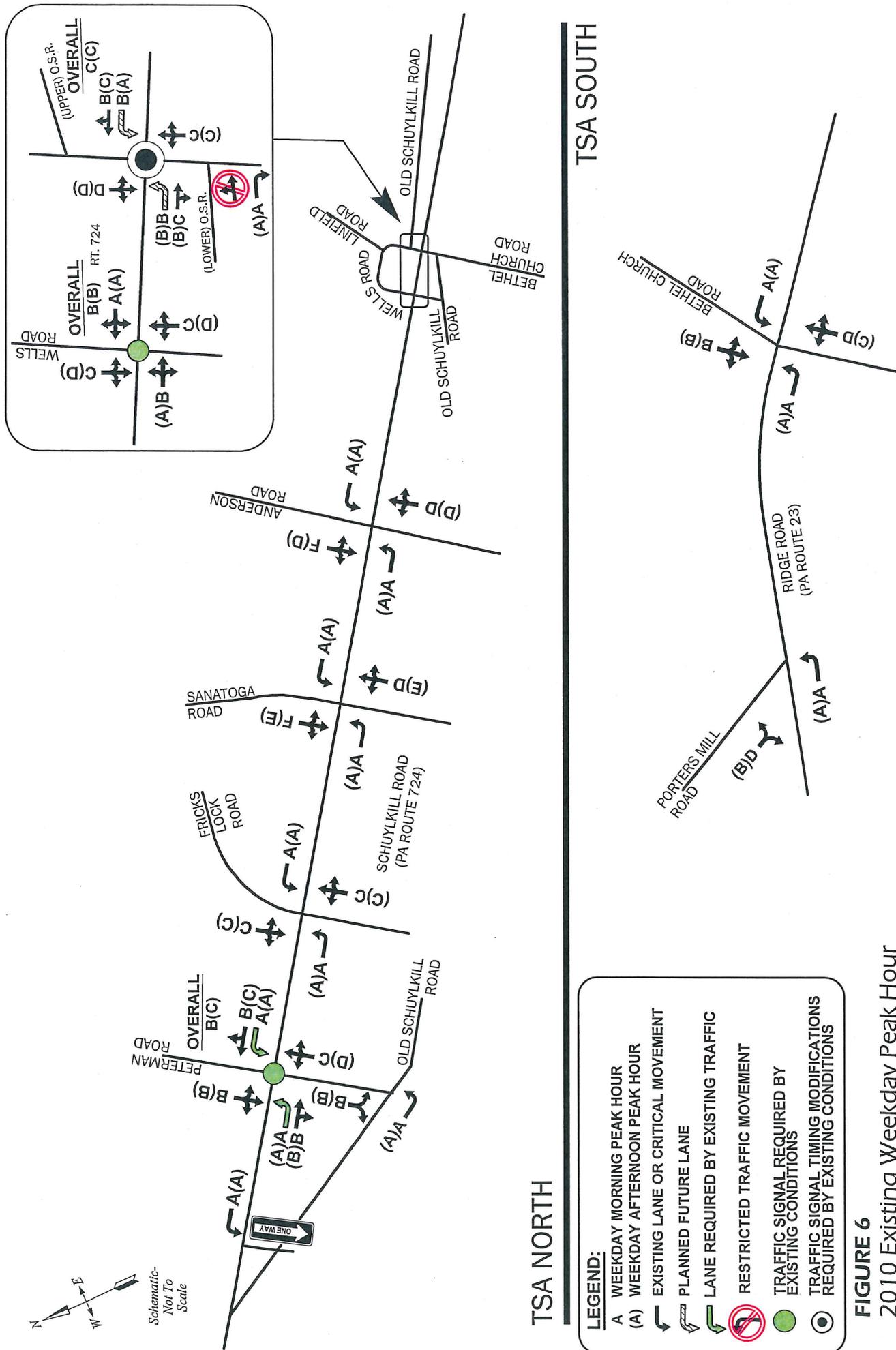
The unsignalized intersection of PA Route 724 and Old Schuylkill Road fails to achieve both the preferred level-of-service criteria and PennDOT traffic signal warrant criteria; however, if the egress movements exiting Old Schuylkill Road are restricted, this intersection will meet preferred level-of-service criteria. In addition, since the restricted egress traffic from the PA Route 724/Old Schuylkill Road intersection will divert to the PA Route 724/Peterman Road intersection, this additional traffic will allow the PA Route 724/Peterman Road intersection to meet PennDOT's traffic signal warrant criteria, and with installation of a traffic signal and (the planned) eastbound and westbound left-turn lanes along PA Route 724, the PA Route 724/Peterman Road intersection will meet the preferred level-of-service criteria. Additional directional signage advising motorists of the new routes should be provided. Also, the roadways/intersections impacted by the traffic diversions should ultimately be upgraded to Township specifications, as feasible and practical.

At the Parker Ford Village intersections (PA Route 724/Bethel Church Road/Linfield Road and Bethel Church Road/Old Schuylkill Road), it will be necessary to implement the currently planned improvements which are currently in the design/construction phase in order for the

Table 5. Existing Improvement Program

Int No.	Intersection	Service Area	Traffic Control	Recommended Capacity Improvements <sup>1</sup>
1	PA Route 724 (Schuylkill Road) and Old Schuylkill Road	North	Stop Sign	Restrict egress movements from Old Schuylkill Road, and convert to one-way flow entering from PA Route 724. Provide directional signing at appropriate locations.
2	PA Route 724 (Schuylkill Road) and Peterman Road	North	Stop Sign	Widen eastbound and westbound PA Route 724 to provide separate left-turn lanes. Install a traffic signal.
3	PA Route 724 (Schuylkill Road) and Fricks Lock Road	North	Stop Sign	No improvements recommended or required.
4	PA Route 724 (Schuylkill Road) and Sanatoga Road	North	Stop Sign	No improvements recommended or required.
5	PA Route 724 (Schuylkill Road) and Anderson Road	North	Stop Sign	No improvements recommended or required.
6	PA Route 724 (Schuylkill Road) and Wells Road	North	Stop Sign	Install a traffic signal.
7	PA Route 724 (Schuylkill Road) and Bethel Church Road/Linfield Road	North	Traffic Signal	Widen eastbound and westbound PA Route 724 to provide separate left-turn lanes and replace traffic signal equipment.
8	Bethel Church Road and Old Schuylkill Road (lower)	North	Stop Sign	Restrict the through and left-turn movements from Old Schuylkill Road. Remove the northbound right-turn area along Bethel Church Road onto eastbound PA Route 724.
9	Linfield Road and Old Schuylkill Road (upper)	North	Stop Sign	No improvements recommended or required.
10	Old Schuylkill Road and Peterman Road	North	Stop Sign	No capacity improvements required; however, intersection corner radii should be increased to accommodate diverted (Intersection # 1 and 2) traffic.
11	PA Route 23 (Ridge Road) and Porters Mill Road	South	Stop Sign	No improvements recommended or required.
12	PA Route 23 (Ridge Road) and Bethel Church Road	South	Stop Sign	No improvements recommended or required.

1 - Recommended improvements to achieve the preferred level-of-service requirements during the weekday afternoon peak hour.



**FIGURE 6**

2010 Existing Weekday Peak Hour  
Levels of Service With Improvements

# EAST COVENTRY TOWNSHIP ROADWAY SUFFICIENCY ANALYSIS CHESTER COUNTY, PENNSYLVANIA



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signalized intersection to meet the preferred level-of-service criteria. These improvements include provision of separate left-turn lanes along PA Route 724, traffic signal equipment upgrades, other minor geometric modifications, and restriction of the eastbound Old Schuylkill Road approach to permit only right-turn movements (as noted in Table 5).

## Future Traffic Conditions

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Act 209 requires a minimum five-year future time horizon for the development of the *Transportation Capital Improvements Plan* and *Transportation Impact Fee Ordinance*. A 10-year time frame was selected by the Transportation Advisory Committee for the East Coventry Township Act 209 traffic analysis (early 2010 to the end of 2019). The *Land Use Assumptions Report* projected the ultimate build-out potential of the Township, as well as the 2019 development projections for the Township as a whole. For the purposes of this study, in order to develop the 2019 build-out projections for each service area, the 2019 projections for the entire Township were proportioned to each of the Transportation Analysis Zones (TAZ) in both services areas based on the relative ratio of ultimate build-out assumed in each TAZ to the ultimate municipal-wide build-out, unless a specific development plan was identified.

### *Future Traffic Components*

Total future traffic volume forecasts for 2019 include three components: existing traffic, pass-through traffic, and development traffic. The first component, **existing traffic** was described in the previous section. The second component of future traffic projections is **pass-through traffic**, which is subdivided into the following two elements:

- The first element reflects future increases in regional traffic, which is both generated and destined to locations external to the Transportation Service Area, but which pass through the service area along the study roadways. This first element of pass-through traffic includes traffic generated by specific known future developments located within the adjacent municipalities.
- The second element of pass-through traffic includes future traffic generated from other designated transportation service areas within the Township. Specifically, since East Coventry Township has two transportation service areas, development traffic in one service area constitutes pass-through traffic in the other service area. For example, while traffic generated from within TSA-South is considered “development” traffic in TSA-South, this same traffic is considered “pass-through” traffic when it traverses through TSA-North.

**Development traffic** that is generated by new development within the Transportation Service Area constitutes the third and final component of future 2019 traffic volumes, based upon the development projections contained in the *Land Use Assumptions Report*.

### *Trip Generation*

Based upon the *Land Use Assumptions Report*, vehicular trip generation was estimated for the 2019 weekday afternoon peak hour utilizing the Institute of Transportation Engineers’

publication, *Trip Generation, 8<sup>th</sup> Edition*. Additionally, several actively proposed developments were also specifically included in the future 2019 traffic projections to represent current development activity within the Township. The resulting 2019 weekday afternoon peak hour trip generation is summarized in **Table 6** for each service area, and more detailed information regarding the peak hour trip generation of each of the projected developments is provided in **Appendix G**.

**Table 6. Development Condition Vehicular Trip Generation**

<b>Service Area</b>	<b>Total Trip Generation</b>
TSA – North	1,480 trips
TSA – South	147 trips

***Trip Distribution***

Vehicular traffic volumes generated by new development over the next ten years were generally distributed to the area roadway network based on existing travel patterns, as well as the location of specific future development parcels with respect to the roadway network and other major traffic generators and destinations.

***2019 Future Pass-Through Traffic***

An annual traffic growth rate of 2.05 percent per year was applied to the existing weekday afternoon peak hour traffic volumes to reflect regional traffic growth, which is consistent with the traffic growth rate recommended by PennDOT’s Bureau of Planning and Research for similar roadways in Chester County.

In addition, traffic associated with 13 developments located within the surrounding municipalities was distributed through the Township roadway network. These 13 developments, as summarized in **Table 7**, represent the known proposed developments identified by staff of the surrounding municipalities, and were determined to have an influence on the study roadways and intersections.

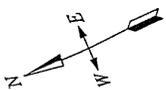
**Table 7. Proposed Development in Surrounding Municipalities**

<u>Municipality</u>	<u>Development</u>	<u>Size</u>
South Coventry Township	Pigeon Creek Road	14 single-family homes
East Vincent Township	Solty's Farm	134 single-family homes 72 townhomes
North Coventry Township	Shops at Coventry	74,400 sq. ft. shopping center
	Ridgebury Heights	5 single-family homes
	Temple Estates	9 single-family homes
	Laurel Grove	16 single-family homes
	Whispering Ponds	42 attached units 18 detached units
	Rosewarne	6 single-family homes
	North Coventry Commercial	124 room hotel 7,050 sq. ft. restaurant
Limerick Township	Shopping Center	142,000 sq. ft. discount club store 47,000 sq. ft. shopping center

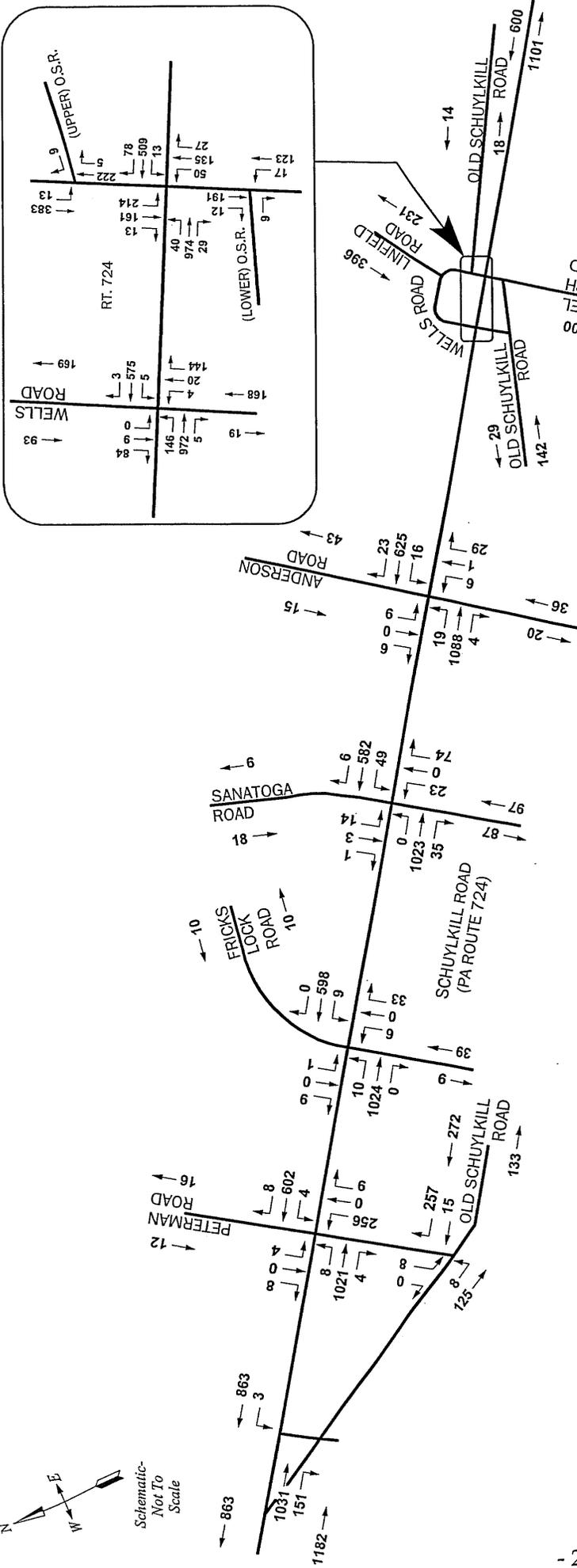
The 2019 future pass-through weekday morning and weekday afternoon peak hour traffic volumes are illustrated in **Figures 7 and 8**. The detailed trip generation and distribution worksheets for the developments assumed in the 2019 future pass-through conditions have been included in **Appendix H**.

***2019 Future Development Traffic***

As previously explained, the traffic generated by new development located within the Transportation Service Area constitutes the third and final component of future 2019 traffic. The 2019 future development weekday morning and weekday afternoon peak hour traffic volumes were determined based on assignment of development traffic within the Transportation Service Area, and added to 2019 future pass-through traffic volumes. The 2019 future development traffic volumes are illustrated in **Figures 9 and 10**. The detailed trip generation and distribution worksheets for the developments assumed in the 2019 future development conditions have been included in **Appendix I**.

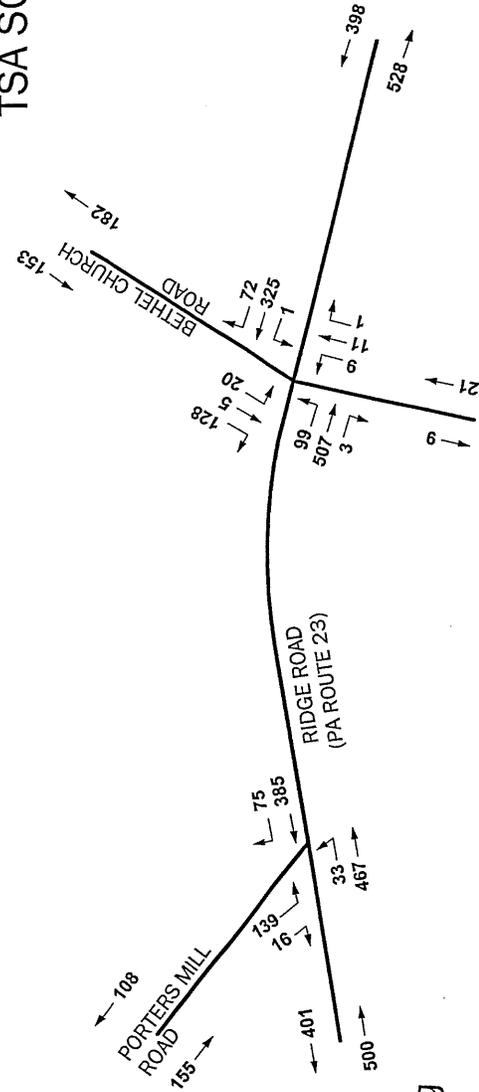


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**TSA NORTH**

**TSA SOUTH**



**FIGURE 7**

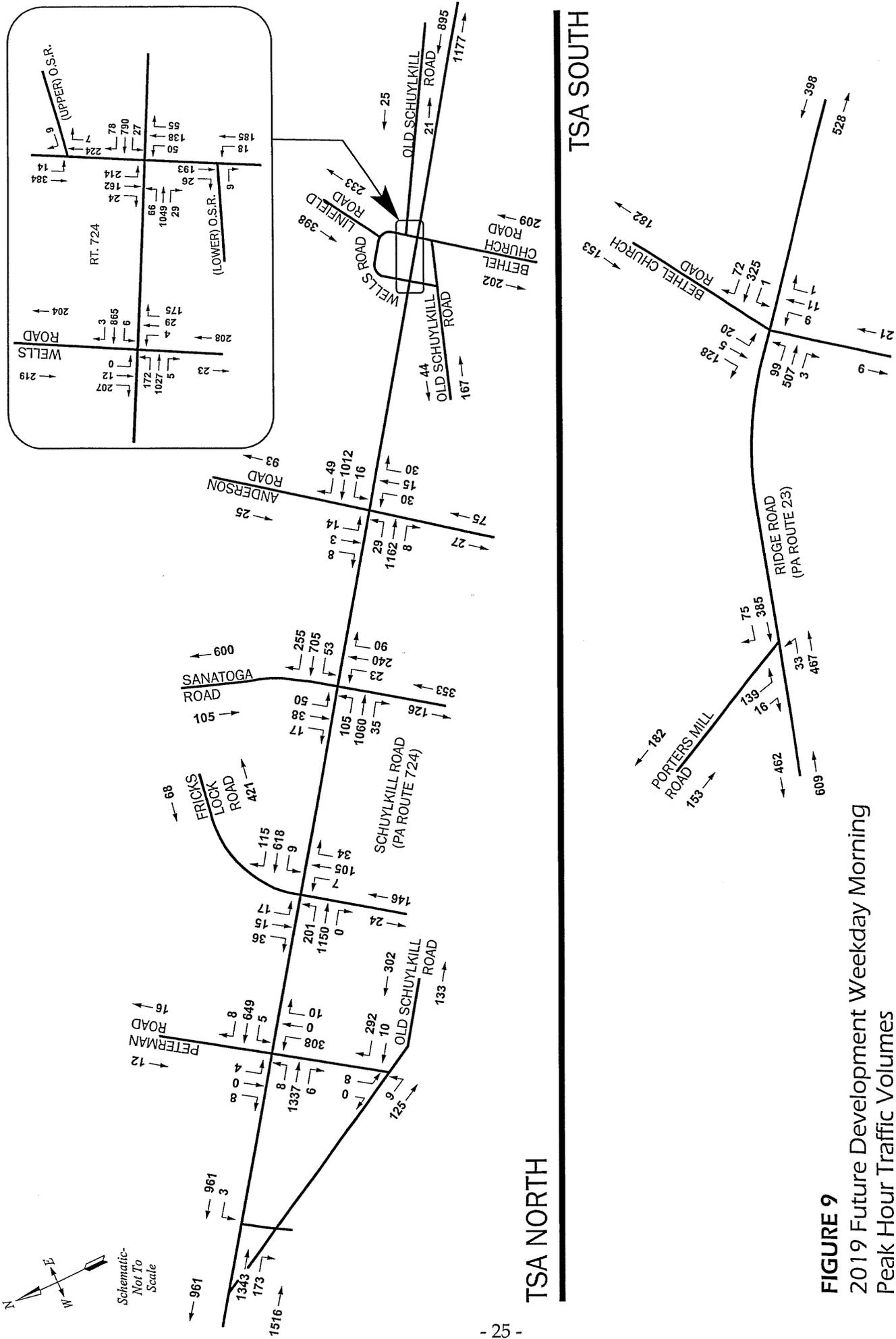
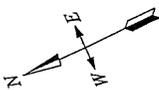
2019 Future Pass-Through Weekday Morning  
Peak Hour Traffic Volumes

**EAST COVENTRY TOWNSHIP  
ROADWAY SUFFICIENCY ANALYSIS  
CHESTER COUNTY, PENNSYLVANIA**



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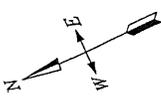
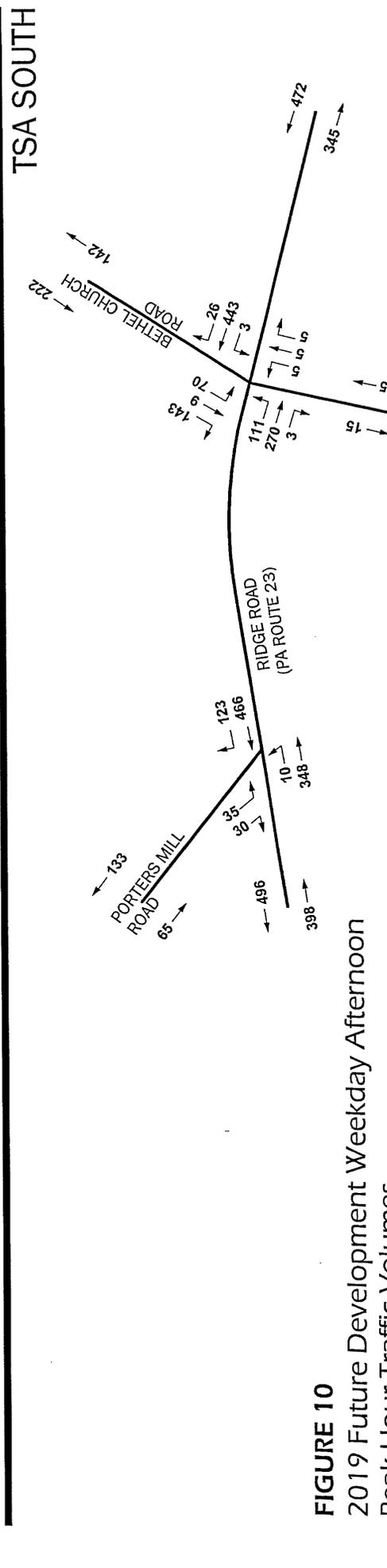
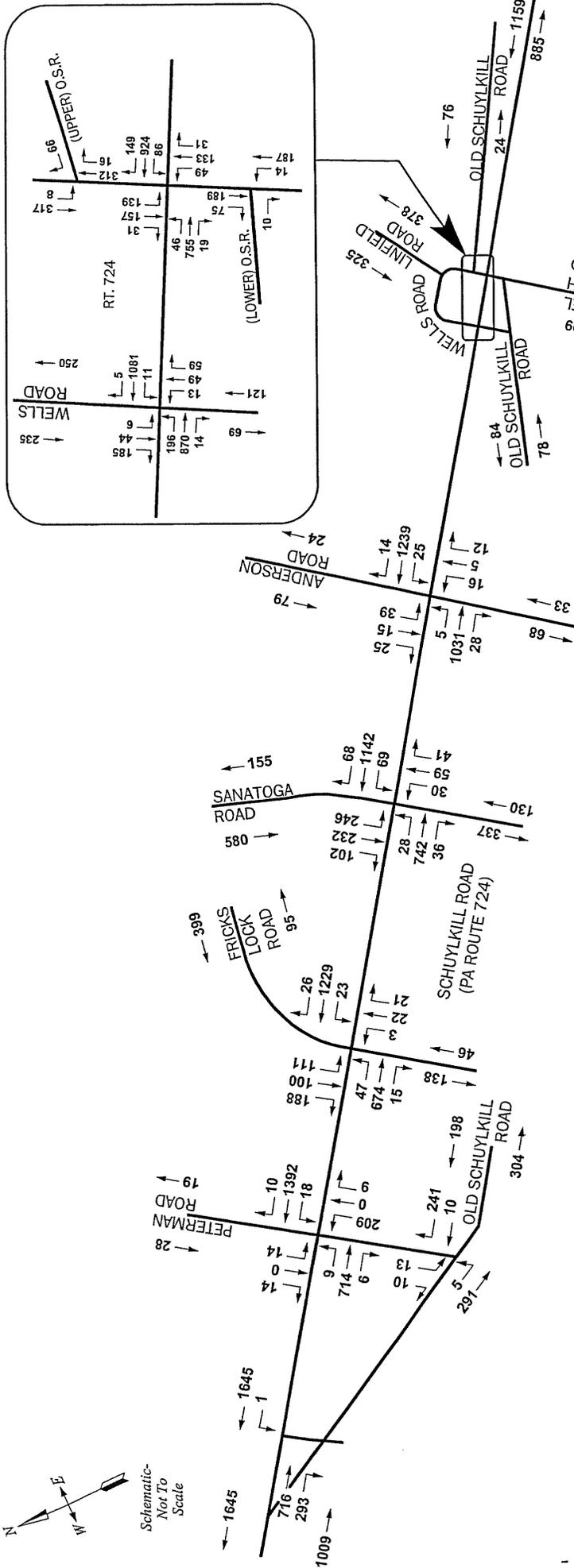
**FIGURE 9**  
 2019 Future Development Weekday Morning  
 Peak Hour Traffic Volumes

**EAST COVENTRY TOWNSHIP  
 ROADWAY SUFFICIENCY ANALYSIS  
 CHESTER COUNTY, PENNSYLVANIA**



**McMAHON**  
 TRANSPORTATION ENGINEERS & PLANNERS

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**FIGURE 10**  
 2019 Future Development Weekday Afternoon  
 Peak Hour Traffic Volumes  
**EAST COVENTRY TOWNSHIP**  
**ROADWAY SUFFICIENCY ANALYSIS**  
**CHESTER COUNTY, PENNSYLVANIA**

### *2019 Future Pass-Through Traffic Levels of Service*

The future 2019 pass-through traffic volumes illustrated in Figures 7 and 8 were subject to the previously described capacity/level-of-service analysis procedures to determine 2019 pass-through levels of service, and the detailed analyses are provided in **Appendix J**. As required by Act 209, the future conditions analysis was completed for future 2019 pass-through traffic volumes for each study intersection, assuming implementation of the improvements included in the Existing Capital Improvement Program, in order to determine the incremental traffic impacts and required for mitigation of future pass-through traffic.

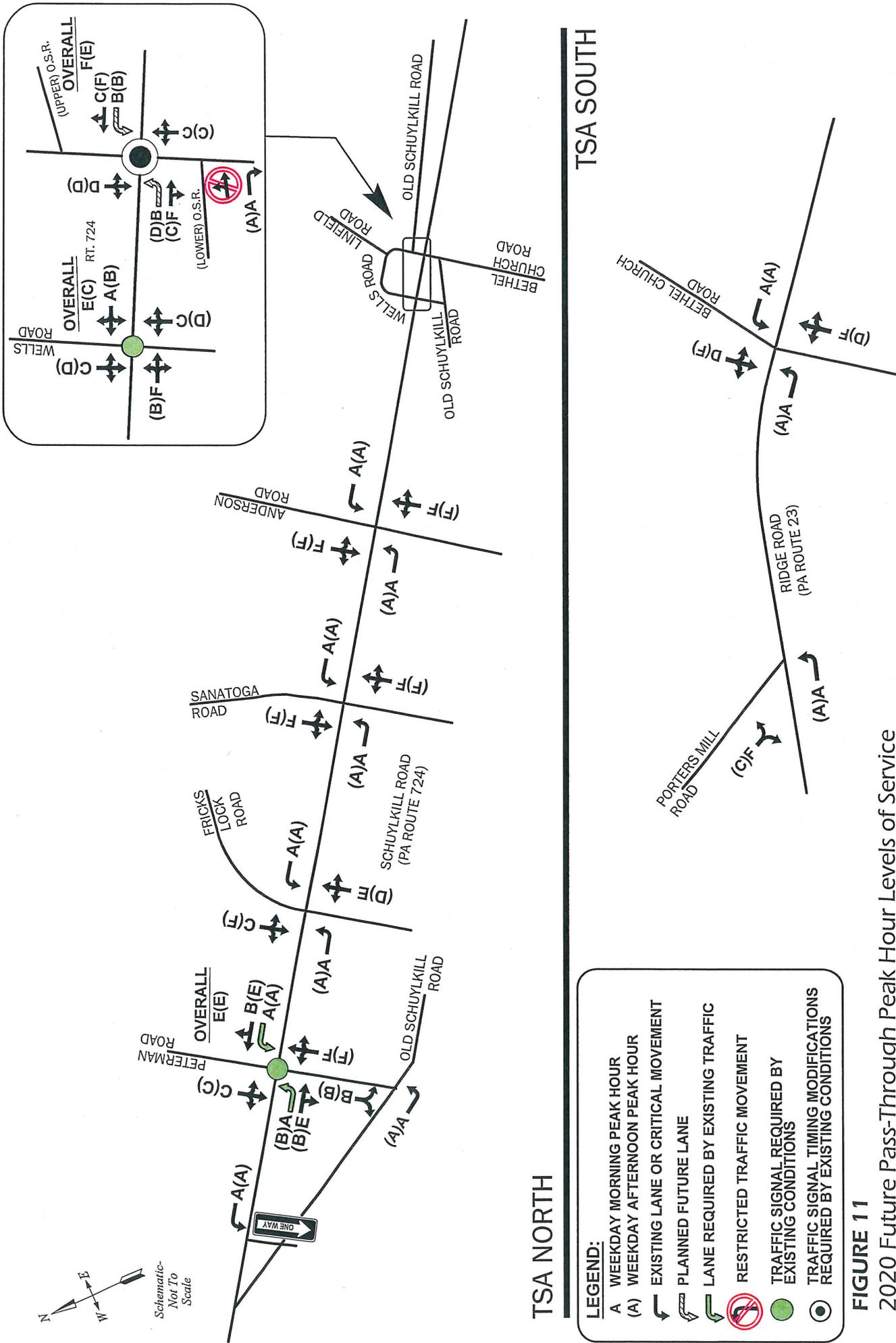
**Figure 11** summarize the results of the 2019 future pass-through traffic capacity/level-of-service analyses for the study intersections, with completion of the previously described programmed and required improvements. Traffic operating conditions at the following study intersections will not satisfy the preferred level of service criteria under 2019 future pass-through conditions.

- PA Route 724 and Peterman Road
- PA Route 724 and Fricks Lock Road
- PA Route 724 and Sanatoga Road
- PA Route 724 and Anderson Road
- PA Route 724 and Wells Road
- PA Route 724 and Bethel Church Road/Linfield Road
- PA Route 23 and Porters Mill Road (during the weekday morning peak hour only)
- PA Route 23 and Bethel Church Road

### *2019 Future Pass-Through Improvement Program*

The additional improvements required to accommodate pass-through traffic, beyond those improvements necessary to accommodate existing traffic at the preferred levels of service are illustrated in **Figure 12**. Also, these specific improvements required by future pass-through traffic to achieve the preferred level of service criteria are summarized in more detail in **Table 8** for each study intersection, respectively. Improvements will be required at seven study intersections in order to achieve the preferred level-of-service under future pass-through traffic conditions. However, the following four unsignalized intersections will fail to achieve both the preferred level-of-service criteria and PennDOT peak hour traffic signal warrant criteria, and therefore, improvements (i.e., signalization) must be deferred (waived) until such time that traffic volumes satisfy traffic signal warrant criteria:

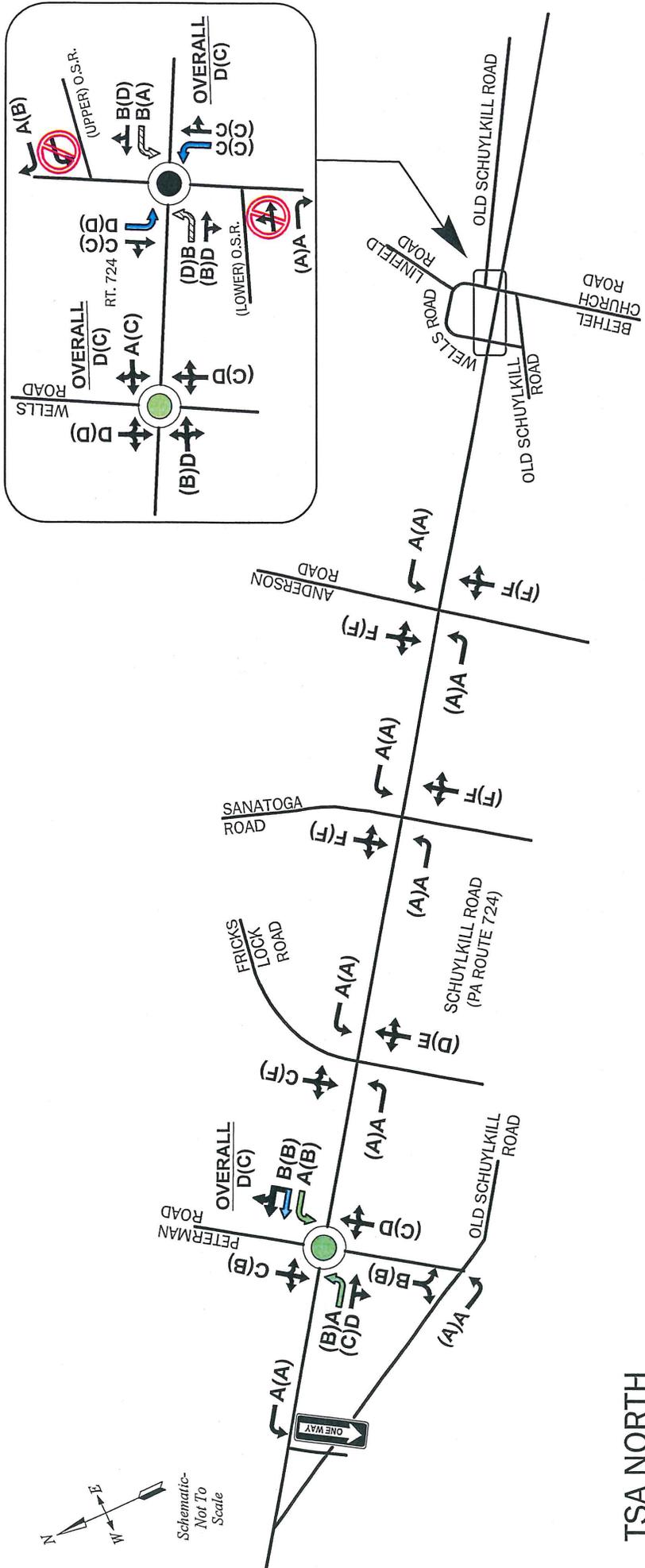
- PA Route 724 and Fricks Lock Road
- PA Route 724 and Sanatoga Road
- PA Route 724 and Anderson Road
- PA Route 23 and Bethel Church Road



# EAST COVENTRY TOWNSHIP ROADWAY SUFFICIENCY ANALYSIS CHESTER COUNTY, PENNSYLVANIA



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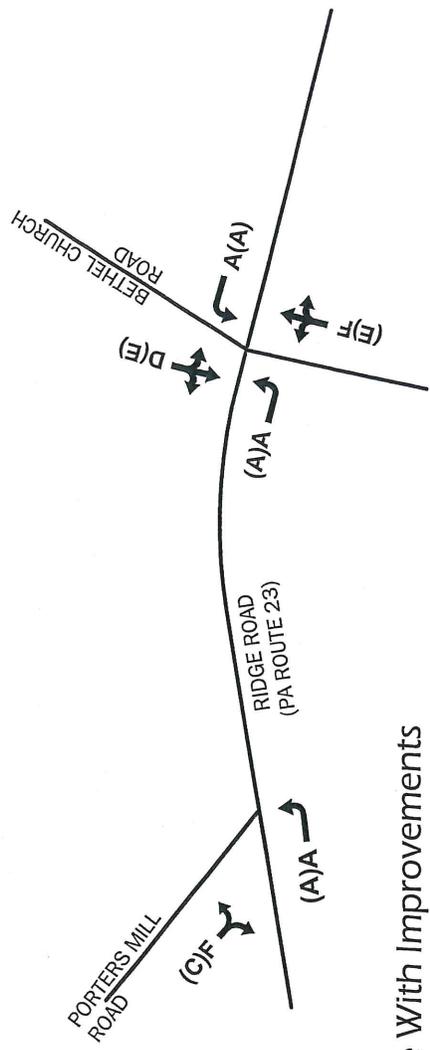


**TSA NORTH**

**LEGEND:**

- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- EXISTING LANE OR CRITICAL MOVEMENT
- LANE REQUIRED BY EXISTING TRAFFIC
- LANE REQUIRED BY PASS-THROUGH TRAFFIC
- PLANNED FUTURE LANE
- RESTRICTED TRAFFIC MOVEMENT
- TRAFFIC SIGNAL REQUIRED BY EXISTING CONDITIONS
- TRAFFIC SIGNAL TIMING/PHASING MODIFICATIONS REQUIRED BY PASS-THROUGH TRAFFIC

**TSA SOUTH**



**FIGURE 12**

2020 Future Pass-Through Peak Hour Levels of Service With Improvements

**EAST COVENTRY TOWNSHIP  
ROADWAY SUFFICIENCY ANALYSIS  
CHESTER COUNTY, PENNSYLVANIA**



Table 8. Pass-Through Improvement Program

Int No.	Intersection	Service Area	Traffic Control	Recommended Capacity Improvements <sup>1</sup>
1	PA Route 724 (Schuylkill Road) and Old Schuylkill Road	North	-	No improvements recommended or required.
2	PA Route 724 (Schuylkill Road) and Peterman Road	North	Traffic Signal	Widen PA Route 724 to provide a second westbound through lane. Modify the traffic signal timings.
3	PA Route 724 (Schuylkill Road) and Fricks Lock Road	North	Stop Sign	No improvements recommended or required.
4	PA Route 724 (Schuylkill Road) and Sanatoga Road	North	Stop Sign	No improvements recommended or required.
5	PA Route 724 (Schuylkill Road) and Anderson Road	North	Stop Sign	No improvements recommended or required.
6	PA Route 724 (Schuylkill Road) and Wells Road	North	Traffic Signal	No improvements recommended or required.
7	PA Route 724 (Schuylkill Road) and Bethel Church Road/Linfield Road	North	Traffic Signal	Widen northbound Bethel Church Road and southbound Linfield Road to provide separate left-turn lanes.
8	Bethel Church Road and Old Schuylkill Road (lower)	North	Stop Sign	No improvements recommended or required.
9	Linfield Road and Old Schuylkill Road (upper)	North	Stop Sign	Restrict the exiting left-turn movement, and provide appropriate directional signage.
10	Old Schuylkill Road and Peterman Road	North	Stop Sign	No improvements recommended or required.
11	PA Route 23 (Ridge Road) and Porters Mill Road	South	Stop Sign	No improvements recommended or required. (Traffic signal warranted during the AM peak hour only)
12	PA Route 23 (Ridge Road) and Bethel Church Road	South	Stop Sign	No improvements recommended or required.

1 - Recommended improvements to achieve the preferred level-of-service requirements during the weekday afternoon peak hour.

In order to achieve the preferred level-of-service criteria at the PA Route 724/Peterman Road intersection, it is recommended to widen PA Route 724 to provide a second westbound through lane. In addition, traffic signal timing modifications will be necessary for the intersection to achieve the preferred level-of-service.

At the PA Route 724/Bethel Church Road/Linfield Road intersection it is necessary to widen northbound Bethel Church Road and southbound Linfield Road to provide separate left-turn lanes, and modify the traffic signal timings at the intersection to meet the preferred level-of-service criteria. In addition, at the PA Route 724/Wells Road intersection, no additional capacity improvements are necessary at this intersection during the weekday afternoon peak hour.

In addition, at the PA Route 23/Porters Mill Road intersection, improvements (i.e., signalization) are only warranted during the weekday morning peak hour, which is not the basis of the Transportation Impact Fee. As such, improvements to this intersection will not be included in the Transportation Capital Improvements Plan.

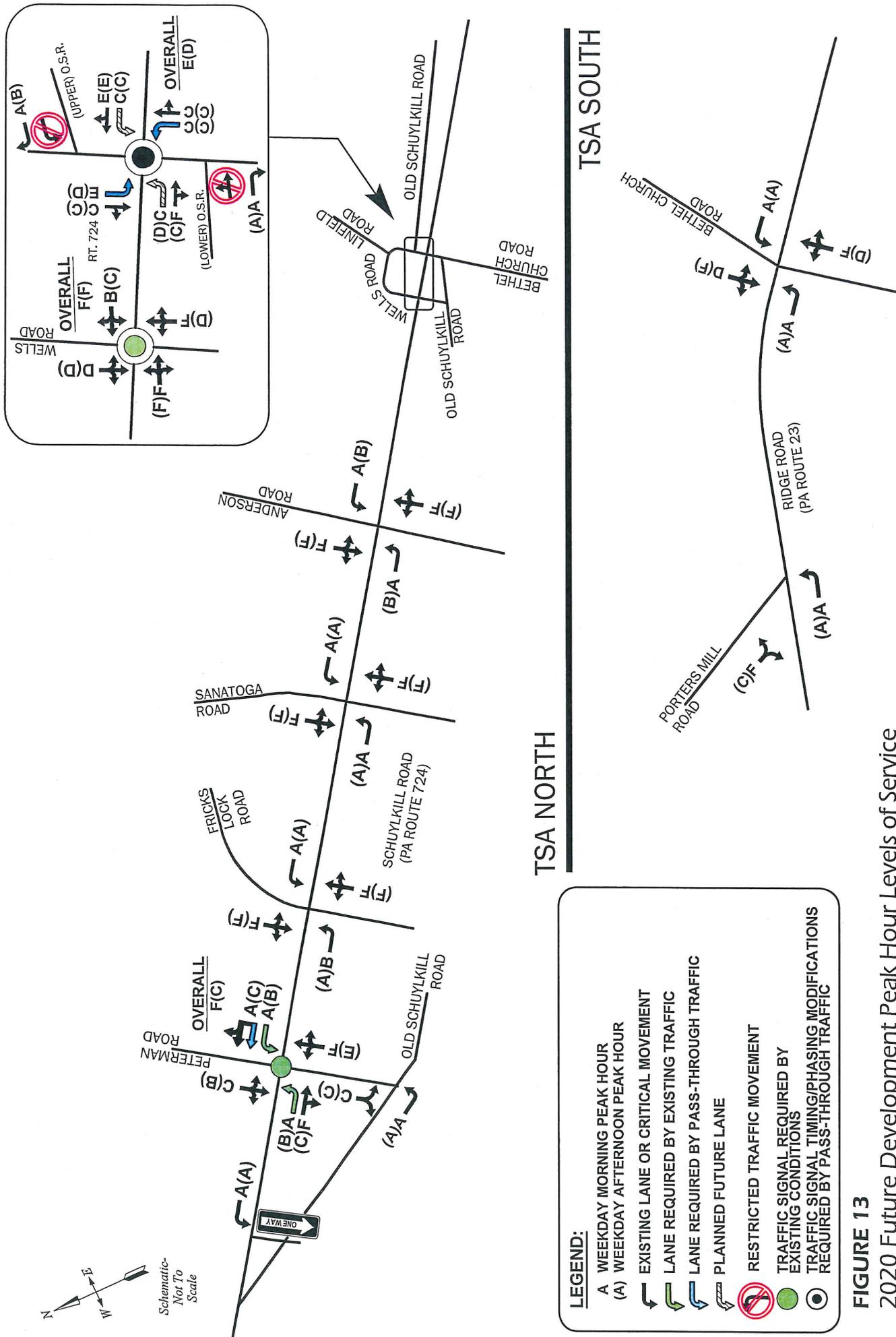
### *2019 Future Development Traffic Levels of Service*

The future development traffic volumes presented in Figures 9 and 10 were subject to the previously described capacity/level-of-service analysis procedures to determine future 2019 development levels of service, and the detailed analyses are provided in **Appendix K**. The 2019 future development conditions are illustrated in **Figure 13**, and indicate that the following seven study intersections will not satisfy the preferred levels of service criteria, and will require further improvements beyond the previously identified existing improvements, programmed/committed improvements, and future pass-through improvements:

- PA Route 724 and Peterman Road
- PA Route 724 and Fricks Lock Road
- PA Route 724 and Sanatoga Road
- PA Route 724 and Anderson Road
- PA Route 724 and Wells Road
- PA Route 724 and Bethel Church Road/Linfield Road
- PA Route 724 and Porters Mill Road (during the weekday morning peak hour only)
- PA Route 23 and Bethel Church Road

### *2019 Future Development Improvement Program*

The improvements necessary to achieve the preferred level of service criteria under 2019 development traffic conditions at the study intersections are summarized in **Table 9**, and are also illustrated in **Figure 14**. In summary, improvements will be required at seven study



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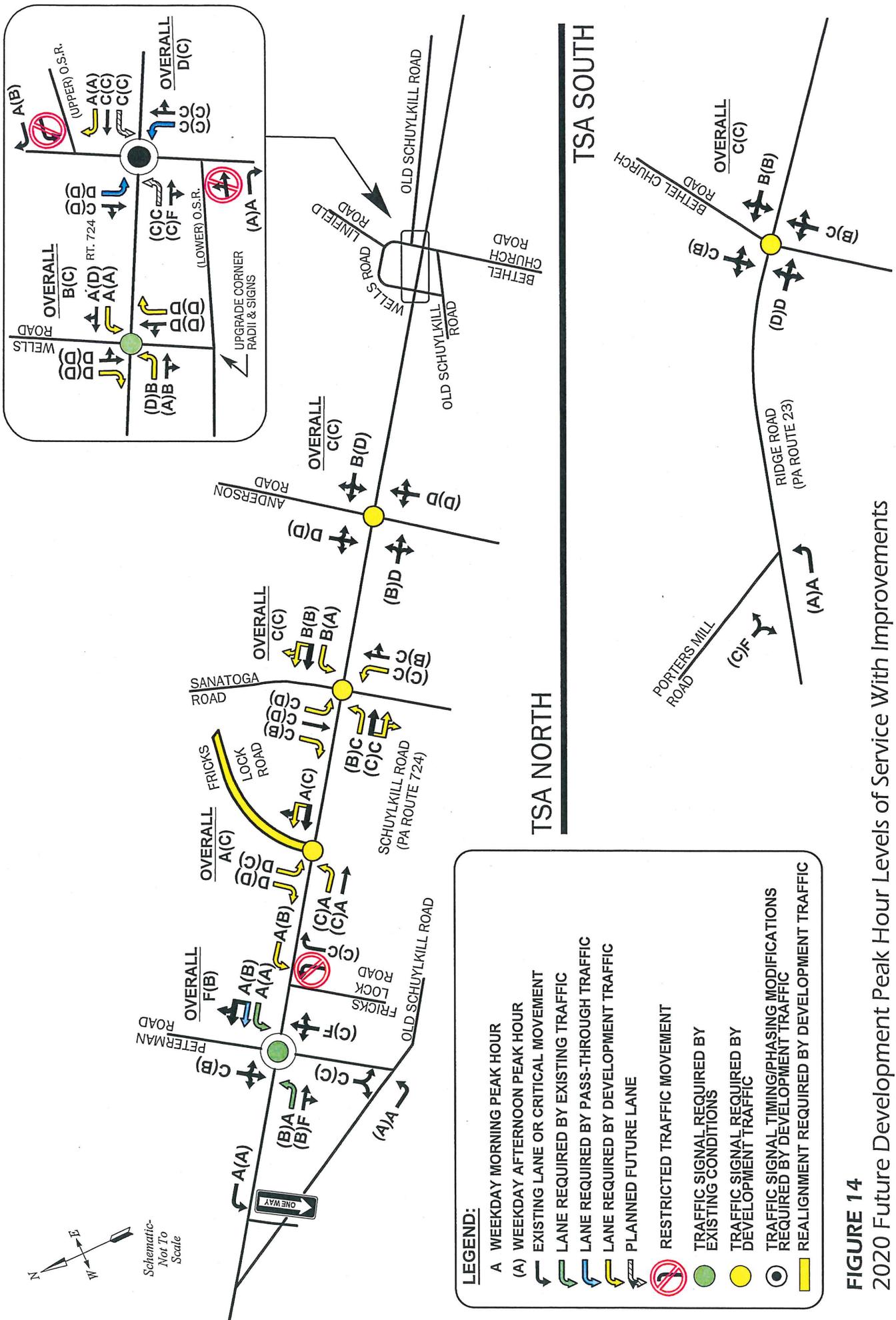
- A WEEKDAY MORNING PEAK HOUR
- (A) WEEKDAY AFTERNOON PEAK HOUR
- EXISTING LANE OR CRITICAL MOVEMENT
- LANE REQUIRED BY EXISTING TRAFFIC
- LANE REQUIRED BY PASS-THROUGH TRAFFIC
- PLANNED FUTURE LANE
- RESTRICTED TRAFFIC MOVEMENT
- TRAFFIC SIGNAL REQUIRED BY EXISTING CONDITIONS
- TRAFFIC SIGNAL TIMING/PHASING MODIFICATIONS REQUIRED BY PASS-THROUGH TRAFFIC

**FIGURE 13**  
 2020 Future Development Peak Hour Levels of Service  
**EAST COVENTRY TOWNSHIP**  
**ROADWAY SUFFICIENCY ANALYSIS**  
**CHESTER COUNTY, PENNSYLVANIA**

Table 9. Development Improvement Program

Int No.	Intersection	Service Area	Traffic Control	Recommended Improvements
1	PA Route 724 (Schuylkill Road) and Old Schuylkill Road	North	-	No improvements recommended or required.
2	PA Route 724 (Schuylkill Road) and Peterman Road	North	Traffic Signal	No improvements recommended or required.
3	PA Route 724 (Schuylkill Road) and Fricks Lock Road	North	Stop Sign	North Leg of Fricks Lock Road - Realign the north leg of Fricks Lock Road, and provide separate left- and right-turn lanes. Widen eastbound PA Route 724 to provide a separate left-turn lane. Widen westbound PA Route 724 to provide a second through lane. Install a traffic signal.  South Leg of Fricks Lock Road - Restrict the northbound Fricks Lock Road left-turn movement. Widen westbound PA Route 724 to provide a separate left-turn lane.
4	PA Route 724 (Schuylkill Road) and Sanatoga Road	North	Stop Sign	Widen PA Route 724 to provide a separate left-turn lane and a second through lane in both directions. Widen northbound Sanatoga Road to provide a separate left-turn lane, and widen southbound Sanatoga Road to provide separate left- and right-turn lanes. Install a traffic signal.
5	PA Route 724 (Schuylkill Road) and Anderson Road	North	Stop Sign	Install a traffic signal
6	PA Route 724 (Schuylkill Road) and Wells Road	North	Traffic Signal	Widen PA Route 724 to provide separate left-turn lanes in both directions. Widen northbound and southbound Wells Road to provide separate right-turn lanes.
7	PA Route 724 (Schuylkill Road) and Bethel Church Road/Linfield Road	North	Traffic Signal	Widen PA Route 724 to provide a separate westbound right-turn lane. Modify the traffic signal timings.
8	Bethel Church Road and Old Schuylkill Road (lower)	North	Stop Sign	No improvements recommended or required.
9	Linfield Road and Old Schuylkill Road (upper)	North	Stop Sign	No improvements recommended or required.
10	Old Schuylkill Road and Peterman Road	North	Stop Sign	No improvements recommended or required.
11	PA Route 23 (Ridge Road) and Porters Mill Road	South	Stop Sign	No improvements recommended or required. (Traffic signal warranted during the AM peak hour only)
12	PA Route 23 (Ridge Road) and Bethel Church Road	South	Stop Sign	Install a traffic signal.

1 - Recommended improvements to achieve the preferred level-of-service requirements during the weekday afternoon peak hour.



**FIGURE 14**  
 2020 Future Development Peak Hour Levels of Service With Improvements

# EAST COVENTRY TOWNSHIP ROADWAY SUFFICIENCY ANALYSIS CHESTER COUNTY, PENNSYLVANIA



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intersections to accommodate development-generated traffic within the respective transportation service area to satisfy the preferred levels-of-service.

At the PA Route 724/Peterman Road intersection, it is necessary to provide a separate northbound Peterman Road left-turn lane, so that this approach provides a separate left-turn lane and a shared left-/through/right-turn lane, and modify the traffic signal timing/phasing. It is noted that these improvements satisfy the preferred level-of-service criteria during the weekday afternoon peak hour at this intersection, and further improvements (such as an additional eastbound PA Route 724 through lane) would be necessary to achieve the preferred level-of-service at this intersection during the weekday morning peak hour. However, since the weekday morning peak hour is not the basis for the Transportation Impact Fee calculation, the preferred level-of-service is waived for the weekday morning peak hour.

In order to achieve the preferred level-of-service criteria at the PA Route 724/Fricks Lock Road intersection and to properly accommodate turning maneuvers, it is necessary to realign the north leg of Fricks Lock Road so that it intersects PA Route 724 at 90 degrees, creating a new T-intersection, and install a traffic signal, which is warranted based on PennDOT criteria. In addition, the south leg of Fricks Lock Road will remain in its current location. At the new PA Route 724/Fricks Lock Road (north leg) intersection, it is necessary to widen eastbound PA Route 724 to provide a separate left-turn lane, and widen westbound PA Route 724 to provide a second through lane. Also, the southbound Fricks Lock Road approach to the intersection should provide separate left- and right-turn lanes. At the PA Route 724/Fricks Lock Road (south leg) intersection, it is necessary to restrict the exiting left-turn movement and install a westbound PA Route 724 left-turn lane. At the time of this report, the Coventry Business Park was an approved subdivision that was required to provide the noted intersection improvements. Due to current economic conditions and inactivity of the land development project, it is possible that this development may not occur by 2020. If it is determined that the Coventry Business Park project will not be moving forward in the future, then this study should be updated and the improvement responsibilities for the PA Route 724/Fricks Lock Road intersection should not specifically be assigned to this project.

At the PA Route 724/Sanatoga Road intersection, it is necessary to install a traffic signal, which is warranted based on PennDOT's criteria. In addition, it is necessary to widen eastbound and westbound PA Route 724 to provide separate left-turn lanes and a second through lane in both directions. In addition, it will be necessary to widen northbound and southbound Sanatoga Road to provide separate left-turn lanes, and widen southbound Sanatoga Road to provide a separate right-turn lane.

In order for both the PA Route 724/Anderson Road and PA Route 23/Bethel Church Road intersections to operate at the preferred level-of-service criteria, each require installation of a traffic signal, which is warranted at both intersections based on PennDOT's criteria.

At the PA Route 724/Bethel Church Road/Linfield Road intersection it will be necessary to widen westbound PA Route 724 to provide a separate right-turn lane, and modify the traffic

signal timings at the intersection to meet the preferred level-of-service criteria. It is noted that these improvements satisfy the preferred level-of-service criteria during the weekday afternoon peak hour at this intersection, and further improvements (such as an additional eastbound PA Route 724 through lane) would be necessary to achieve the preferred level-of-service at this intersection during the weekday morning peak hour. However, since the weekday morning peak hour is not the basis for the Transportation Impact Fee calculation, and since adequate right-of-way is not available for the necessary improvements, the preferred level-of-service is waived for the weekday morning peak hour.

At the PA Route 724/Wells Road intersection, it is necessary to widen eastbound and westbound PA Route 724 to provide separate left-turn lanes, and widen northbound and southbound Wells Road to provide separate right-turn lanes. It is noted that some of the previously mentioned Parker Ford Village improvements have not been recommended by the Traffic Impact Advisory Committee, nor included in this study's recommendations. Based on the findings of this current study, alternative improvements to the Wells Road cul-de-sac and other Village improvements were found to be less effective than the improvements recommended herein.

In addition, at the PA Route 23/Porters Mill Road intersection, improvements (i.e., signalization) are only warranted during the weekday morning peak hour, which is not the basis of the Transportation Impact Fee. As such, improvements to this intersection will not be included in the Transportation Capital Improvements Plan. Also, PennDOT typically does not approve signalization based upon satisfaction of the Peak Hour Warrant criteria for only one hour. The Township should monitor this intersection in the future to determine when a traffic signal is fully warranted.