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UPPER PERKIOMEN VALLEY REGIONAL TRANSPORTATION STUDY AREA

ROADWAY SUFFICIENCY ANALYSIS

EAST GREENVILLE BOROUGH, PENNSBURG BOROUGH, RED HILL BOROUGH, GREEN LANE BOROUGH, UPPER HANOVER TOWNSHIP, MARLBOROUGH TOWNSHIP

MONTGOMERY COUNTY, PA

Prepared for:

Upper Perkiomen Valley Regional Planning Commission
Montgomery County Planning Commission

July 2007
MCPC 0601

Pennoni
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS

July 18, 2007

MCPC 0601

Upper Perkiomen Valley Regional Planning Commission
76 West 6th Street
Pennsburg, PA 18076

RE: UPPER PERKIOMEN VALLEY REGIONAL TRANSPORTATION STUDY RSA AND CIP FINAL SUBMISSION

Dear Members of the Upper Perkiomen Valley Regional Planning Commission:

In submitting this letter, we are presenting our final submission of the Roadway Sufficiency Analysis (RSA) and Capital Improvements Plan (CIP), which were prepared as part of the Upper Perkiomen Valley Regional Transportation Study to evaluate whether the region would benefit from the formal adoption of an Act 209 Transportation Impact Fee Ordinance. Although the Upper Perkiomen Valley Regional Planning Commission (UPVRPC) has decided not to pursue the adoption of an Impact Fee Ordinance at this time, we would like to convey how the region can benefit from using the RSA and CIP.

The following is a summary of the key elements that the RSA and CIP provide for the region:

- An assessment of the traffic conditions at twelve (12) study area intersections under three (3) scenarios, existing conditions (2006), future conditions (2016) without anticipated development within the study area, and future conditions with anticipated development within the study area;
- Transportation improvement projects recommended to mitigate the deficiencies at each of the intersections when analyzed under the above three (3) scenarios;
- Conceptual cost estimates for each of the recommended transportation improvement projects;
- An estimated Transportation Impact Fee for the entire region per new PM peak hour trip.

In order for the RSA and CIP to be most effective for the region, we recommend that the UPVRPC prioritize the recommended improvement projects. A prioritized list of projects will allow for the UPVRPC to identify the intersections that are in most need of improvement and for which funding should be sought first. Funding opportunities for the improvements should be investigated at the County, State, and Federal levels. In addition, the RSA and CIP will be valuable tools for the UPVRPC to use in negotiations with future developers to form public-private partnerships for the completion of transportation improvement projects.

As realized through the completion of the Upper Perkiomen Valley Regional Transportation Study, the Act 209 Transportation Impact Fee Ordinance has several restrictions or barriers, which influence the attractiveness of impact fees as a means for funding transportation improvements in this region. Several studies have been completed over the years to identify these barriers, and assess ways to improve the Act. The latest study, being completed on behalf of PennDOT, will provide a handbook for municipalities with guidance whether Act 209 will be appropriate for the municipality. The handbook will also provide a step-by-step process for the municipalities to follow if they do elect to pursue a transportation impact fee ordinance. It is anticipated that the handbook will be finalized during the late summer of 2007.

In addition, State legislative initiatives have been filed, such as the current House Bill Number 397, filed in February 2007, which amends the current Act 209 to further define the terms related to impact fees and to allow municipalities to utilize a comprehensive plan to fulfill the requirements of the Act in lieu of preparing a Capital Improvements Plan.

Since the UPVRPC has learned a great deal about the benefits and restrictions of the Act 209 Transportation Impact Fee Ordinance through the completion of this study, we recommend that the members of the UPVRPC collaborate to develop recommendations of how the Act 209 could be revised to be more attractive to municipalities and regions. The recommendations developed should be forwarded to Pennsylvania's State legislators to initiate future House bills for changes to the Act.

In summary, although the Upper Perkiomen Valley Regional Planning Commission has elected not to pursue an Act 209 Transportation Impact Fee Ordinance at this time, the Roadway Sufficiency Analysis and Capital Improvements Plan that were prepared as necessary steps in the evaluation process can be used as valuable tools, which we would encourage the region to utilize in the future.

Very truly yours,

PENNONI ASSOCIATES INC.

Earl W. Armitage III

Earl W. Armitage III, P.E.
Pennoni Associates Inc.

cc: Leo Bagley, Section Chief: Transportation, Montgomery County Planning Commission
Ginamarie Mangano, Principal Planner, Montgomery County Planning Commission
Michael Narcowich, Senior Planner, Montgomery County Planning Commission (w/Enclosures)
Marlborough Township (w/Enclosures)
Upper Hanover Township (w/Enclosures)
East Greenville Borough (w/Enclosures)
Green Lane Borough (w/Enclosures)
Pennsburg Borough (w/Enclosures)
Red Hill Borough (w/Enclosures)
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I. INTRODUCTION

This report has been prepared as required within ARTICLE V-A, entitled "Municipal Capital Improvement", Act 209 of the Pennsylvania Municipalities Planning Code on behalf of the Upper Perkiomen Valley Regional Planning Commission and the Montgomery County Planning Commission for the Upper Perkiomen Valley Transportation Study Area in Montgomery County, PA. Preceding this report was the preparation of a Land Use Assumption Report (LUAR) for the study area, which was prepared by the Montgomery County Planning Commission and completed on September 29, 2006.

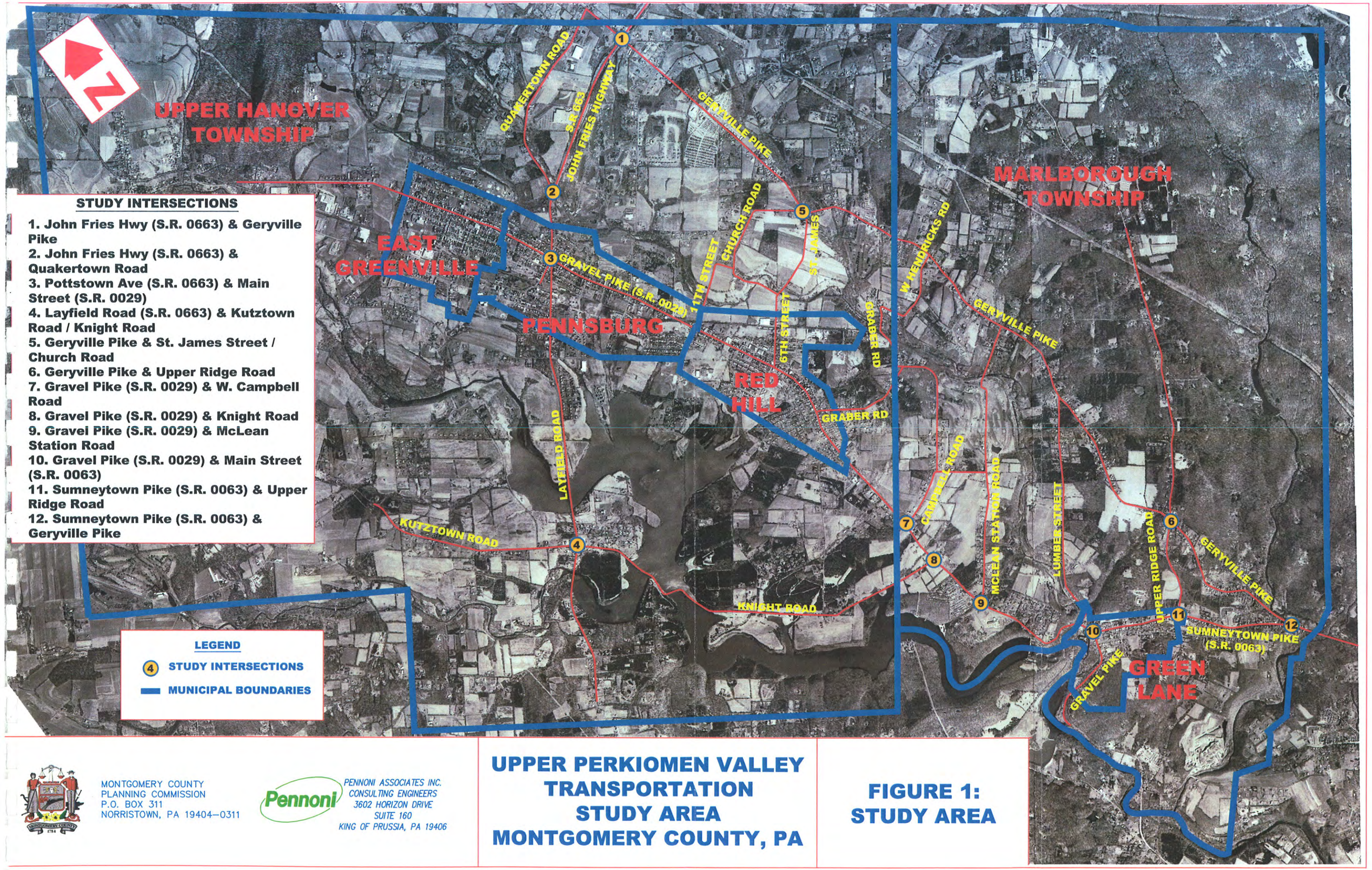
The Upper Perkiomen Valley Regional Planning Commission is comprised of six (6) municipalities (East Greenville Borough, Pennsburg Borough, Red Hill Borough, Green Lane Borough, Upper Hanover Township and Marlborough Township). The preparation of this report is unique in that these municipalities have joined together with the County and State to address existing and future traffic issues on a regional level, not only on a local level.

The limits of the Upper Perkiomen Valley Regional Transportation Study Area include East Greenville Borough, Pennsburg Borough, Red Hill Borough, Green Lane Borough, Upper Hanover Township and Marlborough Township. More specifically, the study area includes the length of John Fries Highway (SR 0663) from Geryville Pike to Knight Road/Kutztown Road (SR 1033), the length of Gravel Pike (SR 0029) from Pottstown Avenue (SR 0663) to Sumneytown Pike (SR 0063), the length of Sumneytown Pike (SR 0063) from Gravel Pike (SR 0029) to Geryville Pike, and the length of Geryville Pike from John Fries Highway (SR 0663) to Sumneytown Pike (SR 0063). As noted, the primary roadways within the study area are State Routes (SR).

This report summarizes the analysis of traffic conditions within the study area, including existing conditions, projected future conditions without specific development within the study area, and projected future conditions with specific development within the study area. These conditions were analyzed at 12 intersections along John Fries Highway (SR 0663), Gravel Pike (SR 0029), Sumneytown Pike (SR 0063), and Geryville Pike. **FIGURE 1** illustrates the location of the study intersections within the County.

BACKGROUND

According to ARTICLE V-A, as enabled by PA Act 209 (effective 12/19/1990), traffic impact fee ordinances must be systematically developed, based upon and directed toward traffic related improvements attributable to new land development related traffic within the study area. Traffic related improvements that are presently required or which would result from on-going regional development (beyond the boundary of the study area) must be financed with other sources other than impact fees.



STUDY INTERSECTIONS

1. John Fries Hwy (S.R. 0663) & Geryville Pike
2. John Fries Hwy (S.R. 0663) & Quakertown Road
3. Pottstown Ave (S.R. 0663) & Main Street (S.R. 0029)
4. Layfield Road (S.R. 0663) & Kutztown Road / Knight Road
5. Geryville Pike & St. James Street / Church Road
6. Geryville Pike & Upper Ridge Road
7. Gravel Pike (S.R. 0029) & W. Campbell Road
8. Gravel Pike (S.R. 0029) & Knight Road
9. Gravel Pike (S.R. 0029) & McLean Station Road
10. Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)
11. Sumneytown Pike (S.R. 0063) & Upper Ridge Road
12. Sumneytown Pike (S.R. 0063) & Geryville Pike

LEGEND

(4) STUDY INTERSECTIONS

MUNICIPAL BOUNDARIES

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UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA MONTGOMERY COUNTY, PA

FIGURE 1: STUDY AREA

Preceding the preparation of this report, a Land Use Assumptions Report was prepared by the Montgomery County Planning Commission and commissioned for the purpose of predicting the most realistic future development scenario anticipated for the Upper Perkiomen Valley Regional Transportation Study Area within Montgomery County.

This report establishes the existing and future traffic engineering needs of the study area based upon the Preferred Level of Service for the area. The incremental traffic improvements identified to accommodate existing, on-going regional growth (i.e., pass-through traffic, without specific development in the study area) and the expected future traffic demand (including expected development specifically within the study area) are enumerated herein. Activities following this report, necessary to complete the Act 209 process and implement a traffic impact fee ordinance include:

1) The preparation of a Capital Improvements Plan (CIP), and
2) Drafting/passage of the actual Transportation Impact Fee Ordinance.

The Capital Improvements Plan (CIP) will establish conceptual cost estimates for each recommended improvement project. The Impact Fee Ordinance synthesizes the elements of all preceding phases, focusing on expected new development traffic impact, legally enabling the municipalities to collect and use impact fees for transportation network improvements.

II. EXISTING TRAFFIC CONDITIONS

The existing traffic conditions scenario includes the inventory and assessment of transportation facilities and travel demands as they occurred during the Spring and Summer of 2006 (May – July 2006) within the Upper Perkiomen Valley Regional Transportation Study Area. The existing conditions scenario is often the most readily understood traffic scenario since it reflects the current day-to-day experiences, and influences the perceptions of the area motorists.

EXISTING TRANSPORTATION FACILITIES

Regional Network

The Upper Perkiomen Valley Region (UPVR) is located in the northwestern section of Montgomery County, approximately 43 miles northwest of Center City Philadelphia. The UPVR is approximately 36 square miles and includes the six municipalities of East Greenville Borough, Pennsburg Borough, Red Hill Borough, Green Lane Borough, Upper Hanover Township, and Marlborough Township.

The UPVR is located in close proximity to Routes 29, 663, 100, and the Northeast Extension of the Pennsylvania Turnpike allowing for convenient access to other areas such as Allentown, Reading, Pottstown, and Quakertown. The UPVR's location also provides convenient access in to the Region for the significant number of employees that are drawn in by the Region's many large industries.

The UPVR is considered part of the Philadelphia metropolitan region. However, due to its distance from the existing population centers, the area still possesses a rural quality of life. The area is mainly comprised of large tracts of land including large residential lots, farms, and also vacant lots. The industrial portion of the Region generally contains large plants on large parcels of land with shopping centers and offices located within the four Boroughs.

Roadway and Intersection Characteristics

The Upper Perkiomen Valley Regional Transportation Study Area roadway system, as illustrated in **FIGURE 1,** consists primarily of two lane, undivided roadways. Regional access to the area is provided via the Northeast Extension of the Pennsylvania Turnpike from the North, Routes 29 and 100 from the West, and Route 63 from the East.

TABLE 1 summarizes the operating characteristics of the primary study area roadways as determined through document research and the field reconnaissance performed in July 2006.

TABLE 1
STUDY AREA
ROADWAY CHARACTERISTICS[1]

ROADWAY	MUNICIPALITY	ROADWAY CLASSIFICATION	ROADWAY OWNERSHIP	POSTED SPEED LIMIT (MPH)
John Fries Highway/Pottstown Avenue/Layfield Road	Upper Hanover Township & Pennsburg Borough	Principal Arterial	PennDOT S.R. 0663	35 to 55
Gravel Pike	All	Principal Arterial	PennDOT S.R. 0029	25 to 45
Main Street/Sumneytown Pike	Marlborough Township & Green Lane Borough	Principal Arterial	PennDOT S.R. 0063	35 to 45
Geryville Pike	Upper Hanover & Marlborough Townships	Minor Arterial	Township	35 to 40
Knight Road/Kutztown Road	Upper Hanover & Marlborough Townships	Minor Arterial	PennDOT S.R. 1033 /Township	40
Upper Ridge Road	Marlborough Township	Major Collector	PennDOT S.R. 1032	35 to 45
Quakertown Road	Upper Hanover Township	Minor Collector	PennDOT S.R. 1038	40
St. James Street	Upper Hanover Township & Red Hill Borough	Major Collector	Township/Borough	35
Church Road	Upper Hanover Township	Minor Collector	Township	Not Posted
West Campbell Road	Marlborough Township	Minor Collector	Township	35
McLean Station Road	Marlborough Township	Minor Collector	Township	35

[1] Roadway Characteristics within the Study Area as defined by the Study Intersections in **TABLE 2**.

Twelve (12) study intersections have been selected by the Upper Perkiomen Valley Regional Planning Commission and Montgomery County Planning Commission to be evaluated and included in the Roadway Sufficiency Analysis and Capital Improvements Plan. The study intersections are as indicated in **TABLE 2.** Photos of each study intersection are also included in ***APPENDIX A.***

TABLE 2
STUDY INTERSECTIONS

INTERSECTION NUMBER	INTERSECTION	MUNICIPALITY	EXISTING CONTROL
1	John Fries Highway (S.R. 0663) & Geryville Pike	Upper Hanover Township	Traffic Signal
2	John Fries Highway (S.R. 0663) & Quakertown Road	Upper Hanover Township	Stop Sign(s)
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	Pennsburg Borough	Traffic Signal
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	Upper Hanover Township	Traffic Signal
5	Geryville Pike & St. James Street/Church Road	Upper Hanover Township	Stop Sign(s)
6	Geryville Pike & Upper Ridge Road	Marlborough Township	Stop Sign(s)
7	Gravel Pike (S.R. 0029) & W. Campbell Road	Marlborough Township	Stop Sign(s)
8	Gravel Pike (S.R. 0029) & Knight Road	Marlborough Township	Stop Sign(s)
9	Gravel Pike (S.R. 0029) & McLean Station Road	Marlborough Township	Stop Sign(s)
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	Green Lane Borough	Stop Sign(s)
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	Marlborough Township	Stop Sign(s)
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	Marlborough Township	Stop Sign(s)

ACCIDENT ANALYSIS

Statistics pertaining to reportable accidents occurring on the State Routes within the study area were analyzed for the time period between June 2003 and June 2006. The data was obtained from the Pennsylvania Department of Transportation's Center for Highway Safety. A summary of the data is provided in **TABLE 3** below.

TABLE 3
ACCIDENT DATA SUMMARY

	INTERSECTION	NUMBER OF REPORTABLE ACCIDENTS	COLLISION TYPE								
			BACKING	ANGLE	REAR END	HEAD ON	HIT FIX OBJ.	OPP DIR. SIDE SWIPE	SAME DIR. SIDE SWIPE	NON COLLISION	UNKNOWN
1	John Fries Highway (S.R. 0663) & Geryville Pike	12	—	5	3	1	1	1	1	—	—
2	John Fries Highway (S.R. 0663) & Quakertown Road	1	—	—	—	—	—	—	—	1	—
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	20	1	11	4	1	1	1	1	—	—
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	18	—	13	3	—	—	—	—	2	—
7	Gravel Pike (S.R. 0029) & W. Campbell Road	2	—	—	—	—	—	1	—	—	1
8	Gravel Pike (S.R. 0029) & Knight Road	4	—	1	1	—	1	—	—	1	—
9	Gravel Pike (S.R. 0029) & McLean Station Road	2	—	—	2	—	—	—	—	—	—
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	5	—	2	1	—	2	—	—	—	—
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	8	—	4	1	—	3	—	—	—	—
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	6	—	4	—	1	—	1	—	—	—

EXISTING TRAFFIC VOLUMES

Manual traffic counts were conducted in May 2006 during the weekday morning peak hours (7:00-9:00 AM) and weekday evening peak hours (4:00-6:00 PM) at each of the study intersections.

The traffic count data is provided in ***APPENDIX B***. The existing AM and PM peak hour traffic volumes for the study area are illustrated in **FIGURE 2.**

ASSESSMENT OF EXISTING TRAFFIC OPERATIONS

Peak hour operations were evaluated at the study intersections for existing conditions. The analyses were performed in accordance with the procedures outlined in the Highway Capacity Manual, Special Report 209, published by the Transportation Research Board, Washington, D.C., using the latest version of Trafficware's Synchro Version 6.0 Software. The results of these analyses provide Level of Service (LOS) designation, volume/capacity ratios, and average seconds of delay experienced by motorists for each intersection movement at each study intersection.

Level of Service is a measure of vehicle operator satisfaction with the driving experience. For a signalized intersection this has been quantified with designations "A" through "F" based on the average vehicle delay per approach and the overall intersection. For an unsignalized intersection this has been quantified with designations "a" through "f" also based upon average vehicle delay per approach and the overall intersection for all-way stop-controlled intersections. The LOS concept is a rating system established to objectively evaluate the operational adequacy of an intersection or roadway. The definitions of Levels of Service "A" through "F" for signalized and unsignalized intersections are contained in **TABLE 4** and **TABLE 5** below.

TABLE 4
LEVEL OF SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE (LOS)	CONTROL DELAY (SECONDS PER VEHICLE)
A	< 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

UPPER HANOVER TOWNSHIP

MARLBOROUGH TOWNSHIP

EAST GREENVILLE

PENNSBURG

RED HILL

GREEN LANE

QUAKERTOWN ROAD

JOHN FRIES HIGHWAY (S.R. 0663)

GERYVILLE PIKE

CHURCH ROAD

GRAVEL PIKE (S.R. 0029)

11TH STREET

6TH STREET

ST. JAMES

GRABER RD

GRABER RD

POTTSTOWN AVENUE (S.R. 0663)

KUTZTOWN ROAD

LAYFIELD ROAD (S.R. 0663)

KNIGHT ROAD

CAMPBELL ROAD

MCLEAN STATION ROAD

LUMBER STREET

UPPER RIDGE ROAD

GERYVILLE PIKE

SUMNEYTOWN PIKE (S.R. 0063)

GRAVEL PIKE

LEGEND

SIGNALIZED INTERSECTION

STOPPED APPROACH

MUNICIPAL BOUNDARIES

44 (139) AM VOLUME (PM VOLUME)

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UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA MONTGOMERY COUNTY, PA

FIGURE 2: EXISTING (2006) TRAFFIC VOLUMES

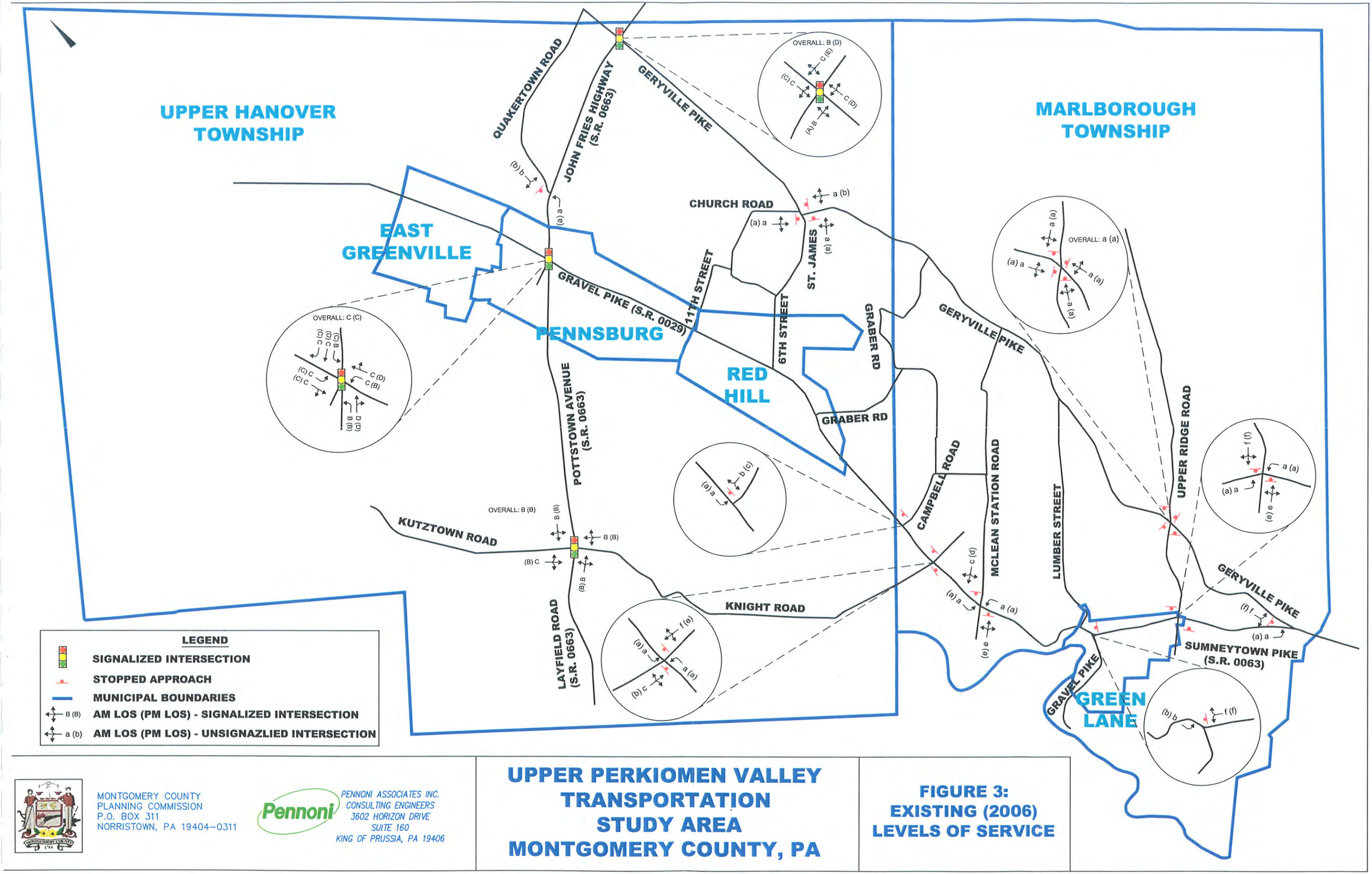
TABLE 5
LEVEL OF SERVICE CRITERIA
FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE (LOS)	INTERSECTION DELAY (SECONDS PER VEHICLE)
a	≤ 10
b	> 10 and ≤ 15
c	> 15 and ≤ 25
d	> 25 and ≤ 35
e	> 35 and ≤ 50
f	> 50

Average Delay refers to the time a vehicle arriving at the intersection must wait before proceeding through the intersection. The volume/capacity (V/C) ratio compares the number vehicles attempting to utilize an approach or intersection to the capacity of the approach or intersection for a specific time period. As the traffic volumes near the capacity of the approach or intersection, congestion occurs. A V/C of 1.0 indicates that the volumes equal the estimated capacity of the intersection or approach.

From a traffic engineering perspective, stable and predictable traffic operations are generally encountered when volumes are equal or less than capacity. Yet it is possible for traffic to experience LOS "F" conditions with V/C ratios below 1.0 if, for example, a low volume minor street approach is governed by a traffic signal with a very long cycle length. Conversely, theoretical capacity may be exceeded by demand volume, while average delays are maintained at LOS "E" or better by providing good traffic progression through adjacent signalized intersections.

FIGURE 3 illustrates the existing Level of Service during the AM and PM peak hours. **TABLE 6** and **TABLE 7** summarize the overall performance of the signalized and unsignalized study intersections, respectively, within the study area. Summary outputs for the analysis software are provided in ***APPENDIX C.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***



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UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA MONTGOMERY COUNTY, PA

FIGURE 3: EXISTING (2006) LEVELS OF SERVICE

TABLE 6
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
EXISTING CONDITIONS

	INTERSECTION	AM		PM	
		LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
1	John Fries Highway (S.R. 0663) & Geryville Pike	B	19.4	D	39.5
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	C	29.9	C	34.1
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	B	14.1	B	12.2

TABLE 7
OPERATIONAL SUMMARY
AT UNSIGNALIZED STUDY INTERSECTIONS
EXISTING CONDITIONS

	INTERSECTION	STOPPED APPROACH(ES)	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
2	John Fries Highway (S.R. 0663) & Quakertown Road	Quakertown Road	b	10.5	b	12.2
5	Geryville Pike & St. James Street/Church Road	Geryville Pike (WB)	a	5.7	b	12.6
		St. James Street	a	5.5	a	6.1
		Church Road	a	3.2	a	5.3
6	Geryville Pike & Upper Ridge Road[3]	All	a	8.1	a	8.9
7	Gravel Pike (S.R. 0029) & W. Campbell Road	W. Campbell Road	b	13.8	c	15.8
8	Gravel Pike (S.R. 0029) & Knight Road	Knight Road (EB)	c	19.4	b	13.8
		Knight Road (WB)	f	59.0	e	39.4
9	Gravel Pike (S.R. 0029) & McLean Station Road	McLean Station Road (EB)	e	43.4	e	36.0
		McLean Station Road (WB)	d	29.3	c	16.2
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	Main Street (S.R. 0063)	f	187.8	f	265.9
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	Upper Ridge Road (NB)	e	39.5	e	39.4
		Upper Ridge Road (SB)	f	217.0	f	76.5
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	Geryville Pike	f	390.5	f	104.8

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection
[3] All-way stop, LOS and Delay for overall intersection

ACCEPTABLE LEVELS OF SERVICE

Preferred and/or minimum acceptable Peak Hour Levels of Service have been implemented as a basis for ensuring that a desired quality of life (in so far as that may be reflected in traffic conditions) is maintained at each study intersection and that further deterioration of traffic operational conditions is prevented beyond that which will occur due to regional growth beyond the control of the municipalities.

TABLE 8 lists the Preferred Levels of Service that were selected and will be employed in the remainder of these analyses (which provides traffic related improvement recommendations necessary to attain these preferred thresholds) given existing traffic volumes, projected 2016 pass-through traffic volumes (without specific study area development) and projected 2016 total future traffic volumes (with specific study area development).

TABLE 8
PREFERRED LEVELS OF SERVICE
AT STUDY INTERSECTIONS

	PREFERRED/MINUMUM ACCEPTABLE LOS[1]
Overall Intersection	D
Each Movement/Approach	E

[1] Level of Service, see Tables 4 and 5 for Description

RECOMMENDED IMPROVEMENTS FOR EXISTING CONDITIONS

As shown in **TABLE 6** and **TABLE 7**, the following intersections do not operate at or above the preferred/acceptable Levels of Service as defined in **TABLE 8.**

- Gravel Pike (S.R. 0029) & Knight Road
- Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)
- Sumneytown Pike (S.R. 0063) & Upper Ridge Road
- Sumneytown Pike (S.R. 0063) & Geryville Pike

As noted in **TABLE 2** above, each of these intersections is unsignalized. In order to determine if each of the intersections warrants a traffic signal under the existing conditions, PennDOT's Four Hour and Peak Hour warrant analyses were completed for each intersection utilizing the traffic count data obtained in May 2006 (***APPENDIX B***).

PennDOT's Four Hour and Peak Hour traffic signal warrant analyses are generally based upon the total volume on the major street approaches and the higher volume of the minor street approaches, along with the posted speed limit on the major street. It is important to note that these warrant analyses are considered a starting point to determine if a traffic signal should be further considered and do not require that an intersection be signalized.

Upon completion of the traffic signal warrant analyses, it was found that the following two (2) intersections warrant traffic signals under existing conditions:

- Gravel Pike (S.R. 0029) & Knight Road
- Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)

It should also be noted that the intersections of Sumneytown Pike (S.R. 0663) & Upper Ridge Road and Sumneytown Pike (S.R. 0663) & Geryville Pike do not warrant a traffic signal based on PennDOT's Four Hour and Peak Hour warrant analyses utilizing the posted speed limit on Sumneytown Pike (S.R. 0663) of 35 mph. However, if the warrant analyses are based upon an assumed speed of 40 mph, which vehicles may be traveling on Sumneytown Pike (S.R. 0663), both intersections do warrant a traffic signal according to PennDOT's guidelines. The PennDOT Four Hour and Peak Hour traffic signal warrant analyses for the above intersections can be found in ***APPENDIX E***.

Therefore, in order to achieve the preferred Levels of Service, the improvements as indicated in **TABLE 9** are recommended. It is recommended that traffic signals are installed at each of the above intersections due to the high major street volumes. The resulting Levels of Service and Delay with the implementation of the recommended improvements are also provided in **TABLE 9**. The Levels of Service during AM and PM peak hours are illustrated in **FIGURE 4.** Summary outputs for the analysis software are provided in ***APPENDIX F.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***

UPPER HANOVER TOWNSHIP

MARLBOROUGH TOWNSHIP

EAST GREENVILLE

PENNSBURG

RED HILL

GREEN LANE

QUAKERTOWN ROAD

JOHN FRIES HIGHWAY (S.R. 0663)

GERYVILLE PIKE

GRAVEL PIKE (S.R. 0029)

CHURCH ROAD

11TH STREET

6TH STREET

ST. JAMES

GRABER RD

POTTSTOWN AVENUE (S.R. 0663)

KUTZTOWN ROAD

LAYFIELD ROAD (S.R. 0663)

KNIGHT ROAD

CAMPBELL ROAD

MCLEAN STATION ROAD

LUMBER STREET

UPPER RIDGE ROAD

SUMNEYTOWN PIKE (S.R. 0063)

OVERALL: B (D)

OVERALL: C (C)

OVERALL: a (a)

OVERALL: B (B)

OVERALL: A (A)

OVERALL: A (A)

OVERALL: C (C)

OVERALL: D (B)

LEGEND

- SIGNALIZED INTERSECTION
- STOPPED APPROACH
- MUNICIPAL BOUNDARIES
- B (B) AM LOS (PM LOS) - SIGNALIZED INTERSECTION
- a (b) AM LOS (PM LOS) - UNSIGNAZLIED INTERSECTION
- D (C) PROPOSED IMPROVEMENT

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FIGURE 4: EXISTING (2006) LEVELS OF SERVICE WITH IMPROVEMENTS

TABLE 9
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
EXISTING CONDITIONS WITH IMPROVEMENTS

	INTERSECTION	RECOMMENDED IMPROVEMENTS	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
8	Gravel Pike (S.R. 0029) & Knight Road	▪ Install traffic signal	A	6.9	A	5.3
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	▪ Install traffic signal	C	22.3	C	25.2
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	▪ Install traffic signal	A	8.5	A	8.1
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	▪ Install traffic signal ▪ Restrict Eastbound left turns on Sumneytown Pike (S.R. 0063)	D	37.8	B	11.4

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection

III. PROJECTED PASS-THROUGH TRAFFIC CONDITIONS

Pass-through traffic conditions (i.e., without specific development occurring within the study area) have been evaluated for a 2016 study horizon, consistent with the threshold and the target date presented in the Land Use Assumptions Report. Evaluation of the pass-through traffic scenario is important within in the Act 209 planning process in that it defines the future traffic and transportation baseline for which East Greenville Borough, Pennsburg Borough, Red Hill Borough, Green Lane Borough, Upper Hanover Township, Marlborough Township and/or PennDOT will be responsible. Pass-through traffic volumes represent the incremental increase in traffic demand on each municipality's primary routes over existing volumes due to ongoing regional development beyond the municipality's boundaries for the duration of the planning period (in this case 10 years), but without specific development within the municipality.

PASS-THROUGH TRAFFIC VOLUMES

Projections of traffic growth expected by 2016, due to ongoing development outside the various municipalities, were formulated by applying the standard growth rate of 2.1% growth per year, as suggested by PennDOT District 6-0. The resultant projected pass-through peak hour traffic volumes are illustrated in **FIGURE 5.**

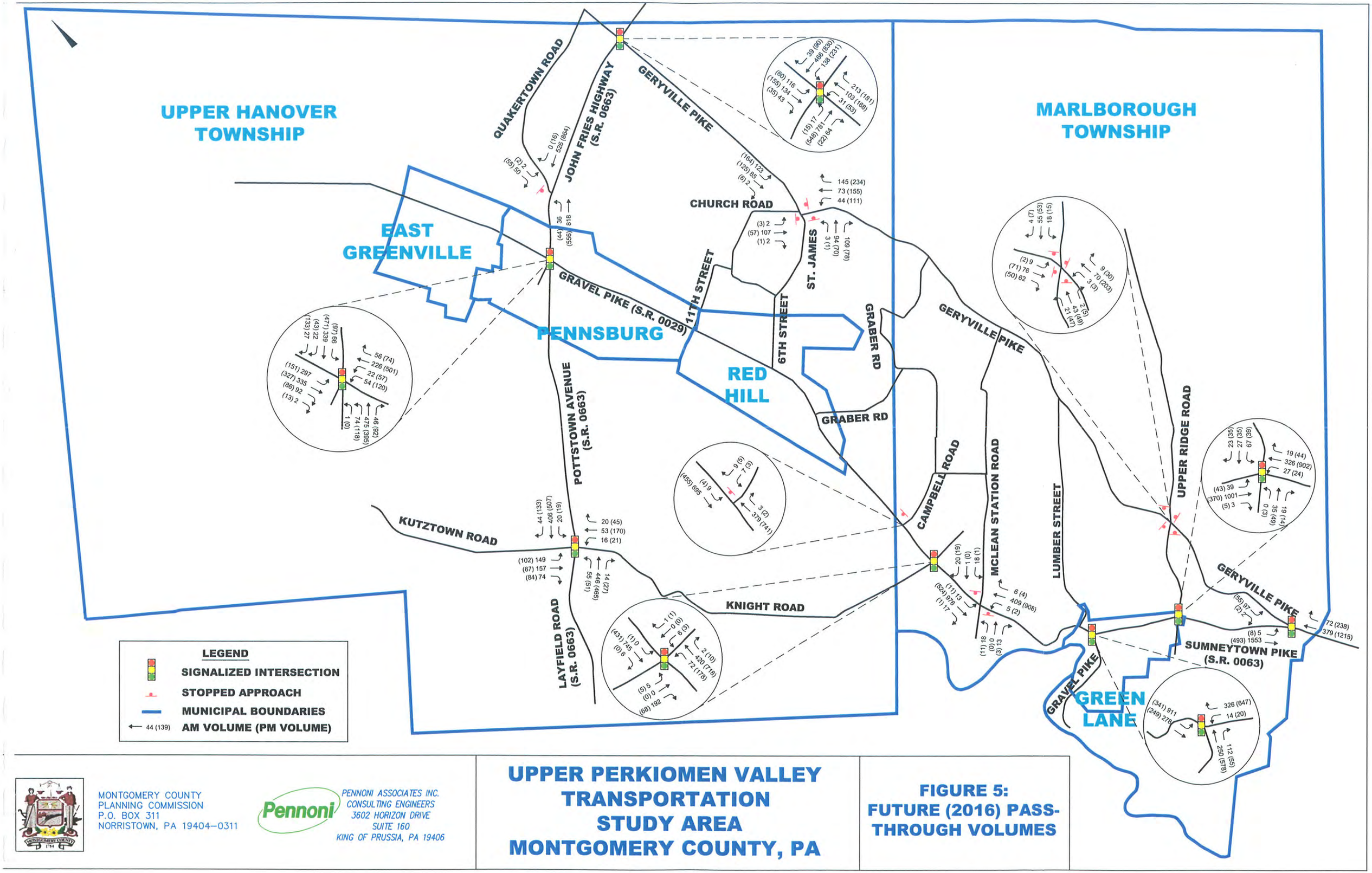

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FIGURE 5: FUTURE (2016) PASS-THROUGH VOLUMES

ASSESSMENT OF PASS-THROUGH TRAFFIC OPERATIONS

TABLE 10 and **TABLE 11** summarize the overall results of the Level of Service analysis of pass-through volumes for the signalized and unsignalized intersections. It is assumed there will be an implementation of optimized traffic signal timings and phasing (i.e., no physical roadway improvements) for the anticipated traffic volumes at the signalized intersections. These Levels of Service are also depicted on **FIGURE 6.** Summary outputs for the analysis software are provided in ***APPENDIX G.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***

TABLE 10
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
2016 PASS-THROUGH CONDITIONS

	INTERSECTION	AM		PM	
		LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
1	John Fries Highway (S.R. 0663) & Geryville Pike	D	54.9	F	119.8
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	D	43.6	F	85.5
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	C	22.7	B	16.7
8	Gravel Pike (S.R. 0029) & Knight Road	A	8.9	A	7.5
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	D	40.9	E	64.2
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	B	11.7	B	11.1
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	F	115.3	D	46.4

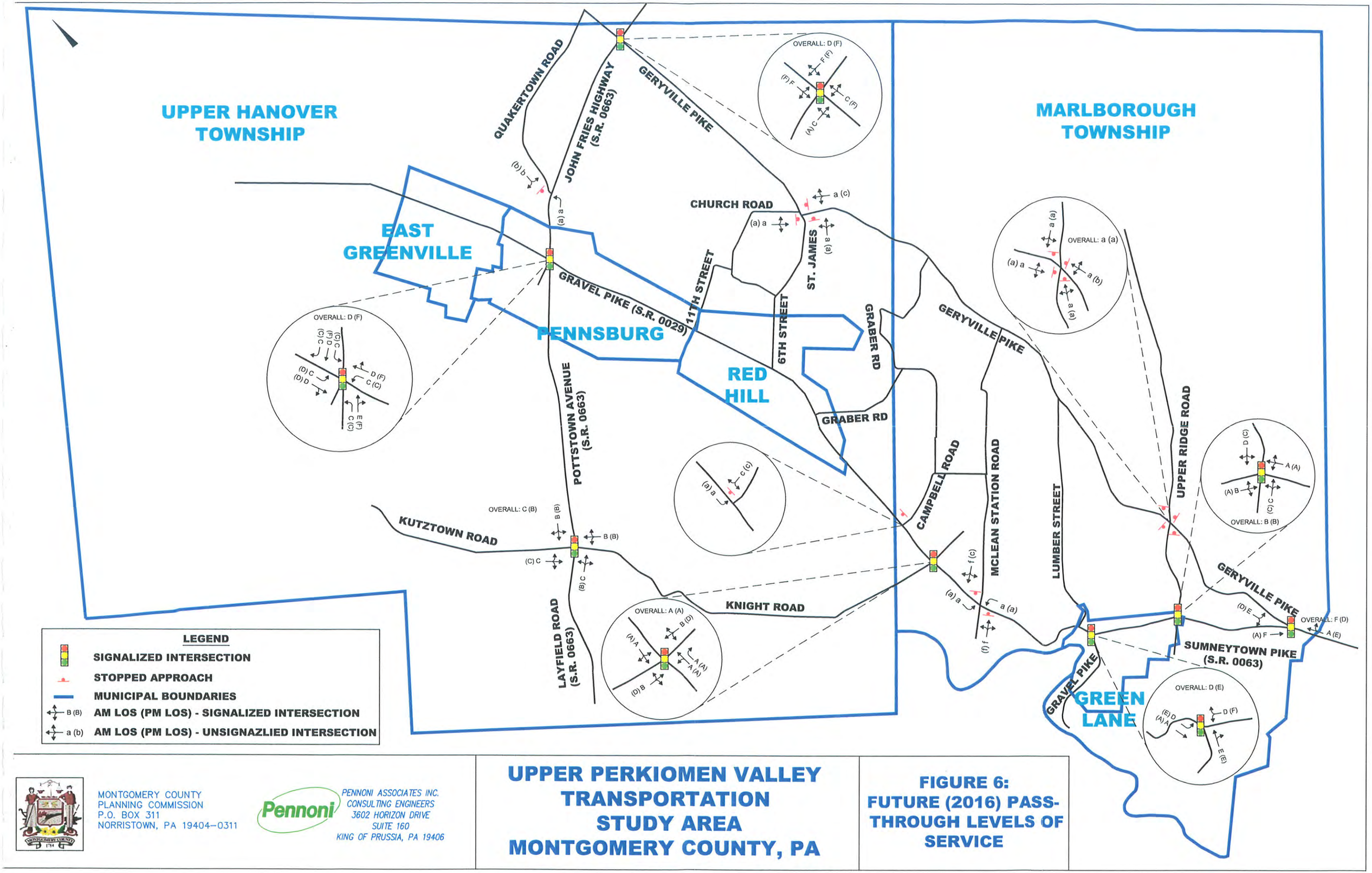

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FIGURE 6: FUTURE (2016) PASS-THROUGH LEVELS OF SERVICE

TABLE 11
OPERATIONAL SUMMARY
AT UNSIGNALIZED STUDY INTERSECTIONS
2016 PASS-THROUGH CONDITIONS

	INTERSECTION	STOPPED APPROACH(ES)	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
2	John Fries Highway (S.R. 0663) & Quakertown Road	Quakertown Road	b	11.3	b	14.1
5	Geryville Pike & St. James Street/Church Road	Geryville Pike (WB)	a	9.1	c	17.0
		St. James Street	a	7.9	a	8.8
		Church Road	a	4.8	a	4.4
6	Geryville Pike & Upper Ridge Road[3]	All	a	8.5	a	9.7
7	Gravel Pike (S.R. 0029) & W. Campbell Road	W. Campbell Road	c	16.5	c	19.7
9	Gravel Pike (S.R. 0029) & McLean Station Road	McLean Station Road (EB)	**f**	146.9	**f**	76.2
		McLean Station Road (WB)	**f**	65.9	c	21.1

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection
[3] All-way stop, LOS and Delay for overall intersection

RECOMMENDED IMPROVEMENTS FOR PASS-THROUGH CONDITIONS

As shown in **TABLE 10** and **TABLE 11** above, the following intersections do not operate at or above the preferred/acceptable Levels of Service as defined in **TABLE 8.**

- John Fries Highway (S.R. 0663) & Geryville Pike
- Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)
- Gravel Pike (S.R. 0029) & McLean Station Road
- Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)
- Sumneytown Pike (S.R. 0063) & Geryville Pike

As noted in **TABLE 2** above, the intersection of Gravel Pike (S.R. 0029) & McLean Station Road is unsignalized. In order to determine if this intersection warrants a traffic signal in the 2016 pass-through conditions, PennDOT's Four Hour and Peak Hour warrant analyses were completed for the intersection utilizing the projected 2016 pass-through volumes.

Upon completion of the traffic signal warrant analyses, it was found that the intersection of Gravel Pike (S.R. 0029) & McLean Station Road does warrant a traffic signal during the AM peak hour of 8:00AM – 9:00 AM for McLean Station Road due to the close proximity of Marlborough Elementary School to the subject intersection. The PennDOT Four Hour and Peak Hour traffic signal warrant analyses for the intersection can be found in ***APPENDIX H.***

In order to achieve the preferred Levels of Service, the improvements as indicated in **TABLE 12** are recommended. The resulting Levels of Service and Delay with the implementation of the recommended improvements are also provided in T**ABLE 12.** The Levels of Service during AM and PM peak hours are illustrated in **FIGURE 7.** Summary outputs for the analysis software are provided in ***APPENDIX I.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***

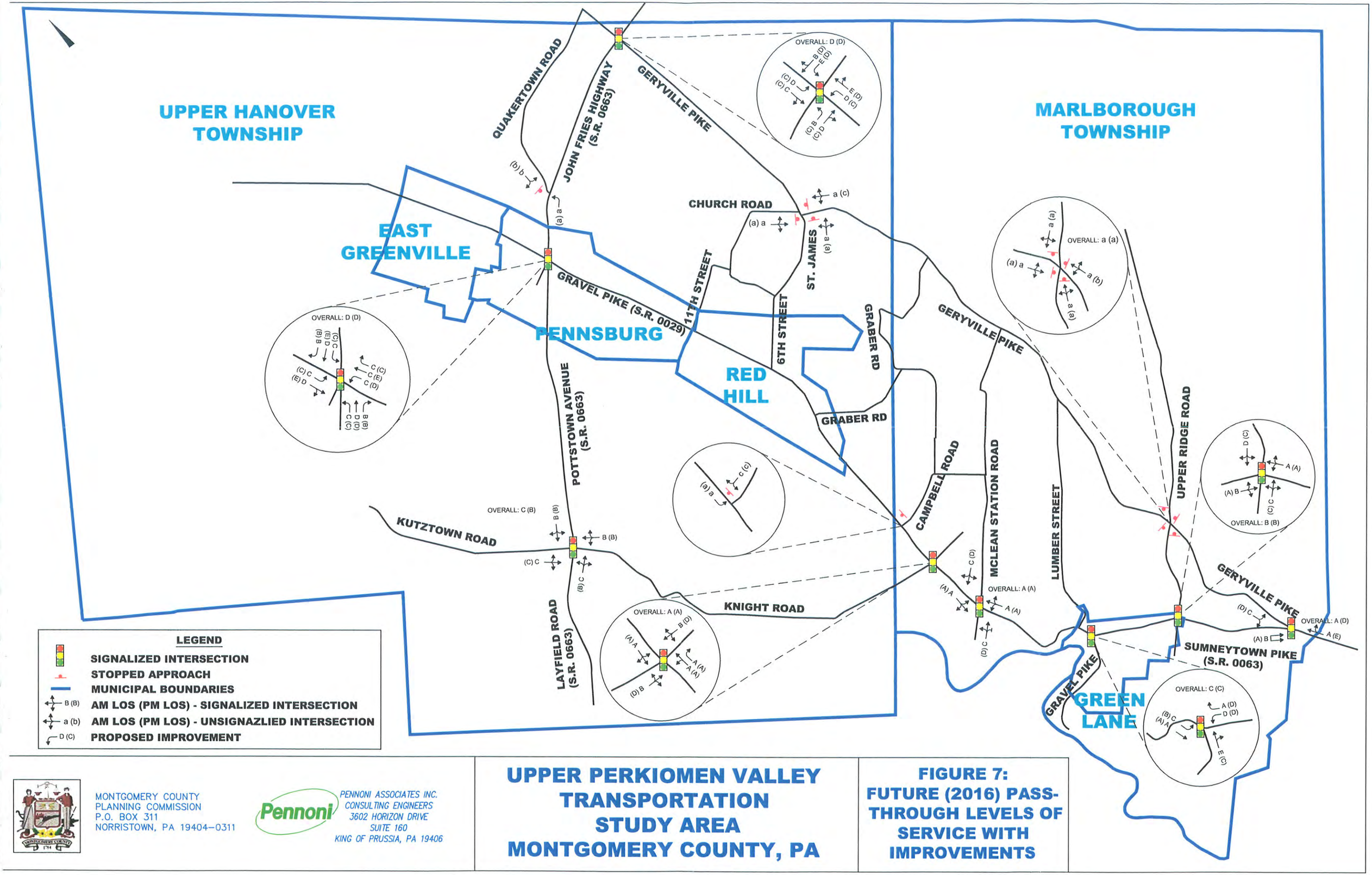

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FIGURE 7: FUTURE (2016) PASS-THROUGH LEVELS OF SERVICE WITH IMPROVEMENTS

TABLE 12
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
2016 PASS-THROUGH CONDITIONS WITH IMPROVEMENTS

	INTERSECTION	RECOMMENDED IMPROVEMENTS	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
1	John Fries Highway (S.R. 0663) & Geryville Pike	▪ Left turn lanes on each approach ▪ Left turn arrows for the Westbound approach of John Fries Highway (S.R. 0663) and the Southbound approach of Geryville Pike	D	43.4	D	39.9
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	▪ Right turn lanes on the Eastbound approach of Pottstown Avenue (S.R. 0663) and the Northbound approach of Gravel Pike (S.R. 0029)	D	36.4	D	54.2
9	Gravel Pike (S.R. 0029) & McLean Station Road	▪ Install traffic signal ▪ Realign McLean Station Road	A	8.9	A	4.9
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	▪ Separate right and left turn lanes on Westbound approach of Main Street (S.R. 0063)	C	24.9	C	28.1
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	▪ Add a through lane on Eastbound approach of Sumneytown Pike (S.R. 0063)	A	8.6	D	45.0

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection

IV. DEVELOPMENT GENERATED TRAFFIC

The Land Use Assumptions Report reflects projected changes in land use, densities, intensities and/or population within the study area. It is the "future" which best approximates development within the study area for the established planning horizon. In this situation, the Land Use Assumptions Report portrays the development scenario used in the projection of 2016 total future traffic volumes.

TRIP GENERATION

The development contained within the Land Use Assumptions Report was tabulated on a zoning district specific basis for each municipality for both residential and non-residential development. Vehicular traffic generation analyses were performed by applying standard trip generation rates, as documented by the Institute of Transportation Engineering (ITE) in their publication titled ***Trip Generation, 7th edition***, to the identified uses and sizes of the anticipated development portrayed within the Land Use Assumptions Report throughout the study area. **TABLE 13** details the foreseen development per municipality within the next ten (10) years.

TABLE 13
ANTICIPATED FUTURE DEVELOPMENT
IN THE UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA

MUNICIPALITY	RESIDENTIAL DEVELOPMENT (DWELLING UNITS)	NON-RESIDENTIAL DEVELOPMENT (SQUARE FOOTAGE)
East Greenville Borough	45	3,600
Pennsburg Borough	270	28,800
Red Hill Borough	99	64,440
Green Lane Borough	4	0
Upper Hanover Township	377	56,700
Marlborough Township	104	26,460
Total	**899**	**180,000**

The residential and non-residential development assumed for each municipality was further divided into development per zoning district. Based on the permitted land uses per zone, each individual development was correlated to an appropriate land use within ITE's ***Trip Generation, 7th edition*** publication to determine the anticipated traffic volumes associated with the development. **TABLE 14** shows the anticipated AM and PM peak hour trips associated with the residential and non-residential development in each municipality. The detailed trip generation analyses are provided in ***APPENDIX J.***

TABLE 14
TRIP GENERATION
IN THE UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA

MUNICIPALITY	RESIDENTIAL DEVELOPMENT TRIPS		NON-RESIDENTIAL DEVELOPMENT TRIPS	
	AM	PM	AM	PM
East Greenville Borough	23	30	6	6
Pennsburg Borough	141	177	115	116
Red Hill Borough	56	71	100	96
Green Lane Borough	4	4	0	0
Upper Hanover Township	284	381	108	103
Marlborough Township	79	105	37	49
Total	**587**	**768**	**366**	**370**

TRIP DISTRIBUTION

The expected distribution of the new development traffic upon the study area roadway network was estimated by reviewing each municipality's zoning map to determine where the anticipated developments could be located and by examining the pattern of existing peak hour traffic volumes along the study area roadways. The new development traffic was distributed through the network such that the inbound and outbound traffic was applied to the maximum number of study intersections (to provide conservative future traffic projections), while maintaining the overall pattern of existing peak hour traffic.

FIGURE 8 illustrates the assignment of the development traffic to the study intersections.

UPPER HANOVER TOWNSHIP

MARLBOROUGH TOWNSHIP

EAST GREENVILLE

PENNSBURG

RED HILL

GREEN LANE

QUAKERTOWN ROAD

JOHN FRIES HIGHWAY (S.R. 0663)

GERYVILLE PIKE

CHURCH ROAD

ST. JAMES

11TH STREET

6TH STREET

GRABER RD

GRAVEL PIKE (S.R. 0029)

POTTSTOWN AVENUE (S.R. 0663)

KUTZTOWN ROAD

LAYFIELD ROAD (S.R. 0663)

KNIGHT ROAD

CAMPBELL ROAD

MCLEAN STATION ROAD

LUMBER STREET

UPPER RIDGE ROAD

SUMNEYTOWN PIKE (S.R. 0063)

GRAVEL PIKE

45 (74)

66 (52)

(18) 15
(5) 7

15 (24)
3 (3)
2 (1)

(2) 1

3 (4)

3 (4)

53 (69)
8 (18)
(13) 2
(1) 3
18 (9)
7 (7)
5 (4)
(87) 54
(1) 1

4 (3)
3 (1)
(0) 2
(14) 17
(7) 13
0 (3)
12 (37)
3 (6)
1 (5)

(25) 17
(31) 22
(2) 1
(15) 5
17 (15)
109 (120)
6 (8)
14 (20)
(17) 28
(108) 102
(6) 7
9 (17)
22 (20)
11 (7)

2 (1)
1 (1)
(2) 1
(199) 183
0 (1)
180 (206)

3 (9)
39 (47)
1 (1)
2 (2)
5 (10)
1 (0)
(10) 13
(10) 9
(2) 2
2 (1)
26 (32)
0 (2)

(200) 183
(0) 1
178 (206)
6 (29)
(1) 0
(14) 27

7 (11)
(0) 6
(13) 4
(201) 206
2 (5)
179 (224)

5 (1)
4 (4)
8 (5)
0 (3)
119 (126)
(4) 3
(128) 164
1 (4)

(23) 21
(135) 175
13 (46)
121 (134)

(121) 168
(80) 47
110 (129)
72 (100)

LEGEND

- SIGNALIZED INTERSECTION
- STOPPED APPROACH
- MUNICIPAL BOUNDARIES
- 44 (139) AM VOLUME (PM VOLUME)

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FIGURE 8: DEVELOPMENT TRAFFIC VOLUMES

V. PROJECTED TOTAL FUTURE TRAFFIC CONDITIONS

Projected 2016 Total Future Traffic conditions represent the cumulative effect of existing traffic, traffic resulting from on-going regional development (as quantified by Pass-Through traffic), and the traffic impact of the development expected to occur within the study area (as quantified by the assignment of the Land Use Assumptions Report's traffic) within the next ten (10) year period.

FIGURE 9 illustrates the resultant AM and PM total peak hour traffic volumes projected for 2016, including assignment of development traffic to the study intersections.

ASSESSMENT OF TOTAL FUTURE TRAFFIC OPERATIONS

TABLE 15 and **TABLE 16** summarize the results of the Level of Service analysis of total future traffic volumes, which is also depicted graphically in **FIGURE 10**. It is assumed there will be an implementation of optimized traffic signal timings and phasing (i.e., no physical roadway improvements) for the anticipated traffic volumes at the signalized intersections. Summary outputs for the analysis software are provided in ***APPENDIX K.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***

UPPER HANOVER TOWNSHIP

MARLBOROUGH TOWNSHIP

EAST GREENVILLE

PENNSBURG

RED HILL

GREEN LANE

QUAKERTOWN ROAD

JOHN FRIES HIGHWAY (S.R. 0663)

GERYVILLE PIKE

CHURCH ROAD

GRAVEL PIKE (S.R. 0029)

11TH STREET

6TH STREET

ST. JAMES

GRABER RD

GRABER RD

POTTSTOWN AVENUE (S.R. 0663)

KUTZTOWN ROAD

LAYFIELD ROAD (S.R. 0663)

KNIGHT ROAD

CAMPBELL ROAD

MCLEAN STATION ROAD

LUMBER STREET

UPPER RIDGE ROAD

GERYVILLE PIKE

SUMNEYTOWN PIKE (S.R. 0063)

GRAVEL PIKE

LEGEND

SIGNALIZED INTERSECTION

STOPPED APPROACH

MUNICIPAL BOUNDARIES

44 (139) AM VOLUME (PM VOLUME)

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FIGURE 9: TOTAL FUTURE (2016) VOLUMES

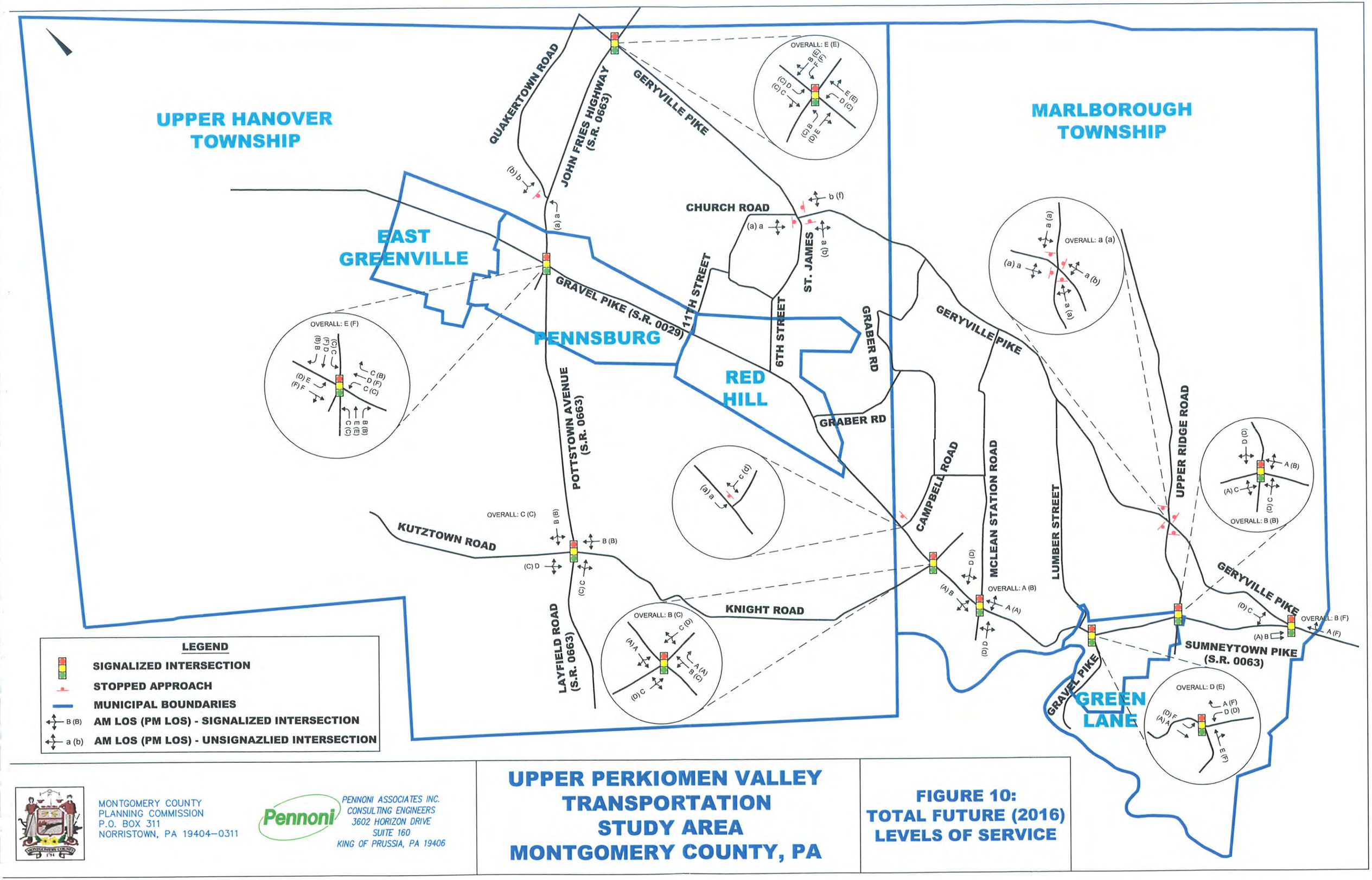

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FIGURE 10: TOTAL FUTURE (2016) LEVELS OF SERVICE

TABLE 15
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
TOTAL FUTURE (2016) TRAFFIC CONDITIONS

	INTERSECTION	AM		PM	
		LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
1	John Fries Highway (S.R. 0663) & Geryville Pike	**E**	55.1	**E**	61.9
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	**E**	58.8	**F**	97.4
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	C	26.7	C	20.5
8	Gravel Pike (S.R. 0029) & Knight Road	B	13.6	C	22.5
9	Gravel Pike (S.R. 0029) & McLean Station Road	B	12.4	A	7.2
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	C	24.9	**E**	64.1
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	B	18.8	B	16.1
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	A	8.6	**F**	95.0

TABLE 16
OPERATIONAL SUMMARY
AT UNSIGNALIZED STUDY INTERSECTIONS
TOTAL FUTURE (2016) TRAFFIC CONDITIONS

	INTERSECTION	STOPPED APPROACH(ES)	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
2	John Fries Highway (S.R. 0663) & Quakertown Road	Quakertown Road	b	11.5	b	14.7
5	Geryville Pike & St. James Street/Church Road	Geryville Pike (WB)	b	10.9	**f**	82.5
		St. James Street	a	9.4	b	10.1
		Church Road	a	4.6	a	6.2
6	Geryville Pike & Upper Ridge Road[3]	All	a	8.9	a	10.5
7	Gravel Pike (S.R. 0029) & W. Campbell Road	W. Campbell Road	c	24.5	d	31.4

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection
[3] All-way stop, LOS and Delay for overall intersection

RECOMMENDED IMPROVEMENTS FOR TOTAL FUTURE TRAFFIC CONDITIONS

As shown in **TABLE 15** and **TABLE 16** above, the following intersections do not operate at or above the preferred/acceptable Levels of Service as defined in **TABLE 8.**

- John Fries Highway (S.R. 0663) & Geryville Pike
- Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)
- Geryville Pike & St. James Street/Church Road
- Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)
- Sumneytown Pike (S.R. 0063) & Geryville Pike

As noted in **TABLE 2** above, the intersection of Geryville Pike & St. James Street/Church Road is unsignalized. In order to determine if this intersection warrants a traffic signal in the 2016 total future conditions, PennDOT's Four Hour and Peak Hour warrant analyses were completed for the intersection utilizing the projected 2016 total future volumes (with development).

Upon completion of the traffic signal warrant analyses, it was found that the intersection of Geryville Pike & St. James Street/Church Road does warrant a traffic signal utilizing

PennDOT's Four Hour and Peak Hour warrant analyses. The PennDOT traffic signal warrant analyses for the intersection can be found in ***APPENDIX L.***

In order to achieve the preferred Levels of Service, the improvements as indicated in **TABLE 17** are recommended. The resulting Levels of Service and Delay with the implementation of the recommended improvements are also provided in **TABLE 17**. The Levels of Service during AM and PM peak hours are illustrated in **FIGURE 11.** Summary outputs for the analysis software are provided in ***APPENDIX M.*** In addition, a detailed Levels of Service report for the AM and PM peak hours for each study intersection movement/approach can be found in ***APPENDIX D.***

UPPER HANOVER TOWNSHIP

MARLBOROUGH TOWNSHIP

EAST GREENVILLE

PENNSBURG

RED HILL

GREEN LANE

QUAKERTOWN ROAD

JOHN FRIES HIGHWAY (S.R. 0663)

GERYVILLE PIKE

CHURCH ROAD

GRAVEL PIKE (S.R. 0029)

11TH STREET

6TH STREET

ST. JAMES

GRABER RD

POTTSTOWN AVENUE (S.R. 0663)

KUTZTOWN ROAD

LAYFIELD ROAD (S.R. 0663)

KNIGHT ROAD

CAMPBELL ROAD

MCLEAN STATION ROAD

LUMBER STREET

UPPER RIDGE ROAD

SUMNEYTOWN PIKE (S.R. 0063)

OVERALL: C (C)

OVERALL: B (B)

OVERALL: a (a)

OVERALL: C (D)

OVERALL: C (C)

OVERALL: B (C)

OVERALL: A (B)

OVERALL: B (B)

OVERALL: B (C)

OVERALL: D (D)

LEGEND

- SIGNALIZED INTERSECTION
- STOPPED APPROACH
- MUNICIPAL BOUNDARIES
- B (B) — AM LOS (PM LOS) - SIGNALIZED INTERSECTION
- a (b) — AM LOS (PM LOS) - UNSIGNAZLIED INTERSECTION
- D (C) — PROPOSED IMPROVEMENT

MONTGOMERY COUNTY
PLANNING COMMISSION
P.O. BOX 311
NORRISTOWN, PA 19404–0311

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
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UPPER PERKIOMEN VALLEY TRANSPORTATION STUDY AREA MONTGOMERY COUNTY, PA

FIGURE 11: TOTAL FUTURE (2016) LEVELS OF SERVICE WITH IMPROVEMENTS

TABLE 17
OPERATIONAL SUMMARY
AT SIGNALIZED STUDY INTERSECTIONS
TOTAL FUTURE (2016) TRAFFIC CONDITIONS
CONDITIONS WITH IMPROVEMENTS

	INTERSECTION	RECOMMENDED IMPROVEMENTS	AM		PM	
			LOS[1]	DELAY (sec.)[2]	LOS[1]	DELAY (sec.)[2]
1	John Fries Highway (S.R. 0663) & Geryville Pike	▪ Add a through lane on Eastbound and Westbound approaches of John Fries Highway (S.R. 0663)	C	22.4	C	23.8
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	▪ Add a through lane on Northbound and Southbound approaches on Gravel Pike (S.R. 0029)	C	34.2	D	40.0
5	Geryville Pike & St. James Street/Church Road	▪ Install traffic signal ▪ Realign Church Road	B	10.6	B	19.6
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	▪ Separate through and right lanes on Northbound approach of Gravel Pike (S.R. 0029)	D	35.2	D	49.4
12	Sumneytown Pike (S.R. 0063) & Geryville Pike	▪ Add a right lane at Westbound approach of Sumneytown Pike (S.R. 0063)	B	11.1	C	26.0

[1] Level of Service, see Tables 4 and 5 for Description
[2] Delay measured in average seconds of delay per vehicle for overall intersection

VI. SUMMARY AND CONCLUSION

This report summarizes a systematic investigation into existing and projected 2016 traffic conditions within the Upper Perkiomen Valley Regional Transportation Study Area in Montgomery County, PA. This work is being performed as required within ARTICLE V-A, entitled "Municipal Capital Improvement", Act 209 of the Pennsylvania Municipalities Planning Code on behalf of the Upper Perkiomen Valley Regional Planning Commission and the Montgomery County Planning Commission.

This Roadway Sufficiency Analysis has analyzed existing, projected pass-through (future traffic volumes accounting for on-going regional growth but without specific development within the study area) and projected total future traffic conditions (accounting for on-going regional growth and specific development along the study corridors per the adopted Land Use Assumptions Report) at twelve (12) study intersections within the Upper Perkiomen Valley Regional Transportation Study Area.

Analyses of the existing and pass-through traffic scenarios reveal operational deficiencies in several locations, particularly at the intersections of Gravel Pike (S.R. 0029) and Main Street (S.R. 0063) and Sumneytown Pike (S.R. 0063) and Geryville Pike.

Future development generated traffic volume will add approximately 950 new vehicles during the AM peak travel hours and approximately 1150 new vehicles during the PM peak travel hours. Improvements to five (5) of the twelve (12) study intersections are recommended as outlined in **TABLE 18** below:

TABLE 18
SUMMARY OF RECOMMENDED IMPROVEMENTS

	INTERSECTION	TRAFFIC CONDITION SCENARIO		
		EXISTING	PASS-THROUGH (2016)	TOTAL FUTURE (2016)
1	John Fries Highway (S.R. 0663) & Geryville Pike	NA	▪ Left turn lanes on each approach ▪ Left turn arrows on Westbound approach of John Fries Highway (S.R. 0063) and Southbound approach of Geryville Pike	▪ Add a through lane on Eastbound and Westbound approaches of John Fries Highway (S.R. 0663)
2	John Fries Highway (S.R. 0663) & Quakertown Road	NA	NA	NA
3	Pottstown Avenue (S.R. 0663) & Gravel Pike (S.R. 0029)	NA	▪ Right turn lanes on Eastbound approach of Pottstown Avenue (S.R. 0663) and Northbound approach of Gravel Pike (S.R. 0029)	▪ Add a through lane at Northbound and Southbound approaches of Gravel Pike (S.R. 0029)
4	Layfield Road (S.R. 0663) & Knight Road/Kutztown Road	NA	NA	NA
5	Geryville Pike & St. James Street/Church Road	NA	NA	▪ Install traffic signal ▪ Realign Church Road
6	Geryville Pike & Upper Ridge Road	NA	NA	NA
7	Gravel Pike (S.R. 0029) & West Campbell Road	NA	NA	NA
8	Gravel Pike (S.R. 0029) & Knight Road	▪ Install traffic signal	NA	NA
9	Gravel Pike (S.R. 0029) & McLean Station Road	NA	▪ Install traffic signal ▪ Realign McLean Station Road	NA
10	Gravel Pike (S.R. 0029) & Main Street (S.R. 0063)	▪ Install traffic signal	▪ Separate right and left turn lanes at Westbound approach of Main Street (S.R. 0063)	▪ Separate through and right lanes at Northbound approach of Gravel Pike (S.R. 0029)
11	Sumneytown Pike (S.R. 0063) & Upper Ridge Road	▪ Install traffic signal	NA	NA

12	Sumneytown Pike (S.R. 0063) & Geryville Pike	▪ Install traffic signal ▪ Restrict Eastbound left turns on Sumneytown Pike (S.R. 0063)	▪ Add a through lane at Eastbound approach of Sumneytown Pike (S.R. 0063)	▪ Add a right lane at Westbound approach of Sumneytown Pike (S.R. 0063)

The recommended improvements may be partially financed by land-development impact fees. An opinion of probable costs will be defined in the Capital Improvements Plan (CIP). Upon completion of the CIP, an Impact Fee Ordinance will be required to legally enable the Upper Perkiomen Valley Regional Planning Commission to collect and use impact fees for transportation improvements within the Upper Perkiomen Valley Regional Transportation Study Area.