

**FORT WASHINGTON  
NEIGHBORHOOD  
TRAFFIC STUDY**

**Upper Dublin Township,  
Montgomery County, Pennsylvania**

*Prepared for:*  
**Upper Dublin Township  
and the  
Fort Washington Rescape Committee**

**April 1999**

## EXECUTIVE SUMMARY

On behalf of the Fort Washington Rescape Committee, McMahon Associates, Inc. has conducted an evaluation of neighborhood traffic conditions in the area of Fort Washington bounded approximately by Bethlehem Pike to the west, Madison Avenue to the east, Highland Avenue to the north, and Pennsylvania Avenue to the south. The results of this traffic study are intended to assist Upper Dublin Township and the Fort Washington Rescape Committee in developing a comprehensive plan for the historic Fort Washington area. The traffic elements of the comprehensive plan involve methods to address traffic congestion, traffic “calming”, and improvement of pedestrian and vehicular safety throughout the neighborhood. The findings and recommendations from the report are detailed below.

- This evaluation commenced with a thorough data collection program involving measurements of traffic volumes and conditions along the neighborhood streets and intersections, identification of traffic flow patterns through the neighborhood, and an inventory of the physical conditions and features of the neighborhood street system.
- The traffic count program revealed that Fort Washington Avenue carries approximately 5,000 vehicles per day (total in both directions), Summit Avenue currently carries approximately 1,900 vehicles per day (total in both directions), and Madison Avenue currently carries approximately 900 vehicles per day (total in both directions).
- A detailed evaluation of the neighborhood intersections indicates that most movements generally function at acceptable levels of service, with little to average delay. The primary exception is the intersection of Pennsylvania Avenue and Bethlehem Pike, which experiences high levels of delay during the commuter peak hour periods, causing some motorists to seek alternate routes through the Fort Washington neighborhood.
- The results of an origin-destination (O-D) survey conducted during the weekday morning and afternoon peak periods within the neighborhood indicate that there are two distinct non-local neighborhood pass-through traffic patterns, in addition to locally generated traffic from within the neighborhood. These pass-through traffic patterns are as follows:
  - (1) Through traffic oriented between Bethlehem Pike and either Pennsylvania Avenue or Highland Avenue uses Washington Lane, Montgomery Avenue, or Spring Avenue at their intersections with Bethlehem Pike to travel within the neighborhood, in order to avoid the intersection of Bethlehem Pike and Pennsylvania Avenue.
  - (2) Through traffic oriented in a north-south direction within the Township between Highland Avenue and Pennsylvania Avenue, or vice versa, uses either Fort Washington Avenue, Summit Avenue, or both, through the neighborhood.

- A number of roadway improvements have been identified and are scheduled to be underway for the area in the very near future which will temporarily effect traffic flows until completion of their construction. These roadway projects are as follows:
  - Beginning summer of 1999, the Pennsylvania Department of Transportation will replace the Bethlehem Pike Bridge over the SEPTA R5 regional rail line, located just south of the intersection of Bethlehem Pike and Pennsylvania Avenue. As a result, the Bethlehem Pike bridge will be closed for approximately nine months in this vicinity, and traffic will be detoured via PA Route 309.
  - The Pennsylvania Department of Transportation is scheduled to begin the rehabilitation of the PA Route 309 Expressway in the year 2000. The proposed reconstruction consists of rebuilding the on-ramps and off-ramps along PA Route 309 to provide more acceleration and deceleration area, as well as complete redesign of several interchanges, including the Fort Washington interchange with Pennsylvania Avenue and the Pennsylvania Turnpike. In the vicinity of the study area the three bridge overpasses, at Fort Washington Avenue, Highland Avenue, and Madison Avenue will be replaced. Though a specific bridge construction phasing schedule has not been established, the work will occur prior to construction work on the mainline of PA Route 309, and either the Fort Washington Avenue bridge or the Summit Avenue bridge will remain open to traffic at all times.
  - The construction of PA Route 309 is scheduled to last for approximately five years. During construction, full and partial ramp closures are proposed as part of a phased construction plan. PennDOT's intent is to maintain two through lanes in each direction on PA Route 309; however, due to the construction and the ramp closures, it is anticipated that some traffic will detour to the local road system. Therefore PennDOT will be implementing a series of improvements at major area intersections, including Bethlehem Pike and Fort Washington Avenue, prior to actual construction on PA Route 309.
  - The goal of the Fort Washington Reshape Committee is to implement the consensus traffic elements of the comprehensive plan during the PA Route 309 construction schedule, with completion of these elements coinciding with completion of PA Route 309 project.
- As a result of the aforementioned non-local pass-through traffic patterns, traffic calming improvement measures are suggested to deter non-local traffic from using the neighborhood roads as a convenient through route, and to improve traffic conditions on the surrounding roads and intersections. Alternatively, in the case of Fort Washington Avenue, which is the only north-south through route within this section of the Township, improvement measures are suggested to reduce vehicle speeds within the neighborhood.
- The traffic calming strategies described below consist of a series of suggested regulatory signing, operational, and physical improvements to deter or calm through

traffic in the study area. The traffic calming strategies address the following roadways and intersections.

- Washington Lane, Montgomery Avenue, and Spring Avenue
- Fort Washington Avenue, and Summit Avenue
  - Option 1 – One Way Pair
  - Option 2 – Fort Washington Avenue – Primary Route
- **Washington Lane, Montgomery Avenue, Spring Avenue** - The O-D survey results indicate that Washington Lane, Montgomery Avenue, and Spring Avenue (at their intersections with Bethlehem Pike) are used as bypass routes through the neighborhood for travel between Bethlehem Pike and Pennsylvania Avenue and/or Highland Avenue, presumably to avoid traffic congestion along Pennsylvania Avenue, including its intersection with Bethlehem Pike. The traffic control and traffic calming improvement options described below address this pass-through traffic pattern within the neighborhood west of Fort Washington Avenue, and at the same time, attempt to minimize traffic circulation impacts to the local residents.
  - Designate Washington Lane as one-way northbound between Bethlehem Pike and Montgomery Avenue. This one-way pattern will allow access into the neighborhood, but restrict egress from the neighborhood to Bethlehem Pike.
  - Restrict turning movements at the intersection of Montgomery Avenue and Bethlehem Pike to right-turn-in and right-turn-out only. This restriction will allow limited access for the residents within the neighborhood, but will prohibit pass-through traffic from turning left from Montgomery Avenue and from Bethlehem Pike.
  - Designate Montgomery Avenue as one-way eastbound between Washington Lane and Fort Washington Avenue, to eliminate the pass-through movement from Pennsylvania Avenue to Bethlehem Pike northbound.
  - Designate Spring Avenue as one-way eastbound between Locust Road and Elliger Avenue, to eliminate the pass-through movement within the neighborhood from Pennsylvania Avenue to Bethlehem Pike northbound.
  - Monitor the conditions along Prospect Avenue upon implementation of the above-described traffic control recommendations, in the event there is a diversion of the pass-through traffic to Prospect Avenue.
- **Fort Washington Avenue and Summit Avenue** – The O-D survey results indicate that Fort Washington Avenue and Summit Avenue are used as pass-through routes within the neighborhood for through travel between Highland Avenue to the north and Pennsylvania Avenue to the south. Since, Fort Washington Avenue is the only north-south through roadway within this section of the Township, it is not practical to eliminate the through traffic, but rather the objective is to control or calm the pass-

through traffic within the neighborhood, and accommodate the pass-through traffic consistent with a neighborhood setting.

- **Option 1: Fort Washington Avenue and Summit Avenue One-Way Pair -**  
This one-way designation would utilize the traffic signals located at the respective terminus intersections of Fort Washington Avenue and Highland Avenue to the north and Summit Avenue and Pennsylvania Avenue to the south. In order to provide controlled egress via the traffic signals from within the neighborhoods, Fort Washington Avenue could be designated to one-way northbound and Summit Avenue would be designated one-way southbound. The objective of this option is to distribute the unavoidable pass-through traffic along the two roadways. The associated traffic control and traffic calming improvements which could be implemented in conjunction with this improvement option are as follows:
  - **Narrow Street Widths** – In order to accommodate the pass-through traffic, narrow street widths help to control or calm the traffic consistent with a neighborhood setting. We recommend for both Summit Avenue and Fort Washington Avenue the creation of chokers or mid-block bulbouts or curb extension. A choker is a physical control which involves extending the curbing and widening the sidewalk or grass area to direct traffic to the center of the narrowed road. In addition to aesthetic appeal, narrow street widths promotes slower vehicle speeds.
  - **Close the Madison Avenue Bridge** - Closure of the Madison Avenue bridge over PA Route 309 should be considered in order to eliminate the possibility of through traffic from Fort Washington Avenue and Summit Avenue shifting to Madison Avenue.
  - **Speed-Actuated Warning Message or Beacon** – Use of such devices along both Fort Washington Avenue and Summit Avenue will alert motorists of excessive travel speeds. Variable message signs, on either a temporary or full-time basis, or alternatively, flashing beacon warning signs could be installed.
  - **Pedestrian Crosswalks** - Provision of painted or textured pavement pedestrian crosswalks at the cross-street intersections are effective for accommodating pedestrian traffic and alerting the pass-through motorists of pedestrian activity and the neighborhood setting, especially in conjunction with the narrowing of the street widths.
  - **Fort Washington Avenue/Pennsylvania Avenue Traffic Signal** – Alternatively, relative to the designation of Fort Washington Avenue as one-way northbound and Summit Avenue as one-way southbound, installation of a traffic signal at the intersection of Fort Washington

Avenue and Pennsylvania Avenue would help regulate eastbound Pennsylvania Avenue traffic turning left into Fort Washington Avenue northbound. Currently, the intersection does not satisfy the PennDOT warrants, however, warrants will be satisfied with implementation of the aforementioned traffic calming measures due to the redistribution of traffic.

- **Option 2: Designate Fort Washington Avenue as the Primary Through Road** – With this option, the objective is to retain the pass-through on Fort Washington Avenue, and thereby dilute the pass-through traffic volumes from the other parallel streets, most notably Summit Avenue. There are additional associated traffic control and traffic calming improvements which could be implemented in conjunction with this improvement option, as described below:

- Install a Traffic Signal at Fort Washington Avenue and Pennsylvania Avenue – A traffic signal is important to retain the pass-through traffic along Fort Washington Avenue, because it would provide controlled ingress and egress at the intersection of Fort Washington Avenue and Pennsylvania Avenue. If installed, we would recommend that the traffic signal would be operated under the same signal controller as the signal Bethlehem Pike and Pennsylvania Avenue, due to their close proximity. Again, currently the intersection does not satisfy the PennDOT warrants, however, we believe warrants will be satisfied with implementation of the other traffic calming measures and with the signal, due to the redistribution of traffic.
- Install Chicanes, or Mid-Block Slow Points, along Summit Avenue – In order to direct the pass-through traffic to the Fort Washington Avenue corridor, there is a need for enhanced traffic control or traffic calming strategies along Summit Avenue. Aside from narrowing of street widths or installation of “chokers”, as described above, we suggest installation of chicanes. Chicanes establish an artificial 45-degree bend in the otherwise straight travel path, generally created by the placement of curbed plantings within the roadway arranged on alternating sides of the road. Use of chicanes results in either a single-lane or narrow two-lane gap (depending upon the desired level of traffic calming) for traffic to negotiate in a snake-like fashion.
- Narrow Fort Washington Avenue Street Width - Although designated for two-way traffic, narrowing of the Fort Washington Avenue street width through installation of chokers or median islands will help to control or calm the traffic along this road, consistent with the neighborhood setting.
- Close the Madison Avenue Bridge - Closure of the Madison Avenue Bridge over PA Route 309 should be considered in order to eliminate the

possibility of through traffic from either Fort Washington or Summit Avenue shifting to Madison Avenue.

- Close the Summit Avenue Bridge – An alternative option would be to close the Summit Avenue Bridge over PA Route 309. This would provide an added measure to restrict the pass-through traffic volumes along Summit Avenue; however, there may be some diversions of traffic to both parallel routes off Fort Washington Avenue and Madison Avenue.
  - Speed-Actuated Warning Message or Beacon – Use of such devices, along both Fort Washington Avenue and Summit Avenue will alert motorists of excessive travel speeds. Variable message signs, on either a temporary or full-time basis, or alternatively flashing beacon warning signs could be installed.
  - Pedestrian Crosswalks - Provision of painted or textured pavement pedestrian crosswalks at the cross-street intersections are effective for accommodating pedestrian traffic and alerting the pass-through motorists of pedestrian activity and the neighborhood setting, especially in conjunction with the narrowing of the street widths.
- The results of an on-street parking study reveals on-street parking predominantly during the weekday along both Fort Washington Avenue and Summit Avenue, immediately north of Pennsylvania Avenue. Based on our observations, these parked vehicles are overflows due to insufficient available capacity within the surface parking lot at the SEPTA R5 Fort Washington rail station. However, there is a vacant parcel of land on the southeast corner of Summit Avenue and Pennsylvania (in Whitemarsh Township) which may be developed. Therefore, we recommend that both Upper Dublin and Whitemarsh Townships, SEPTA, and any other future owner of the property work together during the land development process to develop shared parking arrangements. Additionally, we recommend the Township investigate implementation of parking restrictions during the daytime hours on Monday through Friday along at least the east side of Fort Washington Avenue and the west side of Summit Avenue, in the first blocks north of Pennsylvania Avenue. As such, residents and guests would still be permitted to park in the evening after work and on the weekends.
  - The results of the sidewalk inventory conducted within the neighborhood indicate that sidewalks are currently provided along both sides of Summit Avenue, and along the western side of Fort Washington Avenue continuously from Highland Avenue to Pennsylvania Avenue; however sidewalks are provided only sporadically along the east side of Fort Washington Avenue. Additionally, sidewalks exist along both sides of Highland Avenue and along only the north side of Pennsylvania Avenue within the commercial area. Also, sidewalks are provided at other isolated locations within the neighborhood, including at the intersection of Madison Avenue and Prospect Avenue, in the vicinity of the Township park and the Montessori school. Within the neighborhood we recommend use of sidewalks to link the neighborhood to local

destination centers within walking distance, such as the commercial district along Pennsylvania Avenue, the Township park, and the Montessori school. Although it is desirable to provide sidewalks throughout the neighborhood, due to physical constraints and cost, it is not always feasible. Therefore, at minimum, we recommend installation of some additional sidewalk in order to link the main roads of Fort Washington Avenue and Summit Avenue to the Montessori school and the park, especially for the safety of children. Additionally, completion of the sidewalk along the entire east side of Fort Washington Avenue should be considered, in conjunction with the recommended traffic calming improvements.

## INTRODUCTION

On behalf of the Fort Washington Rescape Committee, McMahon Associates, Inc. has conducted an evaluation of neighborhood traffic conditions in the area of Fort Washington bounded approximately by Bethlehem Pike to the west, Madison Avenue to the east, Highland Avenue to the north, and Pennsylvania Avenue to the south (**Figure 1**). The results of this traffic study are intended to assist Upper Dublin Township and the Rescape Committee in development of a comprehensive plan for the historic Fort Washington area. The traffic elements of the comprehensive plan involve methods to address traffic congestion, traffic “calming”, and improvement of pedestrian and vehicular safety throughout the neighborhood. The purpose of this report is to address specific issues regarding neighborhood traffic control and on-street parking within the Fort Washington neighborhood. The tasks associated with this study included:

- Inventory of existing roadway characteristics and usage within the study area street system, including:
  - Automatic Traffic Recorder Counts along the key north/south streets within the study area: Washington Avenue, Summit Avenue, and Madison Avenue.
  - Manual Turning Movement counts during the weekday morning and afternoon peak hour periods at eleven neighborhood intersections.
  - License plate surveys at nine intersections during the weekday morning and afternoon peak periods, to identify origin-destination patterns through the neighborhood.
  - Field inventory of current on-street parking and traffic control regulations, as well as a sidewalk inventory, for all streets within the study area.
  - Field observations of the study area on-street and SEPTA surface lot parking demand characteristics during the weekday peak parking demand periods (10:00 AM to 11:00 AM and 8:00 PM to 9:00 PM).
- Evaluation of existing traffic and operational conditions on the study area roadways, including detailed capacity/level-of-service analysis at each of the study area intersections.
- Contacts with public agencies, including the Pennsylvania Department of Transportation and SEPTA, relative to project construction schedules and traffic implications associated with the PA Route 309 rehabilitation project, the Bethlehem Pike bridge reconstruction project, and the future status of the R5 Regional Rail Line Station in Fort Washington.
- Development of recommendations to address non-local traffic flow patterns through the neighborhood by use of traffic “calming” techniques and regulatory signing.
- Development of recommendations regarding locations of sidewalks in the neighborhood study area to facilitate pedestrian interconnections within the community and on-street parking demands, including the impacts of the SEPTA rail station.

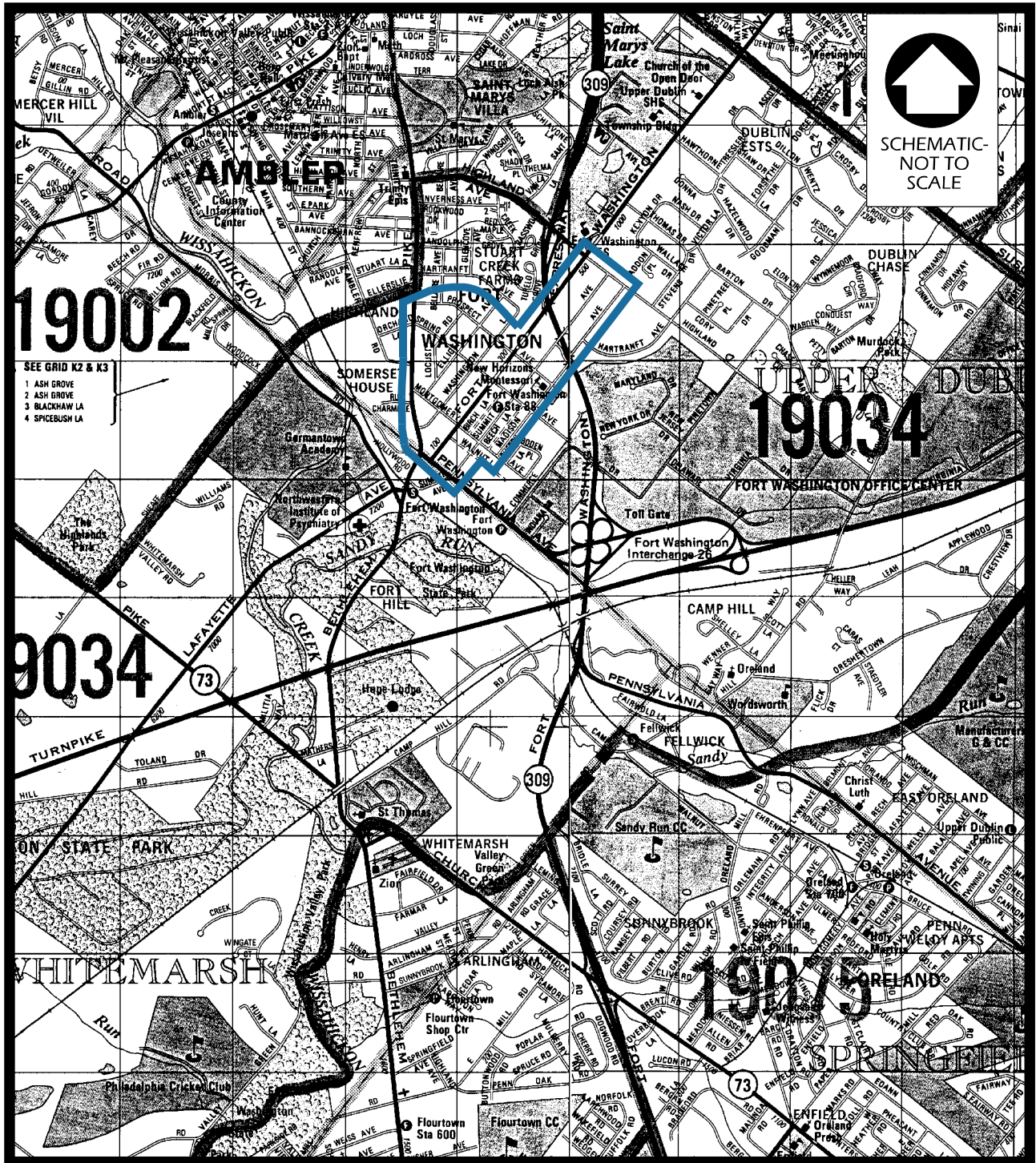


FIGURE 1  
Site Location Map

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

## **EXISTING TRANSPORTATION SETTING**

The Fort Washington neighborhood study area is mostly residential, with some exceptions. The Fort Washington Fire Company is located along Summit Avenue, south of Spring Avenue, and the Trinity Lutheran Church is located on the southeast corner of Summit Avenue and Spring Avenue. The New Horizons Montessori School is located on the southwest corner of the intersection of Madison Avenue and Prospect Avenue, directly across from the Kevin Wallace Memorial Klosterman Park. Also, the SEPTA Fort Washington R5 Regional Rail Line Station is located along Summit Avenue, south of Pennsylvania Avenue and east of Bethlehem Pike. Additionally, within the study area the Pennsylvania Avenue corridor is predominantly commercial, as well as Bethlehem Pike in the vicinity of Pennsylvania Avenue. Immediately east of the study area is the Fort Washington Office Park, which includes the Fort Washington Expo Center, and also the interchanges with the Pennsylvania Turnpike (Exit 26-Fort Washington) and PA Route 309.

As noted previously, the neighborhood study area is approximately bounded by Bethlehem Pike to the west, Madison Avenue to the east, Highland Avenue to the north, and Pennsylvania Avenue to the south. These and other roadways within the study area are described below.

### ***Existing Roadway Characteristics***

Three roadways within the study area are State Highways. Bethlehem Pike (S.R. 2018) is part of the State Highway System and is the western boundary of the study area, traversing Upper Dublin Township in generally a north/south direction. In the vicinity of the study area, Bethlehem Pike provides one travel lane in each direction, with a center area for left turns, within a general cartway width of 36 feet. The posted speed limit is 40 miles per hour and on-street parking is prohibited.

Pennsylvania Avenue (S.R. 2027) is also part of the State Highway System and it is the southern boundary of the study area. Pennsylvania Avenue extends southeastwardly from Bethlehem Pike to its interchange with the Pennsylvania Turnpike (Exit 26-Fort Washington) and PA Route 309. Pennsylvania Avenue provides two travel lanes in each direction within a cartway width of 48 feet. The posted speed limit is 35 miles per hour and on-street parking is prohibited.

Fort Washington Avenue (S.R. 2022) is the only State Highway that traverses through the neighborhood study area, connecting Pennsylvania Avenue to Highland Avenue and beyond. Fort Washington Avenue is the only through collector road within this section of Upper Dublin Township, providing one travel lane in each direction within a variable cartway width between 32 feet and 35 feet. The posted speed limit on Fort Washington Avenue is 35 miles per hour. On-street parking is prohibited along the entire western side of Fort Washington Avenue within the neighborhood between Pennsylvania Avenue and Highland Avenue.

The remaining study area roadways are local Upper Dublin Township streets. Highland Avenue is a Township roadway that traverses the area in a northwest/southeast direction between Ambler Borough and Camphill Road. Highland Avenue provides one travel lane in each direction, and it has a posted speed limit of 35 miles per hour.

Summit Avenue and Madison Avenue are both Township roadways that parallel Fort Washington Avenue. Both Summit Avenue and Madison Avenue extend southwesterly from their intersections with Highland Avenue. Summit Avenue extends to Pennsylvania Avenue and then continues through the SEPTA Fort Washington rail station parking area to its intersection with Bethlehem Pike. Madison Avenue terminates at Montgomery Avenue. Summit Avenue and Madison Avenue both provide one travel lane in each direction, and have posted speed limits of 25 miles per hour. Summit Avenue provides a variable cartway width between 28 feet and 32 feet. The cartway width along Madison Avenue is generally narrower. Specifically, between Prospect Avenue and Spring Avenue, the cartway width is 29 feet, and between Prospect Avenue and Highland Avenue, the cartway width is approximately 18.5 feet.

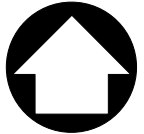
Prospect Avenue, Spring Avenue, and Montgomery Avenue are Township roadways that generally parallel Highland Avenue and Pennsylvania Avenue and are oriented in an east-west direction within the neighborhood study area. Each of these roadways intersect with Bethlehem Pike. Also, each of these roads provides one travel lane in each direction. The cartway widths along these roads are generally narrow, and specifically west of Fort Washington Avenue, where the cartway widths vary between approximately 18.5 feet and 21 feet. On-street parking is generally permitted on each of these roads, and their posted speed limit is 25 miles per hour.

Washington Lane is also a Township roadway, and it extends northward from its intersection with Bethlehem Pike as it parallels Fort Washington Avenue. Washington Lane does not continue through the study area to Highland Avenue, but rather it terminates at Hartranft Avenue. Washington Lane provides one travel lane in each direction within a narrow cartway width, varying between approximately 17 feet and 18 feet in sections. On-street parking is permitted along Washington Lane, except along the block north of Bethlehem Pike. Washington Lane has a posted speed limit of 25 miles per hour.

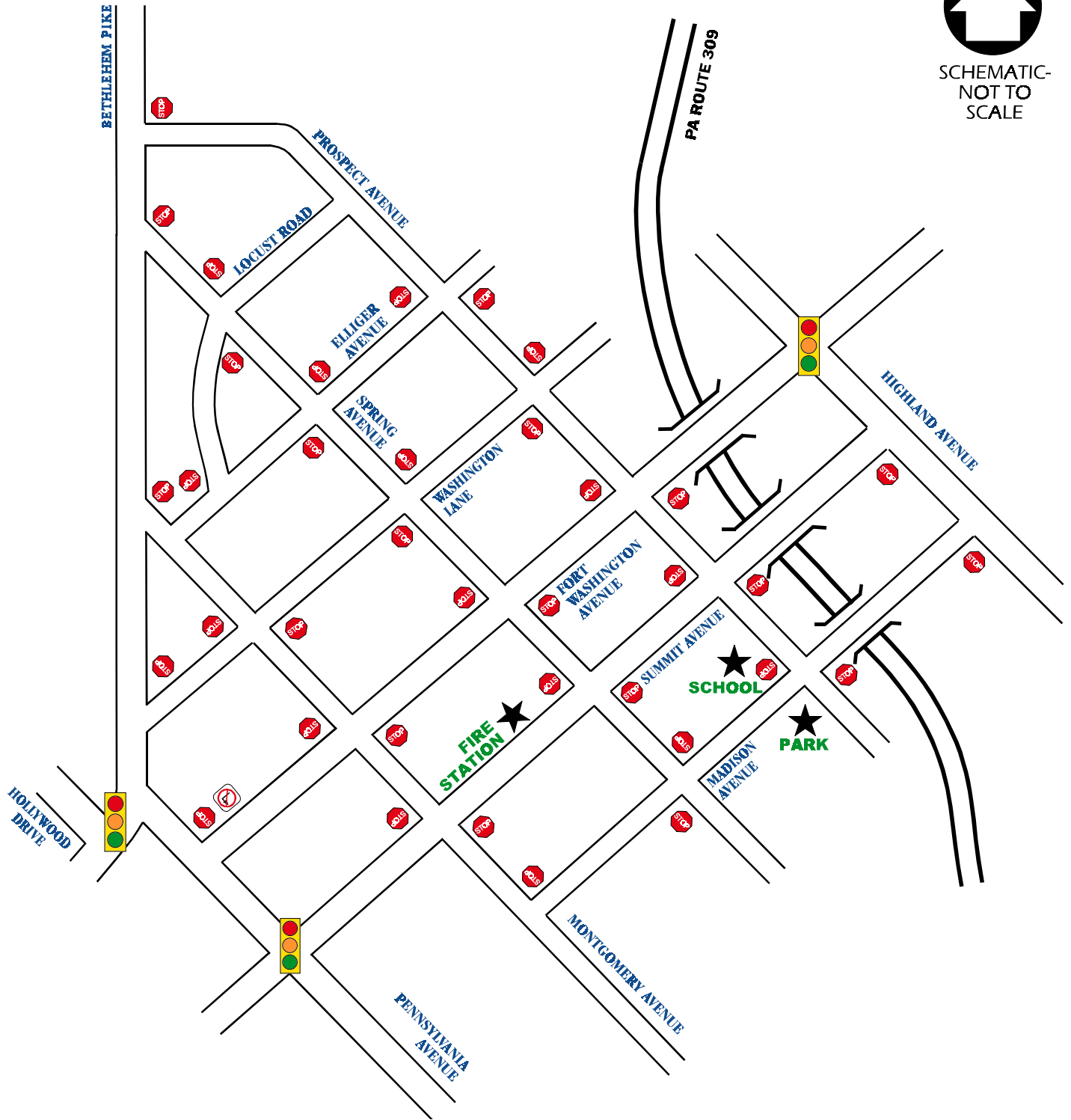
### ***Intersection Controls***

Traffic control devices at each of the study area intersections are summarized in **Figure 2**. Most of the intersections are stop-sign controlled. Traffic signals are located at three intersections: Fort Washington/Highland Avenue, Summit Avenue/Pennsylvania Avenue, and Bethlehem Pike/Pennsylvania Avenue.

The intersection of Pennsylvania Avenue and Bethlehem Pike is controlled by a multi-phase, semi-actuated traffic signal. Hollywood Drive, which is offset from Pennsylvania Avenue, forms the fourth leg of the signalized intersection. Hollywood Drive is a short cul-de-sac that provides access to a small number of residential dwellings. The loop detector on this fourth leg is not functioning properly, resulting in a “signal call” to the Hollywood Drive phase on every cycle, even when there are no vehicles on the Hollywood Drive approach. This results



SCHEMATIC-  
NOT TO  
SCALE



**FIGURE 2**  
Existing Traffic Control Devices

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

in unnecessary green time allocated to this minor approach during every cycle, which reduces the available green time for the heavier volume approaches and increases their delay.

The Hollywood Drive loop should be repaired as soon as possible. However, as an alternative, since Hollywood Drive is very low-volume approach, it could be considered to eliminate Hollywood Drive from the traffic signal control. Accordingly, since Hollywood Drive is in such close proximity to the intersection, it should be considered to prohibit the left turns to and from Hollywood Drive. Although this would improve the overall operation of the intersection and minimize the delay and congestion along Bethlehem Pike and Pennsylvania Avenue, it would have some impact to the few residents along Hollywood Drive.

The intersection of Fort Washington Avenue/Highland Avenue to the north and Summit Avenue/Pennsylvania Avenue to the south are both controlled by two-phase semi-actuated traffic signals.

It should also be noted that all movements are permissible at each of the study area intersections with just one exception. Left-turns are prohibited from Fort Washington Avenue southbound to Pennsylvania Avenue eastbound.

### *Existing Traffic Volumes*

To quantify existing traffic volumes and travel patterns within the study area, 24-hour Automatic Traffic Recorder (ATR) counts were conducted along Fort Washington Avenue, Summit Avenue, and Madison Avenue in the vicinity of their PA Route 309 overpasses. The ATR's were conducted for a one-week period in December 1998 to record both the daily and hourly traffic flows, and the vehicle speeds. The summarized ATR counts are provided in **Appendix A**. In the vicinity of the PA Route 309 overpasses, Fort Washington Avenue carries approximately 5,000 vehicles per day (total in both directions), Summit Avenue currently carries approximately 1,900 vehicles per day (total in both directions), and Madison Avenue currently carries approximately 900 vehicles per day (total in both directions).

Among the three roadways, Madison Avenue carries much less traffic, as it is a residential local road, and it does not extend through the neighborhood from its intersection with Highland Avenue to Pennsylvania Avenue, but rather it terminates at Montgomery Avenue. Fort Washington Avenue and Summit Avenue carry more traffic since they both extend through the study area, between Highland Avenue and Pennsylvania Avenue. Fort Washington Avenue, which continues past Highland Avenue and is the only through collector road within this section of the Township, carries the largest traffic volume of the three roads in this vicinity.

Further review of the ATR data indicates that traffic demand on the roadways peaks during two periods of the weekday. These periods are during the morning, between 7:00 AM and 9:00 AM when many people are traveling to work, and again during the late afternoon, between 4:00 PM and 6:00 PM when most people are traveling home from work. As such, Manual Turning Movement (MTM) counts were conducted during the commuter peak periods between

7:00 AM and 9:00 AM and 4:00 PM and 6:00 PM on a typical weekday at the following intersections:

- Pennsylvania Avenue and Summit Avenue
- Pennsylvania Avenue and Fort Washington Avenue
- Washington Lane and Bethlehem Pike
- Montgomery Avenue and Bethlehem Pike
- Spring Avenue and Bethlehem Pike
- Prospect Avenue and Bethlehem Pike
- Fort Washington Avenue and Highland Avenue
- Summit Avenue and Highland Avenue
- Madison Avenue and Highland Avenue
- Fort Washington Avenue and Montgomery Avenue
- Summit Avenue and Montgomery Avenue

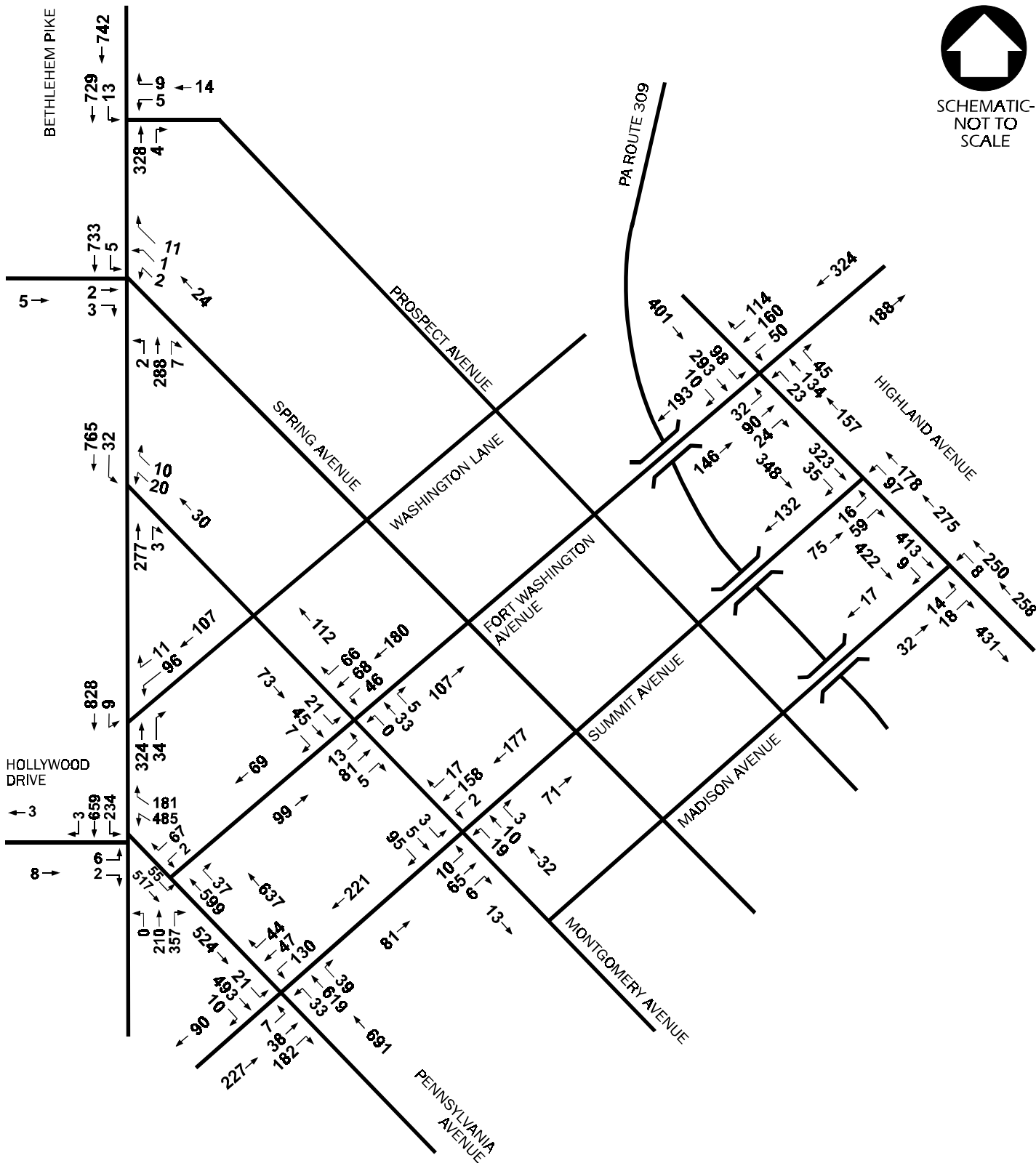
These MTM counts are tabulated by 15-minute intervals and are contained in **Appendix B**. The four highest consecutive 15-minute periods during the weekday morning and weekday afternoon periods constitute the peak hours. The resultant existing peak hourly traffic volumes are depicted in **Figures 3 and 4** for both the weekday morning and weekday afternoon peak hours, respectively.

A review of the turning movement data indicates that traffic migrates to Fort Washington Avenue near Highland Avenue, since its intersection with Highland Avenue is controlled by a traffic signal. The traffic signal provides controlled ingress and egress movements, whereas the Summit Avenue intersection with Highland Avenue is controlled by a stop sign on Summit Avenue. However, near Pennsylvania Avenue (to the south), traffic migrates to Summit Avenue since its intersection with Pennsylvania Avenue is similarly controlled by a traffic signal, whereas Fort Washington Avenue is controlled by a stop sign, and left-turn movement from Fort Washington Avenue southbound to Pennsylvania Avenue eastbound is prohibited.

### ***Existing Travel Speeds***

The ATR's were also used to collect data regarding the prevailing travel speeds on each of these three residential roadways. The prevailing travel speeds on these roads is identified by the 85<sup>th</sup> percentile speed, or the speed at which 85 percent of all drivers travel at or below. The speed data results are provided in **Appendix A** and are summarized in **Table 1**.

As summarized in Table 1, Fort Washington Avenue, which carries the highest traffic volumes in the study area, also has the highest travel speeds. The 85<sup>th</sup> percentile speed along Fort Washington Avenue at its PA Route 309 overpass is approximately 45 miles per hour as compared to the posted speed limit of 35 miles per hour. Along Summit Avenue, the 85<sup>th</sup> percentile speed is approximately 40 miles per hour as compared to the posted speed limit of 25 miles per hour. Additionally, on Madison Avenue the 85<sup>th</sup> percentile speed is approximately 33 miles per hour as compared to the posted speed limit of 25 miles per hour. As indicated by the



**FIGURE 3**  
1998 Existing Weekday Morning Peak Hour Traffic

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



SCHEMATIC-  
NOT TO  
SCALE

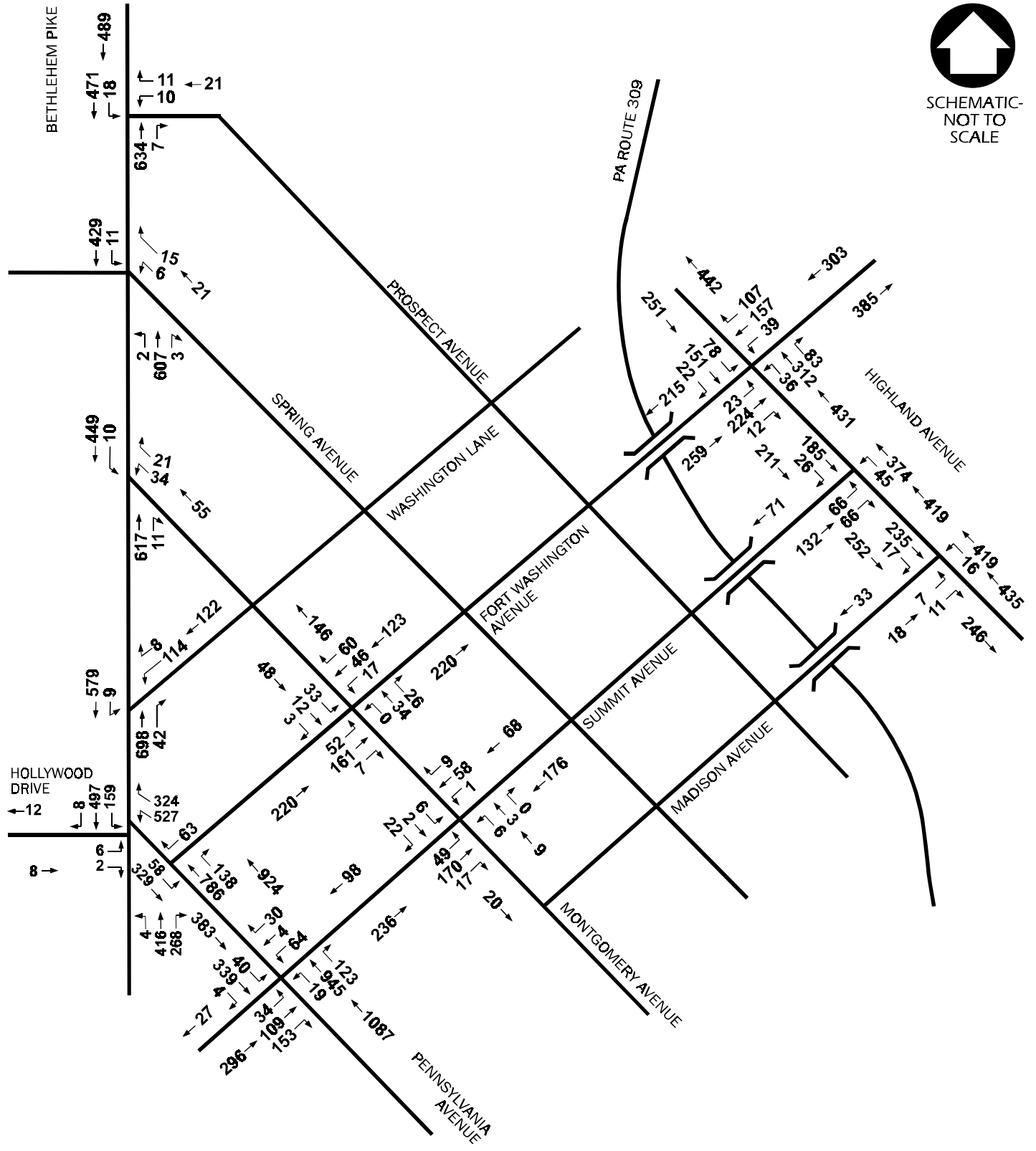


FIGURE 4  
1998 Existing Weekday Afternoon Peak Hour Traffic

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

**Table 1**  
**Prevailing Travel Speeds**  
**Upper Dublin Township, Montgomery County, PA**

<b>Location</b>	<b>Direction</b>	<b>Posted Speed Limit</b>	<b>85th Percentile Speed<sup>(1)</sup></b>
<i>Fort Washington Avenue</i> at the PA Route 309 overpass	SB	35 mph	47 mph
	NB	35 mph	45 mph
<i>Summit Avenue</i> at the PA Route 309 overpass	SB	25 mph	39 mph
	NB	25 mph	40 mph
<i>Madison Avenue</i> at the PA Route 309 overpass	SB	25 mph	33 mph
	NB	25 mph	32 mph

---

<sup>(1)</sup> 85<sup>th</sup> percentile speed is defined as the speed at which 85 percent of all drivers travel at or below and is generally considered to be the prevailing travel speed on the roadway.

data, travel speeds on each of the three roadways are in excess of the posted speed limits by at least 25 percent.

### *Existing Levels of Service*

The traffic volumes in Figures 3 and 4 were subject to detailed capacity/level-of-service analysis in accordance with the standard techniques contained in the "Highway Capacity Manual"<sup>(1)</sup>. 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 a roadway can be expressed in terms of levels of service. A level of service 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."

Correlations between average delay per vehicle and the respective levels of service are provided for unsignalized intersections in **Table 2**. Correlations between average delay per vehicle and the respective levels of service are provided for signalized intersections in **Table 3**. Level-of-service D or better conditions are typically considered acceptable by PennDOT and most municipal jurisdictions in suburban areas such as Upper Dublin Township. Level E represents conditions approaching capacity of the intersection movement, and level F represents failure conditions, or conditions at or above the capacity of the intersection movement.

Utilizing the above-described methodology, detailed capacity/level-of-service analyses were completed for the existing peak hour periods at the study area intersections. The analysis results are presented in **Figure 5**, and the detailed capacity/level-of-service analysis worksheets are contained in **Appendix C**.

As shown in Figure 5, the intersection of Bethlehem Pike and Pennsylvania Avenue/Hollywood Drive currently functions at overall LOS D and E during the weekday morning and afternoon peak hours, respectively. Specifically, the westbound left-turn movement functions at LOS E and F during the morning and afternoon peak hours, respectively, and the northbound approach functions at LOS F during the weekday afternoon peak hour. All other movements currently function at LOS D or better during the two peak hours. It should be again noted that the broken loop detector on the Hollywood Drive approach results in a "signal call" to the Hollywood Drive phase every signal cycle, whether a vehicle is there or not. This wastes the available green time, and increases delay for the other higher-volume approaches.

The other two signalized intersections within the study area, Fort Washington Avenue/Highland Avenue and Summit Avenue/Pennsylvania Avenue currently function at LOS B overall, and LOS C or better for all movements during the two peak hours.

---

<sup>(1)</sup> *Transportation Research Board, Special Report 209, Highway Capacity Manual, published by the Transportation Research Board, Washington, DC, 1994.*

**Table 2**  
**Level-of-Service Criteria<sup>(1)</sup>**  
**Unsignalized Intersections**

<u>Level of Service</u>	<u>Description</u>	<u>Stopped Delay Per Vehicle (seconds)</u>
A	Little or no delay	$\leq 5.0$
B	Short traffic delays	5.1 to 10.0
C	Average traffic delays	10.1 to 20.0
D	Long traffic delays	20.1 to 30.0
E	Very long traffic delays	30.1 to 45.0
F	(2)	>45

---

<sup>(1)</sup> *Transportation Research Board, Special Report 209, Highway Capacity Manual, Washington, DC, 1994.*

<sup>(2)</sup> *Demand exceeds capacity of the lane or approach. Delays greater than 45 seconds occur. Improvements to the intersection should be investigated.*

**Table 3**  
**Level-of-Service Criteria<sup>(1)</sup>**  
**Signalized Intersections**

<b>Level of Service</b>	<b>Description</b>	<b>Stopped Delay Per Vehicle (seconds)</b>
A	Very low delay, high quality flow.	$\leq 5.0$
B	Low delay, good traffic flow.	5.1 to 15.0
C	Average delay, stable traffic flow.	15.1 to 25.0
D	Longer delay, approaching capacity flow.	25.1 to 40.0
E	Limit of acceptable delay, capacity flow.	40.1 to 60.0
F	Unacceptable delay, forced flow.	$>60.0$

<sup>(1)</sup> *Transportation Research Board, Special Report 209, Highway Capacity Manual, Washington, DC, 1994.*

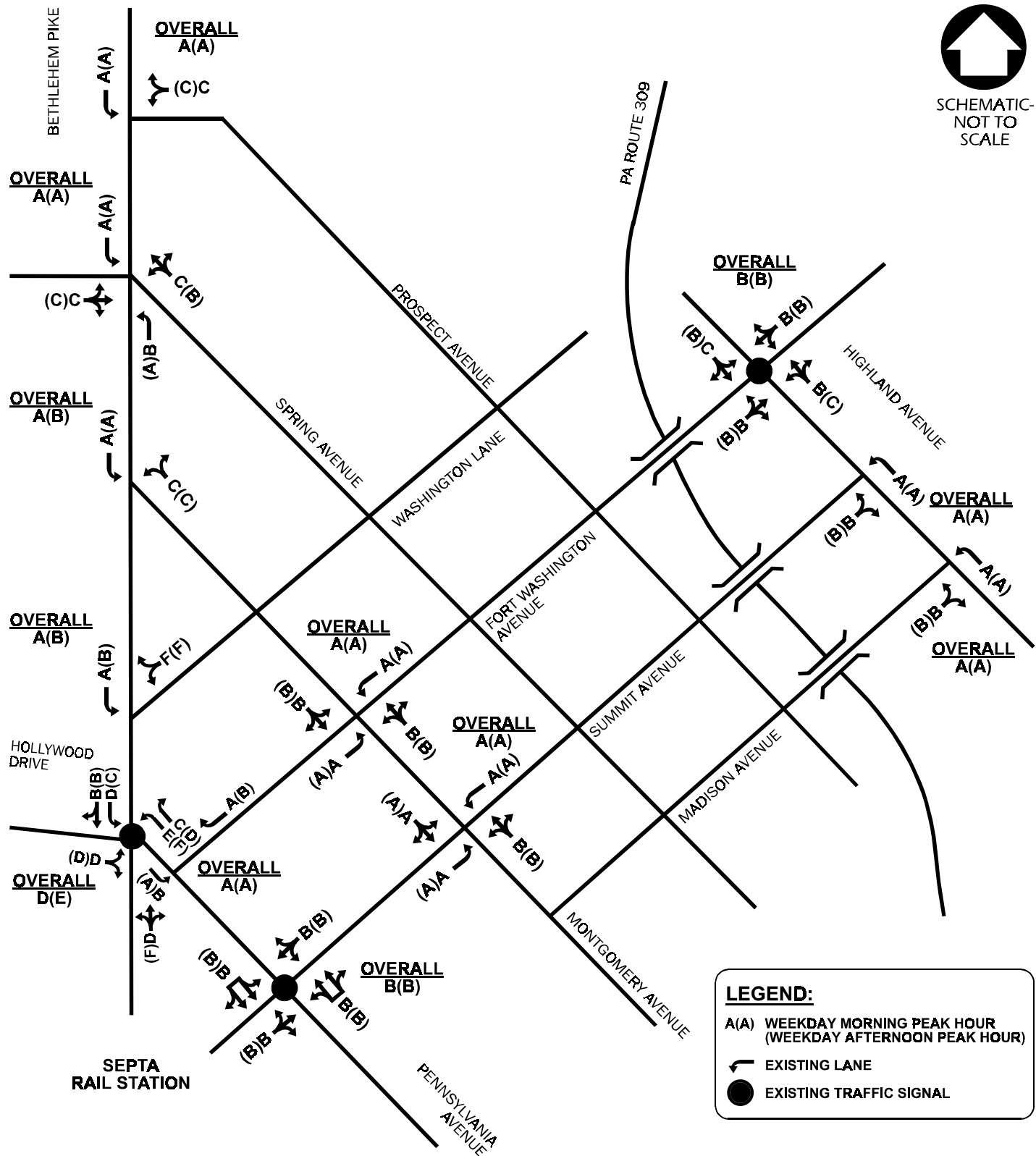


FIGURE 5  
1998 Existing Levels of Service

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

The unsignalized intersection of Washington Lane and Bethlehem Pike currently functions at overall LOS B or better during the two peak hours; however, the southbound Washington Lane approach currently functions at LOS F during both peak hours. This is due to the high volume of traffic on Bethlehem Pike at this location, and the volume of traffic turning left from Washington Lane onto Bethlehem Pike during the peak hours.

All other intersections within the study area currently function at LOS B or better overall, and at LOS C or better for all movements, during both the morning and afternoon peak hours.

### ***Programmed Improvements***

- ***Bethlehem Pike SEPTA Bridge Reconstruction***

Scheduled to begin in the summer of 1999, the Pennsylvania Department of Transportation will replace the Bethlehem Pike bridge over the SEPTA R5 regional rail line, located just south of the intersection of Bethlehem Pike and Pennsylvania Avenue. The planned bridge replacement will result in a 34-foot wide bridge, providing one travel lane in each direction with a center-left-turn lane. This bridge replacement is proposed to occur, prior to the PA Route 309 rehabilitation project, to be discussed in more detail below.

As a result of the planned bridge construction, Bethlehem Pike will be closed in this vicinity for approximately 9 months. The established detour road includes Pennsylvania Avenue, PA Route 309, and Church Road (S.R. 0073). Southbound Bethlehem Pike through traffic will turn left onto Pennsylvania Avenue, to southbound PA Route 309, to Church Road (S.R. 0073), to Bethlehem Pike, and vice versa for the northbound Bethlehem Pike return movement. However, during the detour, it is likely that some motorists will use other alternative detour routes based on their local knowledge of the road system.

It is anticipated that during construction of this project, volumes at the intersection of Bethlehem Pike and Pennsylvania Avenue will reduce significantly resulting in less conflicting traffic movements and less congestion. There will be essentially no northbound Bethlehem Pike traffic, except traffic generated locally by the few businesses north of the bridge. All Pennsylvania Avenue traffic will turn right onto Bethlehem Pike northbound, and all Bethlehem Pike southbound traffic will turn left, however, it will be unopposed by conflicting northbound through traffic.

- ***PA Route 309 Rehabilitation Project***

The Pennsylvania Department of Transportation is scheduled to begin the rehabilitation of the PA Route 309 Expressway in the year 2000. The proposed reconstruction consists of rebuilding the on-ramps and off-ramps along PA Route 309 to provide more acceleration and deceleration area, as well as complete reconstruction of some interchanges, including the Fort Washington interchange with Pennsylvania Avenue and the Pennsylvania Turnpike.

A key feature of the proposed redesign of the Fort Washington interchange is improved traffic flow on Pennsylvania Avenue. Under current conditions, Pennsylvania Avenue through traffic must enter and exit PA Route 309 along a short distance between the Fort Washington and Oreland interchanges. In the future, with the improved interchange design, through traffic along Pennsylvania Avenue will not access the PA Route 309 Expressway, but rather use a new collector/distributor road.

As part of the PA Route 309 rehabilitation project, the three bridge overpasses within this study area, at Fort Washington Avenue, Highland Avenue, and Madison Avenue will be replaced. The bridge work will occur prior to any of the construction work on the mainline of PA Route 309, and as such may occur as soon 2000. A specific bridge construction phasing schedule has not been established at this time, however, the plan is to keep either the Fort Washington Avenue or the Summit Avenue bridge open for traffic at all times in order to accommodate the respective detour traffic.

The construction for the PA Route 309 rehabilitation is scheduled to take approximately five years, and during construction there is a construction and ramp closure phasing plan. It is intended to maintain two through lanes in each direction on PA Route 309. However, due to the construction and the ramp closures, it is anticipated that traffic will detour to the local road system. Accordingly, Bethlehem Pike is expected to accommodate additional traffic, since it is a parallel route to PA Route 309.

Off-site improvements are proposed for many intersections adjacent to the PA Route 309 corridor, including Bethlehem Pike and Pennsylvania Avenue, to accommodate the increased traffic. These improvements are proposed to be completed by the end of the year 1999. At the Pennsylvania Avenue/Bethlehem Pike intersection, it is planned to construct a separate northbound right-turn lane and modify the traffic signal timing and phasing for a northbound Bethlehem Pike right-turn overlap (“green arrow”) phase to operate in conjunction with the westbound Pennsylvania Avenue phase. These improvements will improve the traffic operations of the intersection, especially after the construction associated with the PA Route 309 rehabilitation project.

### ***Existing Neighborhood Traffic Patterns***

To identify specific traffic patterns in the study area, a license plate origin-destination survey was conducted during the weekday morning and weekday afternoon peak periods. The results of the license plate origin-destination survey specifically note the volume of non-local traffic that uses the neighborhood roadways as a pass-through route. This is traffic that enters the study area, and subsequently exits the study area within a short time frame, probably to avoid traffic congestion along Pennsylvania Avenue and its intersection with Bethlehem Pike. The survey was conducted at key locations to document vehicles entering or leaving the neighborhood, as noted below:

- Summit Avenue at Pennsylvania Avenue
- Fort Washington Avenue at Pennsylvania Avenue

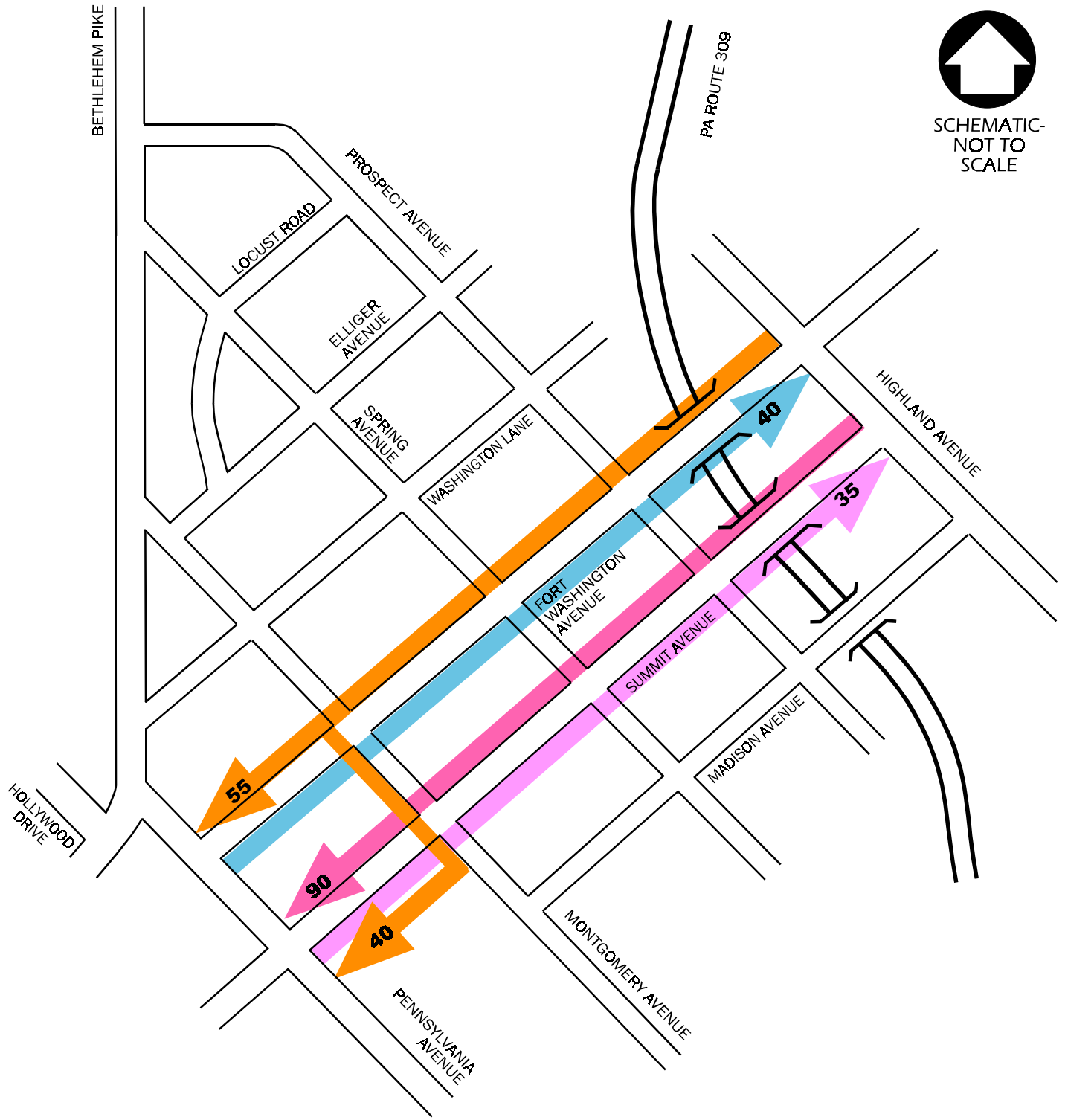
- Washington Lane at Bethlehem Pike
- Montgomery Avenue at Bethlehem Pike
- Spring Avenue at Bethlehem Pike
- Prospect Avenue at Bethlehem Pike
- Fort Washington Avenue at Highland Avenue
- Summit Avenue at Highland Avenue
- Madison Avenue at Highland Avenue

The license plate origin-destination survey data are contained in **Appendix D**, and the results are summarized in **Figures 6A and 6B** for the weekday morning commuter peak period and in **Figures 7A and 7B** for the weekday afternoon commuter peak period. The origin-destination survey results presented in Figures 6A, 6B, 7A, and 7B illustrate the predominant neighborhood through travel routes and patterns during both the weekday morning and weekday afternoon commuter peak periods, as identified through a review of the manual turning movement counts conducted in the study area. The traffic volumes presented in Figures 6A, 6B, 7A, and 7B identify the predominant neighborhood pass-through traffic routes and patterns which occurred 10 or more times over the course of either the morning or afternoon peak hour.

Figure 6A illustrates the predominant non-local, through traffic patterns along Fort Washington Avenue and Summit Avenue between Pennsylvania Avenue and Highland Avenue during the morning peak hour. During the morning peak period, the predominant direction of traffic along Fort Washington Avenue and Summit Avenue is southbound to Pennsylvania Avenue. Also, some vehicles shift to Summit Avenue, somewhere within the neighborhood, due to the left-turn restriction on southbound Fort Washington Avenue at its intersection with Pennsylvania Avenue. Traffic uses the signal at Pennsylvania Avenue and Summit Avenue in order to turn left onto Pennsylvania Avenue eastbound or to continue straight to the SEPTA station. Although a lesser amount, some non-local pass-through traffic is oriented in the northbound direction during the morning peak period.

Figure 7A illustrates the predominant non-local, through traffic patterns along Fort Washington Avenue and Summit Avenue during the afternoon peak period. The volume of non-local pass-through traffic utilizing Fort Washington Avenue and Summit Avenue is higher in the afternoon than during the morning peak period, and is more predominant in the northbound direction oriented to Highland Avenue. Also, vehicles shift from Summit Avenue to Fort Washington Avenue, probably due to the traffic signal at the Fort Washington/Highland Avenue intersection, and because Fort Washington Avenue continues through the Township. Although a lesser amount, non-local, pass-through traffic is oriented in the southbound direction during the afternoon peak period.

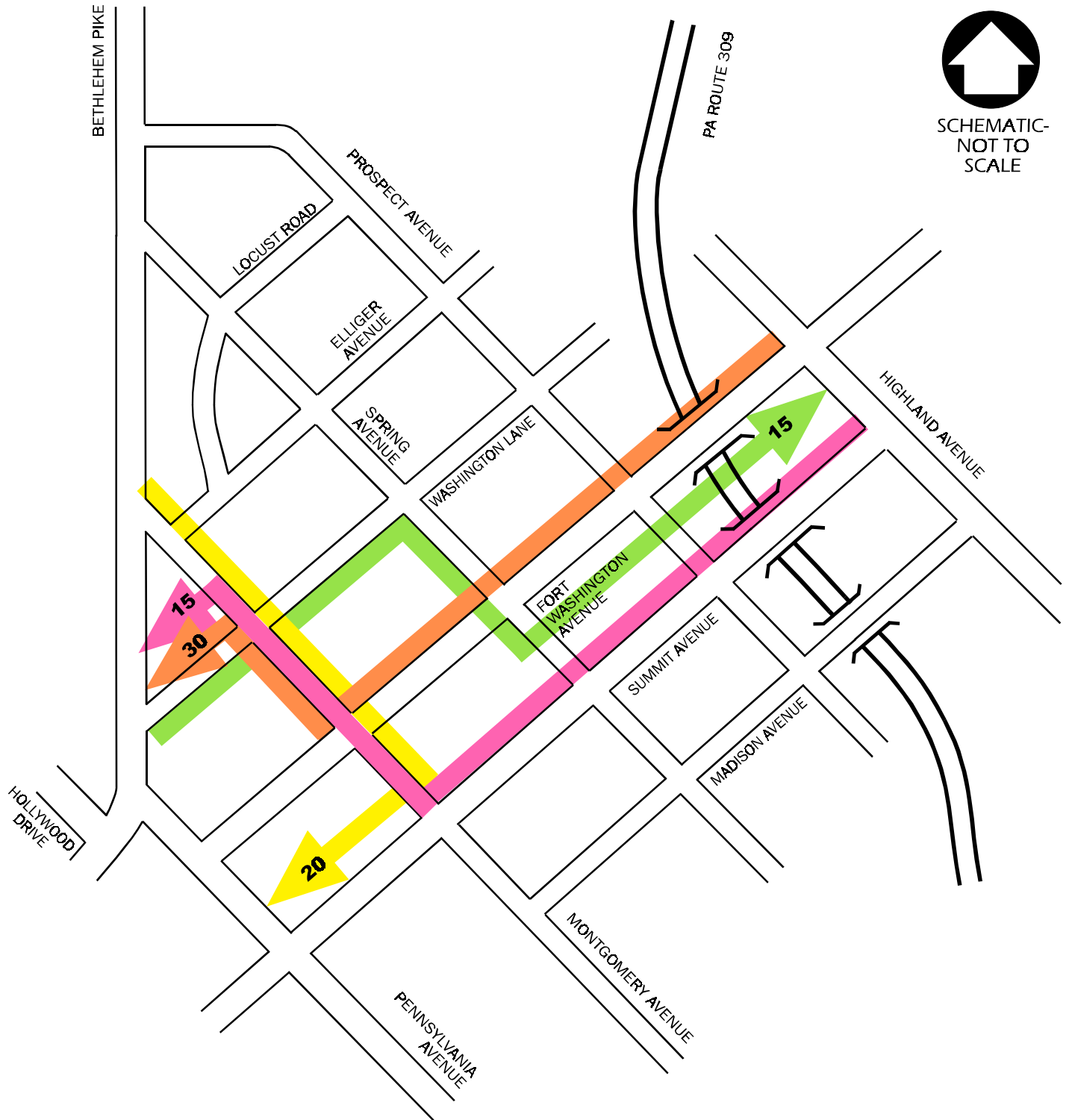
Figures 6B illustrates the predominant non-local through traffic patterns along Washington Lane and Montgomery Avenue to/from their intersections with Bethlehem Pike during the morning peak period. Traffic uses Washington Lane and Montgomery Avenue as a



**FIGURE 6A**  
Existing Weekday Morning Traffic Patterns

# FORT WASHINGTON TRAFFIC STUDY

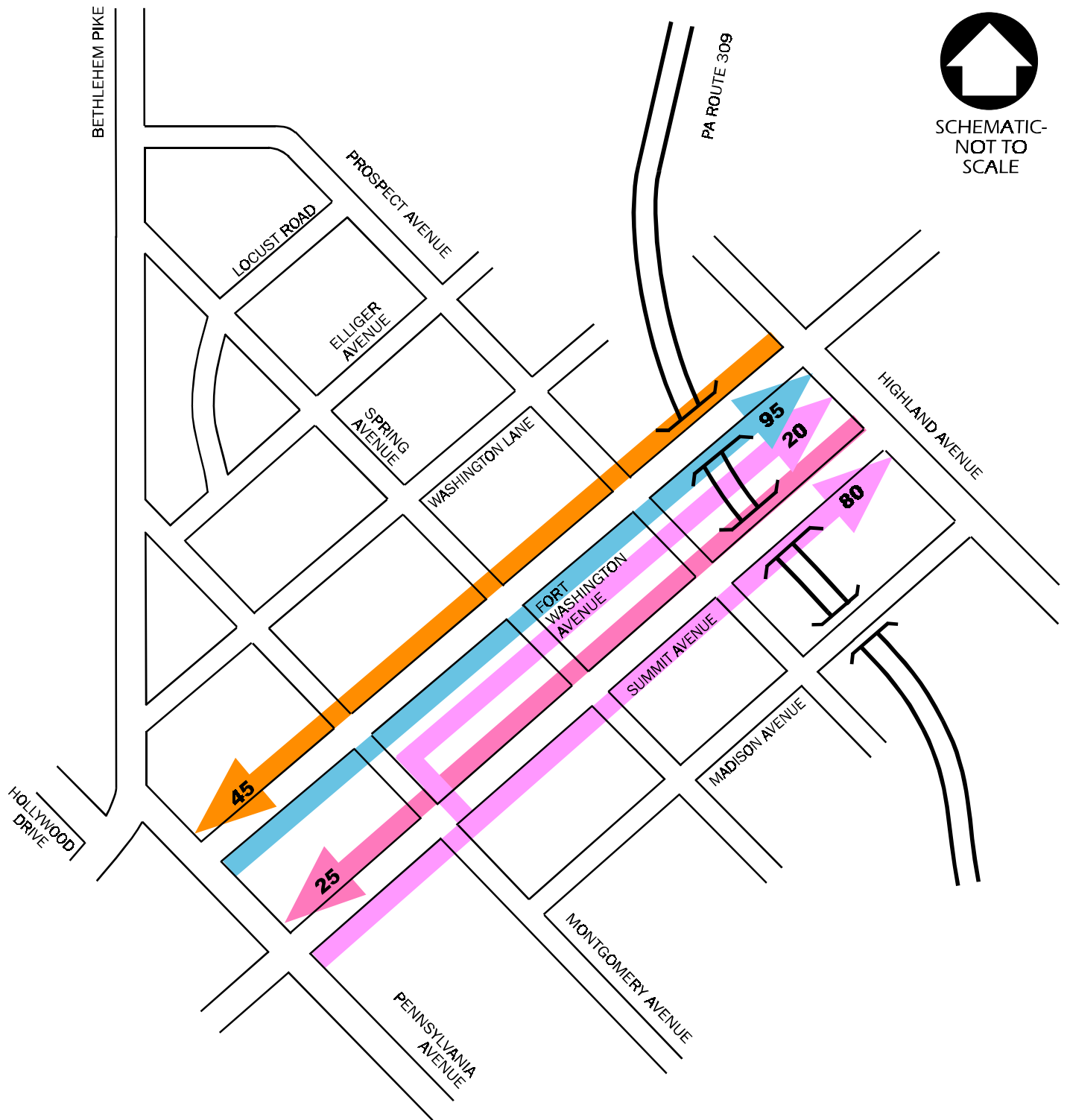
## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



**FIGURE 6B**  
Existing Weekday Morning Traffic Patterns (Continued)

# FORT WASHINGTON TRAFFIC STUDY

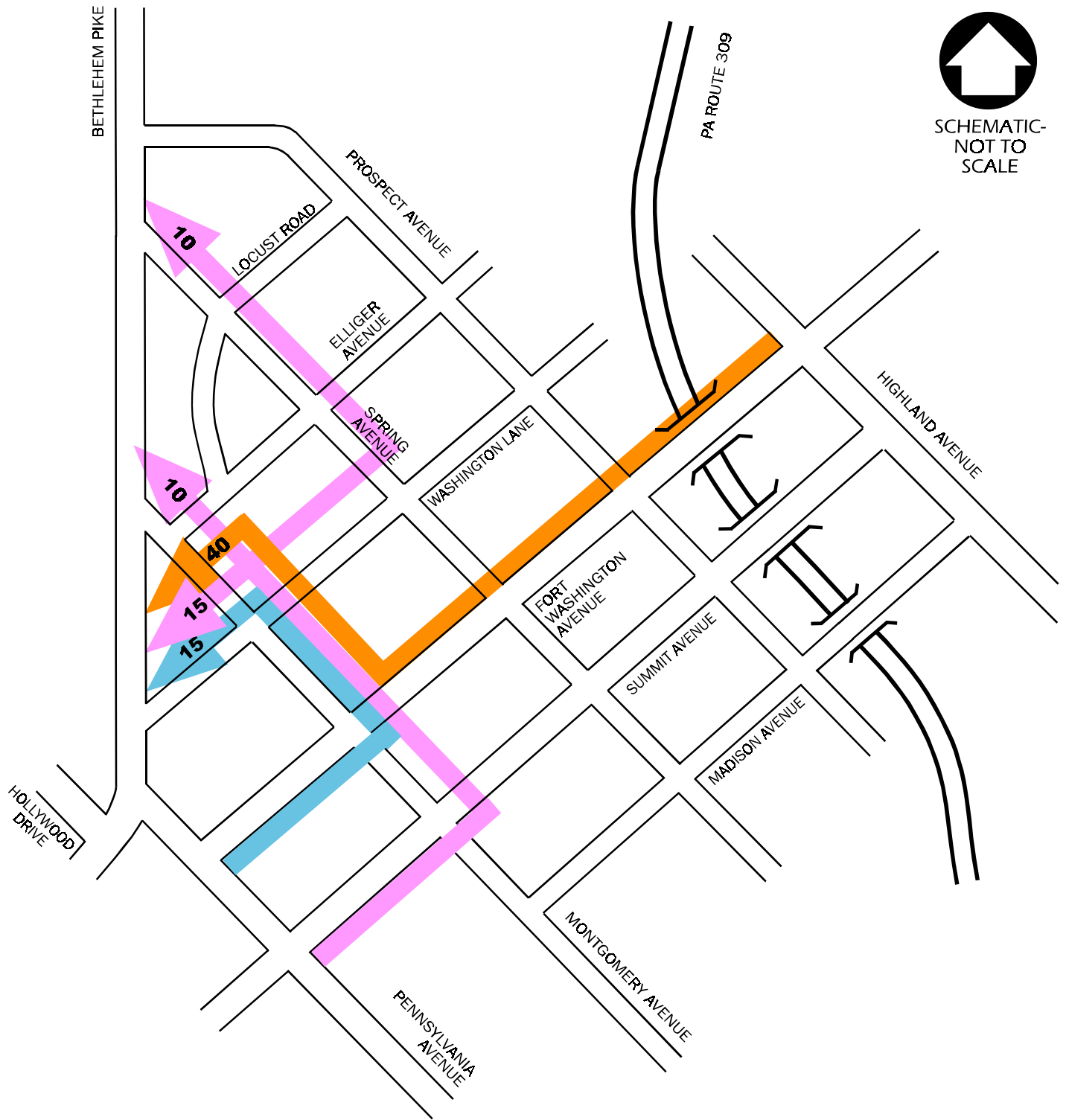
UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



**FIGURE 7A**  
Existing Weekday Afternoon Traffic Patterns

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



**FIGURE 7B**  
Existing Weekday Afternoon Traffic Patterns (Continued)

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

pass-through route to avoid peak period traffic congestion at the signalized intersection of pass-through route to avoid peak period traffic congestion at the signalized intersection of Bethlehem Pike and Pennsylvania Avenue. During the morning peak period through traffic from southbound Bethlehem Pike uses Montgomery Avenue to the Summit Avenue signalized intersection with Pennsylvania Avenue to travel eastbound on Pennsylvania Avenue or continue straight to the SEPTA station. In the morning peak period, Washington Lane is more heavily used as a pass-through route, as vehicles travel south through the neighborhood, along Summit Avenue and Fort Washington Avenue, to Washington Lane, to turn left onto southbound Bethlehem Pike. These vehicles avoid the delay associated with turning westbound onto Pennsylvania Avenue and then turning left southbound onto Bethlehem Pike at the traffic signal. Although a lesser amount, vehicles from northbound Bethlehem Pike turn right into Washington Lane, ultimately destined to Fort Washington Avenue at its intersection with Highland Pennsylvania Avenue, in order to avoid the delay of turning left from Pennsylvania Avenue onto Fort Washington Avenue across the opposing traffic.

Figure 7B illustrates the predominant non-local pass-through traffic patterns along Washington Lane, Montgomery Avenue, and Summit Avenue to/from their intersections with Bethlehem Pike during the afternoon peak period. Again, during the afternoon peak period, these pass-through routes are used to avoid peak period traffic congestion at the signalized intersection of Bethlehem Pike and Pennsylvania Avenue. In the afternoon, Washington Lane is the predominant pass-through route for traffic oriented to Bethlehem Pike, as vehicles travel from both Summit Avenue and Fort Washington Avenue to Washington Lane. These vehicles are likely travelling westbound on Pennsylvania Avenue and diverting through the neighborhood to turn left onto southbound Bethlehem Pike from Washington Lane, to avoid the congestion and delay on westbound Pennsylvania Avenue, especially at its signalized intersection with Bethlehem Pike. Also, vehicles traveling along Fort Washington Avenue southbound from Highland Avenue divert to Washington Lane to turn left onto Bethlehem Pike southbound to avoid the delay of turning onto westbound Pennsylvania Avenue and then left onto southbound Bethlehem Pike. Although a lesser amount, vehicles divert to both Montgomery Avenue and Spring Lane from the Summit Avenue intersection with Pennsylvania Avenue in order to avoid the delay along westbound Pennsylvania Avenue at its intersection with Bethlehem Pike.

### ***Neighborhood Traffic Patterns Summary***

Based on the results of the license plate origin-destination survey, there are two distinct non-local neighborhood pass-through traffic patterns, in addition to locally generated traffic patterns from the Fort Washington neighborhood. These through traffic patterns are as follows:

- (1) Traffic which is oriented between Bethlehem Pike and either Pennsylvania Avenue or Highland Avenue that uses Washington Lane, Montgomery Avenue, or Spring Avenue at their intersections with Bethlehem Pike to travel within the neighborhood to or from Pennsylvania Avenue or Highland Avenue in order to avoid the intersection of Bethlehem Pike and Pennsylvania Avenue.

- (2) Through traffic which is oriented in a north-south direction within the Township, between Highland Avenue and Pennsylvania Avenue, or vice versa, that uses either Fort Washington Avenue, Summit Avenue, or both through the neighborhood.

As a result of these non-local neighborhood pass-through traffic patterns, traffic calming improvement measures are suggested to deter non-local traffic from using the neighborhood roads as a convenient through route, and to improve traffic conditions on the surrounding roads and intersections. Alternatively, in the case of Fort Washington Avenue, which is the only north-south through route within this section of the Township, improvement measures are suggested to reduce vehicle speeds within the neighborhood.

The following section describes several traffic control and traffic calming improvement measures to improve the neighborhood traffic conditions. However, it is important to note that any traffic control measures to deter non-local pass-through traffic may also affect the traffic patterns of the local neighborhood residents.

## TRAFFIC CALMING STRATEGIES

The traffic calming strategies described below consist of a series of suggested regulatory signing and physical features to deter or calm through traffic within the neighborhood study area. The traffic calming strategies described, which are discussed below, pertain to the following:

- Washington Lane, Montgomery Avenue, Spring Avenue
- Fort Washington Avenue, Summit Avenue
  - Option 1 – One Way Pair
  - Option 2 – Fort Washington Avenue – Primary Route

### *Washington Lane, Montgomery Avenue, Spring Avenue*

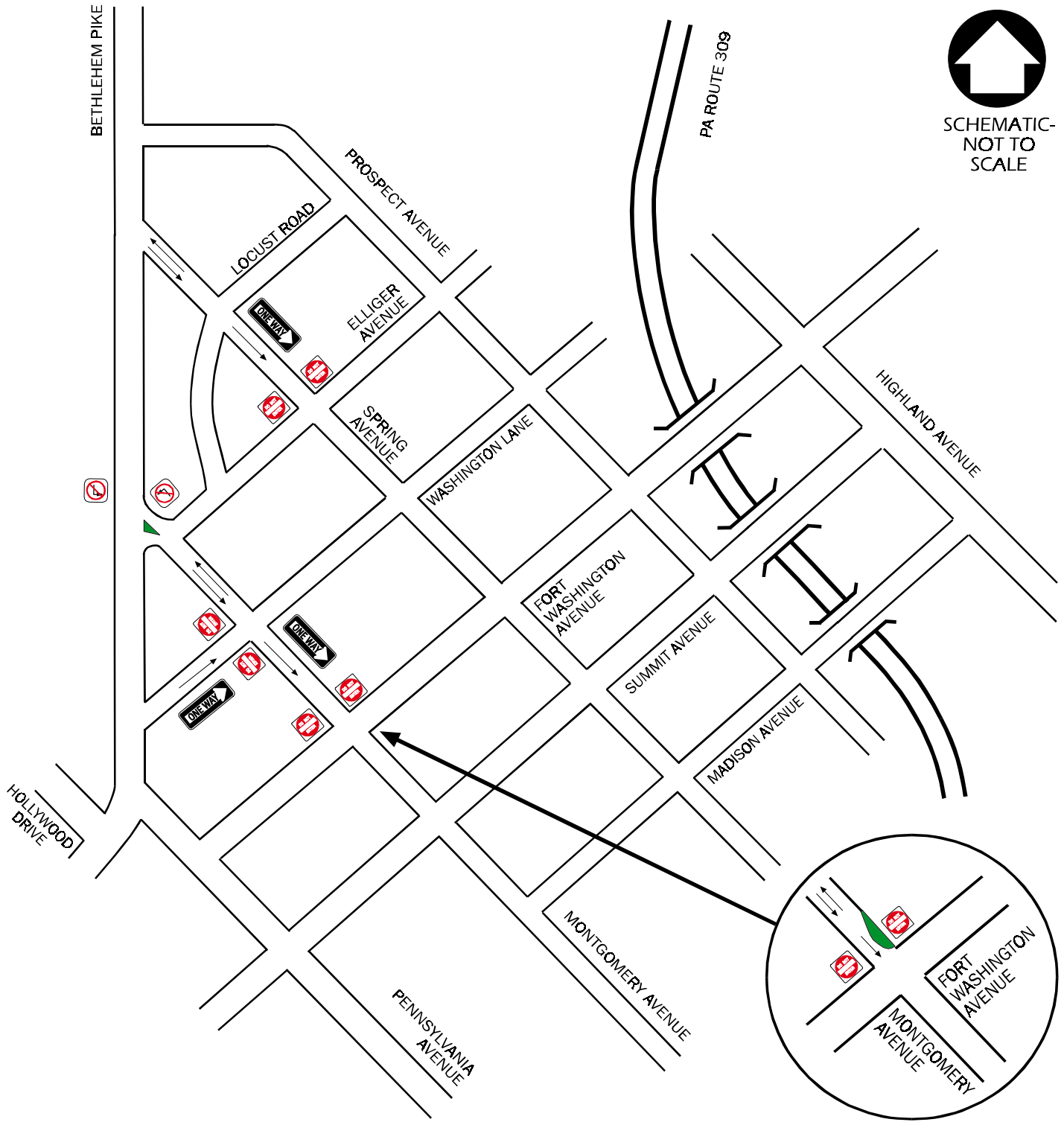
The traffic patterns indicate Washington Lane, Montgomery Avenue, and Spring Avenue (at their intersections with Bethlehem Pike) are used as bypass routes through the neighborhood to travel to or from Pennsylvania Avenue or Highland Avenue, presumably to avoid traffic congestion along Pennsylvania Avenue and at its intersection with Bethlehem Pike. The traffic control and traffic calming improvement options presented in Figure 8, and described herein, address this pass-through traffic pattern within the neighborhood west of Fort Washington Avenue, while at the same time attempt to minimize the impact to the local residents.

- Washington Lane, between Bethlehem Pike and Montgomery Avenue

Designate Washington Lane as one-way northbound between Bethlehem Pike and Montgomery Avenue, in order to allow access into the neighborhood, and restrict egress from the neighborhood to Bethlehem Pike. This passive traffic control will eliminate the pass-through movement from Pennsylvania Avenue and Highland Avenue to Bethlehem Pike southbound. Install one-way signing at the Washington Lane intersection with Bethlehem Pike and install Do Not Enter signs at the Washington Lane intersection with Montgomery Avenue.

- Montgomery Avenue, between Bethlehem Pike and Washington Lane

Restrict turning movements at the intersection of Montgomery Avenue and Bethlehem Pike to right-turn-in and right-turn-out only. This traffic control can be implemented through No Left-Turn signing at the intersection, or alternatively, in conjunction with reconstruction of the existing channelization island on Montgomery Avenue at the intersection. This passive and physical traffic control allows limited access for the residents within the neighborhood, but it prohibits pass-through traffic from turning left from Montgomery Avenue and from Bethlehem Pike. This traffic control will eliminate the pass-through movement from Pennsylvania Avenue and Highland Avenue to Bethlehem Pike southbound. Also, it will eliminate the pass-through movement for traffic traveling south on Bethlehem Pike and turning left into the neighborhood, oriented



  
 SCHEMATIC-  
 NOT TO  
 SCALE

**FIGURE 8**  
 Washington Lane, Montgomery Avenue,  
 Spring Avenue Traffic Control Improvements

**ALTERNATIVE  
 HALF-CLOSURE  
 INSTALLATION**

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

to Pennsylvania Avenue. This improvement, however, does not affect traffic within the neighborhood that is directed from Pennsylvania Avenue to Bethlehem Pike northbound.

- Montgomery Avenue, between Washington Lane and Fort Washington Avenue

Designate Montgomery Avenue as one-way eastbound between Washington Lane and Fort Washington Avenue. Install one-way signing at the Montgomery Avenue intersection with Washington Lane and install Do Not Enter signs at the Montgomery Avenue intersection with Fort Washington Avenue. In conjunction with the above-described recommendations, this passive traffic control will eliminate the pass-through movement from Pennsylvania Avenue to Bethlehem Pike northbound.

- Spring Avenue, between Locust Road and Elliger Avenue

Designate Spring Avenue as one-way eastbound between Locust Road and Elliger Avenue. Install one-way signing at the Spring Avenue intersection with Locust Road and install Do Not Enter signs at the Spring Avenue intersection with Elliger Avenue. In conjunction with the above-described recommendations, this passive traffic control will eliminate the pass-through movement within the neighborhood from Pennsylvania Avenue to Bethlehem Pike northbound. Although this is a low-volume pass-through movement, there is need for traffic controls to ensure against future pass-through movements which could shift from Montgomery Avenue or Washington Lane as a result of the above-described suggestions. In order to continue to allow full-movement access at the intersection of Spring Avenue and Bethlehem Pike for the residents, Locust Road south and north of Spring Avenue and Spring Avenue west of Locust Road should be open for two-way flow.

- Prospect Avenue

At the present time it is not recommended to implement traffic control improvements along Prospect Avenue, based on the low traffic volumes and low correlation of the pass-through movements from the results of the license plate survey. However, upon implementation of the above-described traffic control recommendations, it may be necessary to monitor the future traffic volumes along Prospect Avenue in the event there is a diversion of the pass-through traffic to Prospect Avenue.

- Half-Closure or Semi-Diverter Installation Alternative

As an alternative to the one-way signing recommendations described above, consideration should be given to installing a half-closure or semi-diverter at any of the above locations. The half-closure is an extension of the curb that narrows the street width to permit only one direction of travel. This physical control improvement reinforces the intent of the one-way directional traffic control as a result of the added physical barrier to restrict traffic flow in one direction, and as such, two-way flow can be maintained within the street section for the convenience to the residents. This traffic control adds aesthetic

appeal to the neighborhood, as it can also be used for landscaping or street scaping. An example of the half-closure is illustrated schematically on Figure 8 for the intersection of Montgomery Avenue and Fort Washington Avenue. It is important to ensure visibility of the physical barrier through use of advance warning signs, reflective channelization, and reflectors.

### *Benefits*

The benefits associated with installation of the above-described traffic control improvements are as follows:

- ***Reduce Traffic Volumes*** – One-way streets and signing regulations are effective to reduce the pass-through traffic volumes; however, there is increased compliance and traffic volume reduction associated with the physical barrier of the half-closure.
- ***Improve Safety*** – Through reducing the vehicle conflicts, safety should improve for vehicles, pedestrians, and bicyclists within the neighborhood intersections.
- ***Low Violation and Enforcement Dependence*** – Although there may be a need for increased enforcement initially, overall, one-way signing with Do Not Enter signs generally requires low enforcement. The compliance is further increased with the added physical barrier of the half-closure.
- ***Cost and Maintenance*** – There is comparatively low costs and maintenance associated with signs; however cost and maintenance do increase with a half-closure.
- ***Minimal Business Impact*** – Because of the businesses located along Washington Lane north of Bethlehem Pike, designation of Washington Lane as one-way northbound still allows these businesses to attract customer traffic from Bethlehem Pike.
- ***Minimal Delay for Emergency Services*** – Emergency service providers can disregard the one-way signing designation if necessary, and the physical barrier of the half-closure remains passable on the open side for emergency response.
- ***Possible Speed and Noise Reduction*** – By eliminating the pass-through traffic from within the neighborhood, it is possible that vehicle speeds and associated vehicle noise will be reduced along these internal, residential roads, since the majority of traffic will be local residents only, assuming they abide by the speed limits.
- ***Aesthetic Appeal*** – The half-closure option offers the opportunity to provide landscaping or street scaping within the neighborhood intersection.

### *Impacts*

The impacts associated with installation of the above-described traffic control improvements are as follows:

- ***Inconvenience to Local Neighborhood Residents*** – The one-way designation would apply to the residents as well, and as such, the neighborhood residents would be required to adjust their local driving patterns.

- *Effects to Business Egress Traffic* – The one-way northbound designation on Washington Avenue allows the businesses on Washington Lane to attract customers directly from Bethlehem Pike. However, traffic exiting these businesses will need to circulate within the neighborhood to return to Bethlehem Pike.
- *Transit Route Effects* – Any existing or future school bus or transit routes may be required to alter their routes.
- *Cost and Maintenance* – Signage is a low cost measure, however, the cost of the half-closure is moderate (approximately \$4,000.00 per installation), and the maintenance is moderate because of the landscaping and the potential threat of vandalism.

### *Traffic Volumes*

Implementation of the above-described traffic control recommendations will reduce the traffic volumes from within this section of the neighborhood, and as such it will cause the pass-through traffic to be redistributed to remain on the major roadways such as Pennsylvania Avenue, Bethlehem Pike, Fort Washington Avenue, and Summit Avenue. The redistributed peak hour traffic volumes are presented in **Appendix E** for both the weekday morning peak hour and the weekday afternoon peak hour, respectively.

As illustrated in Appendix E, the two-way traffic volumes on Washington Lane, south of Montgomery Avenue are expected to be reduced by approximately 70 percent during the two peak hours with the above-described improvements. The two-way traffic volumes on Montgomery Avenue, west of Washington Lane are expected to be reduced by approximately 50 percent during the two peak hours. Since pass-through traffic is minimal along Spring Avenue, the improvements are expected to yield a much smaller reduction of approximately 10 percent during the two peak hours.

### *Levels of Service*

The traffic volumes presented in Appendix E were subject to detailed capacity level-of-service analysis in accordance with the techniques described previously, and the results of the capacity/level-of-service analysis are also presented in Appendix E. Based on the traffic analysis results, because of the reduction of traffic volumes due to the diversion of pass-through traffic, all of the intersections will continue to operate at the same or improved levels of service as under existing conditions.

### ***Fort Washington Avenue and Summit Avenue***

Fort Washington Avenue and Summit Avenue between Highland Avenue and Pennsylvania Avenue are used as pass-through routes within the neighborhood, in order to link sections of the Township to the north to destinations in the south, and vice versa. The destinations along Pennsylvania Avenue include the Pennsylvania Turnpike Fort Washington

Interchange (Interchange 26), the PA Route 309 Expressway, the SEPTA R5 Fort Washington rail station, and the Fort Washington Office Park accessed by Commerce Drive, among others.

Fort Washington Avenue and Summit Avenue are primarily used for two reasons. To begin, the Fort Washington Avenue intersection with Highland Avenue, and the Summit Avenue intersection with Pennsylvania Avenue are both controlled by traffic signals, which provides for controlled movement of traffic at these intersections for northerly and southerly flow. Secondly, Fort Washington Avenue is the only north-south through roadway within this section of the Township that links to the neighborhoods to the north of Highland Avenue. As such, it is not practical to eliminate the through traffic from this road, but rather the objective should be to control or calm the pass-through traffic within the neighborhood study area, and to accommodate the pass-through traffic consistent with a neighborhood setting. The following discussion presents different traffic control options for the Fort Washington Avenue and Summit Avenue corridors. It is important to note that each of the following options assumes implementation of the previously described traffic control solutions for Washington Lane, Montgomery Avenue, and Spring Avenue.

#### Option 1: Fort Washington Avenue and Summit Avenue One-Way Pair

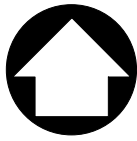
The first option to consider in order to control or calm the traffic along the Fort Washington Avenue and Summit Avenue corridors designation of these roads as one-way pairs. In doing so, the one-way designation would utilize the traffic signals located at the respective terminus intersections (Fort Washington Avenue and Highland Avenue to the north and Summit Avenue and Pennsylvania Avenue to the south). In order to provide controlled egress via the traffic signals from within the neighborhoods, Fort Washington Avenue could be designated to one-way northbound and Summit Avenue could be designated to one-way southbound. The objective of this option is to distribute the unavoidable pass-through traffic along two roadways. The associated traffic control and traffic calming improvements which could be implemented in conjunction with this improvement option are illustrated in **Figure 9**, and are described as follows:

- Fort Washington Ave. One-Way Northbound and Summit Ave. One-Way Southbound

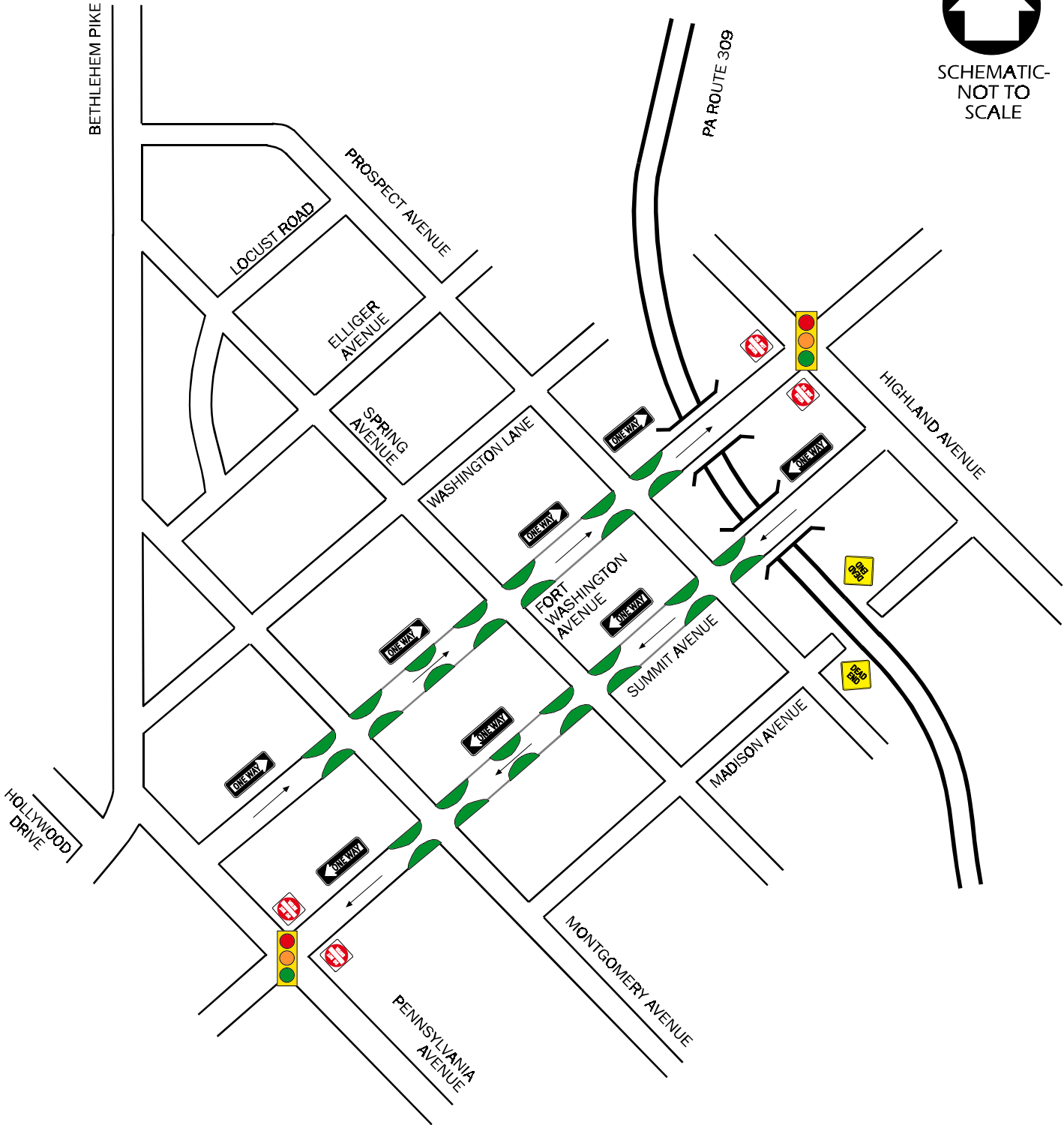
This passive traffic control, as described above, reduces traffic volumes by distributing the pass-through traffic along two roadways, and controlled egress is provided via the traffic signals at Fort Washington Avenue with Highland Avenue and Summit Avenue with Highland Avenue.

- Narrow Street Widths

The key feature of this physical traffic control improvement option is to allow the pass-through traffic, but also to control or calm the traffic since these roads are located within a neighborhood setting. The traffic calming relates directly to the need to accommodate the pass-through traffic consistent with a neighborhood setting. Vehicle speeds along these roadways are an issue, especially since designation of these roads



SCHEMATIC-  
NOT TO  
SCALE



**FIGURE 9**

Option 1: Fort Washington Avenue and Summit Avenue One-Way Pair

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

as one-way yields wider cartways for one lane of travel, which encourages excessive travel speeds. Introduction of narrow street widths promotes slower vehicle speeds.

The traffic calming technique that involves the narrowing of street widths is termed a choker or mid-block bulbout or curb extension. A choker is a physical control which involves extending the curbing and widening the sidewalk or grass area to direct traffic to the center of the narrowed roadway. The installation of chokers enables sidewalks to be widened, which promotes pedestrian safety as it also reduces the pedestrian street crossing distance. Also, the widened area is suitable for landscaping and street scaping that improves appearance of the neighborhood. Also, the chokers can be used to designate and protect areas for on-street parking. The narrowed street widths combined with street scaping and on-street parking promotes reduced vehicle speeds. Some studies reveal the speed reduction may only be minimal; however, it will assist to reduce speeds, especially in conjunction with other improvements as described below.

The existing cartway width varies between 32 feet and 35 feet along Fort Washington Avenue and between 28 feet and 32 feet along Summit Avenue. As such, under this improvement scenario, we recommend installation of chokers on both sides of the road at mid-block and intersection locations in order to designate a 14 foot one-way lane of travel. As such, the chokers could be designed to extend the curb approximately eight to ten feet on both sides of the road, and on-street parking could be permitted along the remainder of the roadway between the chokers. The placement of the chokers is important to accommodate normal turning radii, and it is also important to maintain visibility of the physical barrier through use of advance warning signs, reflective channelization, and reflectors.

As an enhancement to the installation of chokers along Fort Washington Avenue and Summit Avenue would be reconstruction of a narrower bridge cartway width in conjunction with the PA Route 309 rehabilitation project. As such, the Township should provide input to PennDOT for replacement of the bridges for narrower cartway widths. However, this would preclude any future widening of these roadways over the bridges in the future, should the need ever arise.

- Close the Madison Avenue Bridge

As part of this improvement option, it should be considered to close the Madison Avenue bridge over PA Route 309. Under this improvement scenario, the objective is to concentrate the pass-through traffic to those street corridors that are designed to accommodate the traffic volumes. Additionally, since the character of Madison Avenue is more typical of a local, residential roadway, given that Madison Avenue is not a through road, and the school and park is located along this road which yields higher pedestrian traffic. Furthermore, because of the physical traffic calming devices recommended for Fort Washington Avenue and Summit Avenue, pass-through motorists may attempt to bypass the parallel section of these roads along Madison Avenue. For all of these reasons, it should be considered to close the Madison

Avenue bridge over PA Route 309 in order to eliminate the possibility of through traffic shifting to Madison Avenue.

- Speed Actuated Warning Message or Beacon

A passive speed control mechanism can be installed along both Fort Washington Avenue and Summit Avenue to alert motorists of their excessive travel speed. This could be actuated by either loop detectors or radar detection. Variable message signs can be used on either a temporary or full-time basis to alert passing motorists of their travel speed. Alternatively, a flashing beacon warning sign can be installed at certain locations along the roadways which only illuminates when passing motorists exceed a set speed.

There are also other direct measures to reduce vehicle speeds; however, these measures require further participation or acceptance by the community and local authorities. These other measures include speed humps or speed tables, rumble strips, and increased police enforcement.

- Pedestrian Crosswalks

Provision of painted or textured pavement pedestrian crosswalks at the cross-street intersections are effective for accommodating pedestrian traffic and alerting the pass-through motorists of pedestrian activity and the neighborhood setting. The pedestrian crosswalks can be implemented in conjunction with the narrowing of the street widths. Installation of the crosswalks may slightly reduce the pass-through vehicle speeds; however, more importantly it increases the awareness of the motorists to the neighborhood setting.

An alternative to the painted or textured pedestrian crosswalks is raised pedestrian crosswalks, which further alerts motorists of the pedestrian crossing within the neighborhood. In addition, because of the vertical displacement, raised crosswalks will likely reduce vehicle speeds. However, implementation of this measure must be planned carefully, especially for a through collector road such as Fort Washington Avenue.

- Fort Washington Avenue/Pennsylvania Avenue Traffic Signal Alternative

An alternative to consider relative to the designation of Fort Washington Avenue as one-way northbound and Summit Avenue as one-way southbound is the installation of a traffic signal at the intersection of Fort Washington Avenue and Pennsylvania Avenue. The traffic signal would be controlled by the same controller for the traffic signal at the intersection of Bethlehem Pike and Pennsylvania Avenue. The Fort Washington Avenue and Pennsylvania Avenue traffic signal would only regulate eastbound Pennsylvania Avenue traffic turning left into Fort Washington Avenue northbound. Currently this northbound traffic is accommodated at the unsignalized

intersection with Fort Washington Avenue, and at the traffic signal at Summit Avenue, however this would cease to occur if Summit Avenue is designated as one-way southbound.

The traffic signal phasing would only stop the Pennsylvania Avenue westbound traffic to create a gap for traffic turning left into Fort Washington Avenue northbound. As such, eastbound Pennsylvania Avenue traffic would operate under a constant green phase, or free-flow.

The traffic analysis of this intersection, with the traffic signal installation to only regulate the eastbound Pennsylvania Avenue left-turn traffic, reveals that the intersection would operate with acceptable levels-of-service D or better. Installation of a traffic signal would require cooperation from Upper Dublin Township and PennDOT, since presently the intersection does not satisfy the PennDOT traffic signal warrant criteria. However, the belief is that if the Fort Washington Avenue and Summit Avenue corridors were designated as one-way pairs, the future eastbound Pennsylvania Avenue left-turn volumes would support the traffic signal installation.

### ***Benefits***

The benefits associated with installation of the above-described traffic control improvements are as follows:

- ***Reduce Traffic Volumes*** - One-way streets and signing regulations are effective to reduce the pass-through traffic volumes by distributing the traffic along two roadways, however, in certain sections, especially along Summit Avenue, traffic volumes may increase to balance with Fort Washington Avenue.
- ***Possible Speed Reduction*** – The combination of the above-described recommendations should reduce the vehicle speeds along both roadways.
- ***Improve Safety*** – Through reducing the vehicle conflicts by designating the roadways as one-way, reducing the vehicle speeds, and creating an improved sense of neighborhood with pedestrian facilities, the safety should improve for vehicles, pedestrians, and bicyclists within the neighborhood.
- ***Low Violation and Enforcement Dependence*** – The one-way pair designation in combination with the narrow street widths will require no added police enforcement; however, the measures to reduce speed may require increased enforcement initially or periodically.
- ***Aesthetic Appeal*** – The chokers or street narrowing offers the opportunity to provide landscaping or street scaping within the neighborhood intersections.

### *Impacts*

The impacts associated with installation of the above-described traffic control improvements are as follows:

- ***Inconvenience to Local Neighborhood Residents*** – The one-way designation would apply to the residents as well, and as such, the neighborhood residents would be required to adjust their local driving patterns.
- ***Minimal Delay for Emergency Services*** – Although, two-way access is maintained through the neighborhood, emergency service providers may need to disregard the one-way designation. This is especially true for the Fort Washington Fire Company located along Summit Avenue south of Spring Avenue, and as such, the local emergency service providers should be invited to comment on the recommendations before any final decisions are rendered.
- ***Transit Route Effects*** – Any existing or future school bus or transit routes may be required to alter their routes.
- ***Cost and Maintenance*** – The cost of the chokers along both roadway corridors is high (approximately \$4,000.00 per pair), and the maintenance is moderate because of the landscaping and the potential threat of vandalism.
- ***Cooperation from Authorities*** – Because Fort Washington Avenue is a State roadway, any improvements would require the review and concurrence of PennDOT. Additionally, Fort Washington Avenue is designated as an emergency snow route, and as such, additional coordination and approval by PennDOT is required.

### *Traffic Volumes*

Implementation of the above-described traffic control recommendations will redistribute the local and pass-through traffic volumes within the neighborhood. The redistributed peak hour traffic volumes are presented in **Appendix F** for the weekday morning peak hour and the weekday afternoon peak hour, respectively.

As shown in Appendix F, traffic volumes on both Fort Washington Avenue and Summit Avenue will be more consistent throughout the study area, as compared to existing conditions. Fort Washington Avenue will carry more traffic in the southern portion and less in the northern portion as compared to existing conditions. Conversely, Summit Avenue will carry more in the northern portion and less in the southern portion as compared to existing conditions. On each corridor, traffic volumes are expected to balance since this option removes the need to shift between the two roadways.

Despite the redistribution and balancing of the traffic volumes along the two roadways, traffic conditions should improve as a result of the implementation of the traffic calming strategies to accommodate the vehicular traffic in concert with the neighborhood, pedestrian-friendly setting.

### *Levels of Service*

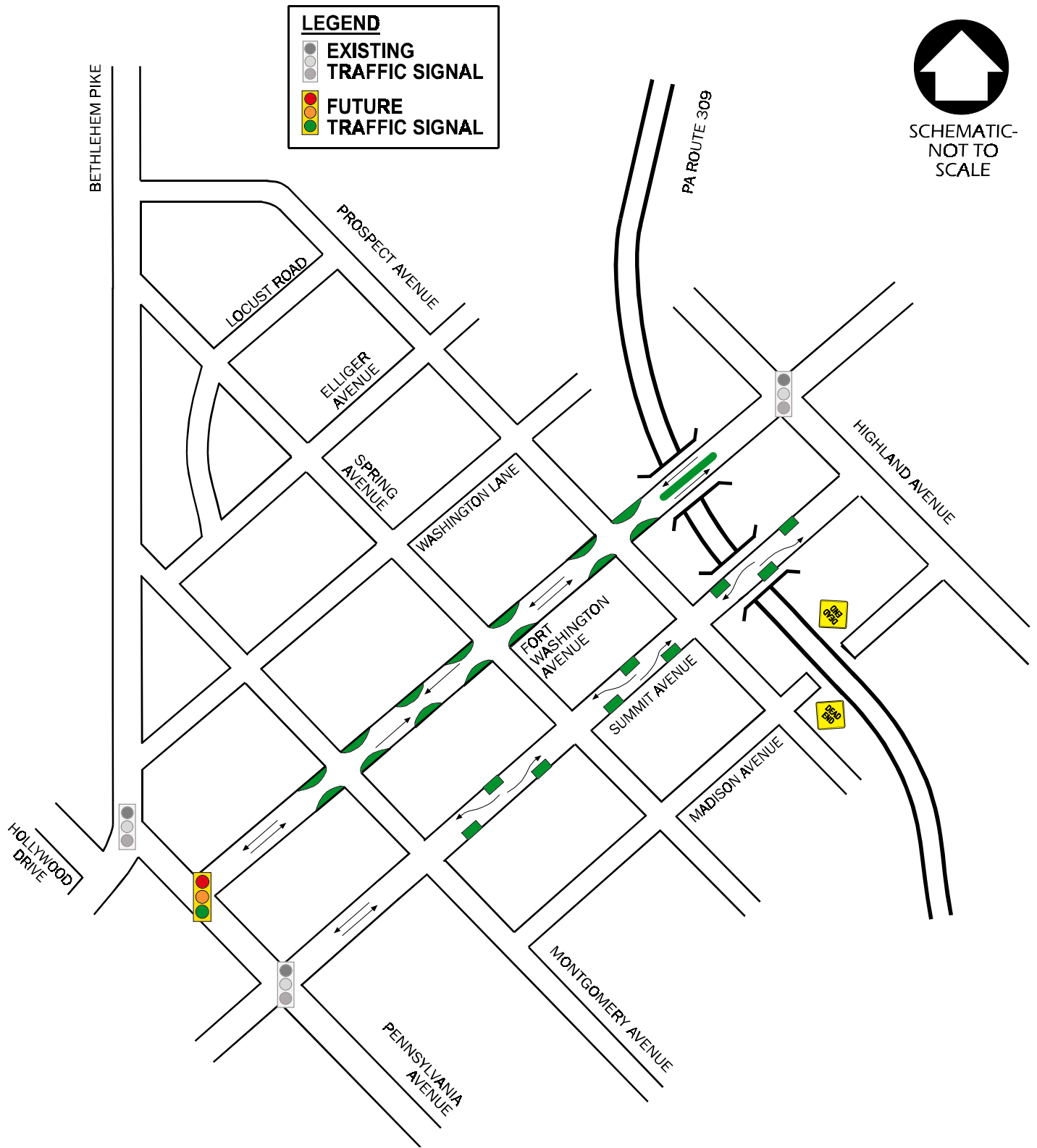
The traffic volumes presented in Appendix F were subject to detailed capacity level-of-service analysis in accordance with the techniques described previously. The results of the capacity/level-of-service analysis are also presented in Appendix F. As illustrated, with the two-way pair option, all movements at each of the study area intersections on both Summit Avenue and Fort Washington Avenue will function at LOS D or better during both peak hour periods.

### Option 2: Designate Fort Washington Avenue as the Primary Through Road

The second option to consider to control or calm the traffic is contrary to the one-way pair option previously described. Its objective is to attract the pass-through traffic to one designated through roadway, Fort Washington Avenue, and dilute the pass-through traffic volumes from the other parallel streets, most notably Summit Avenue. Since Fort Washington Avenue is the only through collector roadway within this section of the Township, it can be justified to designate this as the only road for pass-through traffic within the neighborhood, thereby reducing the traffic volumes along the other local roads. Currently pass-through traffic travels along both Fort Washington Avenue and Summit Avenue within the neighborhood for the reasons mentioned previously, most notably for controlled egress at the signalized intersections of Fort Washington Avenue with Highland Avenue, and Pennsylvania Avenue with Summit Avenue. Therefore, in order to attract the pass-through traffic to only the Fort Washington Avenue corridor, it is necessary to install a traffic signal at the southern intersection of Pennsylvania Avenue and Fort Washington Avenue. There are additional associated traffic control and traffic calming improvements which could be implemented in conjunction with this improvement option as illustrated in **Figure 10**, and as described below:

- Install a Traffic Signal at Fort Washington Avenue and Pennsylvania Avenue

Installation of a traffic signal at this intersection is important to attract and maintain the pass-through traffic along Fort Washington Avenue in order to provide controlled ingress and egress at the intersection of Fort Washington Avenue and Pennsylvania Avenue. The controlled turning movements is especially critical for traffic turning left from southbound Fort Washington Avenue onto Pennsylvania Avenue eastbound and also for traffic turning left from eastbound Pennsylvania Avenue onto Fort Washington Avenue. Otherwise, traffic would continue to use the traffic signal at the intersection of Pennsylvania Avenue and Summit Avenue. The traffic signal would be controlled by the same controller for the traffic signal at the intersection of Bethlehem Pike and Pennsylvania Avenue.



**FIGURE 10**  
Option 2: Designate Fort Washington Avenue as the Primary Through Road

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

The traffic signal phasing would stop the Pennsylvania Avenue westbound traffic at its intersection with Fort Washington Avenue to create a gap for traffic turning left into Fort Washington Avenue northbound. Additionally, there would be a new phase added to the combined intersections of Pennsylvania Avenue with both Fort Washington Avenue and Bethlehem Pike, to allow egress for traffic from southbound Fort Washington Avenue, including the left-turn movement which is currently prohibited. The traffic signal would also operate with a clear-out phase so westbound Pennsylvania Avenue traffic is not trapped between the two intersections.

The traffic analysis of this intersection with the traffic signal installation at Fort Washington Avenue reveals that the intersection would operate with acceptable levels-of-service D or better. However, installation of a traffic signal would require cooperation from Upper Dublin Township and PennDOT, since presently the intersection does not satisfy the PennDOT traffic signal warrant criteria. However, with Fort Washington designated to accommodate all pass-through traffic within the neighborhood, the belief is that future eastbound Pennsylvania Avenue left-turn volumes and southbound Fort Washington Avenue volumes would support the traffic signal installation.

An alternative variation to the installation of the traffic signal is to only regulate eastbound Pennsylvania Avenue traffic turning left into Fort Washington Avenue northbound, and continue to restrict the southbound Fort Washington left-turn movement. In doing so, the southbound Fort Washington Avenue phase would be eliminated from the signal cycle, which would improve the overall Fort Washington Avenue/Pennsylvania Avenue/Bethlehem Pike operations. As part of this variation, southbound Fort Washington Avenue would divert to Summit Avenue along Montgomery Avenue to turn left at the Summit Avenue traffic signal, as under existing conditions. Accordingly, it should also be considered to cul-de-sac the north leg of Summit Avenue north of its intersection with Montgomery Avenue to prevent pass-through traffic from using Summit Avenue.

- Install Chicanes or Mid-block Slow Points along Summit Avenue

In order to further divert the pass-through traffic to the Fort Washington Avenue corridor, there is a need for enhanced traffic control or traffic calming strategies along Summit Avenue. Narrowing of the street widths or installation of chokers as described above is a valid strategy; however, since under this improvement scenario the objective is to maintain the local and residential character along Summit Avenue, further devices should be considered. As such, we suggest installation of chicanes for consideration.

Chicanes establish an artificial 45-degree bend in the otherwise straight travel path, generally created by the placement of curbed plantings within the roadway arranged on alternating sides of the road. Use of chicanes results in either a single-lane or narrow two-lane gap (depending upon the desired level of traffic calming) for traffic to negotiate in a snake-like fashion. Chicanes are generally more effective for reducing vehicle speeds than chokers or street narrowing because of the artificial turning maneuvers.

Additionally, chicanes are effective in reducing traffic volumes because of their inconvenience to pass-through motorists. As such, in combination with the traffic signal at Pennsylvania Avenue and Fort Washington Avenue, the chicanes along Summit Avenue should divert the pass-through traffic to Fort Washington Avenue. Additionally, there is aesthetic appeal associated with the chicanes, as they can be used for landscaping or street scaping. The placement of the chicanes is important to accommodate normal turning radii, and as such, sets of chicanes are generally placed approximately 400 to 600 feet apart. Also, it is important to maintain visibility of the physical barrier through use of advance warning signs, reflective channelization, and reflectors.

- Narrow Fort Washington Avenue Street Width

Although the objective of this option is to divert the pass-through traffic to Fort Washington Avenue, it may be desirable to narrow Fort Washington Avenue through installation of chokers or median islands in order to control or calm the traffic since these roads are located within the neighborhood setting. Again, the traffic calming relates directly to the need to accommodate the pass-through traffic consistent with a neighborhood setting, which includes accommodations for pedestrians and treatments to reduce vehicle speeds. The introduction of narrow street widths promotes slower vehicle speeds.

As previously described, installation of chokers as a physical traffic control of extending the curbing and widening the sidewalk or grass area to narrow the cartway, promotes pedestrian safety by reducing the street crossing distance; provides opportunity for street scaping which improves appearance of the neighborhood; provides designated areas for on-street parking; and promotes reduced vehicle speeds. Also, in certain locations, such as on the bridge over PA Route 309, a median island could be installed with street scaping in order to narrow the cartway width.

Under this improvement scenario, Fort Washington Avenue could be narrowed through installation of chokers or median islands in order to designate a narrower, two-lane cartway. The cartway width varies between 32 feet and 35 feet, and as such, the chokers or median islands could be designed to establish a narrower 22-foot, two-way cartway, with 11-foot travel lanes. The placement of the chokers is important to accommodate normal turning radii, and it is also important to maintain visibility of any of the physical barriers through use of advance warning signs, reflective channelization, and reflectors.

- Close the Madison Avenue Bridge

As part of this improvement option, we recommend closure of the Madison Avenue bridge over PA Route 309. For the reasons described under the prior one-way pair option, closure of the Madison Avenue bridge would limit the pass-through traffic only to Fort Washington Avenue and preserve Madison Avenue as a local residential road, as it is designed.

- Close the Summit Avenue Bridge Alternative

Alternatively, we evaluated the implications associated with closure of the Summit Avenue bridge over PA Route 309, as an added measure to restrict the pass-through traffic volumes along Summit Avenue. Under this scenario, there would be some diversions of traffic to both parallel routes of Fort Washington Avenue and Madison Avenue. Both roadways can accommodate the additional traffic; however, there is a possibility of traffic oriented to and from the east along Highland Avenue to be diverted to Madison Avenue, and the traffic volumes would increase by approximately 150 vehicles during the weekday morning peak hour, and by approximately 100 vehicles during the weekday afternoon peak hour. As such, additional traffic calming measures such as those presented previously (i.e., chicanes) should be considered along Madison Avenue if the Summit Avenue bridge is closed, in order to direct all pass-through traffic to Fort Washington Avenue.

- Speed Actuated Warning Message or Beacon

As described previously, a passive speed control mechanism can be installed along Fort Washington Avenue to alert motorists of their excessive travel speed. Variable message signs can be used on either a temporary or full-time basis to alert passing motorists of their travel speed, or alternatively, flashing beacon warning signs can be installed at certain locations along the roadway which would only illuminate when passing motorists exceed the set speed.

- Pedestrian Crosswalks

As described previously, provision of painted or textured pavement pedestrian crosswalks at the cross-street intersections are effective for accommodating pedestrian traffic and alerting the pass-through motorists of pedestrian activity and the neighborhood setting. As such, pedestrian crosswalks can be installed at the cross-street intersections with Fort Washington Avenue to increase the awareness of the motorists within the neighborhood setting.

### *Benefits*

The benefits associated with installation of the above-described traffic control improvements are as follows:

- ***Reduce Traffic Volumes*** – Chicanes along Summit Avenue in combination with the traffic signal at Pennsylvania Avenue and Fort Washington Avenue will reduce the pass-through traffic volumes (and noise); however, traffic volumes will increase along Fort Washington Avenue.
- ***Speeds Reduction*** – The chicanes along Summit Avenue will reduce the vehicle speeds as a result of the artificial turning maneuvers.

- ***Improve Safety*** – Although the safety benefits are less along Fort Washington Avenue, potential narrowing of the street width improves the pedestrian safety. Additionally, introduction of the chicanes along Summit Avenue will reduce the traffic volumes and vehicle speeds, thereby improving the vehicular and pedestrian safety within the neighborhood.
- ***Low Violation and Enforcement Dependence*** – The chicanes along Summit Avenue are self-enforcing; however, the measures to reduce speed may require increased enforcement initially or periodically.
- ***Minimal Delay for Emergency Services*** – Two-way access is maintained on both Fort Washington Avenue and Summit Avenue. However, the local emergency service providers should be invited to comment on the recommendations before any final decisions rendered, especially as a result of the minor constraint of the chicanes on Summit Avenue.
- ***Aesthetic Appeal*** – The chicanes and also the chokers or street narrowing offers the opportunity to provide landscaping or street scaping within the neighborhood.

### *Impacts*

The impacts associated with installation of the above-described traffic control improvements are as follows:

- ***Inconvenience to Local Neighborhood Residents*** – As with any traffic calming strategy, the recommendations apply to the residents as well, and as such, the neighborhood residents would be required to adjust their local driving patterns. However, the suggestions associated with this option impact the residents the least, since two-way flow is maintained on both Summit Avenue and Fort Washington Avenue.
- ***Transit Route Effects*** – Any existing or future school bus or transit routes may be required to alter their routes.
- ***Cost and Maintenance*** – The cost of the chicanes and chokers along both roadway corridors is high (approximately \$4,000.00 per pair) and the cost of the median island is also high (approximately \$15,000.000). The maintenance is moderate because of the landscaping and the potential threat of vandalism.
- ***Cooperation from Authorities*** – Because Fort Washington Avenue is a State roadway, any improvements would require the review and concurrence of PennDOT. Additionally, Fort Washington Avenue is designated as an emergency snow route, and as such, additional coordination and approval by PennDOT is required.

### *Traffic Volumes*

Implementation of the above-described traffic control recommendations will redistribute the local and pass-through traffic volumes within the neighborhood. The redistributed peak hour traffic volumes are presented in within **Appendix G** for the weekday morning

peak hour and the weekday afternoon peak hour. As illustrated in Appendix G, the peak hour traffic volumes on Fort Washington Avenue may increase over existing conditions; however, conversely, the traffic volumes along Summit Avenue are expected to decrease.

Again, despite the redistribution of the traffic volumes along the two roadways, traffic conditions should improve as a result of the implementation of the traffic calming strategies to accommodate the vehicular traffic in concert with the neighborhood, pedestrian-friendly setting.

### *Levels of Service*

The traffic volumes presented in Appendix G were subject to detailed capacity level-of-service analysis in accordance with the techniques described previously, and the results of the capacity/level-of-service analysis are also presented in Appendix G. As described previously, with the intersection of Bethlehem Pike, Pennsylvania Avenue, and Fort Washington Avenue functioning under one traffic signal controller, all movements at the intersection will function at acceptable LOS D or better. All movements at the other study area intersections will also function at acceptable LOS D or better with the improvements proposed under this option.

## COMMUNITY FEATURES

As part of the evaluation of the transportation and traffic conditions within the Fort Washington neighborhood study area, McMahon conducted an inventory of the parking regulations and peak parking demand, as well as the locations of sidewalk within the neighborhood. The inventories focused on the main roads of Fort Washington Avenue and Summit Avenue, as well as the neighborhood blocks located closest to Pennsylvania Avenue.

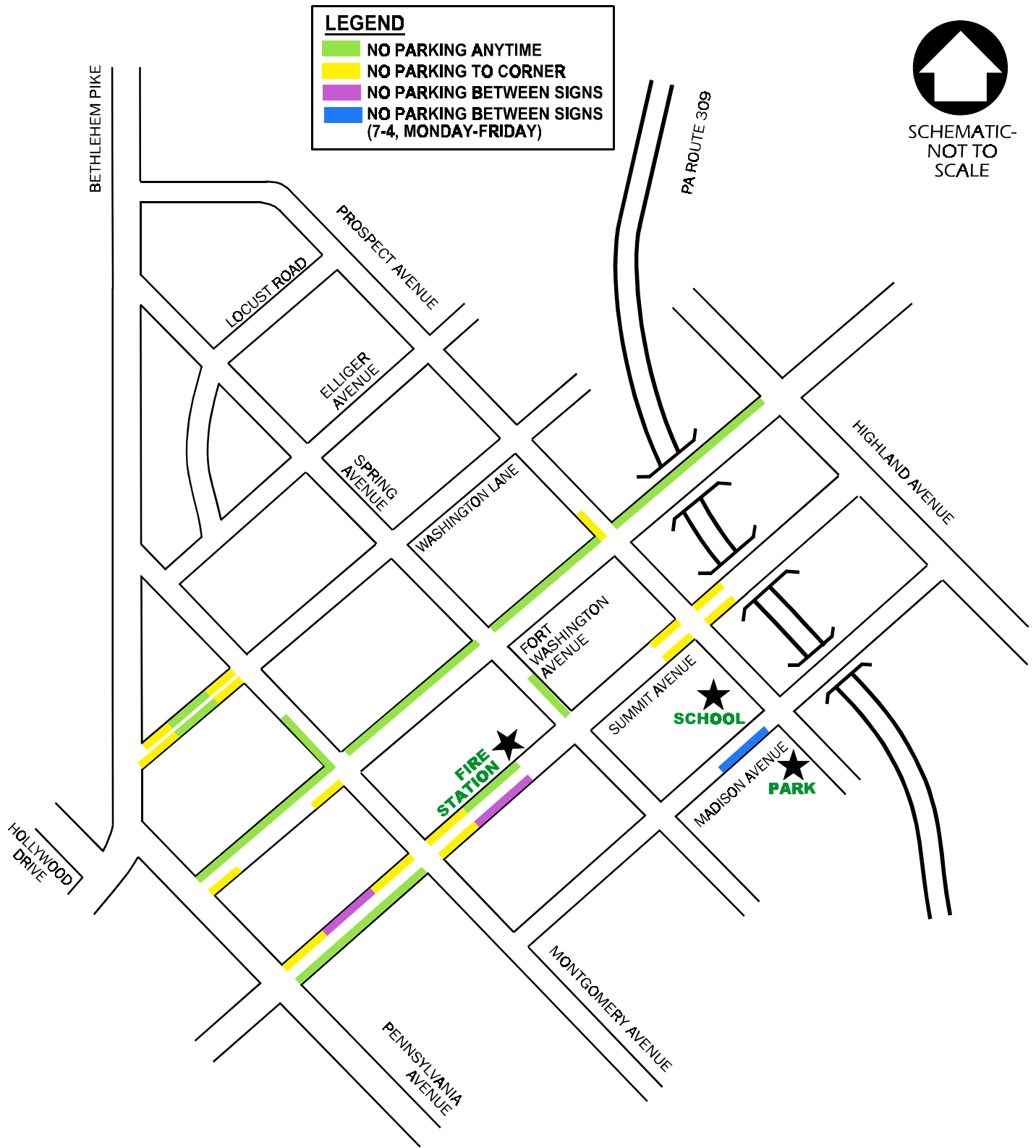
### *On-Street Parking*

The results of the parking regulations inventory are illustrated in **Figure 11**. As shown, on-street parking is generally permitted throughout the neighborhood, however there are some restrictions. Along the entire length of Fort Washington Avenue between Pennsylvania Avenue and Highland Avenue, on-street parking is prohibited on the west side of the road. Parking is also prohibited along the east side of Summit Avenue between Pennsylvania Avenue and Montgomery Avenue. Probably due to the business traffic activity, parking is prohibited along both sides of Washington Lane in the block between Bethlehem Pike and Montgomery Avenue. There are also limited other restrictions within the neighborhood such as in front of the fire station along Summit Avenue.

The peak parking demand inventory was conducted between approximately 10:00 AM and 11:00 AM during the weekday morning in order to quantify the parking demand characteristics of the area businesses and the SEPTA R5 Fort Washington rail station, since by this time, peak commuter traffic has arrived at work. Additionally, the peak parking demand inventory was conducted between approximately 8:00 PM and 9:00 PM during the weekday evening in order to quantify the peak parking demand characteristics of the residents within the neighborhood. The results of the parking demand inventory are illustrated in **Figures 12 and 13** for the weekday midday and weekday evening peak parking demand characteristics, respectively.

As illustrated in Figure 12, the weekday midday on-street parking demand is predominant along both Fort Washington Avenue and Summit Avenue, immediately north of Pennsylvania Avenue. Based on our observations, these parked vehicles are overflow due to insufficient available capacity within the surface parking lot within the SEPTA R5 Fort Washington rail station. Throughout the rest of neighborhood, the on-street parking is minimally distributed.

Although not illustrated in Figures 12 and 13, we also conducted an inventory of the peak parking demand characteristics within the SEPTA Fort Washington rail station located in Whitmarsh Township. Within rail station parking facilities, divided between two parking lot areas in the northern and southern sections of the SEPTA facility, there are a total of approximately 170 designated parking spaces; however, there is additional space to accommodate vehicles in unmarked spaces in the northern parking lot. During the peak weekday midday period, after nearly everyone has arrived to work, the SEPTA surface lots are completely full. A total of approximately 276 parked vehicles were located within the facility, which includes approximately 106 parked vehicles in unmarked spaces in the northern parking lot.



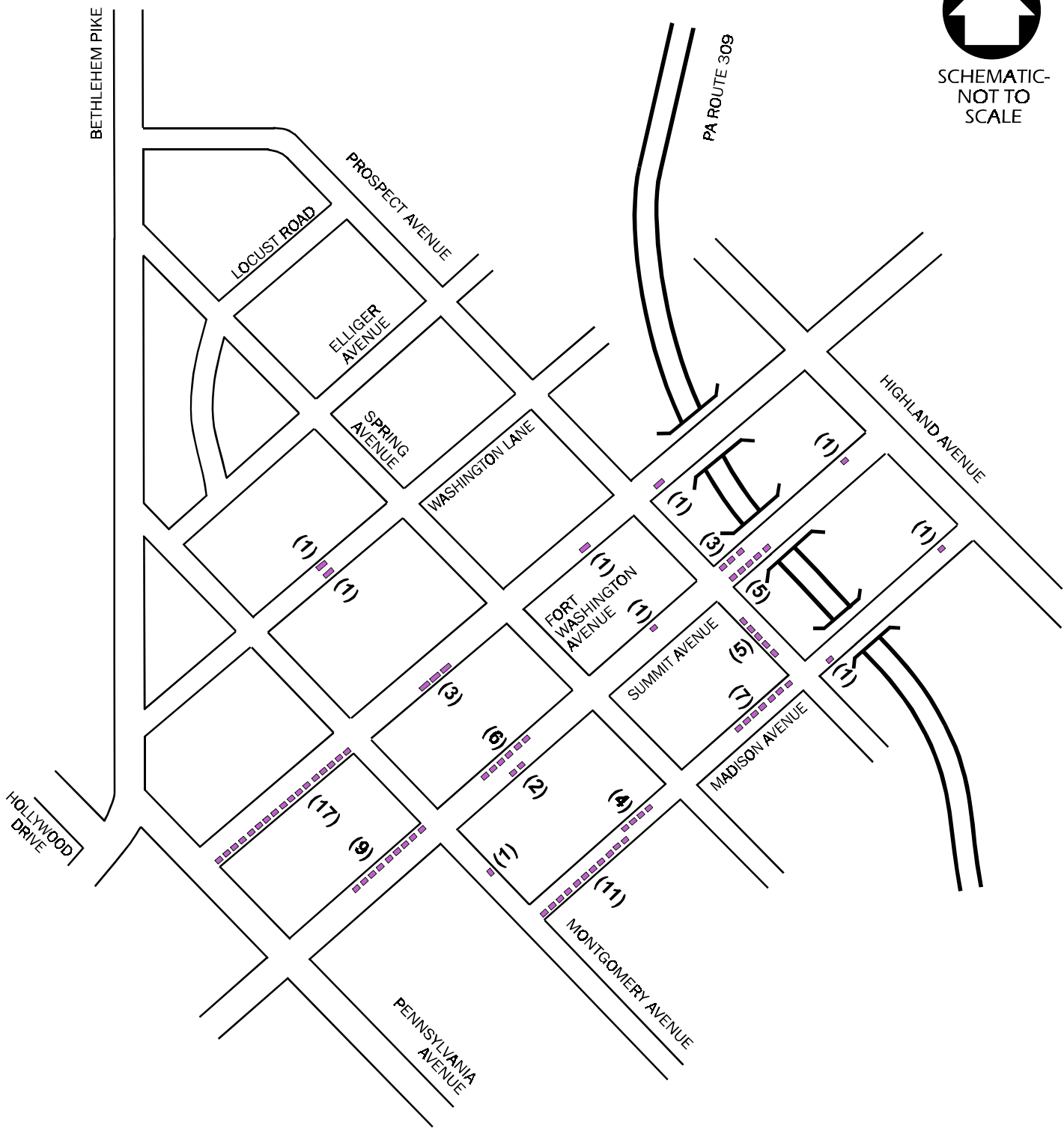
**FIGURE 11**  
On-Street Parking Restrictions

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



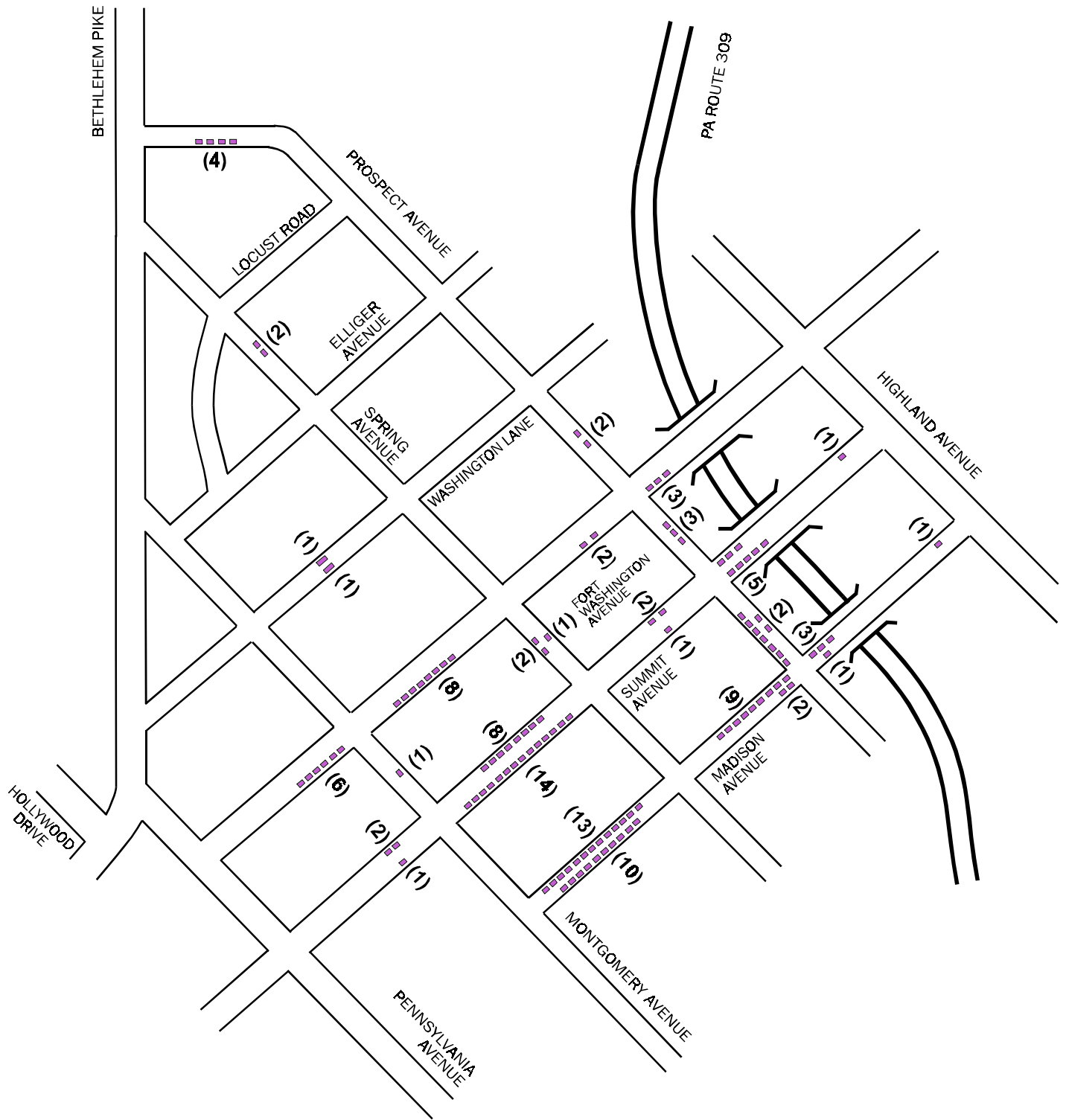
SCHEMATIC-  
NOT TO  
SCALE



**FIGURE 12**  
Existing Weekday Midday On-Street Parking Demand

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA



**FIGURE 13**  
Existing Weekday Evening On-Street Parking Demand

# FORT WASHINGTON TRAFFIC STUDY

## UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

Conversations with SEPTA officials reveal that SEPTA had attempted to purchase the portion of land on the southeast corner of Pennsylvania Avenue and Summit Avenue in order to increase the parking supply for the Fort Washington rail station, and mitigate the overflow into the neighborhood. However, negotiations have since ceased, and SEPTA will not be purchasing the land.

It is expected that any other use of this property would attract SEPTA patrons utilizing at least a portion of the parking lot to park illegally. As such, we recommend that both Upper Dublin and Whitemarsh Townships, SEPTA, and any other future owner of the property work together during the land development process to develop shared parking arrangements. Additionally, we recommend the Township investigate implementation of parking restrictions during the daytime hours on Monday through Friday along at least the east side of Fort Washington Avenue and the west side of Summit Avenue, in the first blocks north of Pennsylvania Avenue. As such, residents and guests would still be permitted to park in the evening after work and on the weekends.

### *Sidewalk Inventory*

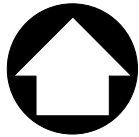
The results of the sidewalk inventory are illustrated in **Figure 14**. As shown, sidewalks are currently provided along both sides of Summit Avenue, and along the western side of Fort Washington Avenue continuously from Highland Avenue to Pennsylvania Avenue; however sidewalks are provided only sporadically along the east side of Fort Washington Avenue. Additionally, sidewalk exists along both sides of Highland Avenue and along only the north side of Pennsylvania Avenue within the commercial area. Also, sidewalks are provided at other isolated locations within the neighborhood, including at the intersection of Madison Avenue and Prospect Avenue, in the vicinity of the Kevin Wallace Memorial Klosterman Park and the New Horizons Montessori School.

Within the community we recommend use of sidewalk to link the neighborhood to the destination centers within walking distance, such as the commercial district along Pennsylvania Avenue, and the park and school. The purpose of the sidewalk is to provide a protected and designated path for pedestrian traffic, especially along the higher volume roads. Although it is desirable to provide sidewalk throughout the neighborhood, due to physical constraints and cost it is not always feasible. Therefore, since sidewalk is not presently provided along most of the lower volume residential roads, we do not view this as critical, since the conflicting vehicular traffic volumes are less, especially after implementation of the traffic calming solutions, and pedestrians can walk within the roadway if necessary.

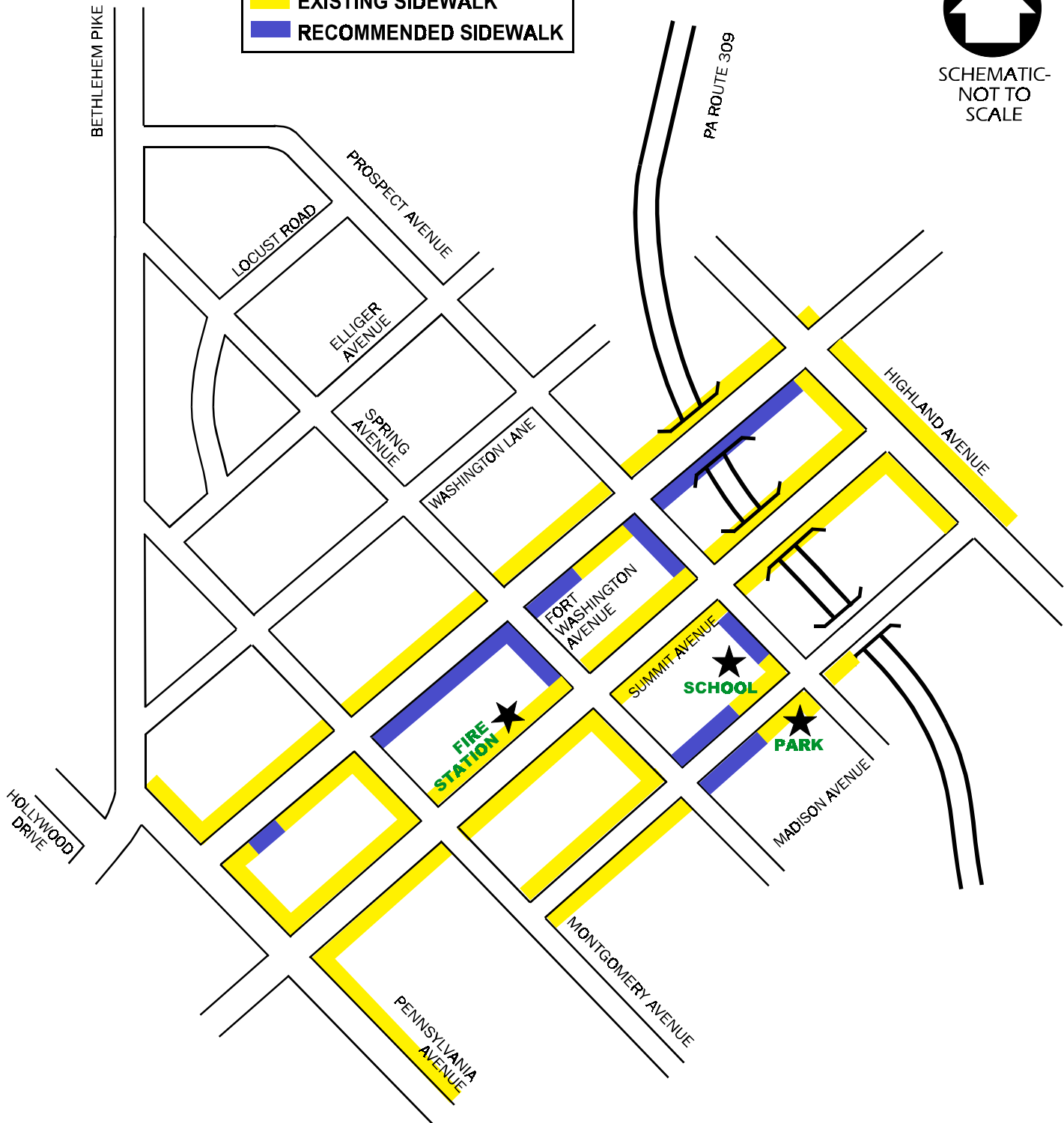
Since sidewalk is presently provided along one or both sides of the two main roads through the neighborhood, Fort Washington Avenue and Summit Avenue, the pedestrian link to the local commercial center along Pennsylvania Avenue is established. However, at minimum, we recommend installation of some additional sidewalk in order to link the main roads of Fort Washington Avenue and Summit Avenue to the school and the park, especially to assist the children.

**LEGEND**

- EXISTING SIDEWALK
- RECOMMENDED SIDEWALK



SCHEMATIC-  
NOT TO  
SCALE



**FIGURE 14**  
Sidewalk Inventory

# FORT WASHINGTON TRAFFIC STUDY

UPPER DUBLIN TOWNSHIP, MONTGOMERY COUNTY, PA

Additionally, although not as critical, it should be considered to complete the sidewalk along the entire east side of Fort Washington Avenue, which in conjunction to the recommended traffic calming improvements, will help to establish the neighborhood environment along this pass-through route.