

September 28, 2016

SWAB 0309

Jane Billings, Borough Manager  
Borough Administrative Office  
Borough of Swarthmore  
121 Park Avenue  
Swarthmore, PA 19081- 1536

**RE: Traffic Calming Study  
Yale Avenue – 100 & 200 Block**

Dear Ms. Billings:

Swarthmore Borough received a petition in October 2015 from residents on Yale Avenue to initiate a Traffic Calming Study to address the reported increase in traffic volume and speeding on Yale Avenue between the Vassar Avenue and Swarthmore Avenue intersections. In accordance with PennDOT Publication 383 *"Pennsylvania's Traffic Calming Handbook,"* the following provides a summary of existing conditions and potential options for traffic improvements to address the resident concerns.

#### **STUDY AREA**

As defined in the resident petition, the area studied along Yale Avenue consists of a 2-block section starting at Vassar Avenue, continuing through the Dickinson Avenue intersection and terminating at South Swarthmore Avenue. The Vassar and Dickinson Avenue crossings are 4-way intersections with stop controls on the side streets only; pedestrian sidewalk is located on all sides of Yale Avenue and the side streets at both intersections. Yale Avenue meets South Swarthmore Avenue at an offset tee intersection with stop controls in all directions; pedestrian sidewalk is located on both sides of South Swarthmore Avenue and on the north side of Yale Avenue.

Yale Avenue is relatively straight supporting 2-way traffic travelling in the eastbound and westbound directions. The travel lanes are consistently 10 feet wide with shoulders of varying widths and an undefined bike lane, transitioning from an overall road width of 30 feet at Swarthmore Avenue to 34 feet at the Little Crum Creek culvert crossing and 32 feet wide between Dickinson and Vassar Avenues.

The block length between Vassar and Dickinson is approximately 365 feet providing access to residential homes on both sides (5 driveways). In contrast, the block length from South Swarthmore to Dickinson Avenue is nearly 1300 feet with residential properties on the south side and half the north side block (17 driveways) and Little Crum Creek Park on the remaining portion of the street.

The roads within the Study Area are classified as follows:

- Yale Avenue – Urban Minor Arterial, Collector
- Vassar Avenue – Local Road
- Dickinson Avenue – Local Road
- South Swarthmore Avenue - Urban Minor Arterial, Collector

## **DATA ANALYSIS**

Given the functional classification of Yale Avenue as a collector street, the road is qualified for traffic calming in accordance with PennDOT requirements. In order to determine if the conditions on Yale Avenue constitute the need for traffic calming, the following factors were evaluated.

### *Travel Speed*

The posted speed limit on Yale Avenue is 25 miles per hour, which is consistent for the road classification in a residential area. The Swarthmore Borough Police Department conducted a speed study at two locations on the 100 and 200 block of Yale Avenue from October 26, 2015 through November 11, 2015. The 85<sup>th</sup> percentile speed on the 200 block of Yale Avenue, between Dickinson and Vassar Avenue, is reported at 33 miles per hour; and, on the 100 block of Yale Avenue, between South Swarthmore and Dickinson Avenue, is over 38 miles per hour.

Speeding is a concern when the 85<sup>th</sup> percentile speed is greater than 10 miles per hour over the speed limit. Due to the length of the 100 block and possibly the straight and wide characteristics of the road, speeding in excess of 10 miles per hour over the speed limit is confirmed by the data collected. The travel speed on the 200 block is approaching the limit to cause concern; however, due to the block length vehicles are not exceeding 10 miles per hour over the posted limit.

### *Volume*

PennDOT reported traffic data for Yale Avenue indicates an average daily traffic (ADT) of 3,881 vehicles per day in 2014. The traffic count completed by the Police Department in 2015 suggests an increase in traffic has occurred on Yale Avenue; reporting an ADT of 4,960 vehicles per day (4,901 VPD on the 100 block and 5,018 VPD on the 200 block).

### *Crash Rate*

A 5-year crash history was provided by the Swarthmore Borough Police Department from 2010 through 2015. Five reported accidents were recorded within the Study Area; all minor in nature involving minor injuries and/or towing.

While the low crash rate on Yale Avenue does not support the need for traffic calming, the high speed and increased volume does indicate the road eligibility for appropriate traffic calming measures to reduce speed and volume.

## **TRAFFIC CALMING MEASURES**

Options considered for traffic calming to reduce speed and control traffic volumes include *speed humps, speed cushions, curb extensions/bulb outs, raised intersections, signage and pavement markings, and radar speed control signs*. These measures were evaluated with community representatives and Borough committee members at the Public Safety meeting in August 2016 and as a result of the committee discussion, the following improvements were selected and illustrated on the enclosed exhibits.

### *Radar Speed Control Signs*

The installation of radar speed control signs in both directions on Yale Avenue is most effective to reduce travel speed. The signs should be installed midway on the 100 block of Yale Avenue near the limit of Little Crum Creek Park to provide speed rates to vehicles travelling in both directions. Radar speed control signs effectively manage speed and can be temporarily or permanently installed without major disruption to the existing roadway.

It is our understanding that the Borough has already purchased a radar speed control sign with two solar power supplies to be permanently installed at an appropriate location in the subject area.

### *Speed Cushions*

Speed humps and speed cushions have a significant effect on speed; however, Yale Avenue is a designated route for emergency services and response time is critical. Speed cushions are modified speed humps installed across the roadway with spaces between the humps to permit wider axle emergency vehicles to pass without slowing down, providing a reasonable solution to slow traffic without compromising emergency response times. In order to reduce speed on the 100 block of Yale Avenue, speed cushions should be installed in two locations, equally spaced between Dickinson and South Swarthmore Avenue. PennDOT reports the potential for a 15% reduction in speed and 30% reduction in traffic volume using speed cushions.

Speed cushions can be temporarily or permanently installed and cost approximately \$5,000 to \$6,000. Although speed cushions can reduce traffic speed and volume, an increase in noise from the road is possible. Similar to potholes, larger vehicles and truck traffic travelling over a speed cushion may create more noise for nearby residents. If noise is a concern, a temporary installation may be appropriate.

### *Curb Extensions / Bulb-Outs*

The concern for pedestrians crossing Yale Avenue at Dickinson and Vassar Avenue was also reported by the public and committee members at the August Public Safety meeting. In order to reinforce the need to reduce speed within the Study Area and improve safety for pedestrians, a combination of signage, striping and curb bulb-outs is recommended for each intersection. Curb bulb-outs extend the curb into the shoulder at all four corners of the intersection to narrow the street and provide a shorter distance for pedestrians to cross the road. The bulb-out intersections are supplemented with highly visible crosswalks in all directions and advance signage on Yale Avenue for vehicles to "Yield to Pedestrians in Crosswalk." In addition to creating greater safety for pedestrians, PennDOT states that most curb extensions reduce speed by 1 to 2 miles per hour by funneling traffic through a narrower street opening.

The cost for curb extension on Yale Avenue can be approximately \$20,000 per intersection.

### *Pavement Marking*

Painted edge lines, centerline striping, and marked bike lanes can narrow the road lanes and generally reduce traffic speed by 1 to 2 miles per hour. Currently, Yale Avenue is striped with a double yellow centerline and white edge strips at the shoulder to define 10-foot wide lanes in each direction. Adding striping to better define the shoulder and designate a bike lane can improve the existing striping conditions and provide the impression of narrower lanes, thus reducing traffic.

The cost to re-stripe Yale Avenue within the Study Area is approximately \$12,000-\$16,000.

**IMPLEMENTATION**

Based on the feedback from the Public Safety meeting and in accordance with PennDOT Publication 383 guidelines, the following phased implementation schedule is recommended:

Phase 1 (Immediately)	Install Radar Speed Control Signs Proceed with temporary installation, evaluate traffic conditions post-installation and the need for a permanent sign.
Phase 2	Install Speed Cushions Proceed initially with a temporary installation to evaluate noise conditions in residential area.
Phase 3	Install Curb Extensions/Bulb-Outs Initial installations should include reflective crosswalks and advance "Yield to Pedestrians in Crosswalk" signs. Curb extensions may be installed if and when funding permits giving priority to Dickinson Avenue before considering installation at Vassar Avenue.
Phase 4	Enhance Pavement Markings

The recommended goals for traffic calming on Yale Avenue are to reduce the 85<sup>th</sup> percentile speed to below 35 miles per hour and traffic volumes by 10%; therefore, traffic should be monitored for 3 to 6 months between each phase to evaluate reductions in traffic volume and speeding. If the implemented measures are satisfactory and achieve these goals, the Borough should gauge the need for a permanent installation. Should an installation fail to meet the target reductions or cause unforeseen conflicts, the subsequent phase should be implemented and effects measured and evaluated in the same fashion.

Thank you for the opportunity to provide recommendations for traffic calming on Yale Avenue. Should you have any questions or concerns, please feel free to contact me.

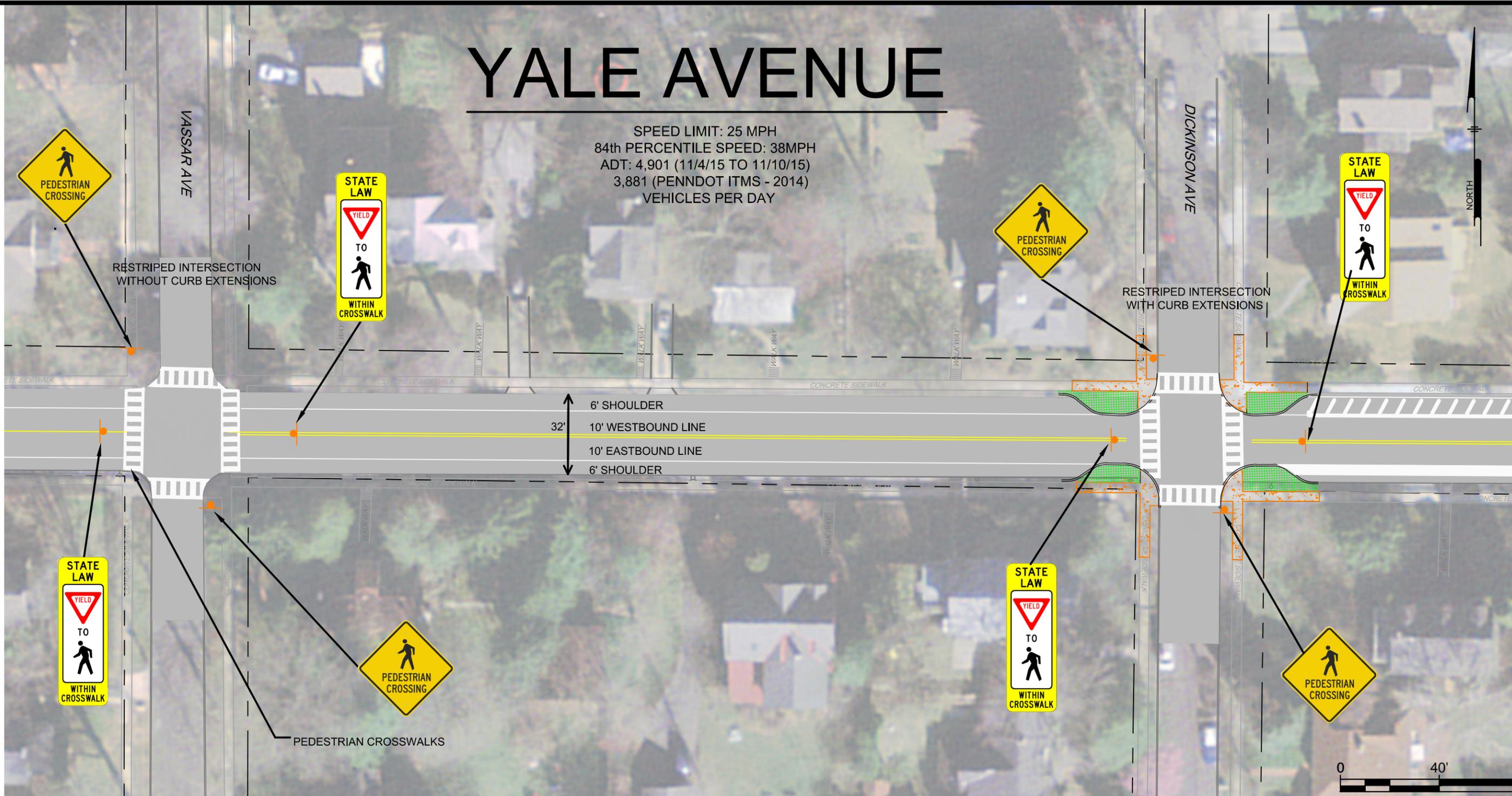
Sincerely,



Joseph A. Mastronardo, PE  
Senior Engineer  
**PENNONI ASSOCIATES INC.**  
Borough Engineer

# YALE AVENUE

SPEED LIMIT: 25 MPH  
 84th PERCENTILE SPEED: 38MPH  
 ADT: 4,901 (11/4/15 TO 11/10/15)  
 3,881 (PENNDOT ITMS - 2014)  
 VEHICLES PER DAY



P:\PROJECTS\SWAB\0309-YALE AVENUE TRAFFIC CALMING\DESIGN\CAD\1001-REV-0-28-16 11X17 CUT SHEETS-SECTION1.DWG  
 PLOTTED: 7/19/2017 3:18:46 PM, BY: NOAH SPEAR, PLOTSTYLE: PENNONI NCS.STB, PROJECT STATUS: ---



**PENNONI ASSOCIATES INC.**  
 One Drexel Plaza  
 3001 Market Street, Suite 200  
 Philadelphia, PA 19104  
 T 215.222.3000 F 215.222.3588

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

YALE AVENUE TRAFFIC CALMING  
**TRAFFIC CALMING CONCEPT DESIGN**  
 BOROUGH OF SWARTHMORE  
 121 PARK AVENUE  
 SWARTHMORE, PA 19081

PROJECT	SWAB 0309
DATE	2016-09-29
DRAWING SCALE	1"=40'
DRAWN BY	NMS
APPROVED BY	JAM
<b>CM-1</b>	
SHEET	1 OF 3

# YALE AVENUE

SPEED HUMP SIGN

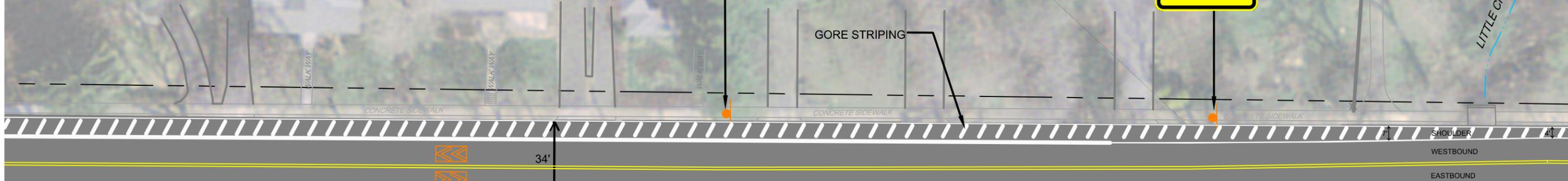


SPEED LIMIT: 25 MPH  
 84th PERCENTILE SPEED: 38MPH  
 ADT: 5,018 (10/26/15 TO 11/1/15)  
 3,881 (PENNDOT ITMS - 2014)  
 VEHICLES PER DAY

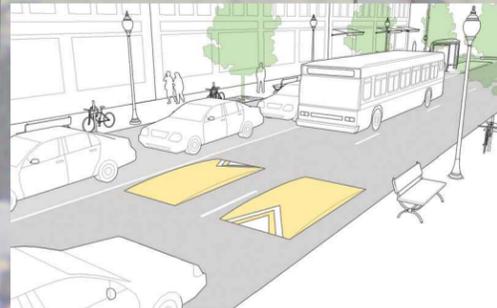
SPEED CONTROL SIGN



GORE STRIPING



SPEED HUMP SIGN



SPEED CUSHIONS

BIKE LANE



SPEED CONTROL SIGN



SPEED HUMP SIGN



P:\PROJECTS\SWAB\0309-YALE AVENUE TRAFFIC CALMING\DESIGN\CAD\1001-REV-0-28-16\11X17 CUT SHEETS-SECTION1.DWG  
 PLOTTED: 7/19/2017 3:18:46 PM, BY: NOAH SPEAR, PLOTSTYLE: PENNONI.NCS,STB, PROJECT STATUS: ---



**PENNONI ASSOCIATES INC.**  
 One Drexel Plaza  
 3001 Market Street, Suite 200  
 Philadelphia, PA 19104  
 T 215.222.3000 F 215.222.3588

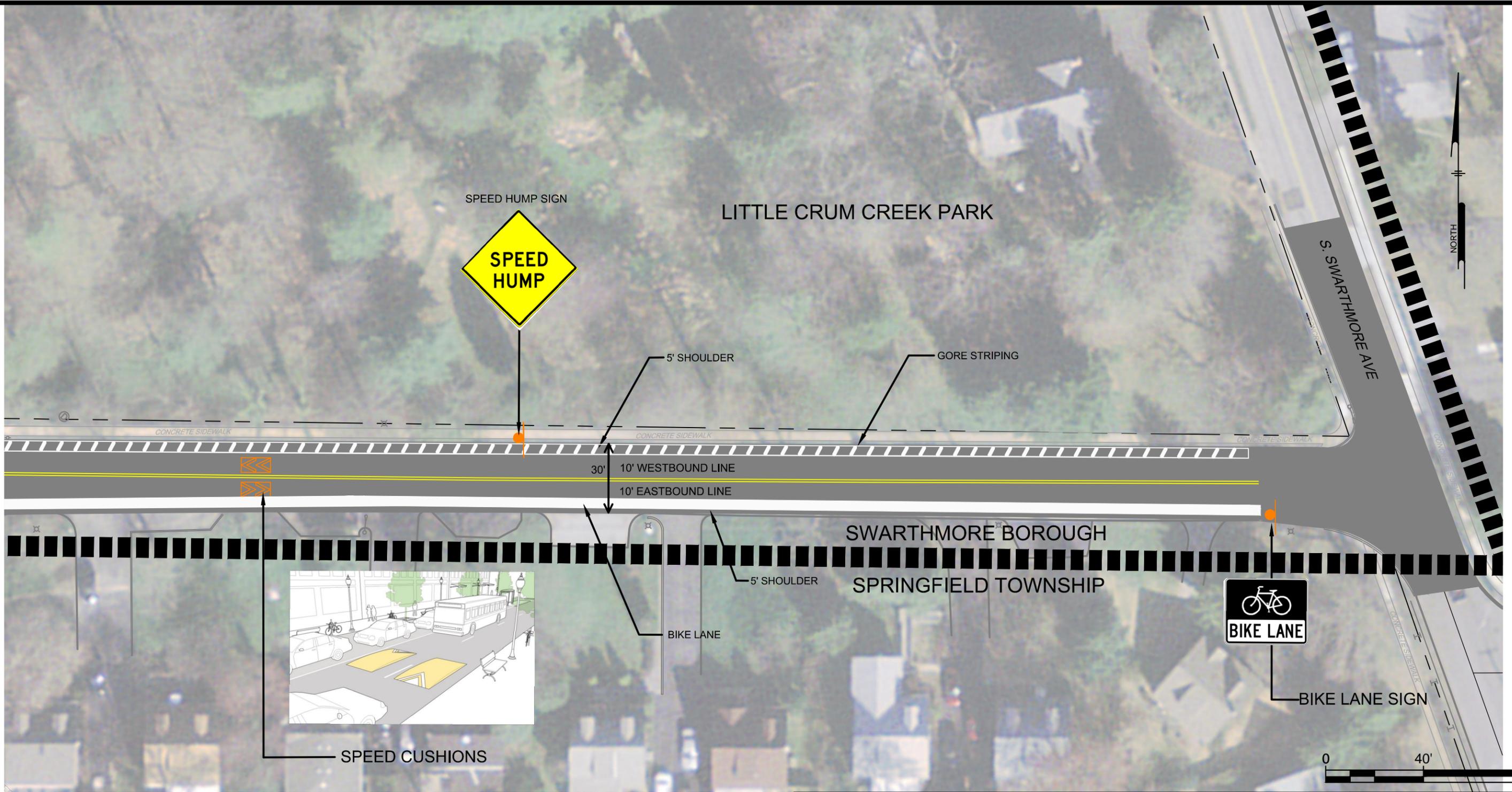
ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

YALE AVENUE TRAFFIC CALMING  
**TRAFFIC CALMING CONCEPT DESIGN**  
 BOROUGH OF SWARTHMORE  
 121 PARK AVENUE  
 SWARTHMORE, PA 19081

PROJECT	SWAB 0309
DATE	2016-09-29
DRAWING SCALE	1"=40'
DRAWN BY	NMS
APPROVED BY	JAM

**CM-2**  
 SHEET 2 OF 3

P:\PROJECTS\SWAB0309-YALE AVENUE TRAFFIC CALMING\DESIGN\CAD\1001-REV-09-28-16\11X17 CUT SHEETS-SECTION1.DWG  
 PLOTTED: 7/19/2017 3:18:46 PM, BY: NOAH SPEAR, PLOTSTYLE: PENNONI NCS.STB, PROJECT STATUS: ---



**PENNONI ASSOCIATES INC.**  
 One Drexel Plaza  
 3001 Market Street, Suite 200  
 Philadelphia, PA 19104  
 T 215.222.3000 F 215.222.3588

ALL DOCUMENTS PREPARED BY PENNONI ASSOCIATES ARE INSTRUMENTS OF SERVICE IN RESPECT OF THE PROJECT. THEY ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE BY OWNER OR OTHERS ON THE EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY PENNONI ASSOCIATES FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT OWNERS SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO PENNONI ASSOCIATES; AND OWNER SHALL INDEMNIFY AND HOLD HARMLESS PENNONI ASSOCIATES FROM ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF OR RESULTING THEREFROM.

YALE AVENUE TRAFFIC CALMING  
**TRAFFIC CALMING CONCEPT DESIGN**  
 BOROUGH OF SWARTHMORE  
 121 PARK AVENUE  
 SWARTHMORE, PA 19081

PROJECT	SWAB 0309
DATE	2016-09-29
DRAWING SCALE	1"=40'
DRAWN BY	NMS
APPROVED BY	JAM
<b>CM-3</b>	
SHEET	3 OF 3