pennsylvania
DEPARTMENT OF TRANSPORTATION

PennDOT Local Technical Assistance Program

Walkable Communities Program

Tamaqua Borough

Schuylkill County

Pennsylvania

April, 2014

Confidential: Traffic Engineering and Safety Study

This document was prepared by the Department of Transportation as an in-depth safety study for the purpose of improving highway safety and is legally protected pursuant to 75 Pa. C.S. 3754 and 23 U.S.C. 409.

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Introduction

Walkable Communities Program – Definition and Purpose

Pennsylvania and the United States as a whole are undergoing a change in transportation culture from a society which relies heavily on single occupancy vehicles to a society that emphasizes multi-modal access and accommodations. The term "Walkable Community" stems from this changing transportation culture in how it affects the land use context and connectivity of a community. A Walkable Community is made up of a network of interconnected land uses and transportation linkages which allow pedestrians the ability to safely walk to day-to-day destinations such as school, stores, businesses, etc. This report will not turn a participating municipality into a Walkable Community overnight but it will provide the information and resources to make impactful improvements to enhance the safety of the existing pedestrian infrastructure. A systematic focus on improving pedestrian infrastructure, educating the public of walking health benefits, and planning for land use connectivity will over time yield a more pedestrian friendly community.

The purpose of the Walkable Communities Program (WCP) is to proactively engage Pennsylvanian municipalities to demonstrate the elements of a Walkable Community by addressing specific safety concerns within the municipality and to also provide the resources for participating municipalities to develop their own safety improvement programs. Each year, PennDOT's Local Technical Assistance Program (LTAP) partners with six municipalities to complete the WCP together. The majority of participating municipalities are identified through an annual statewide crash data assessment and ranking effort but some municipalities apply for participation unsolicited. All municipal participation in the WCP is voluntary and participation does not imply municipal safety deficiencies. The intended outcome of WCP participation is to provide each partnering municipality with a report that enables them to complete the following two actions:

1. Achieve a measureable impact to enhance pedestrian safety by implementing safety improvements at specific locations as identified within this report.
2. Develop and/or sustain an ongoing safety improvement program that is modeled after the WCP process.

Walkable Communities Program Report – Intended Use

This report was developed for and is intended to be used by the employees of the participating municipality. This report is not intended for the general public. As indicated on the cover of the report, this report is a traffic engineering and safety study which is considered confidential by both state and federal law. Upon final delivery of this report, it becomes the property of the partnering municipality to do as they wish with its contents.

This confidentiality is intended to protect participating municipalities from potential liability that may be created by this report, thus allowing municipal employees to research locations with documented or inherent safety issues present and in turn improve the safety of their transportation network. A safety improvement program, together with real improvements, will ultimately reduce a municipality's exposure to liability.

Walkable Communities Program Report – Content Overview

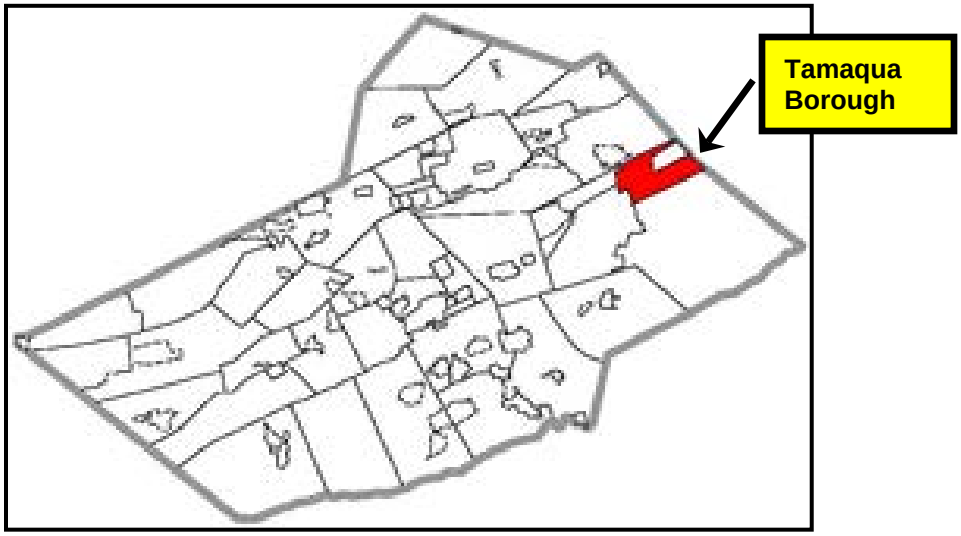
Prior to the development of this WCP report, PennDOT LTAP engineers met with municipal representatives and completed a kick-off meeting. Within the meeting, the goals and process of the WCP were discussed in detail. The group then identified numerous locations along locally owned roads or at the intersection of a locally owned road and state owned roadway where the municipality knows of or believes there is a pedestrian safety issue present. Upon the conclusion of the meeting, 3-4 locations were selected for further evaluation. These 3-4 locations were field viewed after the meeting to obtain site specific information. This report formally addresses the safety concerns at the 3-4 selected locations. This report consists of the following sections:

- Community Overview – this section provides an overview of pedestrian safety and walkability within the municipality.
- Safety Locations – this section identifies the 3-4 locations agreed upon at the kick-off meeting and then provides an in-depth safety study for each location. Each safety study clearly defines the safety issue(s) present, provides a detailed crash evaluation summary, and provides short, mid, and long-term potential solutions, as applicable, to address the pedestrian/bicycle safety issue(s).
- Safety Improvement Program – this section provides supplemental information on developing a systematic safety improvement program within the municipality. This section also contains information related to specific Pennsylvania funding opportunities and specific Pennsylvania crash statistics.
- Appendix Resource Materials – this section contains the electronic resources that are referenced throughout the Safety Locations section of the report. The municipality should consult these resources upon making the decision to implement so as to ensure that the most current guidelines/standards/regulations are used.

Approximately one year after the report is delivered an LTAP representative will telephone an official at the municipality to discuss the countermeasures implemented, their effectiveness, and the municipality's experience with the Walkable Communities Program and its contribution to an effective and ongoing safety improvement program.

Community Overview

This Walkable Communities report focuses on Tamaqua Borough, Schuylkill County, Pennsylvania. Tamaqua Borough is located in eastern Schuylkill County and has a population of 7,107 residents as of the 2010 census. The initial analysis of Pennsylvania Department of Transportation (PennDOT) five-year crash data showed that on local roads and at the intersections of local roads and state roads, Tamaqua Borough had 1 fatality, 6 major crashes and a total of 112 reported crashes. This data results in an overall crash rate of approximately 1.58 reported crashes per 100 population from January 1, 2008 to December 31, 2012. Of the 112 reportable crashes, 15 crashes (13%) involved pedestrians.

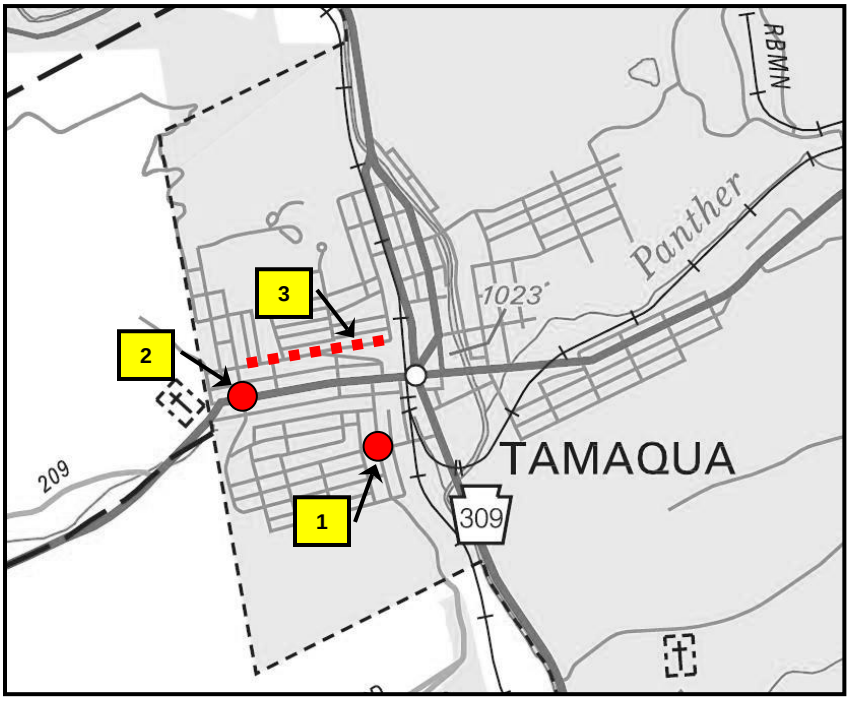


Safety Locations

Prioritized List of Locations

Tamaqua Borough identified three locations as priority safety locations during the initial interview. The municipality and LTAP discussed these locations and the municipality added their own points of view based on their local knowledge of crash records, history, and safety concerns. From these discussions the priority safety locations were determined. The priority safety locations can be found on the map provided below and each safety location is discussed throughout the remainder of this report. The locations are as follows:

1. Intersection of Spruce Street and Hunter Street
2. Intersection of W. Broad Street (Rt. 209) and Lehigh Street
3. Lafayette Street Corridor



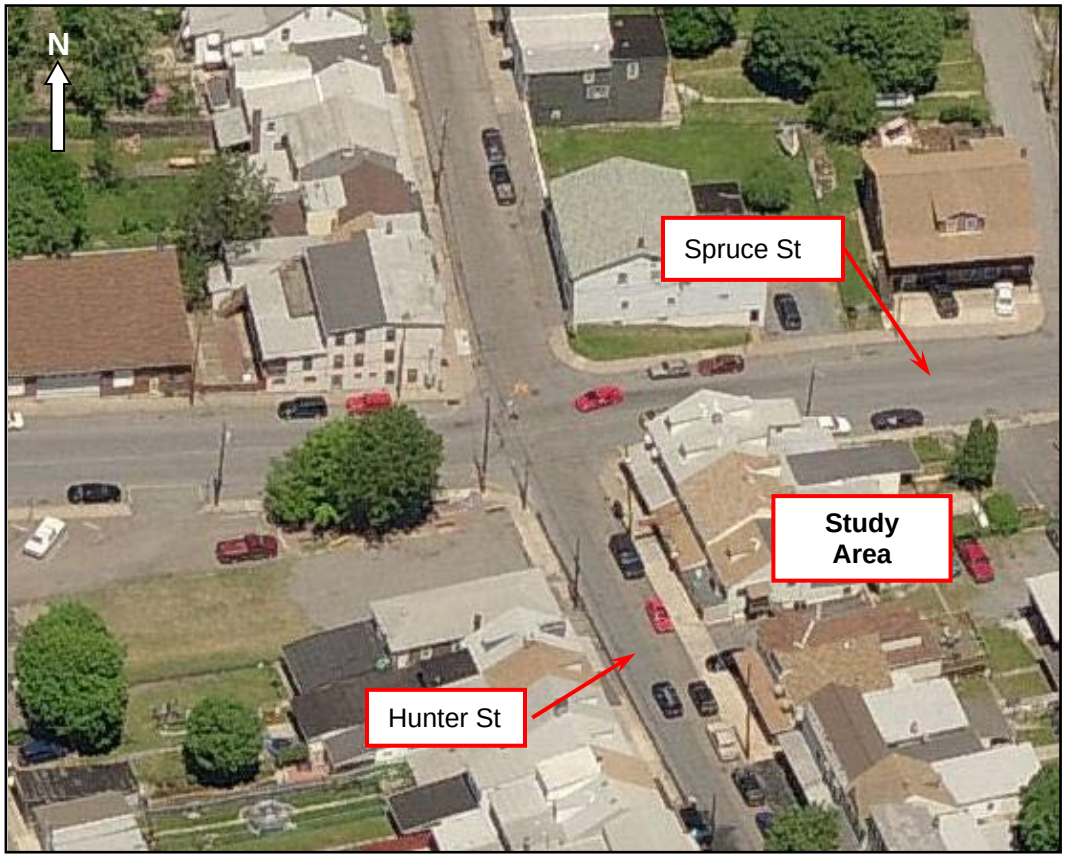
Field view observations, discussions with municipal personnel, and traffic engineering experience are largely responsible for the content and findings of this report.

References to chapters/sections/pages are provided throughout this report to provide specific guidance as to where technical/informational materials can be found to help municipalities implement the potential solutions. Referenced materials within this report are current as of the date of submission. Municipalities should exercise caution when consulting referenced materials to ensure that materials used during implementation are current. The Appendix Reference Materials section of this report contains hyperlinks to current resources.

Location 1: Intersection of Spruce Street and Hunter Street

Issue: The Borough is concerned about the safety of pedestrians crossing at this intersection due to it being a congested area with high volumes of pedestrians and vehicles and lack of updated vehicular and pedestrian signal equipment and pedestrian accommodations. The pedestrian volumes at this intersection are generated by the close proximity of Tamaqua Area High School and Lehigh Carbon Community College as well as the presence of a bus stop.

Spruce Street is a two-way, two-lane east/west Urban Collector posted at 25 MPH and carries approximately 2,850 vehicles per day according to PennDOT's Internet Traffic Monitoring System (iTMS) data. A steep vertical grade exists on Spruce Street at the intersection and no parking restrictions. Hunter Street is a narrow, two-way, two-lane north/south Urban Collector with no posted speed limit in the vicinity of the intersection and parking is restricted along the west side of the street. A single multi-directional pendant signal head hangs from spanwire in the center of the intersection and pavement markings are not present on any approach. Advance left turn phasing is not present on any approach.



Crash Evaluation: The following crash evaluation stems from reportable crash data obtained from PennDOT. The crash data covered the most recent five years (2008-2012) of available crash data as of the time this report was written.

According to the crash data, 1 reportable crash occurred at Location 1.

PennDOT Reportable Crash Data Breakdown:

Prevalent Travel Direction / Location of Motorist at fault:
- WB turning left

Prevalent Crash Types:
- Angle

Prevalent Crash Causation Factors:
- Improper / Careless Turn

Road Condition at Time of Crash:
- Other – substance on roadway

Lighting:
- Day

Based on PennDOT crash history data there does not appear to be a crash trend. Note that this evaluation does not take into consideration non-reportable crashes.

Potential Solutions:

The following "Signal Improvement" solutions will require altering the Signal Permit Plan and obtaining approval from PennDOT. Section 212.5 of PennDOT Publication 212, *Official Traffic Control Devices*, discusses installation and maintenance responsibilities for traffic control devices along state highways, local highways, and at local highway approaches to state highways. Depending upon the modifications to the traffic signal, ADA compliance may be required for the related pedestrian facilities (such as pushbuttons, pedestrian signal heads, curb ramps, etc…).

Studies – perform the following studies in order to obtain existing information within the study area:

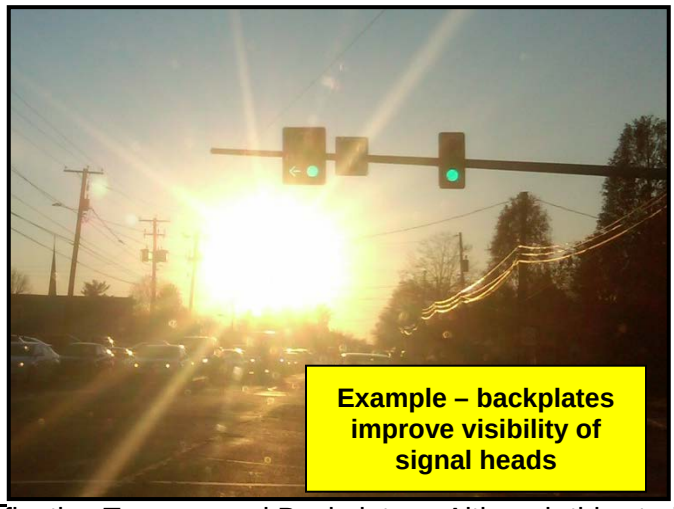
1. Pedestrian Volume Study: Conduct pedestrian volume studies during peak traffic periods to count the number of pedestrians that are crossing at this intersection. Conduct these counts on an average walking-friendly day to quantitatively assess pedestrian activity during average conditions. These volumes will allow the Borough to make well informed decisions related to pedestrian accommodations and the improvements to implement.

2. Capacity Analysis: Perform traffic counts at this intersection if counts performed within the last three years are not available. Obtain the services of a qualified engineer to complete a capacity analysis at this intersection along with other intersections that are a part of a coordinated signal system (if applicable) to evaluate the existing directional volumes, signal timing & phasing and queue lengths & delay. Knowing the capacity of the intersections will better focus and prioritize the Borough's decisions as to whether or not to implement some of following solutions. Complete the traffic volume studies during the middle of the week (Tuesday – Thursday) during AM and PM peak hours and avoid special traffic conditions so as to get data that best reflects average traffic volumes.

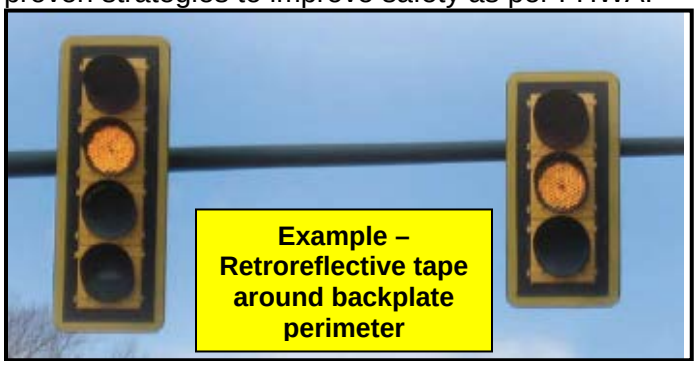
Short-term Solutions – depending on the results of the studies listed above, consider providing the following short-term improvements:

Based on this signal not being in compliance with Section 4D.11 of the 2009 MUTCD and Section 4.1 of PennDOT Publication 149, *Traffic Signal Design Handbook* which states that "There shall be a minimum of two vehicular signal faces on each approach", plans should be put into effect to upgrade the signal to current standards as discussed below in the Long-term Solutions Sections. This upgrade might include mastarms with overhead signal heads to provide greater visibility for approaching motorists. In the interim, a few options are presented below in the short- and mid-term solutions sections to improve safety at the signal.

1. Signal Improvements:
    a. Backplates: Although this study focuses primarily on improving pedestrian related improvements, consider installing backplates on all signal heads to enhance the contrast between traffic signal indications and their surroundings for both day and night conditions. This will improve the visibility and awareness of the signal head indications and will likely improve pedestrian safety. Prior to installation, consult with a signal contractor / engineer to ensure the existing span wire can support the additional load.



b. Retroreflective Tape around Backplates: Although this study focuses primarily on improving pedestrian related improvements, consider installing a yellow retroreflective strip with a minimum width of 1-inch and a maximum width of 3-inches along the perimeter face of each backplate to project a rectangular appearance at night as per Section 4D.12 of the 2009 MUTCD. These are proven strategies to improve safety as per FHWA.



c. L.E.D. Signal Heads: Replace all existing 8" signal heads and 12" incandescent lamp signal heads with 12" L.E.D. signal heads to increase signal visibility to motorists and help reduce crashes. This is a proven strategy to improve the visibility of signals and signs at intersections as per Strategy 17.2 D2 of NCHRP Report 500, Volume 12. L.E.D.s are a brighter, longer lasting lamp, which improves safety and uses less energy than an incandescent lamp, thus producing a significant cost savings in the Borough's electricity expenditures.

2. Basic Treatments:
   a. Pavement Markings
      i. Stop Bar Installation: Consider installing stop bars on all approaches of the intersection. Stop bars should be used to indicate the point behind which vehicles are required to stop in compliance with a traffic signal control according to Section 3B.16 of the 2009 MUTCD. A stop bar will also further indicate a potential stop condition to a traveling motorist. In this case, locate the stop bar 4-feet in advance of the edge of the curb ramp (or unmarked crosswalk) to ensure that the stopping point of vehicles is short of the unmarked crosswalk in accordance with Section 3B.16 and Figure 2A-3(D) of the 2009 MUTCD.

ii. Double Yellow Centerlines: Consider installing double yellow centerlines on all side streets for approximately 100 feet in accordance with TC-8600 of PennDOT Publication 111M, *Traffic Control Pavement Markings & Signing Standards*. If warranted, double yellow centerlines in lieu of single yellow centerlines are required as per Section 3B.01 of the 2009 MUTCD.

b. Warning Signs: Consider installing a SIGNAL AHEAD (W3-3) sign on all approaches to the intersection to bring attention to the signal since two signal indications are not present on each approach.

c. Guide Signs: Consider installing oversized STREET NAME (D3-1) signs on diagonal corners to emphasize the intersecting streets to motorists approaching the intersection. Better street delineation will bring attention to the intersecting cross street and allow motorists to find the cross street in advance of the intersection and give them ample time to make their desired turn and yield to pedestrians in the crosswalk.

d. Sign Installation: Ensure mounting heights of all signs are in accordance with Section 2A.18 of the 2009 MUTCD, which states the bottom of all traffic control signage along areas of pedestrian activity shall be installed at least 7-feet above the surface of the sidewalk.

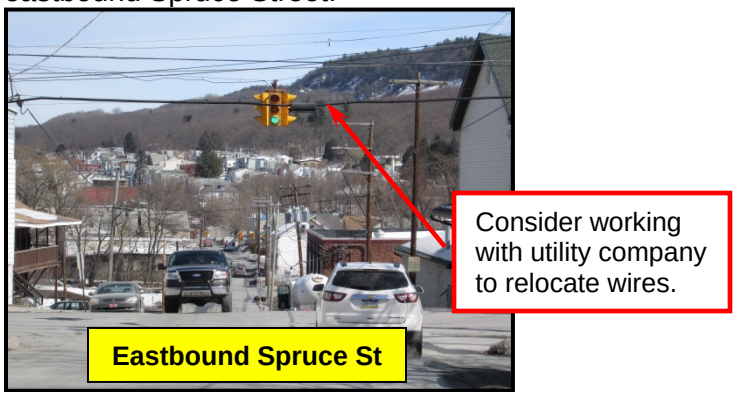
e. Retroreflectivity:

i. On Signs: Use high intensity retroreflective material (ASTM Type III) or better for all signs in accordance with Section 2.1 of PennDOT Publication 46, *Traffic Engineering Manual*; Section 2A.07 of the 2009 MUTCD; and Section 212.104 of PennDOT Publication 212, *2006 Official Traffic Control Devices.*

ii. In Posts: Consider using reflective material in the channel posts of all warning signs in accordance with Section 2A.21 of the 2009 MUTCD, and Section 500, Page 500-1 of PennDOT Publication 447, *New Product Evaluation for Low Volume Local Roads*.

3. Maintenance Treatments:

a. Sight Lines: Consider working with the utility company to relocate the electrical wires that may be obstructing the sight distance of the signal heads from eastbound Spruce Street.



b. Signing and Pavement Markings: If installed, continually restripe faded pavement markings, particularly the crosswalk pavement markings, and replace faded and/or damaged/defaced signs. Consider using Thermoplastic pavement

markings at highly traveled locations to increase visibility and decrease maintenance. Establish a schedule for inspection, cleaning, and replacement. In accordance with Section 2A.08 of the 2009 MUTCD, an assessment or management method that is designed to maintain sign retroreflectivity shall be used. A free sign management tool can be found on LTAP's website, provided at the end of this report. Once on the website, click on "New Items" and under "LTAP News / Events" the Borough will find information related to the free sign inventory and management tool. If the Borough has questions about the tool, please contact LTAP.

c. Sidewalk Maintenance: Pennsylvania's state law requires all sidewalks to be maintained by either the municipality or property owner; however, state law does not distinguish between the municipality and the property owner. Consider adopting an ordinance to require property owners to maintain their own sidewalk if such an ordinance is not currently in place. The following are a few of the sidewalk accessibility standards according to Sections 6.5 and 6.7 of PennDOT Publication 13M, *Design Manual Part 2, Highway Design* and the ADA:

- The continuous sidewalk widths at a minimum must be 5 feet. Sidewalks with widths of 4 feet may be used if passing spaces are provided at maximum intervals of 200 feet.
- Vertical changes in the sidewalk greater than a quarter of an inch must be beveled.
- Any objects such as signs, canopies, and tree limbs with their leading edges between 27 inches and 80 inches above the finished sidewalk shall protrude no more than 4 inches into any portion of the sidewalk.

Spalling/cracked sidewalks create tripping hazards for pedestrians.

Section 6.7 of PennDOT Publication 13M, *Design Manual Part 2, Highway Design*, contains the requirements for the design of sidewalks. Any sidewalk not in compliance should be fixed. The municipality should have a plan in place for regular inspections of their sidewalks and enforcement of the sidewalk maintenance ordinance. A plan may include yearly inspections of the entire municipality or periodic inspections of different sections within the municipality. There are several funding sources available for sidewalk improvements. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).

4. Other Treatments:
   a. Enforcement - Sidewalk Maintenance: Consider using targeted law enforcement to enforce sidewalk maintenance. Even with an ordinance in place that requires

property owners to maintain their own sidewalk, a municipality may be open to a liability lawsuit if there is no active enforcement of the ordinance.

Mid-term Solutions – if safety concerns still exist after the implementation of the short-term solutions, consider providing the following improvements:

1. Enhanced Signal Improvements:
    a. Additional Signal Heads: To comply with Section 4D.11 of the 2009 MUTCD and Section 4.1 of PennDOT Publication 149, *Traffic Signal Design Handbook*, replace the existing 4-way pendant signal head with individual signal heads, positioned so as to provide two signal heads in line with each approach. Install additional span wire as needed and additional overhead signal heads on each approach to increase signal visibility for motorists. This is a proven strategy to improve safety as per FHWA. Prior to installation, consult with a signal contractor / engineer to ensure the existing and proposed span wire can support the additional load.
    b. Countdown Displays: Consider installing countdown pedestrian signal heads on all approaches to the intersection. Note that installing pedestrian signals will require curb ramps to be installed in accordance with current PennDOT standards as per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design*. It should also be noted that Section 1.3 of PennDOT Publication 149, *Traffic Signal Design Handbook*, requires that all newly installed pedestrian signals contain a countdown display. According to Section 4E.07 of the 2009 MUTCD, all existing pedestrian signal heads throughout the municipality shall be retrofitted to countdown displays after their useful life if the pedestrian change interval (flashing hand) is more than 7 seconds in duration. Therefore, it is recommended that the Borough take a proactive approach to upgrading their pedestrian signals throughout the Borough to include pedestrian change interval countdown displays.

    c. Accessible Pedestrian Signals: Consider installing pedestrian pushbuttons equipt with audible and vibrotactile (a tactile arrow on the pushbutton that vibrates during the walk interval) walk indications that will provide an audible tone and vibrotactile arrow during the walk interval. Consider installing pedestrian pushbuttons with an LED and audible feedback device which will give the user feedback that the "call" has been registered and the button is working, thus encouraging the user to wait for the “walk” phase.

2. Enhanced Basic Treatments:
    a. Pavement Markings: Crosswalk Installation: Consider installing marked crosswalks across all approaches of the intersection. Note that marking crosswalks will require curb ramps to be installed in accordance with current PennDOT standards as per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design*. Consider installing Type B or Type C crosswalks in accordance with PennDOT Publication 111M, *Traffic Control Pavement Markings and Signing Standards – TC 8600 and 8700* to provide maximum visibility of the crosswalk.

3. Other Treatments:
    a. Sidewalk Installation: It is not uncommon for municipalities to work with individual property owners to help offset the cost to improve their sidewalks. Consider spearheading a plan to construct new sidewalks along Spruce Street and Hunter Street with an agreement between the Borough and individual property owners regarding funding and maintenance. The physical condition of sidewalks can have a large impact on the quality of life and walkability in a community. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).
    b. Curb Ramp Improvements: Consider constructing new curb ramps on corners of the intersection where curb ramps do not meet current standards and/or are without DWS (Detectable Warning Systems). PennDOT's specific requirements for ADA compliant curb ramps can be found in PennDOT Publication 72M, *Standards for Roadway Construction*, Standard Drawing Number RC-67M. RC-67M provides curb ramp details for numerous variations of sidewalk/intersection designs. Sections 6.9, 6.10, and 6.11 of PennDOT Publication 13M, *Design Manual 2: Highway Design*, also address the design of curb ramps at intersections.

Long-term Solutions – if safety concerns still exist after the implementation of the short-term and mid-term solutions, consider providing the following improvements:

1. Enhanced Signal Treatments - Traffic Signal Warrant Analysis: Based on the results of the existing capacity analysis, consider working with PennDOT and obtaining the services of a qualified engineer to conduct a Removal of Traffic Signals Study in accordance with Section 4.11 of PennDOT Publication 46, *Traffic Engineering Manual* and a signal warrant analysis in accordance with Chapter 4C of the 2009 MUTCD and Section 212.302 of PennDOT Publication 212, *Official Traffic Control Devices,* to determine if the existing signal is in fact warranted and justified today. Collect additional 24-hour counts using ATRs on each approach in addition to the traffic counts collected for the existing capacity analysis. Use caution when performing this study, as PennDOT will require the municipality to fund (although State and Federal funds may be used to remove unwarranted traffic signals) and promptly remove the signal due to liability issues if it is determined through the study that the signal is in fact not warranted. Based on the outcome of the warrant analysis, consider the following options:
    a. Option 1: If the signal warrant analysis indicates that a signal is warranted, consider upgrading the traffic signal equipment to meet current standards and preferences in accordance with PennDOT Publication 149, *Traffic Signal Design*

Handbook. Equipment updates might include providing a mastarm for each approach, two (2) overhead traffic signal heads per lane, 12" Light Emitting Diode (LED) signal heads, backplates and/or retroreflective tape around backplates, overhead guide signs, revised phasing times and clearance times, and full pedestrian accomodations including pedestrian signal heads with a countdown display and pedestrian pushbuttons. Note that these modifications to the signal will trigger ADA compliance. Providing overhead signal heads is a proven strategy to improve safety as per FHWA, will increase signal visibility for motorists, and help reduce crashes caused by running the red light. LED's are a brighter, longer lasting lamp which improves safety and uses less energy than an incandescent lamp thus producing a significant cost savings in the Borough's electric bill.

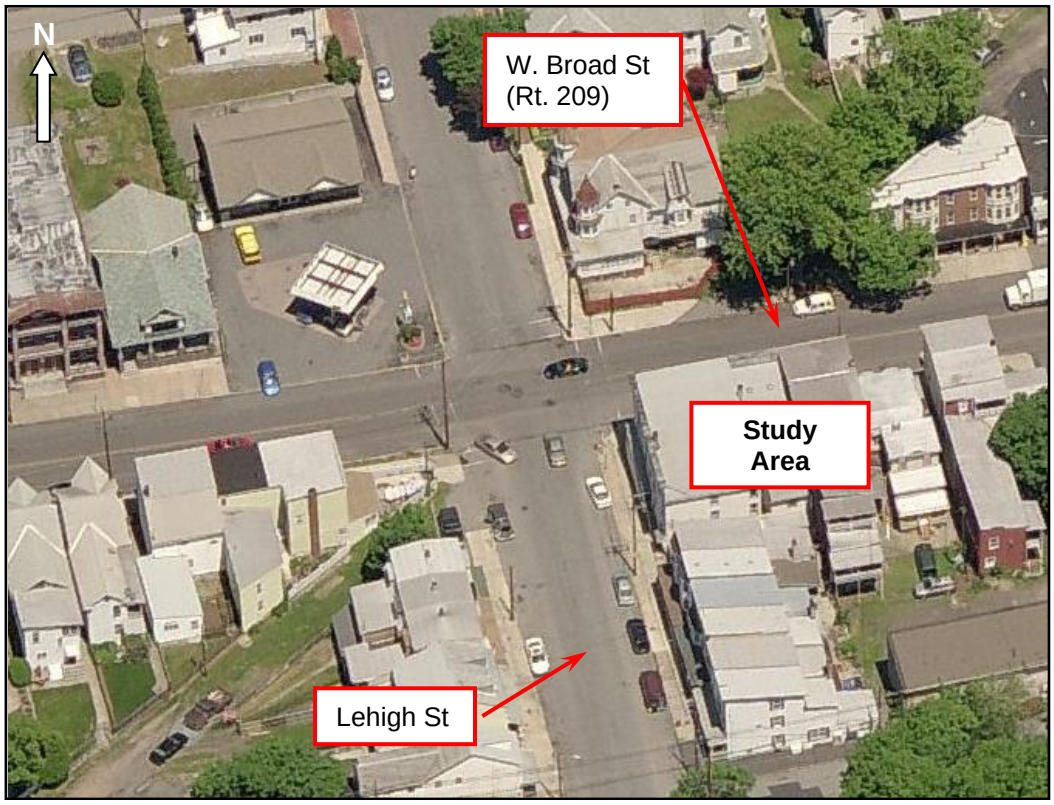
b. Option 2: If the signal warrant analysis indicates that a signal is not warranted, remove the signal equipment in accordance with Section 4.11 of PennDOT Publication 46, *Traffic Engineering Manual* and perform an engineering study for a Two-Way or Multi-Way STOP (R1-1) sign installation in accordance with Section 2B.07 of the 2009 MUTCD. Install STOP (R1-1) signs on the required approaches as determined from the study supplemented with Stop Beacons consisting of one or more signal sections with a flashing circular red signal indication in each signal section in accordance with Section 4L.05 of the 2009 MUTCD. This will increase motorist awareness of the revised traffic control conditions at this intersection.

Location 2: Intersection of W. Broad Street (Rt. 209) and Lehigh Street

Issue: The Borough is concerned about pedestrians crossing at this intersection due to the high volumes of traffic on both W. Broad Street (Rt. 209) and Lehigh Street. Sight distance beyond cars parked too close to the corners could potentially create safety issues for both pedestrians and vehicles crossing W. Broad Street (Rt. 209) from northbound Lehigh Street.

W. Broad Street (Rt. 209) is a 40-foot wide, east/west free-flowing two-lane, two-way Urban Minor Arterial with a 25 MPH posted speed limit and carries approximately 4,350 vehicles/day, as per PennDOT's Internet Traffic Monitoring System (iTMS) data. Lehigh Street is a 40-foot wide, north/south STOP controlled two-lane, two-way Urban Collector with a 25 MPH posted speed limit and carries approximately 2,850 vehicles/day, as per PennDOT's Internet Traffic Monitoring System (iTMS) data.

Parking is allowed on both sides of all approaches. Faded Type A marked crosswalks are installed across all approaches of this intersection. PEDESTRIAN (W11-2) warning signs are not present on any approach to this intersection.



Crash Evaluation: The following crash evaluation stems from reportable crash data obtained from PennDOT. The crash data covered the most recent five years (2008-2012) of available crash data as of the time this report was written.

According to the crash data, 7 reportable crashes occurred at Location 2.

PennDOT Reportable Crash Data Breakdown:

Prevalent Travel Direction / Location of Motorist at fault:
- NB traveling straight – 4 crashes
- SB traveling straight – 2 crashes
- WB traveling straight – 1 crash

Prevalent Crash Types:
- Angle – 5 crashes
- Rear-end – 1 crash
- Backing – 1 crash

Prevalent Crash Causation Factors:
- Proceed Without Clearance – 5 crashes
- Too Fast For Conditions – 1 crash
- Careless / Illegal Backing – 1 crash

Road Condition at Time of Crash:
- Dry – 6 crashes
- Wet – 1 crash

Lighting:
- Day – 5 crashes
- Street Light – 2 crashes

Based on PennDOT crash history data there appears to be a crash trend in this study area involving northbound motorists proceeding without clearance and causing angle crashes during daylight, under dry conditions. Note that this evaluation does not take into consideration non-reportable crashes.

Potential Solutions:

Since Route 209 is a state highway, the Borough will need to work with PennDOT to implement any study findings and/or proposed improvements within PennDOT right-of-way to ensure all appropriate permits are obtained. Section 212.5 of PennDOT Publication 212, *Official Traffic Control Devices*, discusses installation and maintenance responsibilities for traffic control devices along state highways, local highways, and at local highway approaches to state highways.

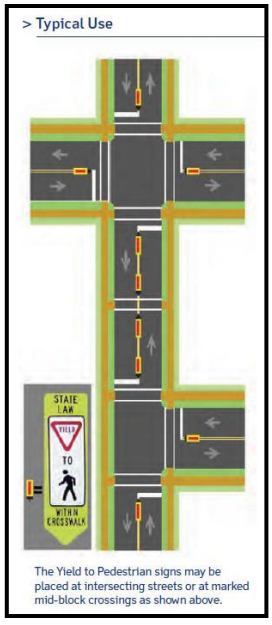
Studies – perform the following studies in order to obtain existing information within the study area:

1. Spot-Speed Studies: Conduct vehicular spot-speed studies in accordance with Appendix (17)(ii) of PennDOT Publication 212, *Official Traffic Control Devices* to determine the 85th percentile speeds along W. Broad Street (Rt. 209). The results of the spot-speed study will quantify the existing speeds along W. Broad Street (Rt. 209) and allow the Borough to make well informed decisions related to sight distance issues and law enforcement. If necessary, LTAP can assist the Borough with performing the studies.

2. Sight Distance Study: Conduct corner sight distance surveys in accordance with Appendix (16) of PennDOT Publication 212, *2006 Official Traffic Control Devices*, to determine if there is adequate sight distance around parked cars for vehicles and pedestrians crossing W. Broad Street, particularly in the northbound direction. Use the 85th percentile speeds along W. Broad Street (Rt. 209) for these calculations. PennDOT Form M-950S may be used as a Sight Distance Worksheet. If necessary, LTAP can assist the Borough with performing the surveys.

Short-term Solutions – depending on the results of the studies listed above, consider providing the following short-term improvements:

1. Basic Treatments:
    a. Regulatory Signs:
        i. No Parking Signs: If the results of the sight distance study indicate an issue for north and southbound vehicles and pedestrians crossing W. Broad Street (Rt. 209) due to parked vehicles on W. Broad Street (Rt. 209), consider revising any existing parking restrictions and relocating any NO PARKING signs to the beginning of the revised parking restriction. Place the sign no less than the statutory distance of 30-feet from the STOP (R1-1) sign or 20-feet from the crosswalk as per Section 3353 of *The Vehicle Code (Title 75)*. While it is understood that providing every available spot for on-street parking is essential in a business/residential district, it may be necessary to further restrict parking to improve safety.
        ii. In-Street Ped Signs: Consider installing IN-STREET PEDESTRIAN CROSSING (R1-6) signs on the double yellow centerline of W. Broad Street (Rt. 209)

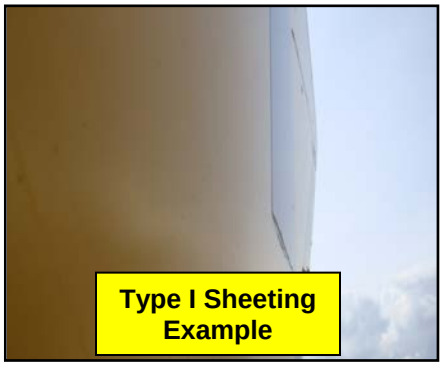


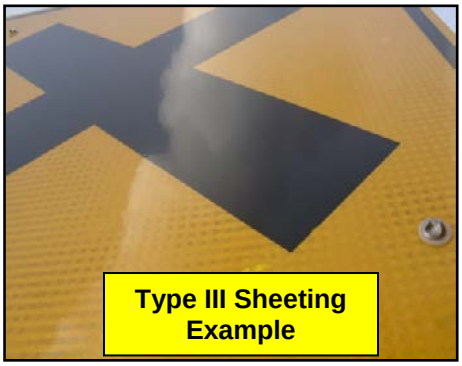
in accordance with Section 2B.12 of the 2009 MUTCD. These signs on crashworthy supports can be obtained at no cost by contacting the PennDOT District 5-0 Bicycle/Pedestrian Coordinator. These techniques are depicted in an example picture below and in the layout sketch provided from PennDOT's Yield to Pedestrians Brochure.

b. Warning Signs:
   i. At Crosswalk: Install new fluorescent yellow-green PEDESTRIAN (W11-2) signs supplemented with the DIAGONAL DOWNWARD POINTING ARROW (W16-7p) plaque at the uncontrolled crosswalk location on each approach of W. Broad Street (Rt. 209).
   ii. In Advance of Crosswalk: Install fluorescent yellow-green PEDESTRIAN (W11-2) signs supplemented with an AHEAD PLAQUE (W16-9P) in advance of the uncontrolled crosswalk location on each approach of W. Broad Street (Rt. 209).

Example – Pedestrian Warning Signs

c. Guide Signs: Consider installing oversized STREET NAME (D3-1) signs on diagonal corners to emphasize the intersecting streets to motorists approaching the intersection. Better street delineation will bring attention to the intersecting cross street and allow motorists to find the cross street in advance of the intersection and give them ample time to make their desired turn and yield to pedestrians in the crosswalk.
d. Sign Installation: Ensure mounting heights of all signs are in accordance with Section 2A.18 of the 2009 MUTCD, which states the bottom of all traffic control signage along areas of pedestrian activity shall be installed at least 7-feet above the surface of the sidewalk.
e. Retroreflectivity:
   i. On Signs: Use high intensity retroreflective material (ASTM Type III) or better for all signs in accordance with Section 2.1 of PennDOT Publication 46, *Traffic Engineering Manual*; Section 2A.07 of the 2009 MUTCD; and Section 212.104 of PennDOT Publication 212, *2006 Official Traffic Control Devices.*

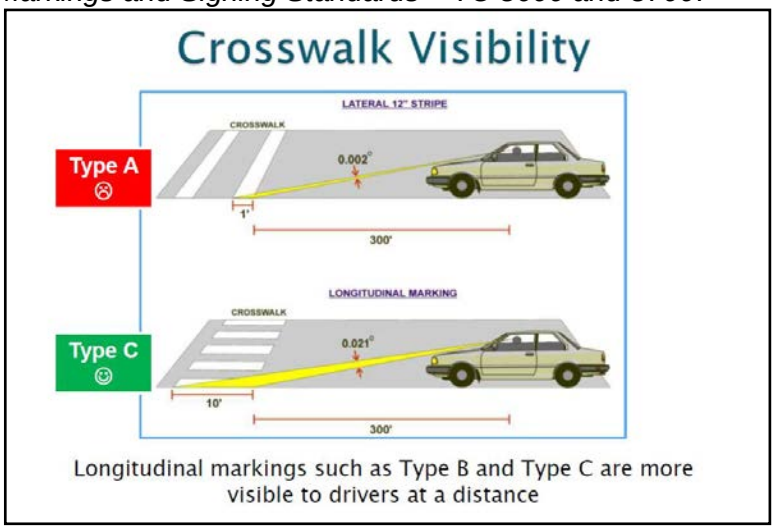




ii. In Posts: Consider using reflective material in the channel posts of all warning and stop signs in accordance with Section 2A.21 of the 2009 MUTCD, and Section 500, Page 500-1 of PennDOT Publication 447, *New Product Evaluation for Low Volume Local Roads*.

f. Pavement Markings:

i. Crosswalk Installation: Consider upgrading existing Type A marked crosswalks to Type C marked crosswalks to provide improved visibility of the crosswalks for pedestrians as well as motorists. Note that re-striping or modifying crosswalks is considered a maintenance activity, and may not require curb ramps to be upgraded in accordance with current PennDOT standards as per Section 6.3.A in PennDOT Publication 13, *Design Manual Part 2, Highway Design*; however, if the re-striping includes a crosswalk to curbs without curb ramps at the crossing, it will be necessary to install curb ramps. Install pavement markings in accordance with PennDOT Publication 111M, *Traffic Control Pavement Markings and Signing Standards – TC 8600 and 8700*.

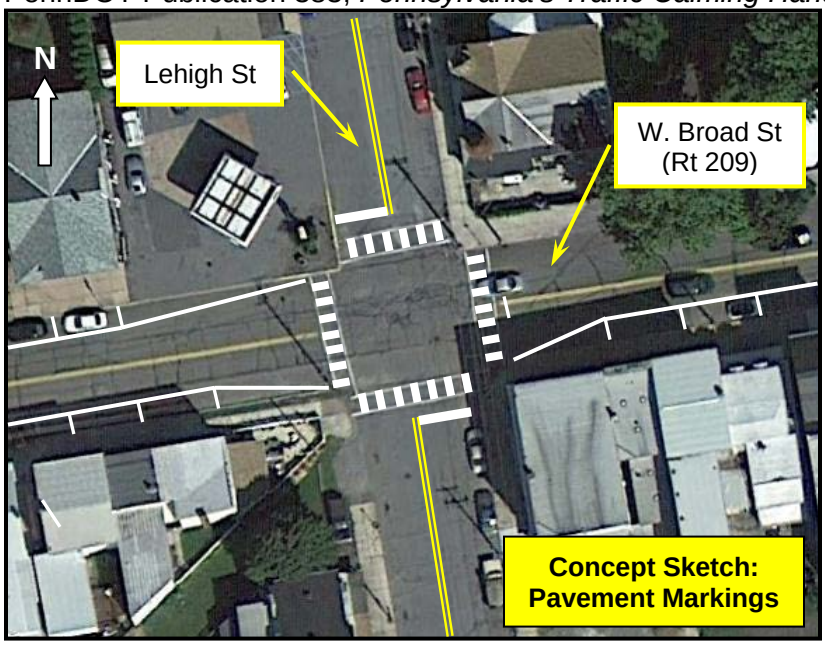


ii. Stop Bar Installation: Consider installing stop bars on the north and southbound approaches of Lehigh Street to a minimum of 4-feet in advance of the marked crosswalk to ensure that the stopping point of a vehicle is short of the marked crosswalk in accordance with Figure 2A-3(D) of the 2009 MUTCD and PennDOT Publication 111. Also, ensure stop bars are 12" wide.

iii. Double Yellow Centerlines: Consider painting double yellow centerlines on both Lehigh Street approaches to this intersection for at least 100-feet to provide guidance and better traffic control.

iv. Parking Restrictions: Consider supplementing the NO PARKING signs with pavement markings in the parking lanes on the east and westbound approaches of W. Broad Street (Rt. 209) to clearly delineate parking restrictions that allows for sufficient sight distance for north and southbound motorists to see east and westbound traffic approaching the intersection.

v. White Edgelines with Parking Delineation: Consider providing white edge lines and pavement markings to delineate parking spaces along W. Broad Street (Rt. 209) to guide motorists, account for the pavement used for on-street parking, and to ensure the most efficient parking conditions when accommodations are limited. Studies show that narrowing the width of travel lanes, or giving the appearance of narrow travel lanes with lane striping, can reduce speeds by 2 to 5 MPH. Refer to page 76 of PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*.



2. Maintenance Treatments:
   a. Signing and Pavement Markings: Continually restripe faded pavement markings and replace faded and/or damaged/defaced signs. Consider using Thermoplastic pavement markings at highly traveled locations to increase visibility and decrease maintenance. Establish a schedule for inspection, cleaning, and replacement. In accordance with Section 2A.08 of the 2009 MUTCD, an assessment or management method that is designed to maintain sign retroreflectivity shall be used. A free sign management tool can be found on LTAP's website, provided at the end of this report. Once on the website, click on "New Items" and under "LTAP News / Events" the Borough will find information related to the free sign inventory and management tool. If the Borough has questions about the tool, please contact LTAP.

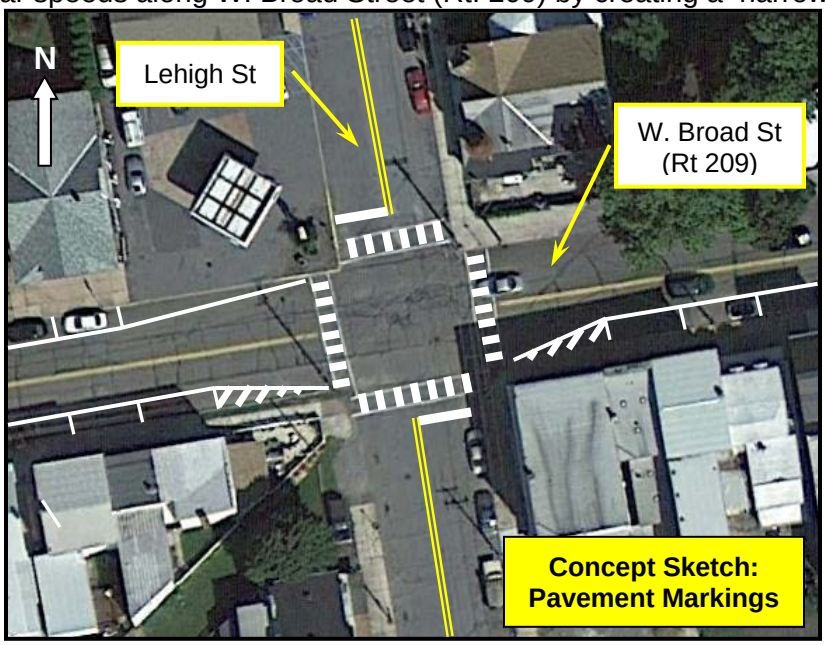
b. Sidewalk Maintenance:
Pennsylvania's state law requires all sidewalks to be maintained by either the municipality or property owner; however, state law does not distinguish between the municipality and the property owner. Consider adopting an ordinance to require property owners to maintain their own sidewalk if such an ordinance is not currently in place. Section 6.7 of PennDOT Publication 13M, *Design Manual Part 2, Highway Design*, contains the requirements for the design of sidewalks. Any sidewalk not in compliance should be fixed. The municipality should have a plan in place for regular inspections of their sidewalks and enforcement of the sidewalk maintenance ordinance. A plan may include yearly inspections of the entire municipality or periodic inspections of different sections within the municipality. There are several funding sources available for sidewalk improvements. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).

3. Other Treatments:
   a. Enforcement:
      i. Speed: Consider using law enforcement to enforce speed limits on W. Broad Street (Rt. 209) if the spot-speed studies indicate a speeding problem exists. The Borough's request for increased enforcement from the police will be validated with documented spot-speed studies.
      ii. Parking Violations: Consider using targeted law enforcement to enforce the existing or revised parking restrictions.
      iii. Yield to Pedestrians Law: Consider using targeted law enforcement to enforce motorist compliance with yielding to pedestrians in the crosswalk.

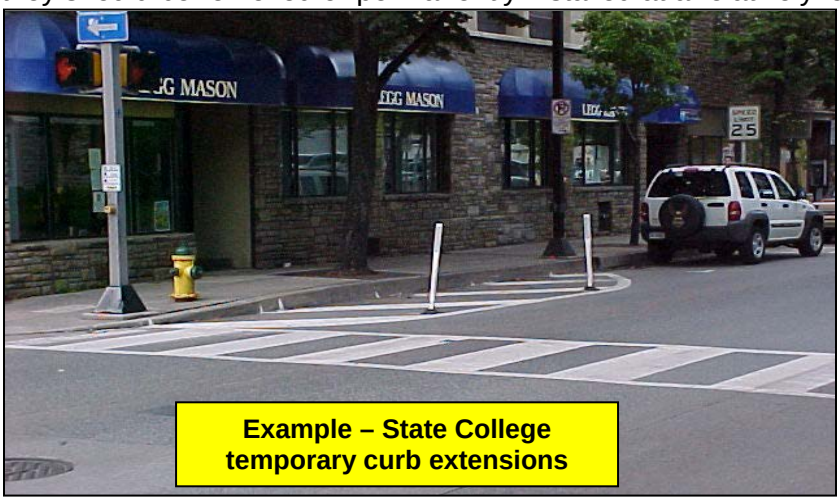
Mid-term Solutions – if safety concerns still exist after the implementation of the short-term solutions, consider providing the following improvements:

1. Enhanced Basic Treatments:
   a. Pedestrian Warning Signs: Consider installing oversized PEDESTRIAN (W11-2) warning signs (36"x36" or 48"x48" vs. 30"x30") and appropriate supplemental plaques on each approach of W. Broad Street (Rt. 209) at or in advance of the intersection with Lehigh Street. Consult with PennDOT Publication 236, *Handbook of Approved Signs* for information on all proposed signs at this location. Ensure that they are properly placed in accordance with Chapter 2C of the 2009 MUTCD.
   b. Flashing Beacons: Consider supplementing the PEDESTRIAN (W11-2) sign assemblies which are either placed in advance of or at the uncontrolled crosswalk with flashing beacons to bring extra attention to these warning signs in accordance with Chapter 4L of the 2009 MUTCD.

c. Pavement Markings – Shoulder Goring: Consider providing diagonal pavement markings (shoulder goring) in the shoulder area along W. Broad Street (Rt. 209) in conjunction with the parking restriction striping to further emphasize the parking restrictions, bring attention to the intersection, and potentially reduce vehicular speeds along W. Broad Street (Rt. 209) by creating a narrowing effect.



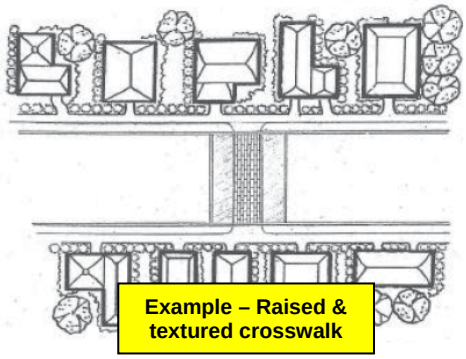
d. Temporary Curb Extension: Consider installing temporary curb extensions across W. Broad Street (Rt. 209). Use a combination of pavement markings and flexible delineator posts to create temporary curb extensions similar to the example from State College below. Consider installing additional flexible delineator posts than what is shown in the example. Since a parking lane is present along both sides of W. Broad Street (Rt. 209), curb extensions can be accommodated by the existing pavement width. According to Chapter 5 of PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*, curb extensions would reduce travel lanes, provide a traffic calming effect at the crosswalks, and provide a shorter distance for pedestrians to cross travel lanes. This recommendation can be done quickly and results can be evaluated to see if they should be removed or permanently installed at a relatively low cost.



2. Other Treatments:
    a. Sidewalk Installation: It is not uncommon for municipalities to work with individual property owners to help offset the cost to improve their sidewalks. Consider spearheading a plan to construct new sidewalks along Lehigh Street and possibly W. Broad Street (Rt. 209) with an agreement between the Borough and individual property owners regarding funding and maintenance. The physical condition of sidewalks can have a large impact on the quality of life and walkability in a community. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).
    b. Curb Ramp Improvements: Consider constructing new curb ramps on corners of the intersection where curb ramps do not meet current standards and/or are without DWS. PennDOT's specific requirements for ADA compliant curb ramps can be found in PennDOT Publication 72M, *Standards for Roadway Construction*, Standard Drawing Number RC-67M. RC-67M provides curb ramp details for numerous variations of sidewalk/intersection designs. Sections 6.9, 6.10, and 6.11 of PennDOT Publication 13M, *Design Manual 2: Highway Design*, also address the design of curb ramps at intersections. Consider installing curb extensions across W. Broad Street (Rt. 209) (mentioned later in the Long-term Solutions section) in addition to installing ADA curb ramps with DWS.

Long-term Solutions – if safety concerns still exist after the implementation of the short-term and mid-term solutions, consider providing the following improvements:

1. Roadway Improvements / Alterations:
    a. Raised Crosswalks: Consider constructing raised crosswalks across W. Broad Street (Rt. 209) in lieu of painted crosswalks to potentially reduce speeds and increase the visibility of pedestrians. According to PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook,* they are appropriate on local roads with volumes less than 10,000 vehicles per day and often have the same profile as the Seminole County speed hump.



Example – Raised & textured crosswalk

    b. Textured Crosswalks: Consider using pavers, imprinted concrete or asphalt, or other materials to demarcate the crosswalks and alert motorists that they are entering a pedestrian-friendly area. Textured crosswalks are often used in conjunction with and to enhance raised crosswalks as it has been found that they have virtually no effect on reducing traffic speeds or volumes when constructed alone.
    c. Curb Extensions / Bulb-Outs: Consider installing curb extensions across W. Broad Street (Rt. 209) in addition to installing ADA curb ramps with DWS. According to Chapter 5 of PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*, curb extensions would reduce travel lanes, provide a traffic calming effect at the crosswalks, provide a shorter distance for pedestrians to cross travel lanes, and give them a better line of sight while still being protected on the curb. Installing curb extensions would require a design process to ensure

vehicular movements will not be compromised with the shortened width of roadway and to ensure proper drainage is maintained.

d. Streetscape Improvements: The Borough can conduct a traffic calming study to determine if streetscape improvements including landscaping measures, trees, sidewalk furniture may be appropriate along W. Broad Street (Rt. 209) throughout the business/residential district. PennDOT Publication 383, *Traffic Calming Handbook*, outlines the study process as well as the different devices that may be employed.

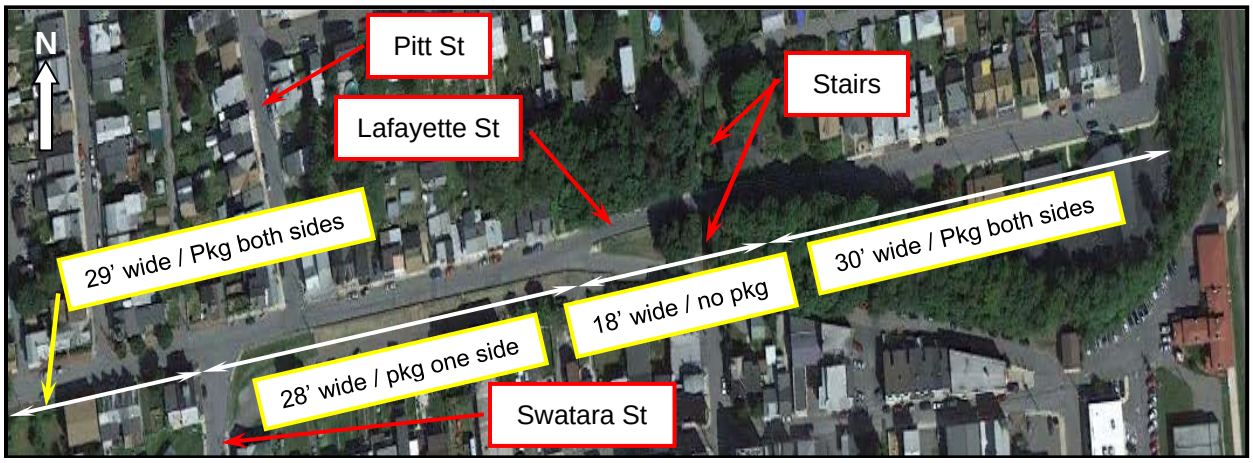
e. Pedestrian Traffic Control Systems: Consider installation of various PennDOT approved Pedestrian Traffic Control Systems such as Rectangular Rapid Flashing Beacons (RRFB's) or Overhead Pedestrian Sign Assemblies to enhance the crosswalk across W. Broad Street (Rt. 209). These systems are solar powered or A/C devices intended to catch motorist's attention through flashing lights when a pedestrian pushbutton or a motion sensor is activated when pedestrian activity is present. This solution would require coordination with and approval from PennDOT.

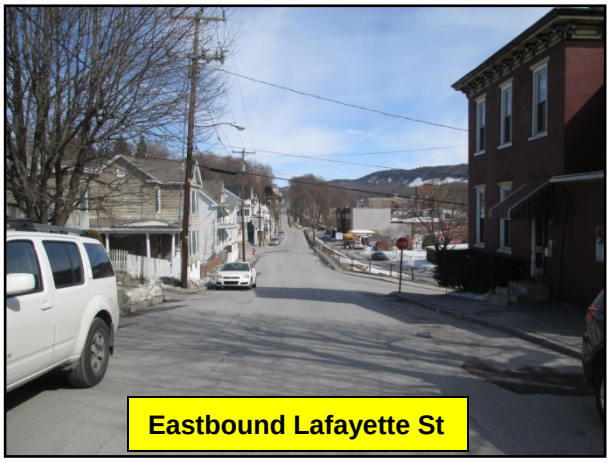
Location 3: Lafayette Street Corridor

Issue: The Borough is concerned about pedestrians walking along and crossing Lafayette Street due to narrow sections of roadway and wide intersections. The Borough is also concerned about high speeds of vehicular traffic, particularly through the narrow section of roadway.

Lafayette Street is an east/west two-lane, two-way Urban Collector with a 25 MPH posted speed limit in the westbound direction and carries approximately 2,050 vehicles/day, as per PennDOT's Internet Traffic Monitoring System (iTMS) data. It is generally free-flowing except at the intersections with Swatara Street / Pitt Street and Lehigh Street. The width of the street and parking restrictions vary along Lafayette Street as depicted in the picture below.

Sidewalk is sporadic along the corridor and is in poor condition. Pavement markings, crosswalks, and PEDESTRIAN (W11-2) warning signs are not present along Lafayette Corridor. Stairs exist in the north/south direction and lead to crossing Lafayette Street through the narrow wooded section of the roadway. The Borough is considering installing a midblock crosswalk at the stair location.





Crash Evaluation: The following crash evaluation stems from reportable crash data obtained from PennDOT. The crash data covered the most recent five years (2008-2012) of available crash data as of the time this report was written.

According to the crash data, 5 reportable crashes occurred at Location 3. Of these 5 crashes, 1 involved a pedestrian.

PennDOT Reportable Crash Data Breakdown:

Prevalent Crash Directions/Movement:
- WB motorist traveling straight – 4 crashes
- EB motorist traveling straight – 1 crash

Prevalent Crash Types:
- Rear-End – 3 crashes
- Pedestrian – 1 crash
- Opposite Direction Sideswipe – 1 crash

Prevalent Crash Causation Factors:
- Driver Distracted – 2 crashes
- Improper Driver Actions – 2 crashes
- Too Fast For Conditions – 1 crash

Road Condition at Time of Crash:
- Dry – 5 crashes

Lighting:
- Street Light – 3 crashes
- Day – 2 crashes

Based on PennDOT crash history data, there appears to be a crash trend involving motorists causing rear-end crashes due to improper actions or being distracted under street lit, dry conditions. Note that this evaluation does not take into consideration non-reportable crashes.

Potential Solutions:

Studies – perform the following studies in order to obtain existing information within the study area:

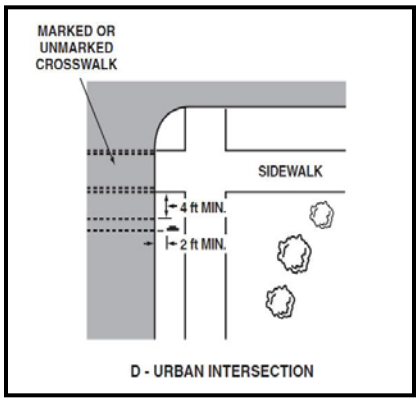
1. Safe Running Speed Study: If a study has not been conducted and an ordinance has not been passed to enforce the 25 MPH speed limit, consider defining Lafayette Street as a "Residence District" to post the speed limit at 25 MPH in accordance with Section 11.3 of PennDOT Publication 46, *Traffic Engineering Manual*. If Lafayette Street can not be defined as a "Residence District", conduct a safe running speed study along Lafayette Street in accordance with Appendix (17)(iii) of PennDOT Publication 212, *Official Traffic Control Device*. The results of the safe running speed study will establish the reasonable and prudent speed along Lafayette Street. The safe running speed study accounts for the spacing of intersections, roadside development (i.e. the absence of shoulders, presence of residential driveways, drainage swells, etc.), intersecting side road sight distance, etc. If necessary, LTAP can assist the Borough with performing the study.

2. Spot-Speed Studies: Conduct vehicular spot-speed studies in accordance with Appendix (17)(ii) of PennDOT Publication 212, *Official Traffic Control Devices* to determine the 85th percentile speeds along Lafayette Street. The results of the spot-speed study will quantify the existing speeds along Lafayette Street and allow the Borough to make well informed decisions related to sight distance issues and law enforcement. If necessary, LTAP can assist the Borough with performing the studies.

3. Pedestrian Volume Study: Conduct pedestrian volume studies during peak traffic periods to count the number of pedestrians that are walking along and crossing Lafayette Street, particularly at the stair location where a midblock crosswalk is being considered. Conduct these counts on an average walking-friendly day to quantitatively assess pedestrian activity during average conditions. These volumes will allow the Borough to make well informed decisions related to pedestrian accommodations and the improvements to implement.

Short-term Solutions – depending on the results of the studies listed above, consider providing the following short-term improvements:

1. Basic Treatments:
    a. Pavement Markings:
        i. Crosswalk Installation at Intersections: Consider installing Type C marked crosswalks across Lafayette Street at all side street intersections to improve visibility of the pedestrian crosswalks along the corridor. Concentrate on the locations with high volumes of pedestrians supported by the Pedestrian Volume Study mentioned above. Note that installing new crosswalks will require curb ramps to be upgraded in accordance with current PennDOT standards as per Section 6.3.A in PennDOT Publication 13, *Design Manual Part 2, Highway Design*. Install pavement markings in accordance with PennDOT Publication 111M, *Traffic Control Pavement Markings and Signing Standards – TC 8600 and 8700*. Ensure stop bars are located at least 4-feet from the marked or unmarked crosswalks in accordance with Section 3B.16 and Figure 2A-3(D) of the 2009 MUTCD.



        ii. Midblock Crosswalk at Stairs: Carefully consider the installation of a midblock crosswalk at the stair location along Lafayette Street. It is noted in PennDOT Publication 46, *Traffic Engineering Manual*, that "While it is desirable to give guidance to pedestrians as to the safest location to cross highways, studies have shown that pedestrian crash rates are

sometimes higher in marked crosswalks than at other locations, perhaps because the markings give pedestrians a false sense of security." Although PennDOT currently has no authority to force municipalities to comply with the Unsignalized Midblock Crosswalk policy set forth in Section 11.9 of PennDOT Publication 46, *Traffic Engineering Manual*, consider applying this policy to the desired midblock crossing at the stair location on Lafayette Street. One of the most important requirements to adhere to is the available sight distance. Also, ensure the stairs comply with current constructions standards prior to installing a crosswalk.

iii. Double Yellow Centerlines: Consider installing double yellow centerlines on Lafayette Street where the travel way is 16-feet or more in accordance with Section 3B.01 of the 2009 MUTCD and TC-8600 of PennDOT Publication 111M, *Traffic Control Pavement Markings & Signing Standards*. This will provide guidance to motorists and in addition to installing edge lines, will reduce the pavement area and create a traffic calming effect.

iv. White Edge Lines: Consider installing white edge lines along Lafayette Street to delineate the parking area and reduce the cartway width. According to page 76 of PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*, studies show that narrowing the width of travel lanes can reduce speeds by 1 to 2 MPH with reported reductions as high as 5 MPH in some locations.

b. Regulatory Signs:

i. In-Street Ped Crossing Signs: If double yellow lines are installed, consider installing fluorescent yellow-green IN-STREET PEDESTRIAN CROSSING (R1-6) signs facing both directions of traffic along Lafayette Street at side street intersections with high volumes of pedestrians for added emphasis and to call additional attention to the crosswalks in accordance with Section 2B.12 of the 2009 MUTCD. These signs on crashworthy supports can be obtained at no cost by contacting the PennDOT District 5-0 Bicycle/Pedestrian Coordinator.

ii. Speed Limit Signs: Based on the results of the safe-running speed study, consider posting SPEED LIMIT (R2-1) signs on the right side of Lafayette Street in each direction while maintaining a maximum interval of ½ mile between signs and keeping within 200-feet of intersections for turning traffic throughout the area in accordance with Section 212.108(e)(1)(ii) of PennDOT Publication 212, *Official Traffic Control Devices*. This will remind motorists of the proper speed to travel along the Lafayette Street corridor.

c. Warning Signs:
   i. In Advance of Crosswalk: Consider installing "advance warning" PEDESTRIAN (W11-2) signs at the "book ends" of the corridor in lieu of installing them at and in advance of each crosswalk location, since this can create an abundance of signs. If used, these "advanced warning" signs may be supplemented with an AHEAD PLAQUE (W16-9P) or a DISTANCE AHEAD PLAQUE (W16-103P) in accordance with PennDOT Publication 236, *Handbook of Approved Signs*.
   ii. At Crosswalk: If there is a particular intersection at which pedestrians cross Lafayette Street, consider installing new fluorescent yellow-green PEDESTRIAN (W11-2) signs supplemented with the DIAGONAL DOWNWARD POINTING ARROW (W16-7p) plaque at the uncontrolled crosswalk location, whether it is marked or unmarked, at the particular intersection.

d. Sign Installation: Ensure mounting heights of all signs are in accordance with Section 2A.18 of the 2009 MUTCD, which states that the bottom of all traffic control signage along areas of pedestrian activity shall be installed at least 7-feet above the surface of the sidewalk.

e. Retroreflectivity:
   i. On Signs: Use high intensity retroreflective material (ASTM Type III) or better for all signs in accordance with Section 2.1 of PennDOT Publication 46, *Traffic Engineering Manual*; Section 2A.07 of the 2009 MUTCD; and Section 212.104 of PennDOT Publication 212, *2006 Official Traffic Control Devices.*
   ii. In Posts: Consider using reflective material in the channel posts of all warning signs in addition to the stop signs in accordance with Section 2A.21 of the 2009 MUTCD, and Section 500, Page 500-1 of PennDOT Publication 447, *New Product Evaluation for Low Volume Local Roads*.

2. Maintenance Treatments:
   a. Signing and Pavement Markings: If installed, continually restripe faded pavement markings and replace faded and/or damaged/defaced signs. Consider using Thermoplastic pavement markings at highly traveled locations to increase visibility and decrease maintenance. Establish a schedule for inspection, cleaning, and replacement. In accordance with Section 2A.08 of the 2009 MUTCD, an assessment or management method that is designed to maintain sign retroreflectivity shall be used. A free sign management tool can be found on LTAP's website, provided at the end of this report. Once on the website, click on "New Items" and under "LTAP News / Events" the Borough will find information related to the free sign inventory and management tool. If the Borough has questions about the tool, please contact LTAP.
   b. Sidewalk Maintenance: Pennsylvania's state law requires all sidewalks to be maintained by either the municipality or property owner; however, state law does not distinguish between the municipality


Spalling/cracked sidewalks create tripping hazards for pedestrians.

and the property owner. Consider adopting an ordinance to require property owners to maintain their own sidewalk if such an ordinance is not currently in place. Section 6.7 of PennDOT Publication 13M, *Design Manual Part 2, Highway Design*, contains the requirements for the design of sidewalks. Any sidewalk not in compliance should be fixed. The municipality should have a plan in place for regular inspections of their sidewalks and enforcement of the sidewalk maintenance ordinance. A plan may include yearly inspections of the entire municipality or periodic inspections of different sections within the municipality. There are several funding sources available for sidewalk improvements. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).

3. Other Treatments:
    a. Enforcement:
        i. Speed: Consider using law enforcement to enforce speed limits on Lafayette Street once an ordinance is in place whether for the existing 25 MPH speed limit or a new speed limit as determined by the suggested safe-running speed study.
        ii. Sidewalk Maintenance: Consider using targeted law enforcement to enforce sidewalk maintenance. Even with an ordinance in place that requires property owners to maintain their own sidewalk, a municipality may be open to a liability lawsuit if there is no active enforcement of the ordinance.

Mid-term Solutions – if safety concerns still exist after the implementation of the short-term solutions, consider providing the following improvements:

1. Enhanced Basic Treatments:
    a. Flashing Beacons: If PEDESTRIAN (W11-2) sign assemblies are installed, consider supplementing the assemblies that are either placed in advance of or at the uncontrolled crosswalk with flashing beacons to bring extra attention to these warning signs in accordance with Chapter 4L of the 2009 MUTCD.

2. Other Treatments:
    a. Sidewalk Installation: It is not uncommon for municipalities to work with individual property owners to help offset the cost to improve their sidewalks. Consider spearheading a plan to construct new sidewalks along Lafayette Street with an agreement between the Borough and individual property owners regarding funding and maintenance. Although probably not desirable, it is possible to add 2-feet to the narrow section of sidewalk through the wooded section of roadway and still maintain a 16-foot travel way. The physical condition of sidewalks can have a large impact on the quality of life and walkability in a community. As per Section 6.3.B in PennDOT Publication 13, *Design Manual Part 2, Highway Design,* if more than 50% of a run of sidewalk is being replaced, the entire length should be upgraded to PennDOT standards (which would include curb ramp upgrades as necessary).
    b. Curb Ramp Improvements: Consider constructing new curb ramps on the corners of all intersections where curb ramps do not exist or do not meet current

standards and are without DWS. PennDOT's specific requirements for ADA compliant curb ramps can be found in PennDOT Publication 72M, *Standards for Roadway Construction*, Standard Drawing Number RC-67M. RC-67M provides curb ramp details for numerous variations of sidewalk/intersection designs. Sections 6.9, 6.10, and 6.11 of PennDOT Publication 13M, *Design Manual 2: Highway Design*, also address the design of curb ramps at intersections.

Long-term Solutions – if safety concerns still exist after the implementation of the short-term and mid-term solutions, consider providing the following improvements:

1. Traffic Control Enhancements:
    a. Raised Intersections: Consider constructing a raised intersection at any of the intersections with Jefferson Street in the study area to potentially reduce vehicle-pedestrian conflicts by providing better visibility for pedestrians. According to PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook,* they are appropriate on local roads with volumes up to 10,000 ADT and raise the intersection and crosswalks 3 to 6 inches above street level.
    b. Textured Crosswalks: Consider using pavers, imprinted concrete or asphalt, or other materials to demarcate the crosswalks across Lafayette Street and alert motorists that they are entering a pedestrian-friendly area. Textured crosswalks are often used in conjunction with and to enhance raised crosswalks or curb extensions as it has been found that they have virtually no effect on reducing traffic speeds or volumes when constructed alone.
    c. Curb Extensions / Bulb-Outs: Consider installing curb extensions across Jefferson Street in addition to installing ADA curb ramps with DWS. Since a parking lane is present along one or both sides of Lafayette Street, curb extensions can be accommodated by the existing pavement width in various locations. According to Chapter 5 of PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*, curb extensions would reduce travel lanes, provide a traffic calming effect at the crosswalks, provide a shorter distance for pedestrians to cross travel lanes, and give them a better line of sight while still being protected on the curb. Installing curb extensions would require a design process to ensure vehicular movements will not be compromised with the shortened width of roadway and to ensure proper drainage is maintained.
    d. Speed Humps: If it is determined through a traffic calming measures study that they are appropriate and warranted, consider constructing speed humps to calm traffic along Lafayette Street. Speed humps should not be constructed if the ADT is greater than 3,500 or if the roadway is a major emergency service route. Although approval is not required by PennDOT for traffic calming on local streets if liquid fuels money is not to be used, it is necessary to document study findings which support the installation of traffic calming measures in accordance with PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*. Community involvement and a comment period is a recommended step in determining if speed humps should be installed.

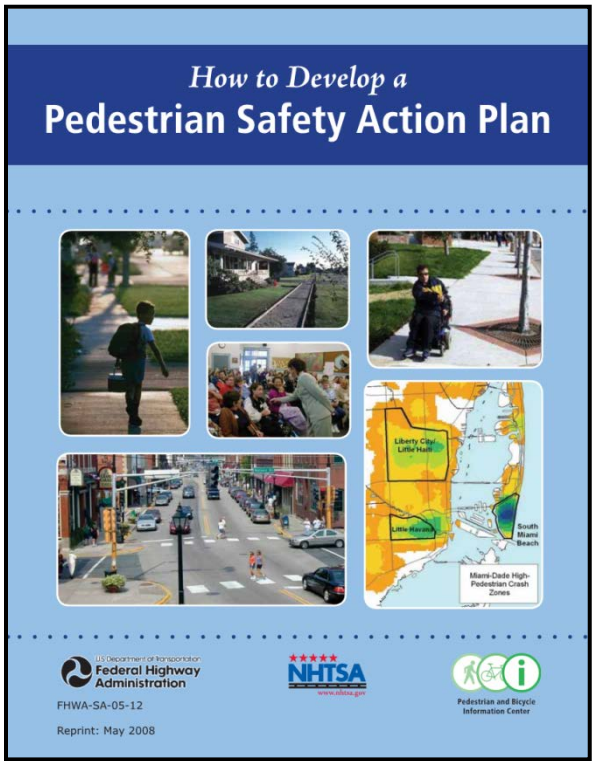
2. Traffic Pattern Alterations:
    a. Cul-de-sac / Road Closure: Consider conducting a study to close the section of Lafayette Street through the narrow, steep vertical grade section where the existing stairs lead across the roadway. This will turn the east section of Lafayette Street into a dead end or cul-de-sac (right-of-way permitting), and the

west section will continue along Berwick Street. This will remove the narrow section of roadway and allow pedestrians to walk freely through this area and provide a safe crossing at the stairs. This solution would require coordination / consultation with emergency response forces to gather and document their input and determine whether they can reasonably and expeditiously reach their destinations if this alteration is implemented. Provisions can be made for emergency vehicle access by creating an opening that is obscured with vegetation; however, provisions for plowing snow would need to be considered. Also, the study should include outreach with residents and business owners that may be affected.

b. One-Way Streets: Consider establishing the east section of Lafayette Street starting at the intersection with Berwick Street as a one-way street in the eastbound direction. This will remove the conflict of passing vehicles in the narrow space and allow room for construction of a standard width sidewalk, and thus improve safety. Sight Distance surveys would be required at the intersections in which traffic will be displaced if a one-way conversion is implemented to ensure that crash issues aren't amplified at another intersection. Conditions as stated in Section 212.113 of PennDOT Publication 212, *Official Traffic Control Devices* are required to be satisfied and documented to establish a one-way street. This solution would require coordination / consultation with emergency response forces to gather and document their input and determine whether they can reasonably and expeditiously reach their destinations if this alteration is implemented. Also, the study should include outreach with residents and business owners that may be affected.

Safety Improvement Program

The second action of the WCP is to take the information/lessons learned from addressing the safety at a few specific locations and in turn develop a systematic municipal safety improvement program. This safety improvement program can take the form of a Pedestrian Safety Action Plan (PSAP). The Federal Highway Administration's (FHWA) guidebook *How to Develop a Pedestrian Safety Action Plan* (PSAP) defines a PSAP as a plan developed by community stakeholders that is intended to improve pedestrian safety in the community. A PSAP is most valuable when used as a dynamic and evolving tool that is regularly and consistently updated; whether annually, when improvements are implemented, or when new data is available. An up-to-date PSAP is an effective tool for managing and evaluating pedestrian safety and for planning future improvements. An updated and current PSAP is also an effective tool when applying for funding when implementing future safety improvements. A well-defined PSAP can assist participating municipalities with planning for safety improvements clearly and efficiently.



http://drusilla.hsrc.unc.edu/cms/downloads/howtoguide2006.pdf

The basic format of a PSAP involves the following steps:

1. Identifying safety/walkability goals and objectives
2. Identifying zones of high risk for pedestrian/vehicle conflicts
3. Selecting and implementing solutions
4. Evaluating the effectiveness of solutions
5. Developing/maintaining written records

Each of these steps is briefly described on the following pages.

Identifying Safety/Walkability Goals and Objectives

Each community should develop goals appropriate for its own needs to improve pedestrian safety and walkability.

Identifying Zones of High Risk for Pedestrian/Vehicle Conflicts

Safety issues can be identified reactively through crash analysis, or proactively through observation and road safety audits, or a combination of both. Using crash data, the preparation of a crash cluster map is the simplest tool to develop and maintain. The map should include the locations of all pedestrian crashes, and be updated annually. More about proactive and reactive techniques is presented in the LTAP Roadway Safety Improvement Program (RSIP) class.

Based on the crash data and other input, a list of priority areas for improvement can be generated. Using the prioritized list, the top crash locations may be analyzed in further detail to identify the causal factors of the incidents.

Selecting and Implementing Solutions

Solutions should focus primarily on high risk zones with the more severe and numerous incidents. Consideration should also be given to those low-cost solutions that can be effectively implemented quickly using existing resources. Further, solutions that can be implemented in conjunction with other ongoing or planned projects can also save resources and time.

After countermeasures have been identified they can be subdivided into short, mid, and long-term solutions, based upon resources and costs. There are federal, state, local, private, and nonprofit funding sources available to fund low, medium, and high-cost safety improvements. A brief explanation of some common funding sources has been provided below along with a new funding source where the findings of this report can be the foundation to secure funding. Depending on the type of project to be undertaken, more than one funding source may be necessary to secure full funding.

Municipal Funding

Liquid Fuels Tax Funds for Counties is an act codified in Title 75 Pennsylvania Consolidated Statutes Chapter 90 which provides Pennsylvania's counties with semiannual allocations for construction, maintenance, and repair of roadway infrastructure. Counties can then in turn allocate these funds to their municipalities for roadway infrastructure projects.

The Policies and Procedures Manual for the liquid fuels program indicates acceptable and unacceptable expenditures. The Manual lists a wide range of eligible roadway infrastructure improvement projects so please consult the Policies and Procedures Manual which can be found online at:

ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/Pub%209.pdf.

Additional information about liquid fuels allocations to counties and their political subdivisions can be found online at:

www.dot.state.pa.us/Internet/Bureaus/pdBMS.nsf/infoMLF965?OpenForm.

Typically, municipalities manage their liquid fuels allocations separately from their general funds. However, municipalities may fund appropriate projects through their general funds by making a project part of its budget.

Transportation Improvement Program (TIP)

Required by the federal Transportation Equity Act of the 21st Century of 1998, Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs) are responsible for developing fiscally responsible short-range and long-range Transportation Improvement Program (TIPs) plans for single or multicounty regions. A municipality should contact their respective PennDOT Engineering District Office who will likely work with the local MPO/RPO to place a proposed project on the appropriate funding plan. Project eligibility is determined separately and then forwarded to the MPO/RPO for possible inclusion on the TIP.

ARLE Funding Program

The Automated Red Light Enforcement (ARLE) Funding Program is administered by the Pennsylvania Department of Transportation's Center for Program Development and Management and the Bureau of Highway Safety and Traffic Engineering. Under 67 PA Code Chapter 233 the revenue that has been generated through the City of Philadelphia's ARLE program will now be used to provide a statewide ARLE funding reimbursement program to provide municipalities with an opportunity to seek additional funding for safety and mobility improvements.

The types of eligible ARLE Funding Program projects are wide ranging and the intent of the Program is to award grants to worthwhile projects that can be completed at a relatively low-cost and can be considered "shovel-ready". "Shovel-ready" projects should be able to be constructed within one-year of receiving the grant. Examples of eligible projects include safety, mobility, and capacity upgrades but for a more detailed list of eligible projects please refer to the ARLE Grant Program website hyperlink provided at the end of this section. Each year around March or April, an announcement will be sent out in the Pennsylvania Bulletin indicating that PennDOT will be accepting applications.

Participation in LTAP's Walkable Communities Program enables local authorities (counties, municipalities, and other local boards or bodies having authority to enact laws relating to traffic) to sponsor safety locations highlighted within this report for receipt of an ARLE Funding Program grant to partially or completely pay for implementation of low/medium-cost "shovel-ready" improvements. When completing the ARLE Funding Program grant application local authorities should keep the following in mind:

- Submit the whole WCP report with the application and highlight the improvements for which the local authority is applying for funding.
- Focus the application on low-cost or medium-cost improvements. It is unlikely that high-cost projects will be funded through the Program.
- Engineering and other related traffic studies will not be funded since the intensions of the Program is to expedite physical improvements.
- The grant is reimbursement based.

- All matching funds, if provided, shall be made available at the time of the application to complete the project. Proof of the available funding must be submitted with the application.
- Currently a sponsor can submit as many applications as they deem appropriate.
- Automated Red Light Enforcement is only authorized for use by First Class Cities through the Pennsylvania Vehicle Code (75 Pa.C.S. §3116). That authorization was scheduled to expire on 12/31/2011, but was extended through 6/30/2012. Legislation is pending that may authorize political subdivisions other than First Class Cities to use ARLE in the future. The ARLE Funding Program is a revenue source from the enforcement of Philadelphia's ARLE program and the ARLE Funding Program is not to be used by municipalities other than the City to Philadelphia to construct or modify ARLE systems.

To access the ARLE Funding Program grant application and for additional information, please utilize the ARLE Grant Program page of PennDOT's Traffic Signal Resource Portal:

http://www.dot.state.pa.us/Portal%20Information/Traffic%20Signal%20Portal/index_files/Automated_Red_Light_Enforcement.htm

All ARLE Funding Program questions should be directed to:

Larry Shifflet
Director, PennDOT Center for Program Development and Management
400 North Street, 6th Floor
Harrisburg, PA 17120
Phone: 717-787-2862
Email: ARLE_Grants@state.pa.us

Evaluating the Effectiveness of Solutions

Often, safety improvements are made but no formal follow-up analysis is completed to determine if the improvement has yielded positive results, negative results, or simply no results. While not mandatory as part of participating in the Walkable Communities Program, it is recommended that the municipality monitor the safety impacts at each of the locations where safety improvements are made. This can be done by examining pedestrian and motorist behavior at the locations and by analyzing crash data. If follow-up analysis is undertaken, these steps should be performed right after the improvements have been implemented, again after three to six months, and again after one year. If necessary, adjustments to the safety improvements or additional safety improvements may be required.

After the priority locations have been addressed, the community may begin to develop safety plans for the next locations. This process of evaluating improvements and developing improvements for additional locations should be repeated annually.

Developing/Maintaining Written Records

Written records and documentation are vital not only to a PSAP, but are also vital to managing a municipality's exposure to liability. The PSAP itself should be written and documented. For each safety improvement, the studies/data collected, the potential solutions considered, and the countermeasures implemented should be documented and filed.

According to state law, safety studies are non-discoverable, meaning that except for special circumstances, they are generally held as confidential, and may not be used as evidence. More information can be obtained from the LTAP class on Risk Management and Tort Liability.

Pennsylvania Crash Facts and Statistics

Each year PennDOT's Bureau of Highway Safety and Traffic Engineering compiles and publishes a comprehensive *Pennsylvania Crash Facts and Statistics* booklet which documents yearly statewide crash trends to include pedestrian and bicycle crashes. Municipalities can access and distribute this PDF document for free to better understand the trends of pedestrian/bicycle crashes within Pennsylvania.

http://www.dot.state.pa.us/Internet/Bureaus/pdBHSTE.nsf/BHSTEHomepage?OpenFrameset

LTAP Contact Information

For all questions about the content of this report or for additional technical assistance, please contact the LTAP contact person who completed this report. For all other questions or to schedule attendance at one of the many free LTAP courses that deal with pertinent topics covered within this report, please use the following contact information:

Call: 1-800-FOR-LTAP
Write: LTAP – Local Technical Assistance Program
Pennsylvania Department of Transportation
Bureau of Planning and Research
400 North Street, 6th Floor
Harrisburg, PA 17120
E-mail: **ltap@state.pa.us**
Web Site: **www.ltap.state.pa.us**

If the municipality has specific questions or needs related to state owned and maintained facilities, please contact the local PennDOT Municipal Services Representatives or PennDOT Engineering District.

Appendix Reference Materials

This appendix contains reference materials to help assist the municipality with implementing the report's suggested safety improvements and sustaining a PSAP.

Municipalities should consult the most current information contained within the following hyperlinks during implementation of potential solutions outlined within this report.

U.S. Department of Transportation Federal Highway Administration (FHWA) – *2009 Manual on Uniform Traffic Control Devices (MUTCD)*

http://mutcd.fhwa.dot.gov/kno_2009.htm

PennDOT Sales Store – Contains free PennDOT publications in PDF format:

ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/PUB%2012.pdf

PennDOT provided engineering and traffic study forms:

http://www.dot.state.pa.us/Internet/Bureaus/pdBHSTE.nsf/infoBHSTETrafStudyForms?OpenForm
http://www.dot.state.pa.us/Internet/Bureaus/pdBOS.nsf/FormsAndPubsHomePage?OpenFrameSet

PennDOT Bicycle and Pedestrian Homepage:

http://www.dot.state.pa.us/Internet/Bureaus/pdBikePed.nsf/BikePedHomepage?openframeset

Pennsylvania Safe Routes to School Resource Center:

http://www.saferoutespa.org/walkability-audits

Pennsylvania Vehicle Code (Title 75):

http://www.dmv.state.pa.us/vehicle_code/index.shtml

U.S. Department of Transportation Federal Highway Administration (FHWA) – NCHRP (National Cooperative Highway Research Program) Report 500, volume 12

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v12.pdf