



# TABLE OF CONTENTS

## 1 | Introduction

A   Purpose	1 - 4
B   Transportation Planning Case	1 - 4
C   Goals	1 - 5
D   Stakeholder and Public Involvement	1 - 5
E   Tasks & Schedule	1 - 6

## 2 | Community Engagement & Identifying Issues

A   Community Engagement Strategy	2 - 2
B   Community Visioning Meeting	2 - 2
C   Online Engagement (Survey)	2 - 3
D   Defining Community Concerns	2 - 4
E   Primary Study Focus	2 - 7

## 3 | Existing Conditions Evaluation

A   Multimodal Transportation Network	3 - 2
B   Sidewalks / Crosswalks	3 - 7
C   On-road Bicycling	3 - 9
D   Ordinance Review	3 - 10
E   Safety Summary	3 - 11
F   Traffic Operations	3 - 11
G   Parking	3 - 14

## 4 | Multimodal Transportation Solutions

A   Borough-wide Network Recommendations	4 - 2
B   Strategic Improvements	4 - 7
C   Additional Improvements	4 - 20
B   Other Considerations	4 - 20

## 5 | Implementation Plan & Funding Strategies

A   Action Plan	5 - 2
B   Planning Level Costs	5 - 5
C   Funding Opportunities	5 - 6

## Appendix

Public Comment Summary
Malvern Borough Ordinance Review
Traffic Count Data
Various Traffic Analyses

## Acknowledgements

The Malvern Multimodal Study was completed by McMahon Associates, Inc. on behalf of Malvern Borough. Funding for the study was provided by the Chester County Board of Commissioners through the Vision Partnership Program (VPP) administered by the Chester County Planning Commission. Grants awarded through the VPP are intended to achieve municipal consistency with Landscapes2, Chester County's Comprehensive Policy Plan. To illustrate the borough's commitment to improving transportation in their community, Malvern Borough provided 50% matching funds to the grant supplied by the VPP.



# Chapter 1

## Introduction





## 1 | Introduction

### A | Purpose

The Borough of Malvern is a unique, diverse, and historic community located in southeastern Pennsylvania that is served by a full range of transportation options. Whether visiting downtown shops, attending a social gathering, or commuting to work, residents and visitors have the choice to drive, walk, bike, or take public transportation to many destinations within and outside of the borough. However, in spite of all of Malvern's attributes, there is still room for improvement in the borough's transportation network.

One major area of concern for Borough Council and Staff is improving walkability as well as the increasing amount of "cut-through" traffic that local neighborhood streets have been experiencing as the popularity of the borough and surrounding area grows. The increased speeds and traffic volumes associated with this cut-through traffic creates hazards for people who drive, walk, bike, or use public transportation in Malvern.

The Malvern Multimodal Study takes a comprehensive approach to evaluating existing transportation issues in Malvern Borough and identifying ways to improve the transportation network. Multimodal transportation improvement recommendations were developed to;

- 1) enhance the transportation network to improve access for all users and encourage non-vehicular travel;
- 2) Improve operations and safety for all users within the transportation network; and
- 3) Promote active transportation to improve the health and well-being of residents.

### B | Transportation Planning Case

This project takes a "system-wide" approach to transportation planning by analyzing the relationship between various transportation modes and surrounding land uses. In recent years, the borough has continually made efforts to improve pedestrian connections, support public transportation, promote carpooling, and encourage mixed-use development that supports reduced trip lengths and frequencies.

Malvern Borough is also implementing the policies of Landscapes2, Chester County's Comprehensive Policy Plan, by developing a plan that interlinks transportation modes into a seamless system. Reducing vehicular dependency, encouraging public transportation, and improving bicycle and pedestrian mobility in the process. This project supports the Chester County Commissioners' strategic plan goal of creating transportation choices for Chester County residents. At the same time, Malvern expects to see increasing taxable assessment spurred by new land developments; further supporting the Commissioners' strategic plan by illustrating a return on investment of planning and revitalization funds. Additionally, this project aims to make Malvern more pedestrian and transit-friendly, supporting the goals of the Chester County's Community Revitalization Program.

Transportation and circulation is addressed in Malvern's 2012 Comprehensive Plan. In the plan, an emphasis is placed on maintaining a balanced, multi-modal transportation network in which each mode is able to contribute to meeting the needs of the Borough's residents." The Comprehensive Plan goes on to list various recommended strategies to achieve this goal. Most of the recommendations are addressed in further

detail in this document.

In 2013, Malvern completed a Transit Oriented Development (TOD) Study in cooperation with the Delaware Valley Regional Planning Commission, the Chester County Planning Commission, and the Southeastern Pennsylvania Transportation Authority. The TOD Study identified transportation improvement opportunities that would support compact, mixed-use, pedestrian-friendly developments surrounding the Malvern Train Station.

Malvern and East Whiteland Township partnered for the Malin Road Extension Feasibility Study in 2010. This study identified ways to improve access to the industrial areas along Warren Avenue and to the Malvern Train Station. The new roadway segment would provide a route for trucks and other commercial traffic from Lancaster Avenue while redirecting traffic away from residential areas.

Borough Council adopted the Patriots Path Plan in 2009. Completed in partnership with East Whiteland and Tredyffrin Townships, the plan identifies potential trail, sidewalk, and pathways to connect the Paoli Battlefield Grounds in Malvern to the Battle of the Clouds Park and Valley Forge National Historic Park.

Malvern Borough is identified as one of the Classic Towns of Greater Philadelphia. Classic Towns takes ideas around urbanism, smart growth, and transit-oriented development and translates them into relatable messages about location decisions and quality of life. The Malvern Multimodal Study supports the ideals of the Classic Towns program by identifying improvements to the transportation network that will preserve and enhance the community qualities that Malvern residents enjoy today.

### C | Goals

The Malvern Multimodal Study seeks to comprehensively address the transportation needs of all residents and visitors of Malvern Borough regardless of individual users ability or mode of travel. The recommendations in this study promote one or more of these four primary goals:

1. Develop multimodal transportation recommendations to accommodate all modes of traffic, focusing specifically on operational and safety enhancements.
2. Implement an effective outreach program to engage the project stakeholders and public.
3. Synthesize past planning and study efforts with the recommendations of this study into a comprehensive planning document.
4. Develop an implementation plan to provide guidance to Malvern Borough in securing funding through grant programs and other means, as well as in implementing multimodal improvements.

### D | Stakeholder and Public Involvement

This study included a comprehensive public outreach process for Malvern residents and visitors to provide input on existing transportation issues and suggest solutions to improve the transportation network for all. In order to ensure community engagement in the issues, various opportunities to provide comments and input were made available during various phases of this project. Participants were able to identify problematic areas for traffic, pedestrians, bicyclists, parking, and transit through attendance of public meetings and completion of an online public input survey. The public input process helped to focus the scope of the study on the most problematic transportation issues facing Malvern Borough and develop impactful improvement recommendations.

A Study Advisory Committee (SAC) was appointed by Borough Council to guide the development of the Malvern Multimodal Study and ensure that the four primary goals were achieved. The SAC was comprised of members Malvern’s Public Safety Committee.

The following individuals were appointed to serve on the SAC:

- John Meisel, Chair, Public Safety Committee
- Jamie Grossman, President of Borough Council, Public Safety Committee
- Julie Raynor, Member, Public Safety Committee
- Todd Lexer, Past Chair, Public Safety Committee

- David Burton, Mayor
- Louis Marcelli, Chief of Police, Malvern Police Department
- Christopher Bashore, Borough Staff
- Neil Lovekin, Borough Staff

The project team collaborated with the SAC to finalize and refine the project scope, identify community stakeholders, assist in the development of public outreach content, and review deliverables throughout the project process. Borough staff and the SAC assisted in identifying public meeting locations, advertising public meetings and other outreach efforts, and facilitating discussion at the public meetings.

Four SAC meetings were convened during the project to complete the following tasks:

- Meeting 1: Project team discussed the draft goals and reviewed prior transportation planning initiatives in the borough. The plan for community outreach was refined by the SAC.
- Meeting 2: Results from the Community Visioning Workshop and online survey were reviewed. The scope of work was refined to focus on areas identified through the community outreach process.
- Meeting 3: Review preliminary findings and recommendations, including vehicular/pedestrian traffic volumes and analyses.
- Meeting 4: Review refined recommendations, implementation plan, priority projects, and the draft report.

The planning process featured a community visioning workshop to identify transportation issues and concerns, identify locations of concerns, and provide potential solutions from the community’s perspective. This meeting was held early on in the project and was attended by approximately 20 community members. The Malvern community was engaged in the community visioning workshop, and comments on specific issues are outlined later in the study. To supplement the traditional public meetings, an online survey was utilized to collect input on various issues. The online survey was successful, receiving comments from approximately 80 individuals on the Malvern community’s perspective pertaining to transportation issues and constraints, the transportation needs and desires, and appropriate solutions to transportation problems.

## Why plan for all modes?

**Facilities for walking, biking, and public transit make communities more socially and economically vibrant.**

- Property values are higher in compact communities
- Homes closer to trails and train stations sell for more
- People who bike spend more money

**Planning for the safety of the most vulnerable transportation types improves the safety for all.**

- Places where people walk & bike have safer streets
- Risk of fatal crashes increases drastically over 30 mph
- Complete streets improve safety by reducing crashes

**People who walk, bike, or use public transportation live healthier lifestyles than those who drive alone.**

- Kids who walk to school are less likely to be overweight
- Cycling replaces sedentary time with healthy exercise
- Using public transportation reduces stress



## F | Tasks & Schedule

The project team was charged with completing six primary tasks while developing the Malvern Multimodal Study.

### Task 1 - Project Management

Ensure high quality deliverables were developed within budget and on schedule. Maintain and monitor the schedule and budget.

### Task 2—Public Outreach

Facilitate the stakeholder and public meeting process throughout the study process.

### Task 3—Existing Transportation Conditions Analysis

Review and analyze readily available data and recent planning efforts and studies in order to identify existing conditions and prior transportation recommendations.

### Task 4—Multimodal Transportation Solutions Conceptual Plan

Provide recommendations to address operational and safety problems identified through the study process.

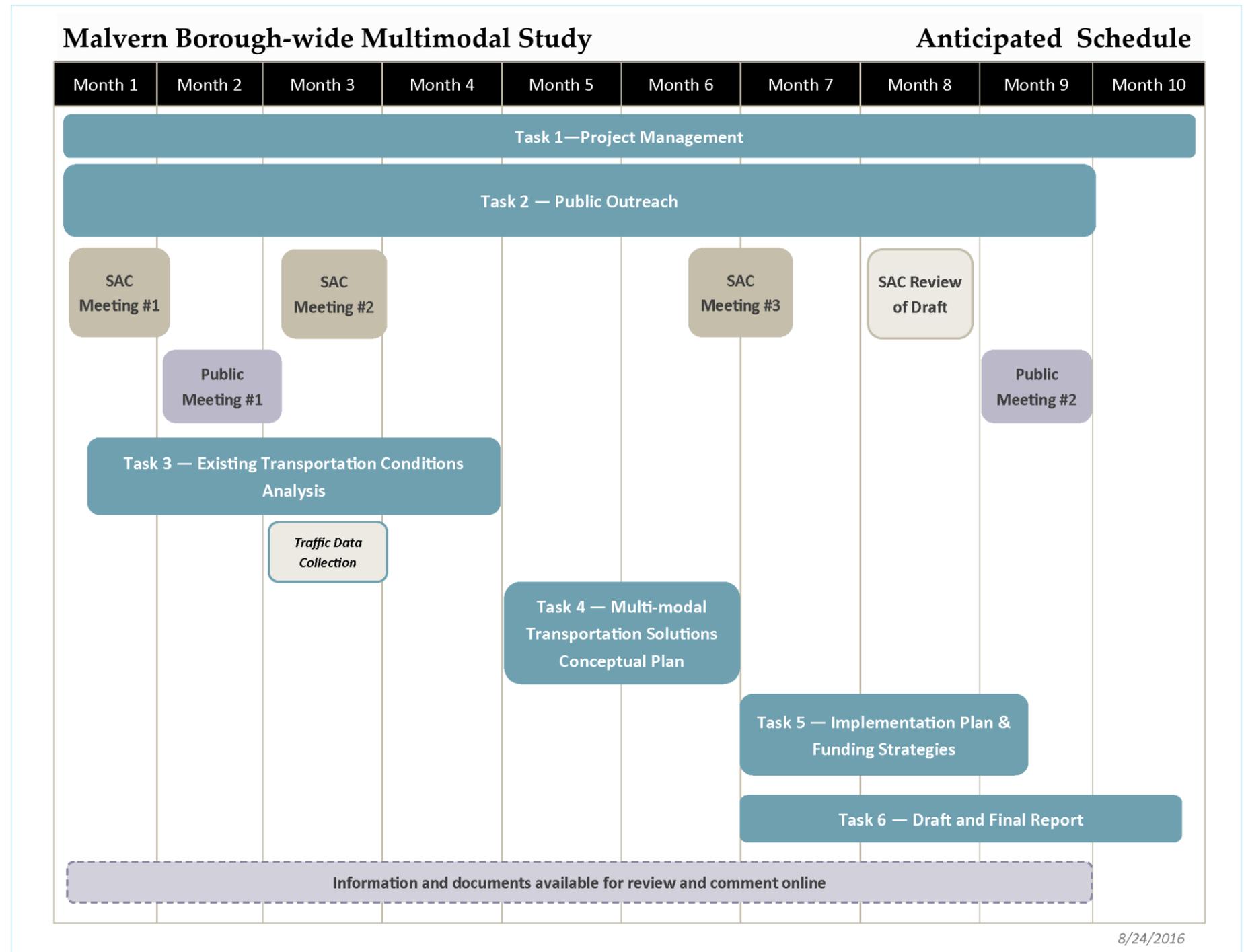
### Task 5—Implementation Plan & Funding Strategies

Develop an implementation plan with particular focus on providing a realistic funding strategy to advance study recommendations and provide clear guidance to the borough.

### Task 6—Draft and Final Report

Prepare a comprehensive report summarizing the process, findings, and recommendations of the study.

It is noted that data collection was delayed from May 2017 until local schools returned from summer break, which delayed the overall project schedule.



# Chapter 2

## Community Engagement & Identifying Issues





## 2 | Community Engagement & Identifying Issues

### A | Community Engagement Strategy

Public involvement was a key component of the Malvern Multimodal Study. Making sure that residents were able to provide their input on the issues and opportunities facing transportation in Malvern Borough is essential to building community support for future implementation of recommended transportation improvements that would result from this document. For these reasons, a comprehensive community engagement strategy was included in the scope of work for the project.

The community engagement strategy included two ways for people to become involved early on in the development of the study. A Community Visioning Workshop and a voluntary online survey. Both of these methods proved to be successful and allowed the project team to collect input on what concerns that community members had and adjust the scope of the project to best address those concerns. Analysis and recommendations were focused on the areas that were most commonly identified by participants.

Recommendations to address the primary community issues were developed and evaluated by the project team with the assistance of the study advisory committee. Those recommendations will be presented to the public at a community meeting as the project is being finalized.

The community engagement strategy is described in detail in this chapter of the document.



### B | Community Visioning Meeting

One component of the community engagement strategy was holding a Community Visioning Meeting. The meeting was held at Malvern Borough Hall on April 3rd, 2017 from 5:00–8:00 pm. Approximately 20 people attended the meeting where they were able to provide input on a range of transportation issues from traffic and speeding to pedestrian safety. Advertisement for the meeting included flyers posted on community boards, a notice on the borough website, and promotion by community partners.

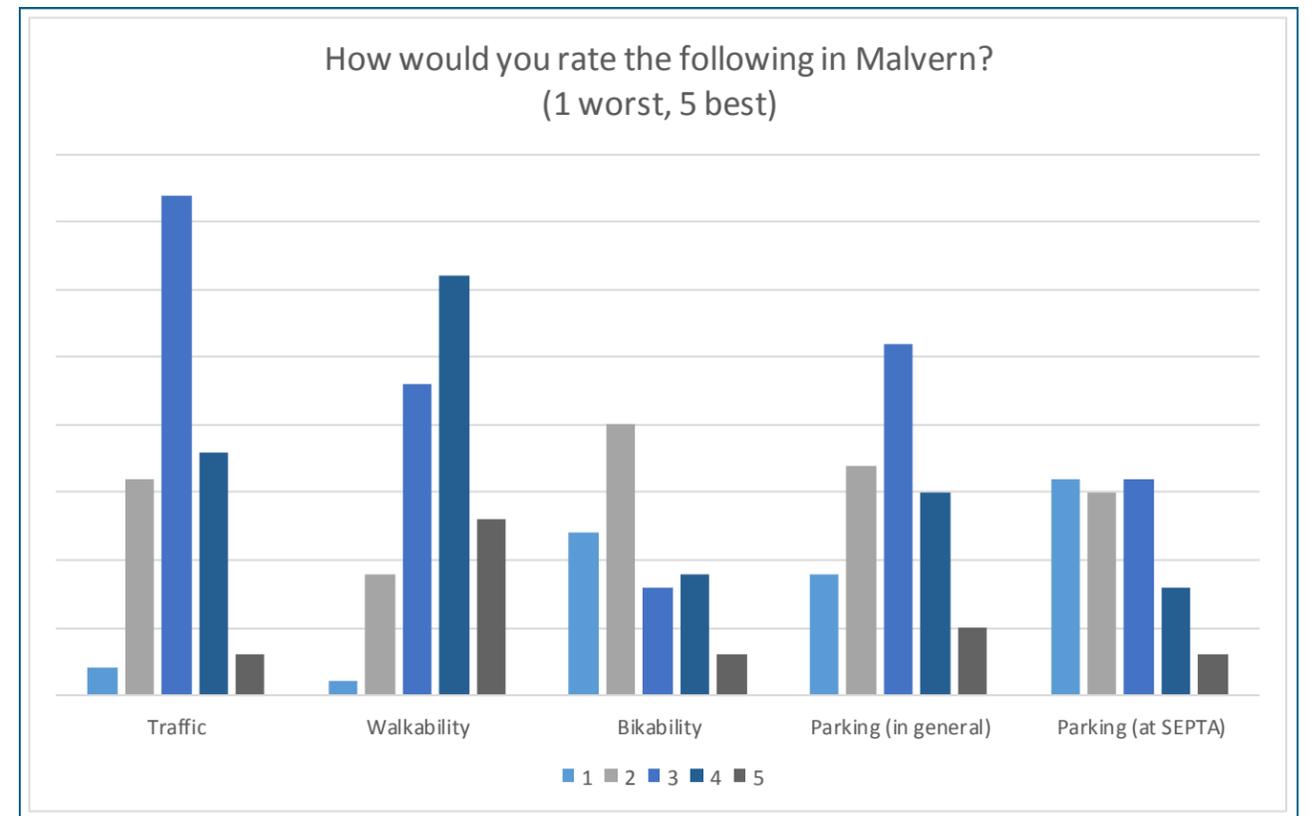
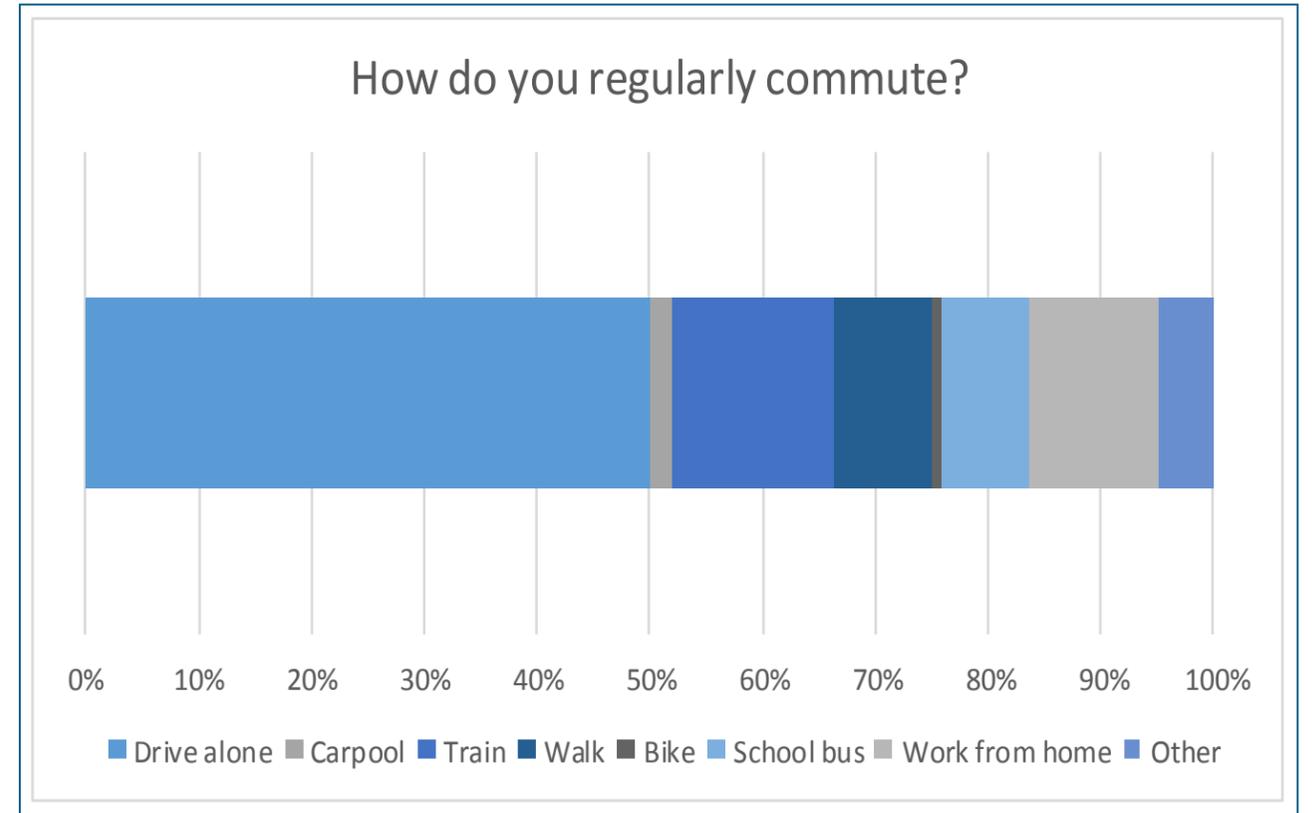
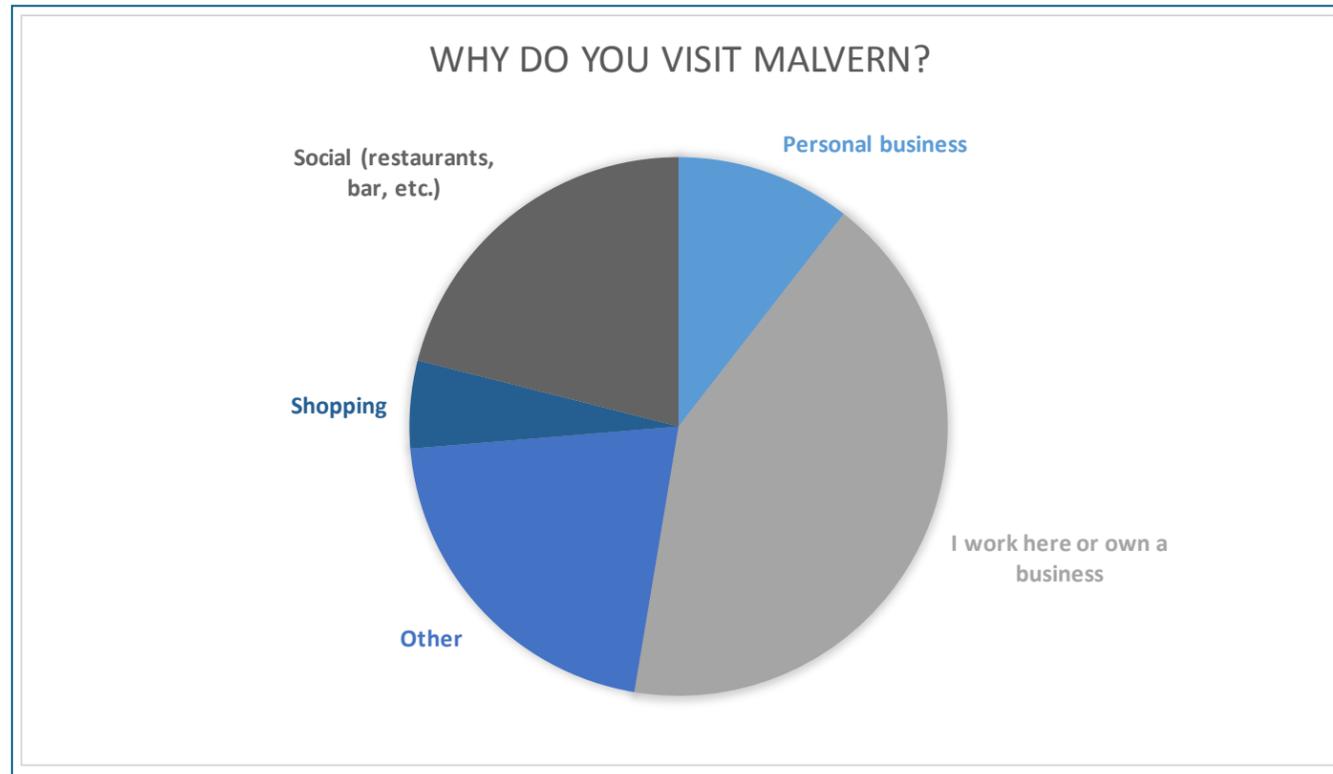
At the meeting, attendees were able to provide their input in a few different formats. Informational boards gave attendees an understanding of the existing transportation features and the available “tools” to address transportation issues. Issue locations could be identified by placing a dot marker on a map of Malvern Borough. Further detail about specific transportation issues could be identified by commenting directly on various maps and exhibits. Additionally, members of the project team and Study Advisory Committee were available to have conversations about issues and concerns related to the transportation network in Malvern Borough. As a result of the Community Visioning Meeting, the scope of the project was fine-tuned to best address the issues identified by the community.

Another goal of the Community Visioning Meeting was to spread the word about the online survey. Even if people were unavailable to attend the public meeting, the online survey gave them a chance to have a say in the future of the transportation network in Malvern Borough and help to shape the recommendations in the Malvern Multimodal Study.

### C | Online Engagement (Survey)

In addition to the Community Visioning Meeting an online survey was used to solicit input on the transportation issues facing Malvern. The survey was cross promoted with the Community Visioning Meeting. Nearly 80 individuals participated in the survey over the course of several weeks in the spring of 2017. Of the respondents, 80% lived in the borough, 15% lived nearby (within a few miles), and 5% lived outside of the immediate area. Non-residents that participated in the survey typically worked or owned businesses in Malvern.

The questions in the survey consisted of a series of multiple choice, ranking, and open-ended questions. They covered topics ranging from general demographic information to questions about specific transportation modes and identification of problem areas.



"It's frustrating to not be able to look at purchasing houses that are walking distance to the train just because there's no safe, direct path."

"Would be fantastic if there was a safe way to bike from Malvern to the Chester Valley Trail."

"The problem isn't the lack of crosswalks, it is the disregard for them."

### D | Defining Community Concerns

The primary goal of the public outreach process was to help focus the scope of the project on the issues in Malvern that were the highest concern to the community. A variety of comments were received on topics ranging from traffic congestion to sidewalk connectivity. In all, 150 unique public comments were received. The majority of the comments came through the online survey— 117. Still, 33 comments were collected at the public meeting. The total number of comments received far exceeded the number of individuals that participated in the survey or attended the meeting, which indicated a high level of engagement for those who were involved in the planning process.

#### Traffic

Community concerns relating to traffic were generally focused around King Street. The highest concentration of comments were at the King Street & Bridge Street intersection. Participants cited both pedestrian safety and traffic operation issues at this intersection. Additional intersections that received a high number of comments were Bridge Street & Broad Street, King Street & Warren Avenue, and King Street & Powelton Avenue. A major traffic concern of a lot of Malvern residents is cut-through traffic.



#### Biking

A common theme in the bicycling related comments was a desire to connect to regional destinations. Particularly, a large majority of people would like to see a multimodal connection to the Chester Valley Trail. Another popular regional destination was Applebrook Park / East Goshen Township Park. Generally, participants view bicycling within Malvern Borough limits to be safe, but bicycling beyond the borough limits is seen as hazardous.

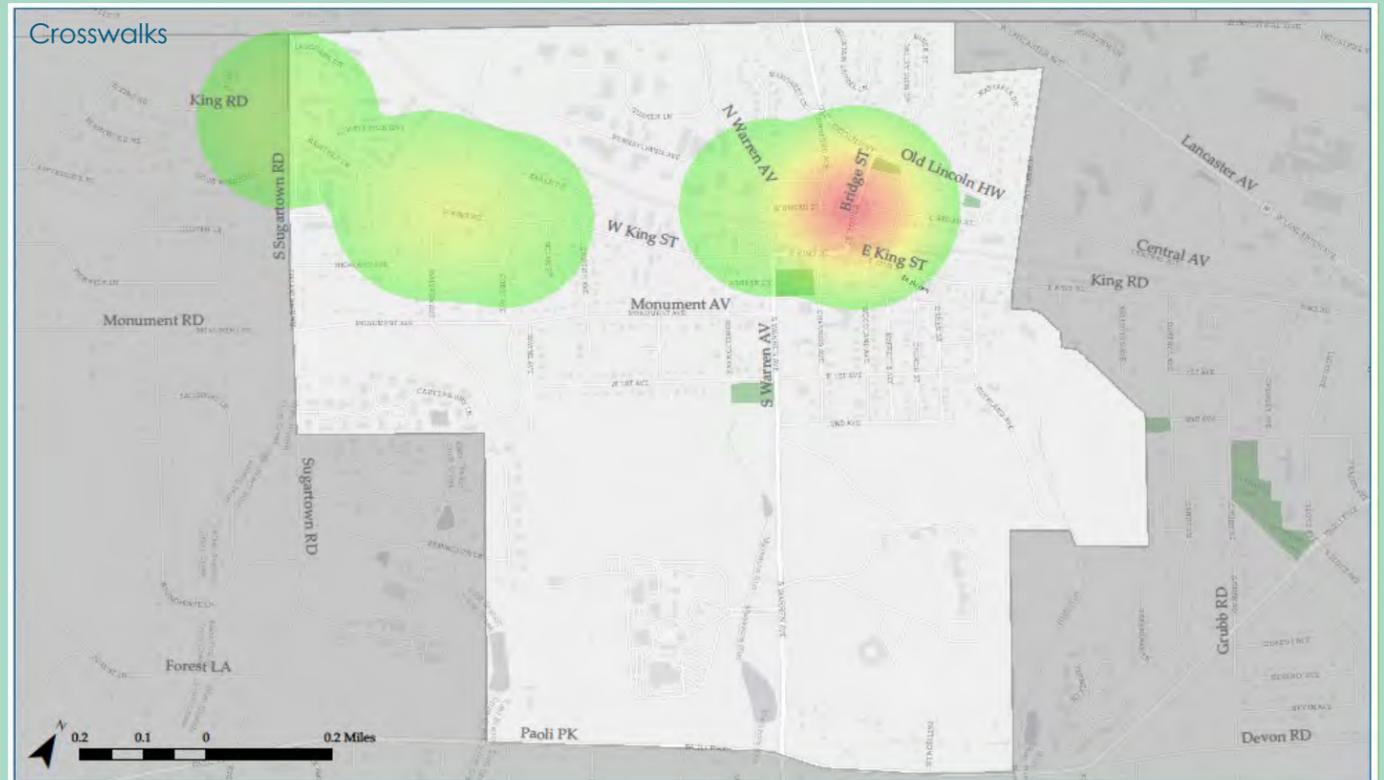
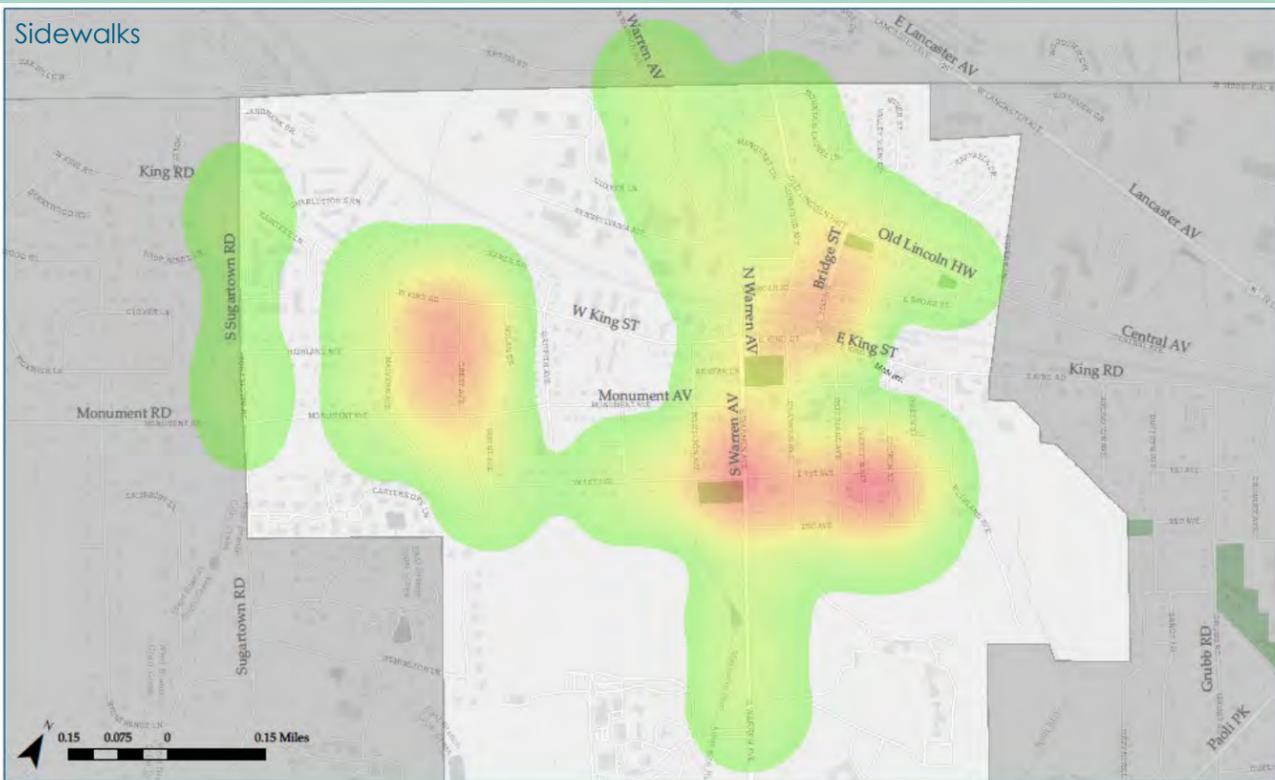


mentioned by several respondents. Most respondents felt that walkability was above average. There were additional comments related to providing traffic calming and improving the visibility of crosswalks throughout the borough. There were not many comments provided on bicycle safety or facilities within the borough. However, several respondents noted that they would like links to other bicycle facilities (trails) and regional destinations. Parking in the borough was viewed as generally adequate except for the Malvern Train Station where many cited that it was difficult to find available parking there. When visiting businesses along King Street, most respondents were able to easily find parking or they take advantage of the pedestrian network to walk to their destination.

A summary of the locations of comments provided by the community is illustrated in **Figure 2.1**. A full listing of each comment and associated map indicating their locations in Malvern Borough, can be found in the Appendix of this document.

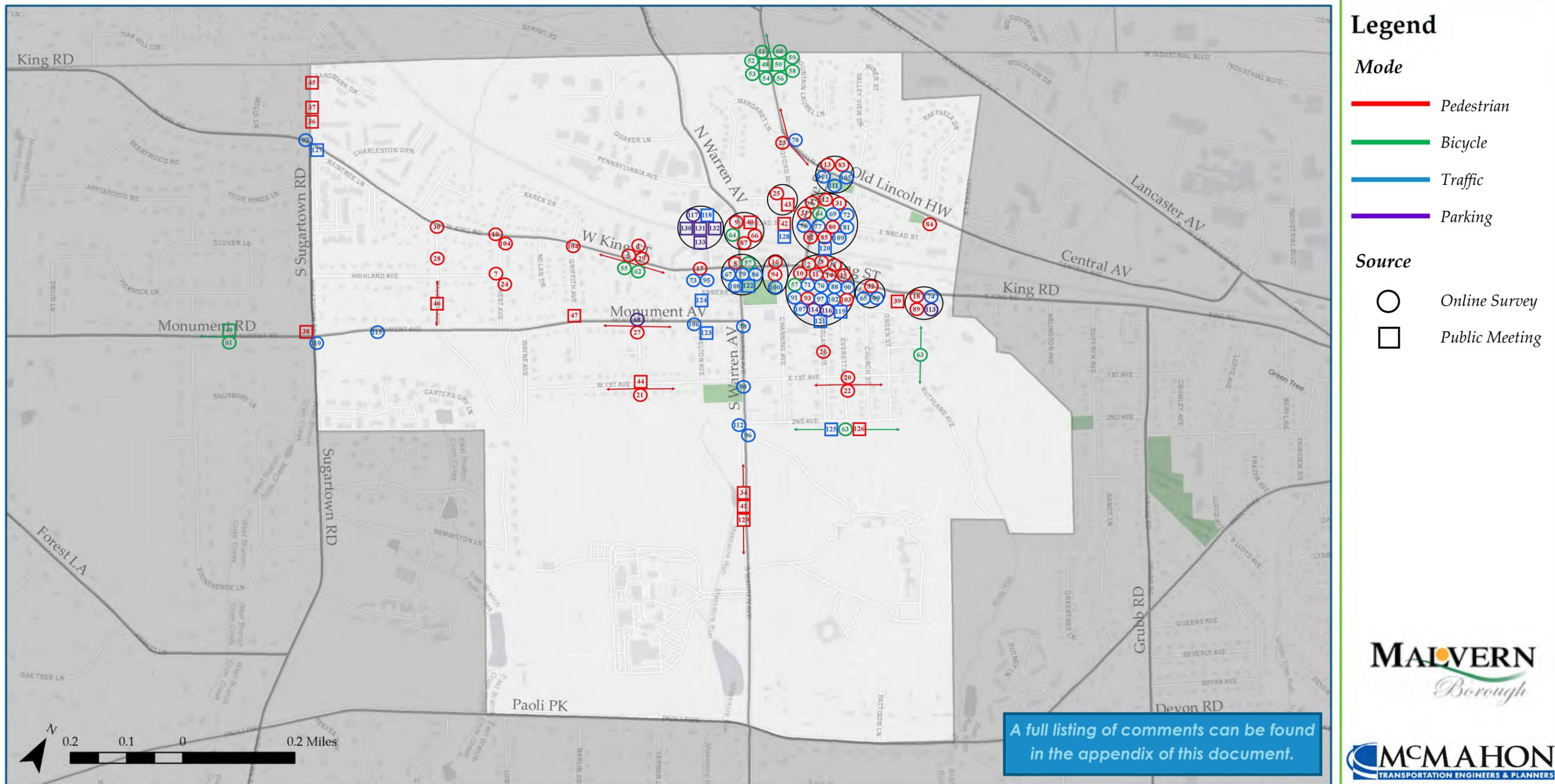
### Walking

Most public participants agreed that the downtown core of Malvern is a walkable place. However, the bigger issue with being able to safely navigate the borough on foot is the general inattentiveness of drivers. The community would like to see a consistent sidewalk network throughout the borough. The most prominent areas that need attention are neighborhoods south of King Street. Desired connections include Highland Avenue, Crest Avenue, S. Warren Avenue, 1st Avenue, Church Street, and Green Street. Additionally, people would like to see sidewalk connections to Lancaster Avenue and Malvern Preparatory School and along Sugartown Road. The most resounding crosswalk concerns are all related to Bridge Street. Intersections at Bridge Street and King Street, Broad Street, and Old Lincoln Highway are the highest concerns. There is additional consensus that crosswalks on W. King Street are not as accommodating as the ones closer to the central business district.



# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 2.1: SURVEY COMMENTS



## E | Primary Study Focus

The results of the community engagement process allowed the project team to focus efforts on addressing the most important issues to the Malvern community. Based on the comments received, the scope of work was refocused on addressing issues at key locations throughout the borough. A large majority of the primary issues relate to navigating the borough on foot. However, regional multimodal connections, cut-through traffic, and safety were also identified as primary concerns.

The scope was refined to include traffic counts and analysis at various intersections in Malvern. The counts and analysis were conducted on weekday morning and afternoon commuter / school peak periods. Vehicular turning movements, pedestrian crossings, and heavy vehicles by approach were counted. Additionally, automated traffic recorder counts at various locations in the borough were added to the scope in order to capture daily traffic volumes, prevailing travel speeds, and vehicle classification.

Intersections studied are listed below:

1. E. King Street and Ruthland Avenue
2. E. King Street and Church Street
3. E. King Street and Bridge Street
4. E. King Street and Channing Avenue
5. E. King Street and SEPTA Parking lot driveway
6. E. King Street and Shopping Center driveways / Powelton Avenue
7. E. King Street and Sugartown Road
8. Monument Avenue and Sugartown Road
9. Monument Avenue and Powelton Road
10. Old Lancaster Avenue and Bridge Street
11. W. Broad / E. Broad Street and Bridge Street
12. W. Broad Street and Warren Avenue
13. E. 1st / W. 1st Avenue and S. Warren Avenue
14. Paoli Pike and S. Warren Avenue

Traffic counts were conducted at the following locations:

1. E. King Street in the vicinity of Ruthland Avenue
2. E. King Street in the vicinity of Griffith Avenue
3. W. King Street in the vicinity of Malvern Avenue
4. W. 1st Avenue in the vicinity of Prospect Avenue
5. E. 1st Avenue east of Church Street
6. 2nd Avenue east of Church Street
7. Old Lincoln Highway in the vicinity of Margaret Lane
8. Bridge Street in the vicinity of W. Broad / E. Broad Street
9. Sugartown Road in the vicinity of Monument Avenue
10. S. Warren Avenue south of 2nd Avenue



# Chapter 3

## Existing Conditions Evaluation





### 3 | Existing Conditions Evaluation

#### A | Multimodal Transportation Network

Like many boroughs of its age and size, Malvern benefits from a compact grid design with a central street serving as the main commercial corridor. This classic layout tends to result in a community that is easily navigable on foot. That same grid layout also provides increased connectivity for other modes. With very few one-way streets in Malvern, bicycle and automobile traffic have ample options to navigate the borough. Malvern also benefits from both bus and regional rail service provided by the Southeastern Transportation Authority (SEPTA). The overall multimodal transportation network in Malvern Borough is described below.

Even with the benefit of the compact grid layout, the infrastructure needed to support walking in the borough is fragmented and in disrepair in some locations. The sidewalk network is mostly complete in the areas closest to the central business district along King Street (see **Figure 3.1**). Neighborhoods farther away from the downtown core generally have more missing sidewalk links. In various areas throughout the borough, sidewalks are either in disrepair or do not meet current design standards. An assessment of current sidewalk and crosswalk conditions is detailed later in this chapter. In the past, Malvern Borough has done a good job requiring sidewalks to be built as part of the land development process, and the borough has even completed some of the missing connections or upgrade other segments via capital improvement projects.

Trail connections into the borough are limited. However, less than a mile to the north of Malvern is the Chester Valley Trail, part of the regional trail network known as The Circuit. A connection from Malvern to the Chester Valley Trail has long been discussed as part of the Patriots Path. Additionally, East Goshen has been working to develop a trail along Paoli Pike that would end in Applebrook Park, less than 1.5 miles to the west of Malvern. Both Malvern and Willistown Township collaborated in 2013 to develop a Malvern–Willistown Greenway Master Plan (see **Figure 3.3**); which identifies a proposed greenway along Paoli Pike as Phase I for

implementation. Existing and planned trails in the Malvern area are shown on **Figure 3.2**.

Due to its mostly residential nature, the functional classification of most roadways within Malvern is that of a local road, as depicted in **Figure 3.4**. Notable exceptions are listed in **Table 3.1** below. Many of the roadways in Malvern Borough have seen significant traffic growth in recent years. For example, the Average Daily Traffic (ADT) along S. Warren Avenue was measured at 11,972 during this study. This is nearly double the ADT of 6,672 measured in 2012.

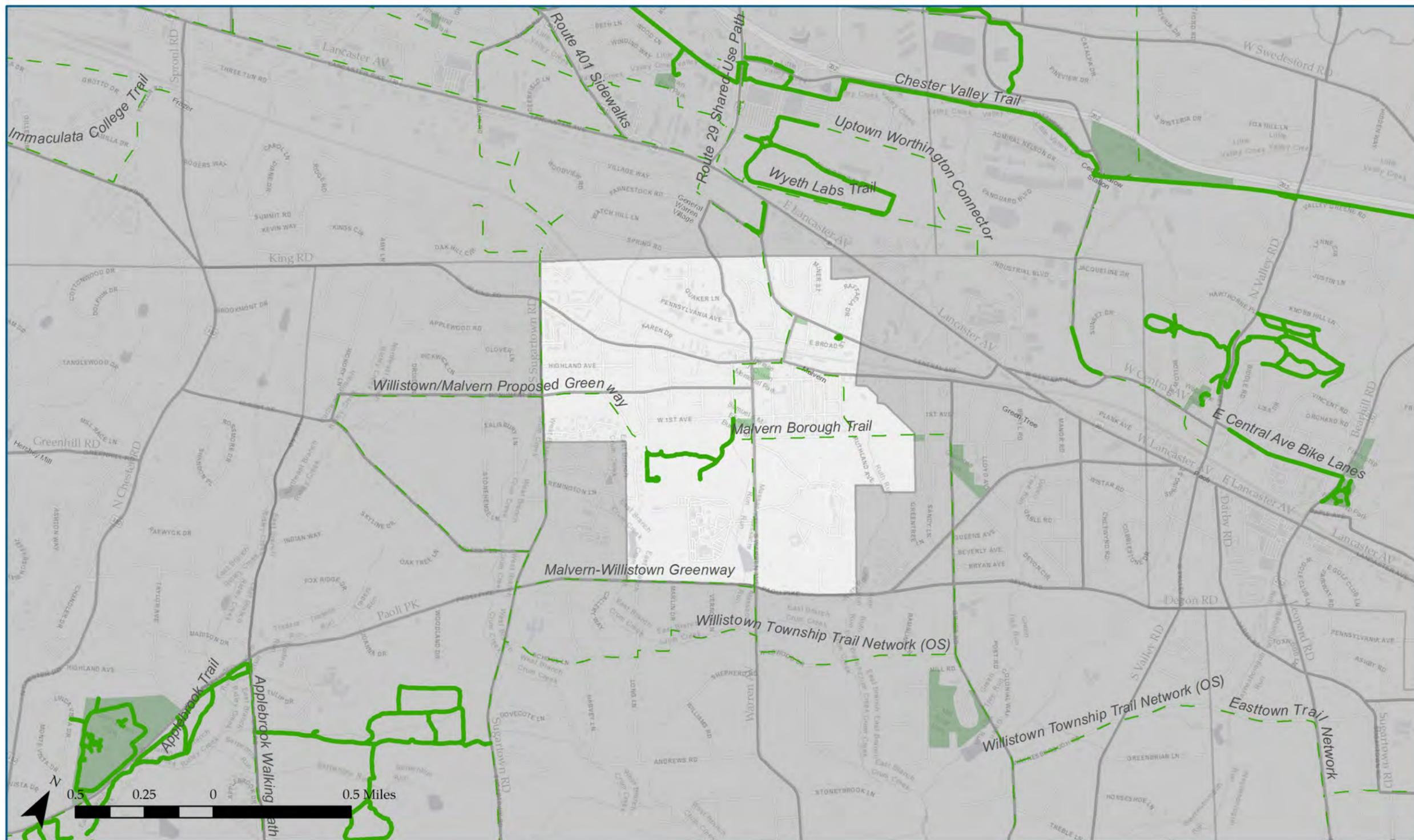
**Table 3.1: Malvern Borough Roadway Characteristics**

Road	Functional Classification	ADT	Year of ADT	Posted Speed	Shoulders
S. Warren Avenue	Minor Collector	11,972	2017	25 / 35 mph	No
N. Warren Avenue	Local Distributor	1,335	1996	25 mph	No
Bridge Street	Minor Collector	9,679	2017	25 mph	No
Old Lincoln Highway (Bridge Street to EWT)	Minor Collector	11,434	2017	25 mph	No
Old Lincoln Highway (Bridge Street to Willistown)	Local Distributor	2,628	1996	25 mph	No
Paoli Pike	Minor Arterial	13,429	2012 / 2014	35 / 45 mph	5'
King Street (near Ruthland Ave)	Major Collector	5,623	2017	25 mph	No
King Street (near Sugartown Rd)	Major Collector	4,124	2017	25 mph	No
Sugartown Road	Major Collector	6,860	2017	40 mph	No
Monument Avenue	Local Distributor	2,710	1996	25 mph	No



# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 3.2: AREA TRAILS



### Legend

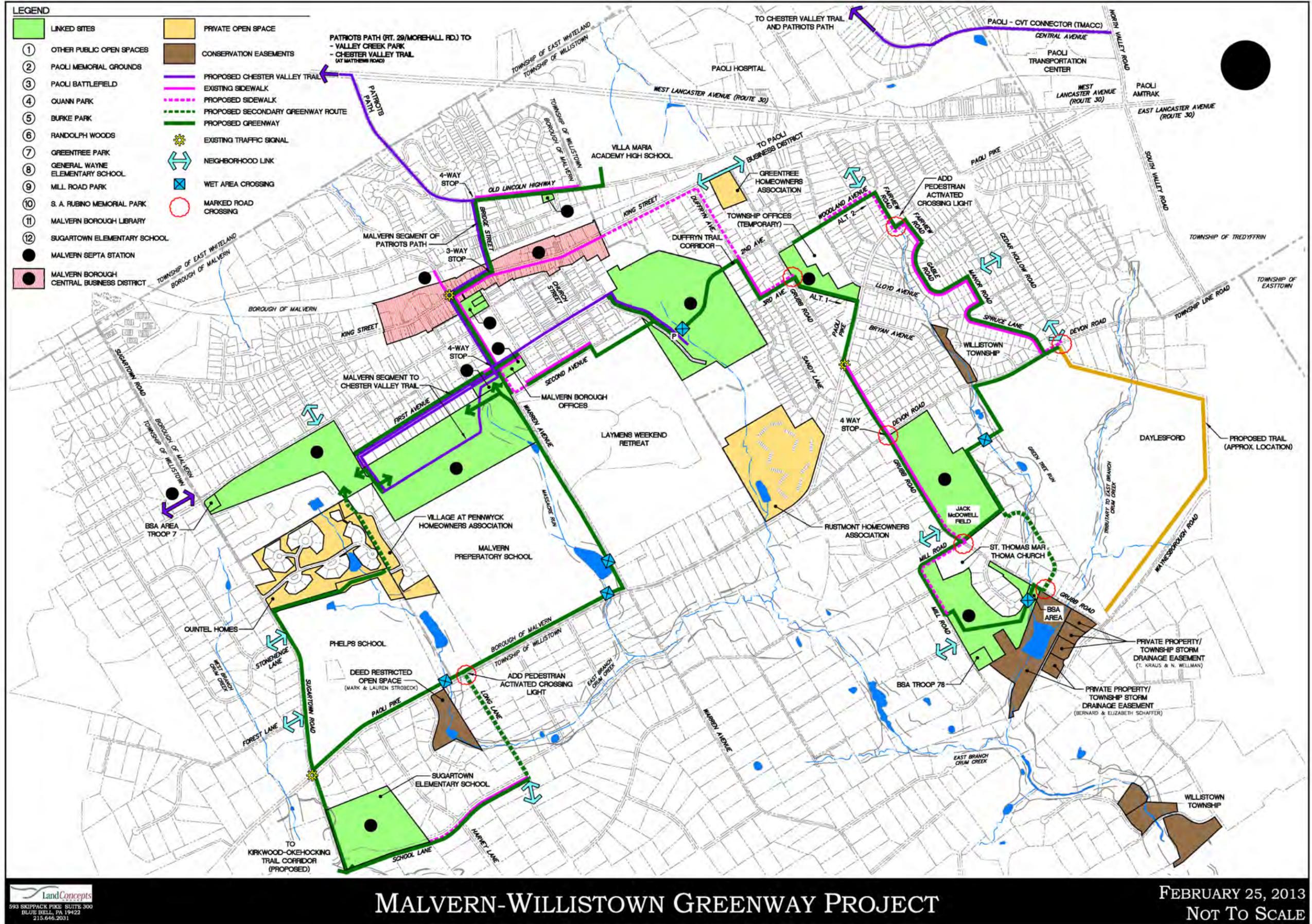
#### Trail Status

- Existing
- Design/Construction
- Proposed

Sources:  
Trails - Chester County  
GIS

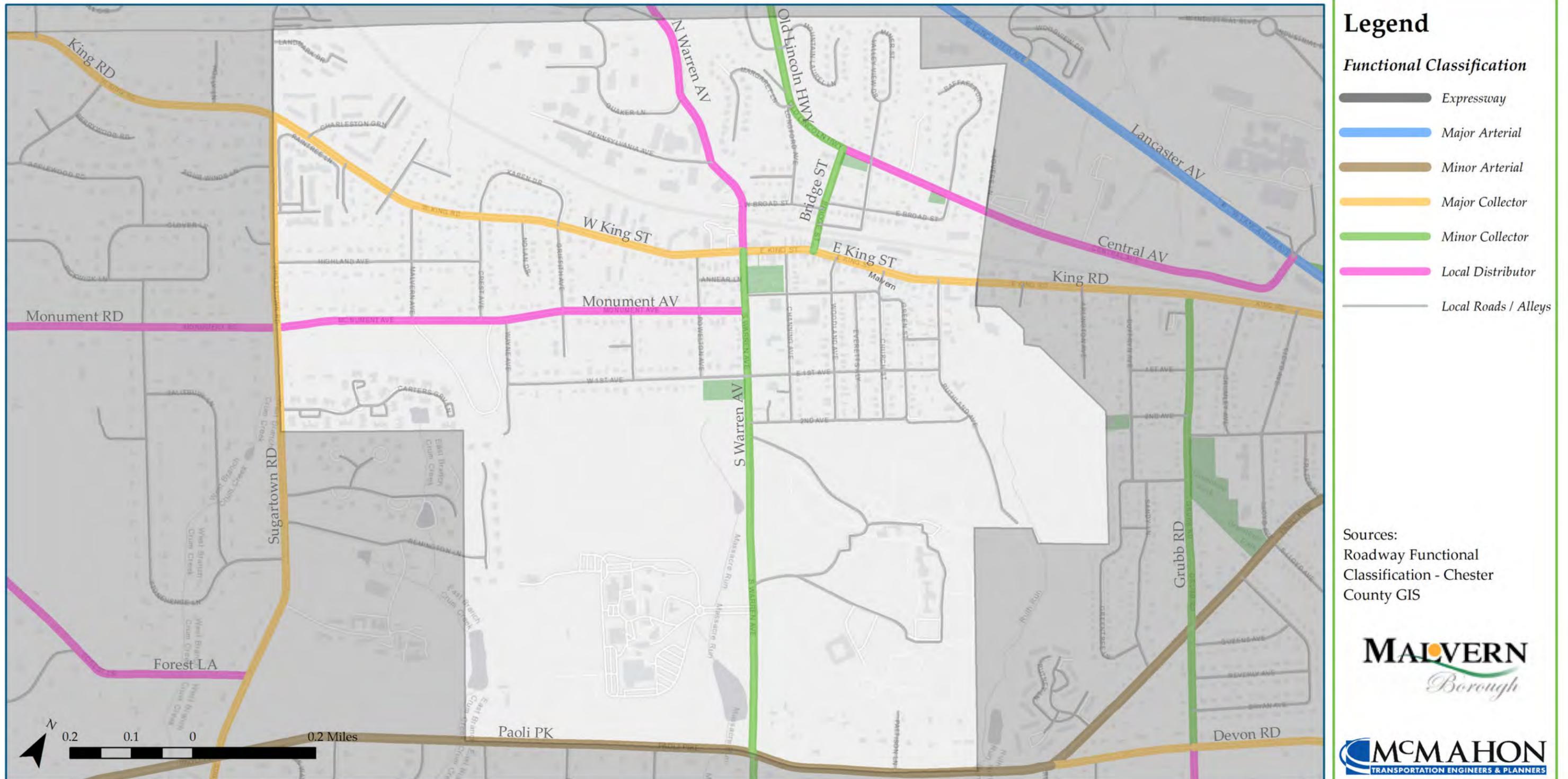


Figure 3.3: Trail Network Map (Malvern-Willistown Greenway Master Plan)



# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 3.4: ROADWAY FUNCTIONAL CLASSIFICATION



## B | Sidewalks / Crosswalks

The typical sidewalk section in Malvern Borough is 4' wide with a 2' grass buffer to the curb (see **Figure 3.5**). This is an outdated standard that does not meet current design standards within the Americans with Disabilities Act (ADA), which requires a minimum width of 5' for sidewalks. Closer to the central business district, sidewalks are generally wider but lack a buffer from the curb. On-street parking is permitted on most roads within the central business district with the exception of Warren Avenue where the sidewalks are approximately 8' – 10' wide.

**Figure 3.5: Typical Sidewalk Section**



In addition to the areas noted in the central business district of Malvern, there are a few additional sections of sidewalk that do not have a buffer from the sidewalk. They are listed below.

- King Street—generally no buffer on the north side between Karen Drive and Powelton Avenue
- Malvern Avenue—east side
- Griffith Avenue— east side near Monument Avenue
- Powelton Avenue—King Street to 1st Avenue
- Broad Street—Warren Avenue to Bridge Street
- Longford Avenue
- Roberts Lane—south side between Channing Avenue and Woodland Avenue

### King Street

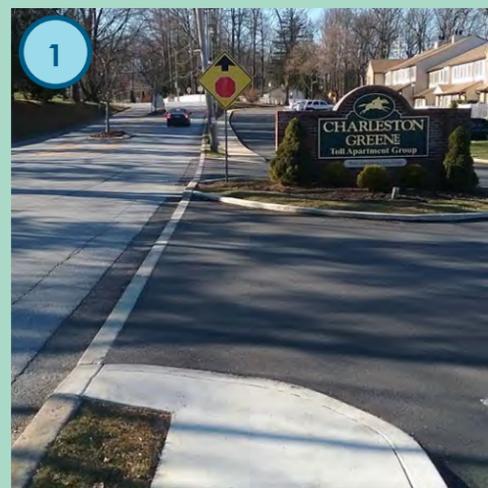
A majority of pedestrian volume in Malvern occurs on King Street, so special attention was paid to documenting the existing conditions there. On King Street, in the central business district, the sidewalks are approximately 8' – 10' wide. In front of the Eastside Flats, the sidewalks are 10' – 15' wide with bump-outs near the intersections. Across the street, the sidewalk is 5' – 6' wide with no buffer.

Many of the crosswalks on the western end of King Street have existing curb ramps but do not have detectable warnings. Instead they utilize a stamped concrete brick pattern as shown here. This is utilized in other areas of the borough, but is most prevalent on the western end of King Street. This type of treatment does not meet ADA design standards for a detectible warning system with truncated domes.



West of Karen Drive / Griffith Avenue much of the sidewalk on King Street follows the typical section as the rest of the borough (4' sidewalk, 2' buffer). However, there are a few key pinch points:

1. The sign and landscaping for Charleston Green obstructs the sidewalk and walking path.
2. There is an approximately 135' section between Malvern Avenue and Crest Avenue where the sidewalk is only 2.5' wide with no buffer and obstructed by telephone poles.
3. There is an unusual ramp connecting Winston Cutting Drive to Raintree Lane.



- Bridge Street
  - 1st Avenue—north side between Powelton Avenue and Woodland Avenue
- Curb ramps are present at nearly all intersections where sidewalks are also present in Malvern Borough. Intersections with missing curb ramps are listed below.
- Crestside Way / Jennings Lane
  - 1st Avenue / Woodland Avenue—only a ramp on southwest corner

- Old Lincoln Highway / East Broad Street—no ramp in southwest corner (also no sidewalk)
- King Street / Bridge Street—no ramp on south side of King Street

There are two mid-block crossings in Malvern Borough. One crosses Channing Avenue diagonally. Providing a crossing between St. Patrick Church and St. Patrick School. It utilizes the ladder marking style and does not have detectable warnings on the curb ramps. The other is on W. 1st Avenue. It utilizes two parallel lines and does not have curb ramps to the sidewalks.



Crosswalks are not widely marked in Malvern Borough. Where crosswalks are marked, the most common style is the painted continental crosswalk pattern. Below is a listing of intersections with marked crosswalks indicating the type of marking and if detectable warnings are present. If an intersection does not appear on this list, that intersection does not have marked crosswalks.

**Table 3.2: Existing Crosswalk Inventory**

Primary Street	Secondary Street	Type of Marking	Detectable Warning	Notes
King Street	Sugartown Road	Continental	No	Only on WB approach
King Street	Karen Drive / Crest Avenue	Continental / Stamped Brick	No	Stamped brick on EB approach
King Street	SEPTA Lot	Continental	Yes	Only on SB approach
King Street	Powelton Avenue	Continental	Yes	Only on EB and NB approaches
King Street	Warren Avenue	Ladder	No	
King Street	Channing Avenue	Continental	Yes	Only on EB and NB approaches
King Street	Bridge Street	Ladder	No	Only on EB and SB approaches
King Street	Eastside Flats Driveway 1	Ladder	Yes	Only on SB approach
King Street	Church Street	Stamped Brick	Yes	
King Street	Eastside Flats Driveway 2	Ladder	Yes	Only on SB approach
King Street	Ruthland Avenue	Stamped Brick	Yes	
Old Lincoln Highway	Raffaella Dr / Broad Street	Ladder	Only on ramp in NW corner	No crosswalk on WB approach, no ramp in SW corner
Old Lincoln Highway	Miner Street	Continental	No	Only on WB and SB approaches
Old Lincoln Highway	Bridge Street	Continental	No	Only on NB approach
Warren Avenue	SEPTA Lot	Continental	Only on SEPTA Lot	
Warren Avenue	Roberts Lane	Continental	On NW and NE corner	
Warren Avenue	Monument Avenue	Continental	Yes	Only on EB approach, no sidewalk on east side of Warren Avenue
Warren Avenue	1st Avenue	Continental	Yes	Only on EB and NB approaches, no sidewalk in NE corner
Monument Avenue	Wayne Avenue	Continental	On west side of Wayne Avenue	No crossing of Monument Avenue
Monument Avenue	Powelton Avenue	Continental	Yes	
Monument Avenue	Griffith Avenue	Continental	No	Only on NB approach
Monument Avenue	Crest Avenue	Continental	On side side of Monument Avenue	Only on EB and SB approaches
Monument Avenue	Malvern Avenue	Continental	Yes	Only on SB approach
Roberts Lane	Channing Avenue	Continental	Yes	
1st Avenue	Powelton Avenue	Continental	Yes	Only on SB approach
1st Avenue	Channing Avenue	Continental	Yes	Only on WB and NB approaches, no sidewalk in NW corner
2nd Avenue	Channing Avenue	Continental	Yes	Only on SB approach

**Typical Crosswalk Markings**

Continental



[www.pedbikeimages.org](http://www.pedbikeimages.org) / Dan Burden

Ladder



[www.pedbikeimages.org](http://www.pedbikeimages.org) / Dan Burden

Stamped Brick



[www.pedbikeimages.org](http://www.pedbikeimages.org) / Dan Burden



### C | On-road Bicycling

There are no dedicated on-road biking facilities in Malvern. On-road biking facilities include bike lanes, sharrows, cycle tracks, and shared use streets. Even without these facilities, many of the borough’s streets are perfectly suitable for even inexperienced cyclists to navigate.

In 2017, DVRPC completed a project to map the relative stress of biking on every road in the region.

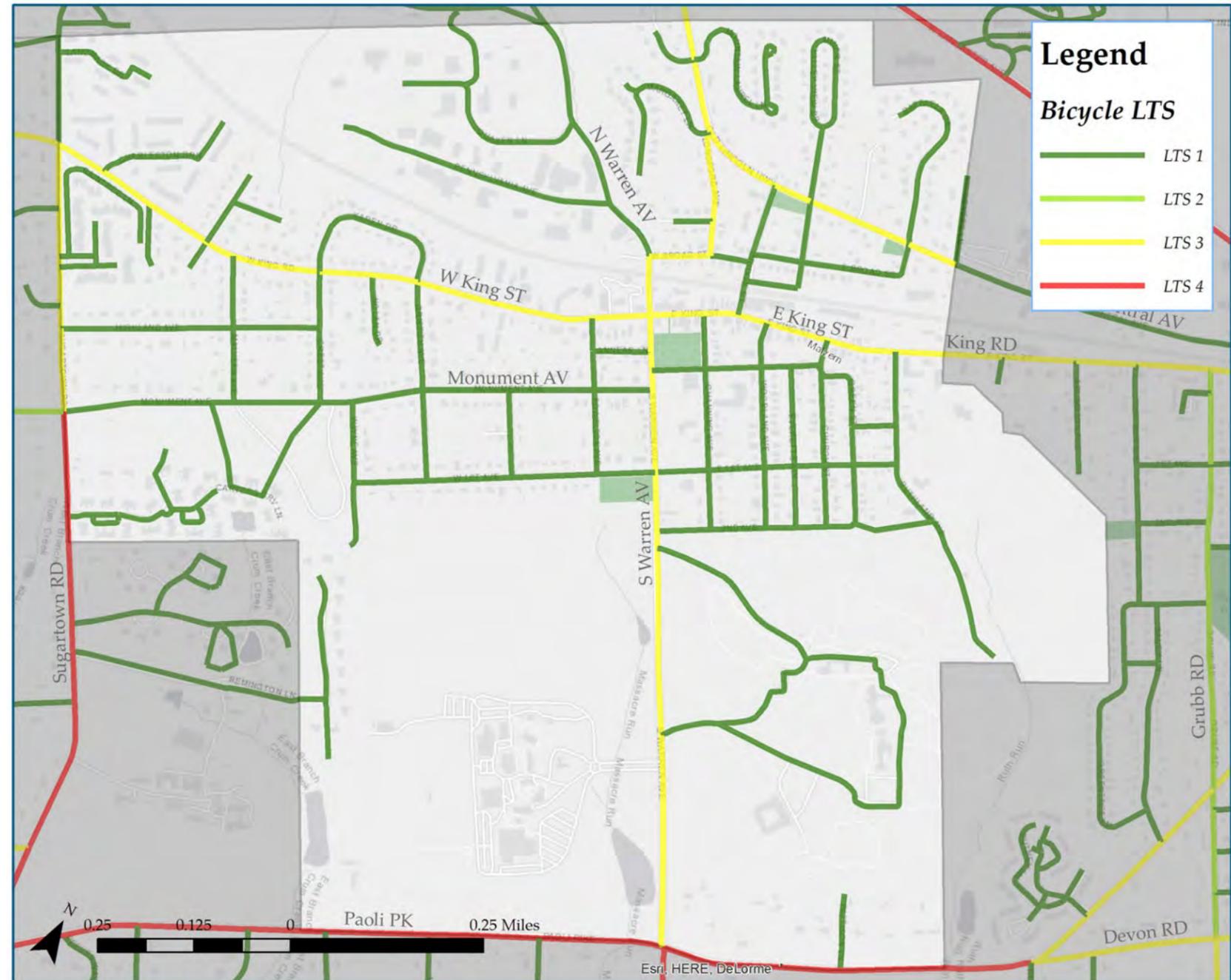
“Level of Traffic Stress (LTS) is a road classification scheme based on the comfort of bicyclists in the traffic stream. DVRPC’s LTS assignment is based on the number of lanes, effective vehicle speed, and presence / type of bicycle facility.”

Source: DVRPC

The Bicycle LTS is divided into four categories. LTS level 1 are roads that are comfortable enough for most people to ride on; characterized as being relaxing and suitable for children. Level 2 roads are appropriate for people that are interested in riding bicycles, but concerned about safety. These roads are characterized as suitable for most adults and presenting little traffic stress. LTS level 3 roads are for riders that are enthused and confident. Level 3 roads have a moderate level of traffic stress and are comfortable for people who ride regularly. The highest level of traffic stress, LTS 4, are only comfortable for the strongest and fearless riders. They are characterized by high traffic stress and are often multilane roads with fast moving traffic.

The results of DVRPC’s Bicycle LTS analysis for Malvern are shown on **Figure 3.6**. Most neighborhood streets in the borough fall into the Bicycle LTS level 1; indicating they would be comfortable enough for most people to bicycle on. However, many regional connections fall into the Bicycle LTS level 3 or 4 category. Particularly, on-road connections to the Chester Valley Trail and to Applebrook / East Goshen Township Park, as were identified as priorities during the public input process.

Figure 3.6: Bicycle Level of Traffic Stress



Source: Bicycle LTS– DVRPC



### D | Ordinance Review

The Malvern Borough Code was examined to determine areas where the current ordinance is not addressing transportation as effectively as it could. Most effort was focused on examining the Zoning Ordinance and Subdivision and Land Development Ordinance (SALDO). However, other chapters within the code were examined as well. The zoning ordinance and SALDO have the largest potential impact on the transportation network. Through these regulations, the borough can require that certain transportation features be constructed; controlling when, where, and their design.

A summary of transportation related standards in Malvern Borough’s Zoning Ordinance and Subdivision and Land Development Ordinance are identified in **Table 3.3**. Both the differences between the two ordinances and areas where they are not effectively regulating have been identified. It is important to note that these two ordinances serve distinct purposes. As such, every issue is not and should not be addressed in both ordinances. In fact, the Zoning Ordinance and SALDO should complement each other to support the overall community vision for transportation. Generally, SALDOs contain more design standards than zoning ordinances. However, to avoid confusion, industry best practice is to maintain consistent definitions between the two ordinances.

Additionally, the Malvern Borough Code contains additional ordinances regulating streets, sidewalks, vehicles, and traffic. These ordinances cover items ranging from the required location of sidewalks to the names, widths, and speed limits on borough streets. Most notably:

“All new buildings constructed in the Borough Malvern after May 8, 1972, shall provide both sidewalks and curbing, the design and location of which shall be determined by the Borough Engineer and approved by Borough Council. Such plans and specifications shall be available for inspection at the borough office.”

§ 179-22

“All existing buildings lacking sidewalks or curbing shall be required to install the same at such time as may hereafter be determined by resolution or ordinance of Borough Council.”

§ 179-24

These ordinances give the borough additional authorization to require sidewalks beyond the requirements of the Zoning Ordinance and SALDO. In the past, Borough Council has exercised this power to authorize the construction of streets, curbs, and sidewalks on various streets throughout the borough. The first instance of this occurred in 1889 (not a typo). More recently, these ordinances were used to accept dedication of streets built by private land developers and to vacate and abandon public rights of way that were never improved by the borough.

The full ordinance review table is located in the Appendix of this document.

**Table 3.3: Summary of existing standards in existing ordinances**

Standard	Zoning Ordinance	SALDO
<b>Pedestrian Facilities</b>		
Definitions	“Sidewalks” are defined in the Zoning Ordinance, but not in the SALDO	“Pedestrian Walkways” are defined, but not mentioned again in the document
When Required	Only required when utilizing off-site parking lots	At the discretion of Borough Council
Where Required	Not addressed	Both sides of streets, in parking lots, where necessary
Design Standards	Not addressed	4’ minimum width; crosswalks must meet ADA standards*
Owner / Maintenance	Not addressed	Owner directly adjacent
Bus Stops	“Bus Stations” defined, but not mentioned again	Not addressed
Crosswalks	Not addressed	“designed to allow for pedestrian crossings in a safe manner”
<b>Trail Facilities</b>		
Definitions	“Greenway” defined, but not mentioned again in the document	“Bicycle Paths” are defined, but not mentioned again in the document
When Required	Not addressed	When desired by the opinion of Borough Council
Design Standards	Not addressed	15’ ROW, 6’ minimum width, meet ADA
Owner / Maintenance	Not addressed	The borough may take dedication, but is not required to
<b>Bicycle Facilities</b>		
Definitions	Not addressed	“Bicycle Lanes” are defined, but not mentioned again in the document
Bicycle Parking	Not addressed	Where required by the borough
<b>Roadways</b>		
Definitions	Both use various terms, but definitions are not consistent	
Various	Mostly refers to SALDO	Contains very detailed design standards

\*Current Americans with Disabilities Act standards requires a minimum width of 5’ for sidewalks (with exceptions allowed under certain circumstances).



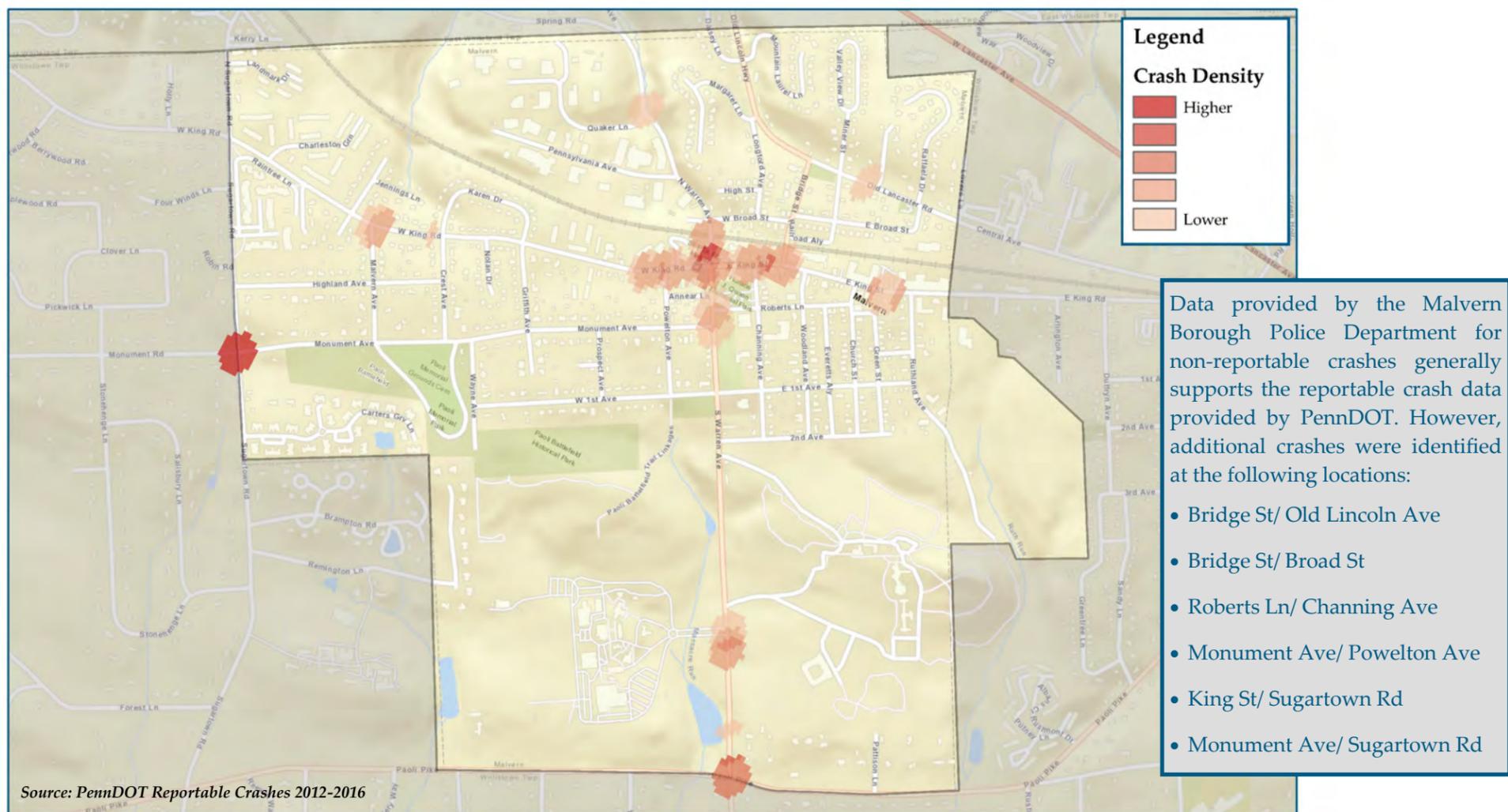
### E | Safety Summary

Available data from PennDOT shows that most reportable crashes in Malvern occur on King Street and Warren Avenue (see **Figure 3.7**) during the period between 2012 and 2016. This is not surprising as those roads are higher functional classification and likely carry more traffic than other roads in the borough. Additionally, there is a significant cluster of crashes at the Paoli Pike / Warren Avenue intersection. Again, this is not a surprise as the functional classification of Paoli Pike is a minor arterial. During the period studied, no crash related fatalities were reported in Malvern Borough. However, 32% of all crashes involved a reportable injury.

The most common type of crashes in Malvern are angle crashes. This crash type occurs at intersections involving vehicles traveling on perpendicular streets where one driver fails to yield the right of way to the other. In Malvern, about 30% of crashes are this type. With the only traffic signals at the intersections of King Street / Warren Avenue and Paoli Pike / Warren Avenue, more than 60% of angle crashes occurred at unsignalized intersections. Common causes of angle crashes include limited sight distance, crossing or making a left turn onto a busier road from a side street, and running red lights.

Additionally, there were four crashes involving pedestrians and one involving a bicycle. All of the crashes involving pedestrians occurred at various intersections along King Street. Nationwide, intersections are hot-spots for pedestrian crashes. Drivers are often busy negotiating the intersection, and people walking across the street are looking where they are going not at what is coming at them from the side.

**Figure 3.7: Crash Clusters**



### F | Traffic Operations

Based on input received from the Study Advisory Committee and through the public outreach strategy, the scope was refined to include traffic counts and analysis at various intersections in Malvern. The counts and analysis were conducted on weekday morning and afternoon commuter / school peak periods.

Automated traffic recorder (ATR) counts were conducted at ten locations throughout Malvern Borough. The ATR data captures daily traffic volumes, prevailing travel speeds, and vehicle classification. Data collected from the ATR counts is represented in **Figure 3.8**.

ATR data was collected at the following locations in Malvern Borough:

1. E. King Street in the vicinity of Ruthland Avenue
2. E. King Street in the vicinity of Griffith Avenue
3. W. King Street in the vicinity of Malvern Avenue
4. W. 1st Avenue in the vicinity of Prospect Avenue
5. E. 1st Avenue east of Church Street
6. 2nd Avenue east of Church Street
7. Old Lincoln Highway in the vicinity of Margaret Lane
8. Bridge Street in the vicinity of W. Broad / E. Broad Street
9. Sugartown Road in the Vicinity of Monument Avenue
10. S. Warren Avenue south of 2nd Avenue

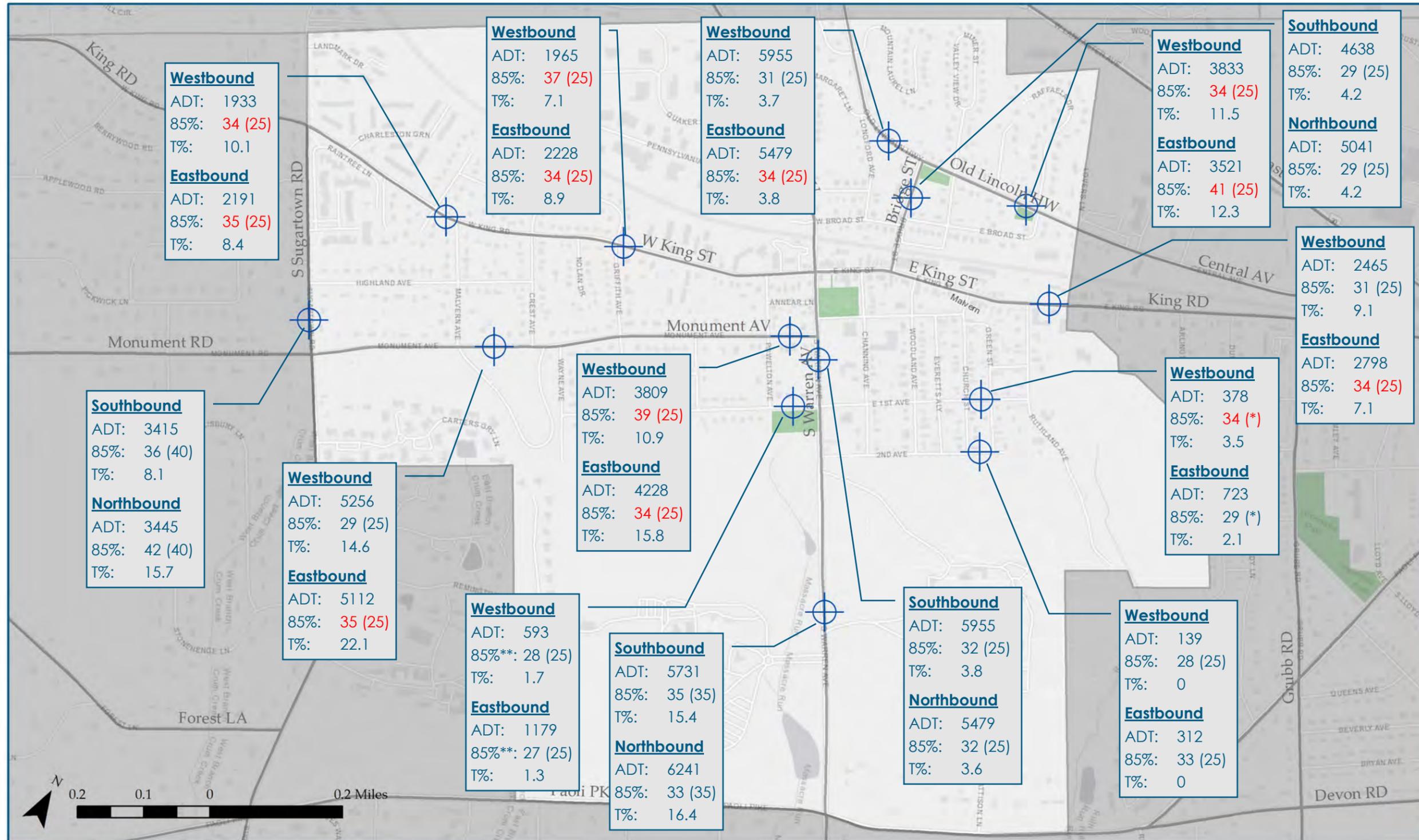
Key highlights from the ATR data are:

- Highest percentage of truck volumes are on Warren Avenue south of 2nd Avenue and Sugartown Road in the northbound direction
- Highest traffic volumes are on Old Lincoln Highway, Bridge Street, and Warren Avenue
- Areas with excessive speeding (most vehicles traveling about 10 mph higher than the posted speed limit) are identified with red text in **Figure 3.8**.



# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 3.8: AUTOMATED TRAFFIC RECORDER DATA



### Legend



### How to Read ATR DATA:

ADT = Average Daily Traffic  
Average volume of vehicles on the road segment each day.

85% = 85th Percentile Speed  
The speed at or below which 85% of all vehicles travel. The posted speed limit is shown in parentheses.

(\* no posted speed limit - assumed 25 mph)

T% = Percent Truck Traffic  
The percentage of ADT that are trucks and heavy vehicles.

\*\* Speed data for W. First Avenue provided by Malvern Borough Police Dept.



Vehicular turning movements, pedestrian crossings, and heavy vehicles by approach were counted. Those intersections were:

1. E. King Street and Ruthland Avenue
2. E. King Street and Church Street
3. E. King Street and Bridge Street
4. E. King street and Channing Avenue
5. E. King Street and SEPTA parking lot driveway
6. E. King Street and Shopping Center driveways / Powelton Avenue

7. W. King Street and Sugartown Road
8. Monument Avenue and Sugartown Road\*
9. Monument Avenue and Powelton Road
10. Old Lancaster Avenue and Bridge Street
11. W. Broad / E. Broad Street and Bridge Street
12. W. Broad Street and N. Warren Avenue
13. E. 1st / W. 1st Avenue and N. Warren Avenue

\*An eleven hour count was conducted at this intersection for the purposes of evaluating traffic control warrants.

Based on the analysis, most intersections in the borough are performing at a level of service of C or higher (see **Table 3.x**). The only intersections that perform lower than a level of service C are: West King Street / Sugartown Road (LOS D in PM); East King Street / Bridge Street (LOS D in AM and PM); Old Lincoln Highway / Bridge Street (LOS F in AM and D in PM); and Paoli Pike / Warren Avenue (LOS E in AM and D in PM). Generally, it is acceptable for intersections to operate at a level of service C or higher.

**Table 3.3: Existing Level of Service at Key Intersections**

Intersection		Level of Service: AM (PM)				
East / West Street	North / South Street	Eastbound	Westbound	Northbound	Southbound	Overall
West King Street	Sugartown Road	B (C)	B (D)	B (C)	A (B)	B (D)
West King Street	Powelton Avenue	A (B)	A (A)	A (A)	A (A)	A (A)
West King Street	Warren Avenue	B (B)	A (B)	C(B)	B(C)	B (B)
East King Street	Channing Avenue	-	A (A)	B (B)	n/a	A (A)
East King Street	Bridge Street	D (E)	B (C)	n/a	C (D)	D (D)
East King Street	Church Street	-	A (A)	B (B)	n/a	A (A)
East King Street	Ruthland Avenue	-	A (A)	B (B)	n/a	A (A)
Old Lincoln Highway	Bridge Street	D (E)	C (C)	F (D)	n/a	F (D)
West Broad Street	Warren Avenue	B (B)	B (B)	A (A)	A (A)	A (A)
W/E Broad Street	Bridge Street	C (C)	C (C)	A (B)	A (A)	A (A)
Monument Avenue	Sugartown Road	D (C)	C (C)	A (A)	A (A)	A (A)
Monument Avenue	Powelton Avenue	A (A)	A (A)	C (B)	C (B)	A (A)
1st Avenue	Warren Avenue	B (B)	B (B)	D (C)	B (D)	C (C)
Paoli Pike	Warren Avenue	F (F)	B (C)	D (C)	D (F)	E (D)

## What is Level of Service?

Intersection level of service (LOS) is a definition of delay that vehicles experience at an intersection. It is determined in slightly different methods for signalized versus stop-controlled intersections. However, the general criteria are as follows:

Level of Service	General Description
A	Free flow
B	Stable flow (slight delays)
C	Stable flow (acceptable delays)
D	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	Unstable flow (intolerable delay)
F	Forced flow (congested and queues fail to clear)

Source: Highway Capacity Manual 2010



## G | Parking

On street parking is permitted on most streets in the borough with some streets requiring a parking permit be purchased from the borough. On-street parking along neighborhood streets was not raised by the public as a significant issue.

Parking is generally prohibited on King Street except in marked spaces where there is a two-hour parking limit, and parking is only permitted in designated locations. Public parking is also provided for King Street below the East-side Flats and in the public lot adjacent to Burke Park. Also, many commercial businesses along King Street provide off-street customer parking.



# Chapter 4

## Multimodal Transportation Solutions





## 4 | Multimodal Transportation Solutions

Recommendations to address the operational and safety issues identified through the study process were developed by the project team with input from the Study Advisory Committee. The solutions focus on vehicular, pedestrian, and bicycle travel, addressing current and potential future deficiencies in Malvern’s transportation system. Recommendations include a combination of capacity improvements, safety countermeasures, traffic calming, pedestrian / bicycle accommodations, and access management solutions. Some of the recommendations are generally applicable to the borough’s broader transportation network. While other recommendations address primary issues at critical locations throughout Malvern Borough.

The recommendations in this chapter are intended to improve upon Malvern Borough’s existing multimodal network by increasing the safety and convenience of traveling in the borough, regardless of ability or mode of travel. Three guiding principles were considered while developing the recommendations as identified earlier in this document:

- 1) Enhance the transportation network to improve access for all users and encourage non-vehicular travel;
- 2) Improve operations and safety for all users within the transportation network; and
- 3) Promote active transportation to improve the health and well-being of residents.

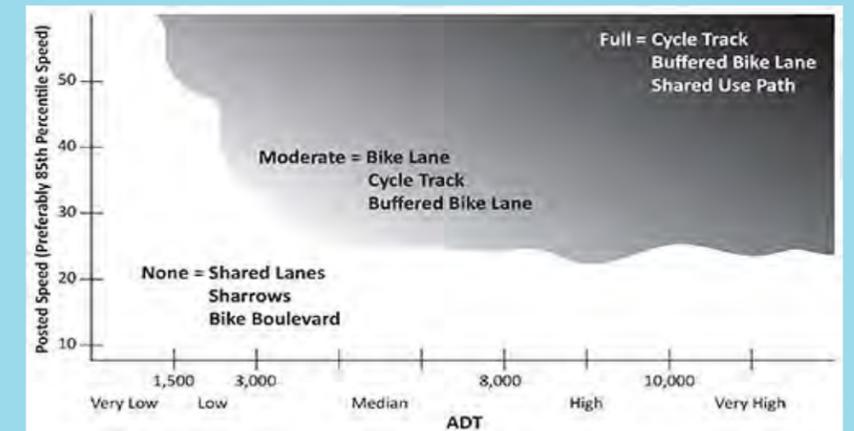
### A | Borough-wide Network Recommendations

Providing for convenient and safe travel for everyone regardless of ability or mode of travel is vital to maintaining the vibrancy of Malvern Borough. In general, the transportation network in the borough is able to serve the needs of people who walk, people who bike, people who use public transportation, and people who drive. However, there are certain aspects of the transportation network that, if improved, would transform how people move about the borough. The following recommendations should be broadly applied to the transportation network in Malvern Borough.

#### Improve Walkability

- Enforce sidewalk maintenance requirements in the Borough Code for existing sidewalks
- Consider taking dedication of sidewalks along priority corridors in the borough
- Continue to identify and allocate funding to construct missing sidewalk links through a borough-wide capital improvement project
- Develop streetscape design standards for new construction
- Upgrade handicap ramps at intersections over time

### Guidelines for Provision of Bicycle Facility Types



Source: Chester County Multimodal Handbook

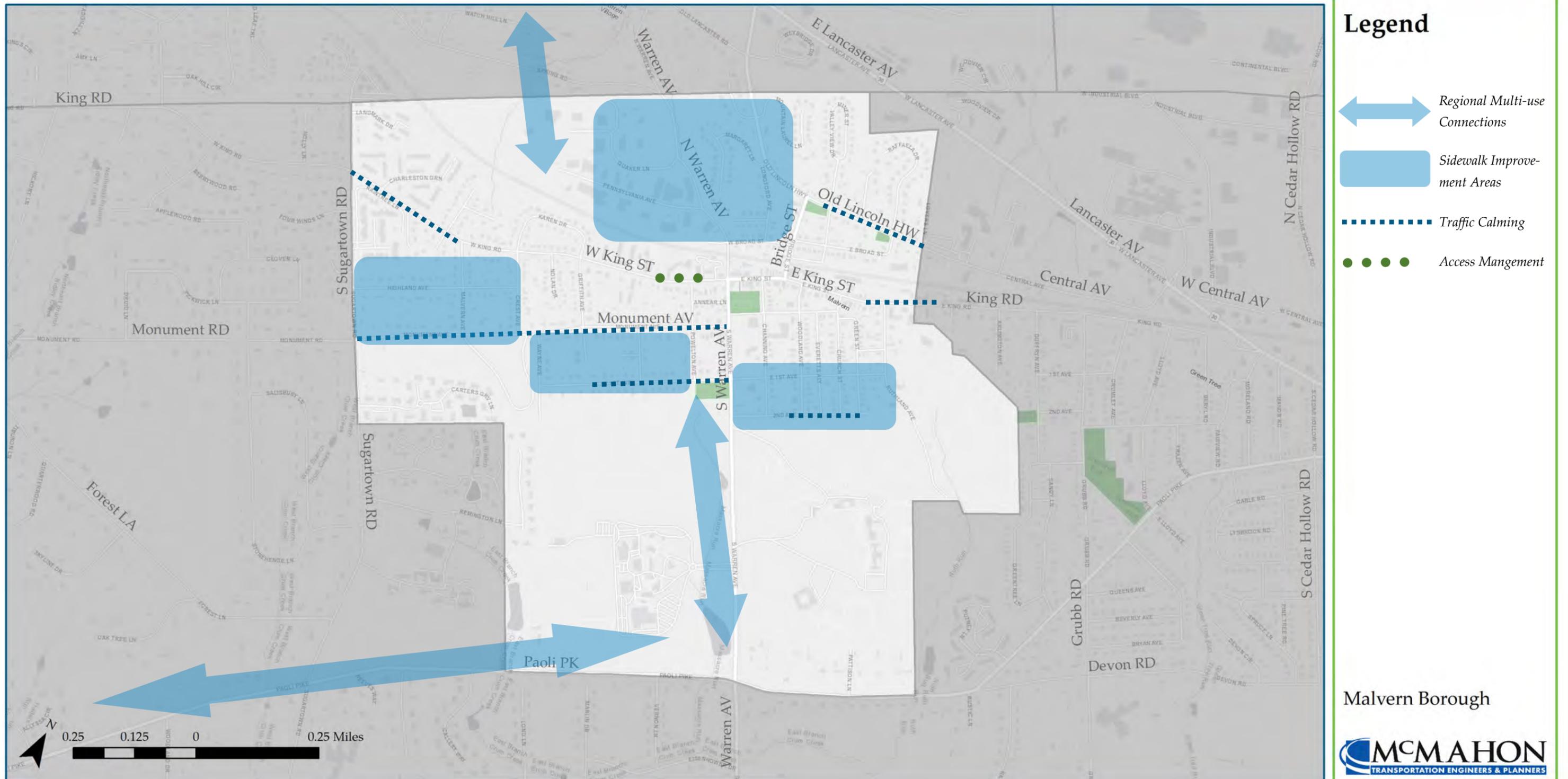
Based on the above guidelines, most roadways within Malvern Borough can serve bicyclists without a separated facilities. The following streets would warrant some level of separation as noted:

Paoli Pike	Shared Use Path
S. Warren Avenue	Shared Use Path
Old Lincoln Highway	Separate Bike Lane
Sugartown Road	Separate Bike Lane
King Street	Shared Lane or Bike Lane

In some cases, there are constraints that preclude provision of the above facility type.

# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 4.1: BOROUGH-WIDE TRANSPORTATION IMPROVEMENTS



### On-Road Bicycling

- Establish a network of safe borough streets for bicycling
- Incorporate bicycle facilities into maintenance / repaving projects on borough-owned streets, and incorporate traffic calming devices, as appropriate (see below)
- Provide bicycle racks to encourage bicycling by provided safe and secure locations to lock bicycles

### Traffic Calming

- Adopt a borough-wide traffic calming policy, including defined procedures for reporting, evaluating, and providing traffic calming measures
- Implement traffic calming strategies to discourage cut-through traffic and reduce vehicle speeds

### Transit

- Consider bus stop shelters along key routes within the borough, particularly along King Street.

### Regional Multimodal Connections

- Continue to be engaged in the Patriots Path Task Force to support the implementation of the Patriots Path Trail, which would provide a multiuse connection to the Chester Valley Trail
- Partner with Willistown Township to implement the Paoli Pike Trail as East Goshen builds its a multi-use connection to Applebrook Park

### Parking

- Review parking standards to be higher levels of vehicle ownership while encouraging non-vehicular trips. Consider eliminating minimum parking standards or introducing maximum parking standards.
- Encourage shared parking and cross access agreements to reduce the number of required parking spaces as well as the number of driveways.

These general network improvements are identified in **Figure 4.1**. The preferred street layout for residential streets, King Street central business district, and gateway corridors is presented in this chapter.

## Traffic Calming Toolbox

The following traffic calming measures are a few examples of potential measures (besides the common speed hump) that could be appropriate in certain locations within Malvern Borough. Some of these measures are specifically recommended for key locations.



### Curb Extension

- Narrows the roadway at intersections to slow vehicular speeds.
- Shortens pedestrian crossing distances and can improve sight lines
- If provided mid-block, they are referred to as chokers.



### Raised Intersection

- Provides a vertical deflection to slow vehicular speeds through the intersection.
- Pedestrian crosswalks can be included in the raised intersection design.
- Raised crosswalks can be provided without raising the entire intersection.



### Diagonal Diverter

- Diverts movements at intersections to a less convenient and circuitous route to discourage cut-through travel.



### Intersection Pavement Treatment

- Brings attention to intersection and slows traffic with pavement texture or special paint treatments.
- Provides an aesthetic enhancement and can compliment streetscape.



### Turning Movement Restriction and Retrofit Street Closure

- Restricts certain turning movements (sometimes only during certain times of the day) to reduce cut-through traffic.
- Full closures should be carefully considered for adverse impacts to surrounding streets and the potential decrease in street connectivity.



### Center Median

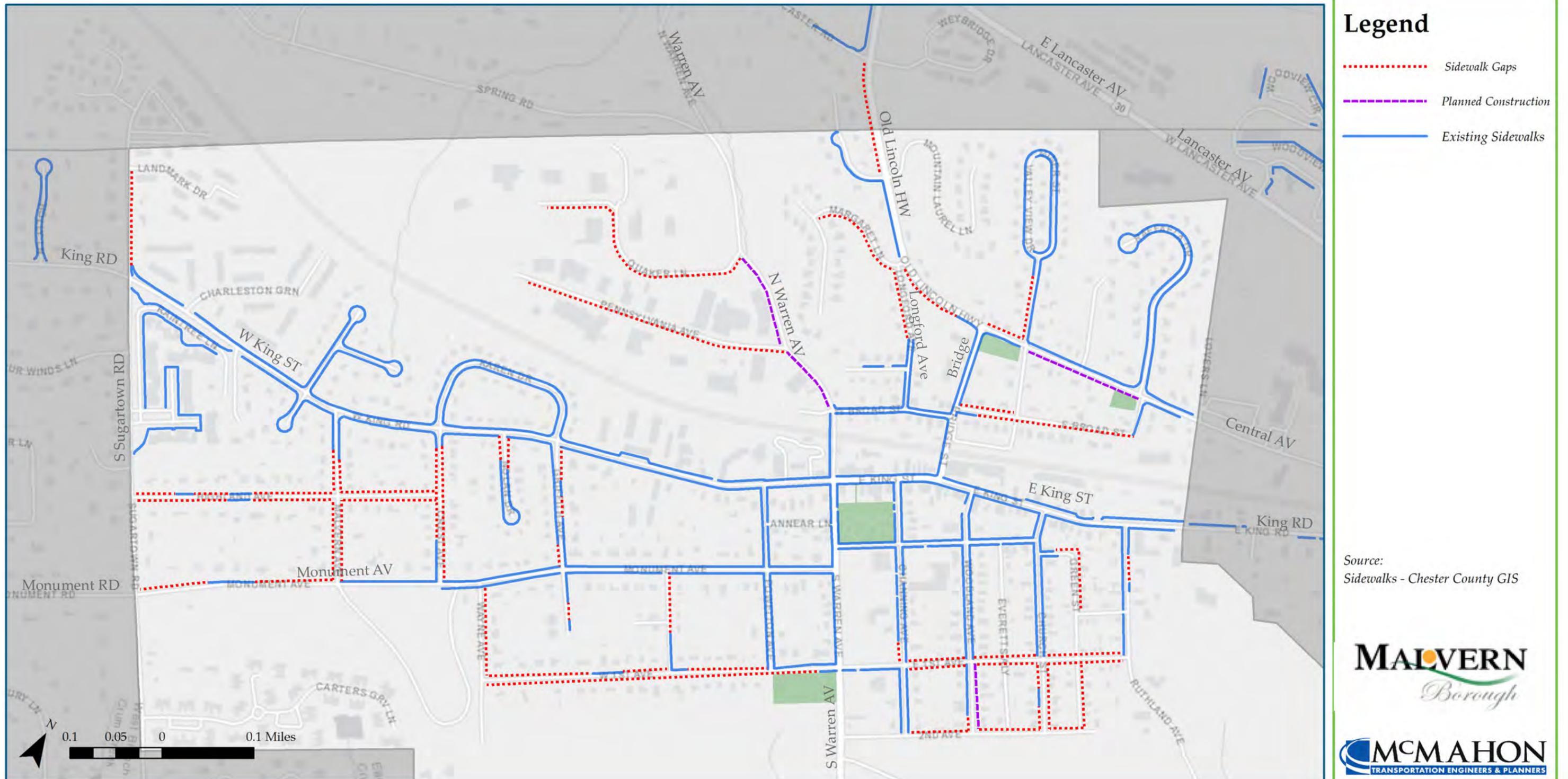
- Slows traffic by narrowing the travel lanes with landscaped median.
- Short medians can be provided in series and include gateway sign treatments.

Many traffic calming measures can be provided on an interim basis at relatively low cost with temporary materials in order to provide an immediate solution or to test the impacts and effectiveness of the installation.



# MALVERN MULTIMODAL TRANSPORTATION STUDY

## FIGURE 4.2: SIDEWALK NETWORK GAPS



### Residential Streets

In Malvern, there are many residential streets that adequately accommodate pedestrian, automobile, and bicycle travel. However, there are also many streets that only have sidewalks on one side of the road or not at all, have wide travel lanes that encourage speeding and cut-through traffic, and are not bicycle friendly.

The cross sections rendered below depict the typical existing and preferred street layout for residential streets in Malvern Borough. The existing cross section identifies potential issues caused by the design. The preferred cross section depicts strategies to address the issues caused by the existing design.

### Preferred Residential Streetscape Designs:

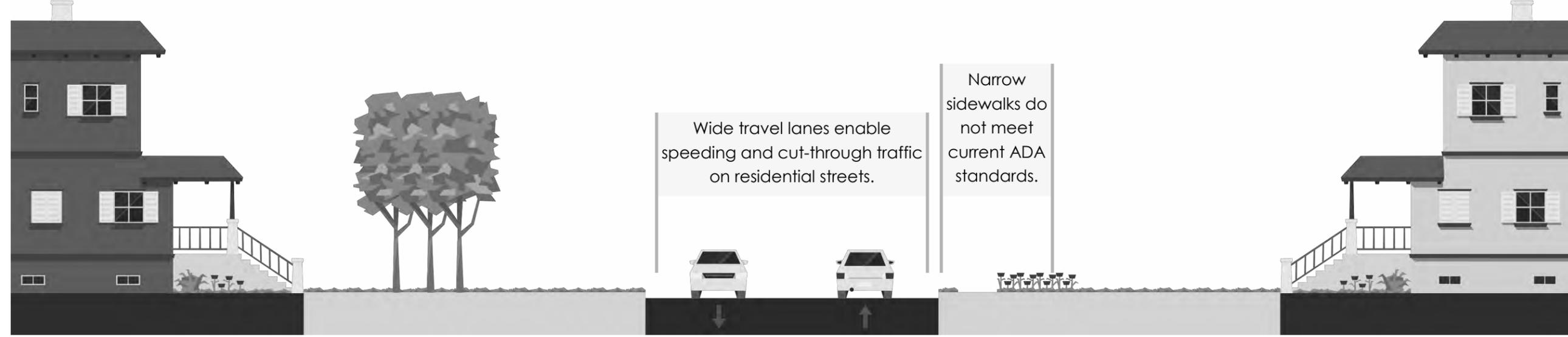


#### Sharrows

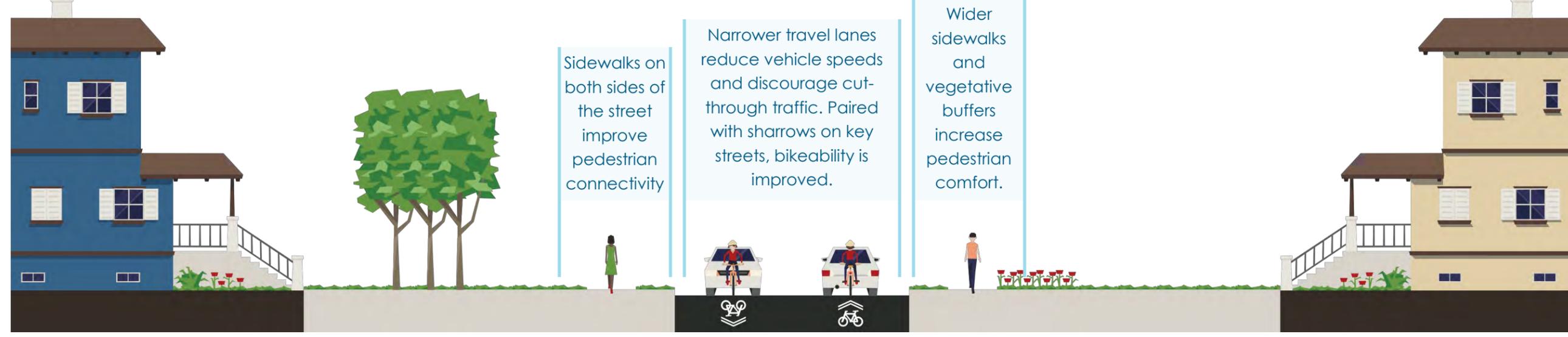
Shared lane markings, or "sharrows", are pavement markings on a roadway that indicate the travel lane may be occupied by bicycles and motor vehicles.

MUTCD figure 9C-9

### Existing Typical Residential Street Layout



### Preferred Typical Residential Street Layout



#### Dimensional Guidance

The proper cross-section dimensions should be based on PennDOT's Design Manual 2 for a Local Road in a Town Center or Suburban Neighborhood context.



King Street Central Business District

The central business district along King Street in Malvern Borough includes a mix of historic, mid-century, and modern redevelopment land-use types. This mix of development causes the streetscape design to be irregular. In the historic area, streetscape elements are squeezed between the building footprints and the cartway. In the mid-century area, buildings are set back more, but an emphasis was placed on accommodating automobiles with the design considerations. The modern redevelopments have tried to strike a balance between accommodating automobiles and providing adequate pedestrian facilities and streetscape.

The example provided is of the historic area of downtown Malvern. This area was chosen, because it has the highest amount of constraints that limit the amount of usable space for streetscape improvements.

Existing Typical King Street Layout



**Street Furniture**  
Street furniture is a term used for objects that are placed on sidewalks to provide additional convenience to pedestrians. These items often include benches, waste receptacles, planters, street lights, bollards, and interpretive signs.

Preferred CBD Streetscape Designs:



Preferred Typical King Street Layout



**Dimensional Guidance**  
The proper cross-section dimensions should be based on PennDOT's Design Manual 2 for a Community Collector in a Town Center context.

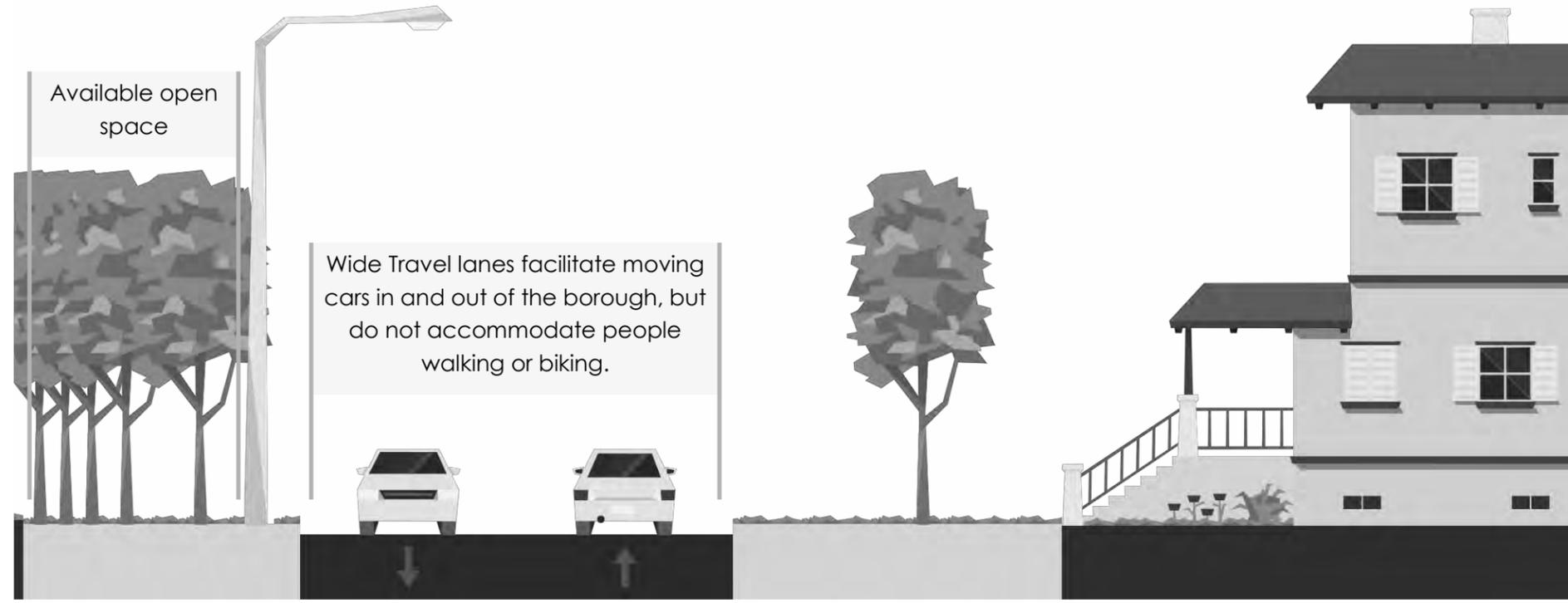


Gateway Corridors

Gateway corridors serve as the main access to and from the core of Malvern Borough. These streets include Old Lincoln Highway and South Warren Avenue. They have been typically designed to facilitate automobile and truck traffic accessing the borough. However, in the case of Old Lincoln Highway, some strides have been made to accommodate pedestrian mobility, though, missing links remain.

The land-use surrounding these roadways is a mix of wooded areas, institutional uses, and traditional housing. These land use patterns tend to consist of large parcel sizes with wide building setbacks. This could be seen as an opportunity to provide additional facilities for pedestrians and bicycles.

Existing Typical Gateway Street Layout



**Multi-use Trail**  
 A shared-use path for pedestrians and bicycles that is physically separated from motor vehicle traffic is commonly called a multi-use trail. These facilities can be located either within a public right of way or easement. Current best practices call for multi-use trails to be designed at least ten (10) feet wide.

Preferred Gateway Corridor Designs:



Preferred Typical Corridor Street Layout



**Dimensional Guidance**  
 The proper cross-section dimensions should be based on PennDOT's Design Manual 2 for a Neighborhood Collector in a Town Center context.



## B | Strategic Improvements

Some of the issues identified during the public input process put an emphasis on concerns at specific locations throughout Malvern Borough. The project team gave special attention to these areas to determine appropriate improvements that could be implemented to mitigate the existing safety and operational issues. The proposed improvements are intended to address pedestrian, bicycle, public transit, and traffic issues at each location.

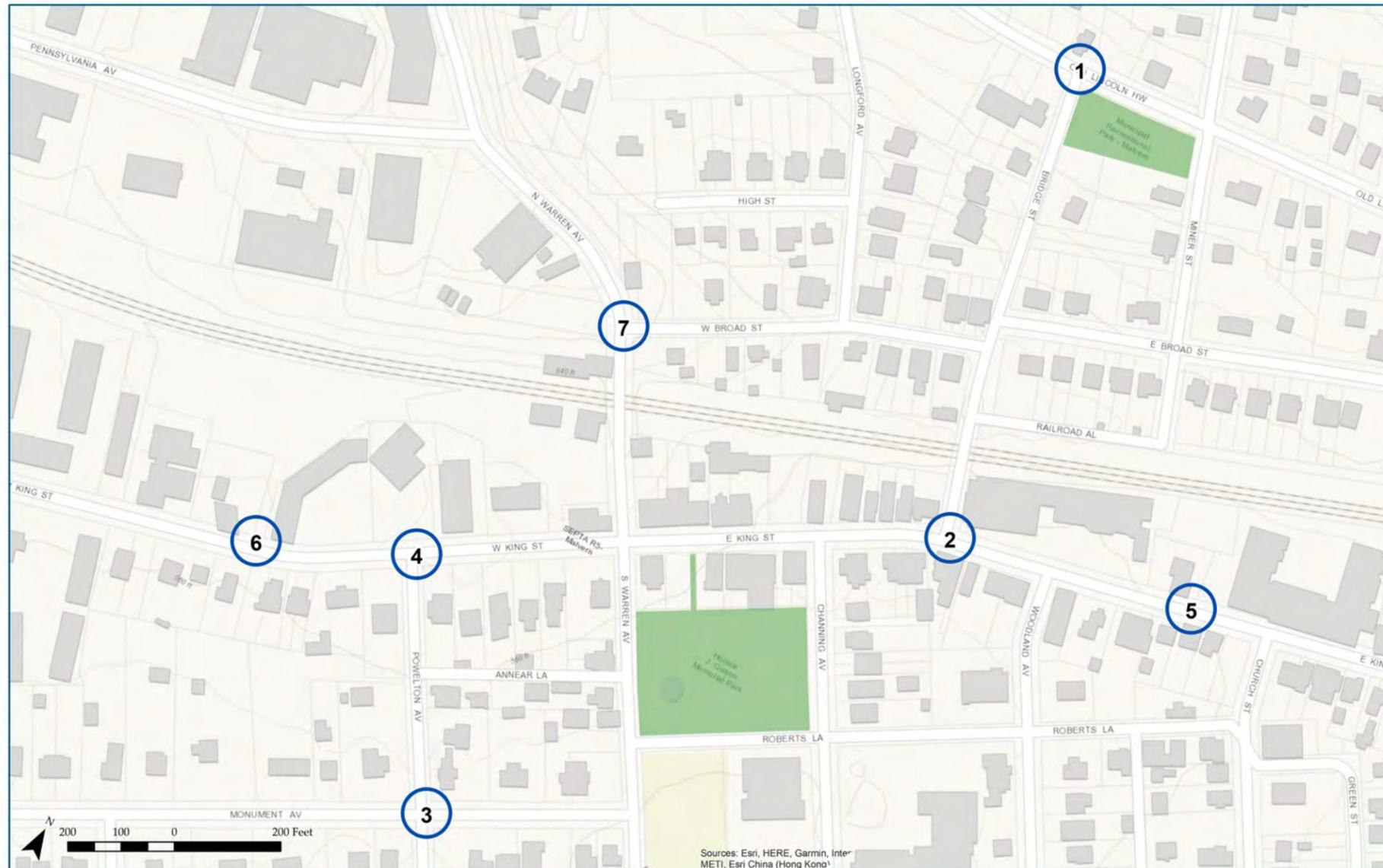
The project team looked at seven (7) locations in the borough to identify recommendations to improve these areas for all modes. The locations are:

1. Intersection of Bridge Street and Old Lincoln Highway
2. Intersection of Bridge Street and East King Street
3. Intersection of Monument Avenue and Powelton Avenue
4. Intersection of West King Street and Powelton Avenue

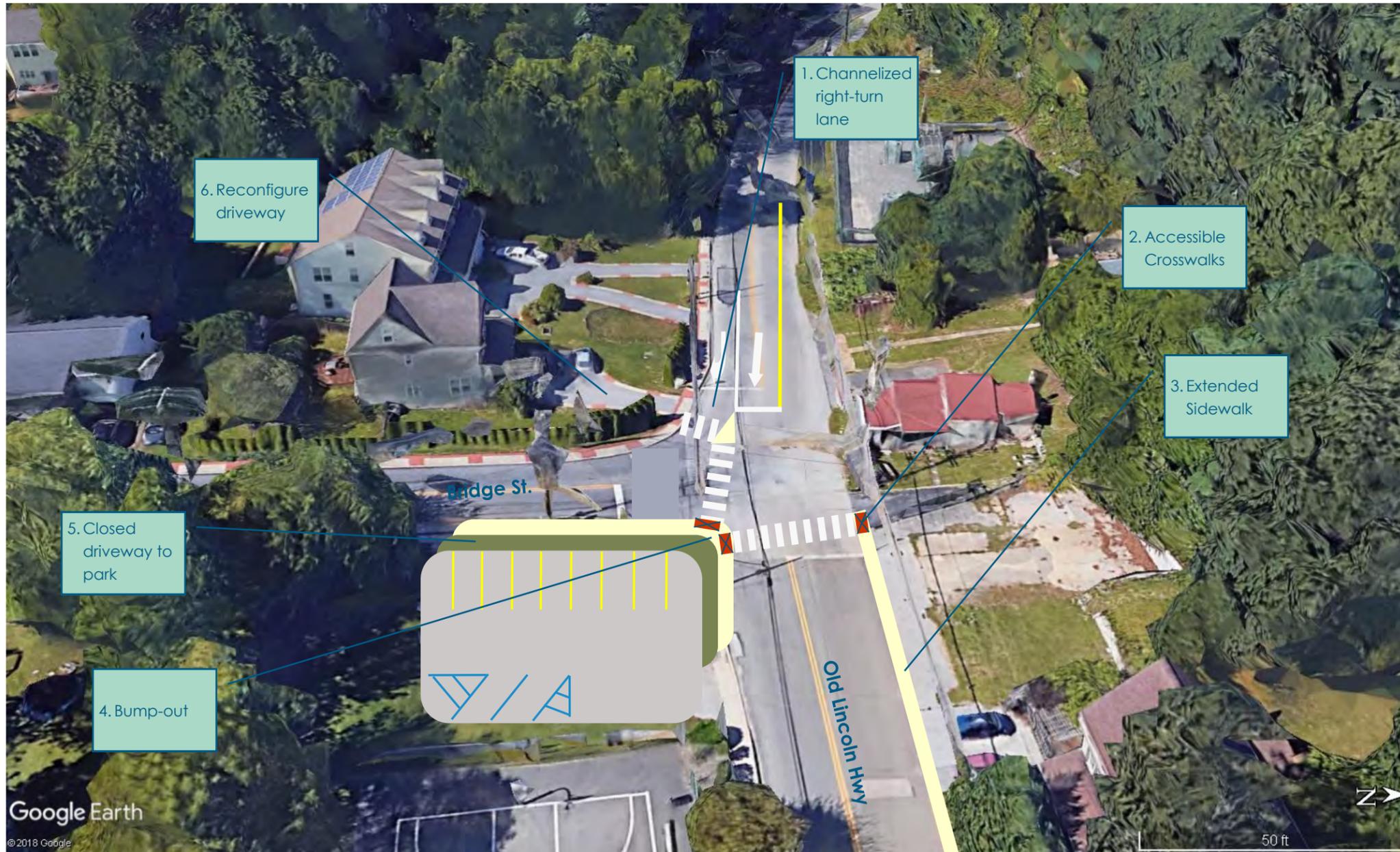
5. East end of King Street (Channing Avenue to borough line)
6. Intersection of West King Street and SEPTA Access
7. Intersection of North Warren Avenue and West Broad Street

Below, **Figure 4.3** depicts these strategic improvement locations. On the following pages, each location is presented with the existing issues, proposed solutions, and additional appropriate solutions.

**Figure 4.3: Strategic Improvement Locations**



Location 1: Intersection of Bridge Street and Old Lincoln Highway



Existing Issues:

- A. Poor pedestrian accommodations
- B. Heavy right turn movements from Old Lincoln Highway onto Bridge Street
- C. Heavy left turn movements from Bridge Street onto Old Lincoln Highway
- D. Driveways conflicts close to intersection

Proposed Solutions:

1. Channelize the right-turn movement from Old Lincoln Highway onto Bridge Street to reduce delay for traffic continuing straight
2. Provide accessible crosswalks across Old Lincoln Highway and Bridge Street
3. Extend the sidewalk along the north side of Old Lincoln Highway
4. Provide a bump-out to shorten the crossing distance for pedestrians
5. Close the driveway on Bridge Street for the community park (would also allow for additional parking)
6. Potential shared driveway for residences to move driveway away from intersection

Additional Appropriate Solutions:

- This intersection meets warrants for traffic signalization based on current traffic volumes.
- A roundabout could be considered, but may impact adjacent properties.



Location 2: Intersection of Bridge Street and East King Street



Existing Issues:

- A. Poor pedestrian accommodations
- B. Heavy right turn movements from Bridge Street onto King Street
- C. Heavy left turn movements from King Street onto Bridge Street
- D. Poor lighting (observed)

Proposed Solutions:

- 1. Install accessible pedestrian crosswalks
- 2. Provide overhead lighting to illuminate intersection
- 3. Install pedestrian crossing signs on each approach to advise drivers of the crosswalk



Additional Appropriate Solutions:

- This intersection meets warrants for traffic signalization based on current and future traffic volumes
- Decorative crosswalks or intersection treatment
- Possible Bridge Street extension to the south, connecting King Street and Roberts Lane
- Consider the use of bump-outs



Location 3: Intersection of Monument Avenue and Powelton Avenue



Existing Issues:

- A. Speeding vehicles on Monument Avenue
- B. Difficult for pedestrians to safely cross Monument Avenue (this is a heavily used pedestrian route between the Malvern School and the Malvern SEPTA station/central business district)
- C. Difficult for traffic on Powelton Avenue to cross intersection

Proposed Solutions:

- 1. Install bump-outs to reduce pedestrian crossing distance on Monument Avenue
- 2. Convert intersection to all-way stop controlled

Additional Appropriate Solutions:

- Decorative crosswalks



Location 4: Intersection of West King Street and Powelton Avenue



**Interim Approach:**  
Raised/textured crosswalk

Existing Issues:

- A. Poor access management (numerous driveways)
- B. Limited opportunities for pedestrian crossings
- C. Need for traffic calming

Proposed Solutions:

1. Convert western most entrance to Malvern Shopping Center to two-way.
2. Revise the interior circulation of the shopping center\*
3. Consolidate the driveways of the shopping center
4. Install new on-street parking
5. Install new pedestrian crossing and bump-out on eastern approach to King Street / Powelton Avenue
6. Convert to four-way intersection by converting the shopping center entrance to two-way and install "Don't Block the Box" signs
7. Consolidate driveways of Malvern Federal Savings Bank and Malvern Professional Building
8. Establish shared access between the Malvern Federal Savings Bank and Malvern Professional Building properties
9. Revise the parking orientation for Malvern Professional Building
10. Reverse circulation around Malvern Professional Building

Additional Appropriate Solutions:

- Traffic calming measures on King Street to the west of this location (horizontal deflection measures would be most appropriate)

\*No net loss of parking spaces when new on-street parking is counted.



Location 5a: East End of King Street

Existing Issues:

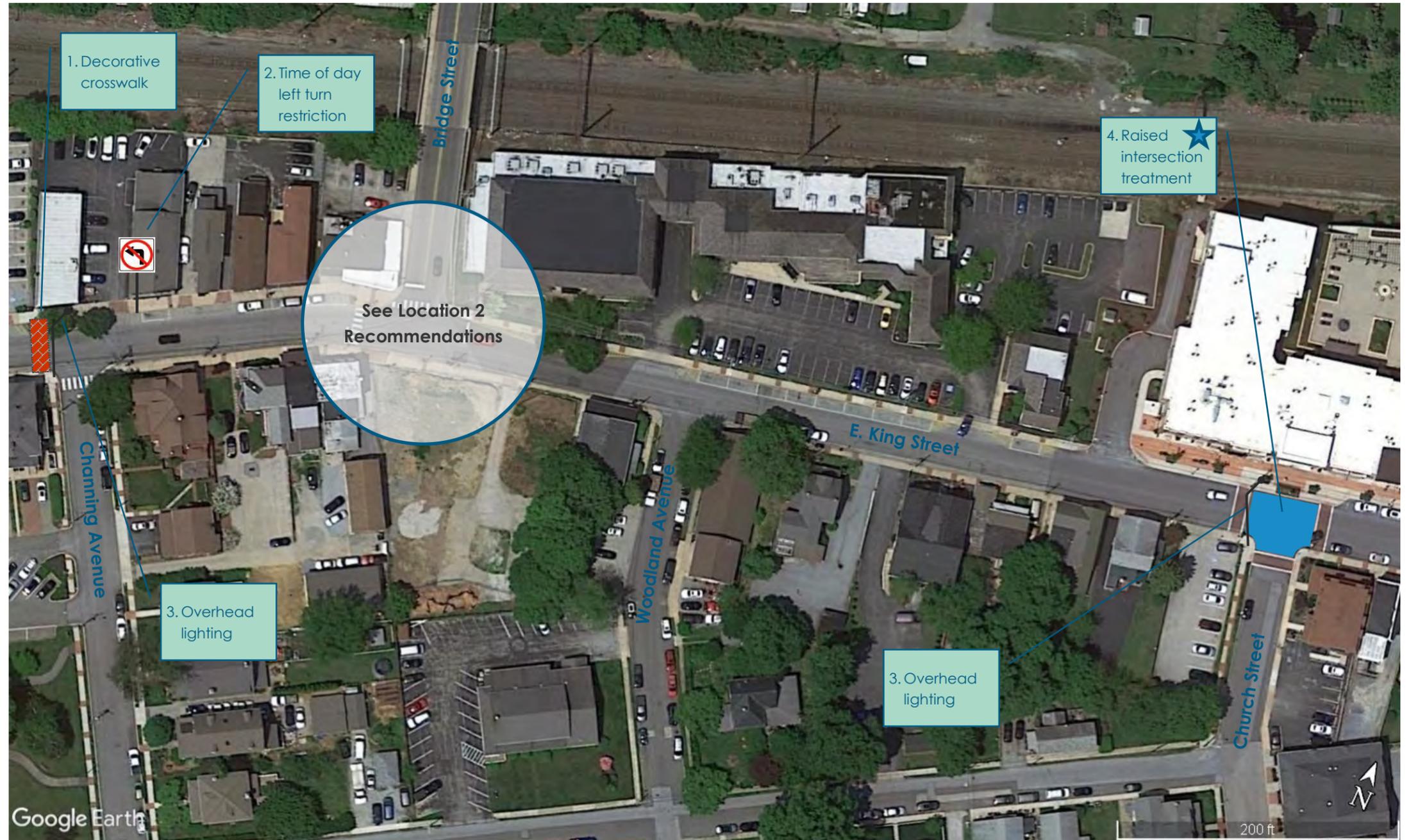
- A. Difficult for pedestrians to cross King Street during peak hours and low light conditions
- B. Vehicles "jump line" to turn left onto Channing Avenue during peak hours
- C. Need to improve pedestrian visibility and safety at King Street and Church Street

Proposed Solutions:

- 1. Install a decorative, raised crosswalk across King Street at Channing Avenue
- 2. Prohibit left turns onto Channing Avenue from King Street during peak hours
- 3. Provide overhead lighting at intersections where pedestrian crossings will occur
- 4. Intersection treatment at King Street and Church Street (i.e. brick pavers, raised intersection, or mural art)

Additional Appropriate Solutions:

- Convert Channing Avenue to one-way northbound
- Install advanced warning pavement markings for pedestrian crossings



 Highest Priority



Location 5b: East End of King Street



**Immediate Recommendations:**

- Install pedestrian crossing signs with Rectangular Rapid Flashing Beacons (RRFB)
- Install solar powered speed limit signs
- Install "SLOW" pavement markings



Existing Issues:

- A. Horizontal curve creates unfomfortable situation for pedestrians
- B. Need to improve pedestrian visibility and safety at King Street and Ruthland Avenue
- C. Limited pedestrian crossing locations
- D. High vehicle speeds entering Malvern Borough

Proposed Solutions:

1. Adjust horizontal curve by:
  - a. Moving centerline to the south
  - b. Strategically eliminating on-street parking
  - c. Installing a bump-out to protect pedestrians
2. Provide overhead lighting to increase visibility in low light situations at intersection of King Street and Ruthland Avenue
3. Intersection treatment at King Street and Church Street (i.e. brick pavers, raised intersection, or mural art)
4. Replace reflective deliniators with concrete bump-outs
5. Consolidate driveway and provide bump-out to narrow cartway width and extend sidewalk to borough line
6. Provide crosswalk and associated overhead lighting at borough line

Additional Appropriate Solutions:

- Install advanced warning pavement markings for pedestrian crossings
- Install gateway median treatment (coordinate with Willistown Township)



Location 6: Intersection of West King Street and SEPTA Access



Existing Issues:

- A. Lack of access management along King Street
- B. Driveways close to intersection
- C. Poor pedestrian accommodation

Proposed Solutions:

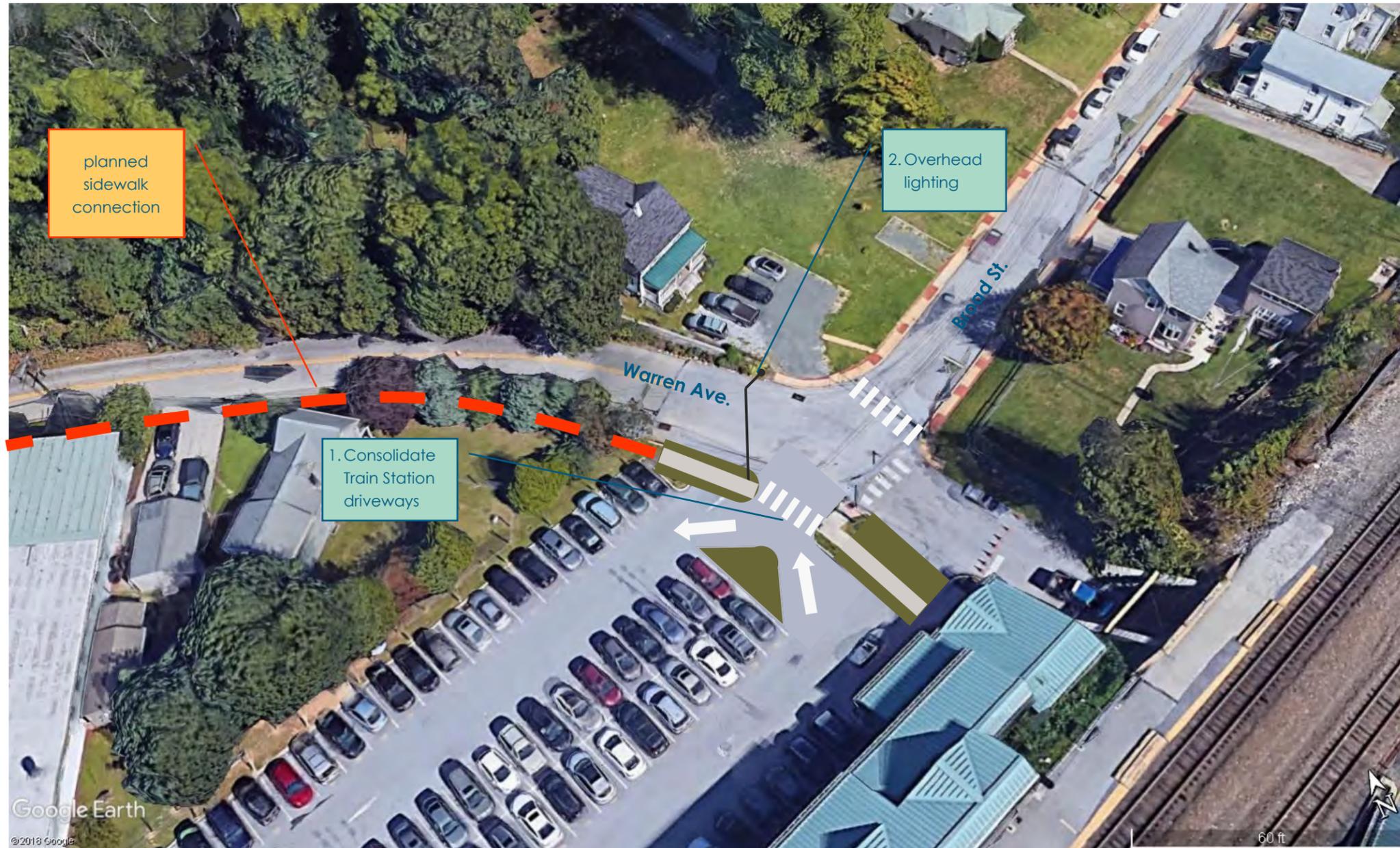
1. Consolidate gas station and beverage store driveways
2. Allow shared access along King Street for gas station and beverage store
3. Move secondary access away from intersection
4. Install new crosswalk across King Street
5. Install buffered sidewalk in front of gas station

Additional Appropriate Solutions:

- Reconfigure shared driveway access on southern intersection approach to provide a single point of access for both properties



Location 7: Intersection of North Warren Avenue and West Broad Street



Existing Issues:

- A. Heavy truck turning movement from N. Warren Avenue onto Broad Street
- B. Difficult to see pedestrians crossing Warren Avenue
- C. Poor vehicular access to Malvern Train Station

Proposed Solutions:

- 1. Consolidate train station driveways to decrease pedestrian and vehicular conflict points
- 2. Provide overhead lighting to increase visibility in low light situations

Additional Appropriate Solutions:

- Raised crosswalk across Warren Avenue
- Construct stairwell on eastern side of Warren Avenue to provide access to the train station platform



Traffic control warrants were tested at various key intersections throughout Malvern Borough to determine the feasibility of some of the proposed improvements. The results of that analysis is depicted in **Table 4.1**. This analysis serves as the basis to whether or not a traffic signal or all-way stop could be installed per PennDOT standards. The analysis results helped guide the proposed improvements in this study.

**Table 4.1: Traffic Control Warrants**

Major Street	Minor Street	Warrant Type	Warrant Met?
E. King Street	Bridge Street	Traffic Signal	Yes
E. King Street	Channing Avenue	All-way Stop	No
E. King Street	Church Avenue	All-way Stop	No
E. King Street	Ruthland Avenue	All-way Stop	No
W. King Street	Sugartown Road	Traffic Signal	Yes
Old Lincoln Highway	Bridge Street	Traffic Signal	Yes
Monument Avenue	Powelton Avenue	All-way Stop	*Pedestrian Route
Sugartown Road	Monument Avenue	Traffic Signal	No
Warren Avenue	Broad Street	All-way Stop	No

Additional Planned Improvements in Malvern Borough

### King Street & Warren Avenue Improvements

Engineering and permitting is currently underway for pedestrian improvements at the intersection of King Street and Warren Avenue in the center of Malvern Borough. Included in this project is an extension of the sidewalk along Warren Avenue from where it currently terminates southward to Pennsylvania Avenue. The crosswalks and handicap ramps will be improved to current ADA standards. Pedestrian push buttons, pedestrian signal heads, and a leading pedestrian walk phase will also be provided.

The plan view shows the intersection of King Street and Warren Avenue. Key features include:
 

- West King Street, North Warren Avenue, and South Warren Avenue, all with a posted speed limit of 25 MPH.
- East King Street with a posted speed limit of 25 MPH.
- Proposed sidewalk extensions along Warren Avenue.
- Improved crosswalks and handicap ramps at the intersection.
- Signage and striping plan for the area.

### E. King Street Pedestrian Improvements

Pedestrian safety issues were recently addressed along the easternmost side of E. King Street on a short-term basis. The use of flexible delineators at the intersections effectively reduce the crossing distance for pedestrians on E. King Street. Additionally, centerline striping was provided and advance warning pavement markings on E. King Street were added to alert drivers that they are approaching a pedestrian crossing.

The aerial view shows E. King Street with several proposed improvements:
 

- Centerline striping on E. King Street.
- Advance warning pavement markings for pedestrian crossings.
- Flexible delineators at intersections.
- Replacement of stop bars and crosswalks.
- Installation of stop bars and relocation of existing stop bars.

**Table 4.2 : Future 2027 Level of Service at Key Intersections with Potential Improvements**

Intersection		2027 Level of Service: AM (PM)					Proposed Improvements
East / West Street	North / South Street	Eastbound	Westbound	Northbound	Southbound	Overall	
West King Street	Sugartown Road	C(D)	B(F)	B(C)	B(B)	B(E)	-
West King Street	Powelton Avenue	A(B)	A(A)	A(A)	A(A)	A(A)	-
West King Street	Warren Avenue	C(B)	B(E)	C(C)	B(D)	C(D)	Addition of Leading Pedestrian Walk Phase. Increased westbound left-turns due to restriction at Channing Avenue.
East King Street	Channing Avenue	-	A(A)	B(B)	n/a	A(A)	Prohibit westbound left-turns during peak hours.
East King Street	Bridge Street	D(D)	A(B)	n/a	E(D)	D(C)	Traffic Signal
East King Street	Church Street	-	A(A)	B(B)	n/a	A(A)	-
East King Street	Ruthland Avenue	-	A(A)	B(B)	n/a	A(A)	-
Old Lincoln Highway	Bridge Street	C(D)	C(C)	F(D)	n/a	F(D)	1. Channelize eastbound right-turn movement
		B(B)	B(B)	B(B)	n/a	B(B)	2. Traffic Signal
		A(A)	A(A)	B(A)	n/a	A(A)	3. Roundabout
West Broad Street	Warren Avenue	B(B)	B(B)	A(A)	A(A)	A(A)	-
W/E Broad Street	Bridge Street	C(C)	C(C)	A(B)	A(A)	A(A)	-
Monument Avenue	Sugartown Road	D(C)	C(C)	A(A)	A(A)	A(A)	-
Monument Avenue	Powelton Avenue	B(A)	A(A)	A(A)	A(A)	A(A)	All-Way Stop Control
1st Avenue	Warren Avenue	B(B)	B(B)	D(C)	C(D)	C(C)	-
Paoli Pike	Warren Avenue	C(B)	D(D)	D(C)	C(D)	D(D)	Left-turn Lanes on all four approaches. Provide eastbound advance phasing.



### C | Additional Recommendations

In addition to the previously described and illustrated recommendations, as well as the continued provision of new sidewalk to gaps in the system and upgrade of existing sidewalks, various other transportation improvements and modifications can be undertaken by the borough to improve multimodal operations and safety. These other specific improvements are summarized in **Table 4.3**.

### D | Other Considerations

In addition to the transportation recommendations and improvements noted above, there are other measures and policies that the borough should consider in order to further enhance the walkability in the heart or downtown of the borough, most specifically along King Street. In many ways, King Street should be considered a destination in itself, a comfortable and enjoyable place to walk that connects to residents, businesses, and other community assets. There are a variety of guidelines that provide detailed guidance on design elements not specific to the roadway/sidewalk design. A few of these non-transportation guidelines to consider for King Street include:

**Setbacks**—reducing setbacks for new buildings brings storefronts closer to the sidewalk and pedestrian.

**Street frontages**—filling in gaps in the street frontage resulting from empty lots, parking lots, and excessive setbacks. Move parking to the rear of the building and provide proper setbacks in these locations.

**Street amenities**—providing various comforts to support streetscape elements such as outdoor seating, shade, and artwork provide a sense of place for users of the street.

**Facades and visibility**—providing interesting and visible architectural elements (including proper positioning of windows and doorways) to connect the outside sidewalk area to the inside of non-residential buildings. For residences, front porches provide this connection.

**Vertical Scale**—scaling a building properly based on the width of the road cross-section (building frontage to building frontage) can also provide a pedestrian with a comfortable sense of vertical and horizontal closure.

**Table 4.3: Additional Multimodal Recommendations**

Location	Type of Improvement	Description
2nd Avenue, just east of S. Warren Avenue	Safety	Restrict the segment between S. Warren Avenue and Channing Avenue to one-way eastbound due to sight distance limitations along S. Warren Avenue and turning maneuverability.
Paoli Pike/S. Warren Avenue intersection	Operational/Safety	Widen each approach to provide separate left-turn lanes.
Sugartown Road/Monument Road intersection	Safety	Clear vegetation within sight lines. Consider flashing beacon with Intersection Warning signage.
East 1st Avenue neighborhood	Safety/Traffic Calming/ Parking	TBD Additionally, provide parking space markings to discourage parking on the adjacent grass buffer area in non-curbed sections.
Patriots Path	Trail	Provide the on-road/off-road trail and route connecting northward to East Whiteland Township (and ultimately the Chester Valley Trail).
S. Warren Avenue (Malvern-Willistown Greenway)	Trail	Provide an off-road multi-use trail along South Warren Avenue between 1st Avenue and Paoli Pike.
West 1st Avenue	Traffic Calming/Sidewalk	Complete sidewalks and provide traffic calming measures such as speed humps or consider diverting measures such as a one-way segment to reduce cut-through.
W. King Street/Sugartown Road intersection	Operational/Safety	Install traffic signal and provide appropriate pedestrian accommodations.
N. Sugartown Road	Safety	Work with property/road owners to either allow school buses to service N. Sugartown Road or to provide a safe waiting area (for students and parents, including vehicles) at Charlestown Green.
West End of King Street	Traffic Calming/Safety	Install textured, raised, or high visibility crosswalks and curb extensions at intersections along King Street. Provide overhead lighting to properly illuminate the intersections.
Midblock Crossings on W. 1st Avenue and Channing Avenue	Safety	These two midblock crossings should be upgraded to meet current ADA requirements and include advanced warning signage and pavement markings to alert motorists.

Most of these changes to King Street would occur over time and through private redevelopment of properties fronting the street. Nevertheless, the borough should proactively evaluate zoning requirements and determine what, if any, modifications should be made in order to foster redevelopment in a manner that fits the walkable vision for Malvern and King Street.



### E | Recommended Crosswalk Treatments

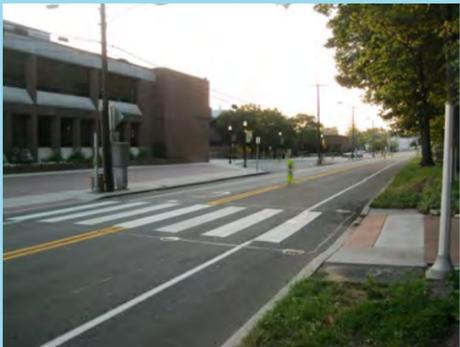
There are a number of different crosswalk treatments that could be installed in Malvern Borough depending on the use of a particular roadway. Factors to consider are the functional classification of the roadway, traffic volumes, pedestrian volumes, vehicle speed, and surrounding land use. Guidance for the type of crossing that should be utilized in different circumstances is provided in **Table 4.4**.

**Table 4.4 : General Crosswalk Treatment Guidance for Malvern**

	Crosswalk Markings	Decorative Marking Style	Raised Crosswalk	Curb Extensions (Bump-outs)	Pedestrian Signal Phasing
					
King Street Central Business District	Minor intersections with lower pedestrian volumes	Intersections with higher pedestrian volumes or near pedestrian generators	Intersections where traffic calming is appropriate and near pedestrian generators	Intersections where traffic calming is appropriate and/or to improve visibility of pedestrians, particularly when on-street parking is common	Pedestrian signal phasing is appropriate at all traffic signals
Gateway Streets	Advanced warning needed in areas with higher vehicle speeds	Generally not recommended due to high traffic volumes	Intersections where traffic calming is desired and with higher pedestrian volumes		
Residential Streets	Appropriate at all intersections	Intersections with higher pedestrian volumes, near pedestrian generators, or along pedestrian routes	Intersections where traffic calming is desired		

**Midblock Crossings**

Midblock crossings must meet specific PennDOT criteria. Vehicle speeds and sight distance factor into PennDOT's approval process for midblock crossings.



**Continental Crosswalks**

Continental painted crosswalks are appropriate for the King Street Central Business District and along Gateway Streets




# Chapter 5

## Implementation Plan & Funding Strategies





## 5 | Implementation Plan & Funding Strategies

### A | Action Plan

To advance the implementation of recommendations in this study, various resources must be identified, mobilized, and coordinated. This action plan should be put into immediate use to lay the foundation for future improvements to Malvern Borough’s transportation network. The recommended action plan should be re-evaluated periodically as individual projects/initiatives are completed or as funding for implementation becomes available.

The action plan is broken into five categories for implementation:

-  **Organizational**—policies & coordination items
-  **Regulatory**—ordinance updates
-  **Financial**—budgeting & grant resources
-  **Education & Advocacy**—promoting transportation options
-  **Advancing Priorities**—studies, design, & maintenance

Many projects recommended in this study could be categorized in several implementation categories. The strategies employed to advance one recommendation may have an impact on how another recommendation could be implemented. Malvern Borough should consider each recommendation holistically while advancing each implementation strategy.



Various stakeholders will need to be engaged to advance the recommendations in this study. Those entities are identified in **Table 5.1** below. The responsible entity(ies) for each action item are identified on the following pages.

**Table 5.1: Key Implementation Stakeholders**

Responsible Entity	Abbreviation
Malvern Borough Council	BC
Borough Staff	Staff
Planning Commission	PC
Parks & Recreation Committee	PR
Zoning Hearing Board	ZHB
Great Valley School District & Private Schools	Schools
Legal Staff	Legal
Police Department	Police
Consulting Firm	Consultant

**Organizational**—policies & coordination items

1. **Form a Multimodal Transportation Committee.** The goal would be to champion the recommendations of this study, as well as address routine issues related to traffic. The committee should include Borough Council and Planning Commission members. Representatives from the Parks & Recreation Committee should be considered to promote collaboration on shared goals and projects. The existing Public Safety Committee could serve as the base group to be supplemented with other community representatives. [BC, PC]
2. **Coordinate with adjacent municipalities on regional mobility issues.** Several of the bicycle and pedestrian routes were identified based on connections to neighboring municipalities and regional multimodal facilities. Continue coordination with adjacent municipalities, particularly on regional trail alignments and connections. [BC, Staff]
3. **Coordinate with Chester County Planning Commission and Delaware Valley Regional Planning Commission.** Chester County and DVRPC both play key roles in programming federal and state funds for transportation improvements projects including bicycle and pedestrian facilities. Coordination with the Chester County Planning Commission to ensure that transportation improvement needs are included on the County’s Transportation Improvements Inventory (TII). Coordinate with both Chester County and DVRPC regarding potential federal and state funding for improvements, including competitive grant programs and updates to the region’s Transportation Improvement Program (TIP). [Staff]
4. **Coordinate with PennDOT.** PennDOT plays a key role for both capital improvements and maintenance of state owned roadways. Coordination with PennDOT is important for both capital projects and development projects, both of which may require a Highway Occupancy Permit (HOP) from PennDOT along state roadways or for installation of traffic or pedestrian signals. Also, if the necessary right-of-way is available, PennDOT may be able to provide low-cost improvements as part of maintenance projects. [PC, Staff]
5. **Coordinate with key stakeholders.** Property owners, business owners, and developers are key partners for implementation. For

capital improvement projects, it will be important to coordinate with property and business owners on design details and construction schedules. Additionally, for improvements that can be implemented through the land development process, it will be important to coordinate with developers regarding the integration of multimodal transportation improvements into land development plans. Lastly, the borough can be proactive in acquiring additional right-of-way and easements, as necessary. [BC, Staff]

6. **Coordinate with Bike Chester County.** Bike Chester County, a local affiliate of the Bicycle Coalition of Greater Philadelphia can provide valuable feedback and input on routes within and connecting to Malvern Borough in regards to needed improvements and maintenance. Bike Chester County may also be a valuable partner in educational and advocacy efforts. [PC, BC]



**Regulatory**—ordinance updates

1. Modify the borough’s Subdivision and Land Development Ordinance to support the previously identified recommendations. [BC, Staff, PC, Legal]
2. Modify the borough’s Zoning Ordinance to support the previously identified recommendations. [BC, Staff, PC, ZHB, Legal]
3. Modify the borough’s land development application process to require a Traffic Impact Study (TIS) that evaluates vehicular as well as pedestrian and bicycle travel. [BC, PC, Legal]
4. Modify the borough’s official map to reflect the recommendations of this document. [BC, PC, Legal]
5. Deny requests seeking to not provide pedestrian accommodations due to the lack of activity/connectivity in the area of the proposed land development project. In order to fulfill the borough’s long-term multi-modal vision, the borough should not accept such reasoning as a justification for a waiver for not providing pedestrian accommodations. [BC, PC]

6. Update the borough’s comprehensive plan to incorporate the recommendations of this study, as appropriate. [BC, PC]
7. Review the borough code regulating posted speed limits, and revise to include the installation of regulatory / informational / warning signage and pavement markings that promote multimodal travel throughout the borough. [BC, Staff]
8. Adopt an overall traffic calming policy for the borough to consider, evaluate, and implement traffic calming measures. [BC, PC]
9. Incentivize reduced parking standards, access management, and shared access. [BC, PC, Legal]

**Financial**—budgeting & grant resources

1. Identify and track funding sources, which have historically changed based on Federal and State priorities and legislation. (A list of available grant opportunities at the time this document was prepared is included.) [Staff]
2. Pursue grants to assist in the funding of further engineering and feasibility studies, construction of pedestrian and bicycle accommodations, and advocacy and safety programs. [Staff]
3. Identify funding resources to advance multi-modal recommendations and priorities. Local match dollars can make grant applications more competitive. In some cases, services (i.e., engineering, planning, right-of-way acquisition, etc.) in lieu of a monetary contribution can be considered. Seek multi-municipal grant opportunities as appropriate for key connections. [BC, Staff]
4. Combine construction of new multimodal facilities and accommodations during routine maintenance projects when feasible. [Staff]
5. Identify opportunities for public-private partnerships, which can often provide a savings to all involved parties. Engineering and acquisition of right-of-way can often be considered as a local match obligation for certain grants. By prioritizing and dedicating funding, the borough will demonstrate its commitment to the project. [BC, PC]



**Education & Advocacy**—promoting transportation options

1. Work with the Great Valley School District and private schools to promote walking, biking, and physical activity among school-aged children. [Staff, Schools]
  - A. Hold a Walking School Bus event. Walking school busses are groups of school age children that meet at a designated location and walk to school with adult supervision. Such events promote walking, safety, healthy lifestyles, and improve driver awareness of children walking to school. [Staff, Schools]
  - B. Hold bike rodeos to focus on providing school age children bicycle safety and riding types. [PR, Schools]
1. Distribute educational materials such as newsletters, email blasts, website postings, and pamphlets promoting multimodal travel and safety (including speeding awareness). [Staff]
2. Hold bike tours on key bike routes throughout the borough and surrounding areas. Bike tours could be led by knowledgeable bicyclists that live within the borough or possibly in conjunction with Bike Chester County. [PR]
3. Promote walking groups within the borough. Walking tours can be led by knowledgeable residents to promote walking within the community. The Chester County Planning Commission leads a series of Town Tours and Village Walks each summer. The borough could partner with the county to host a tour or use the format as a model. [Staff, PR]

**Walking School Bus**

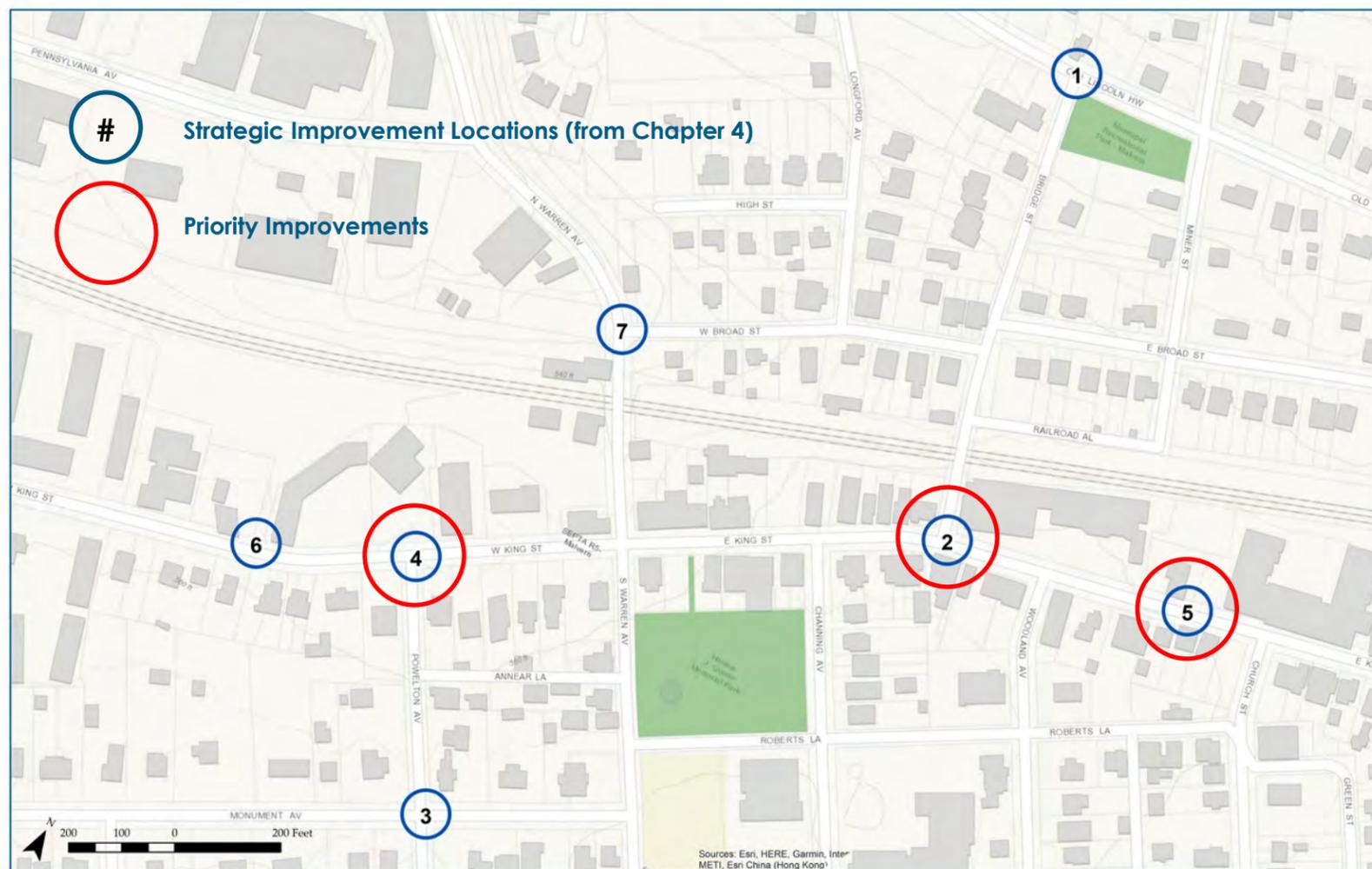


[www.pedbikeimages.org/](http://www.pedbikeimages.org/) / Dan Burden

**Advancing Priorities**—studies, design, & maintenance

1. Monitor and record daily traffic volumes, pedestrian volumes, and travel speeds along the key roadways throughout the borough. Traffic volumes and travel speeds are key determinants in multimodal accommodation selection as well as roadway design. By providing a routine update of these key data, the borough can better monitor its multi-modal needs. [BC, Police]
2. Provide detailed engineering of future bicycle and pedestrian accommodations and facilities as each individual project progresses. [BC, Consultant]
3. Undertake a multimodal review of all other future projects that may have an impact on the local transportation network. Multimodal considerations should be accommodated in the land development and zoning approval process, when feasible. [BC, PC, ZHB]
4. Provide roadway maintenance to improve ride-ability for bicyclists. Clear sight line obstructions around horizontal curves along key roadways. Clearing of overgrown vegetation, clearing of debris, and removal of obstructions can provide safety improvements for all roadway users. [BC, Staff]
5. Develop a wayfinding signage system and provide signage to key destinations within the borough and area for all users. [BC, PR, Staff, Consultant]
6. Advance priority capital improvements into design, engineering, and construction. Priority improvements are indicated on **Figure 5.1** below. [BC, Staff, Consultant]

**Figure 5.1: Priority Improvements**



## B | Planning Level Costs

The improvements recommended in the Malvern Borough-wide Multimodal Transportation Study are consistent with existing traffic control and traffic calming measures provided in Malvern Borough. Planning level costs have been provided in **Table 5.1** to illustrate the approximate costs associated with various proposed improvements. The cost estimates were developed using various resources and recent projects completed in the area. Project costs may rise based upon a variety of factors including but not limited to stormwater management, ADA accessibility issues, landscaping costs, utilities, right-of-way, and other unforeseen factors.

**Table 5.1: Planning Level Construction Cost Estimates**

Improvement Type	Approximate Cost	Notes
Traffic Signal	\$200,000—Three-leg intersection \$250,000—Four-leg intersection	With pedestrian equipment, no closed loop or adaptive; assumes no ADA ramp work
Rectangular Rapid Flashing Beacon (RRFB)	\$35,000— Overhead \$20,000— Post mounted	Per installation (one in each direction); add \$1,500 for solar powered
Curb Extension	\$20,000-\$30,000 each corner	Assumes both sides of corner and associated drainage improvements
Median Island	\$20 to \$30 per square foot	Includes landscaping and curbing, does not include roadway widening
ADA Curb Ramp	\$6,500 per ramp	
Raised Intersection	\$100,000	Including associated drainage improvements
Painted Intersection	\$25,000 to \$50,000	Varies depending on product and intersection size
Sidewalk	\$20 per linear foot	5 feet wide
Sidewalk with grass buffer and curb	\$75 per linear foot	Does not include drainage improvements
Gateway Sign	\$10,000-\$20,000	Includes landscaping
Textured Crosswalk	\$5,000-\$10,000 per crossing	Based on previous borough projects
Painted Crosswalk	\$1,500—Continental Style; \$250—two 6 inch lines	
Raised Crosswalk (painted)	\$25,000 per crosswalk	Assumes no drainage improvements
Raised Crosswalk (textured)	\$30,000 per crosswalk	Assumes no drainage improvements
Speed Hump	\$7,500 each	Based on previous borough projects
Stop Sign (or warning sign)	\$300 to \$500 each	
Driver Feedback Radar Speed Signs (solar)	\$7,500 each	
Overhead Streetlight	\$2,000 each	Utility pole mounted

More detailed cost estimates can be developed once specific improvements have been selected for further review, a conceptual design is prepared, and Malvern borough commits to complete the project or release it for public bid.



*Chester County Planning Commission*



## C | Funding Opportunities

Given the variety of improvements identified, additional funding beyond the borough's general budget will likely be needed for the next stage of implementation. From programs to feasibility studies to design and construction, different funding sources are appropriate depending on the type of project. Several potential funding sources are available from federal, state, regional, and private institutions. Some of these opportunities are highlighted below.

### Federal

Fixing America's Surface Transportation (FAST) Act is the federal transportation bill that was signed into law in December 2015. The FAST Act authorizes federal government spending on highway, public transportation, bicycle/pedestrian, and other projects for the fiscal years 2016 through 2020. Multimodal improvements are eligible for federal funding through several core highway funding programs highlighted below. Programming of federal transportation funds for specific projects is done at a regional level, with some projects awarded federal funds through competitive grant processes. Most federal funding programs require a minimum 20 percent of the project costs to be funded through non-federal sources; these could be state, local, or private funds.

- **Congestion Mitigation and Air Quality Improvement Program (CMAQ):** The CMAQ program provides funding to reduce emissions and improve air quality to meet National Clean Air Act standards. Projects must demonstrate emissions benefits either directly or by reducing congestion. Eligible projects include traditional traffic flow improvements and bicycle and pedestrian facilities that are not exclusively recreational and reduce vehicle trips. A portion of the region's CMAQ funds have historically been awarded through a competitive grant process.
- **Surface Transportation Program (STP):** The STP program provides flexible funding for improvements on federal-aid highways, bridges and tunnels on any public road, bicycle and pedestrian infrastructure, and transit capital projects. STP funds are programmed on the region's Transportation Improvement Program (TIP). A portion of the STP funds are set aside for the Transportation Alternatives program described below.
- **Transportation Alternatives (TA) Set-Aside:** The TA Set-Aside program provides funding to support a variety of alternative modes of transportation, including walking and bicycling. Eligible activities include planning, design, and construction of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized

forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990. A portion of the state and region's TA Set-Aside funds will be awarded through a competitive grant process.

### State

Pennsylvania's Transportation Funding Bill, known as Act 89 of 2013, was signed into law in November 2013 and provides stable and long-term funding for Pennsylvania's transportation system, including highways, roads, bridges, mass transit, and other modes. Overall, it provides \$2.3 billion per year for transportation investments in Pennsylvania. Additionally, it provides a 60 percent increase in Liquid Fuels allocations to municipalities for local roads and bridges over the previous bill. Funding programs made available by Act 89 to local municipalities are listed below.

- **PennDOT Multimodal Transportation Fund (MTF):** Act 89 also established a dedicated Multimodal Transportation Fund that stabilizes funding for ports and rail freight, increases aviation investments, establishes dedicated funding for bicycle and pedestrian improvements, and allows targeted funding for priority investments in any mode. PennDOT awards funding to projects between \$100,000 and \$3 million through a competitive grant process.
- **Commonwealth Financing Authority (CFA) Multimodal Transportation Fund (MTF):** The CFA MTF has the same funding source and similar requirements as the PennDOT MTF. However, the competitive grant process is administered by the Pennsylvania Department of Community Development (DCED), and funding is awarded by the CFA.
- **Green Light-Go:** This program provides state funds for the operation and maintenance of traffic signals along critical and designated corridors on state highways. Act 89 of 2013 created this new funding program for designated corridors.

In addition to Act 89, there are additional funding sources available from the state to advance transportation improvements in Pennsylvania communities. A few of the available funding programs are listed below.

- **Act 13 (Marcellus Shale Impact Fee) - Greenways, Trails and Recreation Program (GTRP):** The CFA administers the GTRP for the development, rehabilitation and improvements to public parks, recreation areas, greenways, and trails utilizing Act 13—Marcellus Shale Impact Fees. Grants are awarded annually and most project

require a 50 percent local match for the total project cost.

- **Community Recreation and Conservation Program:** The Department of Conservation and Natural Resources (DCNR) provides grants for trail and greenway projects through two Community Conservation Partnerships Program (C2P2) grant opportunities. The C2P2—Community Recreation and Conservation program requires a 50 percent match and eligible projects include feasibility studies, trail studies, master site development plans, and comprehensive recreation, park and open space and greenway plans; land acquisition for trails; and new development and rehabilitation of parks, trails and recreation facilities. The C2P2—Recreational Trails Program requires 20 percent match (except for land acquisition projects, which require 50 percent match) and eligible projects include development, rehabilitation and improvements to public parks, recreation areas, greenways, and trails. There is an annual application period for all C2P2 grants.
- **Automated Red Light Enforcement (ARLE) Grant Program:** PennDOT administers a grant program to distribute a portion of the revenue generated by Automated Red Light Running Enforcement (ARLE) in the state. The ARLE grant program is focused on improving safety and mobility and there is an annual competitive application period. Eligible projects include roadway capacity upgrades, such as auxiliary turning lanes, and pedestrian safety and mobility improvements. The ARLE grant program does not require a local match, but all project funding must be identified at the time of the application.

### Regional

The Delaware Valley Regional Planning Commission (DVRPC) has historically sponsored several competitive grant programs for municipalities and other entities in the Greater Philadelphia region based on federal, state, and private funding programs.

DVRPC announces specific grant rounds when funding is available and coordinates project applications and selection. In previous funding rounds, grants have required local matching funds and/or local funding for all pre-construction activities. Applications are often more competitive if the sponsor can provide additional matching funds and if the design is advanced or complete.

