

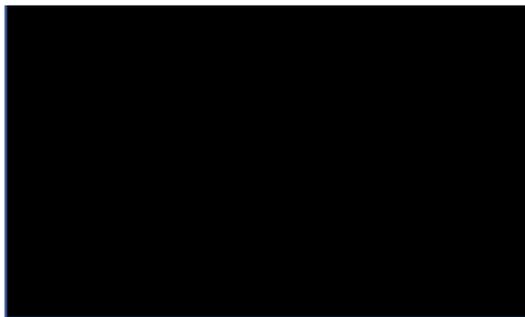
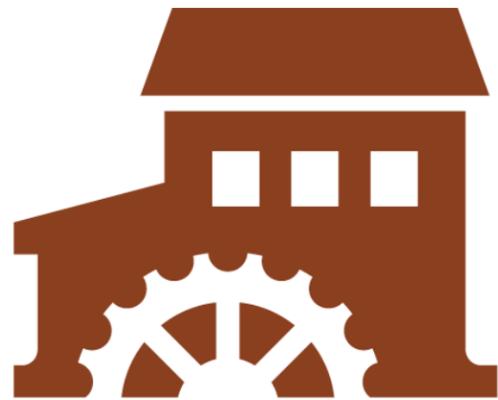


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Township of Ferguson

PINE GROVE MILLS TRANSPORTATION MOBILITY STUDY REPORT

FINAL – July 2022



Submitted to:



Submitted by:



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EXECUTIVE SUMMARY

Introduction

The Pine Grove Mills Mobility Study follows the 2019 Pine Grove Mills Small Area Plan (SAP)¹ and advances one of the key goals of the SAP—to “improve safety and provide for multiple modes of transportation.” Therefore, the objective of the Pine Grove Mills Mobility Study is to evaluate the transportation issues, concerns, and opportunities identified in the SAP and identify concepts and recommendations to address those items and improve overall safety and mobility within Pine Grove Mills.

The study focuses on the Village of Pine Grove Mills and the adjacent neighborhood areas, located southwest of State College Borough between Boalsburg and Pennsylvania Furnace. Pine Grove Mills is physically separated from the more urbanized areas in the Centre Region by an expanse of agricultural lands to the west, north, and east, with Tussey Mountain immediately to the south.

The key product of the Pine Grove Mills Mobility Study is a prioritized listing of new projects, strategies, and other recommendations that may be implemented by staff or be funded through the Ferguson Township Capital Improvement Plan, grant programs, or the state/federal Transportation Improvement Program (TIP).

Partnerships

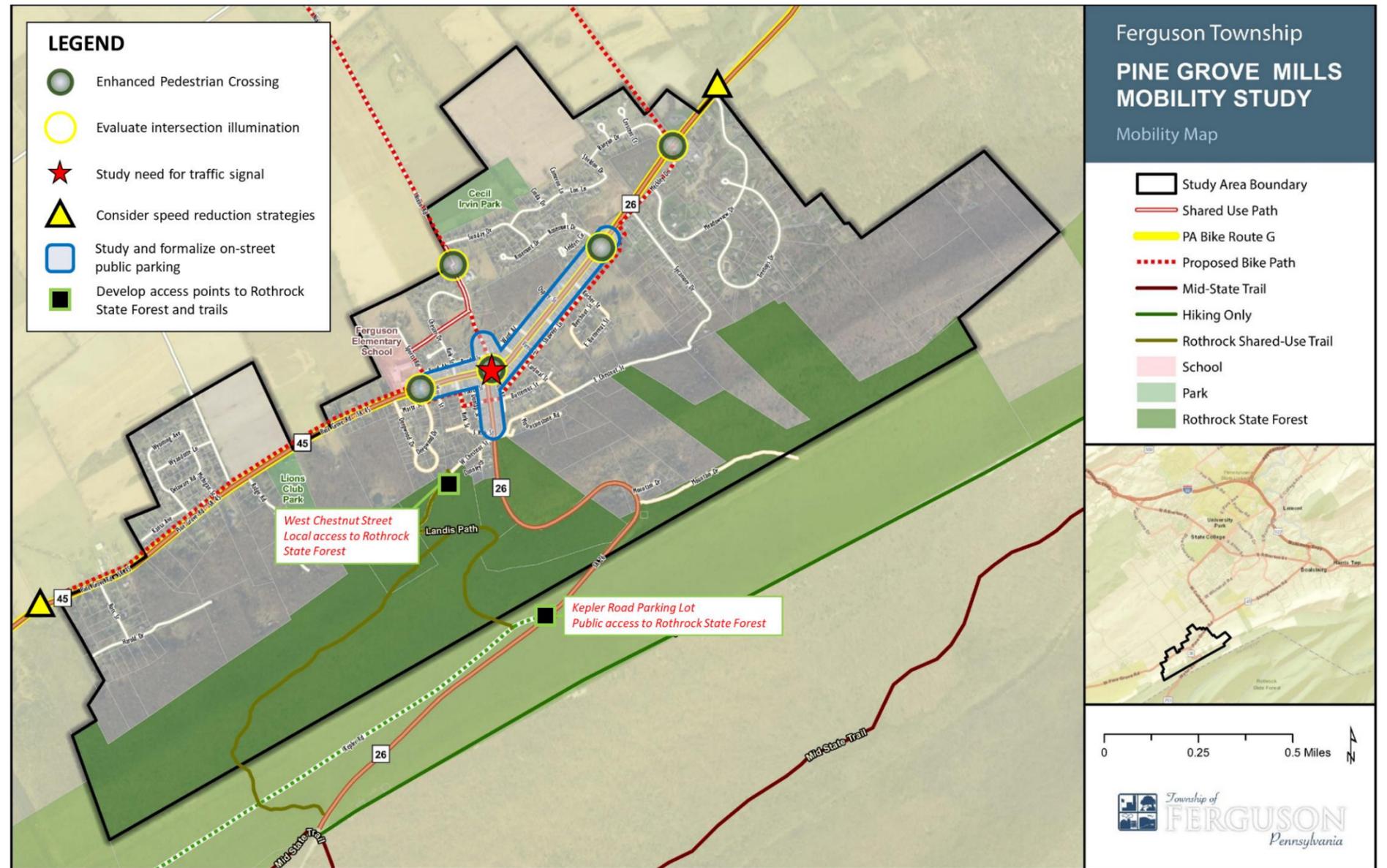
Planning partnerships between Ferguson Township and the following entities were drawn upon for perspectives on transportation in the Pine Grove Mills area and how it functions within the Township, the Centre Region, and Central PA:

- Centre Area Transportation Authority (CATA)
- Centre Regional Planning Agency (CRPA)
- PennDOT Engineering District 2-0

Representatives of these entities participated with Ferguson Township staff and the McCormick Taylor consultant team in the Project Working Group, which was chaired by Ron Seybert, Ferguson Township Engineer. The Working Group met at key points in the study process, staffed the public outreach meetings, and provided continual review of project progress and deliverables.

Public Outreach

The study process placed a strong emphasis on engaging the public in identifying mobility issues, concerns, and potential solutions from their perspective as daily users. The study benefited from a strong public engagement process conducted as part of the SAP, and early in development of the Mobility Study, it was agreed that the variety of transportation goals, objectives, and action steps from SAP would be



Pine Grove Mills Mobility Study Area with Mobility Recommendations from the Pine Grove Mills Small Area Plan

the foundation for the Mobility Study. Regardless, public engagement was the first major study activity, with the intent to verify the SAP outcomes in light of the recent COVID-19 pandemic and changing expectations for transportation. Public outreach was completed through the following:

A Virtual Public Meeting was conducted on October 14, 2021 to introduce the Mobility Study to the community. A brief presentation was followed by more than an hour of open discussion about local perspectives, frustrations, and nuances about day-to-day travel experiences throughout the study area. Twenty-one persons attended the virtual meeting, and 76 persons completed the meeting survey.

An Open House & Concept Display Meeting was conducted on April 18, 2022 in both in-person and virtual formats. The in-person format was held at the Ferguson Township Building using boards showing the study process, findings, and concepts developed. Members of the project Working Group staffed the meeting. The “real-time” virtual format featured the same material, organized via a study area map. One member of the Working Group interacted with online participants.

Virtual participation was also available for two weeks after the Open House through a self-serve portal that offered an introductory video, concept graphics, and an online survey. Study materials were available for viewing and input from April 18 to May 2, 2022.

Poor winter weather conditions on the evening of the Open House likely played a role in the small number of real-time participants (4 in-person and 5 real-time virtual participants). However, 140 total surveys were returned before the virtual plans display portal was closed on May 2.

Assessments

Taking cues from the public engagement activities, including the SAP mobility recommendations, transportation facilities and their operation and safety were evaluated according to data and other indicators that provided insight into trends and potential solutions.

Assessments of travel mobility and function looked at the following

- Warrants for Traffic Signals
- Sidewalk and Bicycle Network Connectivity
- Transit Service
- Parking Inventory, Utilization, and Regulation

Assessments of travel safety looked at the following:

- Crash History – 62 crashes occurred on the study area streets during the last 5 years. These crashes were mapped in GIS and trends were evaluated according to location and collision type. The locations of crash clusters, injury crashes, crashes involving a deer, and crashes occurring at night were specifically investigated.
- Lighting – Nighttime light levels on intersection crosswalks and other street crossing locations were sampled by Township staff using a light meter. The mapped results were compared to industry standards, and locations needing supplemental lighting were identified. About 25% of the lighting samples taken at marked crossings met the minimum standard.
- Pedestrian and Bicycle Roadway Safety Audits – In October 2021, members of the Project Working Group walked and rode bicycles through the study area. They noted areas of safety concern, conflicts with other modes, gaps in the network, and general “state-of-repair” concerns. The observations provided support and input that shaped many of the recommendations developed during the study.

Concept Development

Results from the mobility and safety assessments along with public input received during the initial public meeting in October 2021 suggested the need for a variety of spot location, corridor, and overall study area improvements. Design concepts, options and other strategies were developed and organized according to location or overarching themes, as follows:

- Pine Grove Road & Water Street/Nixon Road Intersection**
Three improvement options consider stop-sign or roundabout conversions, add pedestrian crossings, and narrow/shape the street space to influence vehicle speeds and increase roadside buffers and community space.
- East Pine Grove Road Gateway**
Two improvement options consider a simpler gateway and pedestrian improvement at the Banyan Drive/Meckley Drive intersection versus a roundabout conversion, which would serve as both a pedestrian and gateway improvement.
- Pedestrian and Bicycle Network Improvements**
Seven different concepts were developed at levels of detail ranging from the study area as a whole to street corridors and individual intersections.
 - A Pedestrian and Bicycle Network Opportunities Plan illustrates a functional, integrated network where gaps are completed, and existing facilities are extended to logical junction points.
 - Three enhance pedestrian crossing concepts are recommended at Rosemont Drive, Deepwood Drive (east), and the Nixon Road shared use path.
 - Complete Street concepts are developed for three distinct sections Pine Grove Road, from Ross Street to Meadowview Drive.
- Western Pine Grove Road Gateway**
A concept for installing a gateway treatment at the western edge of Pine Grove Mills is developed based on other Pennsylvania experience with traffic calming on state roads.
- Speed Limit Changes**
Aspirational speed limit changes and their extent were developed for Pine Grove Road, Water Street, and Nixon Road.
- Parking Improvements**
Concepts that clarify and expand parking, mark legal parking spaces, and standardize signing and regulations are recommended.
- Rothrock State Forest Trails Access**
The Mobility Study advances opportunities for improved access and connectivity between Pine Grove Mills and the Rothrock State Forest Trails first suggested in the SAP. The Mobility Study adds location-specific implementation ideas for the primary trail access points and the Kepler Road parking area along SR 0026.

Recommendations

The study developed 13 distinct projects and more than 40 mobility Action Steps. The project recommendations were listed and prioritized using a tier system. Urgent and high impact projects were placed in Tier 1, while less urgent and impactful projects were placed in Tiers 2 and 3. Planning-level cost estimates were also developed for each project. Cost estimates include construction and design costs but did not include right-of-way acquisition or utility-relocation costs.

High priority “Tier 1” project recommendations coming out of the Pine Grove Mills Mobility Study included the following:

- Revising the intersection geometry and adding enhanced pedestrian crossings at the Pine Grove Road & Water Street/Nixon Road intersection.
- Adding enhanced pedestrian crossings at Rosemont Drive, Deepwood Drive (east), and the Nixon Road shared use path crossing.
- Developing Pine Grove Road between Ross Street and Rosemont Drive as a Complete Street.
- Implementing a menu of parking improvements to expand, mark, and coordinate parking regulations along Pine Grove Road and Water Street.
- Reconstructing and extending the sidewalk along Water Street between Pine Grove Road and Chestnut Street.



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CHAPTER 1

Introduction

Pine Grove Mills Small Area Plan

In 2019, the Pine Grove Mills Small Area Plan (SAP) was completed as a community-driven process to “figure out what is important to their area, how it fits into the larger community, and how to address issues or concerns of particular importance to their place.” The SAP was facilitated by the Centre Regional Planning Agency but involved intensive engagement with a small group of community-members in developing the plan and identifying action steps for implementation.

In 2020, a Pine Grove Mills Small Area Plan Advisory Committee was established to advance recommendations and implement the SAP.

Pine Grove Mills Mobility Study

“Improve safety and provide for multiple modes of transportation” was one of the key themes of the Pine Grove Mills SAP. Early in development of the Mobility Study, it was agreed that the variety of transportation goals, objectives, and action steps from SAP would be the foundation for the Mobility Study, providing direction on the issues to be addressed, the concepts to be developed, and solutions to be prioritized and advanced.

Therefore, the objective of the Pine Grove Mills Mobility Study is to evaluate the transportation issues, concerns, and opportunities identified in the SAP and identify concepts and recommendations to address those items and improve overall safety and mobility within Pine Grove Mills.

The Mobility Study approach is built on the Premise, Process, and Purpose described in **Figure 1** and included the following elements:

- Review of the Pine Grove Mills SAP.
- Obtain public input on transportation in Pine Grove Mills
- Conduct systematic and spot inventories of existing conditions (land use and transportation), deficiency indicators, infrastructure functionality, facility gaps, and corridor constraints. This included both Pedestrian and Bicyclist Road Safety Audits.
- Identify safety focus areas, critical modal conflict points, missing connective links, and locations where more intensive evaluation and specialized solutions should be developed.
- Conceptualized the desired complete streets network that achieves the Village’s and Township’s multimodal safety goals.

- Evaluate the aspirational cross-section against the existing condition to identify areas where the built infrastructure requires improvement.
- Develop concepts and recommendations
- Obtain public input on proposed improvements
- Develop project concepts cost estimates
- Develop a prioritization framework, according to the mobility goals identified in the SAP. Create a ranked project listing and document project justification.

The identified projects and strategies may become part of the Ferguson Township Capital Improvement Plan or a state/federally funded project through the Transportation Alternatives (TA) Set-Aside or State Transportation Improvement Program (TIP) with PennDOT coordination.

Mobility Study Setting

Figure 2 illustrates the study area, which includes the Village of Pine Grove Mills and the adjacent neighborhood areas. Pine Grove Mills is located southwest of State College Borough between Boalsburg and Pennsylvania Furnace. PA Route 45 (PA 45, SR 0045)—named Pine Grove Road—is the main east/west corridor, while PA Route 26 (PA 26, SR 0026)—named Water Street—runs north/south and over the mountain. Rothrock State Forest is present adjacent to the study area. Starting from the western study area boundary the study area consists of farmlands and suburban housing. As you travel east along Pine Grove Road toward Boalsburg and State College, housing, community facilities, and small businesses are more prevalent. Ferguson Township Elementary School is present on the north side of Pine Grove Road opposite Deepwood Drive and the Forest Edge neighborhood. Newer residential neighborhoods are present along Chester Drive (Somerset), Lois Lane and Banyan Drive (Hillside Farm), and Meadowview Drive and Treetops Drive (Thistlewood).

Pine Grove Mills is physically separated from the more urbanized areas in the Centre Region by an expanse of agricultural lands to the west, north, and east. The agricultural land uses provide a distinct separation from the commercial areas further to the east along PA 26

and the single-family neighborhoods in the Whitehall Road corridor. The agriculture lands to the west, north, and east contribute to the feeling that one is leaving the urbanized area and entering a rural landscape.

The Tussey Mountain Range runs as far as the eye can see to the east and west of Pine Grove Mills. The mountain is seen as more than the backdrop and buffer of greenspace for the Village. Residents see the mountain as part of the identity of the Village, with the community

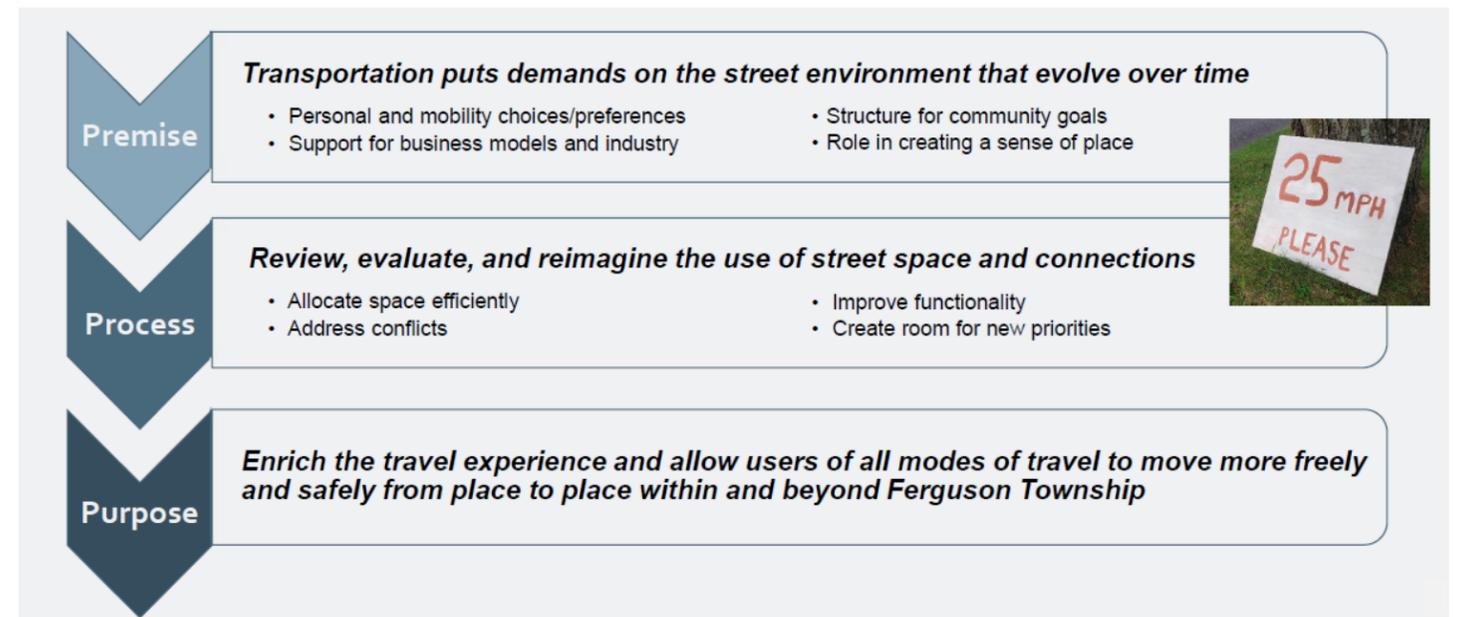


Figure 1. Mobility Study Premise, Process, and Purpose

anchored firmly along the northern slope. A patchwork of active farms, residences, and neighborhoods extend to the southwest along Pine Grove Road to the west end of the study area near Ross Street.

Planning Partnerships

In order to hear multiple perspectives and better understand how the project study area functions, several planning partnerships have been developed for this study.

- Centre Regional Planning Agency (CRPA) is a key planning stakeholder and resource providing a regional perspective for multi-modal transportation. The 2016 Centre Region Bike Plan provides a key resource for bike planning. The CRPA staff also serve as staff of the Centre County Metropolitan Planning Organization (CCMPO).
- PennDOT Engineering District 2-0 owns and maintains the state road system, including PA 26 and PA 45. The proposed study

projects that affect the state system will involve PennDOT, and collaboration with PennDOT during the study and early coordination in project development may benefit project funding and streamline the approval processes.

- The Centre Area Transportation Authority (CATA) previously operated fixed-route transit service within the study area and has proposed on-demand “CATAGo” services for the Pine Grove Mills area starting in Fall 2022. CATA is a key stakeholder, resource for transit service data, and partner in implementing projects that affect CATA bus operations and infrastructure.
- The Pine Grove Mills SAP Advisory Committee was involved to ensure that the mobility issues and opportunities that were identified by the community as a part of the SAP are addressed in the Mobility Study.

Project Working Group

Prior to the start of the study, a Project Working Group was established to provide input into the study and to review draft materials developed as part of the study. The Project Working Group included representation from Ferguson Township as well as CATA, CRPA, the Pine Grove Mills SAP Committee and PennDOT. Collaboration with the working group took place at meetings held between September 2021 and May 2022. **Table 1** gives the members of the Working Group and the organizations they represent. The project team would like to thank the members of the Project Working Group for their participation in the study.

Table 1. Project Working Group Members

Name	Organization
Albert Carlson	PennDOT District 2
Greg Kausch	CATA/CRPA
Trish Meek, AICP	CRPA
Dave Modricker, P.E.	Ferguson Township
Kristina Bassett	Ferguson Township
Ron Seybert, P.E.	Ferguson Township
Jerry Binney	Ferguson Township Planning Commission
Pastor Paul Tomkiel	Pine Grove Mills SAP Committee
Michelle Goddard, AICP	McCormick Taylor
Rob Watts, P.E., PTOE, AICP	McCormick Taylor

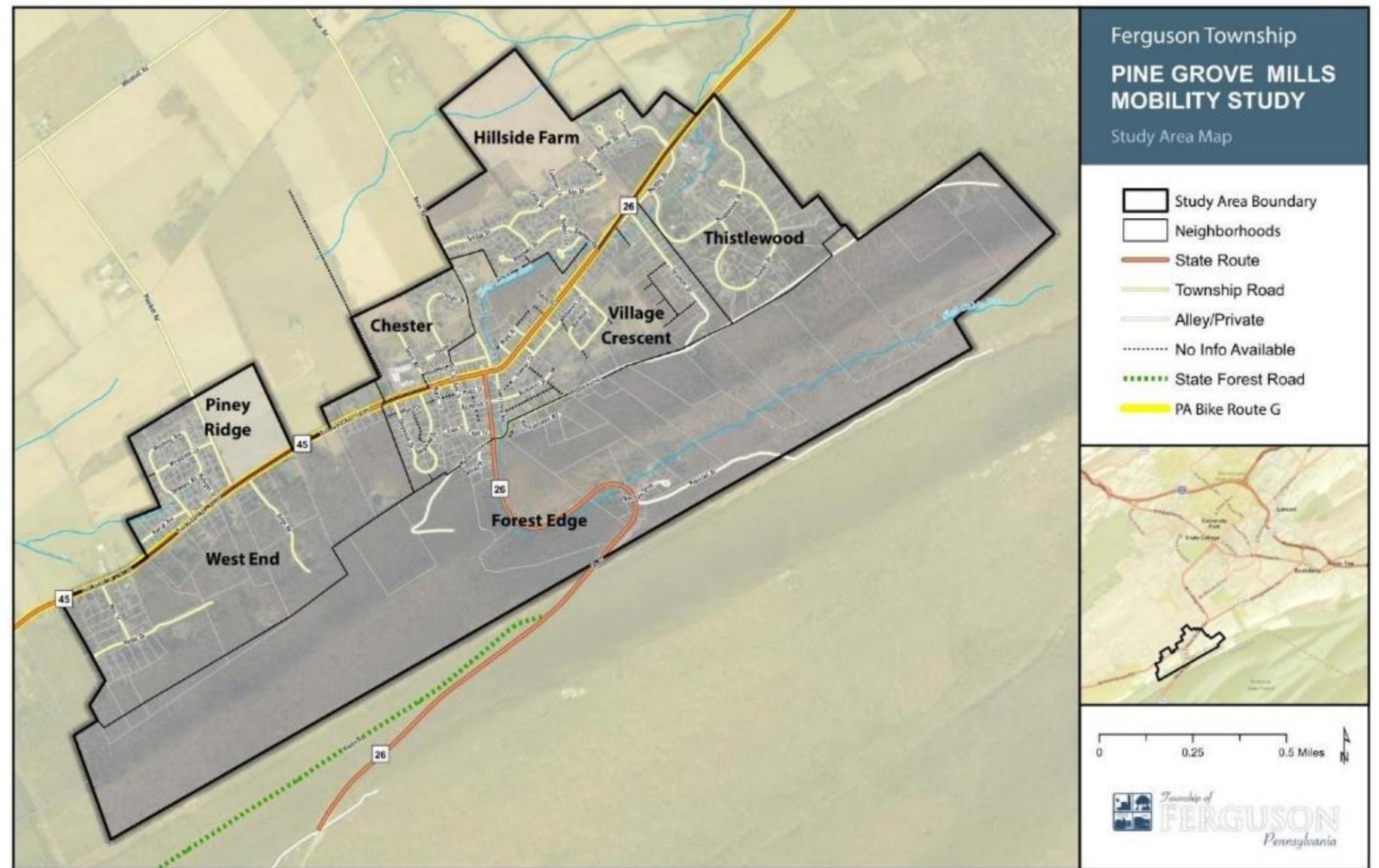


Figure 2. Pine Grove Mills Transportation Mobility Study – Study Area

CHAPTER 2

Context

Land Use

As a village community founded in the 1800s on land purchased by Thomas Ferguson, for whom the Township is named, mixed commercial, residential, and institutional land uses typify the central Village Crescent area. Commercial uses are mostly clustered around the cross-roads area formed by Pine Grove Road (PA 45/PA 26), Water Street (PA 26), and Nixon Road at the center of Pine Grove Mills. Institutional uses (churches and schools) are located along Pine Grove Road to the west of Water Street.

Around the central village, land use is dominated by single-family residential, with several newer subdivisions/neighborhoods developing within the designated regional growth boundary. Older residential subdivisions and single-lot residential development are noted in the West End, Forest Edge, and Village Crescent. Newer subdivision neighborhoods include Piney Ridge, Somerset, Westfield, Hillside Farm, and Thistlewood. Adjacent to the Hillside Farm neighborhood is the Cecil Irvin Park, which continues to be developed by Ferguson Township as a community park.

Along the slopes of the Tussey Range south of Pine Grove Mills, large tracts of mountain land are incorporated as Rothrock State Forest lands. In all other directions, active agricultural operations surround Pine Grove Mills. Many of the agricultural parcels surrounding Pine Grove Mills are enrolled in farmland preservation programs.

Transportation Features

Streets

Figure 3 shows an excerpt from the Ferguson Township Street Classification Map for the Pine Grove Mills Study Area. **Figure 4** shows street ownership overlaid with transportation data sampled in August 2021. The primary Mobility Study streets are as follows:

Pine Grove Road

A state-owned minor arterial carrying about 8,500 vehicles per day east of Water Street, and 2,300 vehicles per day west of Water Street. It is designated SR 0026/45 to the east of Water Street and SR 0045 west of Water Street. Pine Grove Road is considered the “main street” through Pine Grove Mills. The street is two lanes wide with one lane in each direction. The posted speed varies through the study area, with a 25 mph speed limit “in town”. A reasonably completed sidewalk system is provided on both sides of Pine Grove Road from St. Paul

Lutheran Church (west end) to Rosemont Drive (east end). On-street parking is provided on the north side of the street between the Ferguson Township Elementary School and the Naked Egg Café.

Water Street

A state-owned minor arterial (SR 0026) carrying about 4,600 vehicles per day. The street is two lanes wide with one lane in each direction. The posted speed varies through the study area, with a 35 mph speed limit “in-town”. Sidewalk is present on the west side of Water Street. On-street parking appears to be permitted on both sides of the street, even though the shoulders are not wide enough to be considered a full parking lane.

Nixon Road

A Township-owned local street carrying about 1,000 vehicles per day. The street is two lanes wide with one lane in each direction. The posted speed varies through the study area, with a 25 mph speed limit “in-town”. Sidewalk is present on the west side of Nixon Road. On-street parking is prohibited, except for several spaces on the west side near the intersection with Pine Grove Road. The Nixon Road approach at Pine Grove Road is posted for “No Left Turn” because of sight distance concerns.

Intersections

The study area encompasses the following stop-controlled intersections along the primary Mobility Study streets:

- Pine Grove Road & Ross Street
- Pine Grove Road & Plainfield Road
- Pine Grove Road & Deepwood Drive (East & West)
- Pine Grove Road & Kirk Street
- Pine Grove Road & Water Street/Nixon Road
- Pine Grove Road & Rosemont Drive
- Pine Grove Road & Meckley Drive
- Pine Grove Road & Banyan Drive/Meckley Drive
- Pine Grove Road & Meadowview Drive

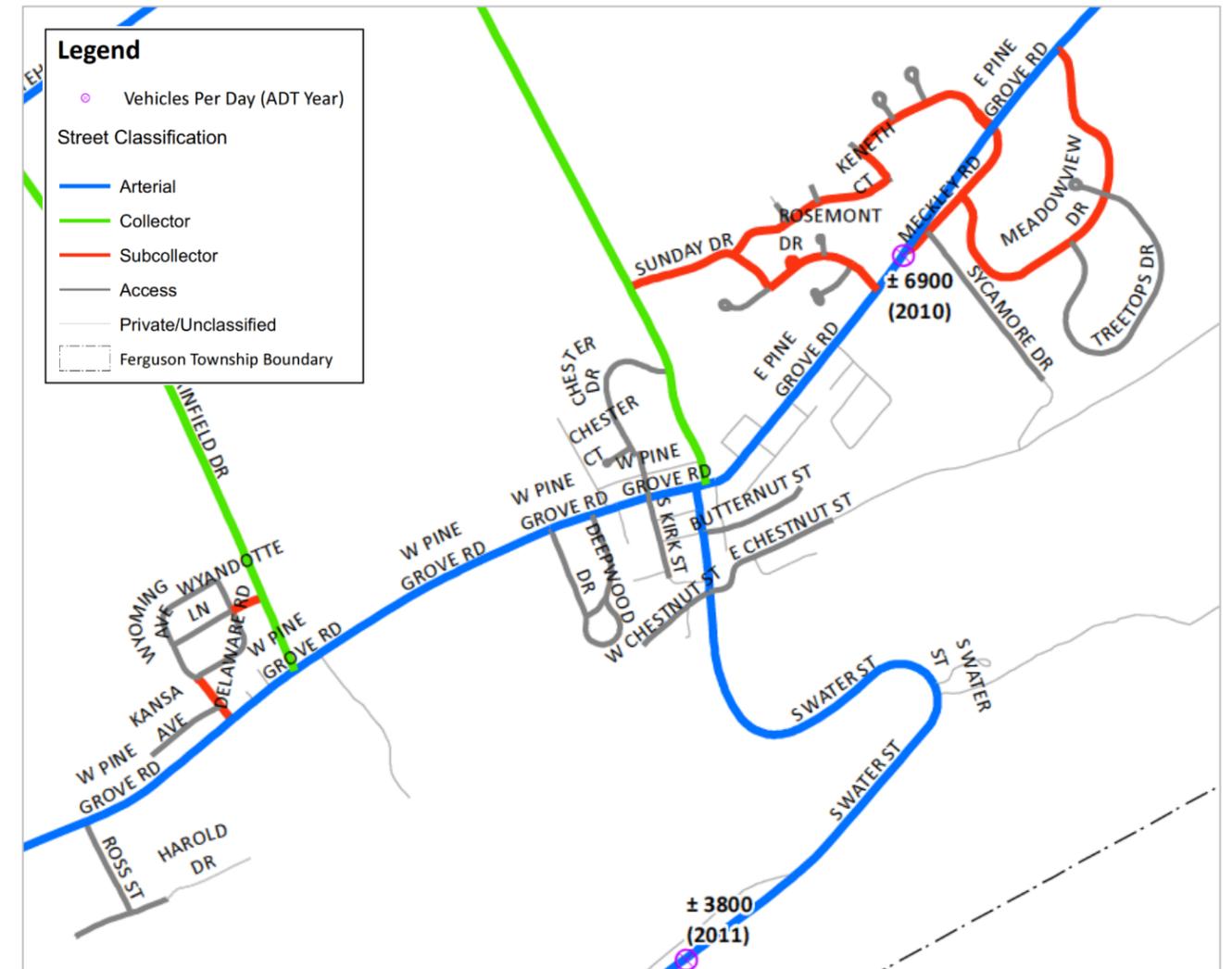
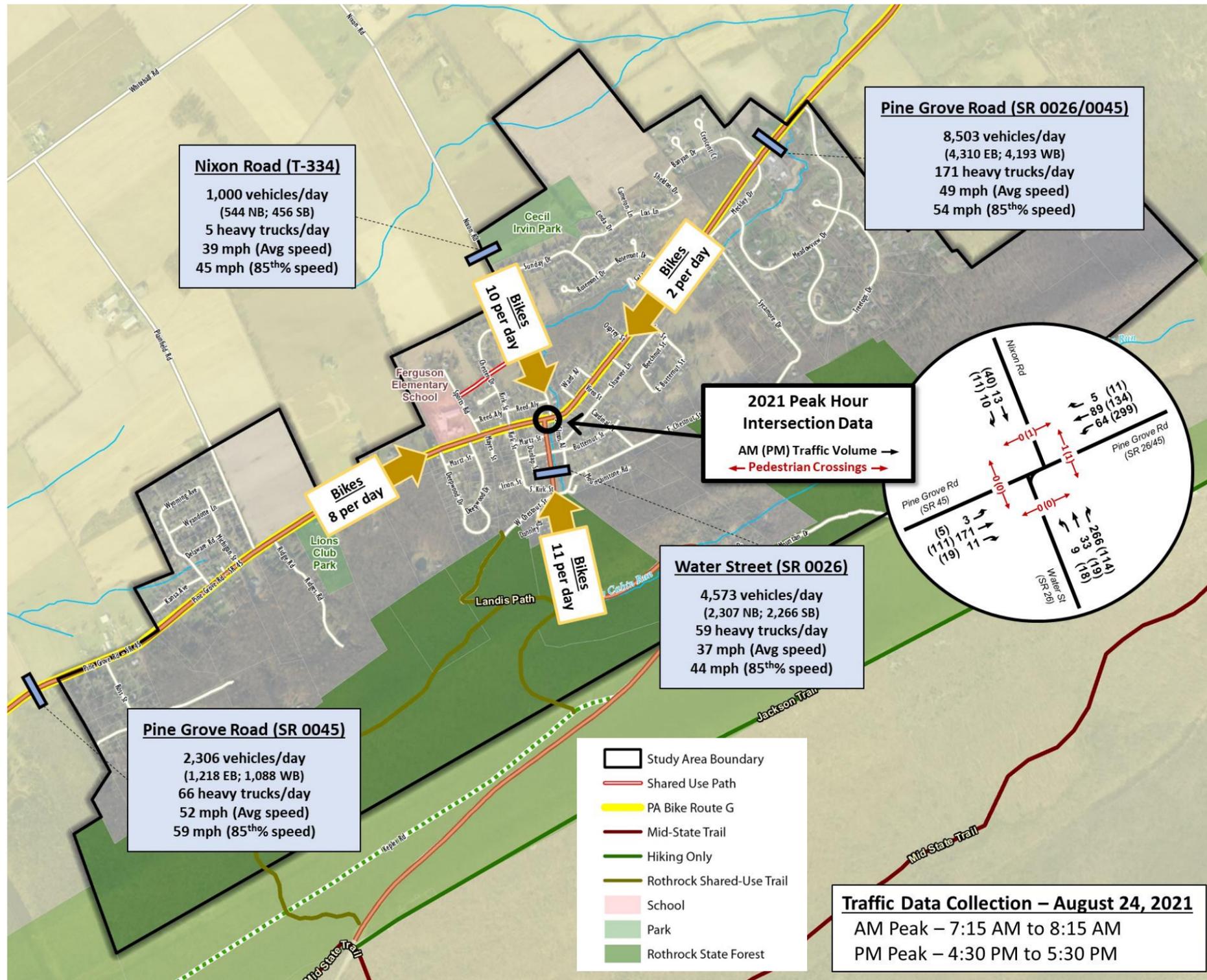


Figure 3. Ferguson Township Street Classification Map (2016)²

- Water Street & Butternut Street
- Water Street & Chestnut Street
- Nixon Road & Chester Drive
- Nixon Road & Sunday Drive

Transit

In 2020 with the onset of the COVID-19 pandemic, the Centre Area Transportation Authority (CATA) discontinued all fixed-route bus service to the Pine Grove Mills area. Prior to 2020, CATA had operated the F Route which served Pine Grove Mills at 20 directional stops along Pine Grove Road (10 inbound/south side; 10 outbound/north side).



Bicycle & Pedestrian Facilities

Continuous sidewalks exist along both sides of Pine Grove Road between Rosemont Drive and St. Paul Lutheran Church, with narrow (3-foot) sidewalks east of Water Street and Nixon Road but wider (5-foot) sidewalks to the west. Sidewalk exists along the west side of Water Street and is narrow and in poor condition. The Township has secured a grant to repair/reconstruct the sidewalk and extend it to Chestnut Street. Narrow sidewalk exists along the west side of Nixon Road. Some neighborhood streets have existing sidewalks on both sides (Banyan Drive, Lois Lane) or one side (Meadowview Drive). Most private streets do not have sidewalk.

A shared use path extends from the Ferguson Township Elementary School and across Chester Drive to Nixon Road. At Nixon Road, the path turns to the north crossing Chester Drive again and continuing to the north along Nixon Road. The path crosses Nixon Road approximately 300 feet south of Sunday Drive and follows the east side of Nixon Road to Sunday Drive. A future extension of the shared use path would connect from Sunday Drive along the east side of Nixon Road and then across to Cecil Irvin Park.

Figure 4. August 2021 Transportation Data Map

CHAPTER 3 Public Outreach

Small Area Plan Outreach

In August 2018, a community survey was distributed, and a total of 205 replies were received.

In response to the question, “What do you value the most about Pine Grove Mills?”, the top 10 responses were:

1. Small town feeling
2. Community/friendly people
3. Green/scenery
4. Location/close to downtown
5. School system
6. History
7. Quaint/quiet
8. Farmers Market
9. Safety
10. Access to parks/natural area

The top ten responses to “What changes would benefit Pine Grove Mills?” were:

1. More community events
2. Better local business opportunities
3. Walking/hiking/biking trails
4. Transportation/traffic concerns
5. Better landscaping and building maintenance
6. Sidewalk connectivity
7. Speeding control
8. Protect/enhances history
9. Streetlight Project
10. Community park/more park land

Taken together, the responses indicated the community’s priority and desire for transportation improvements. One of the themes that came out of the SAP outreach is to “Improve Safety and Provide for Multiple Modes of Transportation.” This theme and its goals and objectives were the catalyst for the Pine Grove Mills Mobility Study.

More information on the SAP is available at <https://www.twp.ferguson.pa.us/planning-zoning/pages/pine-grove-mills-small-area-plan>.

Mobility Study Virtual Public Meeting

On October 14, 2021, Ferguson Township conducted a public meeting to introduce the Pine Grove Mills Mobility Study to the community. Due to COVID-19 protocols, the meeting was held virtually, using the



Figure 5. Postcard Advertising the Mobility Study Survey and Virtual Public Meeting

Microsoft Teams platform. Availability of the meeting and survey was shared through a Ferguson Township press release, the Ferguson Township website, social media by Ferguson Township and partnering agencies, direct mailing to all properties within the study area (Figure 5) and fliers posted through the study area. Meeting materials, including a recording of the virtual meeting, a survey, maps, and graphics, were shared on the Ferguson Township website to allow community members to review the material at any time during the two-week comment period (October 14–28, 2021). Hard copies were also available at the Township building during the comment period.

Twenty-one (21) persons attended the virtual meeting, including team members and presenters. Topics presented at the meeting included:

- Review of the Pine Grove Mills SAP
- Origins of the Pine Grove Mills Mobility Study
- The Mobility Study Process
- Mobility Recommendations from the Pine Grove Mills SAP
- Opportunities for Public Feedback
- Next Steps

A total of 76 participants completed the survey. The following feedback received through the survey was noted:

The top three transportation-related concerns in Pine Grove Mills were identified to be:

1. Excessive vehicle speed
2. Lack of sidewalks/shoulder
3. Lack of bicycle facilities

Survey participants were asked to identify their top five transportation strategies from the SAP and prioritize them with a number--#1 being most important to #5 being less important. The results from highest priority to lowest priority were:

1. Transition S.R. 45 through Pine Grove Mills to a Complete Street with space for all users: drivers, pedestrians, bicyclists, and public transportation riders.
2. Link Pine Grove Mills neighborhoods and community destinations by constructing safe bike paths, bikeways, and walkways.
3. Create comprehensive and safe pedestrian and bike connectivity between regional points of recreation.
4. Improve the intersection of State Routes 26 and 45 with a fully functioning traffic signal and crosswalks.
5. Create/identify/sign access points for established trails in Rothrock State Forest.
6. Create an ADA-accessible streamside walking path and viewing point along Slab Cabin Run on East Chestnut Street.
7. Assess the need for additional on- and off-street parking in the Village Area.

Figure 6 breaks-down the prioritization results for the seven SAP strategies. Each bar graph segment represents the number of priority votes given to that strategy. The segment with the darkest shade of blue represents the number of #1 priority votes. Segments in lighter shades move through the number of #2, #3, #4, and #5 priority votes. The number at the top is a weighted score that accounts for the number of votes by priority. Appendix A includes the Presentation, Meeting Summary, Survey, Summary of Survey Results and Full Survey Results.

The Virtual Public Meeting concluded with a one-hour session reserved for public input and discussion, which enhanced the Working Group’s understanding of local perspectives, frustrations, and nuances about day-to-day travel experiences through the study area.

Mobility Study Open House & Concept Display

On April 18, 2022, Ferguson Township conducted an Open House to present the concepts developed as part of the Pine Grove Mills Mobility Study to the community. Availability of the meeting and survey was shared through a Ferguson Township press release, the Ferguson Township website, social media by Ferguson Township (Figure 7) and partnering agencies, and direct mailing to all properties within the study area. At the Open House, the study concepts and recommendations were displayed, and Working Group members were available to discuss the plan and receive feedback (see Figure 8).

The public was also able to participate in the Open House virtually (online). This included a “real-time” virtual option, where a Working Group member interacted with online participants during the Open

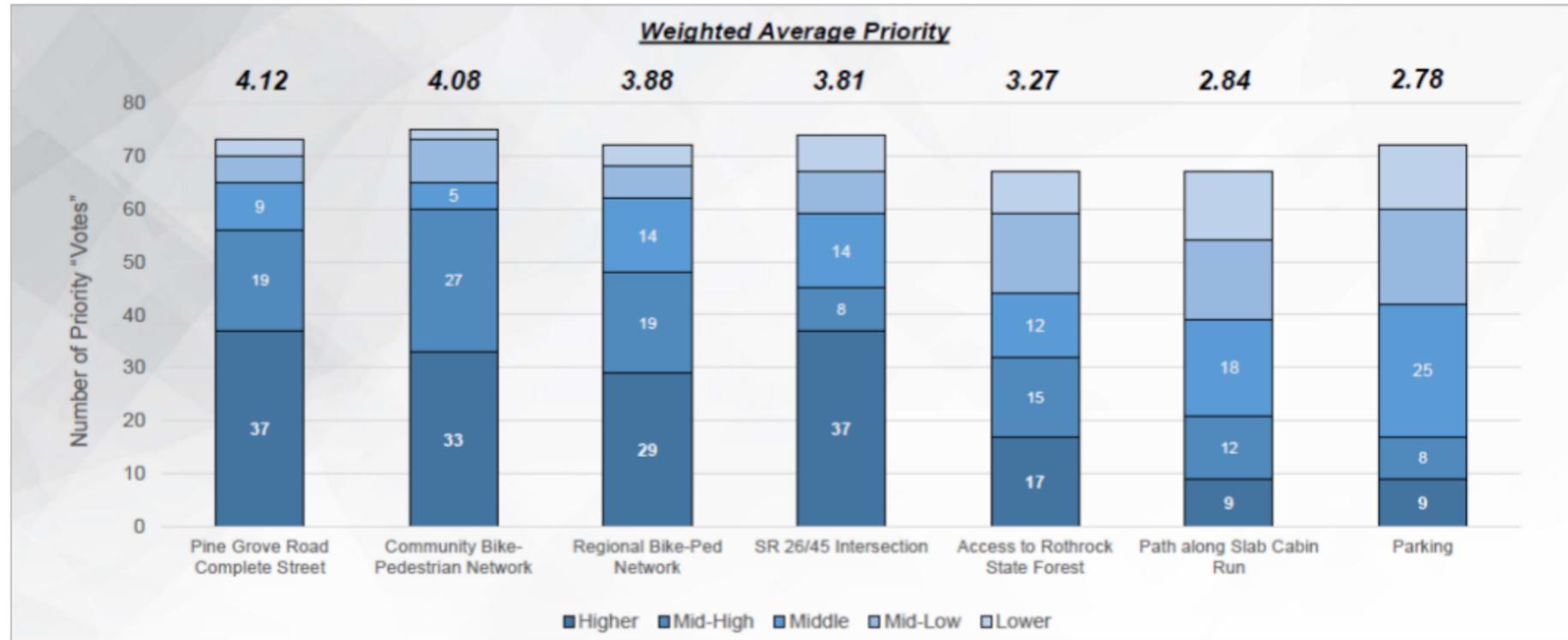


Figure 6. Public Input on Priorities for Transportation Related Strategies from the Small Area Plan

House. Virtual participation was also available for two weeks after the Open House through a self-serve portal that offered an introductory video, concept graphics, and an online survey. Study materials were available for viewing and input from April 18 to May 2, 2022.

Refer to **Appendix B** for the Open House Presentation, Meeting Summary, Survey Form, and Survey Results.

Weather conditions on the evening of the Open House likely played a role in the small number of real-time participants (4 in-person and 5 real-time virtual participants). However, 140 total surveys were returned before the virtual plans display portal was closed on May 2.



Figure 7. Ferguson Township Facebook Post advertising the Open House.



Figure 8. Open House Plans Display, Ferguson Township Meeting Room, April 18, 2022

CHAPTER 4 Assessments

Pine Grove Road & Water Street/Nixon Road Traffic Signal Warrant Evaluation

A traffic signal warrant study of the Pine Grove Road & Water Street/Nixon Road intersection, completed in November 2021, evaluated the signal warrants found in the Manual on Uniform Traffic Control Devices (MUTCD) according to traffic data sampled in late-August 2021—when both Penn State University and the State College Area School District were in full session. The Eight-Hour Vehicular Volume, Four Hour Vehicular Volume, Peak Hour Vehicular Volume, Pedestrian Volume, and Crash Experience signal warrants were evaluated. None of these warrants was found to be met, and an operational analysis found that the intersection was operating at an acceptable level of service on all approaches. The study concluded that a traffic signal is not warranted at this time. The Signal Warrant Study Report is provided in [Appendix C](#).

Roadway Safety Audits

Pedestrian Roadway Safety Audit

On October 13, 2021, a team of five (5) Working Group members conducted an informal Pedestrian Roadway Safety Audit (RSA) on the primary Township-owned streets and existing shared use paths in the study area, including Pine Grove Road, Water Street, Nixon Road, Meckley Drive, and portions of Kirk Street and Chester Drive. The team paused at key intersections to assess street crossing needs, including crosswalks, ADA-compliant ramps and landing areas, lighting, and potential solutions to the needs noted. The audit started at 9:00 AM and concluded at 12:30 PM and included only daytime conditions. Additionally, nighttime illumination readings were performed. [Appendix D](#) contains the detailed prompt lists and responses compiled from the audit team. The electronic project documentation includes a catalog of photos taken of the street, sidewalk, and shared use path conditions during and immediately prior to the RSA.

Conclusions & Recommendations

- Develop a consistent standard for marking crosswalks and providing ADA-compliant crossings at street intersections.
- The lack of pedestrian crossings at the intersections, particularly across Pine Grove Road, was noted.
- Where sidewalks were narrow, blockages by wheelchair ramps, bikes, toys, trash cans, recycling bins, etc., were noted.
- At a few points long the existing sidewalk, the 3-foot width was obstructed by utility poles or other objects.

- Trees and other vegetation along the sidewalk should be trimmed to allow clear passage.
- Gravel and other debris washes from driveways and private streets onto the sidewalk on the south side of Pine Grove Road.
- Sidewalk maintenance on the Slab Cabin Creek Bridge is the responsibility of the adjoining property owner.

Bicycle Roadway Safety Audit

On October 13, 2021, a team of four (4) Working Group members conducted an informal Bicycle RSA while riding the roadways, sidewalks, and bike facilities in the study area. The audit started at 3:00 PM and concluded at 5:30 PM, including daylight conditions only. [Appendix D](#) contains the detailed prompt lists and responses compiled from the audit team. The electronic project documentation includes a catalog of photos taken of the street, sidewalk, and shared use path conditions during and immediately prior to the RSA.

Conclusion & Recommendations:

- Bicycling on sidewalk is possible but difficult where sidewalk is narrow. Ramps at Pine Grove Road/Water Street/Nixon Road are an impediment to bicycles. An on-road bicycling strategy should be considered.
- Pine Grove Road West – Confident Bicyclists (see [Figure 9](#) FHWA Bicyclist Design User Profiles) may feel comfortable using the road or shoulder between Ross Street and the Elementary School. Vehicle speeds in the travel lanes increase to the west. Adding width to the shoulder and clearing gravel/debris would make the shoulder more attractive as a bicycling route for less confident riders.
- Pine Grove Road East – Confident bicyclists may feel comfortable riding on the road with traffic, but parking creates pinch points, and there is some ambiguity about who has a right to the travel lane. Any on-road bicycling strategy should consider the interaction of bicyclists with parked cars.
- Nixon Road – Somewhat Confident bicyclists may feel comfortable riding with traffic, given the lower traffic volumes. Casual riders would likely opt for the shared use path.
- Shared Use Path –The path provides good connectivity to the Ferguson Township Elementary School, but the section along the cemetery is unpaved and somewhat eroded in spots. Consider paving this section of the shared use path.
- Kirk Street – A lockable gate installed on Kirk Street between Pine Grove Road and Chester Court is an obstacle to bike travel and also disrupts the continuity of the roadway system for vehicles and emergency services traffic. Consider removing the gate as a street networking strategy that would distribute traffic more equitably across the Township-owned streets. This strategy would take vehicular pressure off of the Sunday Drive, Rosemont Drive, and Nixon Road corridors. The strategy would provide a supportive route option and may reduce non-

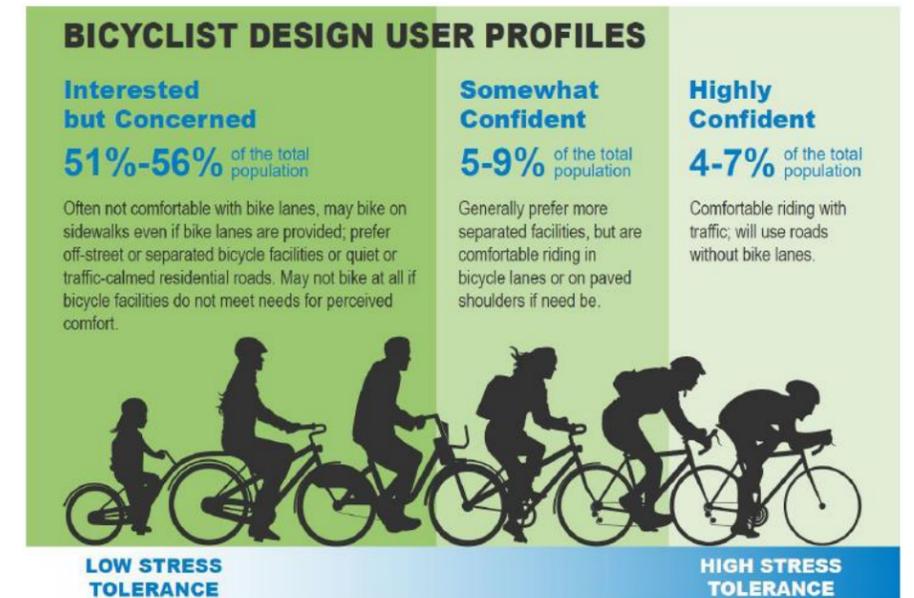


Figure 9. FHWA Bicyclist Design User Profiles³

compliance with the turn restriction on Nixon Road at Pine Grove Road. The strategy has implications related to increased traffic volume and operations at the intersection with Pine Grove Road, which could be tested by removing the gate temporarily. *NOTE: This strategy emerged late in the study process and was not vetted with the community through the Pine Grove Mills Mobility Study public engagement process. The strategy requires additional study.*

Safety & Crash Trend Analysis

Crashes that occurred between January 1, 2015 and December 31, 2020 were mapped to the study area roadways and analyzed for trends that may contribute to mobility issues. Within the five-year timeframe, the following area-wide trends are noted:

- 62 crashes occurred.
- A total of 24 personal injuries and no fatalities were reported.
- No crashes with bike or pedestrian involvement were reported.
- One truck-related crash was reported (East Pine Grove Road, east of Banyan Drive/Meckley Drive).
- 11 of the 62 crashes involved collisions with a deer or avoidance of a deer in the roadway.

Crashes by Collision Type

[Table 2](#) gives the area-wide frequency of crashes by collision type. [Figure 10](#) symbolizes all crashes by collision type and identifies eight crash clusters (three or more crashes in proximity)—seven clusters along Pine Grove Road and one along Water Street.

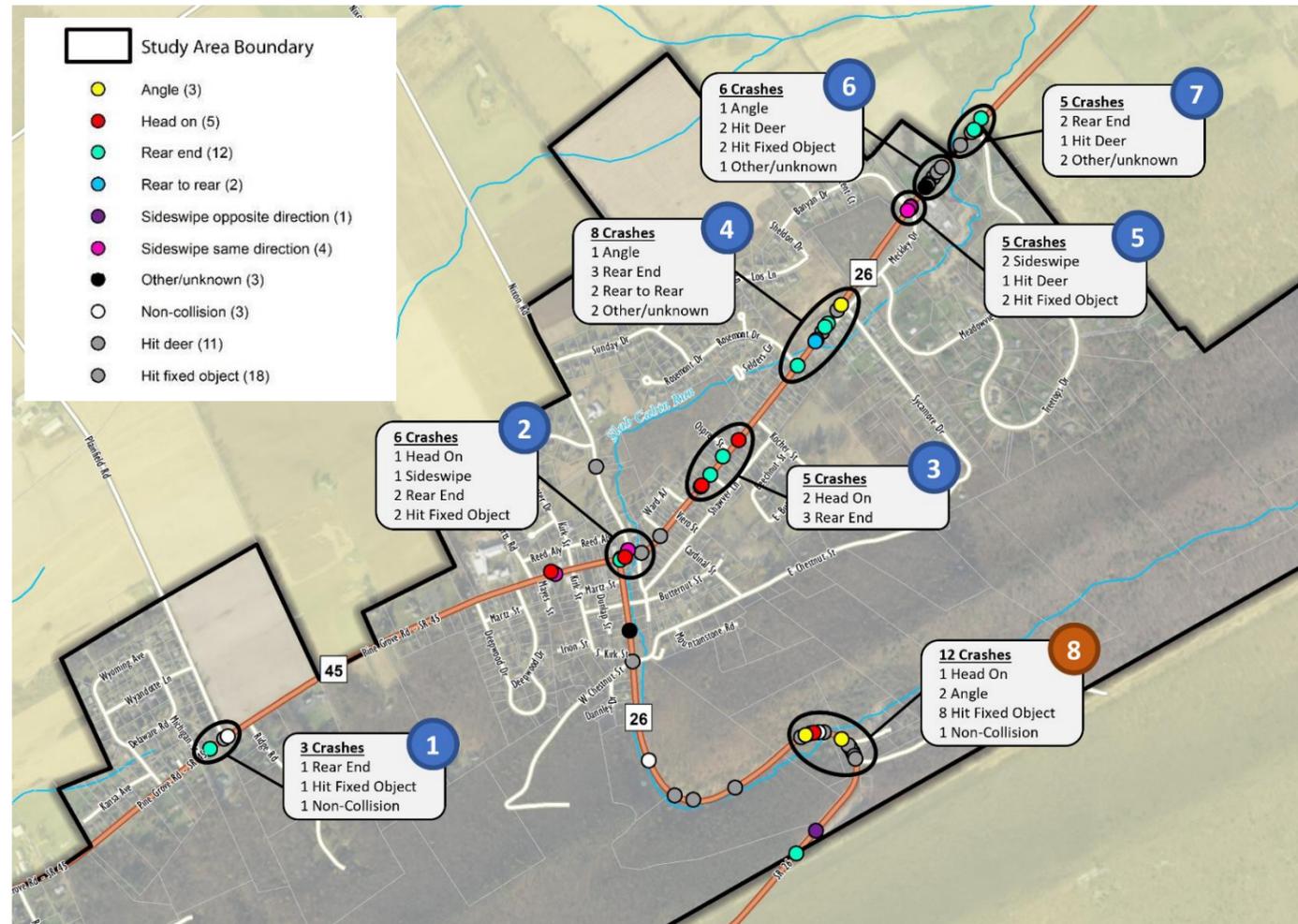


Figure 10. Crashes by Collision Type and Cluster⁴



Figure 11. Injury Crashes⁴

Table 2. Crashes by Collision Type

Collision Type	# of Crashes
Angle	3
Head On	5
Rear End	12
Rear to rear	2
Sideswipe	5
Hit Fixed Object	18
Non-Collision	3
Other/Unknown	3
Hit Deer	11
Total Crashes	62

Crashes by Cluster

The following trends are noted for each numbered crash cluster:

1. Pine Grove Road at Plainfield Road – No trends identified. Crash severity was low, and no injuries were reported.
2. Pine Grove Road at Water Street and Nixon Road – Three crashes on Pine Grove Road, two on Water Street, and one on Nixon Road. Collision types are indicative of intersection conflicts and constrained street geometry.
3. Pine Grove Road, between Nixon Road and Viero Street – Two of the five crashes were “head-on”. One of the head-on crashes caused five injuries. Three of the five crashes occurred at night, with the other two affected by wet roadway conditions.
4. Pine Grove Road, between Rosemont Drive and Sycamore Drive – Three of the eight crashes were rear end collisions, with two others being rear-to-rear collisions in the Naked Egg Café parking lot. Crash severity was either minor or vehicle-disabling. Two injuries were reported.
5. Pine Grove Road at Banyan Drive/Meckley Drive – The five crashes were tightly clustered at the intersection. Icy roadway conditions contributed to the two hit fixed object crashes. The two sideswipes involved vehicles entering the left turn lane then unexpectedly turning right. Crash severity was low, and no injuries were reported.
6. Pine Grove Road, between Meadowview Drive and Banyan Drive/Meckley Drive – Four of the six cluster crashes (67%) occurred at night.
7. Pine Grove Road at Meadowview Drive – Four of the five crashes (80%) occurred at night. The two rear-end crashes involved a westbound vehicle waiting to turn left into Meadowview Drive. A turn lane is not provided at Meadowview Drive, and vehicles must stop in the travel lane.
8. Water Street – Nine of the 12 crashes were hit fixed object or non-collision crashes. Eight of the 12 crashes involved wet, icy, or snow-covered road conditions. Seven of the 12 crashes resulted in injuries, with six of these being more severe

“reportable” crashes. Crashes are likely related to the roadway curvature and grade, which are most problematic during inclement weather. PennDOT continues to monitor and improve Water Street (SR 0026) to address crash history. A high friction surface treatment (HFST) project for Water Street (Pine Grove Mountain) was recently approved to be bid in 2022. The project is part of a bundle with two other HFST projects in Centre County.

Crashes by Severity

Figure 11 symbolizes crashes where injuries were sustained.

- 46 of the 62 total crashes (74%) caused no injuries.
- The remaining 16 crashes (26%) caused one or more injuries. Four crashes caused multiple injuries.
- All 16 crashes involving injuries occurred on East Pine Grove Road (6) or Water Street (10). No injury causing crashes occurred on West Pine Grove Road or Nixon Road.

Crashes and Roadway Illumination

Figure 12 locates only those crashes that occurred at night—that is under dusk, dark, or streetlight illumination conditions. 33 of the 62 crashes (53%) occurred at night under dark conditions (with or without streetlighting). The night crash data was overlaid with intersection illumination data provided by Ferguson Township. Illumination levels are indicated by dots that compare the sampled light level to standards established by the American Association of State Highway Transportation Officials (AASHTO). Table 3 gives the standards according to land use and street context.

- **Green** dots indicate readings that meet or exceed the standard.
- **Yellow** dots indicate readings that do not meet the standard but are close to meeting it.
- **Red** dots indicate readings that do not meet the standard and are not close to meeting it.

Table 3. Facility Classification and Illuminance Design Values⁶

Facility Classification	Off-Roadway Light Sources	Minimum Illuminance (foot-candles)	Streets Fitting Classification
Minor Arterial	Commercial	1.4	Pine Grove Road Water Street
Collectors	Intermediate	0.7	Nixon Road
Local	Intermediate	0.7	All other study streets
Sidewalks	Commercial	0.9	All study streets
	Intermediate	0.6	
Pedestrian and Bicycle Ways	All	2.0	All study streets

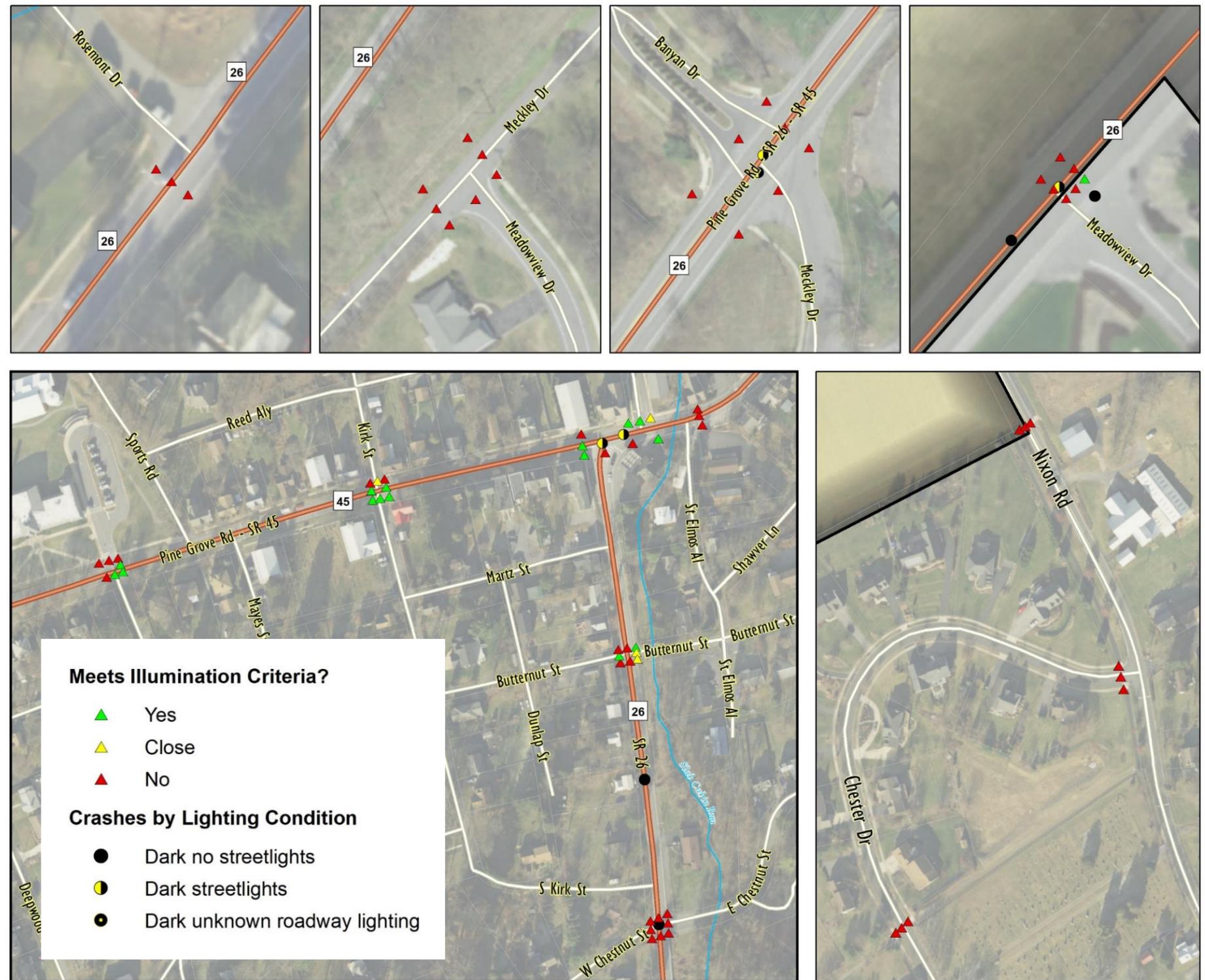


Figure 12. Nighttime Crashes and Illumination Criteria⁵

Conclusions & Recommendations

- Update, renew/replace, and add lighting with efficient LED with all enhanced pedestrian crossings.

Parking Assessment

Parking Supply & Utilization

Figure 13 shows parking sign locations and the permitted parking areas. The utilization of parking on many Township-owned streets is regulated according to the Township’s Municipal Code, Chapter 15 (Motor Vehicles and Traffic), Part 4 (General Parking Regulations). For some streets, the ordinance restricts parking at all times on both sides of the street (e.g., Deepwood Drive), while other locations are regulated according to certain days and hours (e.g., Pine Grove Road, south side, prohibited except Sunday 8:00 AM to 12:00 noon).

A street signage system that communicates the parking regulations is currently in place. The signs in place are generally in good condition and consistent with the ordinance, with the following observations:

- Public feedback received through both the SAP and Mobility Study indicated that drivers had difficulty identifying the legal parking areas based on the signs.
- Parking signage on the south side of Pine Grove Road west of Water Street is less frequent/systematic and does not communicate the ordinance-permitted parking on Sundays.
- The No Parking zones adjacent to intersections along Pine Grove Road appear to be sized according to the sight distance needed for a 35-mph posted speed. The No Parking areas could be adjusted to match the current 25 mph posted speed.
- On the north side of Pine Grove Road near the Naked Egg Café, the eastern end of the on-street parking area is not posted.
- Some of the parking signage along Water Street is older and works off a different “system” than the signage along Pine Grove Road.
- An on-street “Loading Zone” is designated along the west side of Water Street near Pine Grove Road but is not in current use.
- Water Street is not referenced in the Municipal parking ordinance or posted in the same manner on both sides. For instance, the No Parking areas (sight triangles) on the east side of Water Street around Butternut and West Chestnut Streets intersections are not posted. A fire hydrant is also noted on the southeast corner at Butternut Street.

Table 4 summarizes the inventory and utilization of on-street parking along Pine Grove Road, Water Street, and Nixon Road. Signs designate where parking is permitted, but spaces are not marked. Areas around driveways and street intersections were excluded from the inventory to identify Functional Parking Areas with enough space to park at least one car. The length of each Functional Parking Area



Figure 13. Functional Parking Areas & Ordained Parking

was measured to estimate the Functional Parking Capacity, assuming 25 feet per parked vehicle. Street Sections were defined for the purpose of the inventory.

Parking Utilization was measured according to the number of parked vehicles observed at four different times during Thursday, December 16, 2021. In **Table 4**, the left-most columns give the number of vehicles parked during these times and the percentage of the Functional Parking Capacity that was occupied. The following observations are noted:

- The on-street parking capacity in Pine Grove Mills is approximately 90 vehicles.
- Parking utilization during the overnight hours was the highest (22%, 19 vehicles), which indicates use of parking by residents living in Pine Grove Mills.
- Daytime utilization was about half of the overnight utilization (11%, 10 vehicles).

- Spaces along East Pine Grove Road between Nixon Road and Viero Street were the most highly utilized spaces (40-60%). Spaces along West Pine Grove Road between the Elementary School and Water Street were the next most utilized (14-57%).
- During the day of study, the handicap-accessible space on West Pine Grove Road was utilized continually, while the one on East Pine Grove Road was not used.

On-street parking is currently permitted (by Ordinance) on the south side of East and West Pine Grove Road during Sunday morning between 8:00 AM and 12:00 PM. However, parking observations were not completed since church service schedules and attendance were still being impacted by the COVID-19 pandemic. Outreach was attempted to the Pine Grove Mills Presbyterian Church and St. Alban’s Anglican Church in January 2022⁷. Carl Campbell, Pastor of the Pine Grove Mills Presbyterian Church provided the following input:

1. Thinking beyond COVID-19, how do you plan to conduct your Sunday Worship Services? In-person, virtual, or both?

Table 4. Pine Grove Mills Parking Utilization Data

	Pine Grove Road										Water, Pine Grove Rd to Chestnut	Nixon near Pine Grove Road	Regular Total Parked	Handicap* Total Parked
	Elem School to Kirk		Kirk to Water	Nixon to Viero	Viero to Shawver		Shawver to Kocher	Kocher to Rosemont	Across from Naked Egg					
	Regular	Handicap*			Regular	Handicap*								
Friday 12/17/2021	12:00 AM	4	1	3	3	2	0	2	3	0	0	2	19	1
	Overnight	57%	100%	43%	60%	22%	0%	10%	21%	0%	0%	67%	22%	50%
Friday 12/17/2021	8:30 AM	2	1	1	3	0	0	2	1	0	0	1	10	1
	AM	29%	100%	14%	60%	0%	0%	10%	7%	0%	0%	33%	11%	50%
Thursday 12/16/2021	12:00 PM	2	1	2	2	0	0	1	0	2	0	1	10	1
	Midday	29%	100%	29%	40%	0%	0%	5%	0%	17%	0%	33%	11%	50%
Wednesday 12/15/2021	5:00 PM	1	1	3	3	0	0	1	1	0	0	1	10	1
	PM	14%	100%	43%	60%	0%	0%	5%	7%	0%	0%	33%	11%	50%

Spaces Available	Pine Grove Road										Water, Pine Grove Rd to Chestnut	Nixon near Pine Grove Road	Regular Total Available	Handicap* Total Available
	Elem School to Kirk		Kirk to Water	Nixon to Viero	Viero to Shawver		Shawver to Kocher	Kocher to Rosemont	Across from Naked Egg					
	Regular	Handicap*			Regular	Handicap*								
Spaces Available		7	1	7	5	9	1	20	14	12	11	3	88	2

Pastor Campbell: Both. We expect fewer in-person participants going forward, based on surveys.

- How many on-street parking spaces (Pine Grove Road or elsewhere) do you think your church needs to accommodate members on a Sunday morning?

Pastor Campbell – More! About 15-20 families attend in-person on Sundays. They park on the north side of Pine Grove Road only and may park into the No Parking areas near the intersections. We did not know it was legal to park on the south side of Pine Grove Road, and to our knowledge, no one parks on that side—especially when vehicles are parked on the north side. Wouldn't the street be too narrow for traffic? Overflow parking is typically at the Elementary School (ad-hoc; no agreement). During larger events (weddings, funerals, etc.), we park vehicles along the alley behind the cemetery. We also share St. Alban's parking when events do not overlap. Occasionally, overflow parking may happen on Deepwood Drive, even though it is signed for No Parking.

- What other concerns or observations do you have about the need for parking along Pine Grove Road on Sunday mornings?

Pastor Campbell – Further reductions in parking along Pine Grove Road. It seems that the parking zones have gotten smaller in recent years.

Conclusions & Recommendations

- Seek opportunities to add public, on-street parking near the intersection of Pine Grove Road & Water Street/Nixon Road in concepts that address this area.
- Continue the township policy that new businesses/land development are responsible for providing their own parking supply according to the zoning code. On-street parking may supplement or provide flex spaces but is not intended to supply the full amount of parking required.

Transit Assessment

Table 5 summarizes transit ridership data provided by the Centre Area Transportation Authority (CATA) for routes serving Pine Grove Mills during the three fiscal years from 2017 to 2020. The following observations are noted:

- The pair of stops (199/200) at the Post Office and Nixon Road was the most active stop on the Pine Grove Mills Route (F).

CATABus routes, other micro-transit zones, and select destination points outside of the established micro-transit zones at certain waypoints.

- A 60% decline in ridership is noted from FY 2017-18 through FY 2019-20. Greg Kausch indicated that the ridership decline for Pine Grove Mills coincides with declines for the overall system during the same timeframe. The decline is also attributed to service reductions on the route serving Pine Grove Mills.

Transit service to Pine Grove Mills was suspended following the onset of the COVID-19 pandemic and had not been restored as of Spring 2022. However, CATA expects to introduce a new Southwest State College CATAGo! zone to provide on-demand transit service to Pine Grove Mills during Weekday peak commuter hours—i.e., 6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM. Free transfers would be provided to high-frequency

Table 5. CATA Ridership Boardings & Alightings, Pine Grove Mills Routes, 2017 to 2020⁸

Stop	FY 2017-18		FY 2018-19		FY 2019-20	
	APC Boards	APC Alights	APC Boards	APC Alights	APC Boards	APC Alights
187-(X) PnGrv_Ross_IB	14		10		6	
188-(X) PnGrv_Ross_OB	1	20		16		10
189-(X) PnGrv_Wymng_IB	4	1	2		1	
190-(X) PnGrv_Wymng_OB		28		15		9
191-(X) PnGrv_Plnfld_OB	14	222	10	91	6	56
192-(X) PnGrv_Plnfld_IB	300		134		77	
193-(X) 347 W Pine Grve	1	85		19		12
194-(X) 290 W Pine Grve	28		1		1	
195-(X) PnGrv_Dpwd_IB	99	1	77		44	
196-(X) PnGrv_Dpwd_OB		7	7	10	4	6
197-(X) W PnGrv_Sports	6	54		35		21
198-(X) PnGrv_Mayes	78	10	53		30	
199-(X) PineGrve_Nixon	2	303	1	304	1	186
200-(X) PineGrve_PostOf	434	3	444	8	255	5
201-(X) 226 E Pine Grve	146		55	1	32	1
202-(X) 229 E Pine Grve	1	127	6	52	3	32
203-(X) PnGrv_Rsemnt_OB	15	136	1	67	1	41
204-(X) PnGrv_Rsemnt_IB	131	3	59	1	34	1
205-(X) PnGrv_Meckley	1	1	23		13	
206-(X) E PnGrv_Banyan		17	5	20	3	12
Total	1,275	1,018	888	639	510	390
	2,293		1,527		900	

CHAPTER 5

Design Concepts

The survey input received through the Mobility Study’s First Public Meeting confirmed the community’s goals for improving transportation mobility and indicated the relative importance of action steps generated by the SAP. A series of design concepts were developed to implement the mobility goals, with most being constructable projects that are immediately feasible for consideration in the Township’s Capital Improvement Program. Some concepts include aspirational elements or options that would require additional enabling steps before they may be pursued. These include concepts that go outside of the existing public street right-of-way and may be accomplished by future land development projects and dedication of streets and other transportation infrastructure for Township ownership. For the purposes of presentation, concepts were named and organized either by location or mobility element, as follows:

- H. Pine Grove Road & Water Street/Nixon Road Intersection
- I. East Pine Grove Road Gateway
- J. Pedestrian & Bicycle Network Improvements
- K. West Pine Grove Road Gateway
- L. Parking Improvements
- M. Rothrock State Forest Trails Access

Concept Design References & Guidance

All concept drawings provided in this study are two-dimensional illustrations of ideas drawn over the publicly available aerial mapping. The drawings are not based on engineering survey but are informed by transportation design guidance. As concept designs, they initiate agency and public coordination and start the discussion of project impacts, engineering issues, and implementation costs. The following references and guidance documents were used:

- American Association of State Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, 2011.
- American Association of State Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, 2012.
- Roundabouts: An Informational Guide, Second Edition, 2010.

The following sections provide the full illustration of each concept alongside a description of the key features, benefits/challenges, design factors, and implementation considerations.

A. Pine Grove Road & Water Street/ Nixon Road Intersection

The concept addresses the central intersection in Pine Grove Mills where Water Street and Nixon Road intersects Pine Grove Road. The concept also extends to the east along Pine Grove Road to encompass St. Elmo’s Lane and the street space between Pine Grove Hall and the Post Office. The current intersection is controlled by stop signs on the Water Street and Nixon Road approaches. A flashing warning signal at Water Street gives flashing yellow to the Pine Grove Road approaches and flashing red to the Water Street approach. Left turns from Nixon Road are restricted because of sight distance concerns.

The 2050 Centre County Metropolitan Planning Organization (CCMPO) Long Range Transportation Plan (LRTP) includes \$10.6 million in the 2014-2050 period for a project to realign Nixon Road with Water Street and install a traffic signal (if warranted). Because of the impacts to historic structures in Pine Grove Mills, the community may no longer favor the Nixon Road realignment idea, and a smaller scale, context-sensitive project is envisioned in this mobility study.

Concept Development

Public input about the intersection indicated the need for pedestrian accommodations and a desire to remove the Nixon Road left turn restriction, which induces cut-through traffic along Sunday Drive and Rosemont Drive. The SAP suggested that the flashing warning signal be replaced with a full traffic signal. However, the traffic signal was not found to be warranted according to traffic volume, pedestrian volume, or crash history. It is unlikely that the traffic signal will be warranted in the future without significant regional traffic growth or local land development.

Therefore, three Concept Options were developed to add pedestrian accommodations and attempt to improve or resolve the Nixon Road sight distance issues without the full traffic signal. The concepts utilize stop-control or roundabout control to emphasize a low-speed environment within the heart of Pine Grove Mills.

Concept A.1, Stop Controlled Option

Figure 14 illustrates the Stop-Controlled Option, which includes the following key elements:



Figure 14. Pine Grove Road & Water Street/Nixon Road – Concept A.1, Stop Controlled Option

Full-Sized and Mini Roundabouts⁹

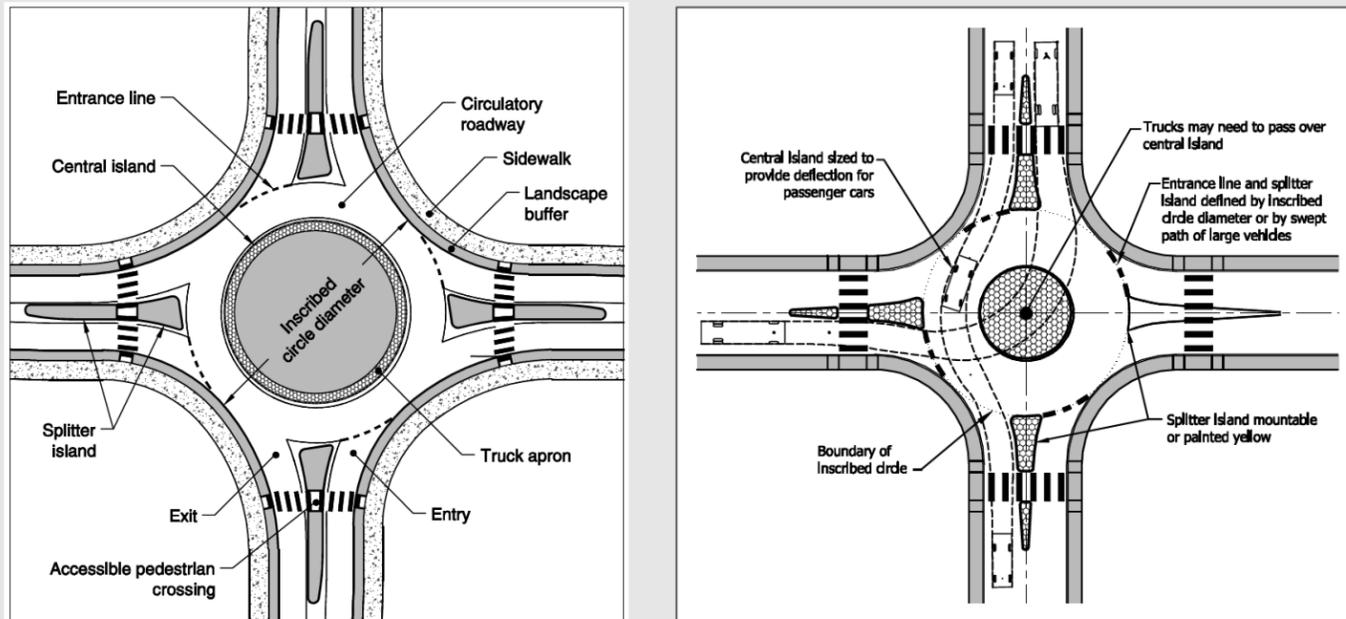
Roundabouts are an intersection control strategy with proven safety advantages over signal because of the elimination of conflicts, reductions in crash severity, and lowering of vehicle speeds at the intersection. They are a worthy option for consideration where a signal is not warranted but stop-control is not performing as desired.

The key design features of a roundabout are its inscribed diameter, center island, and entry points. A full-sized roundabout has entry features that slow vehicles and a diameter of 130 to 150 feet that would allow large trucks to circulate around the center island. The center island is curbed and raised with a truck apron that is mountable by the rear wheels of large trucks when making turns. Otherwise, the center island is not traversable. The entry “splitter” islands are commonly raised/curbed concrete islands that serve as pedestrian refuges on each approach. The entry features require vehicles to slow when entering the roundabout must slow when turning into the roundabout.

Where space is limited, smaller “mini-roundabouts” may be designed with a smaller diameter (less than 90 feet). The entry “splitter” islands may be raised and curbed concrete islands, or they can be painted. The center island may be raised somewhat and outlined with a depressed or mountable curb but is fully traversable by large vehicles—

including semi-trucks and farm machinery (see inset).

Since the space around the Pine Grove Road & Nixon Road/Water Street intersection is somewhat constrained by the existing intersection space, adjacent buildings, Slab Cabin Run, and the Pine Grove Road bridge over Slab Cabin Run, the roundabout designs considered for this intersection are in the mini roundabout category.



Full-Sized Roundabout – Plan View

Mini Roundabout – Plan View

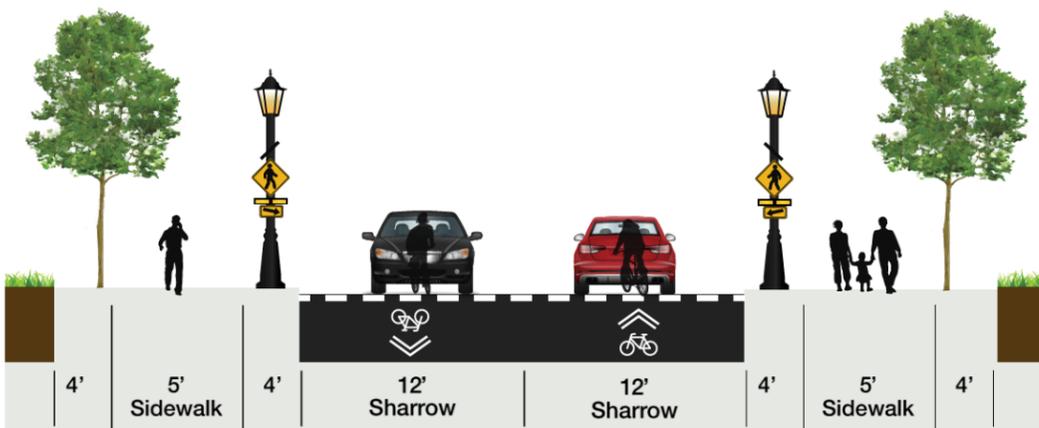


Figure 15. Pine Grove Road Cross-Section with Enhanced Pedestrian Crossing

- Retain the existing stop-controlled intersection, with revised Water Street and Pine Grove Road geometry.
- Add two enhanced pedestrian crossings of Pine Grove Road with rapid flashing beacons, high-visibility pavement markings, and enhanced lighting.
- Add high-visibility crosswalks with enhanced lighting at Water Street, Nixon Road, St. Elmo’s Lane, and Post Office Driveway.

Figure 15 illustrates the roadway cross-section, signage, and beacon arrangement at the enhanced pedestrian crossings of Pine Grove Road shown in Concepts A.1, A.2, and A.3.

Table 6. Concept A.1, Stop-Controlled Option, Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Adds <u>two</u> fully enhanced crossings of Pine Grove Road. • Stop sign control is well understood by drivers and in context with the small-town environment. • Introduces minimal new delay on Pine Grove Road. • Does not preclude installation of a traffic signal in the future. 	<ul style="list-style-type: none"> • Vehicles on Pine Grove Road do not stop or yield at the intersection, and speeds may remain higher than desired. • Turn restrictions would still be required on Nixon Road. • Long pedestrian crossing distance across Water Street.

Concept A.2, Small Mini-Roundabout Option

Figure 16 illustrates the Small Roundabout Option, which includes the following key elements:

- Convert the intersection to a small “mini-roundabout”.
- Add an enhanced pedestrian crossing of Pine Grove Road with rapid flashing beacons, high-visibility pavement markings, and enhanced lighting between Pine Grove Hall and the Post Office.
- Add high-visibility crosswalks with enhanced lighting at all other crossing locations, including the roundabout, Nixon Road, St. Elmo’s Lane, and Post Office Driveway.

Table 7. Concept A.2, Small Roundabout Option, Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Adds <u>one</u> fully enhanced crossing of Pine Grove Road. • Allows Nixon Road drivers to turn right and use the roundabout for “U-turns” to travel east toward State College/Boalsburg. • Reduces vehicle speed through the intersection, as vehicles yield when entering the roundabout. 	<ul style="list-style-type: none"> • Roundabout adds new delay for vehicles on Pine Grove Road. • Turn restrictions would still be required on Nixon Road. • Pedestrian crossings <u>at the roundabout</u> would not be equipped with rapid flashing beacons. • The roundabout center island is not raised (to allow large vehicle to turn across it); vehicles can enter the roundabout without slowing. • Precludes installation of a traffic signal in the future.

Concept A.3, Large Mini Roundabout Option

Figure 17 illustrates the Large Roundabout Option, which includes the following key elements:

- Convert the intersection to a large “mini-roundabout”.
- Add an enhanced pedestrian crossing of Pine Grove Road with rapid flashing beacons, high-visibility pavement markings, and enhanced lighting between Pine Grove Hall and the Post Office.
- Add high-visibility crosswalks with enhanced lighting at all other crossing locations, including the roundabout, Nixon Road, St. Elmo’s Lane, and Post Office Driveway.

Table 8. Concept A.3, Large Roundabout Option, Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Adds <u>one</u> fully enhanced crossing of Pine Grove Road. • Allows Nixon Road drivers to turn right and use the roundabout for “U-turns” to travel east toward State College/Boalsburg. • Reduces vehicle speed through the intersection, as vehicles yield when entering the roundabout. 	<ul style="list-style-type: none"> • Requires property/right-of-way acquisition, and potential for expensive environmental clearance/remediation costs associated with gas station. • Roundabout adds new delay for vehicles on Pine Grove Road. • Turn restrictions would still be required on Nixon Road. • Pedestrian crossings <u>at the roundabout</u> would not be have rapid flashing beacons. • The roundabout center island is traversable; vehicles can enter the roundabout without slowing. • Precludes installation of a traffic signal in the future.

Implementation Considerations

Water Street Realignment

The adjusted Water Street alignment shown in all three concepts would better suit truck turning operations and put pedestrians directly in front of drivers. Alternatively, it may be possible to convert the painted “porkchop” island on Water Street into a curbed pedestrian refuge. Regardless, the design of access to the Pine Grove Country Store and the Slab Cabin Run bridge structure will require close coordination with the business owner and PennDOT.

Pine Grove Road Reconfiguration

Pine Grove Road is reconfigured in all three concepts to add a minor horizontal deflection, narrow the travel lanes, and reclaim the space for sidewalk, buffers, on-street parking, and other roadside uses (landscaping, street-side business use, etc.).

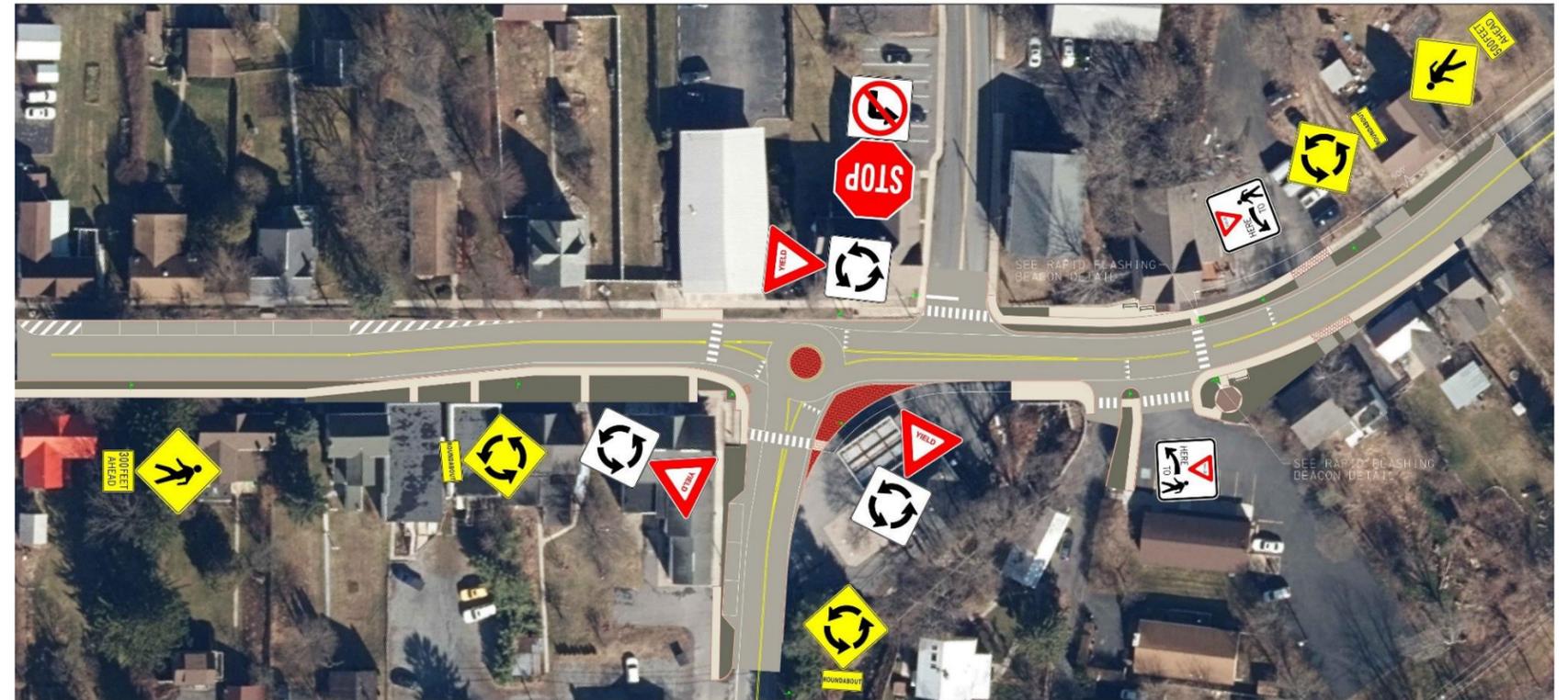


Figure 16. Pine Grove Road & Water Street/Nixon Road – Concept A.2, Small Roundabout Option

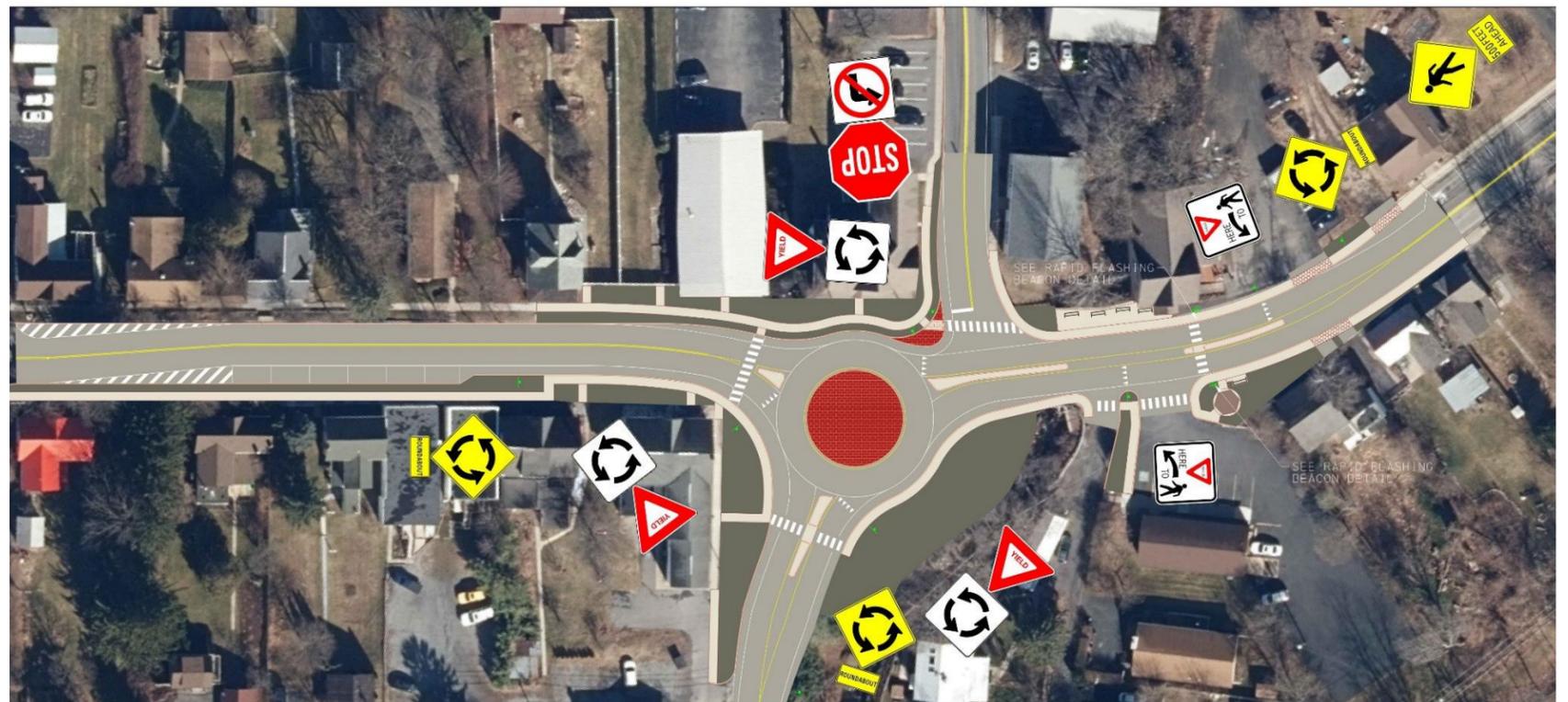


Figure 17. Pine Grove Road & Water Street/Nixon Road – Concept A.3, Large Roundabout Option

Ongoing Use of Flashing Signal

With the rectangular rapid flashing beacons (RRFB), the flashing signals at the intersection may not be effective or may take attention away from the RRFB installation(s). During design, consider the need/desirability of updating or removing the existing flashing signal.

Repurposing Street Space at the Post Office

With all three concepts, there may be an opportunity to repurpose the approximately 1,500 square feet of excess street space in front of the Pine Grove Mills Post Office (see **Figure 18**). Much of the space is currently paved shoulder area that may have, at one time, been used as a bus pull-out or a Postal Service drop box location. Suggested ideas included new on-street parking, gazebo, and bike parking. A covered area could serve as a community gathering spot and serve multiple purposes. Feedback provided during the Mobility Study Open Plans Display indicated the most support for a bus shelter/gazebo, but most ideas received a similar number of “votes”. Other ideas suggested by participants leaned toward green space of some kind, with a significant number of votes for doing nothing.

Cost Estimates

- Stop-Control Option = \$834,500
- Small Roundabout Option (not estimated)
- Large Roundabout Option = \$1,269,100

Complementary Street Repurposing Project

- Street Space Repurposing = \$215,200

Rectangular Rapid Flashing Beacons (RRFBs)¹⁰

RRFBs are user-activated devices placed in combination with signs, lighting, and crosswalk markings calling attention to pedestrians and bicyclists at an established crossing point. The device includes two rectangular-shaped LED arrays that light up as yellow flashing indications when activated. RRFBs differ from other flashing beacons in their shape, flash rate, and light intensity. RRFBs are only lighted when a user activates the device, typically via a push button. The light intensity is adaptive to the surrounding light conditions.



The devices are a common pedestrian safety improvement modification on streets with a speed limit under 40 mph and have been shown to reduce pedestrian crashes by nearly 50%.



Figure 18. Street Space Identified for Repurposing

RECOMMENDATIONS

Approximately 41% of survey respondents preferred the Large Mini Roundabout Option, 39% preferred the Stop-Control Option, and 20% preferred the Small Mini Roundabout Option. Since public input was split on a preferred concept, the Stop-Control Option (A.1) was recommended based on input from the Board of Supervisors. This option does not preclude installation of a traffic signal in the future and avoids some of the unknowns and potentially problematic issues associated with the other concepts.

- Implement the Stop-Control Option (Concept A.1).
- Implement a Street Repurposing project in front of the post office to include landscaping, bike rack, and gazebo.
- During design, determine the most desirable configuration of the Water Street approach—whether with or without the channelized right turn lane and a raised concrete island to serve as a pedestrian refuge when crossing Water Street.
- Following construction, review the available Nixon Road sight distance and speeds on Pine Grove Road to determine if the Nixon Road left turn restriction can be removed.
- Conduct observations and educational events at the enhanced crossings during the first few weeks of implementation.

B. East Pine Grove Road Gateway

The concept addresses input received through the SAP and Mobility Study surveys indicating the desire for a gateway treatment on Pine Grove Road. Reducing vehicle speeds entering Pine Grove Mills was a key functional goal of the gateway. Two alternative concepts were developed for the gateway treatment.

Concept B.1, Pine Grove Road & Banyan Drive/Meckley Drive, Full-Size Modern Roundabout

Figure 19 illustrates the Full-Size Modern Roundabout gateway option, which includes the following key elements:

- Convert intersection to a full-size modern roundabout.
- Add high-visibility pedestrian crossings with overhead lighting across Pine Grove Road, Banyan Drive, and Meckley Drive.
- Install a landscaped “green median” on Pine Grove Road with landscaping and signage to create the eastern gateway to Pine Grove Mills.

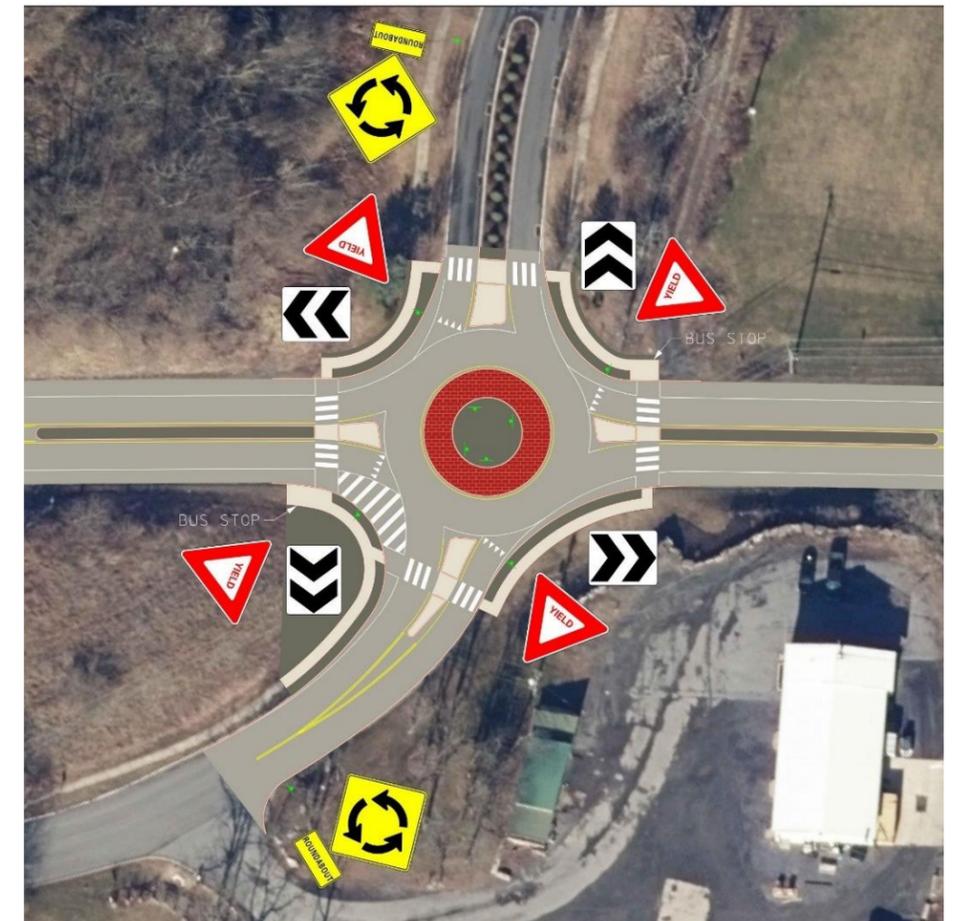


Figure 19. Concept B.1, Pine Grove Road & Banyan Drive/Meckley Drive, Full-Size Modern Roundabout

C. Pedestrian & Bicycle Network Improvements

Improvements to the pedestrian and bicycle network in Pine Grove Mills were addressed at various scales and include the following:

- Plans that address the entire Pine Grove Mills study area are summarized at a high-level over the study area mapping.
 - *Concept C.1 – Pedestrian and Bicycle Network Opportunities Plan*
- Localized concept plans are the most detailed and are drawn over aerial mapping for visualization purposes.
 - *Concept C.2 – Pine Grove Road Enhanced Crossing at Rosemont Drive*
 - *Concept C.3 – Nixon Road Enhanced Crossing at the Shared Use Path*
 - *Concept C.4 – Pine Grove Road Enhanced Crossing at Deepwood Drive (East)*
- Corridor or sub-area plans are defined by their extents along a particular corridor—in this case, Pine Grove Road.
 - *Concept C.5a – Pine Grove Road West, Ross Street to Ferguson Township Elementary School*
 - *Concept C.5b – Pine Grove Road Central, Ferguson Township Elementary School to Rosemont Drive*
 - *Concept C.5c – Pine Grove Road East, Rosemont Drive to Meadowview Drive*

Concept C.1, Pedestrian & Bicycle Network Opportunities Plan

Figure 22 illustrates the study area-wide Pedestrian and Bicycle Network Opportunities Plan which is formed by the existing pedestrian and bicycle facilities as well as new connection opportunities identified during the SAP and Mobility Study. The Plan illustrates a functional, integrated network where gaps are completed, and existing facilities are extended to logical junction points. As such, it serves as a starting point for other concepts illustrates developed in this study.

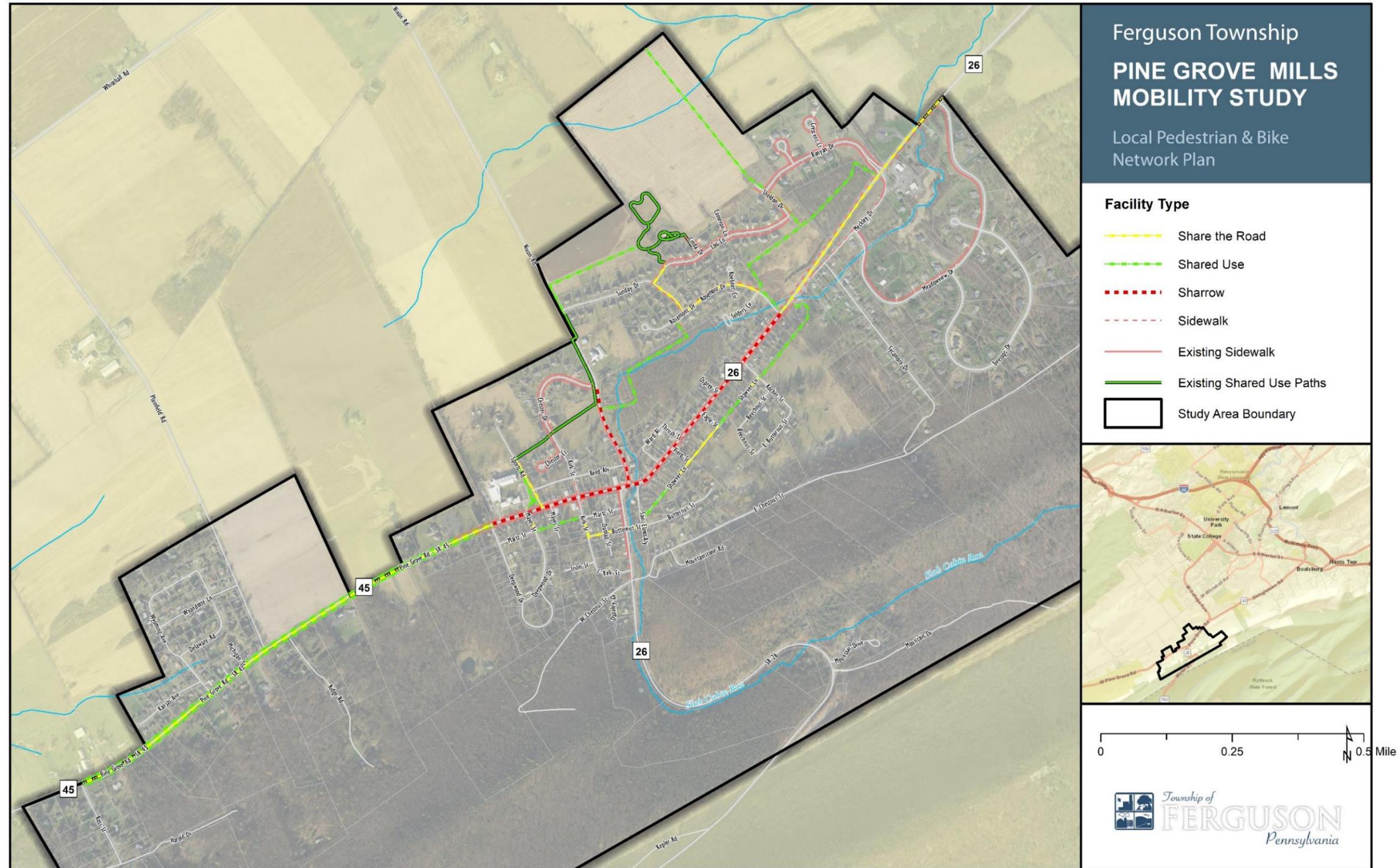


Figure 22. Pedestrian & Bicycle Network Opportunities Plan

The following plan “themes” are noted:

- **Redundancy**, where some connections may be more feasible in the short-term while others may be more desirable as an ultimate solution. The connections both north and south of Pine Grove Road east of Nixon Road illustrate this theme.

Vacant Parcel Opportunities, which traverse vacant but developable properties and could be integrated into future subdivision designs. In particular, parcels north of Pine Grove Road illustrate this theme, particularly the vacant parcel surrounding Slab Cabin Run and various parcels in the Hillside Farm subdivision.

- **Existing Neighborhood Opportunities**, that go through established neighborhoods and would require property owner input and participation. This is illustrated by the bike connections envisioned along Shawver Lane and the sidewalk and share the road connections along Sunday Drive, Lois Lane, and Rosemont Drive.
- **Accommodating Through vs. Local Bicycle Travel**, including:
 - Accommodating bicyclists desiring to travel through Pine Grove Mills. These focus on improving Pine Grove Road as the most direct through path.
 - Providing for bicyclists desiring to travel within Pine Grove Mills. These focus on creating a local, functional network for accessing key activity-generators—schools, parks, trails, post office, restaurants, and churches.
- **Connection Challenges**, which affects certain connections that were envisioned traversing Township-owned and privately-owned streets as well as private property may not have a clear path forward for implementation. Steps involving street dedication, updates to Township standards, ongoing maintenance, utility impacts, and right-of-way acquisition.

Concept C.2, Pine Grove Road Enhanced Crossing at Rosemont Drive

Figure 23 illustrates the Enhanced Crossing of Pine Grove Road at Rosemont Drive, which includes the following key elements:

- Add an enhanced pedestrian crossing of Pine Grove Road, with roadside signage, user-activated rapid flashing beacons, high-visibility pavement markings, and enhanced lighting.
- Add high visibility pedestrian crossing of Rosemont Drive, with signage and overhead lighting.

While only one concept was developed for the crossings, features from other concepts overlap at this location. The following are noted:

- The potential new sidewalk/pathway connection along Rosemont Drive is part of the Pedestrian and Bicycle Network Opportunities Plan (Section C.1).
- Sharrows on Pine Grove Road (cross-section) reflect the Complete Street recommendations in Section C.5b.

Table 11. Concept C.2, Pine Grove Road Enhanced Pedestrian Crossing at Rosemont Drive – Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Provides a crossing of Pine Grove Road where sidewalk ends on the north side of Pine Grove Road and pedestrians access the Shadow Oaks Community along Rosemont Drive. 	<ul style="list-style-type: none"> • Existing vehicle speeds near the intersection may approach the 40 mph limit where RRFBs are considered appropriate.

Cost Estimate

- Enhanced Crossing at Rosemont Drive = \$84,100

RECOMMENDATION

- C.1a Construct an Enhanced Crossing at Rosemont Drive.



Figure 23. Concept C.2, Pine Grove Road Enhanced Crossing at Rosemont Drive

Concept C.3, Nixon Road Enhanced Crossing at the Shared Use Path

Figure 24 illustrates the Enhanced Crossing of Nixon Road at the existing shared use path, which includes the following key elements:

- Update the existing shared use path crossing of Nixon Road to create an enhanced crossing with signage, rapid flashing beacons, high-visibility pavement markings and lighting.

Table 12. Concept C.3, Nixon Road Enhanced Pedestrian Crossing at the Shared Use Path – Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Signage and beacons increase awareness, visibility, and distance to the crossing, 	<ul style="list-style-type: none"> • Northbound sight distance to the crossing is severely reduced by the roadway's vertical profile.

Cost Estimate

- Enhanced Crossing at Shared Use Path = \$106,600; Also estimated as part of TASA Grant.

RECOMMENDATION

The majority of public comments were supportive of this option.

C.1b Construct an Enhanced Crossing at the Shared Use Path.

Concept C.4, Pine Grove Road Enhanced Crossing at Deepwood Drive (East)

Figure 25 illustrates the Enhanced Crossing of Pine Grove Road at Deepwood Drive (East) which includes the following key elements:

- Add an enhanced pedestrian crossing of Pine Grove Road on the west side of Deepwood Drive, with roadside signage, rapid flashing beacons, high-visibility pavement markings and overhead lighting.
- Add high visibility pedestrian crossing of Deepwood Drive, with signage and overhead lighting.

Table 13. Concept C.4, Pine Grove Road Enhanced Crossing at Deepwood Drive (East) – Benefits & Challenges

Benefits	Challenges
<ul style="list-style-type: none"> • Provides a crossing of Pine Grove Road at a pedestrian crossing point adjacent to a school. • Moving the crossing to the west side of Deepwood Drive eliminates the need for school children to cross the school bus loop driveway, which is active during school arrival and departure periods. • The enhanced crossing will assist crossing guards during school arrival and departure periods. 	<ul style="list-style-type: none"> • The proposed sidewalk landing areas and ramps are in the vicinity of utility poles and a fire hydrant. • Creating ADA-compliant sidewalk and ramps may require regrading of the southwest intersection corner and sidewalk adjustments to the west along Pine Grove Road

Cost Estimate

- Enhanced Crossing at Deepwood Drive = \$108,000

RECOMMENDATION

C.1c Construct an Enhanced Crossing at Deepwood Drive (East).



Figure 24. Concept C.3, Nixon Road Enhanced Crossing at the Shared Use Path



Figure 25. Concept C.4, Pine Grove Road Enhanced Crossing at Deepwood Drive (East)

Concept C.5, Pine Grove Road Complete Street

Complete Streets are streets designed and operated to enable safe use and support mobility for all users. Complete Streets approaches vary based on community context. They may address a wide range of elements, such as sidewalks, bicycle lanes, bus lanes, public transportation stops, crossing opportunities, median islands, accessible pedestrian signals, curb extensions, modified vehicle travel lanes, streetscape, and landscape treatments. Complete Streets reduce motor vehicle-related crashes and pedestrian risk, as well as bicyclist risk when well-designed bicycle-specific infrastructure is included. They can promote walking and bicycling by providing safer places to achieve physical activity through transportation.

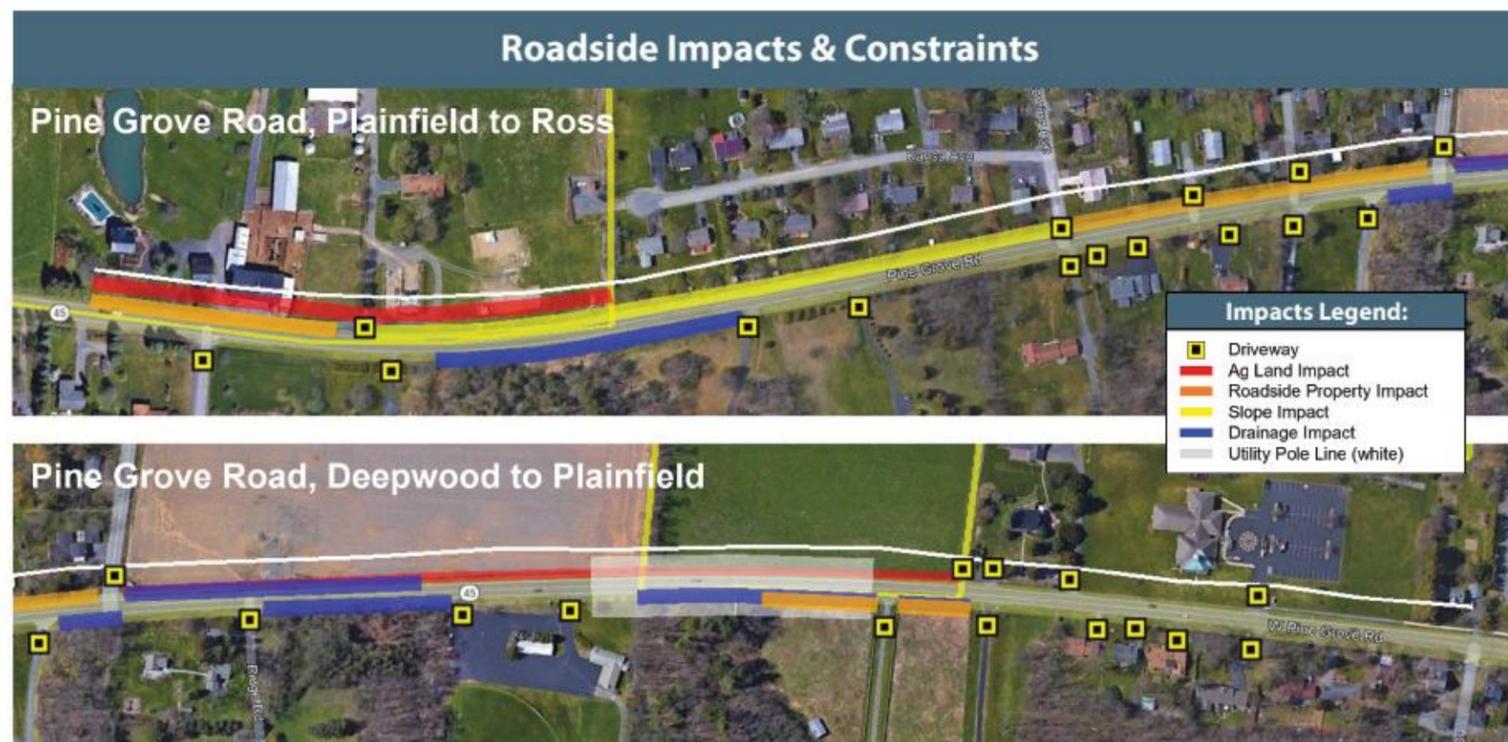
The Complete Street concept proposes different treatments for Pine Grove Road and west of the Ferguson Township Elementary School, according to the street configuration and right-of-way available.

Concept C.5a, Pine Grove Road West, Ross Street to Ferguson Township Elementary School

Figure 26 shows the alternative Complete Street concepts that were considered for Pine Grove Road between Ross Drive and the Elementary School. Concepts considered adding on-road bike lanes (Alternative 1) or various positionings of a roadside shared use path (Alternative 2)—i.e., entirely on the north side of Pine Grove Road (2A), entirely on the south side (2B), or alternating sides (2C).

Evaluation of the various alternatives was summarized into the Matrix of Issues, Benefits, and Impacts for each concept, shown in the bottom right corner of Figure 26. Where impacts could be quantified, a comparison was used to rate high, moderate, low, or nominal impacts. Each of the impacts considered in the evaluation are design cost/complexity drivers or considerations in environmental clearance. Issues addressed known challenges and impacts/constraints that were not specifically quantified. Benefits were described either qualitatively or according to impacts avoided.

As an alternative ready for immediate/short-term implementation, the On-Road Shoulder Bike Lanes (Alternative 1) is recommended to accommodate the observed on-road bicyclists. The widening fits within the existing right-of-way and has nominal impacts to adjacent



Category	On-Road, Shoulder Bike Lanes Alt. 1	Shared Use Path		
		North Side Alt. 2A	South Side Alt. 2B	Alternating Sides Alt. 2C
		<ul style="list-style-type: none"> • High construction cost • Likely requires ROW acquisition/easements • Requires ongoing Township maintenance cost 	<ul style="list-style-type: none"> • Steep slope between Wyoming Ave and Farm may be fatal flaw • Highest overall impact 	<ul style="list-style-type: none"> • Highest number of driveway/street crossings • Significant drainage impacts
<ul style="list-style-type: none"> • Lower construction cost • No ongoing Township maintenance cost • No ROW acquisition or easements anticipated 	<ul style="list-style-type: none"> • Pedestrian friendly • More appealing to casual bike riders 	<ul style="list-style-type: none"> • Most direct connection to school at east end • Lowest number of driveway/street crossings 	<ul style="list-style-type: none"> • Connects to Ross Street at west end • Avoids steep slope, Ag land, and utility pole impacts 	<ul style="list-style-type: none"> • Connects to existing sidewalk and school at east end; Ross Street at west end • Avoids highest impacts
Driveway Impacts	Moderate <i>All driveways and streets could be affected</i>	Moderate 7 driveways, 3 streets	High 18 driveways, 0 streets	Moderate 13 driveways, 1 street
Ag Land Impacts	None (within existing ROW)	High 2,550 feet frontage	Nominal	Moderate 1,595 feet frontage
Roadside Property Impacts	None (within existing ROW)	High 1,120 feet	Moderate 360 feet	Nominal
Steep Side Slope	Nominal	Very High 1,260 feet	Nominal	Nominal
Drainage Impacts	Nominal	Low 563 feet	High 1,640 feet	Moderate 1,260 feet
Utility Poles Involved	Nominal	All	None	Some
RECOMMENDED				

Figure 26. Concept C.5a, Pine Grove Road Complete Street, Ross Street to Ferguson Township Elementary School

slopes, drainage areas, and agricultural lands. Finally, widening the roadway shoulders does not preclude future development of a shared use path system along Pine Grove Road.

Nominal pedestrian traffic was observed walking along Pine Grove Road in this area during the study, and the latent demand for such a facility (i.e., “build it and they will come”) was not established. Still, the community’s ongoing interest in active transportation and a shared use path along Pine Grove Road is noted. Such a path would be useful for recreation and functional travel to Pine Grove Mills. This area of the Township does not have immediate access to other walking networks, and the shared use trail could see significant traffic, including a potential “safe routes to school” option.

If construction of a shared use path is progressed, a design that alternates between the north and south sides of Pine Grove Road avoids the most problematic issues and impacts. The path could also be built in phases, with the segment from the Ferguson Township Elementary School to Plainfield Road along the north side of Pine Grove Road happening first. A crossing of Pine Grove Road would then be needed (PennDOT approval required), with the second phase connecting from Plainfield Road to Ross Street.

Cost Estimates

- Shared Use Path, Pine Grove Road, Ferguson Township Elementary School to Ross Street = \$299,800
- Bike Lanes, Pine Grove Road, Ferguson Township Elementary School to Ross Street – Estimated for TASA Grant.

RECOMMENDATION

Public feedback indicated a preference for on-road, shoulder bike lanes (40% of respondents), followed by a shared use path on the north side (30% of respondents).

- C.2. On Pine Grove Road, from Ross Street to the Ferguson Township Elementary School, widen the shoulders on both sides of Pine Grove Road to 5-feet wide. Sign and mark the shoulders as bike lanes.

Concept C.5b, Pine Grove Road East, Ferguson Township Elementary School to Rosemont Drive

Various Complete Street concepts were considered by the Working Group for Pine Grove Road between the Elementary School and Rosemont Drive. The street cross-sections shown on **Figure 27** illustrate the existing condition (top), options considered, (middle), and the recommended cross-section (bottom, green outline).

The following ideas were considered but dismissed.

- Adding bike lanes requires either widening or removal of the on-street parking. Both were considered fatal flaws, according to input from the community. There is a perceived shortage of

parking, and additional acquisition of right-of-way from property owners was not considered feasible.

- To create a wider sidewalk that might function as a shared use path, the street width could be reduced by moving the curbline and allocating the excess space to the sidewalk on one side. However, the resulting sidewalk width (8-10 feet) would not officially qualify as a “shared use path”. While attractive for pedestrians, this was not considered a solution for bicyclists, who would likely stay on the road anyway.

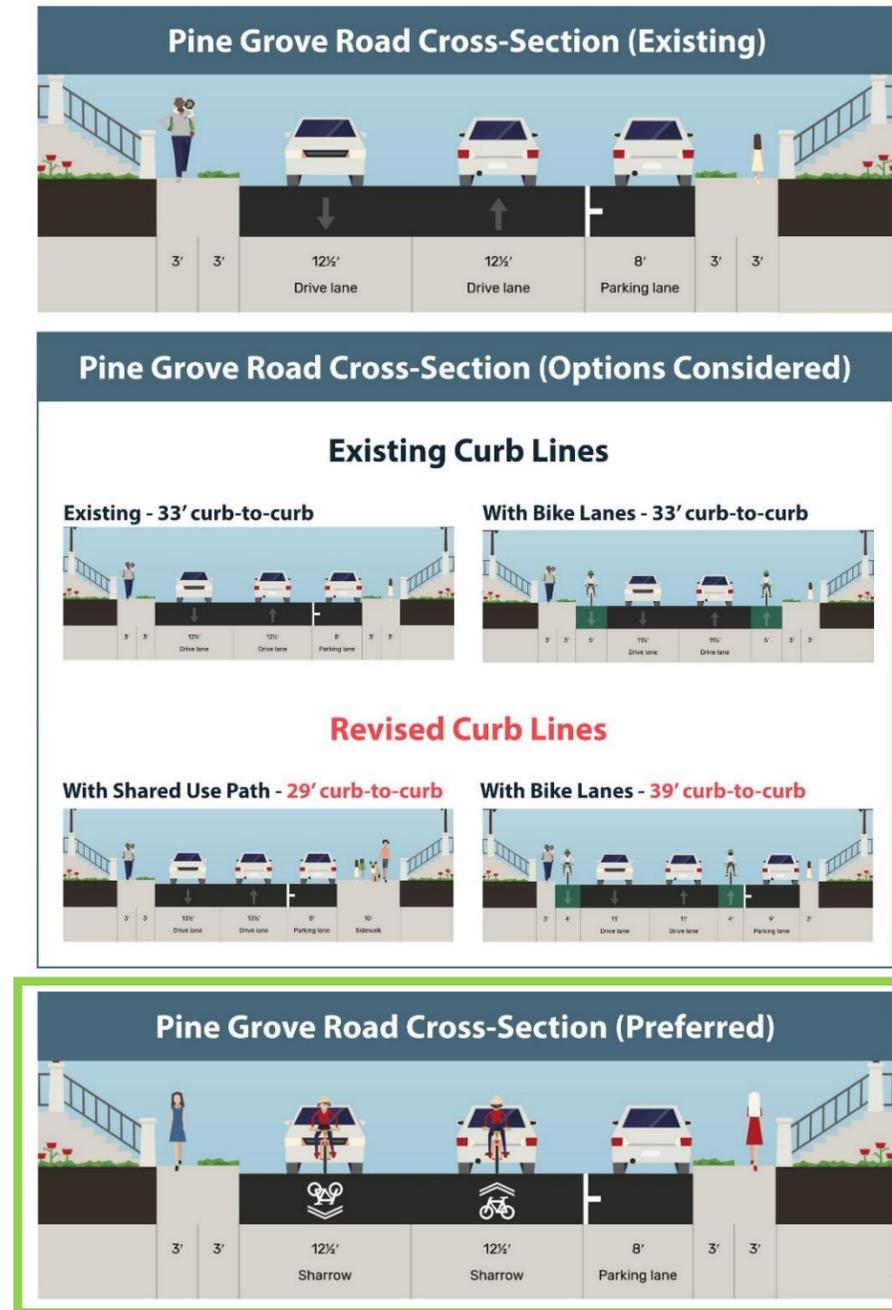


Figure 27. Concept C.5b, Pine Grove Road Complete Street, Ferguson Township Elementary School to Rosemont Drive

Cost Estimate

- Pine Grove Road, Sharrows and Signs = \$77,600

RECOMMENDATION

The public preference in this area is for the shared sidewalk (50% of respondents) followed by bike lanes (36% of respondents) and sharrows (14% of respondents).

- C.3. On Pine Grove Road, from the Ferguson Township Elementary School to Rosemont Drive, add sharrow pavement markings. Consider adding “Bicycles May Use Full Lane” signage.
- C.4. Run community education campaigns on sharrows.

The Sharrow Concept (**Figure 28**) is recommended to accommodate the observed on-road bicyclists at a reasonable cost while keeping the

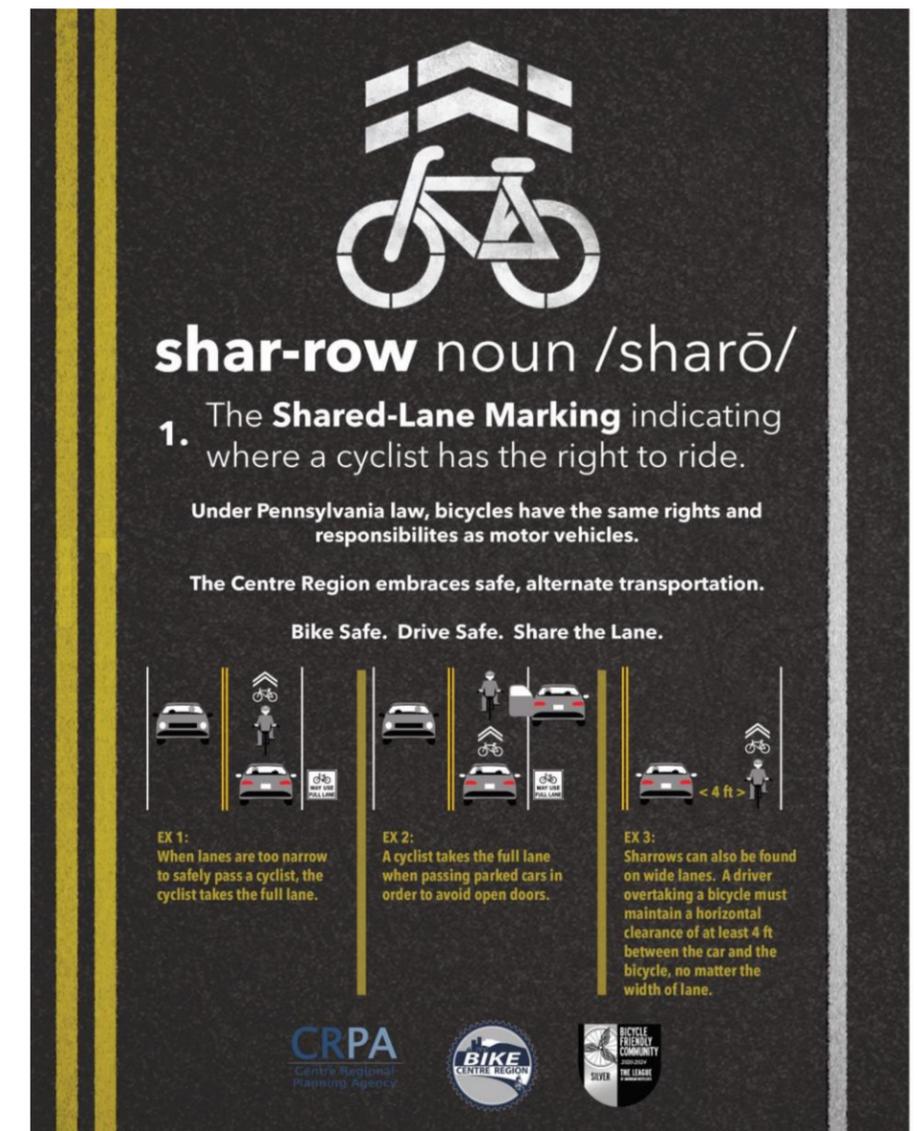


Figure 28. Sharrow Educational Handout¹¹

existing street parking on Pine Grove Road. All other options, including the Shared Sidewalk option preferred by the public, were determined by the project Working Group to be infeasible, due to the work, expense, and disruption required to move curb lines—whether to widen or reduce the width of Pine Grove Road.

While bicyclists traveling through Pine Grove Mills may be encouraged by the sharrow markings to ride on Pine Grove Road, the majority of bicyclists would prefer a designated lane or off-road facility. Therefore, the Pedestrian and Bicycle Network Opportunities Plan identifies a parallel network of shared use paths and neighborhood network connections to accommodate bicyclists who are not comfortable with the sharrow arrangement on Pine Grove Road.

Concept C.5c, Pine Grove Road East, Rosemont Drive to Meadowview Drive

This section of Pine Grove Road has an existing shoulder that is the proper width for use as a bikeable shoulder. In the Pedestrian and Bicycle Network Opportunities Plan, this section is labeled as “Share the Road” similar to Pine Grove Road to the west with the proposed widened shoulder. The parallel network of shared use paths and neighborhood connections north of Pine Grove Road joins back to Pine Grove Road at the Banyan Drive/Meckley Drive intersection. Shoulder clean-up and trimming of vegetation along the road may be needed to make the full width of the shoulder useable for bikes.



Figure 29. Gateway Traffic Calming on PA Route 41, Chatham, PA

D. Western Pine Grove Road Gateway

High traffic speeds on Pine Grove Road and a desire to define edges of the Pine Grove Mills community led to the SAP idea for a gateway traffic treatment that functions as a traffic calming measure. As a state route, Pine Grove Road is subject to PennDOT roadway design standards and policies for traffic calming.

Concept Development

Traffic calming features may be placed on PA state routes, and a gateway traffic calming installation on PA Route 41 (Gap-Newport Pike) in Chatham, Pennsylvania was reviewed for concept ideas. Figure 29 illustrates features that were placed to manage traffic speeds, and includes overhead beacons, speed feedback signs, median deflection/pinch points, and non-traditional pavement markings.

Figure 30 illustrates the proposed West Pine Grove Road Gateway, which includes the following key elements:

- Add a landscaped, green median.
- Narrow lanes through the gateway using pavement markings.
- Add supplemental pavement markings, overhead signage, and beacons with speed feedback signs.

Implementation Considerations

The location shown for the Western Gateway Concept avoids driveway impacts and benefits aesthetically from the mature trees on the south side of Pine Grove Road. There are few, if any, other locations for this kind of treatment. This section of Pine Grove Road is also targeted for bikeable shoulder widening, associated with the Complete Street concept. If a median is proposed with the gateway, roadway lanes may be narrowed and additional widening may be required through the gateway area to maintain consistent shoulder widths.

Cost Estimate

- Western Pine Grove Road Gateway = \$266,100



Figure 30. West Pine Grove Road Gateway

RECOMMENDATION

The survey responses indicated that the public would like to see the following (listed in order of highest responses) as part of the Western Pine Grove Road Gateway:

- a. Welcome to Pine Grove Mills signage
- b. Speed feedback signs
- c. Landscaped median
- d. Pavement markings
- e. Landscaped Roadside

D.1. Construct the Western Pine Grove Road Gateway.

E. Speed Limit Changes

The logic and consistency of speed limit postings on Pine Grove Road, Water Street, and Nixon Road were reviewed, and **Figure 31** illustrates a set of aspirational speeds recommended for the primary routes serving Pine Grove Mills. Speed limit postings on all streets are subject to Pennsylvania law, and an engineering study is needed to justify and document any changes. However, pending changes at the national level may give localities more flexibility in setting speed limits according to local conditions. For the sake of implementation, the speed limit change recommendations are integrated with a nearby concept as described below.

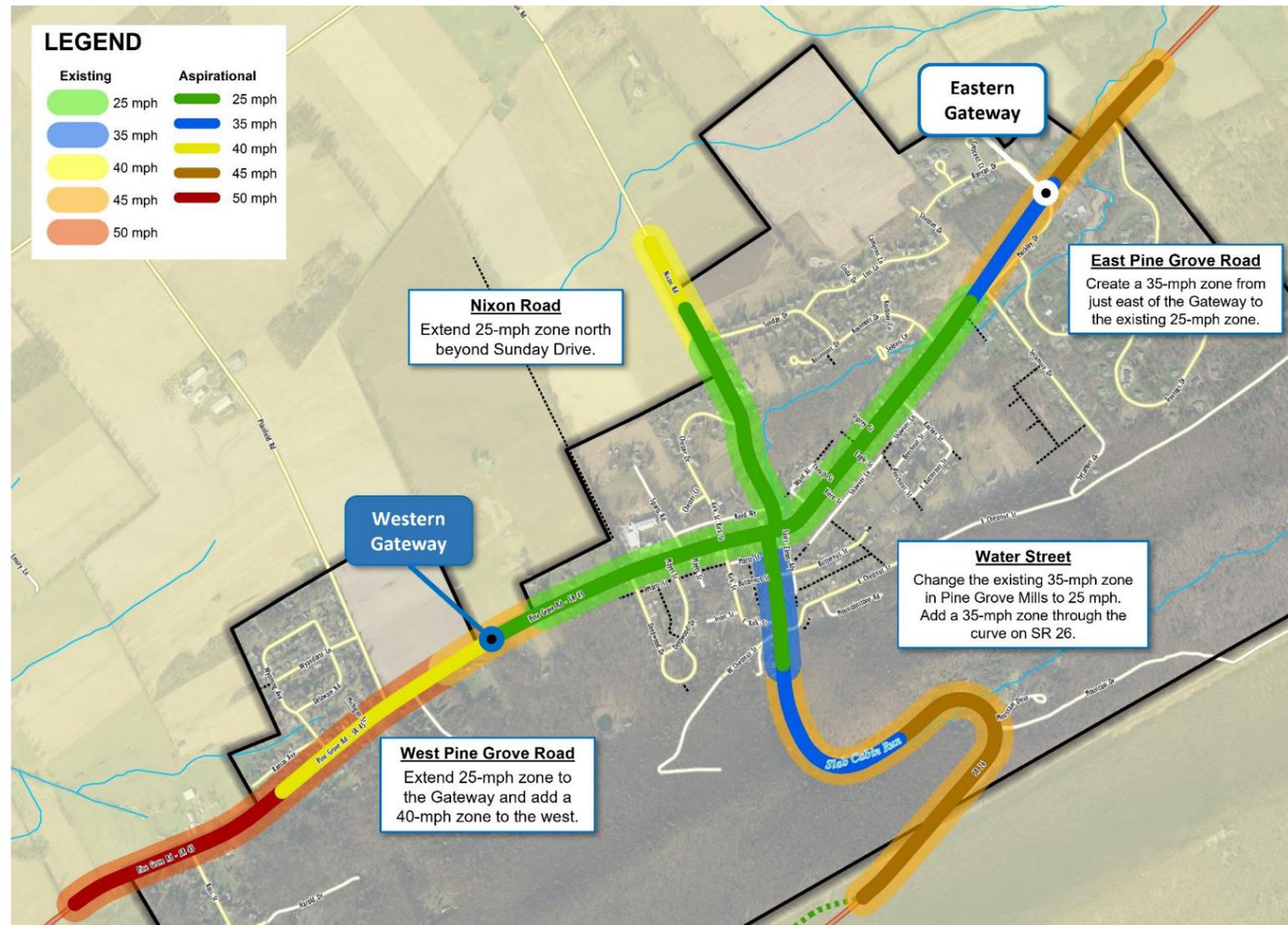


Figure 31. Existing and Aspirational Speed Limit Postings with Gateway Projects

RECOMMENDATIONS

- E.1. Pine Grove Road West – With implementation of the West Pine Grove Road Gateway Treatment, extend the 25 mph speed limit to the gateway location and add a 40 mph zone starting just west of either Wyoming Avenue or Ross Avenue.
- E.2. Pine Grove Road East – With implementation of the Banyan Drive/Meckley Drive Full-Size Modern Roundabout as a gateway treatment, add a 35 mph zone between the gateway and the other end of Meckley Drive.
- E.3. Nixon Road – With construction of the enhanced shared use path crossing, extend the 25 mph zone to the north to encompass the Sunday Drive residential street intersection.
- E.4. Water Street – With the planned high friction surface treatment project, extend the 35 mph zone to the south through the first curve along SR 0026. Consistent with Pine Grove Road and Nixon Road, post Water Street at 25 mph within the developed area of Pine Grove Mills, north of Chestnut Street.

F. Water Street Sidewalk Replacement

As part of a TASA Grant submitted by Ferguson Township, the sidewalk along the west side of Water Street was proposed to be replaced and extended between Pine Grove Road and Chestnut Street. The poor condition of the sidewalk and its crossings of Martz and Smith Streets was noted during the Pedestrian Roadway Safety Audit. According to the TASA grant application and cost estimate prepared by Ferguson Township, the project was scoped to include the following:

- Excavate and fully replace the existing sidewalk surface with a 3 to 5-foot variable with sidewalk and place new sidewalk to terminate at Chestnut Street
- Repair/replace curblines
- Repair/repave driveways, and alleys that intersect Water Street
- Remove street trees (as necessary) and plant new street trees

Cost Estimate

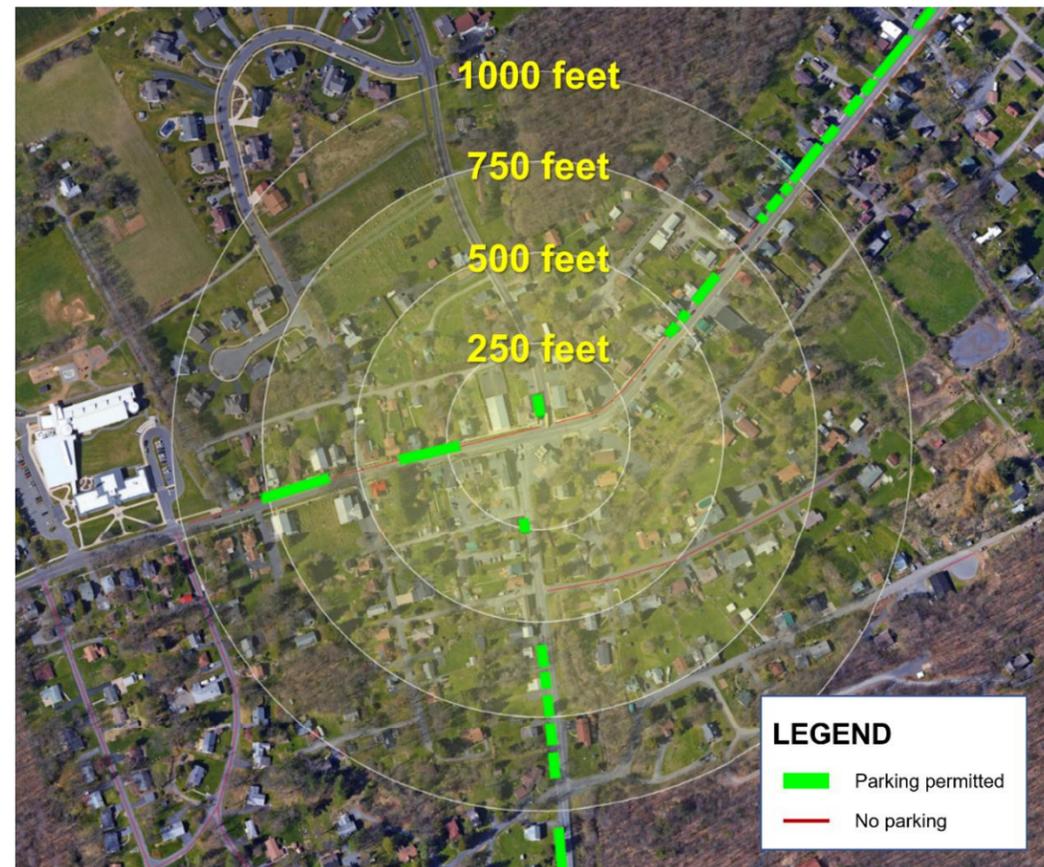
- Cost estimated along with two other projects in the TASA grant application

RECOMMENDATION

- F.1. Replace the Water Street Sidewalk according to the scope of work prepared for the TASA Grant project.

G. Parking Improvements

The SAP identified the need for marking existing parking spaces and increasing the supply of public parking for use by existing and future/potential businesses. The Mobility Study evaluated utilization of the existing parking and provided a series of parking improvement, policy, and ordinance recommendations. **Figure 32** summarizes potential parking increase within a radius of the Pine Grove Road/Water Street intersection with implementation of the concepts.



Public feedback indicated a desire for additional parking near the Pine Grove Road & Water Street/Nixon Road intersection, followed by Pine Grove Road east of Water Street/Nixon Road. There were also many respondents who felt there is not a need for additional parking in Pine Grove Mills.

RECOMMENDATIONS

- G.1. Integrate new and revised parking in the concept for the Pine Grove Road & Water Street/Nixon Road intersection.
- G.2. Evaluate sight distance along Pine Grove Road west of Water Street according to the 25-mph speed limit and expand parking zones where sight distance allows.
- G.3. Mark existing parking spaces along Pine Grove Road.
- G.4. Standardize the parking signage systems, formats, and messaging used throughout Pine Grove Mills.
- G.5. Coordinate ordinance and field postings for parking.
- G.6. Update parking ordinance to remove Sunday parking on the south side of Pine Grove Road.
- G.7. Add No Parking signs at more regular intervals along the south side of Pine Grove Road.
- G.8. Add parking regulation signs along the east side of Water Street to restrict parking within the sight triangle.

H. Rothrock State Forest Trails Access

Concept Development

The SAP recognized opportunities for improved access and connectivity between Pine Grove Mills and the Rothrock State Forest Trails and suggested that walking access for residents be encouraged via the existing neighborhood connections in Pine Grove Mills, while regional/vehicular-based access be directed to the Kepler Road parking area along SR 0026. The Mobility Study advances these general recommendations of the SAP while adding location-specific implementation ideas (**Figure 33**).

Implementation Considerations

Property ownership, maintenance, and liability for trailheads, trail rights of way, turnarounds, and current *de facto* parking areas will likely influence the implementation of certain recommendations made in this study. The Township may need to work in partnership with private owners, agencies, and homeowners' associations (HOAs) to advance certain ideas. For others, the Township may prefer to acquire right-of-way and easements or set up agreements and memorandums of understanding. Where ownership is unclear, the Mobility Study recommendations are contingent upon an ownership assessment.

RECOMMENDATIONS

General Recommendations:

- H.1. Encourage walking or bike access only via the neighborhood trail connections.
- H.2. Work with neighborhoods to develop acceptable trailhead signage and access restrictions (residents only (?), walk only, walk and bike, motorized traffic, horses, etc.)
- H.3. Encourage vehicular access and parking at the Kepler Road access, to the south along SR 0026 (Water Street).
- H.4. Work with DCNR and State Forest to assess the desirability/feasibility of new trail connections through the State Forest to the Mid-State Trail.

Locational Recommendations:

At the Deepwood Drive Trail Access:

- H.5. Maintain existing trail connection on Township right-of-way between Deepwood Drive and State Forest lands.
- H.6. Retain existing "No Parking" along Deepwood Drive.

At the West Chestnut Street Turnaround:

- H.7. Work with DCNR and State Forest to assess ownership of the West Chestnut Street turnaround, trail access point, and gate.
- H.8. Based on the outcomes of ownership/responsibility, update the Township parking ordinance to prohibit vehicular parking in the turnaround and post "No Parking" signs.
- H.9. Assess the functionality and need for the existing gate.
- H.10. Clearly sign and define the trail access point and post a trail map and trail head signage, indicating access restrictions.
- H.11. Consider adding bike parking (rack).
- H.12. Consider stabilizing the embankment and creating a drainage swale above the turnaround area to capture run-off and prevent further erosion in the turn-around, West Chestnut Street, and adjacent properties.

At the Kepler Road Parking Area and Trail Access:

- H.13. Work with DCNR and State Forest to assess ownership of the area currently being used as vehicular parking.
- H.14. Conduct a parking and trail utilization study, including a survey of trail users to determine desired trailhead improvements.
- H.15. Post a trail map and trail head signage, indicating access restrictions.

On-Street Parking Space Supply	Radius from Intersection of Pine Grove Road & Water Street			
	250 ft	500 ft	750 ft	1000 ft
Existing Supply	6	14	32	43
Concepts that Add Parking				
Reimagine Concept	+3	+5	+5	+5
Water Street Streetscape	+3	+4	+4	+4
Other Parking Actions	+1	+2	+3	+3
Potential Increase	+7	+11	+12	+12
	+117%	+79%	+38%	+28%
Potential Supply	13	25	44	55

Figure 32. Existing and Potential Parking by Radius

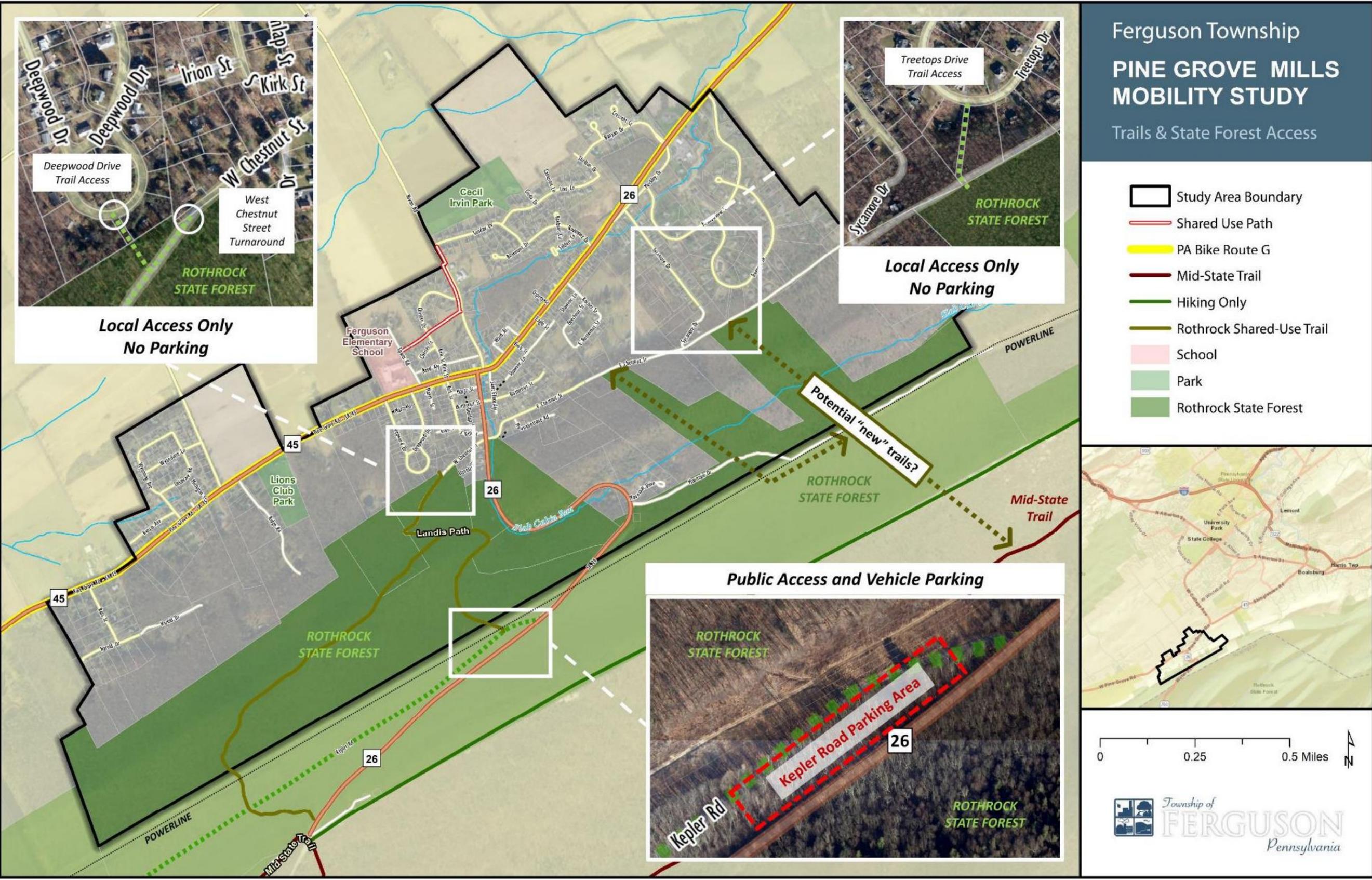


Figure 33. Trails and State Forest Access

CHAPTER 6

Recommendations

Prioritization Framework and Criteria

Projects and recommendations were prioritized during the May 23, 2022 Working Group Meeting. **Figure 34** gives the simplified framework suggested for use in the prioritization process.

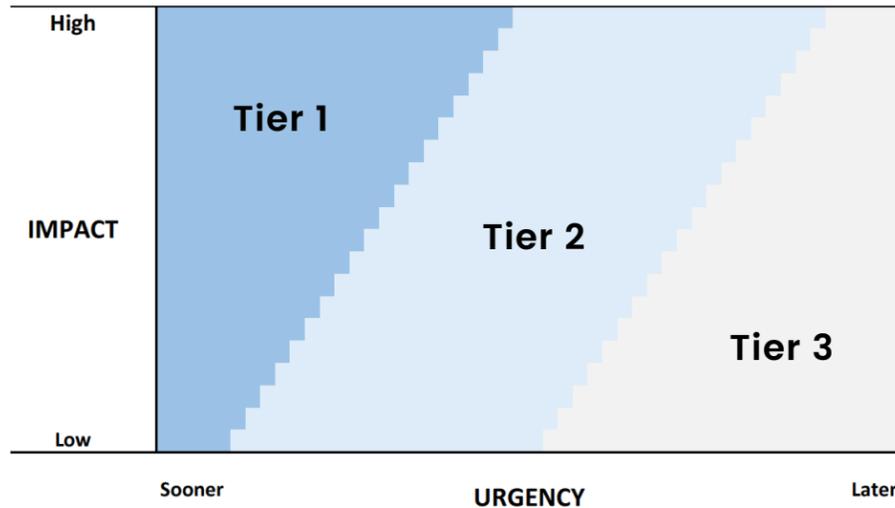


Figure 34. Prioritization Framework – Impact vs. Urgency

Working Group members were asked to draw upon the Pine Grove Mills Mobility Study process, professional experience, and knowledge of the local area to evaluate the “Impact vs. Urgency” for each project.

- **Impact** expresses how well a project addresses and effectively resolves important needs and issues.
- **Urgency** addresses the desired timeframe for implementation, according to the severity of need and implications of waiting.

As projects were reviewed, they were placed into tiers, with Tier 1 having the highest priority and Tier 3 having the lowest priority.

Cost Estimates

Probable cost estimates for each project were developed based on unit prices from PennDOT’s Electronic Contract Management System (ECMS) for recent projects of similar scope in the region. The cost estimate details are provided in **Appendix E** and are based on the following methods and assumptions:

- No cost escalation or inflation are assumed, and all prices assume that the year of expenditure is 2022.
- Construction quantities were estimated for the significant items of work according to the Concept drawings. Smaller items are considered part of the 25% contingency line item.
- Right-of-way costs are not included with these estimates at this conceptual stage, but impacted properties are identified.
- Similarly, utility impacts such as utility poles and fire hydrants are noted, without assigning costs. Costs for relocation can be heavily driven by other utilities which also need to be avoided with any relocation, and without details on underground utilities, detailed costs would vary widely.
- Mobilization, Construction Engineering & Inspection, and Consultant Design/Survey costs are added as percentage multipliers to the cost estimate.

Prioritized List of Projects and Recommendations

Table 14 gives the listing of Recommended Projects. Tier 1 Projects are those that represent the most impactful and urgent projects developed through the Pine Grove Mills Mobility Study. Tier 2 and Tier 3 Recommended Projects, while still recommended for implementation, did not have the same level of impact or urgency as the Tier 1 Projects. The Working Group recommends that they be considered for future funding and implementation.

Deferred Ideas for Future Study

Some ideas and developed during the study were not able to be addressed within the scope of the current study, and the ideas required further research and study. These ideas and projects were collected as “deferred ideas”, which include the following:

- **Kirk Street** – Consider removing the gate on Kirk Street as a street networking strategy that would distribute traffic more equitably across the Township-owned streets. This strategy would take vehicular pressure off of the Sunday Drive, Rosemont Drive, and Nixon Road corridors. Since the strategy has implications related to increased traffic volume on Kirk Street and operations at the intersection with Pine Grove Road, additional study and vetting with the community through a public engagement process is recommended.

Funding and Implementation

Funding for projects recommended in the Pine Grove Mills Mobility Study may be considered for funding through the following sources:

- **Ferguson Township Capital Program** – The Township has made an initial commitment of COVID-19 recovery funds for projects identified in the Mobility Study. The indicated Tier 1 projects

should be considered in Capital Planning conducted in 2022 for immediate implementation.

- **PennDOT and DCED Multimodal Grant Programs** – With the confluence of modal, safety, and operations improvements involved in this project, it should compete well for funding under PennDOT’s and DCED’s Multimodal Transportation Grant Programs. These programs are competitive grant programs that typically involve federal transportation dollars.
- **Transportation Alternatives Set Aside (TASA)** – Many of the recommended projects are also a good fit with the federal TASA program. Recommended projects that have already qualified for TASA funding are noted under the cost estimate.
- **PennDOT Automated Red-Light Enforcement (ARLE) Grant Program** – Smaller transportation and signal projects may qualify for this competitive grant program using funds collected at red-light enforcement locations. The grant guidance documents should be consulted for the types of projects that can be funding through ARLE grants.
- **Private Developer Projects and Contributions** – Certain projects, like the roundabout at Banyan Drive/Meckley Drive, could be implemented as traffic impact mitigation, with a private developer funding part or most of the project. Also, certain pedestrian and bicycle network connections cross several unbuilt but developable parcels. These connections could be placed on the Township’s official map and integrated into the land development plan.

Summary of Recommendation Action Steps

A. Pine Grove Road & Water Street/Nixon Road Intersection

- A.1. Implement the Stop-Control Option (Concept A.1).
- A.2. Implement a Street Repurposing project in front of the post office to include landscaping, bike rack, and bus shelter.
- A.3. During design, determine the most desirable configuration of the Water Street approach—whether with or without the channelized right turn lane and a raised concrete island to serve as a pedestrian refuge when crossing Water Street.
- A.4. Following construction, review the available Nixon Road sight distance and speeds on Pine Grove Road to determine if the Nixon Road left turn restriction can be removed.
- A.5. Conduct observations and educational events at the enhanced crossings during first few weeks of implementation.

B. East Pine Grove Road Gateway

- B.1. Submit a speed limit study request to PennDOT District 2-0 for Pine Grove Road in the vicinity of Banyan Drive/Meckley Drive
- B.2. With approval of a speed limit reduction to 40 mph or lower on Pine Grove Road, construct the Enhanced Pedestrian Crossing Option (Concept B.2).

C. Pedestrian & Bicycle Network Improvements

- C.1. Construct the following enhanced pedestrian crossings:
 - a. Pine Grove Road at Rosemont Drive
 - b. Nixon Road at Shared Use Path
 - c. Pine Grove Road at Deepwood Drive
- C.2. On Pine Grove Road, from Ross Street to the Ferguson Township Elementary School, widen the shoulders on Pine Grove Road to 5 feet wide. Sign/mark the shoulders as bike lanes.
- C.3. On Pine Grove Road, from the Ferguson Township Elementary School to Rosemont Drive, add sharrow pavement markings. Consider adding “Bicycles May Use Full Lane” signage.
- C.4. Run community education campaigns on enhanced pedestrian crossings and sharrows.

D. Western Pine Grove Gateway

- D.1. Construct the Western Pine Grove Road Gateway.

E. Speed Limit Changes

- E.1. Pine Grove Road West – With implementation of the West Pine Grove Road Gateway Treatment, extend the 25 mph speed limit to the gateway location and add a 40 mph zone starting just west of either Wyoming Avenue or Ross Avenue.
- E.2. Pine Grove Road East – With implementation of the Banyan Drive/Meckley Drive Full-Size Modern Roundabout as a gateway treatment, add a 35 mph zone between the gateway and the other end of Meckley Drive.

- E.3. Nixon Road – With construction of the enhanced shared use path crossing, extend the 25 mph zone to the north to encompass the Sunday Drive residential street intersection.
- E.4. Water Street – With the planned high friction surface treatment project, extend the 35 mph zone to the south through the first curve along SR 0026. Consistent with Pine Grove Road and Nixon Road, post Water Street at 25 mph within the developed area of Pine Grove Mills, north of Chestnut Street.

F. Water Street Sidewalk Replacement

- F.1. Replace the Water Street Sidewalk according to the scope of work prepared for the TASA Grant project.

G. Parking Improvements

- G.1. Integrate new and revised parking in the concept for the Pine Grove Road & Water Street/Nixon Road intersection.
- G.2. Evaluate sight distance along Pine Grove Road west of Water Street according to the 25-mph speed limit and expand parking zones where sight distance allows.
- G.3. Mark existing parking spaces along Pine Grove Road.
- G.4. Standardize the parking signage systems, formats, and messaging used throughout Pine Grove Mills.
- G.5. Coordinate ordinance and field postings for parking.
- G.6. Update parking ordinance to remove Sunday parking on the south side of Pine Grove Road.
- G.7. Add No Parking signs at more regular intervals along the south side of Pine Grove Road.
- G.8. Add parking regulation signs along the east side of Water Street to restrict parking within the sight triangle.

H. Rothrock State Forest Trails Access

General Recommendations:

- H.1. Encourage walking or bike access only via the neighborhood trail connections.
- H.2. Work with neighborhoods to develop acceptable trailhead signage and access restrictions (residents only (?), walk only, walk and bike, motorized traffic, horses, etc.)
- H.3. Encourage vehicular access and parking at the Kepler Road access, to the south along SR 0026 (Water Street).
- H.4. Work with DCNR and State Forest to assess the desirability/feasibility of new trail connections through the State Forest to the Mid-State Trail.

Locational Recommendations:

At the Deepwood Drive Trail Access:

- H.5. Maintain existing trail connection on Township right-of-way between Deepwood Drive and State Forest lands.
- H.6. Retain existing “No Parking” along Deepwood Drive.

At the West Chestnut Street Turnaround:

- H.7. Work with DCNR and State Forest to assess ownership of the West Chestnut Street turnaround, trail access point, and gate.
- H.8. Based on the outcomes of ownership/responsibility, update the Township parking ordinance to prohibit vehicular parking in the turnaround and post “No Parking” signs.
- H.9. Assess the functionality and need for the existing gate.
- H.10. Clearly sign and define the trail access point and post a trail map and trail head signage, indicating access restrictions.
- H.11. Consider adding bike parking (rack).
- H.12. Consider stabilizing the embankment and creating a drainage swale above the turnaround area to capture run-off and prevent further erosion in the turn-around, West Chestnut Street, and adjacent properties.

At the Kepler Road Parking Area and Trail Access:

- H.13. Work with DCNR and State Forest to assess ownership of the area currently being used as vehicular parking.
- H.14. Conduct a parking and trail utilization study, including a survey of trail users to determine desired trailhead improvements.
- H.15. Post a trail map and trail head signage, indicating access restrictions.

I. Other Recommendations

Pedestrian Safety & Accommodation

- I.1. Develop a consistent standard for marking crosswalks and providing ADA-compliant crossings at street intersections.
- I.2. Where sidewalks were narrow, blockages by wheelchair ramps, bikes, toys, trash cans, recycling bins, etc., were noted. Consider notifying residents and working with recycling and refuse collection to keep the sidewalk clear.
- I.3. Trees and other vegetation along the sidewalk should be trimmed to allow clear passage.
- I.4. Clarify responsibility for clearing snow from the sidewalk on the Slab Cabin Run Bridge.

Bicycle Safety & Accommodation

- I.5. The shared use path between Nixon Road and Elementary School provides good connectivity but the section along the cemetery has a gravel surface and is eroded in many spots. Conduct maintenance on the gravel surface. Consider paving this section of the shared use path.

Table 14. Pine Grove Mills Mobility Study Recommended Projects

ID	Project	Type	Location	Description	New ROW Anticipated?	Cost Estimate	Tier
1	Concept A.1, Stop Control Option	Major Concept	Pine Grove Road between Water Street and Pine Hall/Post Office	<ul style="list-style-type: none"> Retain the existing stop-controlled intersection, with revised Water Street and Pine Grove Road geometry. Add two enhanced pedestrian crossings of Pine Grove Road with rapid flashing beacons, high-visibility pavement markings, and enhanced lighting. Add high-visibility crosswalks with enhanced lighting at Water Street, Nixon Road, St. Elmo's Lane, and Post Office Driveway. 	No	\$ 834,500	1
	Concept A.3, Large Mini Roundabout Option	Major Concept	Pine Grove Road between Water Street and Pine Hall/Post Office	<ul style="list-style-type: none"> Convert the intersection to a large "mini-roundabout". Add an enhanced pedestrian crossing of Pine Grove Road with rapid flashing beacons, high-visibility pavement markings, and enhanced lighting between Pine Grove Hall and the Post Office. Add high-visibility crosswalks with enhanced lighting at all other crossing locations, including the roundabout, Nixon Road, St. Elmo's Lane, and Post Office Driveway. 	Yes	\$ 1,269,100	
2	Street Repurposing at Post Office	Major Concept	Pine Grove Road in front of Post Office	<ul style="list-style-type: none"> Repurpose portions of the existing roadside pavement, sidewalk, and landscaped area to create a useful, integrated space Elements include expanded green space/landscaping, bike rack, gazebo/seating 	No	\$ 215,200	3
3	Concept B.1, Full-Size Modern Roundabout (Eastern Gateway)	Major Concept	Pine Grove Road at Banyan Drive/ Meckley Drive	<ul style="list-style-type: none"> Convert intersection to a full-size modern roundabout. Add high-visibility pedestrian crossings with overhead lighting across Pine Grove Road, Banyan Drive, and Meckley Drive. Install a landscaped "green median" on Pine Grove Road with landscaping and signage to create the eastern gateway to Pine Grove Mills. Add a 35 mph speed zone on Pine Grove Road between the gateway and the other end of Meckley Drive. 	No	\$ 1,071,800	3
4	Concept C.2, Enhanced Pedestrian Crossing at Rosemont Drive	Enhanced Crossing	Pine Grove Road at Rosemont Drive	<ul style="list-style-type: none"> Add an enhanced pedestrian crossing of Pine Grove Road, with roadside signage, rapid flashing beacons, high-visibility pavement markings and enhanced lighting. Add high visibility pedestrian crossing of Rosemont Drive, with signage and overhead lighting. 	No	\$ 84,100	1/2
5	Concept C.3, Enhanced Pedestrian Crossing at the Shared Use Path	Enhanced Crossing	Nixon Road at Shared Use Path	<ul style="list-style-type: none"> Update the existing shared use path crossing of Nixon Road to create an enhanced crossing with signage, rapid flashing beacons, high-visibility pavement markings and lighting. Extend the 25 mph zone on Nixon Road to the north to encompass the Sunday Drive residential street intersection. 	No	Estimated by Township for TASA Grant (1)	1
6	Concept C.4, Enhanced Pedestrian Crossing at Deepwood Drive (East)	Enhanced Crossing	Pine Grove Road at Deepwood Drive (East)/Elementary School Driveway	<ul style="list-style-type: none"> Add an enhanced pedestrian crossing of Pine Grove Road on the west side of Deepwood Drive, with roadside signage, rapid flashing beacons, high-visibility pavement markings and overhead lighting. Add high visibility pedestrian crossing of Deepwood Drive, with signage and overhead lighting. 	No	\$ 108,000	1
7	Concept C.5a, Pine Grove Road West Complete Street	Complete Street	Pine Grove Road, from Ross Street to Ferguson Township Elementary School	<ul style="list-style-type: none"> Widen the roadway shoulders on both sides of Pine Grove Road to 5 feet Sign and mark the shoulders as bike lanes 	No	Estimated by Township for TASA Grant (1)	1

ID	Project	Type	Location	Description	New ROW Anticipated?	Cost Estimate	Tier
8	Concept C.5b, Pine Grove Road East Complete Street	Complete Street	Pine Grove Road, from Ferguson Township Elementary School to Rosemont Drive	<ul style="list-style-type: none"> Add sharrow markings on Pine Grove Road, according to the MUTCD "Shared Lane Marking" guidelines Consider adding "Bicycles May Use Full Lane" signage. Conduct community education on sharrows. 	No	\$ 77,600 (TASA)	1
9	Water Street Sidewalk Reconstruction and Extension	Pedestrian	West side of Water Street, from Pine Grove Road to Chestnut Street	<ul style="list-style-type: none"> Reconstruct the existing sidewalk with ADA-compliant crossings of Martz Street and Smith Street. Extend the sidewalk by approximately 200 feet, from its current endpoint to Chestnut Street. 	Construction Easements	Estimated by Township for TASA Grant (1)	1
10	Western Pine Grove Road Gateway	Gateway	Pine Grove Road east of Lions Community Park	<ul style="list-style-type: none"> Construct gateway treatment, including median, overhead beacon, speed feedback signs, pavement markings, etc. Extend the 25 mph speed limit to the gateway location and add a 40 mph zone starting just west of either Wyoming Avenue or Ross Avenue. 	No	\$ 266,100	2
11	Parking Improvements	Parking	Pine Grove Road, between Water Street and Ferguson Township Elementary School	Parking Zone Studies and Expansion <ul style="list-style-type: none"> Evaluate sight distance and expand parking zones where sight distance allows. 	No	\$ 6,400	1
		Parking	Pine Grove Road, between Rosemont Drive and Ferguson Township Elementary School	Marking of Parking Spaces <ul style="list-style-type: none"> Mark all legal parking spaces to match the ordained and posted signage. 	No	\$ 1,200	
		Parking	Pine Grove Road and Water Street	Parking Signage Updates <ul style="list-style-type: none"> Update parking signage to use a consistent systems, formats, and messaging. Place signs at more regular intervals along the south side of Pine Grove Road. Add/update signage along Water Street. 	No	\$ 7,800	
		Parking	Pine Grove Mills Study Area	Parking Signage/Ordinance Updates <ul style="list-style-type: none"> Review and update ordinance and parking postings for consistency. 	No	Staff Time	
12	West Chestnut Street Turnaround Improvements	Trails	West Chestnut Street	<ul style="list-style-type: none"> Additional research and coordination required. Establish ownership and work with DCNR and State Forest on an agreement/plan for trail access, posting trail maps, adding bike rack, and other improvements to better maintain the turnaround. 	No	TBD	3
13	Kepler Road Parking Area and Trail Access Improvements	Trails	Kepler Road Parking Area	<ul style="list-style-type: none"> Additional research and coordination required. Establish ownership and work with DCNR and State Forest on an agreement/plan for parking regulations, trail access, posting trail maps, adding bike rack, and other improvements to better maintain the turnaround. 	No	TBD	3

Table Notes:

(1) Cost estimate prepared by Ferguson Township in 2021 = \$839,370. Costs were rolled together for the following three projects:

- i. Widening Pine Grove Road (SR 0045) to add bike lanes from Ross Street to Ferguson Township Elementary School (Table 14, Project ID #7)
- ii. Adding sharrow markings on Pine Grove Road from Ferguson Township Elementary School to Nixon Road and Nixon Road to the Shared Use Path (Table 14, Project ID #8)
- iii. Reconstructing Water Street sidewalk from Pine Grove Road to Chestnut Street (Table 14, Project ID #10)

LIST OF ACRONYMS

AASHTO	American Association of State Highway Transportation Officials
ARLE	Automated Red-Light Enforcement Grant Program
CATA	Centre Area Transportation Authority (Transit)
CCMPO	Centre County Metropolitan Planning Organization
CRPA	Centre Regional Planning Agency
DCNR	PA Department of Conservation & Natural Resources
FHWA	Federal Highway Administration
LOS	Level-of-Service
MPH	Miles Per Hour
PennDOT	Pennsylvania Department of Transportation
ROW	Right-of-way
RRFB	Rectangular Rapid Flashing Beacon
RSA	Roadway Safety Audit
SAP	Small Area Plan
SCASD	State College Area School District
TASA	Transportation Alternatives Set-Aside Program
TIP	Transportation Improvement Program

Directional Designations:

EB	Eastbound
WB	Westbound
NB	Northbound
SB	Southbound

SOURCES & REFERENCES

1. Pine Grove Mills Small Area Plan, Centre Regional Planning Agency in partnership with Ferguson Township, 2019. https://www.twp.ferguson.pa.us/sites/g/files/vyhli576/f/uploads/2019_12_23_pgm_sap_jlw.pdf
2. Ferguson Township Street Classification Map, 2016.
3. Bikeway Selection Guide, Federal Highway Administration (FHWA), 2019.
4. Ferguson Township Police Department Crash Data, provided 2021.
5. Illumination Data, Ferguson Township, taken 2022.
6. AASHTO Roadway Lighting Design Guide, 2018.
7. Phone call discussion held January 11, 2022 between Carl Campbell, Pastor of the Pine Grove Mills Presbyterian Church and Robert Watts, consultant for the Pine Grove Mills Mobility Study.
8. Centre Area Transportation Authority Data, provided 2021.
9. NCHRP Report 672, Roundabouts: An Informational Guide, Second Edition, 2010.
10. PEDSAFE, Pedestrian Safety Guide and Countermeasure Selection System, Rectangular Rapid-Flashing Beacon (RRFB), http://pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=54
11. Sharrow Educational Handout, Centre Regional Planning Agency, provided 2021.

APPENDIX

Appendix A	Mobility Study Virtual Public Meeting Presentation, Meeting Summary, and Survey Results
Appendix B	Mobility Study Open House & Concept Display Presentation, Meeting Summary, and Survey Results
Appendix C	Pine Grove Road & Water Street/Nixon Road Traffic Signal Warrant Study Report
Appendix D	Pedestrian & Bicycle Roadway Safety Audit Detailed Prompt Lists
Appendix E	Concept Cost Estimates