

BUILDING A BETTER GREENBELT

SIGNS, SAFETY, AND A

RIVERFRONT LINK TO FORT HUNTER



Prepared for:

Capital Area Greenbelt Association

and the

Dauphin County Commissioners

Prepared by:

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BUILDING A BETTER GREENBELT: SIGNS, SAFETY, AND A RIVERFRONT LINK TO FORT HUNTER is an engineering plan that analyzes and develops recommendations to address the safety concerns and recommendations presented by Greenbelt users during development of the Association's 2010 strategic plan, **PRESERVING THE GREENBELT FOR FUTURE GENERATIONS**. It continues the process that began with the formation of the Capital Area Greenbelt Association in 1990 - to build and renew the Harrisburg area's 20-mile greenway and trail.

The PA Department of Conservation and Natural Resources and the Dauphin County Commissioners provided significant funding for the development of the plan. We received a great deal of encouragement from Barry Schoch, PENNDOT Secretary, and Rick Allen, former Secretary of the PA DCNR, when they toured the Greenbelt in November 2011. Jeff Haste, Chairman of the Dauphin County Commissioners, has been especially helpful with suggestions and support for the funding strategy to implement the plan's recommendations.

Special thanks also go to Mike Keiser, PENNDOT District 8-0 Executive, and his staff; and PA DCNR staff, in particular Lori Yeich, who first suggested that such a plan be done and supported it throughout. We also thank the representatives of the host municipalities of Susquehanna and Swatara Townships, Paxtang, and Penbrook Boroughs, the City of Harrisburg; Dauphin County Department of Parks and Recreation; Harrisburg Bicycle Club; and several Harrisburg Neighborhood Associations. These folks gave of their time to review draft proposals and offer suggestions.

Finally, we wish to acknowledge the many volunteers, businesses, foundations, and partner organizations that have contributed to the renewal of the Greenbelt over the last twenty-plus years. Their active involvement and support has resulted in a truly wonderful recreation resource for our community - one we hope will be improved even more with the implementation of this plan's recommendations.

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EXECUTIVE SUMMARY

BUILDING A BETTER GREENBELT is an engineering study that analyzes and develops recommendations to address the safety concerns and recommendations presented by Greenbelt users during development of the Association's 2010 strategic plan, **PRESERVING THE GREENBELT FOR FUTURE GENERATIONS**.

This summary outlines the engineering findings, recommendations, preliminary designs, cost estimates, and funding strategy to improve signage; construct safety improvements at key intersections and on-road segments of the Greenbelt; and to develop a riverfront trail to link Dauphin County's Fort Hunter and Wildwood Parks. The proposed improvements are intended to upgrade select portions of the Greenbelt Trail to meet or exceed the standards and guide specifications outlined by the American Association of State Highway and Transportation Officials (AASHTO) and the Manual of Uniform Traffic Control Devices (MUTCD). In addition, those portions of the trail within state road right of way shall satisfy the needs and requirements of PENNDOT.

This plan is supported by funding from the PA Department of Conservation and Natural Resources and the Dauphin County Commissioners. During the development of this study the Association received significant support and input from PENNDOT District 8-0, host municipalities (including Susquehanna and Swatara Townships, Paxtang and Penbrook Boroughs, and the City of Harrisburg), Dauphin County Department of Parks and Recreation, Harrisburg Bicycle Club, and several Harrisburg Neighborhood Associations.

1. New Greenbelt Directional and Warning Sign System

The plan calls for a new system to replace the current mix of 140 Greenbelt signs. Some of them conflicting and confusing while others which have reached their life expectancy are faded and nearly illegible.



The new system will be based on the current Association logo. It will provide direction and warnings to users and motorists and it will direct potential users to trailheads from nearby roadways. The first phase of installation will focus on directional signage. The Greenbelt Association has raised \$47,500 of the estimated cost.

Contributors include: ArcelorMittal, Stabler Foundation, Rails to Trails Conservancy, McCormick Family Foundation, QBP (Quality Bicycle Products), The McClure Company and the Association members.

Harrisburg Area Community College, Wildwood Park, and several of the host municipalities are expected to help with installation. The project is expected to be bid in early 2014 and Phase 1 is to be complete by late spring 2014. Phase 2 of the program will focus on improving traffic signage in conjunction with the safety upgrades discussed below.

2. Permanent Upgrades to Trail Intersections and On-Road Sections

The plan proposes capital improvements to address safety concerns at seven locations along the Greenbelt. The total cost of these improvements (design, construction, and inspection) is estimated at \$1.80 million.



The improvements include, where appropriate: pedestrian controlled flashing signals at intersections, high visibility cross walks, refuge islands at wide roadways, improved trail alignments near crossings, sidewalks where needed for pedestrians, new shared use path to remove trail traffic from roadways, improved trail warning signage for motorists, and full curbs at crossings.

3. Details of Proposed Safety Improvements

Greenbelt crossing at North Front Street. This is one of the busiest crossings with Average Daily Traffic (ADT) of about 20,000 and posted speed of 35 mph. It currently has no traffic control measures for a four lane crossing. The current Greenbelt crossing is at Graham Street two blocks south of the proposed crossing at Vaughn Street. The proposed crossing has better sight distance, is closer to the terminus of Riverfront Park, and is also the current PA Bike Rte. J and the old Harrisburg Bike Route. Our proposal is to create one safe crossing at the northern end of the Riverfront Park Trail at Vaughn Street. Improvements would include: new crosswalks, a pedestrian/bike activated overhead flashing beacon, sidewalk and curb upgrades, and repaving the intersection.



Greenbelt crossing at Herr Street and Greenbelt on-road section on Parkview Drive. The current Parkview Drive has no sidewalks and presents a real safety concern for anyone using the Greenbelt in this area and for local residents. Parkview Drive has a 40' right of way and all proposed improvements are within the Township right-of-way. The proposed improvements include an improved cross walk, refuge island, and pedestrian crossing button at Herr St; traffic calming by narrowing the traffic lanes and installation of curbing and a five foot sidewalk on the west side of the road but within the right-of way. We expect that the sidewalk will be financed through grants but like all sidewalks would be the responsibility of residents to maintain. The proposal also includes milling and overlay (paving) of Parkview Drive from Herr to Walnut Street, installation of standard signage, and pavement markings for bicyclists who would share the road with motorists.

Greenbelts crossings at 28th Street and Market Street Road. This area currently has no traffic controls, signage, crosswalks, or pedestrian landing areas. Market Street Road has a posted speed limit of 25 mph with an ADT of 8,500 and 28th Street has a posted speed limit of 35 mph with an ADT of 5,600. Both crossings have sight distance limitations which warrant additional warning signs and beacons. The proposal is to provide well located visible crosswalks and trail signage; provisions for curbing and buffers to separate trail users from vehicles; relocation of Parkway Boulevard south several feet to allow a shared use path parallel to and outside of the road section between Market and 28th Streets; pedestrian activated flashing beacons for each cross walk; continuation of the existing sidewalk along Parkview Blvd to a point where the traffic volume is significantly reduced as you approach Reservoir Park. The intersection would also be milled and re-paved. The 28th Street crossing would include a refuge island.

Greenbelt crossing at Paxton Street and on-road section on Parkview Lane. The current condition does not include adequate pedestrian consideration in the signal, is a relatively wide crossing, and has an angled crosswalk which adds to the crossing length. Proposed improvements include: re-constructing the trail approach on the south side of the intersection and moving the actual crossing point closer to the signal pole and pedestrian signal control to create a more direct right angle crossing (this will involve construction of a retaining wall near the car dealership and installation of a mountable curb, to direct trail users to the crosswalk); installation of a wider ten foot crosswalk; upgrade of the landing and approach of the trail on the north side of Paxton Street; installation or upgrade of some curbing as protection for trail users at the approach; modification of the signal and push button location; improved signage and pavement markings; and repaving of the affected area of the intersection.

The signal upgrade would include relocated push buttons, new pedestrian signal heads and a lead pedestrian interval. The lead pedestrian interval would be concurrent with the 32nd Street green (left turn) and would allow pedestrians to get into the crosswalk before the left turn light turns green. The length of this delay will vary and would be part of a final design phase. The signal configuration for the proposed McDonald's did not include an exclusive pedestrian phase. Such an exclusive pedestrian phase would only be used where there is an extreme amount of pedestrian traffic.

Greenbelt crossing at SR 441 (28th Street). This crossing has a posted speed limit of 40 mph. The suggested improvements include: re-constructing the trail alignment on either side of the intersection to provide a safe approach and landing area for bicyclists and pedestrians using the

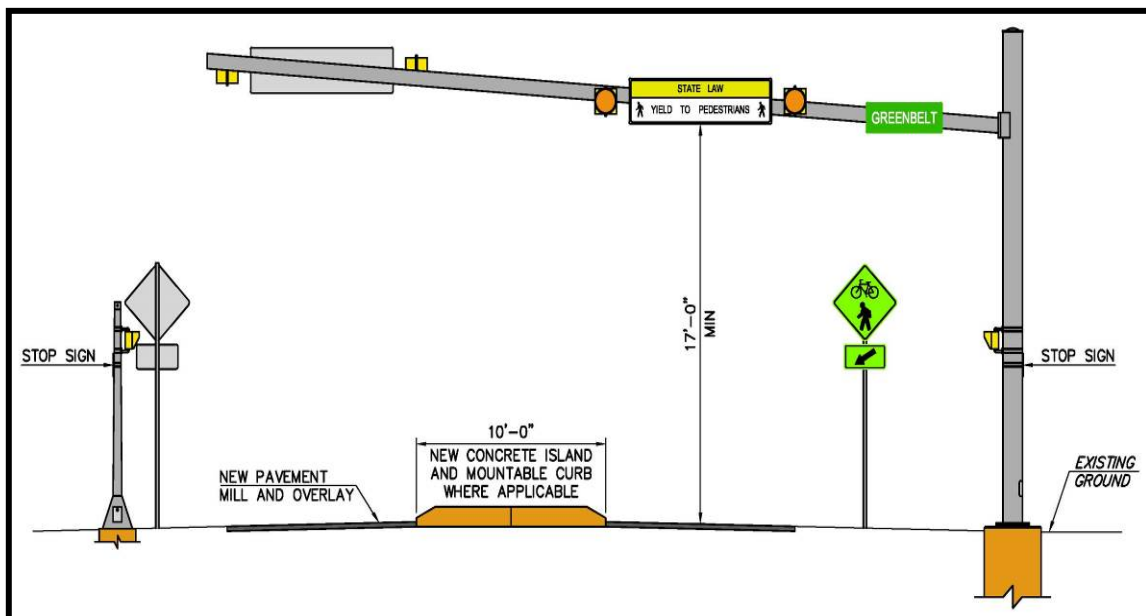
intersection; a refuge island to shorten the crossing distance; a pedestrian activated overhead flashing beacon and yield to pedestrian sign on an overhead mast and on the island; a wider, more visible crosswalk; installation of new pavement markings and warning signs; removal of bollards which are too close to the intersection; and repaving of the intersection area.

Greenbelt crossing at south Cameron Street. This location involves a wide crossing of 3 lanes and is complicated by the entrance to the Harrisburg Resource Recovery Facility which is just to the south. Cameron Street has a posted speed limit of 35 mph (observed speeds are higher) with ADT of 14,000. Our proposed improvements include a refuge island to shorten the pedestrian crossing and calm traffic; a pedestrian activated overhead beacon warning motorists to yield; a wider more visible crosswalk which is moved north from its current location a short distance to improve turning for delivery trucks; a better trail alignment on either side of the intersection; repaving the intersection; and full reveal curbing.

Other recommendations. The study recommends all crossings include an overhead yellow flashing warning beacon to supplement the proposed warning signs. The beacons shall be activated by the presence of a user through video, infrared, and/or loop detection.

At traffic signals all pedestrian push buttons shall be accessible and loop detection for bicycles shall be considered. Pedestrian and bicycle traffic counters are recommended at all signal and warning beacon locations. Pedestrian counts will be critical to future upgrades (i.e. warrants a full signal) and can be used to justify future grant and funding needs.

All warning signs for the trail crossings shall be fluorescent green. Crosswalk markings shall be “piano key” style to increase visibility. Municipalities should enforce traffic speeds at the crossings as a measure of traffic calming.



Overhead mast with warning beacons, signs and Greenbelt identification

4. A Riverfront Link Trail – Wildwood Park to Fort Hunter Park

The plan concluded that linking Dauphin County’s two premier parks, as proposed during the development of the Greenbelt Strategic Plan in 2010, is feasible and that the trail will provide a significant recreational opportunity along the riverfront. The approximately 1.5 mile off-road trail would create a five-mile loop for bicyclists including a beautiful 1 mile riverfront section along North Front Street. The total estimated cost of this project for final engineering, design, permitting, utilities, right-of-way negotiations and construction is \$2.00 million (\$1.70 million for construction and \$300,000 for design).

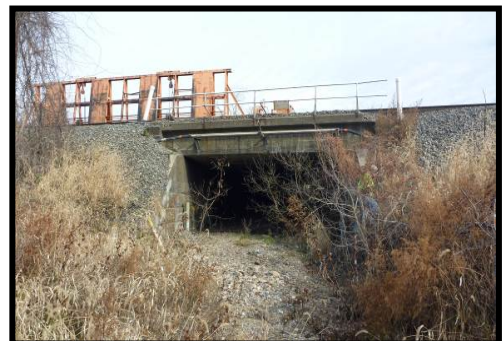


This trail would be a beautiful compliment to the riverfront and we expect it to be heavily used by office personnel in this area as well as compliment the restaurant businesses in the area. This option has been reviewed by PENNDOT District 8-0 and they have given conceptual approval to move forward with the plan. It is also the preferred option of Dauphin County Parks and Recreation - especially after review of the other potential alignments.

Completion of the Fort Hunter trail is predicated on addressing the current situation at the on-road section of the Greenbelt trail at Linglestown and Industrial Roads which poses perhaps the most difficult safety issue for users. The study has identified two options to address this problem area:

Linglestown Road Option 1 - Under the Railroad

This option would cross Industrial Road at the northern entrance to Wildwood Lake and create a shared-use path heading north along the base of Industrial Road embankment, turning west through an abandoned underpass (former Linglestown Road) then connect to Sixth Street (beginning of the Fort Hunter Connector) on the north side of Linglestown Road. The main Greenbelt Trail would then proceed south under the Linglestown Road bridge to rejoin the main trail at Kaby Street. All portions of the trail would be off-road or built as a shared-use path.



Linglestown Road Option 2 - Over the Railroad

This option was proposed by PENNDOT District 8-0 as an alternative if Option 1 could not gain approval of Norfolk Southern Railroad Company to use the abandoned underpass. This option would create a separate 10 foot path along the western side of Industrial Road and on the south side of the Linglestown Road Bridge (see photo at right) protected by a crashworthy barrier. It would link to the main Greenbelt at Kaby Street and include a section



that proceeded under the Linglestown Road bridge to link to the Fort Hunter Trail on the north side of Linglestown Road at Sixth Street. While some portions of the trail would be on an existing road section the trail would be physically separated from vehicular traffic and would function as a shared-use path.

A breakdown of construction costs is as follows.

- Fort Hunter Connector (Sixth Street to Fort Hunter) \$1,425,000
- Linglestown Road spur to Sixth Street; start of the Connector (Option 2) \$275,000
- Linglestown Road safety improvements (Option 2) \$500,000

Only Option 2 is considered, since Option 1 does not appear feasible with the railroad concerns. The safety improvements along Linglestown Road (\$500,000) will be constructed with funds already established under intersection and on-road safety improvements.

Design of the Linglestown Road safety improvements and the Fort Hunter Connector is estimated to be \$300,000.

4. Funding Summary

Directional Signage – Greenbelt signage is fully funded with local funds. The sign plan is complete and the project is to be bid for construction in early 2014.

Safety Improvements – Funding is in place to complete the proposed safety improvements at intersections and on-road portions of the Greenbelt. The funding is summarized below:

- PENNDOT administered Federal Highway Transportation Funding – In September 2013, PENNDOT District 8-0 proposed, and the Harrisburg Area Transportation Study amended, their Transportation Improvement Plan to include construction of eligible aspects of the safety improvements (those on the federal aid system). **Subsequently PENNDOT informed Dauphin County of an award of \$785,000 for construction activities in 2015.**
- PA DCNR Community Conservation Partnership – In April, 2013, Dauphin County applied for \$500,000 to fund final design of the safety improvements and construction of those improvements that do not qualify for federal funding. **The \$500,000 grant was awarded in November 2013.**

Fort Hunter Connector – Partial funding is in place to complete the proposed Fort Hunter Connector. The following funding has been secured to date:

- PA DCED Greenways Trails and Recreation – In August 2013, Dauphin County applied for a grant in the amount of \$250,000 to fund construction at Linglestown Road for connection to Fort Hunter. **The County was awarded \$230,000 in November 2013.**

The following funds have been (or will be) requested to complete the Fort Hunter project.

- Dauphin County Gaming Grant in the amount of \$250,000 to fund the design of the Fort Hunter Connector. The grant application has been submitted and the award is pending.
- Federal and/or State Funds in the amount of \$1,500,000 to construct the Fort Hunter Connector. The \$230,000 DCED grant has funded the initial 15% of the \$1,700,000 construction project.

INTRODUCTION

General

The Capital Area Greenbelt is a 20 mile greenway which encircles the City of Harrisburg. The greenway was built in the early 1900's as part of the "City Beautiful Movement". Over the years the Greenbelt degraded and was eventually closed in 1972 due to flood damage and lack of a unified maintenance organization.

Over the last twenty years the Capital Area Greenbelt Association, a non-profit corporation, has taken the lead in restoring, developing, and maintaining the greenway through cooperation with the host municipalities, several state agencies, and hundreds of volunteers.

The Greenbelt is now a popular pedestrian and bicycle trail around Harrisburg and through its adjacent municipalities. It is identified as a priority in the Dauphin County Parks, Recreation, Open Space, and Greenway Plan and its riverfront section is part of the Susquehanna Greenway and Water Trail - the plan's highest priority.

The trail links neighborhoods to the area's major parks and open spaces and its section along the Riverfront is also a link in the proposed Pittsburgh to Harrisburg Main Line Trail corridor in the State's Greenway Plan

Each year the Greenbelt becomes more established and usage has steadily increased. Recently the Capital Area Greenbelt Association consulted with users and other organizations through a strategic plan process and identified various concerns where improvements are needed. The study concluded that the following needs should be investigated in greater detail and implemented in the near term:

- Wayfinding - Improved marking of the Greenbelt route
- Safety - Enhancements at specific road crossings and on-road sections
- Connectivity - Link to Fort Hunter

To address the needs identified in the strategic plan, the Association continued the process by meeting with PENNDOT, DCNR, and Dauphin County to formulate a detailed scope of a work for an Engineering Study that would produce a detailed plan of action. In 2011, the Association partnered with Dauphin County Parks and Recreation to seek a total of \$120,000 in grant funds from DCNR (\$60,000) and Dauphin County Gaming (\$60,000) to fund the Engineering (Safety) Study. In February 2012 both grants were awarded and a competitive bid process was undertaken to select an engineering firm to conduct the study. In September 2012 Wilson Consulting Group of Mechanicsburg was selected to lead the Engineering Study.

This document, **BUILDING A BETTER GREENBELT: SIGNS, SAFETY, AND A RIVERFRONT LINK TO FORT HUNTER**, summarizes the results of that Engineering Study.

Scope of the Engineering Study

The following three tasks comprise the scope of the study.

Task 1 Signage – Develop a comprehensive and consistent signing plan for the entire Greenbelt. The goal of this task is to allow new and existing Greenbelt users to easily navigate their way around the trail and to identify key points of interest on the route. The sign plan will focus on wayfinding. The plan shall be produced in a format that will allow for immediate implementation at the conclusion of the study.

Task 2 Safety Improvements – Develop preliminary designs for safety improvements at seven (7) intersections and two (2) on-road sections. These improvements will involve physical construction and signing (warning and regulatory) to increase safety by increasing visibility, calming traffic, and, where possible, separating trail users from traffic.

The design work shall be sufficiently detailed to provide budget estimates for use in acquiring funding through various agencies. In addition, graphic presentations of the plans shall be presented to the host municipalities, PENNDOT, and the public.

Task 3 Fort Hunter Connection – Determine the feasibility of developing a shared-use path link from the Greenbelt at Linglestown Road to the County Park at Fort Hunter. Conceptual plans shall be developed to study property and traffic impacts. PENNDOT shall be consulted throughout the process. The plans shall be presented for comment at public meetings.

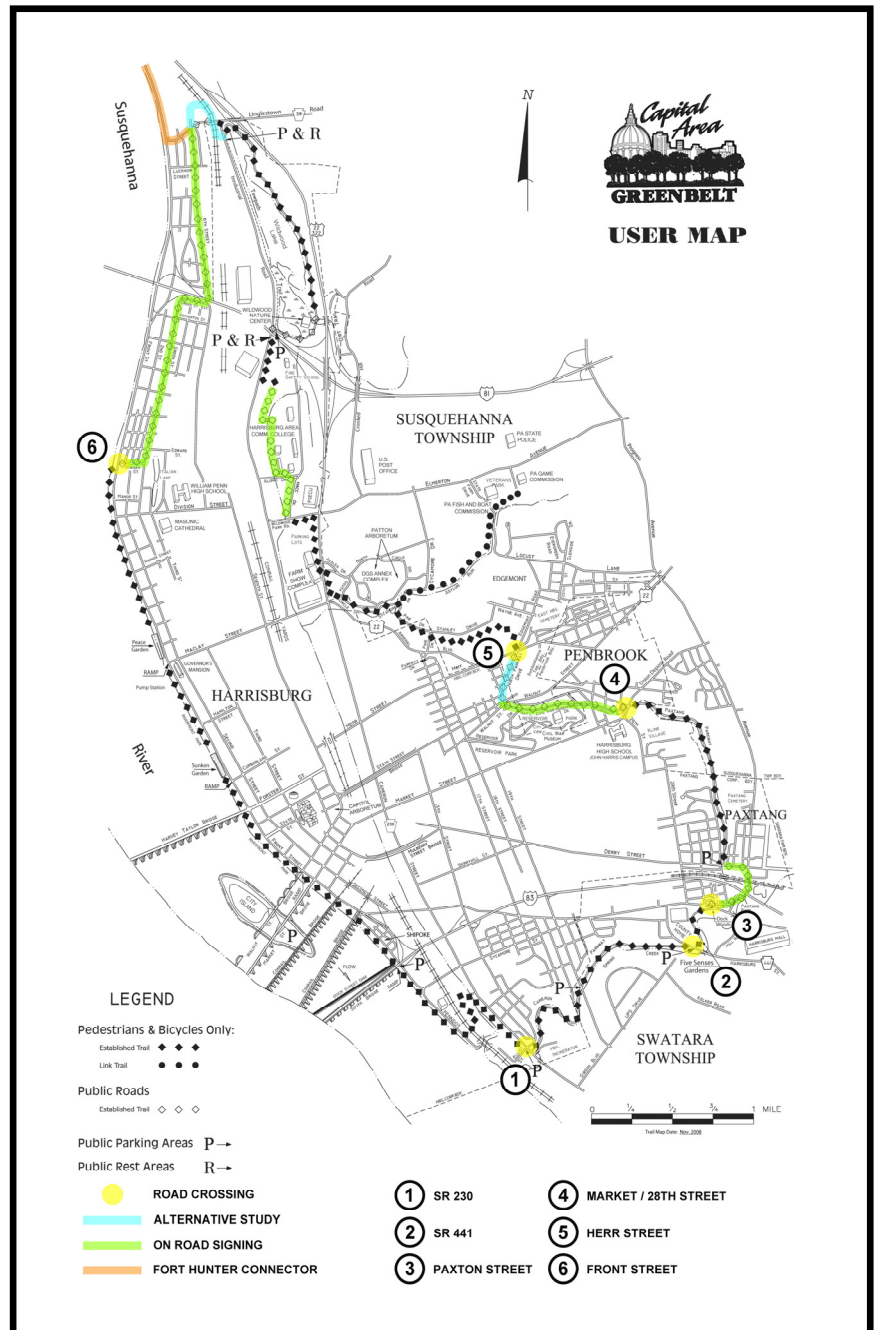


Figure 1 – Map of Study components

Study Process

The study utilized a multi-step process to derive solutions, develop plans, and make recommendations. The process included the following tasks;

1. Problem statement – as defined in the scope of work
2. Data Collection – physical measurements of the sites, mapping, and historical data such as traffic volumes, posted speed, physical dimensions, accident data, etc.
3. Criteria/Standards – identification of accepted standards from sources such as AASHTO, PENNDOT, FHWA.
4. Potential Solutions – application of standards to each site
5. Details – development of plans depicting the solutions
6. Estimates – initial estimates of cost of potential solutions
7. Municipal/Agency Input – review of the plans and estimates by public officials
8. Public Input – review of the plans and estimates by general public
9. Refinement of Plans – plan updates based on Agency, Municipal, and Public input
10. Preliminary Design and Budget Estimates – refined design
11. Funding applications – refined plans used to apply for grants and safety funding
12. *Final Design and Clearances – future task after funding is secured*
13. *Development (construction) – future task after funding is secured*

Stakeholders

The study invited input from a wide array of stakeholders including:

- Capital Area Greenbelt Association
- Dauphin County Parks and Recreation
- Municipalities – City of Harrisburg, Susquehanna Township, Swatara Township, Penbrook Borough, and Paxtang Borough
- PENNDOT – Engineering District 8-0 and Central Office
- PA Department of Conservation and Natural Resources (DCNR)
- Harrisburg Bicycle Club
- Nearby Harrisburg Neighborhood Associations
- Susquehanna River Basin Commission

Public Input

The study used several tools to inform and seek input from the public. First, key stakeholders and municipal staff were identified and asked to serve on one of two advisory groups. These groups received periodic email updates and were asked to share the information through their membership lists or newsletters. Second, each municipality was directly consulted concerning the proposed improvements for specific comments on the preliminary designs. Third, a series of meetings were held during the process, three with the advisory groups and two with the general public, to inform and solicit input on all the recommendations in the plan. Fourth, the Greenbelt Association administered an online survey that also sought input from the public, its membership, and the members of the Harrisburg Bicycle Club. The survey garnered responses from 155 Greenbelt users and helped to confirm the need for improvements and identify specific safety concerns.

These meetings were advertised and one of them was widely reported in the local newspaper. Finally, the Greenbelt Association placed summaries of the recommendations and the final draft plan on its website to facilitate review by its membership, other organizations, and the general public.

The Study developed preliminary designs from input gathered as a part of the Strategic Plan initiative. The Preliminary Designs were presented at public meetings which generated additional input.

The public input received as part of this study created a list of Key Concerns and Recommendations to Address in Final Design of Proposed Greenbelt Improvements. A summary of these comments are provided below:

North Front Street Crossing

- Dangerous crossing – almost impossible to cross at rush hour
- Broad support to move to Vaughn St, near northern end of Riverfront Park
- Consider widening trail near intersection to better accommodate bikes and pedestrians
- Consider nearby canoe access areas, just south of this intersection
- Long term solution may require a traffic light which actually stops motorists

Parkway Drive, Crossing at Herr Street and Edgemont Road

- Consider a separate shared use path along Parkway Drive
- Do not encourage bicyclists to stay on Edgemont Rd to East Harrisburg Cemetery
- Involve the residents and businesses along Parkway Drive during final design of proposed improvements

Market Street Road and 28th Street

- Very complex intersection with traffic coming from all directions
- Not sure where Greenbelt goes north of the Parkway, signing is poor
- Very busy at rush hour

32nd and Paxton St Crossing

- Consider need for maintenance vehicles with trailers to enter trail at this location
- May need to provide a full pedestrian phase which stops traffic for pedestrians and bicyclists
- Several survey respondents and other users note “close shaves” at this location

28th St (SR 441) at Five Senses Garden

- Reconsider need for refuge island
- In re-design of entrance near Five Senses Garden consider need for maintenance vehicles with trailers to enter this area
- Re-construction design for Five Senses Garden Entrance should consider layout of nearby sprinkler system on garden beds adjacent to entrance

South Cameron Street Crossing

- May want to move or shorten refuge island to better accommodate trucks entering Harrisburg Resource Recovery Facility
- Consider how narrowing lanes will affect on-road bicyclists using Bicycle Route J
- Users identified this as another difficult crossing in need of safety upgrade

Linglestown Road and Industrial Roads

- Maybe the most difficult section for users from a safety standpoint
- The final design should create a separate, shared use path; this area is too complicated and traffic too heavy for on-road bike lanes

Fort Hunter Riverfront Trail Link

- Received much support in meetings and in press coverage
- Could provide an opportunity to ameliorate storm water runoff in this area
- Presents opportunities to compliment the office and commercial development occurring along this section of North Front Street
- Provides opportunities to work with PA Fish and Boat Commission and PA Game Commission on access to river and wildlife watching platform
- There is an opportunity to form partnerships with nearby businesses to establish a volunteer effort to assist in the maintenance of this trail segment
- Try to maintain view of Susquehanna when installing protective barrier for bicyclists and pedestrians
- May not need curbing on trail side of five-foot buffer between trail and roadway. This would be similar to traditional trail design on Riverfront Park

DIRECTIONAL SIGNING PLAN

General

A comprehensive route signing plan was identified as the most critical and immediate need to provide a uniform and consistent identification of the Greenbelt. Implementation of the sign plan is considered a low cost / high impact improvement. The existing Greenbelt signs were placed over a long period of time and without a consistent standard. The result is a variety of signs that users report are confusing and inconsistent. Removal of all the existing signs is a part of the proposed improvement plan.



Figure 2 – Example of various existing signs

The goal of the plan is to provide the user with enough signing that the facility is easily navigated, points of interest are identified, and the facility is not “over signed”. The sign plan provides a safer facility for the user to confidently use the Greenbelt without being distracted by concerns for the route.

Phasing of the work

Signage will be installed in two phases, as follows;

- Phase 1: Route (or Directional) Signs – These signs will be placed to identify and provide information along the Greenbelt such as route direction, destinations, landmarks, mileposts, streets, and trailheads.
- Phase 2: Warning and Regulatory Signs – These signs will be placed to address safety concerns and will be installed in conjunction with the intersection and on-road safety improvements. Along with signage, the safety improvements will include physical construction (curbing, sidewalks, paving, signal improvements, etc.).

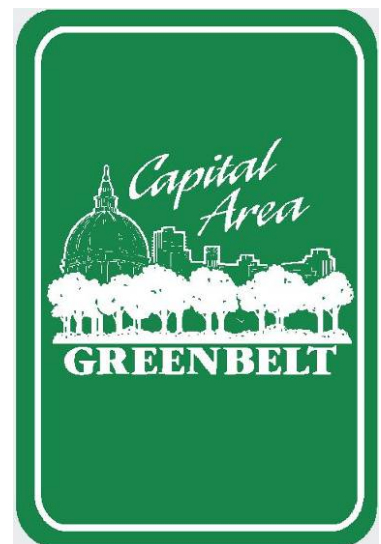
Criteria and Standards

The following sign placement guidelines were developed based on FHWA’s Manual on Uniform Traffic Control Devices (MUTCD, 2009 Edition), Part 9 Traffic Control for Bicycle Facilities, and input from the Greenbelt Association.

Phase 1: Route Signing

Route sign (with Greenbelt logo) – per MUTCD sign M1-8a with Greenbelt logo. Recommended size is 12”x 18” on shared use path and on roadways. Placement will generally be as follows:

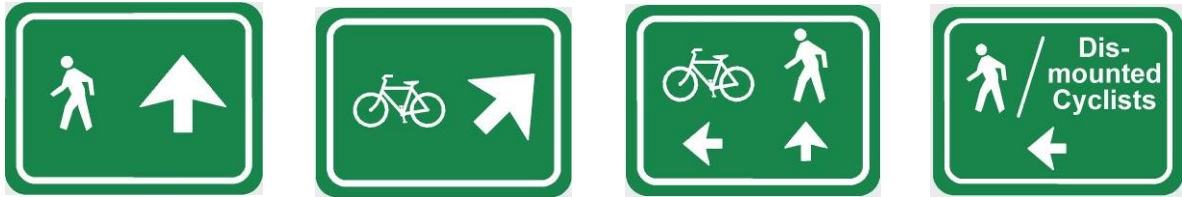
- On-road placement – install signs at street intersections, change of directions, on regular intervals on straight streets. The interval of signs on straight streets should allow the user to always see a sign in the distance. An interval of about 1200 feet (about ¼ mile) was applied for clear unobstructed roadways.
- Shared-use path placement – install signs at street intersections, at mileposts, at intersection with other trails, at trailheads, along connector or spur trails with the M4-5 “TO” sign (12”x6”) and on regular intervals along the path. The interval of signs along the path can be at greater intervals than the street signing where there is no other obvious change in the route. Care should be taken to avoid over signage of the shared use sections.



Bicycle Route Auxiliary Signs (directional arrows) – per MUTCD signs M5 and M6 series, always used in combination with route sign. Recommended size is 12” x 6” for shared use path and roadway. See below:



Bike Route Plaque – per MUTCD sign D11-1bP used with the Route sign on roadways where the Greenbelt splits bikes and pedestrians. Two examples are in HACC and along City Park Drive (between Parkview Lane and Derry Street). The “BIKE ROUTE” shall also have a similar “PED ROUTE” sign for these conditions. Recommended size is 18” x 6”. See below:



Reference Location Signs (mile markers) - per MUTCD sign D10-1 (one digit) always combined with a route sign. This sign will typically be double sided placed on one side of the trail and the mile markers will begin at Walnut Street in River Front Park and shall increase from Mile 0 in a clockwise direction to the beginning point. Recommended size is 6” x 12”. See right:



Destination Signs – per MUTCD sign D-1 series. These signs will be placed along the Greenbelt to identify destinations, or points of interest. Recommended size varies (width)” x 6” for shared use path and roadways. Examples of this sign are as follows:

- City Island
- Italian Lake
- M.L. King Memorial
- Local parks
- Veterans Park (Game Commission connector)

The sign shall have the destination name, with arrow. See below:



Implementation

Signing plans were developed in PENNDOT format at 100-scale using GIS data layers. The plans include sign locations, sign dimensions, MUTCD reference, tabulation of signs (per municipality), and typical section for placement on a trail and on a roadway. The sign tabulations are prepared for each municipality and HACC. The Greenbelt Association has coordinated sign placement efforts with each municipality.

The Greenbelt Association will remove all existing signs. There are approximately 140 existing signs.

The Greenbelt Association will prepare a bid package to order all sign material (panels and posts) on a square foot basis (SF) along with a separate bid price for installation of signs on an EACH basis. All signs will be PENNDOT Type B post mounted. Installation of the signs will be by the Greenbelt Association, municipalities, or the low bid contractor. The sign plan will present only directional signs but the Association may elect to have warning signs fabricated and placed at select locations during the phase of work as available funds may permit.

The Greenbelt Association will coordinate with PENNDOT for sign placement within State Road Right of Way.

Phase 2: Warning and Regulatory Signs

These signs will be placed as part of the safety improvements at intersections and on-road sections. Refer to the next section, **SAFETY IMPROVEMENTS AT INTERSECTIONS AND SELECT ON-ROAD SECTIONS.**

Estimate

The required Phase 1 signs were tabulated and the quantities are summarized below. The estimated cost for the signs is based on a PENNDOT square foot (SF) unit prices for an installed Type B (square steel post) and Type C (square wood post) post mounted sign. This approach provides a conservative estimate of probable cost.

Estimate of Cost – Installed sign panels

- Type B Post Mounted signs: 500 SF at \$40 per SF = \$20,000 (material and labor)
- Type C Post Mounted signs: 300 SF at \$60 per SF = \$18,000 (material and labor)
- Removal of existing signs and contingencies = \$7,000

The total estimated cost of the signing plan is \$45,000. The estimated sign quantities include supplemental (extra) signs for future use and as-directed signs that may be added during the installation process. Cost savings may be realized where municipalities or volunteers agree to install signs at no cost.

The Type C signs are to be installed along shared-use path or off-road sections. The Type B sign is to be installed along on-road sections.

Funding and Proposed Schedule

The Greenbelt Association has developed a funding strategy to raise funds and services to implement the signage plan. The Association established a goal to raise \$52,000 based on a preliminary estimate for fabrication and installation of the recommended signage. As of October 22, 2013, the Association has raised \$47,500. The following have made financial contributions to the signage program:

- ArcelorMittal Steelton.....\$12,000
- Stabler Foundation\$10,000
- Rails-To-Trails Conservancy \$8,000
- McCormick Family Foundation..... \$5,000
- The McClure Company.....\$5,000
- QBP (Quality Bicycle Products)..... \$2,500
- Capital Area Greenbelt Association\$5,000

In addition, Harrisburg Area Community College, Wildwood County Park, Paxtang Borough, Susquehanna Township and Swatara Township have volunteered to install signage within their jurisdictions. With these contributions and potential additions, the Association should have the resources to seek bids in early 2014 for fabrication and installation of the signs. Completion is expected by late spring 2014.

SAFETY IMPROVEMENTS AT INTERSECTIONS AND SELECT ON-ROAD SECTIONS

General

The Greenbelt Association identified specific locations along the trail that present safety concerns for users. In all cases the safety concerns involve areas where bicycles, pedestrians, and motorized vehicles occupy the same roadway section. These areas consist of two types of interaction:

- Trail crossing a roadway – a perpendicular (shared use path) that crosses a roadway
- Trail on the roadway – this is where the trail runs parallel to and within the roadway section (on-road)

Safety improvements will include traffic controls (warning and regulatory signing), pavement markings, and physical construction necessary to increase visibility, calm traffic, and where possible, separate bike/ped traffic from motorized traffic.

Criteria and Standards

The study utilized current standards for planning and design of bicycle and pedestrian facilities.

- FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009
- AASHTO Guide for the Development of Bicycle Facilities, 2012
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities, 2004
- PENNDOT Publication 13M, DM-2, Highway Design, DM-2
- PENNDOT Publication 236, Handbook of Approved Signs
- PENNDOT Traffic Control Standards (TC-8700)
- PENNDOT Publication 383, Traffic Calming Handbook
- PENNDOT Publication 46, Traffic Engineering Manual

Potential Safety Improvements

A summary of potential safety improvements are listed below. These improvements will be applied to each intersection to improve safety. A secondary goal in formalizing each crossing is to promote a uniform look to identify the Greenbelt at each location.

- Traffic Control: Use Regulatory Signage and Warning Signs per MUTCD and AASHTO
- Traffic Control: Use consistent pavement markings for crosswalk
- Visibility: Use wide white (piano key style) lines for crosswalks
- Visibility: Fluorescent green (warning) sign panels to increase visibility
- Visibility: Use Overhead Flashing Beacon (with Greenbelt ID sign)
- Traffic Calming: User activated Flashing Beacon
- Traffic Calming: Narrow roadway lanes; install refuge islands where possible
- Traffic Calming: Narrow traffic lanes for certain on-road sections
- Separation: Shorten crossing distance with refuge islands
- Separation: Align trail normal to road to shorten crossing distance
- Separation: Re-establish full height curbs at crossings
- Separation: Connect nearby existing sidewalks to trail and crossings
- Separation: Eliminate on road sections; replace with protected shared use path
- Separation: Include pedestrian facilities (sidewalk) for on-road sections

Studied Locations - Intersections

In general the existing shared-use path crossings lack consistent signing, are not highly visible, cross high volume roads, have operating speeds that exceed posted speeds, involve signals without a pedestrian phase, lack properly located pedestrian push-buttons, and have long crossing distances.

A description of the studied crossings is provided below;

1. Greenbelt at State Route 3009 (Front Street and Vaughn Street)

Location: City of Harrisburg



Photo 1: Front Street near Vaughn looking north

Existing site data

- Type: Non-signalized mid-block
- Crossing distance: 38 feet
- Number of lanes: 4 (two way traffic)
- ADT: 20,000 vehicles per day
- Posted speed: 35 mph
- Sight Distance Required (per Pub. 46 Section 11.9.2.6): 305 feet (0% grade)
- Minimum Sight Distance Available: 688 feet minimum (okay)

Safety concerns

- Wide pavement section at crossing; 4 lanes (2 each way) with a total pavement width of 38 feet curb to curb.
- There are no formal crossing signs or markings at this location.
- PA Bicycle Route J also uses Front Street and Vaughn Street.

- Trail transitions from shared use path to on-road section at this crossing.
- Sight distance is good but visibility of the crossing may only be fair due to flat grade and roadside obstructions.
- Traffic volume is high with ADT of 20000 (Design Hourly Volume = 2600).
- Posted speed is 35 mph but observed speeds appear higher. The road is posted at 40 mph in Susquehanna Township just north of Vaughn Street.
- Sight distances per PENNDOT Publication 46 apply to properly marked and visible crosswalks. At the posted speed of 35 mph a car will travel 50 feet in one second while a pedestrian traveling at 3 f/s will take about 13 seconds to clear the roadway, the car will travel 650 feet in that time, less than the measured available sight distance of 688 feet.

General Solutions

The current Greenbelt crossing of Front Street is at Graham Street with no crossing controls. Relocation of the crossing to Vaughn Street was done to coincide with Bicycle Route J, provide better sight lines (brush needs to be controlled), and to maximize the use of the Riverfront Park. The proposed crossing (Vaughn Street) is at a location where a shared use path transitions onto a two way street. Traffic volumes and speed on Front Street are high and the crossing involves multi-lane two directional traffic. The crossing needs to be made more visible and accessible to all users. Signing for traffic controls is required. A yellow flashing warning light activated by users is highly recommended to calm traffic since a refuge island is not feasible. The beacon should be mounted on an overhead mast arm with “Greenbelt” sign. The overhead mast arm is preferred in case a full signal is warranted at this location in the future. Traffic counters should be included in the beacon to document usage.

Proposed Scope of Work

- Realign and widen the west approach at Riverfront Park - provide better staging for users.
- Install new pavement markings 10 feet wide – increase visibility and facility identification.
- Provide ADA treatments at each approach.
- Install Greenbelt signing – clearly identify the trail.
- Use fluorescent green roadway signs - increase visibility.
- Include “yield here to pedestrians in crosswalk” signs with stop bar.
- Install a user activated flashing light with signs at the crossing to increase visibility.
- Include pedestrian traffic counter with flashing light.

Improvements and Criteria

- Install standard curb cuts at Vaughn Street and along Front Street. Provide 25 feet of non-mountable curb on each side of the crossing at Front Street.
- Combine bike and pedestrians into one 10 foot crossing on EACH side of Vaughn Street.
- Crossing details - AASHTO Bike Guide Specs, Figure 5-19 and MUTCD Part 9.
- Yield to Pedestrians in crosswalk signs - AASHTO Bike Guide Specs, Figure 5-23, MUTCD Part 3B.17 and PENNDOT TC-8600.
- Greenbelt sign – install on post per MUTCD figure 9B-7 at crossing and on overhead mast arm.

- Flashing warning lights - one of the following:
 - On overhead mast arm
 - Cross Alert System
 - Rectangular Rapid Flashing Beacon – per Pub. 46, Exhibit 4-18
- Make pavement markings at crossing 10 feet wide, use piano key style to provide the highest visibility (treat with anti-slip).

2. **Greenbelt at US Route 0022 (Herr Street and Parkway Drive)**

Location: Susquehanna Township



Photo 2: Parkway Drive looking north at Herr Street and Greenbelt

Existing site data

- Type: Signalized Intersection
- Crossing distance: 35 feet
- Number of lanes: 2 (two way traffic)
- ADT: 20,000 vehicles per day
- Posted speed: N/A crossing is at a signal
- Sight Distance: N/A crossing is at a signal

This intersection is an integral part of the improvements studied for the on-road section from Herr Street to Walnut Street. See On-road section study for additional narrative.

Safety Concerns

- There are no formal crossing signs or markings at this location.
- Trail transitions from shared use path (north) to an on-road section at this crossing.
- No pedestrian facilities south of Herr Street.
- No warning signs at the crossing.

General Solutions

This crossing is at a location where the Greenbelt is a shared-use path on one side of the street (north of Herr) and an on-road facility on the other side. A pedestrian crossing should be established in front of the stop bar on the west side of Herr Street with accessible pedestrian push buttons. The existing island should be modified for pedestrian use. Pedestrian signal heads with counters should be installed.

Bicycles traveling north should stay on the right side of the road (Parkway Drive) and continue onto Edgemont Road making a left turn onto the shared-use path. Bicyclists traveling south should enter the roadway (Parkway Drive) from the existing shared-use path at the northwest quadrant of the intersection.

Intersection work must be done in conjunction with work proposed for Parkway Drive south of Herr Street.

Proposed Scope of Work

- See Parkway Drive On-Road Section

Improvements and Criteria

- See Parkway Drive On-Road Section

3. Greenbelt at State Route 3013 (28th Street)

Location: Susquehanna Township



Photo 3: From Market Street Road looking towards 28th Street

Existing site data

- Type: Non-signalized mid-block
- Crossing distance: 40 feet
- Number of lanes: 2 (two way traffic)
- ADT: 5,600 vehicles per day
- Posted speed: 35 mph
- Sight Distance Required (per Pub. 46 Section 11.9.2.6): 305 ft. (at 0%) & 278 ft. (at +6%)
- Min. Sight Distance Available: 202 ft. at +7% (*mitigate*) and 266 ft. at +3% (*mitigate*)

This intersection is about 100 feet from the intersection below and is treated as one location for this study.

4. Greenbelt at State Route 3023 (Market Street Road)

Location: Susquehanna Township



Photo 4: Market Street Road crossing looking towards the Greenbelt (Paxtang Parkway)

Existing site data

- Type: Non-signalized mid-block
- Crossing distance: 25 feet
- Number of lanes: 2 (two way traffic)
- ADT: 8,500 vehicles per day
- Posted speed: 25 mph
- Sight Distance Required (per Pub. 46 Section 11.9.2.6): 200 ft. (at 0%) & 184 ft. (at +6%)
- Min. Sight Distance Available: 206 ft. at +8% (*mitigate*)

Safety concerns

- Roadway width at (*proposed*) crossings: 2 lanes, 25 feet (no curbs) on Market Street and 2 lanes, 30 feet (with curbs) on 28th Street.
- There are no formal crossings at this location.
- There are no continuous pedestrian facilities at this location.
- Market Street traffic volume is moderate with ADT of 8500 (Design Hourly Volume = 1000); the posted speed is 25 mph.
- 28th Street traffic volume is moderate with ADT of 5600 (Design Hourly Volume = 600); the posted speed is 35 mph.
- Sight distance does not meet the desired minimum at either crossing.
- Sight distances per PENNDOT Publication 46 apply to properly marked and visible crosswalks:
 - Market Street: At the posted speed of 25 mph a car will travel 35 feet in one second while a pedestrian traveling at 3 f/s will take about 8 seconds to clear the roadway; the car will travel 280 feet in that time which is greater than the measured available sight distance in two directions.
 - 28th Street: At the posted speed of 35 mph a car will travel 50 feet in one second while a pedestrian traveling at 3 f/s will take about 10 seconds to clear the roadway; the car will travel 500 feet in that time which is greater than all the measured available sight distances in all directions.

General Solutions

This is an unmarked crossing on a high volume street at a complex combination of intersections. The crossings are about 100 feet apart. The Greenbelt transitions from a shared-use path on the east to a low volume street (Parkway Boulevard) which connects to Reservoir Park. Currently, trail users transition from a shared-use path to a street crossing, onto a short section of road, then another street crossing, to a low volume local road. Due to congestion, traffic varies greatly in speed and volume and there are a number of turning movements where trail users operate.

Improvements should separate the shared use path from the short high volume road section between 28th Street and Market Street. In addition, provide traffic controls, increase the crossing visibility, and calm traffic by installing warning signs, regulatory signs, and user activated flashing warning lights.

A refuge island on 28th Street will fit within the roadway section and would be a great measure to calm traffic and shorten the crossing distance where sight distances are not desirable. Advance warning signs are required where sight distances are not desirable. The flashing warning lights should be mounted on an overhead mast arm and include a pedestrian counter.

Proposed Scope of Work

- Realign the connector road between 28th Street and Market Street - move road south to the right of way line.
- Separate the trail from the roadway by installing a 10 foot wide shared use trail parallel

to the connector road with 5 foot buffer and full height curb.

- Install new pavement markings 10 feet wide – increase visibility and facility identification
- Provide ADA treatments (w/o curbs) at each approach.
- Install a median island on 28th Street – calm traffic speeds, shorten the crossing, and increase crossing visibility.
- Install Greenbelt signing – clearly identify the trail.
- Use fluorescent green roadway signs - increase visibility.
- Include “yield here to pedestrians in crosswalk” signs with stop bar.
- Install a user activated yellow flashing light with signs at the crossing - increase visibility.
- Install pedestrian counters with the flashing light.

Improvements and Criteria

- Make trail approach 10 feet wide and normal to the road for at least 10 feet - east approach.
- Crossing details - AASHTO Bike Guide Specs, Figure 5-19 and MUTCD Part 9.
- Median island - AASHTO Bike Guide Specs, Figure 5-22 and Traffic Calming Handbook.
- Yield to Pedestrians in crosswalk signs - AASHTO Bike Guide Specs, Figure 5-23, MUTCD Part 3B.17 and PENNDOT TC-8600.
- Greenbelt sign – install on post per MUTCD figure 9B-7 at crossing and on overhead mast arm.
- Flashing warning lights; one of the following:
 - On overhead mast arm - See Schuylkill River Trail – Bridge Street.
 - Cross Alert System - see Chester Creek Trail.
 - Rectangular Rapid Flashing Beacon - per Pub. 46, Exhibit 4-18.
- Make pavement markings at crossing 10 feet wide:
 - Piano key style - Highest visibility but may be more slippery.
 - Two wide (6” to 12”) white lines on each side of the crossing - less visible.
 - Two wide white lines with stamped pavement in fill.
- Sign and mark Parkway Boulevard as a shared-road facility per AASHTO Bike Guide Specs, Section 4.3 to Reservoir Park Gate.
- Guide signs for pedestrians on sidewalk along Parkway Boulevard (one way) to first connector where Parkway Boulevard (two way) is widest.

5. Greenbelt at State Route 3010 (Paxton Street)

Location: Swatara Township



Photo 5: Paxton Street crossing looking south

Existing site data

- Type: Signalized Intersection
- Crossing distance: 39 feet
- Number of lanes: 2 (two way traffic)
- ADT: 16,000 vehicles per day
- Posted speed: N/A crossing is at a signal
- Sight Distance: N/A crossing is at a signal

Safety concerns

- Crossing length is over three lanes, 40 feet.
- The conflict is with left turns from 32nd Street onto Paxton during the pedestrian phase. The right turn from Paxton onto 32nd Street is supposed to be a red light during the pedestrian phase but right turn on red is allowed.
- The trail has poor alignment and width on both approaches.
- There is no staging area and the trail grade on the south approach limits sight lines.
- The pedestrian crossing is diagonal across intersection which shortens the distance from the left turns to the pedestrians in cross walk.
- There is a (non-exclusive) pedestrian phase at the signal. Pedestrians cross when 32nd Street traffic is turning left.
- There is only one pedestrian signal head.
- The pedestrian (signal) push buttons are not near the crossing or accessible.
- The right turn lane appears to allow right turns on red, which conflicts with the trail users during the pedestrian phase.

General Solutions

This crossing runs diagonally across the middle of an intersection with no accessible pedestrian push buttons for the signal. The pedestrian phase runs with the left hand turn phase of the signal.

The trail approaches should be widened and improved (paved) and the crossing location slightly re-aligned to lessen the crossing distance. The signal timing should be examined to provide a delay so that pedestrians can enter the intersection before the cars. Pedestrian signal heads with counters should be installed.

Proposed Scope of Work

- Realign and widen the trail approaches – provide better staging for users.
- Have push buttons near trail so all users can use them and make minor signal modifications.
- Provide ADA treatments at each approach.
- Install new curbs on both sides of the roadway to channel users to the crosswalk related in front of the existing stop bars.
- Install Greenbelt signing – clearly identify the trail.
- Use fluorescent green roadway signs - increase visibility.
- Install pedestrian counters with the signal upgrades.

Improvements and Criteria

- Re-align and widen the trail approach and crossing to 10 feet wide and pave the approaches.
- Install new curbs at both crossings with DWS.
- Install W11-15 sign with arrow at crossing along with advance signs for crossing, reference AASHTO Figure 5-19 Bike Guide Specs and AASHTO Guide to Pedestrian Facilities Section 4.2.2.
- Install signs and pavement markings for two-way traffic on one way street (Parkview Drive); reference AASHTO Bike Guide Specs, Section 4.6.3 and Figure 4-12.
- Signal modifications: Relocate pedestrian push buttons, install pedestrian signal heads with countdown, provide a 3 to 5 second delay in 32nd Street green phase, include “yield to pedestrians in crosswalk signs for 32nd Street left turns, and prohibit right turns on red for Paxton Street to 32nd Street.
- Make pavement markings at crossing 10 feet wide:
 - Piano key style - Highest visibility but may be more slippery.
 - Two wide (6” to 12”) white lines on each side of the crossing - less visible.
 - Two wide white lines with stamped pavement in fill.

6. Greenbelt at State Route 0441 (Harrisburg Street)

Location: Swatara Township



Photo 6: SR 441 looking north towards the Greenbelt crossing

Existing site data

- Type: Non-signalized mid-block
- Crossing distance: 25 feet (lanes only)
- Number of lanes: 2 (two way traffic)
- ADT: 5,200 vehicles per day
- Posted speed: 40 mph
- Sight Distance Required: 400 ft. (extrapolated from Pub 46)
- Min. Sight Distance Available: 707 ft. at +2% (okay)

Safety concerns

- Wide pavement section at crossing - 2 lanes 25 feet between white lines with 8 foot shoulders for a total pavement width of 41 feet.
- Width of the marked crossing does not match trail width.
- Traffic volume is moderate with ADT of 5000+ (Design Hourly Volume = 500).
- Posted speed is 40 mph and wide road encourages higher speed.
- Sight distance is good; visibility of the crossing is fair.
- Sight distances per PENNDOT Publication 46 apply to properly marked and visible crosswalks. At the posted speed of 40 mph a car will travel 57 feet in one second while a pedestrian traveling at 3 f/s will take about 11 seconds to clear the roadway (one shoulder and two lanes); the car will travel 627 feet in that time which is less than the measured available sight distance (707 feet).

General Solutions

This is a pure mid-block crossing where a shared-use path exists on both sides of the roadway. The roadway is posted at 40 mph and is relatively flat with wide shoulders and ample lanes. Increasing crossing visibility with current traffic control signing is of primary importance.

To further increase visibility and to add a measure of traffic calming a refuge island and/or an overhead flashing warning light should be considered.

With a 40 mph speed limit and relatively wide road section, traffic calming should be considered. In addition, the “look” of each crossing should be somewhat uniform.

Proposed Scope of Work

- Realign and widen the trail approach on the west – provide better staging for users.
- Install new pavement markings 10 feet wide – increase visibility and facility identification.
- Provide ADA treatments (w/o curbs) at each approach.
- Install a median island – calm traffic speeds, shorten the crossing and increase crossing visibility.
- Install Greenbelt signing – clearly identify the trail.
- Use fluorescent green roadway signs - increase visibility.
- Include “yield here to pedestrians in crosswalk” signs with stop bar.
- Install a user activated flashing light with signs at the crossing - increase visibility.
- Install pedestrian counters with the flashing light.

Improvements and Criteria

- Make trail approach 10 feet wide and normal to the road for at least 10 feet - bollards and gate not needed on the west (trailhead) side.
- Include DWS at each crossing.
- Crossing details - AASHTO Bike Guide Specs, Figure 5-19 and MUTCD Part 9.
- Median island - AASHTO Bike Guide Specs, Figure 5-22 and Traffic Calming Handbook.
- Yield to Pedestrians in crosswalk signs - AASHTO Bike Guide Specs, Figure 5-23, MUTCD Part 3B.17 and PENNDOT TC-8600.
- Greenbelt sign – install on post per MUTCD figure 9B-7 at crossing and on overhead mast arm.
- Flashing warning lights, one of the following:
 - On overhead mast arm - see Schuylkill River Trail – Bridge Street.
 - Cross Alert System - see Chester Creek Trail.
 - Rectangular Rapid Flashing Beacon - per Pub. 46, Exhibit 4-18.
- Make pavement markings at crossing 10 feet wide:
 - Piano key style - Highest visibility but may be more slippery.
 - Two wide (6” to 12”) white lines on each side of the crossing - less visible.
 - Two wide white lines with stamped pavement in fill.

7. Greenbelt at State Route 0230 (Cameron Street)

Location: City of Harrisburg



Photo 7: Cameron Street looking south towards the Greenbelt crossing

Existing site data

- Type: Non-signalized mid-block
- Crossing distance: 46 feet
- Number of lanes: 3 (two way traffic)
- ADT: 14,000 vehicles per day
- Posted speed: 35 mph
- Sight Distance Required (per Pub. 46 Section 11.9.2.6): 305 ft. (at 0%)
- Min. Sight Distance Available: 461 ft. at 0% (okay)

Safety concerns

- Wide roadway crossing - 3 lanes 46 feet total.
- Width of crossing does not match trail width.
- Traffic is heavy with ADT of 14000 (Design Hourly Volume = 1500).
- Posted speed is 35 mph but observed speed appears higher.
- Sight distance is good but visibility of the crossing is fair.
- Sight distances per PENNDOT Publication 46 apply to properly marked and visible crosswalks. At the posted speed of 35 mph a car will travel 50 feet in one second while a pedestrian traveling at 3 f/s will take about 15 seconds to clear the roadway. The car will travel 760 feet in that time which is greater than the measured available sight distance (461 feet).

General Solutions

This is a pure mid-block crossing where a shared use path exists on both sides of the roadway. The roadway is posted at 35 mph, has three lanes, and the traffic volume is heavy. Increasing crossing visibility with current traffic control signing is of primary importance.

To further increase visibility, and to add a measure of traffic calming, a refuge island and an overhead flashing warning light are strongly recommended.

The existing roadway curbs should be improved for separation and connection should be made to existing nearby sidewalks.

Proposed Scope of Work

- Realign and widen the trail approach on the west – provide better staging for users.
- Install new pavement markings 10 feet wide – increase visibility and facility identification.
- Install new curbs with ADA treatments at each approach – define crossing and provide full height curb.
- Install a median island – calm traffic speeds, shorten the crossing and make crossing more visible.
- Install Greenbelt signing – clearly identify the trail.
- Use fluorescent green roadway signs - increase visibility.
- Include “yield here to pedestrians in crosswalk” signs with stop bar.
- Install a user activated flashing light with signs at the crossing - increase visibility.
- Install pedestrian counters with the flashing light.

Improvements and Criteria

- Make trail approach 10 feet wide and normal to the road for at least 10 feet - bollards and gate not needed on the west side.
- Install 25 feet of non-mountable curb with DWS on each side of the depressed curb at the crossing.
- Crossing details - AASHTO Bike Guide Specs, Figure 5-19 and MUTCD Part 9.
- Median island - AASHTO Bike Guide Specs, Figure 5-22 and Traffic Calming Handbook.
- Yield to Pedestrians in crosswalk signs - AASHTO Bike Guide Specs, Figure 5-23, MUTCD Part 3B.17 and PENNDOT TC-8600.
- Greenbelt sign – install on post per MUTCD figure 9B-7 at crossing and on overhead mast arm.
- Install flashing warning lights to supplement the crossing signage, use one of the following:
 - On overhead mast arm - see Schuylkill River Trail – Bridge Street.
 - Cross Alert System - see Chester Creek Trail.
 - Rectangular Rapid Flashing Beacon - per Pub. 46, Exhibit 4-18.
- Make pavement markings at crossing 10 feet wide, use one of the following:
 - Piano key style - highest visibility but may be more slippery.
 - Two wide (6” to 12”) white lines on each side of the crossing - less visible.

- Two wide white lines with stamped pavement in fill.

Preliminary Design - Intersections

Refer to the plans in the appendix of this report for proposed improvements at each intersection. A completed intersection is depicted in the photos below.



Photo 7: Schuylkill River Trail crossing in Spring City, Chester County.



Photo 8: Schuylkill River Trail crossing in Spring City, Chester County.

This intersection utilizes the proper signing, a refuge island, pavement markings, and overhead user activated flashing beacon. Photo 7 shows the trail intersection from about 200 feet in advance of the crossing. The ADT on this road is about 5000. The 6 foot wide refuge island breaks the crossing into two movements and narrows the traffic lanes which calms traffic. The overhead flasher supplements the trail warning signs. The crossing includes “yield here for pedestrians in crosswalk” along with yield lines in the pavement.

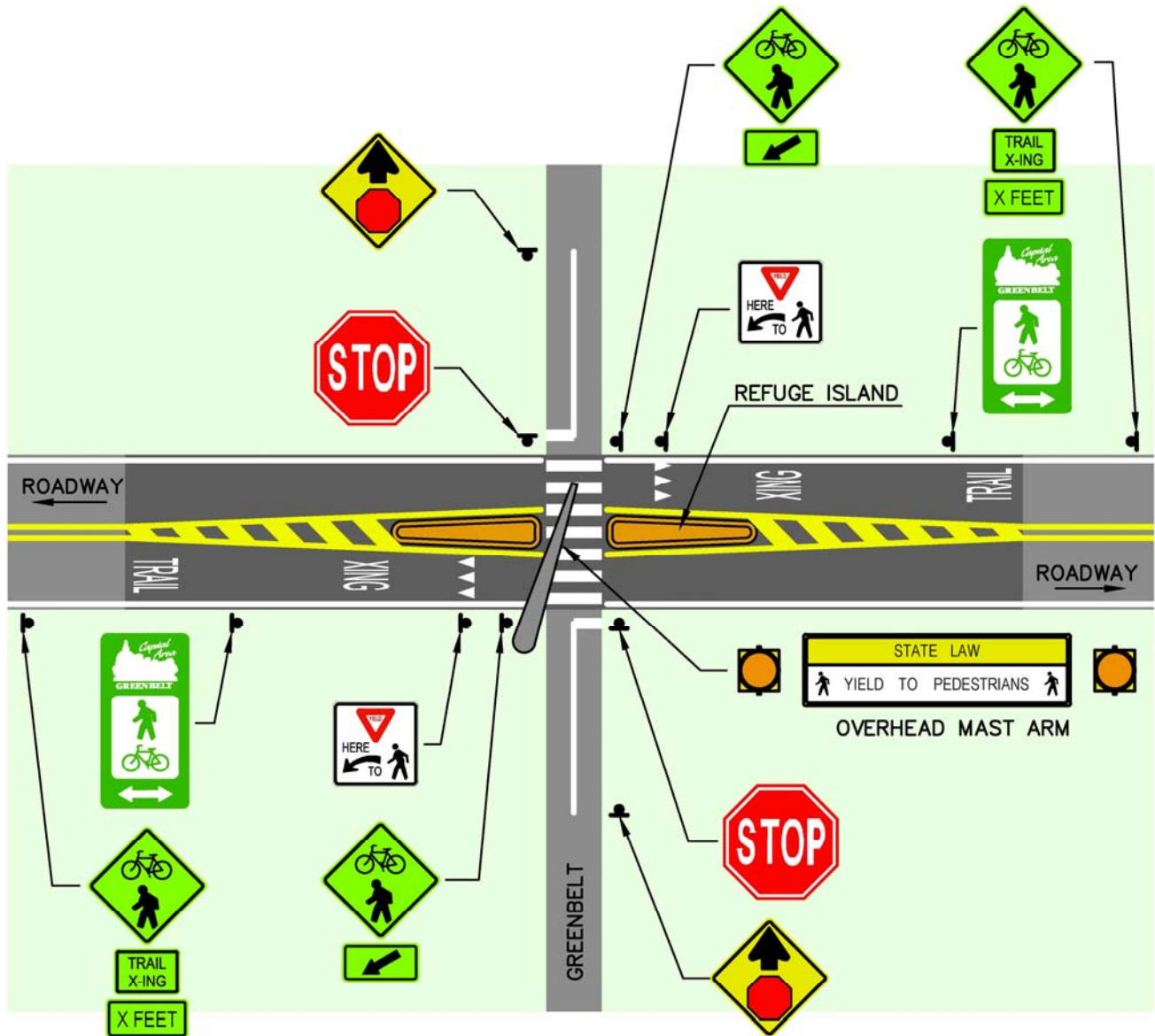


Figure 2 – Schematic layout of typical intersection improvement

Studied Locations – On-Road Sections

There are eight (8) on-road sections along the Greenbelt. A complete list is as follows:

1. City Park Drive between Paxton Street and Derry Street.
2. Parkway Boulevard from Market Street to Walnut Street through Reservoir Park.
3. Parkway Drive from Walnut Street to Edgemont Road north of Herr Street.
4. Stanley Drive between the PENNDOT building and the former State Hospital grounds.
5. HACC Campus from Industrial Road to the west parking lot.
6. Under I-81 at Wildwood Park.
7. Linglestown Road between Industrial Road (north end of Wildwood Park) and Sixth Street.
8. Sixth Street and Green Street from SR 39 to Front Street.

Two of the eight on-road sections were examined as part of this study. Both locations will require physical construction and are on moderate to high volume roads. These two locations are Parkway Drive (No. 3) and Linglestown Road (No. 7).

The remaining six (6) on-road sections will not include physical improvements but may warrant warning signs (W11-1 “SHARE THE ROAD” or W4-11 “bike MAY USE FULL LANE”) and pavement markings (shared lanes or bike lanes). These signs and pavement markings should be included in the construction plans for the intersection and on-road safety improvements.

1. Parkway Drive (Walnut Street to Edgemont Road north of Herr Street)

Location: City of Harrisburg and Susquehanna Township



Photo 9: Parkway Drive looking north within the City near Walnut Street.



Photo 10: Parkway Drive looking south from the Township near Herr Street.

Existing Site Data

This section of roadway is classified as a Collector (Class) Neighborhood (Type). These streets were formally known as “Minor Collectors” with desired operating speeds of 25 to 35 mph, ADT < 6000 and intersections spaced at 300 to 600 feet.

Parkway Drive extends from Walnut Street at Reservoir Park to Herr Street. North of Herr Street the road is Edgemont Drive. An ADT is not available for this street. Based on observed conditions it is estimated to be less than 2000. The posted speed of the road is 25 mph. The existing roadway width is 30 feet curb to curb and the road right of way width is 40 feet.

In accordance with PENNDOT Publication 13M (DM-2), Chapter 1, Table 1.6, Design Values for Neighborhood Collector Roadways, the roadway section should conform to the following:

- Lane Widths: 9 feet to 11 feet
- Shoulder Widths: Provide shoulders as required to accommodate bicyclists
- Curb Returns: 10' to 25 feet (*Note 5: Curb return radius should be as small as possible. Number of lanes, on street parking, bike lanes, and shoulders should be utilized to determine effective radius.*)
- Clear Sidewalk Width: 5 feet to 6 feet
- Buffer Width: 3 feet to 5 feet (*Note 13: Buffer is assumed to be a planted area for suburban neighborhood and corridor contexts*)

Safety concerns

- Inconsistent road section...partial bike lanes
- Bike lane markings not correct at Walnut Street
- Side streets and driveways
- No pedestrian facilities

- Lack of Greenbelt signing
- Poor trail termination of shared-use path at Herr Street intersection
- No pedestrian crossing at Herr Street

General Solutions

- Adjust the roadway section to accommodate all users. Studied road section alternatives:
 - **Option 1 – Bike Lanes**, 2 - 10 foot lanes, 2 - 5 foot bike lanes, and one 5' sidewalk (*this can be done about the existing road centerline*) – this will require retaining walls and property takes.
 - **Option 2 – Shared Lanes**, 2 – 13 foot lanes (shared lanes), one 5 foot sidewalk (*This will require a 2 foot shift in the road centerline*) – this will narrow the existing roadway curb to curb width but not require right of way or retaining walls.
 - **Option 3 – Shared-use Path**, This would technically be a “side-path” per AASHTO and would include 2 - 11 foot lanes, a 2 foot wide barrier and a 10 foot wide shared-use path (on west side of the street). This would narrow the road from 30 feet to 22 feet but would require a 4 foot shift in the west curb line. This would affect utilities and could require property or retaining walls. The side streets would make the barrier discontinuous and the path movements would be complex at Walnut Street. Note: AASHTO discourages side-path treatments except where there are no other options and there are virtually no side streets or driveways.
- Preferred Alternative is Option 2: This will minimize cost and property impacts and the narrower roadway width will calm traffic. Since a full 5 foot bike lane cannot be obtained, each traffic lane will be designated as a “shared lane”.
- Install standard signs and pavement markings for shared lanes per AASHTO and MUTCD.
- Relocated pedestrian crossing at Herr Street to island and reconfigure island to accommodate pedestrians. Improve sight lines at the island for pedestrians crossing the right turn lane. Install pedestrian push buttons on each side of Herr Street.

Physical Improvements

- Mill and overlay all or part of the roadway and improve pavement section where needed.
- Improve (raise) drainage inlets in bike lanes.
- New curbs and sidewalks on west side – adjust intersection radii where possible to shorten pedestrian crossings and calm traffic.
- At the Herr Street intersection do the following:
 - Pedestrians: move the Herr Street stop bar to the west and install the pedestrian crosswalk in front of the stop bar. Use the existing island but provide sight distance for right turn traffic.
 - Bicyclists heading towards Walnut Street: Cyclists will enter North Parkway Drive at the existing curb cut and travel in marked shared lanes.
 - Bicyclists heading towards Herr Street: Cyclists will continue across Herr Street and onto Edgemont in marked shared lanes. The bicyclists will turn left from Edgemont back onto the Greenbelt about 50 feet north of Herr Street. *Consider widened pavement on right side of Edgemont.*

Signing and Pavement Markings

- Install pavement markings for shared lanes per AASHTO Bike Guide Specs Chapter 4.
- Share the road signs with Greenbelt Signing.
- Pedestrian crosswalk markings at Herr Street with yield to pedestrians in crosswalk for right turn lane.
- Intersection signing and new crosswalk markings.

2. Linglestown Road (Wildwood Park to Sixth Street)

Location: City of Harrisburg and Susquehanna Township



Photo 11: Industrial Road looking north towards the Linglestown Road bridge over the railroad. This is a view of the Option A alignment.



Photo 12: Eastern span of the bridge looking at pier 2. Option A proposes to build trail behind the pier.



Photo 13: West face of the railroad underpass (old Linglestown Road) – Option A.



Photo 14: Rear face of the western pier to be used to connect to Fort Hunter.



Photo 15: General view of old Linglestown Road at railroad underpass.



Photo 16: Industrial Road looking north: shoulder proposed for the Option B alignment.



Photo 17: South side of bridge, shoulder for trail location in Option B.



Photo 18: Linglestown Road shoulder approaching the bridge from the west.



**Photo 19: Linglestown Road north side, looking towards Front Street
This is the approximate start of the Fort Hunter connector.**



**Photo 20: North side of Linglestown Road looking east near beginning of
Fort Hunter connector and Linglestown Road loop.**

Existing Site Data

This section of the Greenbelt involves a number of roadways with various classifications. The existing route uses Industrial Highway, Linglestown Road (SR 39), Kaby Street and Sixth Street. Operation of the trail along this route varies depending on the direction of travel.

- Clockwise Operation (from Sixth Street to Wildwood Lake) – For bicycles, this direction of travel requires a right turn from Kaby Street (cul-de-sac) onto Linglestown Road, a right

turn from Linglestown Road to Industrial Highway and then a (mid-block) left turn from Industrial Highway into the Wildwood Park area. The route along Linglestown Road is on a 10 foot wide paved shoulder and on a narrow unimproved shoulder on Industrial Road. This direction of travel only requires crossing a traffic lane for entry into Wildwood Park. There are no exclusive pedestrian facilities on this route.

- Counter-Clockwise Operation (from Wildwood Park to Sixth Street) – For bicycles, this direction of travel requires a right turn onto Industrial Highway, a left turn (at a signal) onto Linglestown Road then a left turn onto Sixth Street. The correct operation for a bicycle is to stay on the right side of all road sections. Because of the high traffic volumes and roadway operating speeds, most cyclists travel on the left side of Linglestown Road. This creates a dangerous condition where there is bi-directional bicycle travel (with pedestrians) on one side of a roadway without a barrier or buffer area. There are no exclusive pedestrian facilities on this route.

Linglestown Road (SR 39) is classified as a Community Arterial Highway with a posted speed of 35 mph and an average daily traffic (ADT) of 15,000. The roadway segment between Industrial Road and Sixth Street crosses over Norfolk Southern. The Industrial Highway intersection is adjacent to the Linglestown Road interchange for US 322 (a limited access highway). Linglestown Road is four lanes wide with a signal at Industrial Highway. There is no signal at the Sixth Street Intersection. The grade of the roadway is 7% on the west bridge approach. The bridge and roadway section includes 12 foot lanes and 10 foot shoulders.

Industrial Highway can be classified as a Community Collector. It is a local road owned by the City of Harrisburg with a posted speed of 35 mph. There are no formal traffic counts. The estimated ADT is 5000. Truck traffic on Industrial Highway is high. The right turn from Linglestown Road to Industrial Highway shows evidence of impact damage to the guiderail and shoulder degradation due to heavy truck traffic and tight geometry. Trucks turning right conflict with bicycles and pedestrians using the Greenbelt.

Sixth Street is a local street in Susquehanna Township. Much of the traffic on Sixth Street turns right onto Linglestown Road. Observed traffic making this movement does not stop. This presents an extremely dangerous condition for cyclists traveling in the wrong direction on Linglestown Road.

Kaby Street is a local “no outlet” street in Susquehanna Township. The Greenbelt uses this street for clockwise travel. There is an opening in the right of way fence, which allows users to enter Linglestown Road with a right turn. The fence opening also encourages bicycle operation on the wrong side of the road.

Safety concerns

- Bicyclists and pedestrians operate on a high volume roadway without protection from a barrier or buffer.
- Inexperienced bicyclists are encouraged to travel on the wrong side of Linglestown Road.
- The west approach on Linglestown Road (7%) promotes slow uphill travel and fast downhill travel for bicyclists.

- The geometry of the Industrial Highway intersection causes trucks to enter the shoulder area where bikes and pedestrians operate.
- The shoulders along Industrial Highway are unimproved which forces most users to operate in the travel lanes.
- The entry into Wildwood Park requires a left turn action from Industrial Highway without a left turn lane or warning signs.
- There are no pedestrian facilities.
- Lack of Greenbelt directional signing

General Solutions

- In the near term the route should be correctly signed to discourage wrong way travel (i.e. bikes on the left side of road) on Linglestown Road. This condition is considered unacceptable as a long term solution.
- The desired solution is to create a shared-use path that is separated from the roadway between Wildwood Park and Sixth Street (or Kaby Street). Two shared-use path alternatives were studied:
 - **Option 1 – Under the Railroad**, Cross Industrial Highway at Wildwood Park with a mid-block crossing, then build a separate trail along the base of the Industrial Road embankment to an existing underpass (old Linglestown Road) under Norfolk Southern Railroad, then back to Kaby Street. This alignment would cross under the existing Linglestown Road bridge twice with the trail located behind the piers. The trail would be separated from the railroad with a fence. The entire trail would meet ADA requirements and would be 10 feet wide. **See photos.**
 - **Option 2 – over the Railroad**, Cross Industrial Highway at Wildwood Park with a mid-block crossing, then build a separate trail along the top of the Industrial Road embankment to Linglestown Road, then use the south shoulder of Industrial Road as the shared use path. This will require shifting and/or narrowing of lanes on Industrial Highway and Linglestown Road. The entire section would be protected with a crashworthy concrete barrier or guiderail. The trail would not meet ADA slope requirements if using the existing roadway grades. The desired path width on the bridge is 10 feet. **See photos.**
- Install standard signs and pavement markings for shared use path per AASHTO and MUTCD.

Physical Improvements

The preferred alternative is Option 1 which requires approval by Norfolk Southern Railroad. Option 2 is an alternative proposed by PENNDOT District 8-0 staff. At the time of this report, Option 1 was still under consideration by the railroad.

Preliminary designs – On-road Sections

Refer to the plans in the appendix of this report for graphics depicting each of the studied on-road sections.

Estimates and Funding

Detailed cost estimates were developed for the seven (7) intersections and the Parkway Drive on-road section.

These estimates were used for a grant submitted to DCNR in 2013 and to apply for federal funding through Tri-County Regional Planning and PENNDOT.

The overall estimated cost is \$1.3 million, NOT including the Linglestown Road section, which may be added into the current funding package. A summary of probable costs is presented below:

• Front Street Crossing	\$100,000	
• Herr Street (US 22) Crossing and Parkway Drive On-road Section	\$275,000	
• 28 th Street and Market Street crossings	\$300,000	
• Paxton Street Crossing	\$75,000	
• Harrisburg Street (SR 441) crossing	\$100,000	
• Cameron Street (SR 230) Crossing	<u>\$125,000</u>	
	Sub-total Construction	\$975,000
• Design (at 20% +/-)	\$175,000	
• Construction Inspection (at 15%)	<u>\$150,000</u>	
	Project Total	\$1,300,000

The DCNR grant would cover the design and most of the local street improvements along Parkway Drive. Federal funds thru the MPO will cover the construction cost on state roads and all of the inspections. It is assumed that all of the work will be bid under one contract. The Greenbelt Portion of the Linglestown Road improvements may be added to the bid package depending on available funding. Probable costs for the Linglestown Road options are presented below:

• Option A (under railroad) - Construction plus 15% for inspection	\$800,000
○ Greenbelt Portion = \$765,000	
○ Fort Hunter Portion = \$35,000	
• Option B (over railroad) - Construction plus 15% for inspection	\$775,000
○ Greenbelt Portion = \$500,000	
○ Fort Hunter Portion = \$275,000	

The estimates assume PENNDOT administered state and/or federal funds. Environmental Clearance and Final Design can be estimated at 20% of the construction cost. The design phase will be a local cost funded thru the County, DCED and/or DCNR.

Schedule

Currently, it is estimated that the design phase of the intersection work will begin in the spring of 2014 and be completed in the spring of 2015. More design time may be required for the Linglestown Road work. Construction of the intersection improvements may begin in 2015 and will take one full construction season.

FORT HUNTER CONNECTOR

General

A major objective of this study was to determine the most feasible and safe route from the Greenbelt to Fort Hunter Park. Currently the Greenbelt is located at Linglestown Road and Sixth Street. There is no defined pedestrian route to Fort Hunter. There are no defined bicycle facilities along Front Street but PA Bicycle Route J is designated along Front Street to the Fishing Creek exit.

Fort Hunter is a major County park located along the Susquehanna River just north of the City of Harrisburg. The park occupies land from the river across North Front Street to the US 322 right of way, which is also the location of the former Pennsylvania Canal. The Fishing Creek (SR 433) exit on US 322 is the northern boundary of the park. The southern end of the park is about 1 mile north of Linglestown Road (SR 39).

The need is to create a shared-use facility separated from existing roadway section(s) for use by non-motorized traffic. The shared use path should be accessible to all users and not just experienced cyclists.

The final Fort Hunter Connector route should efficiently connect to the planned Greenbelt improvements recommended along Linglestown Road.



Photo 21: General view of Front Street looking north. Four lanes of traffic.



Photo 22: Looking north along Front Street.



**Photo 23: Looking north along Front Street at Rockville Bridge.
Two lanes from here to Fort Hunter.**

Studied Alternatives

The beginning of the connector to Fort Hunter is at or near Linglestown Road and Sixth Street.

- **Option 1 - Riverfront alignment:** This option would eliminate one through lane on Front Street south of the Rockville Bridge. The road section would include two through lanes, a middle turn lane, a left turn lane at Linglestown Road, and an 8 to 10 foot wide shared use path along the river side of Front Street. The shared-use path (or side-path) would be buffered from the roadway with a 5 foot wide non-mountable curb with landscaped infill. The right of way width along Linglestown Road is 80 feet and the shared-use path would be built as a side-path along the roadway within the right of way with a 5 foot buffer. Bicycle Route J would be accommodated on both road sections. All work would be done within existing PENNDOT right of way. There are no obvious environmental issues. There are minor utility conflicts.
- **Option 2 - Towpath alignment:** This option would create a shared-use path along the former Pennsylvania Canal, which runs parallel to the railroad and US 322 behind a number of commercial buildings. The trail would connect into Tuscarora Street and run under the Rockville Bridge to Fort Hunter. This alignment would require acquisition of private property and possible relocation of residences or businesses. Wetlands are present along much of this alignment and impacts present an environmental obstacle.
- **Option 3 - Various combinations of Towpath and River Front:** Combinations of the first two options, including a side-path on the east side of Front Street, were also considered. These options would require a mid-block crossing on Front Street or a side-path with numerous driveway and street entrances which are undesirable conditions.

The various alternatives were presented to PENNDOT, Dauphin County, Susquehanna Township, and the public.

Preferred Alignment Alternative

The preferred alternative is Option 1 Riverfront alignment, which includes a shared-use path (built as a side-path) along Linglestown Road then along the river side of Front Street to Fort Hunter. The connector will cross Front Street at the Linglestown signal. Option 1 was found to address all the project needs:

- Provides a continuous shared use path from the Greenbelt to Fort Hunter.
- Provides river access which is most desirable (similar to Riverfront Park).
- Does not require property acquisition - all PENNDOT right of way.
- Has only a few driveway and side street conflicts (only along Linglestown Road).
- Is considered a non-complex design.
- Has limited or no significant environmental concerns.

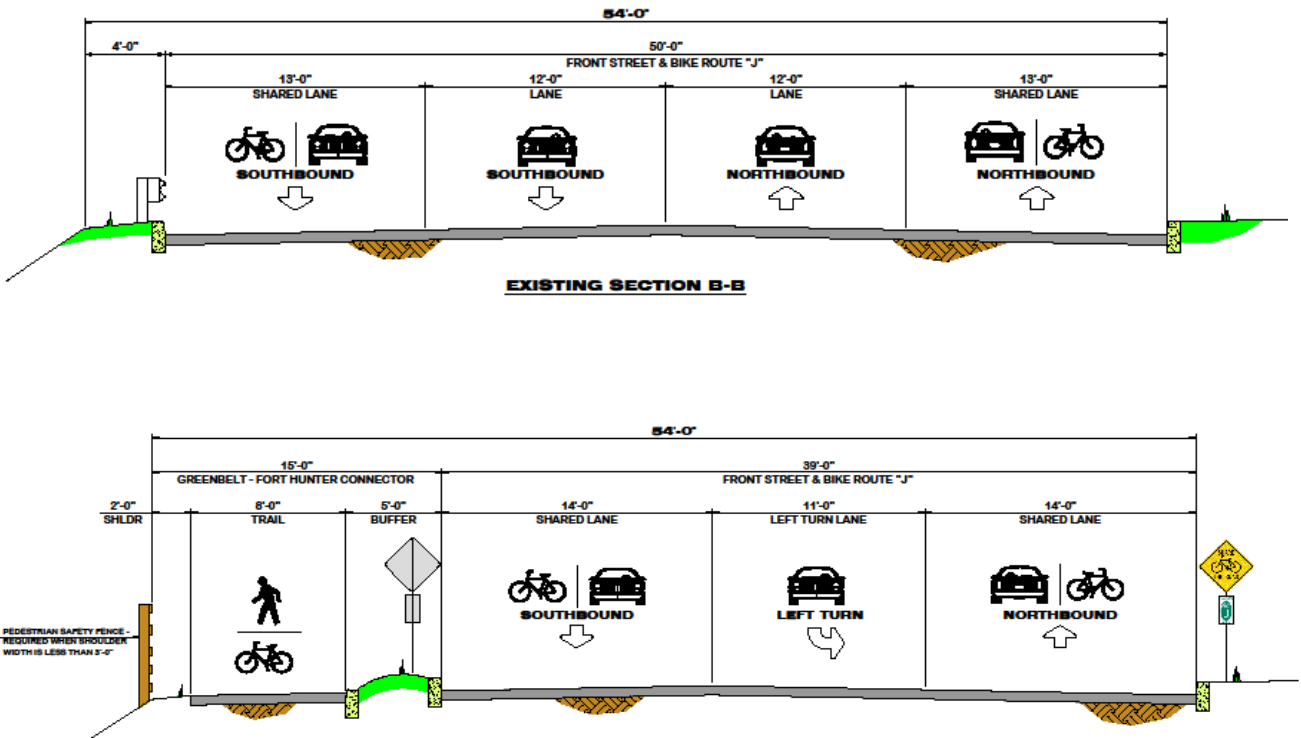


Figure 3 – Existing and proposed roadway sections on Front Street – preferred alternative

Preliminary designs

Refer to the plans in the appendix of this report.

Phasing

Phase 1 – Construct Greenbelt from Wildwood Park to the Kaby Street cul-de-sac. It is proposed that this section will be constructed using DCNR funds (design) and PENNDOT funding through HATS (construction). The trail will be on right of way owned by the City of Harrisburg, PENNDOT limited access right of way and across (either over or under) railroad right of way. It is assumed that this will be built as part of the intersection and on-road safety improvements.

Phase 2 – Construct the Fort Hunter Connector from the Greenbelt beginning at Kaby Street. There are three (3) possible routes to get to Front Street;

1. From Kaby Street – Across Sixth Street parallel to Linglestown Road on the south side to Front Street.
2. From Kaby Street – Across Linglestown Road then on a side path on the north side of Linglestown to Front Street.
3. From Kaby Street – under the Linglestown Road bridge to the north side of Linglestown Road to Front Street – this is the preferred option and is acceptable to PENNDOT. Railroad right of way will be avoided. (Option B on page 36)

Estimate

The estimated cost to design, build, and inspect the Fort Hunter Connector, including Phase 2 above, from Kaby Street to Fort Hunter along Front Street is as follows:

- Environmental Clearance \$125,000
- Utility Clearance \$10,000
- Right of Way Clearance \$15,000
- Right of Way Acquisition \$0
- Utility Relocation \$25,000
- Final Design \$125,000
- Design Phase Total = \$300,000**
- Construction \$1,425,000 (Option 1; page 39)
- Construction \$275,000 (Phase 2 of Linglestown Road; page 40)
- Construction Phase Total = \$2,000,000**

Funding Summary

Directional Signage – Greenbelt signage is fully funded with local funds. The sign plan is complete and the project is to be bid for construction in early 2014.

Safety Improvements – Funding is in place to complete the proposed safety improvements at intersections and on-road portions of the Greenbelt. The funding is summarized below:

- PENNDOT administered Federal Highway Transportation Funding – In September 2013, PENNDOT District 8-0 proposed, and the Harrisburg Area Transportation Study amended, their Transportation Improvement Plan to include construction of eligible aspects of the safety improvements (those on the federal aid system). **Subsequently PENNDOT informed Dauphin County of an award of \$785,000 for construction activities in 2015.**
- PA DCNR Community Conservation Partnership – In April, 2013, Dauphin County applied for \$500,000 to fund final design of the safety improvements and construction of those improvements that do not qualify for federal funding. **The \$500,000 grant was awarded in November 2013.**

Fort Hunter Connector – Partial funding is in place to complete the proposed Fort Hunter Connector. The following funding has been secured to date:

- PA DCED Greenways Trails and Recreation – In August 2013, Dauphin County applied for a grant in the amount of \$250,000 to fund construction at Linglestown Road for connection to Fort Hunter. **The County was awarded \$230,000 in November 2013.**

The following funds have been (or will be) requested to complete the Fort Hunter project.

- Dauphin County Gaming Grant in the amount of \$250,000 to fund most of the **design** of the Fort Hunter Connector. The grant application has been submitted and the award is pending.
- Federal and/or State Funds in the amount of \$1,500,000 to construct the Fort Hunter Connector. The \$230,000 DCED grant has funded the initial 15% of the \$1,700,000 **construction** project.