TRAIL NETWORK MASTER PLAN

Upper Uwchlan Township
Chester County, Pennsylvania

December 5, 2005

Trail Network Master Plan

Upper Uwchlan Township

140 Pottstown Pike
Chester Springs, PA 19425

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DECEMBER 5, 2005

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I. EXECUTIVE SUMMARY

A. PROJECT HISTORY

The development of community trails has been part of Upper Uwchlan Township's recreation and planning policy since the adoption of the Open Space, Recreation and Environmental Resource Plan in 1992. This objective was reiterated in the revised Comprehensive Plan, adopted by the Township in 2002. Since 1992, trails have been developed in Hickory Park, and within several new commercial and residential development projects. Also in 2002, the Brandywine Conservancy prepared a conceptual trail map that proposed trail and bicycle lane alignment in Upper Uwchlan Township. More recently, the Township was awarded funding for the construction of one main trail segment, the proposed Park Road Trail.

B. FEASIBILITY STUDY

A Feasibility Study for the community trail project was prepared prior to master plan development. General project feasibility and the feasibility of specific trail segment development was assessed, and it was determined that the project is supported by area residents and the Upper Uwchlan Township governing body and that funding has been and can continue to be secured to support trail construction. Additionally, it was concluded that private developers will construct several trail segments.

C. MASTER PLAN

The primary objectives of this master plan are to recommend:

(1) the specific trail alignment through Upper Uwchlan Township,

(2) the types of trails to be constructed, and, because the trail network cannot be constructed all at once,

(3) the projects costs and

(4) the project phasing.

Phasing was determined according to trail types: paved multi-use trails, side paths and sidewalks, signed walking streets and bike routes, hiking trails, and bike lanes. The Master Plan is shown as Maps 1, the Pedestrian Trail system, and 2 the Bicycle Trail system. The Master Plan and Maps are also proposed to be adopted as a component of the Township Comprehensive Plan.

Trail Master Plan is recommended to be implemented in seven phases, which are listed and discussed below according to their priority. The costs and currently available funding for each phase/priority are summarized in Table 1. The total trail project cost is estimated to be $7,169,974, and approximately $1.4 million in grant funds and private construction commitments is already available to offset the Phase 1 project costs.

Phase 1: Central Loop Project

An eight foot (8') wide paved, multi-use trail which forms a "central loop" in the Township, primarily along Route 100, Milford and Park Roads. Public-private partnerships with developers will facilitate the construction of segments as part of new land development projects.

Phase 2: Signed Routes and Northern Side Paths.

Phase 2 includes signed bike and walking routes and side paths in the northern part of Upper Uwchlan Township. Signed bicycle routes are proposed for the entire length of Styer and Fellowship Roads, and sections of Krauser, Moore and Font Roads.

Paved, six-foot (6') wide "side paths" are proposed along Styer, Krauser, Greenridge and Font Roads, and signed walking streets are proposed on Lyndell, Reeds, Greenridge Roads.

Table 1: Project Phasing and Cost Summary

Construction Phases	Miles	*Sub-totals*	Total	Available Funds	Net Cost
1. Central Loop Multi-use Trail	5.9		$2,104,017	$1,389,518	$714,498
2. All Signed Routs & North Township Trails	18.8		$845,880		$838,607
– All signed walking streets	*3.3*	*$2,110*			*$2,110*
– All signed bike routes	*11.5*	*$7,273*			
– Styer, Krauser, Green Ridge & Font Roads Side Paths	*4.0*	*$836,497*			*$836,497*
3. Moore Road, Turnstone Way, Dorlans Mill, W. Twp. Line Rds. Side Paths	3.7		$810,413		$810,413
4. Hiking Trails -- Brandywine Trail off-road link and Marsh Creek State Park	1.1		$50,868		$50,868
5. Complete Route 100 Multi-Use Trail (net of Central Loop)	1.0		$244,400		$244,400
6. Little Conestoga, Byers, East Township Line Roads Side Paths & Bike Lanes	8.9		$1,103,196		$1,103,196
– Side Paths	*5.7*	*$1,013,076*			
– Bike Lanes	*3.2*	*$90,120*			
7. Village Streetscapes	0.9		$2,011,200		$2,011,200
– Eagle Village	*0.5*	*$1,500,000*			
– Byers Village	*0.4*	*$511,200*			
	40.3		**$7,169,974**	**$1,389,518**	**$5,773,183**

Phase 3: Southeast Sidewalk and Side Paths Project-Moore Road, Turnstone Way and Dorlans Mill Road.

The third phase is the construction of side paths and sidewalks in the southern portion of the Township, as follows:

Side Paths:

- Moore Road to Ivystone Way.
- West Brandywine Road at Turnstone Way south to Moore Road.
- Dorlans Mill Road south to Struble Trail.

Sidewalks:

- Ivystone Way to Dorlans Mill Road
- Turnstone Way
- Dorlans Mill Road at Moore Road south to Robert Dean Drive

Phase 4: Brandywine Trail Off-Road Link and Marsh Creek State Park Hiking Trails.

Phase 4 is the development of hiking trails, which are to be unpaved. A section of the Brandywine Trail that connects Krauser Road to the northeastern side of Marsh Creek State Park through an existing tunnel is to be reestablished. A hiking trail is also proposed within Marsh Creek State Park to create a loop trail within the park.

Phase 5: Complete Route 100 Multi-use Trail.

The fifth construction phase involves development of the multi-use trail south of Park Road through the Village of Eagle to the Township boundary.

Phase 6: Little Conestoga, Byers, Fellowship & East Township Line Roads Side Paths and Bike Lanes

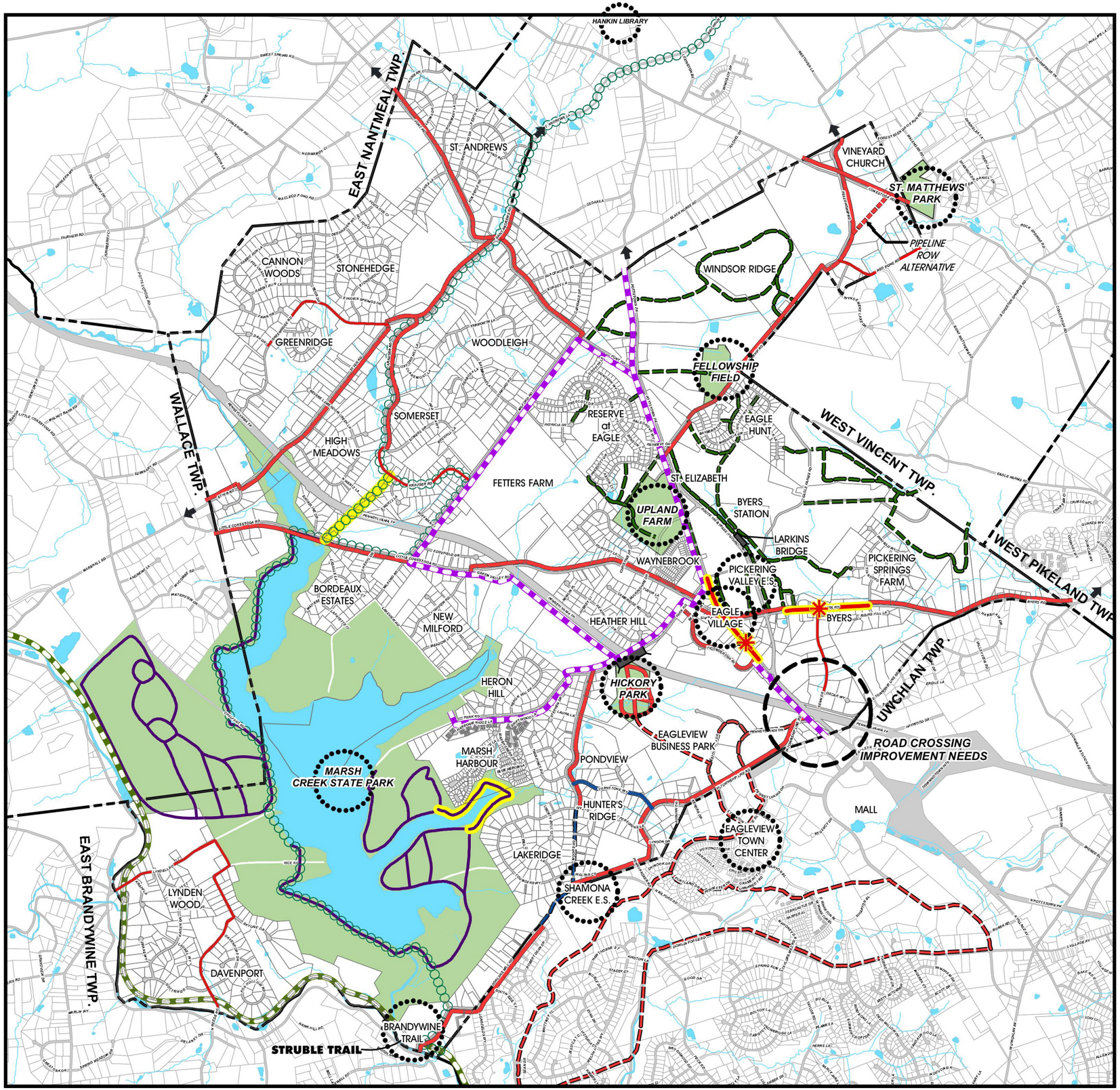
Phase 6 includes the development of four-foot (4') wide bike lanes, on Font, Little Conestoga, Township Line and Moore Roads, and Senn Drive. The Township Line Road bike lane will link with Pennsylvania Bicycle Route "L" along Creek Road just south of the Township in East Brandywine. Phase 6 also includes side paths on Little Conestoga, Byers, Fellowship and East Township Line Roads.

Phase 7: Eagle and Byers Village Streetscapes.

Streetscapes projects for the Villages of Byers and Eagle are proposed for Phase 7, which will include sidewalks, street trees, and lighting.

PennDOT Approval

Trails proposed for development within the rights-of-way of state highways will require Highway Occupancy Permits (HOPs) from PennDOT. PennDOT should be contacted early in the engineering design phase to facilitate application and granting of the required HOPs. State roads include Byers, Little Conestoga, Dorlans Mill, Conestoga (Rt. 401) Roads; and Pottstown Pike (Rt. 100).



LEGEND

- VILLAGE STREETSCAPE PROJECTS (see text)

TOWNSHIP TRAILS

- MULTI-USE (8' min asphalt trail)
- SIDEPATHS (6' min asphalt trail)
- SIDEWALKS
- SIGNED WALKING STREET
- BRANDYWINE TRAIL EXTENSION (blazed dirt path)
- MARSH CREEK TRAIL EXTENSION (boardwalk)

EXISTING TRAILS

- STRUBLE TRAIL (REGIONAL)
- BRANDYWINE TRAIL (REGIONAL)
- SIDEWALKS
- DEVELOPMENT/NEIGHBORHOOD TRAILS
- EAGLEVIEW TRAIL SYSTEM
- HIKING

- DESTINATIONS
- CONNECTION TO ADJACENT COMMUNITIES
- PROPOSED LOCATIONS FOR PEDESTRIAN BRIDGES

1 inch equals 0.5 miles

0 0.5 1 1.5 Miles

NORTH

UPPER UWCHLAN TOWNSHIP COMMUNITY TRAIL MASTER PLAN

PEDESTRIAN TRAILS

Date: 9/14/05	Map # 1	Drawn by : TWB

RAY OTT & ASSOCIATES
17 SOUTH CHURCH STREET
WEST CHESTER, PA 19382

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1504 South Street
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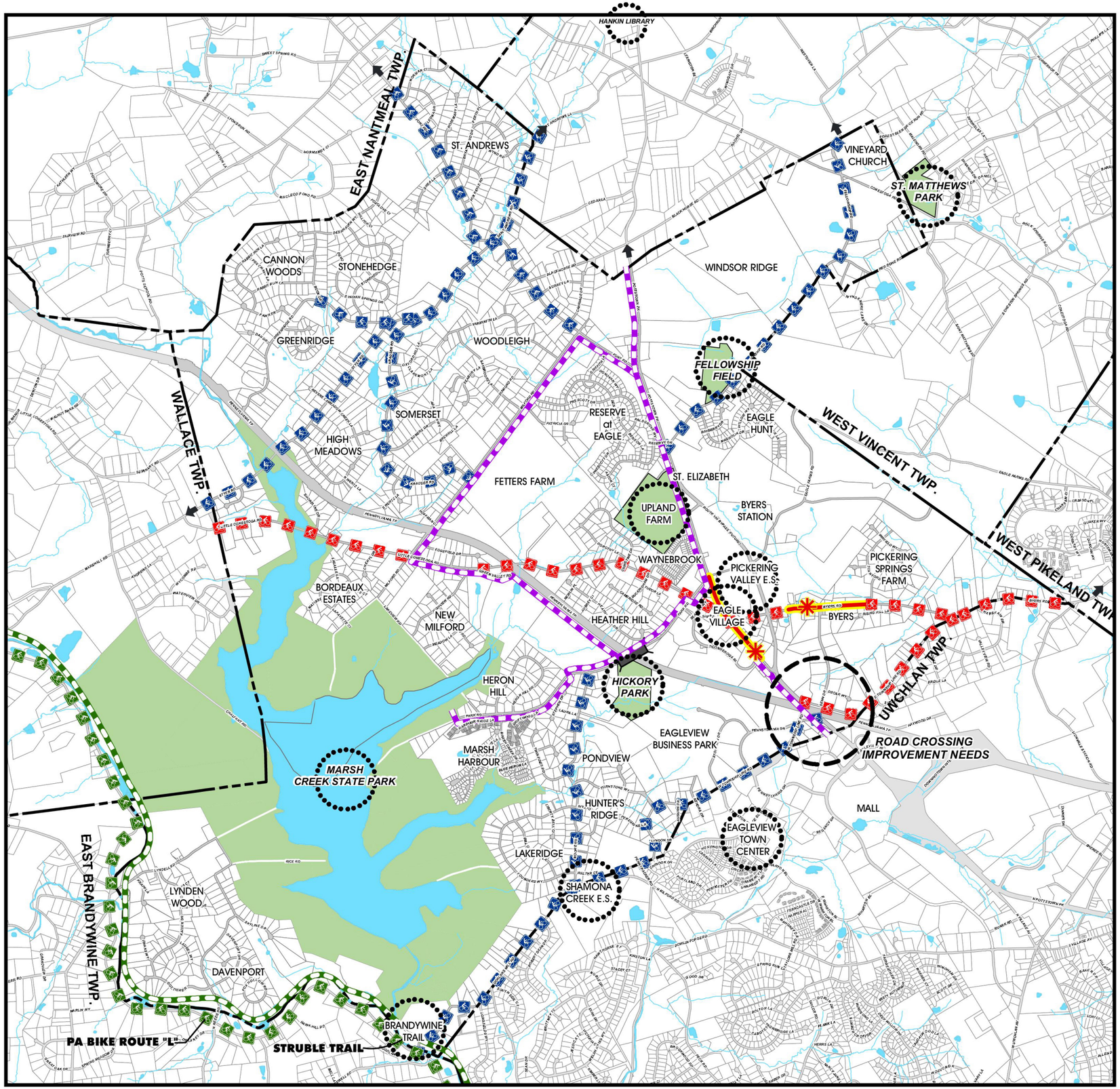

LEGEND

VILLAGE STREETSCAPE PROJECTS (see text)

TOWNSHIP TRAILS

BIKE LANES (4' min both sides of road)

BIKE ROUTE, SIGNED

MULTI-USE TRAILS (8' min asphalt trail)

REGIONAL TRAILS

PA BIKE ROUTE L

STRUBLE TRAIL

DESTINATIONS

CONNECTION TO ADJACENT COMMUNITIES

1 inch equals 0.5 miles

0 0.5 1 1.5 Miles

NORTH

UPPER UWCHLAN COMMUNITY COMMUNITY TRAIL MASTER PLAN

BICYCLE ROUTES

Date: 12/5/05	Map #2	Drawn by : TWB

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II. PROJECT DESCRIPTION, PUBLIC PARTICIPATION AND GOALS & OBJECTIVES

Upper Uwchlan Township, incorporated in 1858, is one of seventy-three (73) municipalities in Chester County and has an area of 11.7 square miles. East Nantmeal Township borders the Township to the north; to the east it is bordered by West Vincent Township; to the south by Uwchlan and East Brandywine Townships, and to the west by Wallace Township. Major transportation routes that pass through Upper Uwchlan Township include Pottstown Pike (State Route 100) and the Pennsylvania Turnpike (State Route 76). Existing recreation facilities in the Township include much of Marsh Creek State Park, and the municipal park, Hickory Park, south of Route 76, on Park Road.

A. PROJECT DESCRIPTION

The Feasibility Study was the first phase of the community trail project, which assessed the practicality of development of a township-wide trail system in Upper Uwchlan Township. The Feasibility Study examined such issues as residents' level of interest such a project, and their support of using tax dollars to pay for the facilities. The Study also examined the feasibility of alignment of specific trail segments.

The second project phase is Master Plan preparation. This Trail Master Plan examines existing conditions of the trail corridor to ensure that the trail is developed with a design that is both sensitive to the environment and the community it serves. The Plan's objective is to recommend trail types, development scenarios, specific alignments and long term maintenance. The Master Plan has two principal components: the Development Plan drawings which show the trail facility types, alignments and surfaces, and this report, which documents the trail planning process. The report includes trail construction cost estimates, together with a schedule of estimated labor and material costs needed to ensure the proper maintenance of the community trail system.

The Master Plan was prepared under the direction of a Project Steering Committee, and with assistance from area residents who attended meetings to discuss trail development issues.

B. PUBLIC PARTICIPATION

Public participation was an essential element of the trail planning process. Public input was gathered in several methods: through the creation of study committee, public meetings, a survey, and interviews. The committee and key person interviews are discussed below. The public meetings and survey are discussed in a later section of this report.

1. Trail Master Plan Committee.

The Trail Master Plan Committee was formed to work with the project consultants in developing the master plan. The Committee members listed below consisted of Township officials, park representatives, park user groups and area residents.

Ben LaGarde, *Chester County Park and Recreation Board, Committee Chair*
Robert Phillips, *Upper Uwchlan Township Park and Recreation Commission, Committee Vice-Chair*
Walter J. Styer, *Upper Uwchlan Township Board of Supervisors*
Wayne Martin, *Upper Uwchlan Township Planning Commission*
Mary Louise Farrow, *Upper Uwchlan Township Historic Commission*
Patricia Donoghue, *Downingtown Area Recreation Consortium*
Jeanne Myers, *Upper Uwchlan Township Resident*
Michael Mostrog, *Upper Uwchlan Township Resident*
James Trolier, *West Vincent Township Resident*
Joan Spangler, *West Nantmeal Township Resident*
Patricia Theurkauf, *East Nantmeal Township Resident*
Kathy Wynn, *Chester County Trails Club*
Lori Nygard, *Marsh Creek State Park Manager*
Randy Frey, *Marsh Creek State Park Manager*

2. Key Person Interviews.

The following people were interviewed based on their affiliation with area recreation groups and clubs, developers, residents and school officials.

Kathy Wynn, Chester County Trails Club
Dominick Zuppo, President, Delaware Valley Bike Club
Patricia Theurkauf, Horseshoe Trail Club
Bill Dawson, West Chester Running Club
Bob Hankin, Hankin Group
Donald Hopson, Pickering Elementary School
Leigh Abbott, Shamona Elementary School
Randy Frey and Lori Nygard, Marsh Creek State Park
John Shaw, Marsh Creek Harbor Homeowners Association
Bruce Phelan, Reserve at Eagle Homeowners Association

C. GOALS AND OBJECTIVES

The Trail Master Plan Committee formulated project goals to guide trails facility development. Project goals and objectives are set forth below.

Recreation Goal #1: Expand recreational opportunities for all area residents.
Recreation Objectives:

- Create a trail system that provides area residents with off-road areas on which to exercise and recreate.
- Create a trail system in Upper Uwchlan Township that accommodates various types of users, such as pedestrians, bicyclists, in-line skaters and equestrians.
- Create a trail system that provides access to the physically handicapped.

Recreation Goal #2: Link Township recreation and park facilities.
Recreation Objective:

- Construct the trail so that it provides direct access to as many public recreation facilities and open spaces as possible.

Transportation Goal: Improve the Township transportation network to reduce reliance on motor vehicles.
Transportation Objectives:

- Create a trail system in Upper Uwchlan Township to link neighborhoods, shopping areas, schools and recreational facilities.
- Create a trail system that supports various modes of non-vehicular transportation.
- Create a trail system that links to trail systems in other Townships.

Historic and Natural Resources Goal: Respect and protect Township historic and natural resources.
Historic and Natural Resources Objectives:

- Construct the trail system in Upper Uwchlan Township to provide views of historic and natural resources, but protects environmental resources and property owners' rights.

3. Public Participation Results.

In February 2004 a public meeting was held to determine where residents wished to travel using trails, and what kinds of trails the residents wished to have (pedestrian and bike trails, trails that can be used by in-line skaters, equestrian trails and on-road bike lanes). The exercise asked attendees to answer a survey and mark on individual maps their desired destination points and potential routes to arrive at these destinations

Public Meeting Survey
The survey results from the March 2004 public meeting is summarized below. The complete survey results are provided as an Appendix to the Feasibility Report.

- It is not easy to getting to places in the Township by walking or biking (30 of 32 respondents)
- Access to Marsh Creek State Park should be improved (32 of 33 respondents)
- If walking and biking access were improved their household would use the new connections (25 of 26 respondents)
- Walking paths should be increased in the Township (82.4% of respondents)
- Bicycle paths should be increased in the Township (78.8% of respondents)
- Connections to major business and retail centers should be increased (62.1% of respondents).
- Connections to schools should be increased (48.3% of respondents)
- The most important features in the Township are natural areas, parks, and rivers and streams.
- Support development of a pedestrian trail in the Township (96.9% of respondents)
- Support the improvement of inter-municipal biking and walking connections (87.5% of respondents)
- There is a need to increase walking and biking opportunities in as safe and interesting manner (90.6% of respondents).
- 19 respondents indicated that access would be a concern if more connections are proposed to be created in Upper Uwchlan Township.
- 18 respondents were concerned with an increase in trash in the Township resulting from trails in the Township, and 16 were concerned about an increase in accidents/safety.
- Support an increase in taxes to implement trails and recreation in the Township (21 of 29 respondents)
- Favor user fees to support costs for access and recreation (15 of 27 respondents)
- Have great interest in the trail master plan project (18 of 30 respondents)

Map Exercise

The public meeting attendees were asked to indicate on individual maps (one per family) desired destinations and walking, equestrian and bicycle routes, and known problem areas along existing routes. The results were compiled onto one map indicating the most popular routes and destinations. These are described below in Table 2 and the map can be found in the Feasibility Study Report.

Table 2: Summary of Public Meeting Map Exercise Results

Most Popular Destinations:	***Most Popular Bicycle Routes:***
Marsh Creek State Park	Route 100/Pottstown Pike
Hickory Park	Saint Andrews Drive
Future Fellowship Park	Milford Road
Village of Eagle	Little Conestoga Road
Eagleview Town Center	Park Road
Pickering Valley Elementary School	Moore Road
Shamona Creek Elementary School	Byers Road
Hankin Library	

Most Popular Pedestrian Routes:	***Unsafe Roads:***
Milford Road	Route 100
Park Road	Park Road
Saint Andrews Road	Moore Road

III. DESIGN STANDARDS

A. TRAIL USER TYPES

Trail users will consist of residents who use the trail for exercise, recreation and travel, and users who reach the trail system from trails the connect to the Upper Uwchlan Township trail system. All potential types of trail users for non-motorized trail systems should be accommodated in the trail design. Additionally, the majority of the trail system should be handicapped accessible and designed according to American with Disabilities Act (ADA) standards.

The trail should be designed to accommodate several types of non-motorized uses. These uses are described in Table 3, together with basic recommended design parameters for each use type.

Table 3: Trail User Types

	Pedestrians	Bicyclists	In-Line Skaters	Cross Country Skiiers
Types	Includes walkers, hikers, joggers, runners, those with baby strollers, bird watchers, etc.	Includes commuters, recreational, touring, mountain bikers, elderly and the young	Beginners, and intemediate and advanced skaters	Beginners, and intemediate and advanced skiiers
Travel/ Design Speeds	3 to 7 mph	10-30 mph	10-30 mph	moderate
Tread Width	High Use: 6'-8'	Multi-Use Trails: 12'-14'	Multi-Use Trails: 12'-14'	Two-way: 7'
Vertical Clearance	7'	8' minimum	7'	7' feet above the snow level

Source: Trails for the Twenty-First Century , Rails-to-Trails Conservancy, 2001, pp. 55-59.

Table 3 shows that in general, bicyclists and in-line skaters require a wider trail tread than do walkers and runners. All types of users shown in the table require between 7'-8' minimum vertical clearance.

B. GENERAL AGENCY TRAIL DESIGN GUIDELINES

This section discusses design recommendations from several sources and examines general design concerns such as safety, landscaping, accessibility and trail design within floodplain areas. Recommended trail construction specifications published by several agencies are set forth below.

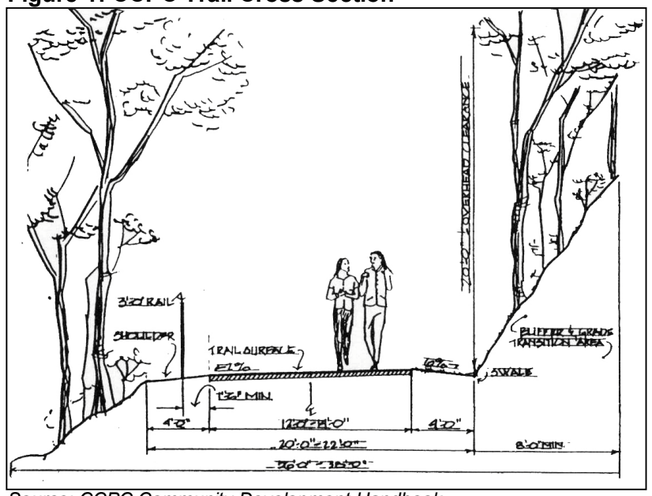
1. Chester County Planning Commission.

Figure 1 shows a trail cross-section from the Chester County Planning Commission (CCPC). CCPC's trail construction recommendations for primary trails include the following design standards:

- eight foot (8') to ten foot (10') trail tread
- two foot to four foot (2'-4') maintained shoulder
- twelve foot to fourteen foot (12'-14') landscaped buffer area

This design will provide for a total trail right-of-way width of twenty-two feet to forty-two feet (22'-42').

Figure 1: CCPC Trail Cross Section



Source: CCPC Community Development Handbook.

2. American Association of State Highway Transportation Officials.

The American Association of State Highway Transportation Officials (AASHTO) provides construction specifications for "shared use paths" in its 1999 publication Guide for the Development of Bicycle Facilities. AASHTO describes shared use paths as "facilities on exclusive rights-of-way and with minimal cross flow by motor vehicles."[1] The intent of a shared use path is to enable simultaneous use by bicyclists, walkers, in-line skaters and runners. AASHTO's construction specifications for a two-way shared use path are:

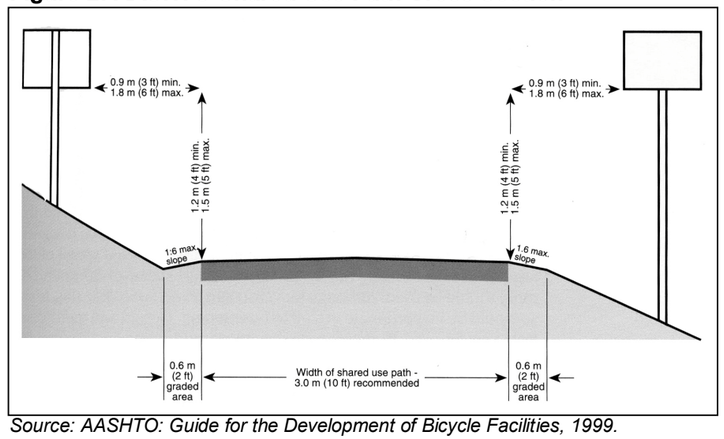
- A minimum path width of ten feet (10')
- A minimum two foot (2') graded shoulder area on both sides of the path, with a 1:6 maximum slope
- Eight foot (8') vertical clearance
- No greater than five percent (5%) grade.

[1] *Guide for the Development of Bicycle Facilities, AASHTO, 1999, p. 33.*

Figure 2 depicts AASHTO's shared use path cross section, including shoulders and graded areas to aid in drainage.

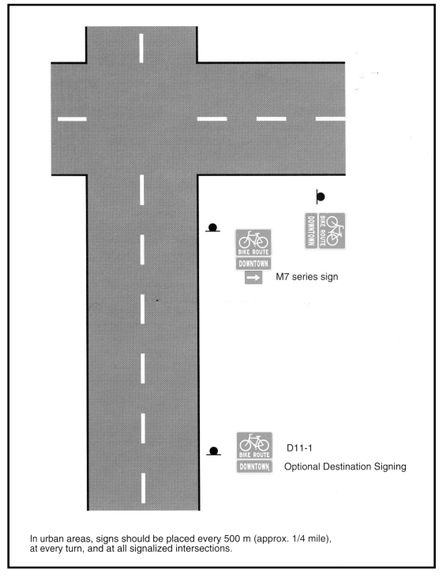
On road, signed bike routes are also proposed along certain Township roads. Figure 3 shows bike route signage placement.

Figure 2: AASHTO Shared Use Path Cross Section



Source: AASHTO: Guide for the Development of Bicycle Facilities, 1999.

Figure 3: AASHTO Shared Bike Route Detail



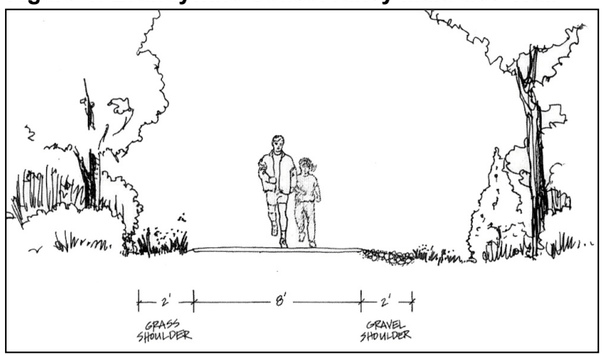
Source: Guide for the Development of Bicycle Facilities, AASHTO, 1999, p. 21.

3. Brandywine Conservancy.

The Brandywine Conservancy provides recommended trail construction specifications in its 1997 publication Community Trails Handbook. Figure 4 shows the Conservancy's trail cross section. The following specifications are recommended for a suburban community such as Upper Uwchlan Township for non-motorized trail use including biking and in-line skating (non-equestrian use):

- Ten foot (10') trail surface width
- Eight foot (8') vertical clearance
- Two foot to five foot (2'-5') cleared shoulder area

Figure 4: Brandywine Conservancy Multi-use Trail



Source: Community Trails Handbook, Brandywine Conservancy, 1997, p. 52.

Additionally, the Brandywine Conservancy recommends the use of crusher fines for trail surfacing, and states that they are "easy to handle, moderately priced, low maintenance and can accommodate a variety of users." However, they are not recommended for high speed bicycling and are unusable for in-line skaters.[2]

Engineers must be consulted during actual trail design, which will include the design of trail drainage. Proper drainage of surface and subsurface water is an important consideration in trail design, construction and management. Improper drainage will detrimentally impact the trail's surface and subgrade. Proper drainage reduces erosion, mitigates the impact of flooding, and maintains water quality.[3]

Table 4 provides compares the advantages and disadvantages of several common types of trail surfacing, and Table 5 provides a comparison of various agencies recommended trail construction specifications.

[2] Community Trails Handbook, The Brandywine Conservancy, 1997, pp. 52-53.
[3] Community Trails Handbook, The Brandywine Conservancy, 1997, p. 52.

Table 4: Trail Surface Comparison

Surface Material	Advantages	Disadvantages
Asphalt	Hard surface, supports most types of uses, all weather, does not erode, accomodates most users simultaneously, low maintenance	High installation cost, costly to repair, not a natural surface, freeze/thaw can crack surface, heavy construction vehicles need access.
Concrete	Hardest surface, easy to form to site conditions, supports multiple use, lowest maintenance, resists freeze/thaw, best cold weather surface	High installation cost, costly to repair, not a natural looking surface, freeze/thaw can crack surface, heavy construction vehicles will need access.
Crusher Fines	Supports most uses, moerately priced, compliments the aesthetic appeal of historic transportation corridors	Does not support in line skaters and skateboarders, will retain moisture-vegetation may sprout within surface, stones must be replenished every 7-10 years.

Source: Trails for the Twenty-First Century, Rails-to-Trails Conservancy, 2001, pp. 69-72.

Table 5: Trail Design Specifications Comparison

	Design Manual		
Design Feature	**AASHTO**	**Trails for the 21st Century**	**Community Trails Handbook**
Paved Width	10 feet minimum	14 ft. (10 ft. min.)	12 feet
Shoulder	2 ft. min., 3 ft. preferred	2 ft. ea. side min.	2 ft. - 5 ft. cleared each side
Horizontal Clearance	3 ft. min., 6 ft. max.	7 feet	n/a
Vertical Clearance	8 ft. min, 10 ft. underpasses	8 ft., 10 ft. min. for tunnels	8 feet
Maximum Grade	5%	5% max., 3% preferred	5% for ADA users
Horizontal Alignment	36 ft. curve radii/12 mph	n/a	n/a

Sources: Guide for the Development of Bicycle Facilities, AASHTO, 1999; Trails for the Twenty-First Century, Rails-to-Trails Conservancy, 2001; Community Trails Handbook, Brandywine Conservancy, 1997.

Trail Safety

Providing a safe and secure trail will facilitate trail use. Primary trail safety issues concern lighting and visibility. The Brandywine Conservancy offers the following recommendations for trail safety and security:

- A visually accessible trail deters crime; trails should be visible to and from nearby roads and buildings.
- Place parking facilities and trail access in areas of high visibility with an on-going human presence.
- Trail use should be limited to between sunrise and sunset to reduce visibility problems.
- Avoid or minimize road crossing and trail intersections
- Grade crossings should be provided with signage, adequate visibility and crosswalk striping.[4]

Additional steps that can be taken to improve trail safety are the installation of emergency call boxes and lighting. Lighting should be properly designed so that it does not create shadows or cause glare.

4. Landscaping.

Landscaping plays several roles in trail design. Proper landscaping can provide shade, block the wind, and contribute to trail safety. The Brandywine Conservancy recommends the following regarding trail landscaping and vegetation:

- Provide a minimum five foot (5') groomed area adjacent to the trail to reduce potential hiding areas
- Deciduous shade trees can be planted to reduce the temperature along the trail in the summer months.
- Evergreen trees can serve as wind blocks for the trail in the wintertime.
- Installing thorny vegetation, fencing and grade changes (berms) can buffer adjacent property owners from the trail.
- Trails should provide for adequate access for safety patrols, both vehicular and bicycle.[5]

Certain PennDOT publications that include design standards for trails and roadways which should be referred to during the engineering design phase of this project include:

- Design Manual Part 2: *Highway Design*
- Publication 203/2003-*Work Zone Traffic Control*
- Publication 408: *Roadway Specifications*
- Publication 461: *Roadside Planting Guideline*
- *Handbook of Approved Signs.*

[4] Community Trails Handbook, The Brandywine Conservancy, 1997, pp. 49-50.
[5] Community Trails Handbook, The Brandywine Conservancy, 1997, p. 49.

5. Accessibility.

It is the Township's desire to provide trail access to all user types, and publicly funded trails are required to provide access and accommodations to the physically handicapped. In order to accommodate the physically handicapped on the trail properly, the following design standards and parameters should be followed:

- Wheelchair users prefer hard surface trails.
- Design minimum trail gradients at less than 5%.
- Wheelchair users require a ten-foot (10') trail tread width.
- Provide trail gates, ramps and designated parking areas at trailheads.[6]

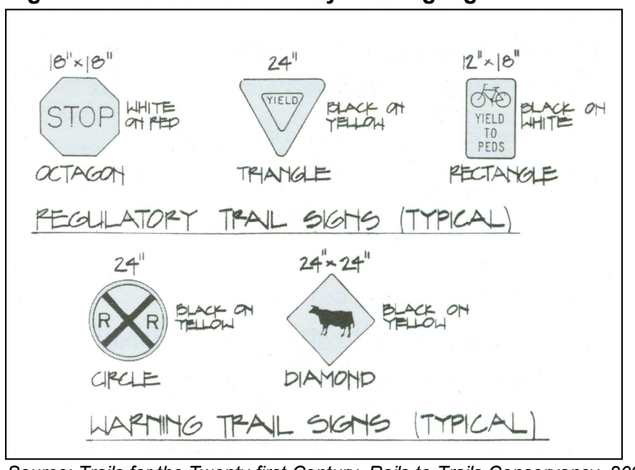
All facilities intended to provide access or accommodation to the physically handicapped must be designed in accordance with American with Disabilities Act (ADA) standards and requirements.

6. Signage

Regulatory Signage

Regulatory signs are used for traffic control, and include stop, yield, right-of-way and speed limit signs.[7] Stop signs should be installed for trail users where the trail intersects with roads, and cautionary traffic signs should be installed on roadways to warn vehicles of potential pedestrian and bicycle traffic. Figure 5 provides a detail for standard cautionary trail signage.[8]

Figure 5: Standard Cautionary Trail Signage



Source: Trails for the Twenty-first Century, Rails to Trails Conservancy, 2001, p.89.

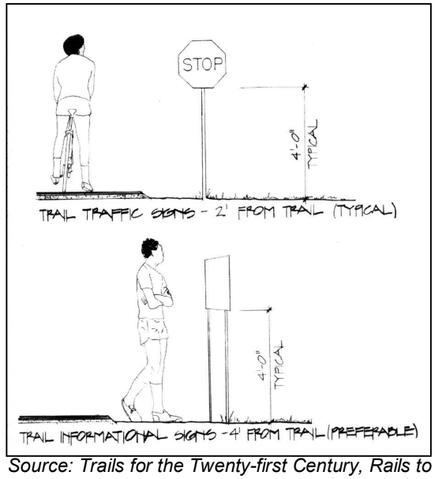
Detailed information regarding sign dimensions, color, shape and size can be found in the Federal Highway Administration's Manual on Uniform Traffic Control Devices. Additionally, crosswalk striping should be painted across roadways to indicate the area of the pedestrian and bicycle right-of-way.

Informational Signage

Informational signage provides trail users with information about trailheads, artifacts and historic resources, connecting trails and destinations. Directional signage should be located along the trail indicating where other trails intersect, and signs should also be provided that describes and interprets unique natural and historic features. Informational signs should be grouped together especially at trailheads and rest areas.[9] Mile markers are also considered informational signage which should consist of a simple wooden or metal post showing the mile number along the trail system.

Placement of signage along the trail is also a consideration in trail development. Figure 6 shows proper regulatory and informational sign placement.

Figure 6: Sign Placement



Source: Trails for the Twenty-first Century, Rails to Trails Conservancy, 2001, p.91.

7. Trails in the Floodplain.

Because floodplains are sensitive environmental areas, special care must be taken when disturbing these areas for trail construction. The Brandywine Conservancy provides several "basic rules" to follow when designing trails within floodplains. These rules are set forth below:

- Whenever possible, avoid sensitive natural areas such as wetlands. Locate trails on the edge or adjacent to these areas.
- Limit crossing the floodplain by trails; position trails at the edge of floodplains, not at their core. If a crossing is required, use erosion resistant materials.
- If gravel, concrete, or asphalt is necessary for construction, remove an equal amount of floodplain material to maintain an unimpeded floodway.
- If trails must be constructed in wet areas, bridging or boardwalks should be used.
- When the crossing the watercourse, the bridge should span both the watercourse and the floodplain.
- Permitting may be required for construction activities within the floodplain.[10]

During the final design of the trail, engineers must be consulted to determine the best design of the trail within floodplain areas.

C. TRAILHEAD LOCATIONS

The community trail system is proposed to be easily accessed from most existing neighborhoods by virtue of the Township's low-volume residential streets and cul-de-sac roads. Residents within these neighborhoods will be able to access the trail from these roads, however, trail users that do not live along these roads and users from outside the Township may wish to access the trail from a trailhead, or may require the facilities at a trailhead during trail use.

1. Existing Trailheads.

Upper Uwchlan Township contains an existing trailhead for the Brandywine Trail, located in the southern corner of the Township, near West Township Line Road. Because the Brandywine Trail and the community trail network will link, this trailhead can be utilized for the Township trail system.

2. Proposed Trailheads.

The most logical and safest places to locate major trailheads for the community trail system are within existing and proposed parks. Existing parks that will allow easy access to the trail and that provide parking areas, bathrooms and other facilities are Marsh Creek State Park in the southwestern portion of the Township, at the end of Park Road and Hickory Park, on Park Road, west of the turnpike. Additionally, Fellowship Park, proposed for development in the next several years, will provide access to the trail, parking and restrooms when the park is fully developed. Fellowship Park will be located on

[6] Community Trails Handbook, The Brandywine Conservancy, 1997, p. 51.
[7] Trails for the Twenty-First Century, Second Edition, Rails to Trails Conservancy, 2001, p.88.
[8] Trails for the Twenty-First Century, Second Edition, Rails to Trails Conservancy, 2001, p.89.
[9] Trails for the Twenty-First Century, Second Edition, Rails to Trails Conservancy, 2001, p.91.
[10] Community Trails Handbook, The Brandywine Conservancy, 1997, p. 48.

the north side of Fellowship Road in the northeastern section of Upper Uwchlan Township. Upland Farm, located on the west side of Route 100, is also proposed as a Township park and should be considered a potential trailhead location. The only trail facility proposed for existing parks are information kiosks containing maps and information regarding the community trail system.

D. GENERAL TRAILHEAD DESIGN STANDARDS

General trailhead design guidelines from several sources are set forth below.

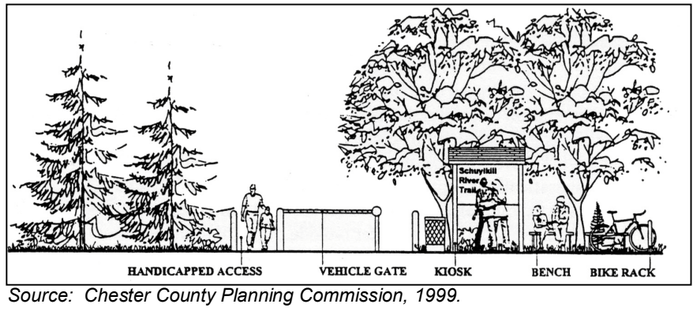
1. Chester County Planning Commission.

The Chester County Planning Commission provides the following recommendations for trail construction:

> Trailheads will vary in complexity and in overall cost based on their location and potential level of use and function. Therefore, trailheads are separated into two categories: Major and Minor. A minor trailhead simply provides access to the trail with a minimum amount of amenities and serves a maximum of two trails. A major trailhead generally serves a minimum of two trails and is considered a focal point of primary feature. At a minimum, a trailhead should be equipped with the following facilities:
>
> - Trash receptacles;
> - Signage to direct potential trail users to and through the trail system;
> - Connector trails or transition areas to the main trail to ensure safe merging by trail users;
> - Gated vehicular barriers to prevent unauthorized access by motor vehicles, while still allowing access to trail maintenance vehicles or emergency vehicles; and,
> - Handicapped access to the trail system including a gate with an appropriate width to accommodate a wheelchair and appropriate surface treatment and parking facilities within 100 feet.
>
> The following facilities should be considered for implementation where a trailhead is designed as a major trailhead or primary feature:
>
> - Maneuvering room for vehicles, pedestrians, bicyclists, and associated recreational equipment;
> - Parking stalls for automobiles and medium security bicycle racks;
> - Information booths or kiosks;
> - Drinking fountains (where infrastructure is available);
> - Landscape plants;
> - Security fencing and lighting; and,
> - Restrooms.[11]

Figure 7 provides CCPC's typical trailhead design concept. The drawing shows the typical features including a bike rack, bench, trash receptacle, bollards, gate, signage and landscaping.

Figure 7: CCPC Trailhead Design



Source: Chester County Planning Commission, 1999.

2. Rails-to-Trails Conservancy.

In 2001, the Rails to Trails Conservancy published Trails for the Twenty-First Century, (TTFC) a guide for trail master planning. TTFC recommends categorizing trailheads as Major or Minor access points. Table 6 provides recommended trailhead facilities for both trail types.

Table 6: Trailhead Facilities

Suggested Facilities-Major Trailheads	Suggested Facilities-Minor Trailheads
Sitting areas	Restrooms
Shade shelters	Drinking fountain
Picnic Areas	Phone
Informational Signage	Recycling receptacle
Interpretive Signage	Bike tire air pump
	Vending machines

[1] Trails for the Twenty-First Century, Rails-to-Trails Conservancy, 2001, p. 94.

TTFC recommends the following with regard to trailhead facilities:

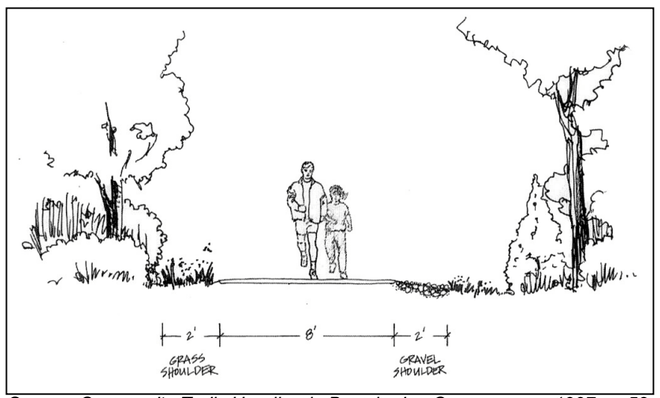
- Locate major trailheads at heavily used access points (Township parks)
- Link the trailhead to as many transportation systems as possible;
- Parking areas should be simple, designed in harmony with the surroundings and should contain one ADA-accessible space for every twenty-five (25) spaces;
- Water fountain spigot heights: 42" for adults, 36" for ADA access with 27" below the basin for wheelchair pull-up, 30" for children;
- Locate water fountains four feet (4') off the pathway;
- Locate benches according to views or protection from sun or wind;
- Ensure that benches are installed so that rain and snow drains from the seat;
- Locate bike racks as close as possible to destinations without interfering with traffic flow; and,
- Locate picnic areas away from hazardous areas and so that they do not interfere with trail activities.

E. SPECIFIC TRAIL DESIGN RECOMMENDATIONS

1. Multi-Use Trail Construction Specifications.

The proposed multi-use trail design is shown in Figure 8. The trail should be constructed of bituminous asphalt paving, except for areas where the trail may cross through wetland areas. Generally, tread width should be eight feet (8') wide. Two-foot (2') wide unpaved shoulders on both sides of the trail are recommended to separate the trail from the cartway. The multi-use trail should be accessible to pedestrians, bicyclists and those with disabilities.

Figure 8: Recommended Multi-Use Trail Cross Section



Source: Community Trails Handbook, Brandywine Conservancy, 1997, p. 52.

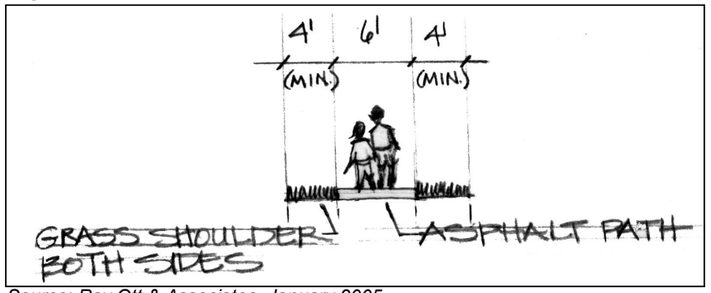
2. Side Paths.

Side paths are proposed for areas where construction of a multi-use trail is infeasible due to right-of-way constraints. Side paths are recommended to be six feet (6') in width with two, four-foot (4') wide

[11] *Phoenixville Strategic Plan, Second Draft, December 1999, p. 8-23.*

unpaved shoulders on both sides of the trail to separate the trail from the cartway. Side paths should be accessible to pedestrians and those with disabilities. Bicycle use is not recommended on side paths. Figure 9 shows the recommended side path cross-section.

Figure 9: ROA Recommended Side Path Cross-Section



Source: Ray Ott & Associates, January 2005.

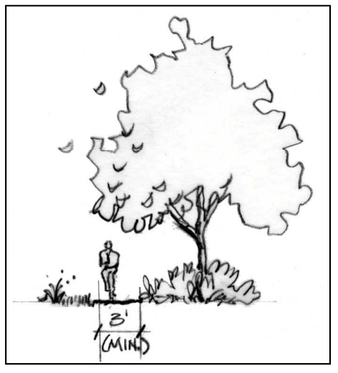
3. Sidewalks.

Sidewalks are proposed in limited areas in the Township, generally as extensions of existing sidewalk systems. Sidewalks will typically be four to five feet (4-5') wide concrete, and elevated by a curb from the cartway.

4. Hiking Trails.

It is recommended that hiking trails be "natural", with no manmade improvements other than clearing sufficient to accommodate a three-foot (3') natural trail tread, as shown in Figure 10.

Figure 10: ROA Recommended Hiking Trail Cross-Section



Source: Ray Ott & Associates, January 2005.

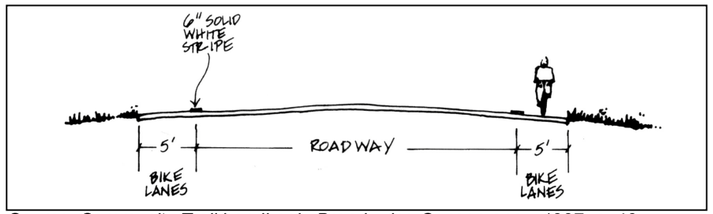
5. Signed Walking Streets.

It is recommended that certain residential streets with traffic volumes that facilitate walking within the cartway be designated as "signed walking streets." The only proposed improvement for signed walking streets are signs indicating that the road is part of the Township trail system, and indicating links to nearby trails.

6. Bike Lanes.

Bike lanes are recommended to located within and on both sides the cartway, four feet to five feet (4'-5') in width, and designated with painted lines. Figure 11 shows a typical bike lane cross-section that can be utilized for the community trail system.

Figure 11: Bike Lane Cross-Section

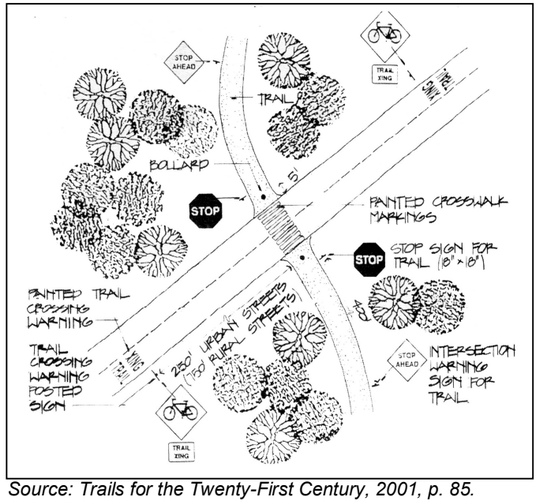


Source: Community Trail handbook, Brandywine Conservancy, 1997, p. 46.

7. Road Crossings.

The multi-use trail and side path system will cross several roadways throughout Upper Uwchlan Township. Figure 12 shows TTFC's recommended design of a typical roadway crossing.

Figure 12: Typical Roadway Crossing Detail



Source: Trails for the Twenty-First Century, 2001, p. 85.

The detail shows the necessary types kinds of cautionary signage, sign and bollard locations, and cross-hatching and painted roadway warnings to facilitate safe roadway crossing for trail users.

F. SPECIAL DESIGN AREAS

Several areas in Upper Uwchlan Township will require special design consideration due to existing conditions such as site geometry, topography and building locations. These areas, shown on Map 3, are distributed throughout the Township and include Byers Village, Eagle Village, the Styer Road, Little Conestoga Road and Route 100 turnpike underpasses, the Styer Road stream bridge and areas which will require significant excavation. Conceptual cross-sections of potential designs for these areas are shown on Sections 2 through 10 on the following pages. Section 1 shows an example of an area on that requires no Milford Road special design with adequate right-of-way for a multi-use trail. The cross-sections illustrate the required alterations to the existing natural and manmade environment to accommodate trail and/or bicycle facilities, and in the case of the villages, streetscape amenities. Pedestrian crossing / warning signs must also be posted for these areas. These areas are described further below.

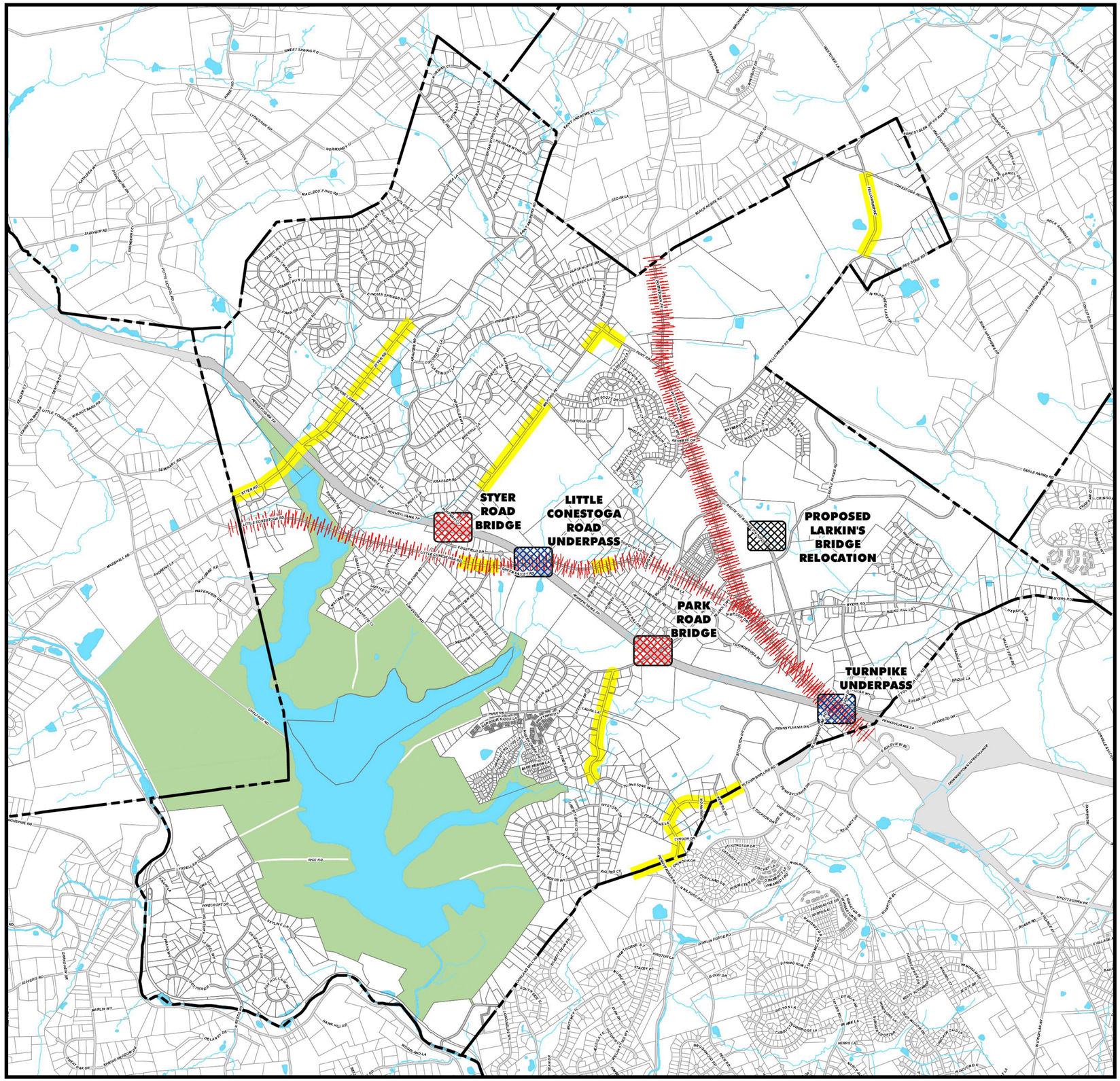
1. Little Conestoga Road Design Alternatives.

The section of Little Conestoga Road pictured in Sections 2 and 3 and is a prime example of areas which will require excavation or cut to create a bench to accommodate a trail or side path facility. Because of the potential need for excavation, two (2) design alternatives are proposed. Alternative A shows an excavated shoulder area, which will contain a six-foot (6') wide side path, a planted shoulder area, and two (2) four-foot (4') wide bike lanes adjacent to the twenty-foot (20') wide cartway. The roadside will be excavated sufficient to construct a six-foot to eight-foot (6'-8') wide path with a four-foot (4') wide planted buffer between the trail and the cartway.

In Alternative B, no excavation takes place and the six-foot (6') wide side path is constructed at the top of the existing bank. At the toe of slope are two (2) four-foot (4') wide bike lanes adjacent to the twenty-foot (20').

2. Little Conestoga Road Turnpike Underpass.

A pedestrian side path is proposed for Little Conestoga Road, the design of which will be affected by the overpass abutments adjacent to the 18-foot (18') wide cartway. Section 4 shows the conceptual design for this underpass, which indicates that the travel lanes will be reduced to nine feet (9') each in order to accommodate a five-foot (5') wide pedestrian side path.



LEGEND

- TURNPIKE BRIDGES
- TURNPIKE UNDERPASSES
- CREEK CROSSING BRIDGE

HIGH TRAFFIC VOLUME ROADS

- ROUTE 100
- LITTLE CONESTOGA RD

ROW ACQUISITION

- ROW 16.5' FROM ROAD CENTERLINE

1 inch equals 0.5 miles

0 0.5 1 1.5 Miles

NORTH

UPPER UWCHLAN COMMUNITY TRAIL MASTER PLAN

DESIGN CONSTRAINTS

Date: 9/14/05	Map #:3	Drawn by : TWB

RAY OTT & ASSOCIATES
17 SOUTH CHURCH STREET
WEST CHESTER, PA 19382

Campbell Thomas & Co. Architects
1504 South Street
Philadelphia PA 19146-1636

3. Styer Road Turnpike Underpass.

Section 5 shows the Styer Road underpass design. A multi-use trail is proposed for Styer Road, which will also be affected by a turnpike overpass. In order to accommodate a ten-foot (10') multi-use trail right-of-way through the underpass, it is recommended that the two (2) travel lanes within the underpass be converted to a one-lane tunnel with stop signs on both sides of the underpass. Warning signs that opposing vehicles must yield to one another thus slowing traffic through this area must be posted. The travel lane will be reduced from 22 feet to 12 feet.

4. Bridge on Styer Road.

The bridge on Styer Road is currently a one lane bridge, with yield signs on both sides of the bridge for opposing traffic. It is recommended that in order to accommodate the proposed six foot (6') wide side path, the cartway should be narrowed to twelve feet (12'), as shown in Section 6.

5. Milford Road Turnpike Bridge.

The cartway is proposed to be reduced to eighteen feet (18') in order to accommodate a five-foot (5') wide side path on the south side of the road separated by a one-foot (1') edge, as depicted in Section 7.

6. Route 100 Turnpike Underpass.

Section 8 shows the Route 100 underpass design. In order to accommodate the multi-use trail proposed for this area of Route 100, it is recommended that a crosswalk will be installed from East Township Line Road across Route 100 at the traffic signal. The multi-use trail will be constructed within the shoulder of the existing cartway, to be separated from the roadway with a guide rail. Pedestrian crossing signs must also be included.

7. Byers Village Design Alternatives.

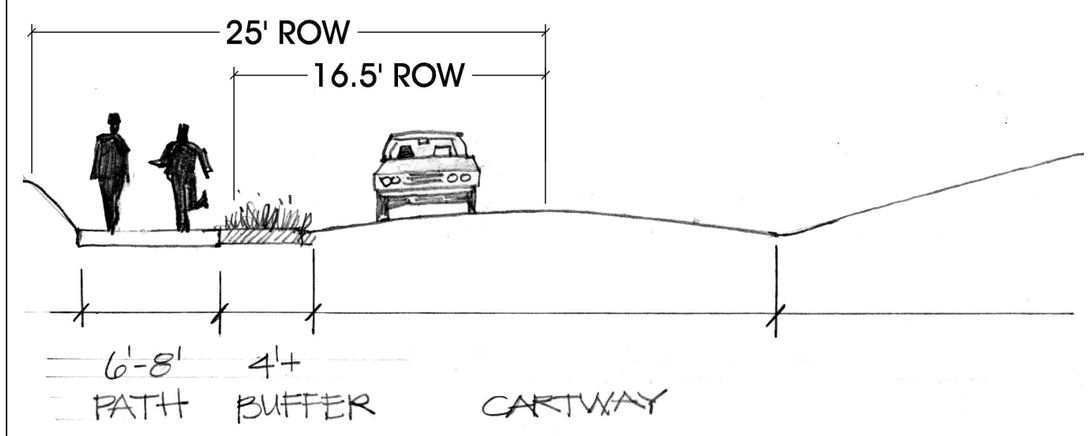
Byers Village, located east of Route 100 at the Village of Eagle. Byers Village is listed on the National Register of Historic Places and includes several historic structures located within feet of the cartway, which is twenty feet (20') in width. Two (2) types of conceptual designs are proposed as shown in Sections 9 and 10, to accommodate areas where the right-of-way is narrow and areas where the right-of-way is a bit wider. In Section 9, the conceptual design for a narrow right-of-way includes a curb and five-foot wide sidewalk on both sides of the street. The cartway would remain twenty feet (20') wide. In areas where the right-of-way is wider, two (2) five-foot (5') wide sidewalks are proposed. Additionally, between the sidewalk and curb, a minimum three-foot (3') wide planting strip is proposed to include street trees.

Alternatively, in Section 10, a four-foot to five-foot (4'–5') wide sidewalk may be installed on one side of Byers Road only, with a three-foot (3') wide planting strip.

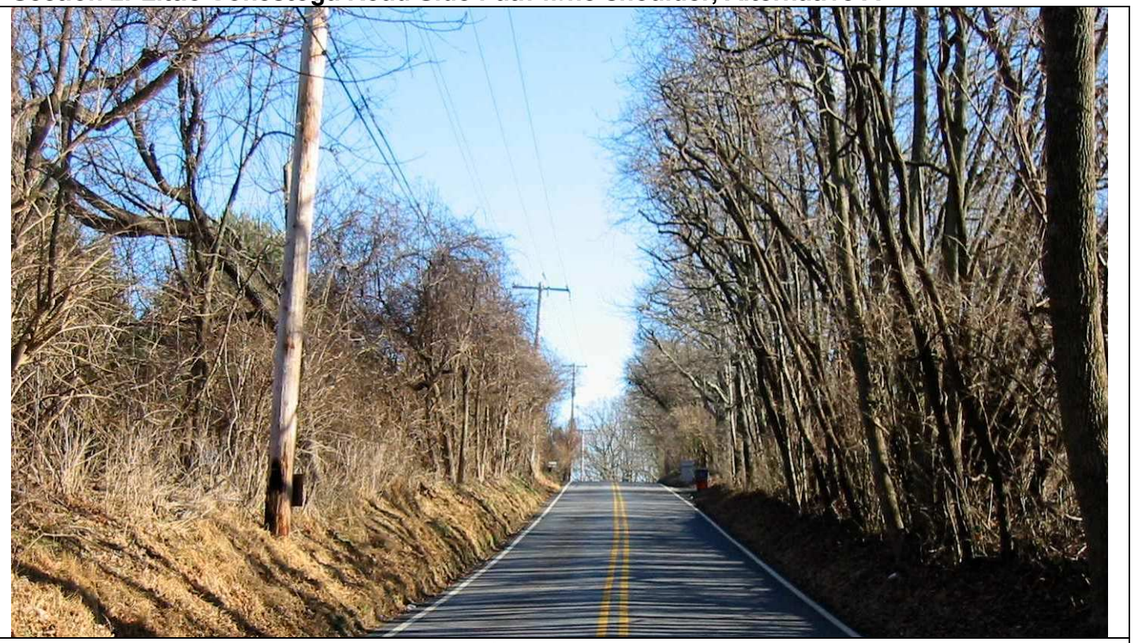
8. Eagle Village Streetscape.

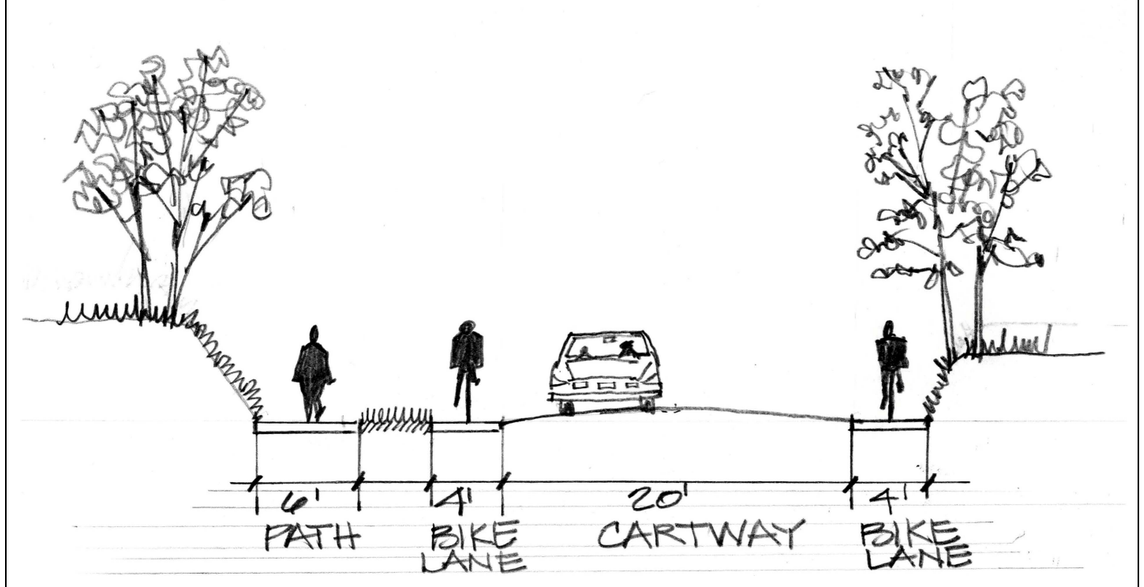
Section 11 shows the proposed conceptual design for the Eagle Village streetscape design south of the intersection of Route 100 and Little Conestoga. Both sides of the two-lane corridor will have a five-foot (5') wide sidewalk, a four foot (4') wide planting strip, a six inch curb, a seven-foot (7') wide parking lane, a four foot (4') wide bicycle lane, and a ten foot (10') wide travel lane.

Section 1. Milford Road Multi-use Trail w/ adequate shoulder

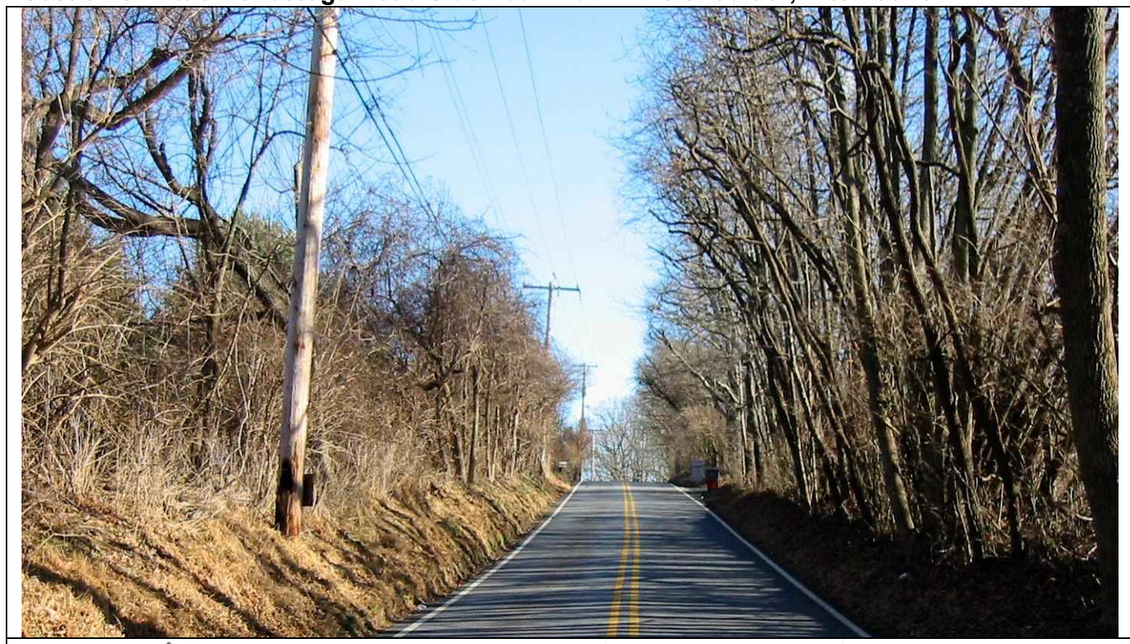


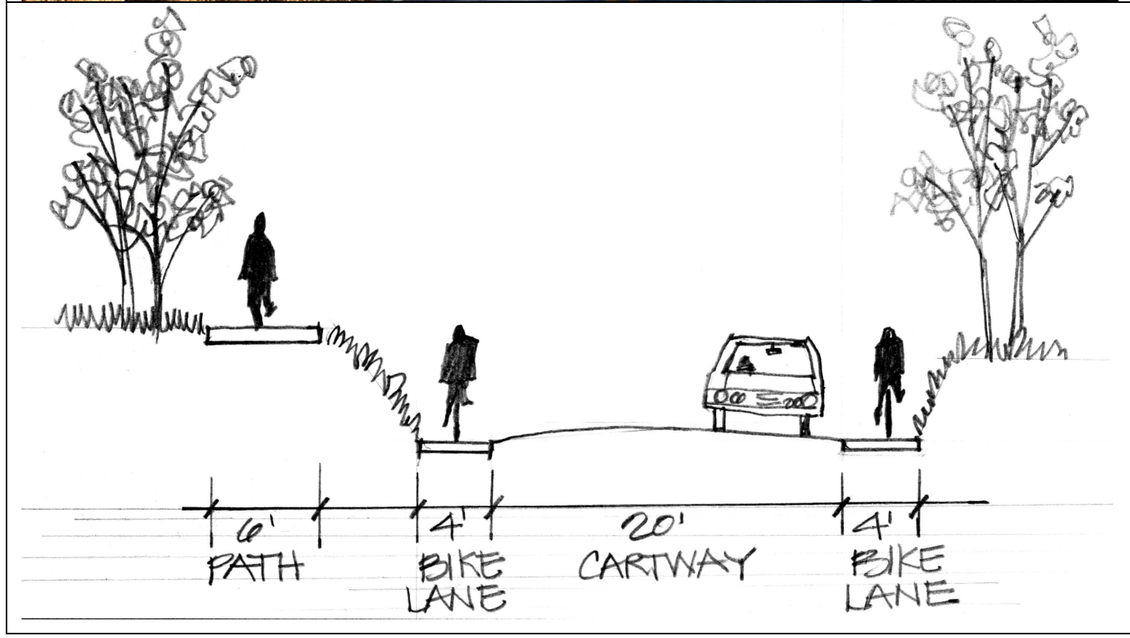
Section 2. Little Conestoga Road Side Path w/no shoulder, Alternative A



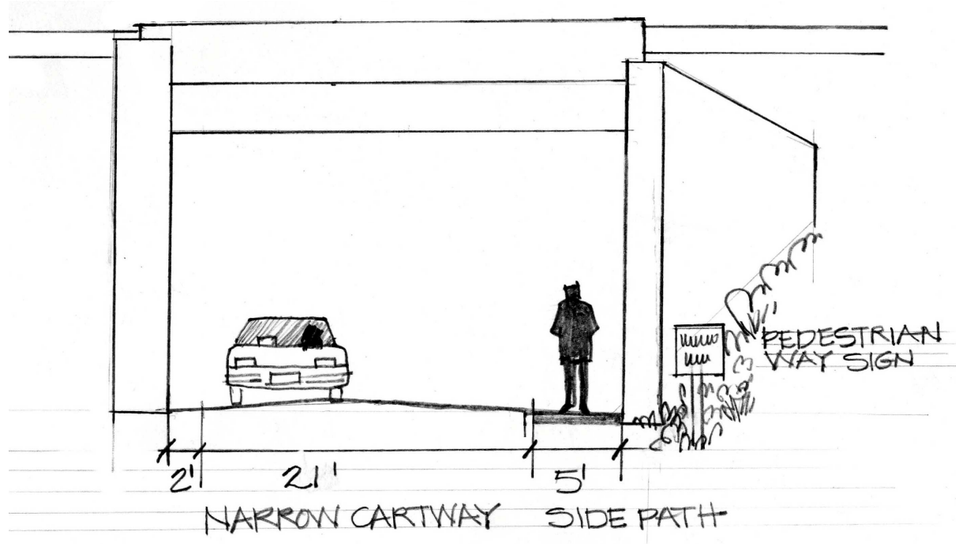


Section 3. Little Conestoga Road Side Path Trail w/ no shoulder, Alternative B

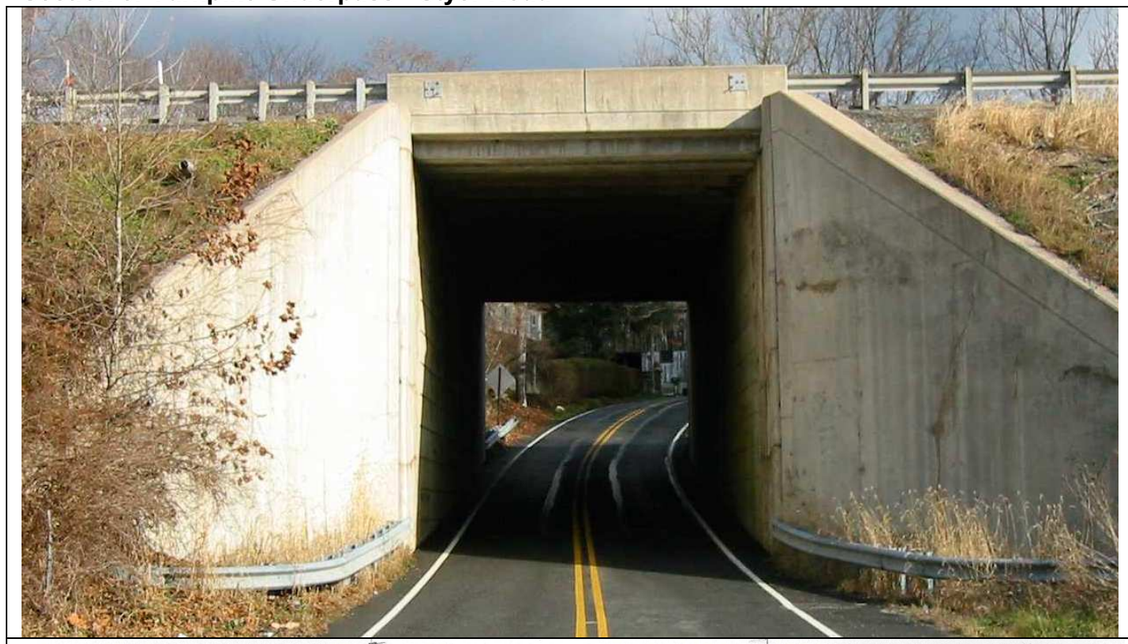


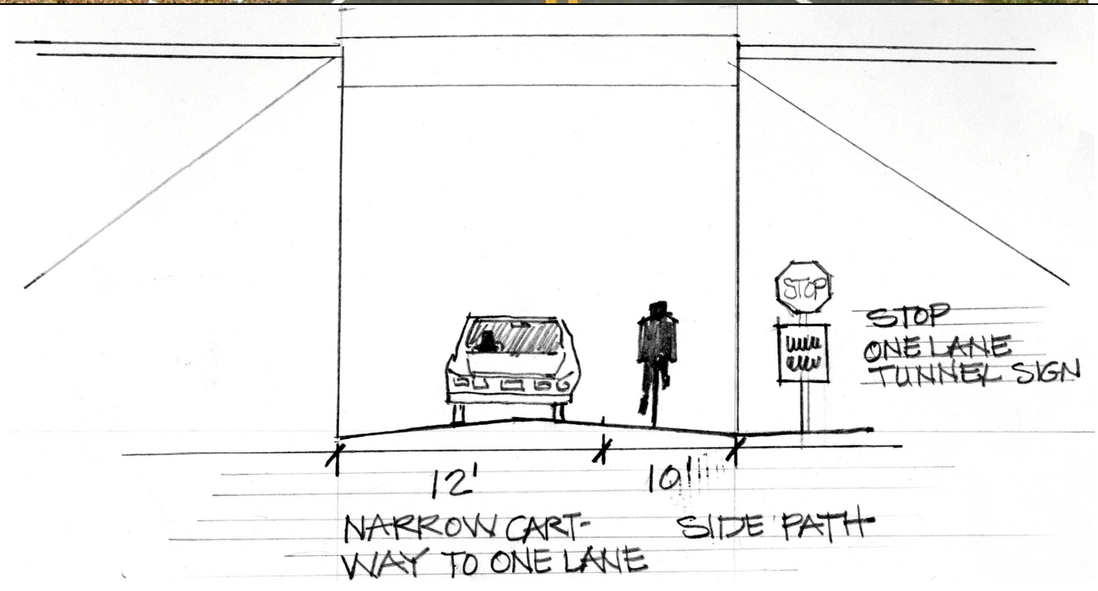


Section 4. Turnpike Underpass - Little Conestoga Road

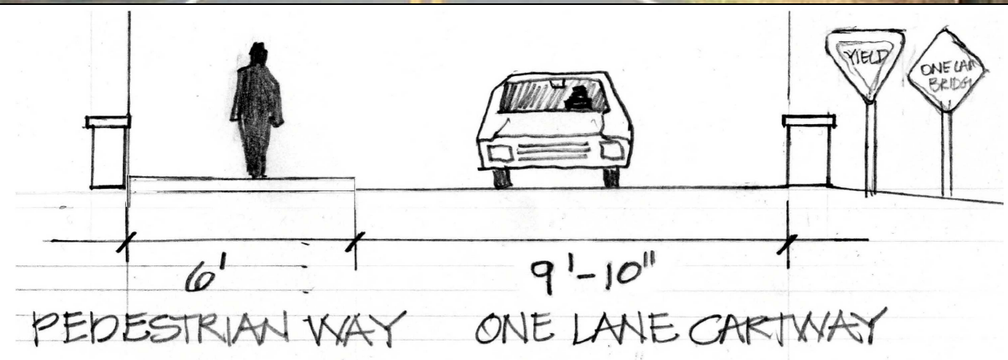


Section 5. Turnpike Underpass - Styer Road

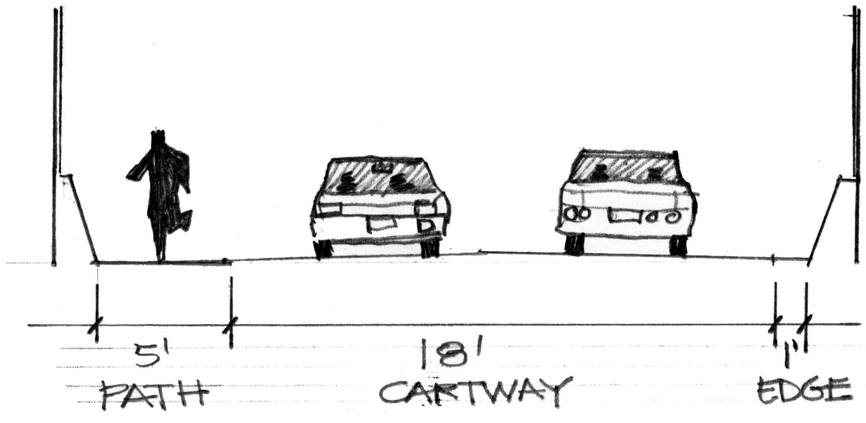




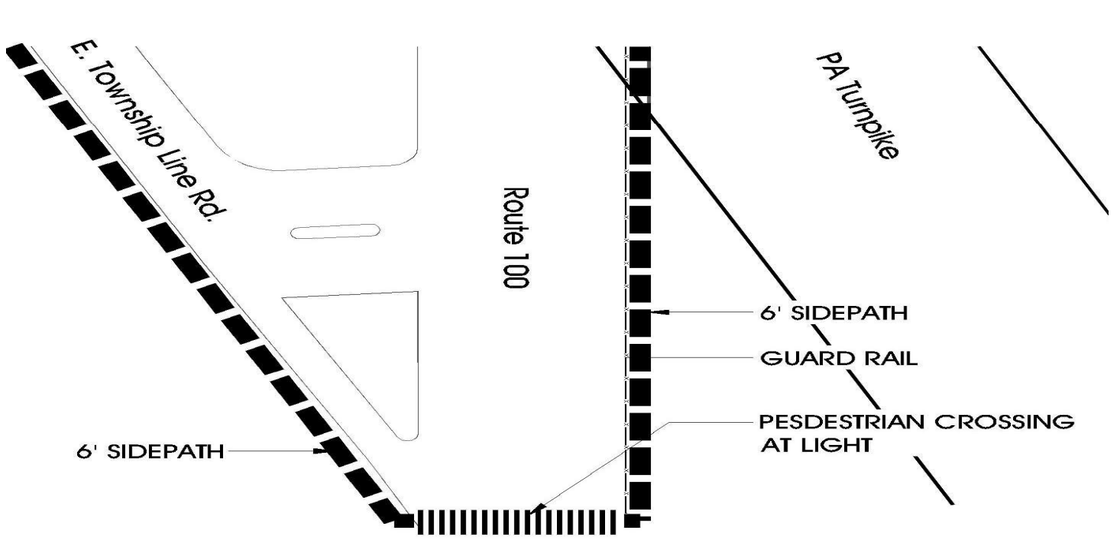
Section 6. Krausers Bridge - Styer Road



Section 7. Turnpike Bridge – Milford Road

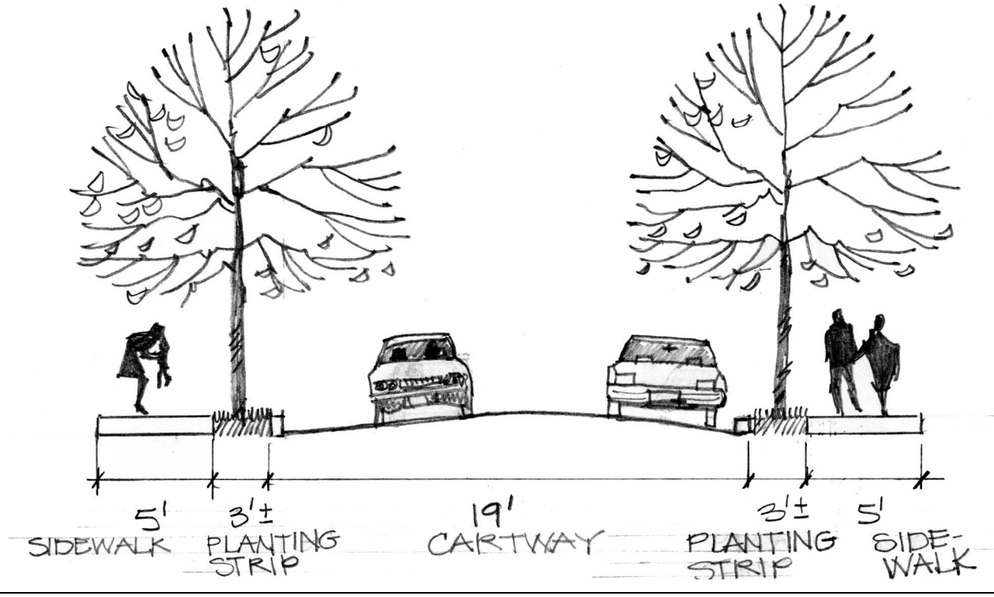


Section 8. Turnpike Underpass – Rt. 100



Section 9. Byers Village - narrow roadway

Section 10. Byers Village - wide roadway



Section 11. Eagle Village Streetscape

IV. TRAIL MASTER PLAN

This chapter will set forth the proposed alignment of the recommended pedestrian and bicycle trail facilities and indicate each project's priority in terms of the schedule for construction. A construction cost estimate is also included and is divided into construction phases.

A. TRAIL TYPES AND ALIGNMENT

Map 1 shows the intended alignment of the proposed pedestrian facilities, including multi-use trails, side paths, hiking trails, sidewalks, and signed walking streets in Upper Uwchlan Township. Required Rights-of-Way. Map 2 shows proposed bicycle facilities, including bike lanes and signed bike routes. In certain portions of the proposed community trail system, rights-of-way will need to be acquired in order to construct the trail according to recommended standards. Maps 1 and 2 also show the areas where additional right-of-way acquisition has been determined to be required. The Construction Cost Estimate, on pages 14A-14G provides an estimate of the purchase cost for required rights-of-way.

Priority 1: Central Loop Multi-use Trail.

Description

Multi-use trails are paved trails that can be used by pedestrians, bicyclists and in-line skaters. Construction of the multi-use trail in Upper Uwchlan Township is concentrated primarily in one proposed project, the "Central Loop." A multi-use trail which forms a "loop" in the center of the Township is proposed to be constructed primarily along Route 100, Milford Road and Park Road. The potential exists for public-private partnerships with local developers to construct trail segments as part of new land development projects. This project is considered the highest priority project of the community trail network.

Alignment

It is recommended that an eight-foot (8') wide paved multi-use trail be constructed on the west side of Route 100 from Park Road extending north to Font Road. Private developers will install portions of this trail segment and development of other portions of this trail loop will be the responsibility of Upper Uwchlan Township. Responsibility and funding will be discussed later in this report.

The multi-use trail should continue on the west side of Font Road to Milford Road, where it should then turn left (to the southwest) and follow along the south side of Milford Road. At Little Conestoga Road the multi-use trail should turn east (left) and follow the east side of Little Conestoga Road until it reaches Green Valley Road. The trail would follow along the east side of Green Valley Road until reaching the Frame and Shea tracts. These tracts are proposed for residential development and the Township will request that private developers construct the multi-use trail through the two (2) sites and connect to Park Road.

At Park Road, the multi-use trail will turn northeast and follow Park Road until it completes the loop at Route 100. The Park Road trail segment will also extend southwest to Marsh Creek State Park and east to trails and sidewalks within the Reserve at Eagle and Waynebrook developments on Route 100.

The total project cost for the Central Loop Project is estimated to be $1,674,220. Subtracting grant funding already awarded to the Township reveals that $284,702 is still needed to fully support estimated project costs.

Priority 2: Signed Routes and Northern Side Paths.

Signed Walking Streets:

It is recommended that certain residential streets with traffic volumes that facilitate walking within the cartway be designated as "signed walking streets." The only proposed improvement to be made to these streets is the installation of signs indicating pedestrian use of the streets. Signed walking streets are proposed in the southwest end of the Township on Lyndell and Reeds Roads, to alert Brandywine Trail users of a way to access Marsh Creek State Park from the west. Signed walking streets are also proposed from Dan Drive along Greenridge Road to Styer Road in the northern section of the Township, and from Somers Drive to Milford Road.

Signed Bike Routes:

The only improvement associated with signed bike routes are the installation of "Share the Road" type signage. Signed bicycle routes are proposed to follow the following road rights-of-ways:

- Entire length of Styer Road and Fellowship Road;
- Krauser Road;
- Northern and central portions of Moore Road; and;
- Central portion of Font Road.

The estimated project cost for signed walking streets and bike routes is $9,510.

Northern Side Paths:

It is recommended that side paths be six-feet (6') in width, paved, and separated from the roadway by a minimum four-foot (4') wide buffer. Side paths are proposed for development along Styer, Krauser, Greenridge and Font Roads in the western portion of the Township.

The cost to construct the Northern Side Paths and Signed Routes project is estimated at $670,485.

Priority 3: Southeast Sidewalk and Side Paths Project-Moore Road, Turnstone Way and Dorlans Mill Road.

It is recommended that side paths and sidewalks be six feet (6') in width, paved, and separated from the roadway by a minimum four-foot (4') wide buffer. Sidewalks will be constructed with a curb. Bicycle use is not recommended on side paths and not permitted on sidewalks. This project is proposed as follows:

Side Paths:

- Moore Road to Ivystone Way.
- West Brandywine Road at Turnstone Way south to Moore Road.
- Dorlans Mill Road south to Struble Trail.

Sidewalks:

- Ivystone Way to Dorlans Mill Road
- Turnstone Way
- Dorlans Mill Road at Moore Road south to Robert Dean Drive

The estimated construction costs for the Southeast sidewalk and side paths project is $667,431.

Priority 4: Brandywine Trail Off-Road Link and Marsh Creek State Park Hiking Trails.

Hiking trails will be unpaved and more natural than the other types of proposed trail facilities.

Brandywine Trail Off-Road Link:

It is recommended that the section of the Brandywine Trail that connects Krauser Road to the northeastern side of Marsh Creek State Park through an existing tunnel be reestablished and adequately maintained in the future.

Marsh Creek State Park:

A hiking trail is proposed within Marsh Creek State Park, on the eastern side of the lake (south of the Marsh Harbor development). This trail will link to existing hiking trails in the park.

The estimated construction cost for hiking trail development is $50,369.

Phase 5: Complete Route 100 Multi-use Trail (net of Central Loop).

The fifth construction phase involves development of the multi-use trail south of Park Road through the Village of Eagle to the Town-

ship boundary. The estimated construction cost for Phase 5 is $244,400.

Phase 6: Little Conestoga, Byers, Fellowship & East Township Line Roads Side Paths and Bike Lanes

Phase 6 is the development of four-foot (4') wide bike lanes, on Font, Little Conestoga, Township Line and Moore Roads, and Senn Drive. The bike lane on Township Line Road will link to the Pennsylvania Bicycle Route "L" which follows Creek Road just south of Upper Uwchlan Township in East Brandywine Township. Phase 6 also includes side paths on Little Conestoga Road, Byers, Fellowship and East Township Line Roads.

Phase 6 construction costs are estimated to be $1,029,603.

Phase 7: Eagle and Byers Village Streetscapes.

Streetscapes projects are proposed for the Villages of Byers and Eagle and will be completed as Phase 7. This project will include sidewalks, street trees, and lighting. Phase 7 construction costs are estimated to be $2,011,200.

B. CONSTRUCTION COST ESTIMATE

A construction cost estimate was developed for the community trail project based on the individual phased pedestrian trail and bike facilities discussed earlier in the chapter. Available public funding that may be utilized to support trail construction project costs is discussed in the following chapter. Several public agencies have previously awarded funding to Upper Uwchlan Township for certain trail projects. Specifically, the Park Road Trail project, including the pedestrian bridge over the Pennsylvania Turnpike, has been awarded a total of $1,389,518 million, which reduces the Total Construction Costs figure from approximately $7,089,309 to $5,708,309. The detailed construction cost estimate is shown by construction phase, together with phasing maps on pages 14A through 14G.

PHASE 1:
CONSTRUCTION COST ESTIMATE: CENTRAL LOOP MULTI-USE TRAIL

Cost Parameters	Cost/SY	Cost/LF	Per Unit	Cost/SF
- 8' asphalt trail, complete	$20	$17.78		
- 4' shoulders, grading & landscape allowance	$5	$4.44		
- road crossings			$1,000	
- right-of-way acquisition allowance				$2
	$25	$22.22		

PROJECT COST

Multi-use Trails	LF	Cost/LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Road Crossings Cost	Other Costs [2]	Total
Park Road (existing benching)	3,735	$22.22	1	$83,000	2	$2,000	$800,000	$885,000
Park Road (no existing benching)	6,365	$22.22	2	$282,889	2	$2,000		$284,889
Pottstown Pike (existing benching)	4,466	$22.22	1	$99,244	4	$4,000		$99,244
Pottstown Pike (no existing benching)	1,039	$22.22	2	$46,178				$46,178
Milford Road (existing benching)	6,370	$22.22	1	$141,556				$141,556
Milford Road (no existing benching)	845	$22.22	2	$37,552				$37,552
Milford Road ROW expansion est. 2815 l.f. [3]				$56,300				$56,300
Font Road (existing benching)	1,909	$22.22	1	$42,422				$42,422
Font Road ROW expansion est. 657 l.f. [3]				$13,140				$13,140
Little Conestoga Road (existing benching)	1,531	$22.22	1	$34,022	1	$1,000		$35,022
Little Conestoga Road (no existing benching)	167	$22.22	2	$7,422				$7,422
Green Valley Road	760	$22.22	1	$16,889				$16,889
Frame Property crossing	1,510	$22.22	1	$33,556				$33,556
Shea Property crossing	2,438	$22.22	1	$54,178				$54,178
TOTAL PROJECT COSTS	31,135	linear feet						**$1,753,347**
	5.9	miles						

[1] Cost factor of 2 applied to road segments with grading and clearing issues
[2] Pedestrian bridge at Turnpike
[3] Right-of-way estimated when existing ROW of 33', 10' additioinal is needed to accommodate multi-use trail.

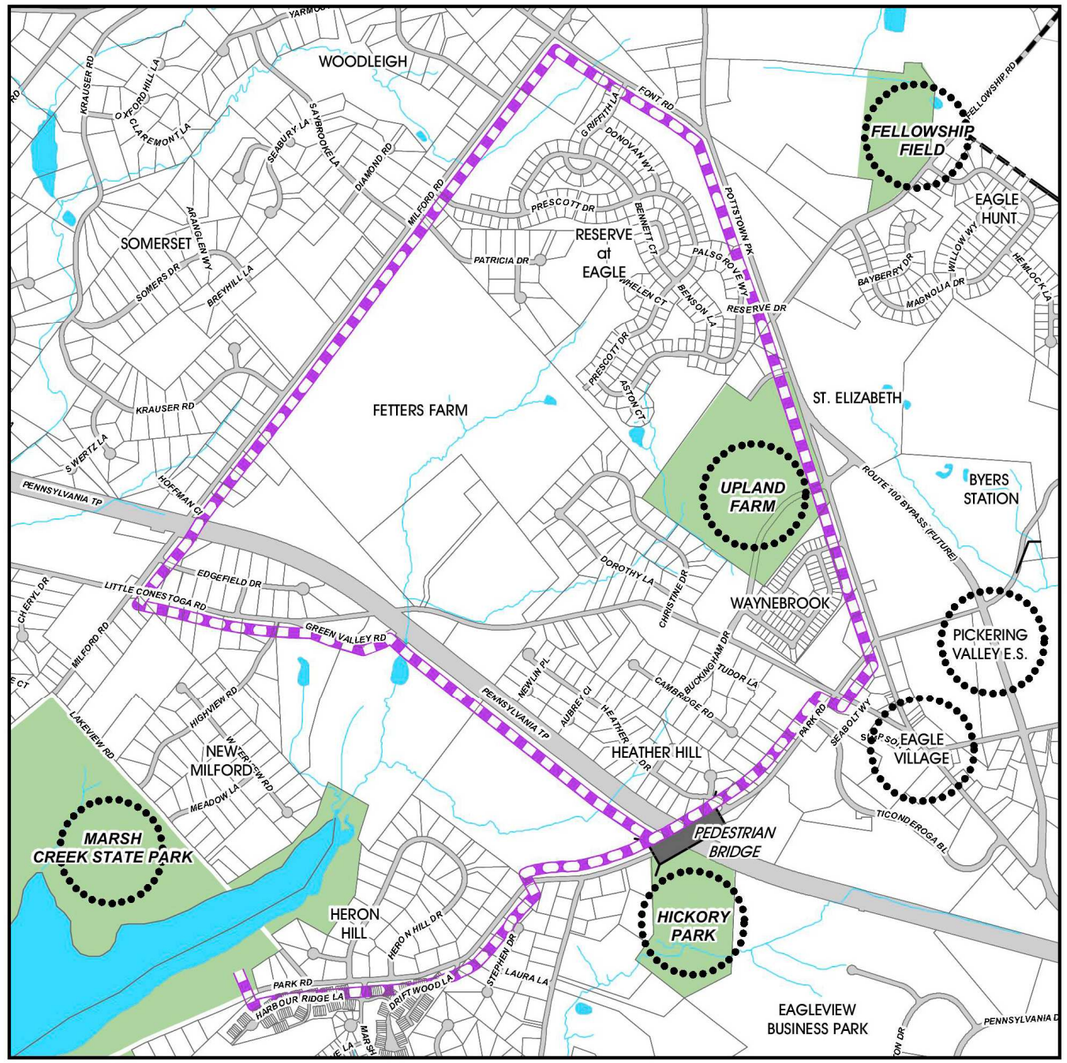
Total		**$1,753,347**
Design & Engineering	10%	**$175,335**
Contingency	10%	**$175,335**
TOTAL CONSTRUCTION COSTS		**$2,104,017**

PROJECT FUNDING
GRANTS

Transportation Enhancement Funds for bridge (2002)	$608,000
Transportation Enhancement Funds for trail (2004)	$400,000
Chester County Round XII, (2001)	$250,000
Total Grants	**$1,258,000**

PRIVATE DEVELOPMENT PROJECTS	LF	Cost/LF		
Reserve at Eagle 6' asphalt trail along Rt. 100 (Toll Brothers)	1,985	$15.00	*adjusted for 6' trail*	$29,775
Waynebrook 6' asphalt trail along Rt. 100 (Cutler Group)	934	$15.00	*adjusted for 6' trail*	$14,010
Frame Property -- negotiate with land development approval	1,510	$22.22		$33,556
Shea Property -- negotiate with land development approval	2,438	$22.22		$54,178
Total Value of Private Projects				**$131,518**

ADDITIONAL FUNDING NEEDS	**$714,498**



PHASE 2:

CONSTRUCTION COST ESTIMATE: SIGNED ROUTES & NORTH TOWNSHIP TRAILS

PEDESTRIAN SIGNED WALKING STREETS

Cost Parameters	Sign	Cost / LF
Street Signage - 1 sign per 1/4 mile	$140	$0.10

Pedestrian Walking Streets	LF	Cost / LF	Cost Factor [1]	Walking Street Sub-total	Total
Lyndell Road & N. Reeds Road	8,148	$0.10	1	$815	$815
Red Bone Road	2,570	$0.10	1	$257	$257
Greenridge Road	3,755	$0.10	1	$376	$376
Krauser Road	3,108	$0.10	1	$311	$311
	17,581	linear feet		**$1,758**	**$1,758**
	3.3	miles			

BICYCLE SIGNED ROUTES

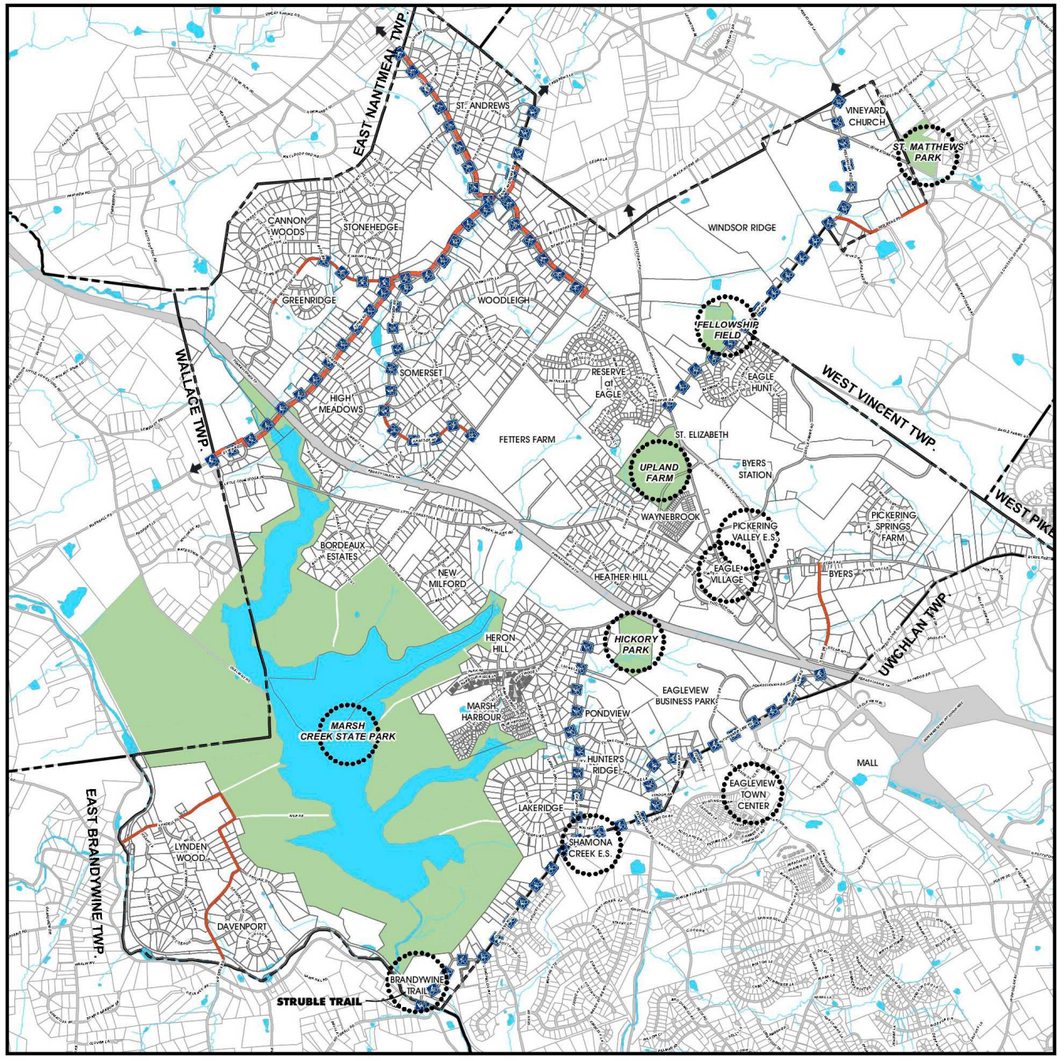
Cost Parameters	Sign	Cost / LF
- share-the-road (1 per 1/4 mi.), route & intersection signs	$140	$0.10

Bicycle Signed Routes	LF	Cost / LF	Cost Factor*	Trail Sub-total	Total
Dorland Mills Road	6,203	$0.10	1	$620	$620
Fellowship Road	10,070	$0.10	1	$1,007	$1,007
Font Road	8,165	$0.10	1	$817	$817
Greenridge Road/St. Andrews Road	8,556	$0.10	1	$856	$856
Krauser Road	6,761	$0.10	1	$676	$676
Moore Road	5,673	$0.10	1	$567	$567
Styer Road	6,588	$0.10	1	$659	$659
West Township Line Road	8,595	$0.10	1	$860	$860
	60,611	linear feet		$6,061	**$6,061**
	11.5	miles			

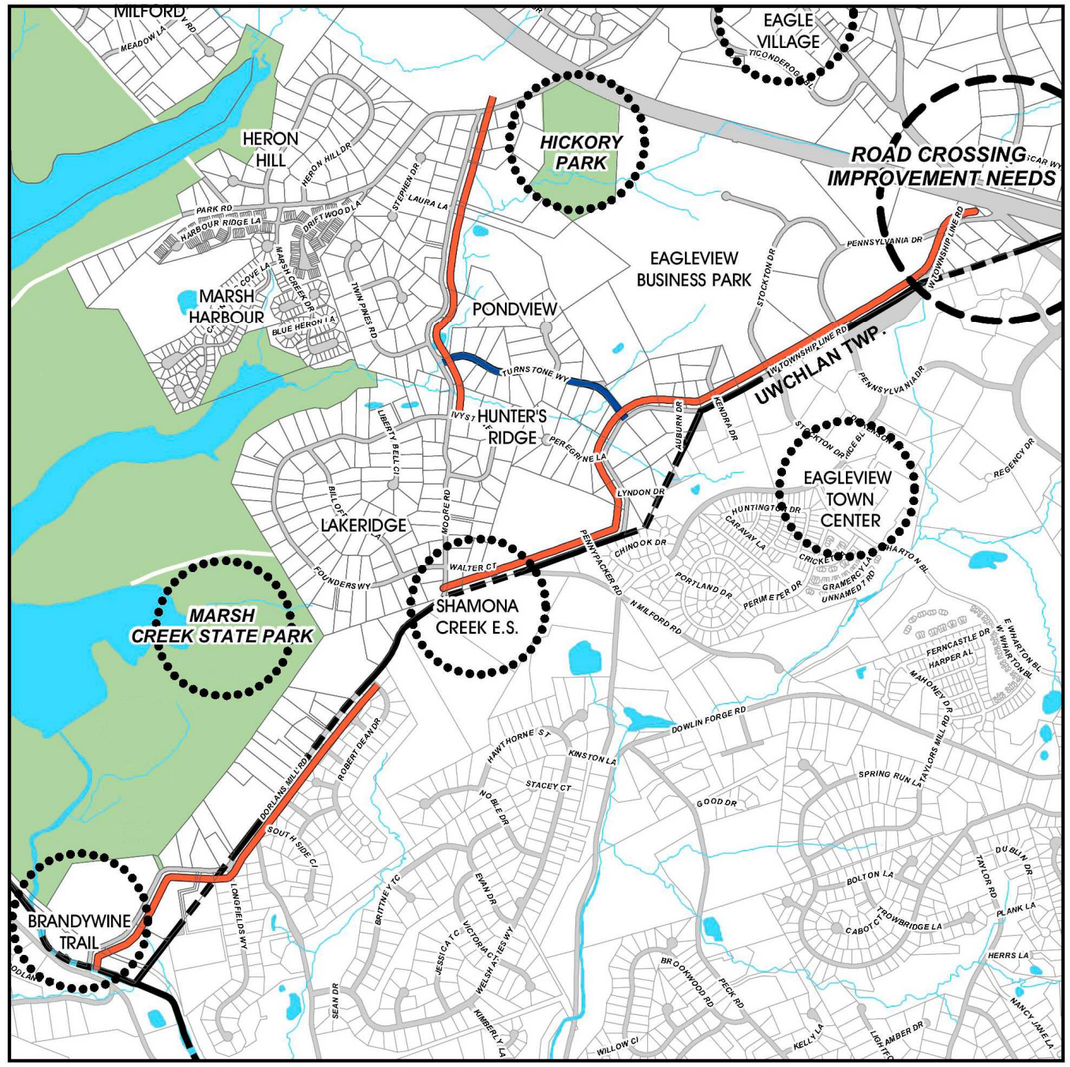
PEDESTRIAN SIDEPATHS

Cost Parameters	Cost / SY	Cost / LF	Per Unit	Cost/SF
- 6' asphalt trail, complete	$20	$13.33		
- 4' shoulders, grading and landscape allowance	$5	$4.44		
- road crossings			$1,000	
- right-of-way acquisition allowance				$2
	$25	$17.78		

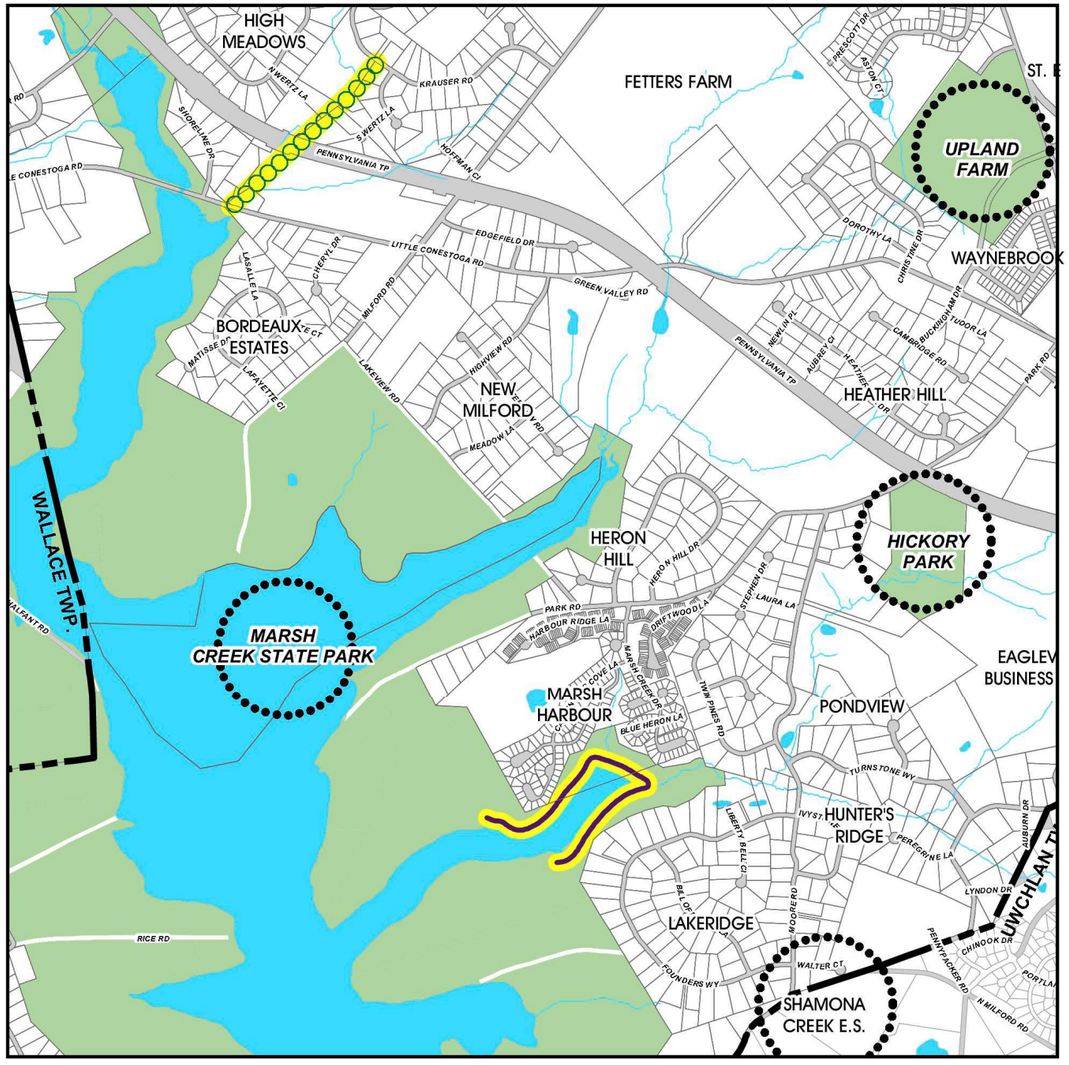
					Road Crossings			
Pedestrian Sidepaths	LF	Cost / LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Cost	Other Costs	Total
Font Road (net of Central Loop Trail)	5,027	$17.78	1	$89,369	7	$7,000		$96,369
Font Road - need grading/clearing	3,093	$17.78	2	$109,973				$109,973
Greenridge Road/St. Andrews Road	986	$17.78	1	$17,529	5	$5,000		$22,529
Greenridge /St. Andrews Rds. - need grading/clearing	5,593	$17.78	2	$198,862				$198,862
Styer Road	4,120	$17.78	1	$73,244	4	$4,000		$77,244
Styer Road - need grading/clearing	2,468	$17.78	2	$87,751				$87,751
Styer Road ROW expansion est. 6522 l.f. [2]				$104,352				$104,352
	21,287	linear feet						**$697,081**
[1] Cost factor of 2 applied to road segments with grading & clearing issues	4.0	miles						
[2] Right-of-way estimated when existing ROW of 33', 8' additioinal is needed to accommodate side path trail.								
Total								**$704,900**
Design & Engineering							10%	**$70,490**
Contingency							10%	**$70,490**
TOTAL CONSTRUCTION COSTS								**$845,880**



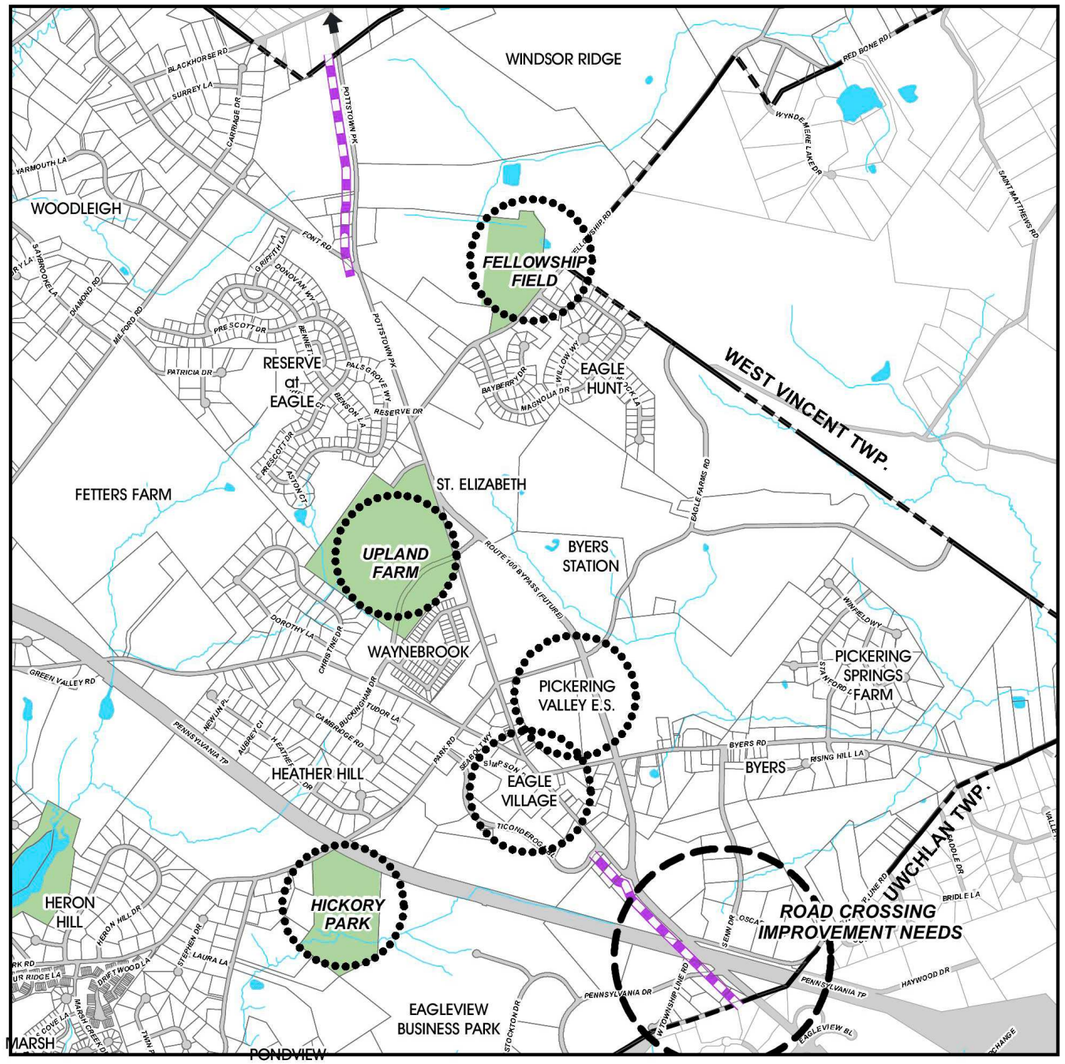
PHASE 3:								
CONSTRUCTION COST ESTIMATE:								
MOORE, DOLIN MILL, W. TWP. LINE SIDE PATHS; TURNSTONE WAY SIDEWALKS								
PEDESTRIAN SIDEPATHS								
Cost Parameters	Cost / SY	Cost / LF	Per Unit	Cost/SF				
- 6' asphalt trail, complete	$20	$13.33						
- 4' shoulders, grading and landscape allowance	$5	$4.44						
- road crossings			$1,000					
- right-of-way acquisition allowance				$2				
	$25	$17.78						
					Road Crossings			
Pedestrian Sidepaths	LF	Cost / LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Cost	Other Costs	Total
Dorland Mills Road	1,659	$17.78	1	$29,493	5	$5,000		$34,493
Dorland Mills Road - need grading/clearing	3,258	$17.78	2	$115,840				$115,840
Moore Road	1,633	$17.78	1	$29,031	3	$3,000		$32,031
Moore Road - need grading/clearing	1,971	$17.78	2	$70,080				$70,080
Moore Road ROW expansion est. 2990 l.f. [2]				$47,840				$47,840
Township Line Road, West	819	$17.78	1	$14,560	6	$6,000		$20,560
Township Line Road, West - need grading/clearing	7,706	$17.78	2	$273,991				$273,991
Township Line Road ROW expansion est. 4457 l.f. [2]				$71,312				$71,312
Turnstone Way sidewalk project	2,279	$70.00	1	$159,530				$159,530
[1] Cost factor of 2 applied to road segments with grading / clearing issues	19,325	linear feet						**$675,344**
[2] Right-of-way estimated when existing ROW of 33', 8' additioinal is	3.7	miles						
needed to accommodate side path trail.								
Total								**$675,344**
Design & Engineering							10%	**$67,534**
Contingency							10%	**$67,534**
TOTAL CONSTRUCTION COSTS								**$810,413**



PHASE 4:								
CONSTRUCTION COST ESTIMATE: HIKING TRAILS								
HIKING TRAILS								
Cost Parameters	Cost / SY	Cost / LF	Per Unit					
- clearing and grading		$2.00						
- road crossings			$250		Road Crossings			
Hiking Trails	LF	Cost / LF	Cost Factor[1]	Trail Sub-total	Road Crossings	Cost		Total
Brandywine Trail off-road link	2,320	$2.00	1	$4,640	1	$250		$4,890
Marsh Creek Park trail additions (some boardwalks)	3,750	$2.00	5	$37,500				$37,500
[1] Cost factor of 5 applied to account for segments requiring boardwalks	6,070	linear feet		$42,140				**$42,390**
over wetlands.	1.1	miles						
Total								**$42,390**
Design & Engineering							10%	**$4,239**
Contingency							10%	**$4,239**
TOTAL CONSTRUCTION COSTS								**$50,868**



PHASE 5:								
CONSTRUCTION COST ESTIMATE: Complete Route 100 Multi-Use Trail (net of Central Loop)								
MULTI-USE TRAILS								
Cost Parameters	Cost / SY	Cost / LF	Per Unit					
- 8' asphalt trail, complete	$20	$17.78						
- 4' shoulders, grading and landscape allowance	$5	$4.44						
- road crossings			$1,000					
	$25	$22.22						
					Road Crossings			
Multi-use Trails	LF	Cost/LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Cost	Other Costs	Total
Pottstown Pike (net of Central Loop Trail)	1,967	$22.22	1	$43,711	4	$4,000		$47,711
Pottstown Pike - need grading/clearing (net of Central Loop Trail)	3,419	$22.22	2	$151,956	4	$4,000		$155,956
[1] Additional grading and clearing	5,386	linear feet						**$203,667**
	1.0	miles						
Total								**$203,667**
Design & Engineering							10%	**$20,367**
Contingency							10%	**$20,367**
TOTAL CONSTRUCTION COSTS								**$244,400**



PHASE 6

CONSTRUCTION COST ESTIMATE: Little Conestoga, Byers, Fellowship, E. Twp. Line Road

PEDESTRIAN SIDEPATHS

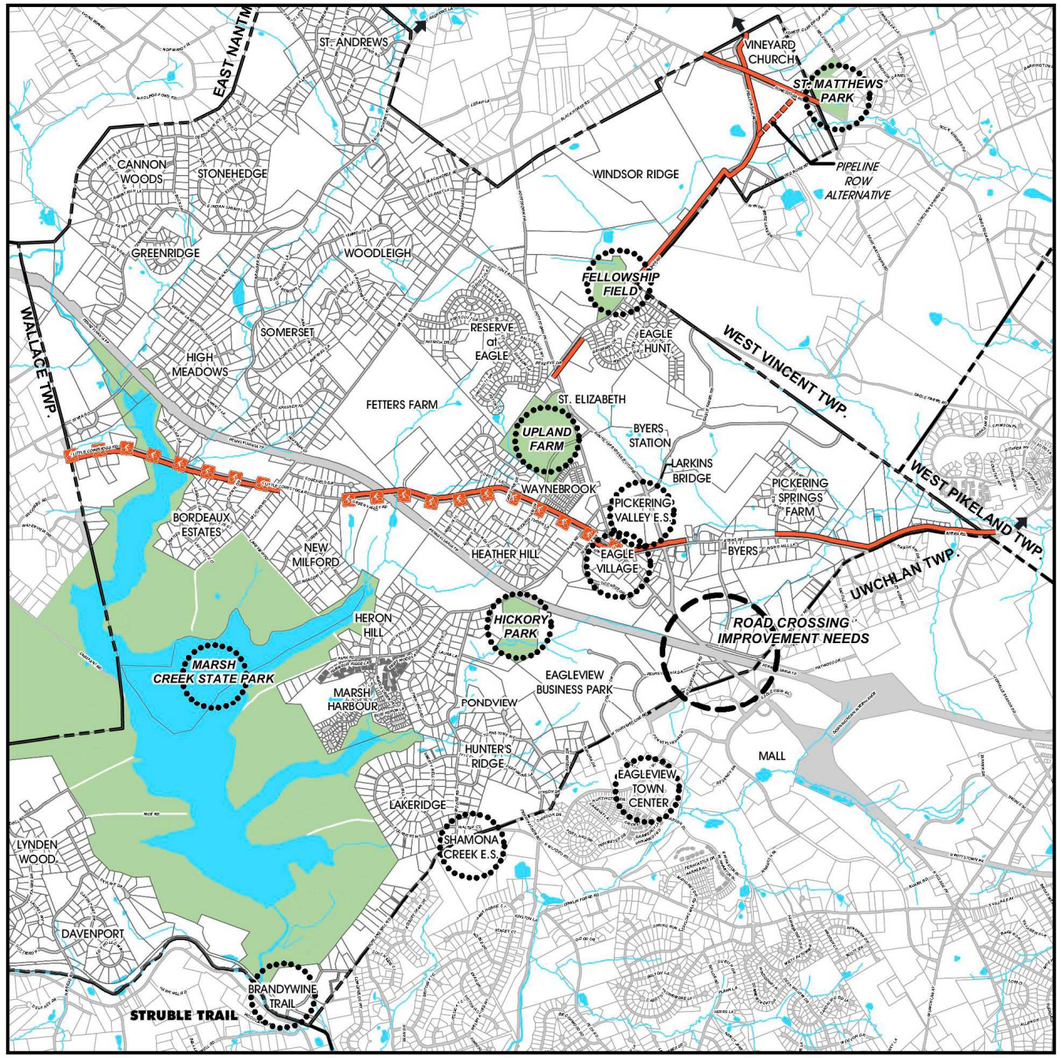
Cost Parameters	Cost / SY	Cost / LF	Per Unit	Cost/SF
- 6' asphalt trail, complete	$20	$13.33		
- 4' shoulders, grading and landscape allowance	$5	$4.44		
- road crossings			$1,000	
- right-of-way acquisition allowance				$2
	$25	$17.78		

Pedestrian Sidepaths	LF	Cost / LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Road Crossings Cost	Other Costs	Total
Byers Road	1,707	$17.78	1	$30,347				$32,347
Byers Road - need grading/clearing	5,247	$17.78	2	$186,560	2	$2,000		$188,560
Conestoga Road	2,169	$17.78	1	$38,560				$38,560
Conestoga Road - need grading/clearing	831	$17.78	2	$29,547				$29,547
Fellowship Road	6,867	$17.78	1	$122,080	2	$0		$122,080
Fellowship Road - need grading/clearing	1,193	$17.78	2	$42,418				$42,418
Fellowship Road ROW expansion est. 2225 l.f. [1]				$35,600				$35,600
Little Conestoga Road	5,620	$17.78	1	$99,911	9	$9,000		$108,911
Little Conestoga Road - need grading/clearing	6,201	$17.78	2	$220,480				$220,480
Little Conestoga Road ROW expansion est. 1608 l.f. [1]				$25,728				$25,728
[1] Right-of-way estimated when existing ROW of 33', 8' additioinal is	29,835	linear feet						**$844,230**
needed to accommodate sidepath trail.	5.7	miles						

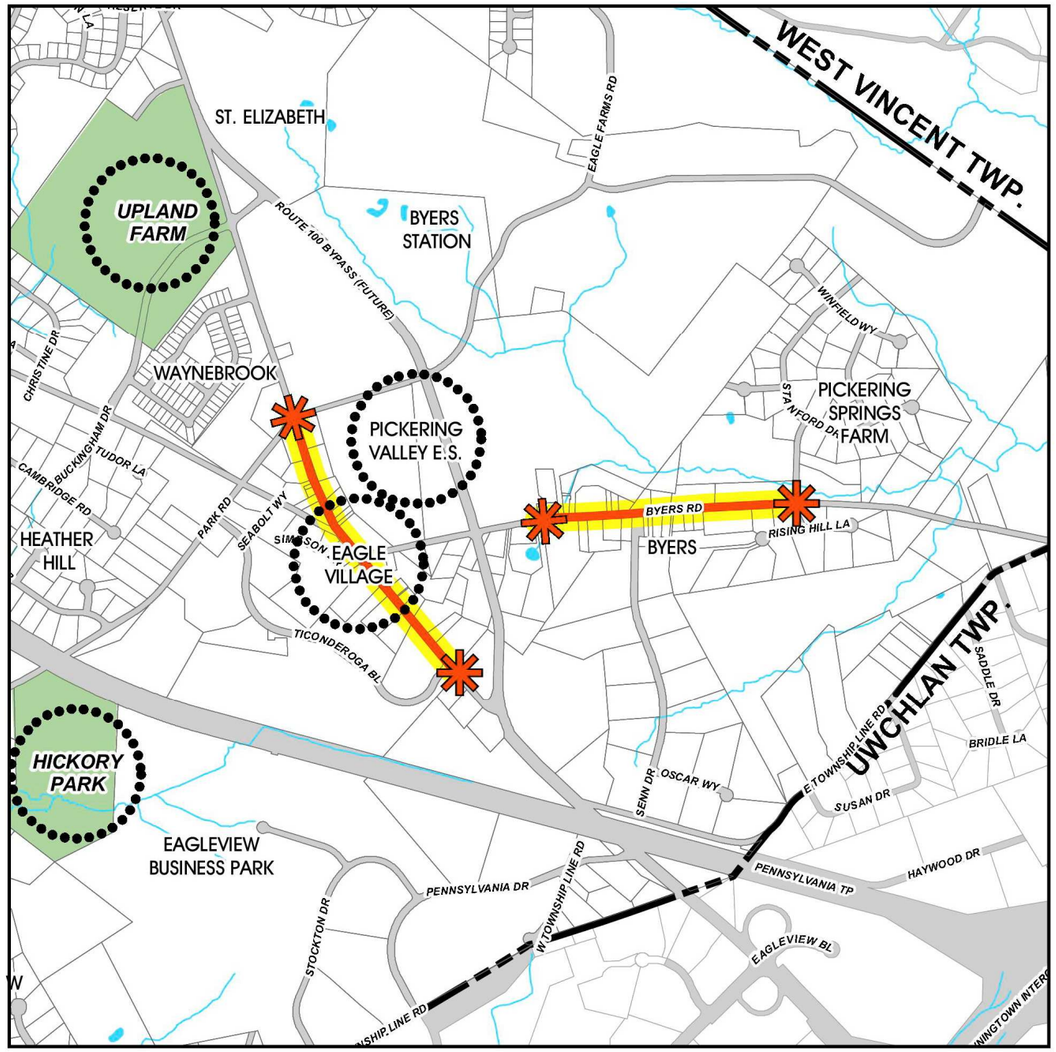
BICYCLE LANES ON EXISTING ROADWAYS

Cost Parameters		Cost / LF	
- 2 lined 4' lanes & signage allowance		$4.00	

Bicycle Lanes on Existing Roadways	LF	Cost / LF	Cost Factor [2]	Trail Sub-total				Total
Byers Road - - need grading/clearing/ROW	6,866	$4.00	2	$54,928				$54,928
Little Conestoga Road	1,527	$4.00	1	$6,108				$6,108
Little Conestoga Road - need grading/clearing (net of Central Loop)	8,624	$4.00	2	$68,992				$68,992
[2] Cost factor of 2 applied to road segments where cartway	17,017	linear feet						**$75,100**
widening/grading issues exist.	3.2	miles						
Total								**$919,330**
Design & Engineering							10%	**$91,933**
Contingency							10%	**$91,933**
TOTAL CONSTRUCTION COSTS								**$1,103,196**



PHASE 7								
CONSTRUCTION COST ESTIMATE: Eagle and Byers Villages Streetscapes								
Cost Parameters			Cost / LF					
Streetscape improvements include sidewalks, street trees, lighting -- allowance:								
- Eagle Village -- 80' right-of-way			$500					
- Byers Village -- <33' right-of-way			$200					
					Road Crossings			
	LF	Cost / LF	Cost Factor [1]	Trail Sub-total	Road Crossings	Cost	Other Costs	Total
Pottstown Pike -- Eagle Village Streetscape	2,500	$500.00	1	$1,250,000				$1,250,000
Byers Village Streetscape improvements	2,125	$200.00	1	$425,000	1	$1,000		$426,000
	4,625	linear feet						**$1,676,000**
	0.9	miles						
Total								**$1,676,000**
Design & Engineering							10%	**$167,600**
Contingency							10%	**$167,600**
TOTAL CONSTRUCTION COSTS								**$2,011,200**



C. TRAIL SYSTEM OPERATION AND MAINTENANCE

1. Maintenance Costs.

An estimated trail maintenance budget was developed to determine the anticipated costs the Township must support in association with trail maintenance. Tables 7 and 8 provide estimates for typical maintenance costs for the multi-use trail and side paths.

Table 7: Multi-Use Trail Annual Maintenance Costs

Task	Cost / Mile [1]	Times per Year/ Season	UUT Cost
Drainage and storm channel maintenance	$500	2	$6,900
Sweep/blow debris from trail tread	$1,200	4	$33,120
Snow Removal	$1,400	4	$33,120
Pickup and removal of trash	$1,200	8	$66,240
Weed control and vegetation management	$1,000	2	$13,800
Mow 4 ft grass shoulder along trail	$1,200	4	$33,120
Minor repairs to trail furniture/safety features	$500	2	$6,900
Maintenance supplies for work crews	$500	N/A	$3,450
Equipment fuel and repairs	$1,000	N/A	$6,900
Total Annual Costs	$8,500		**$203,550**
Trail Resurfacing (asphalt) $10/LF[2]	$52,800		$364,320

[1] Based on national average for 1-mile of trail. Costs may vary for individual trail. Total Upper Uwchlan Township Multi-Use Trail length is approx. 6.9 miles.

[2] Every 7-15 Years, resurface with top coat and replace sections.

Source: Trails for the Twenty-First Century, Rails to Trails Conservancy, 2001, p. 157.

Table 7 indicates that annual costs may total over $203,000 for the maintenance of the 6½ miles of multi-use trail proposed in the Township. Table 8 shows annual maintenance costs of over $87,000 for side paths.

Table 8: Side Path Annual Maintenance Costs

Task	Cost / mile [1]	Times per Year/ Season	UUT Cost
Drainange and storm channel maintenance	$500	2	$6,750
Sweeping/blowing debris from trail tread	$1,200	4	$16,200
Sweep/blow debris from trail tread	$1,200	4	$16,200
Pickup and removal of trash	$1,200	8	$16,200
Weed control and vegetation management	$1,000	2	$13,500
Mowing of 3 ft grass shoulder along trail [2]	$1,200	4	$16,200
Minor repairs to trail furniture/safety features	$500	2	$6,750
Maintenance supplies for work crews	$500	N/A	$6,750
Equipment fuel and repairs	$1,000	N/A	$13,500
Total Annual Costs	**$8,300**		**$112,050**
Side Path Resurfacing (asphalt) $7.50/LF[2]	$39,600		$534,600

[1] Based on national average for 1-mile of trail. Costs may vary for individual trail. Total Upper Uwchlan Township Side Path length-71,029 SF or 13.5 miles.

[2] Cost for Upper Uwchlan Township side path is for 4' grass shoulders.

[3] Every 7-15 Years, resurface with top coat and replace sections.

Source: Trails for the Twenty-First Century, Rails to Trails Conservancy, 2001, p. 157.

For both the multi-use trail and side paths, the most expensive maintenance items were trash and debris removal, and vegetation management. The intervals at which these tasks will be required to be performed will vary depending upon trail use and weather.

Trail and side path resurfacing will need to be performed on average every ten (10) years, and will cost approximately $364,000 for the multi-use trail and $534,000 for the side path system.

Other maintenance items that need to be addressed from time to be addressed from time within the community trail system, such as line painting. The hiking trail sections will also need to be cleared of vegetation at an approximate cost of $400 per year. Occasionally, signage may need to be replaced, which will cost approximately $100 per sign plus labor.

2. Maintenance Schedule.

As stated above, trail resurfacing will need to be performed about every ten years. Except for resurfacing, the routine maintenance listed in Tables 8 and 9 will need to be performed throughout the year, depending on weather conditions and the level of trail use, as set forth in Table 9.

Table 9: Trail Maintenance Schedule

Task	Schedule
Drainage/ channel maintenance	3-5 times/year
Sweeping/blowing debris	16-24 times/year
Trash removal	16-24 times/year
Vegetation Management	8-12 times/year
Shoulder mowing	8-24 times/year

Source: Trails for the Twenty-First Century, Rails to Trails Conservancy, 2001, p. 159.

3. Trail Operation Revenue.

Significant revenue for the Township will not be generated by trail operation. However, it is expected that Township businesses will benefit from trail implementation due to store and restaurant patronage trail users.

V. PROJECT FUNDING

A variety of federal, state and local governmental agencies provide grant and reimbursement programs that support the development of park facilities and trails. These programs are summarized below.

A. COUNTY FUNDING

The primary source of park development funding from Chester County is provided through the Landscapes 21st Century Fund, described below.

1. Chester County Landscapes 21st Century Fund.

This program supports greenways acquisition and trails development in Chester County municipalities. The maximum per-project amount of funding that can be awarded through this program ranges between $250,000-$350,000 annually, depending on project types. Additional funding can be awarded in increments of up to $50,000 if certain additional project criteria are met. A maximum of three (3) grants can be open and active with the County in any one year. These applications are typically due in the spring of each year.

B. STATE FUNDING

The Department of Conservation and Natural Resources has several grant programs for which the Township can apply for funding to help support the costs of park development. They are described below. These applications are typically due in the fall of each year.

1. Pennsylvania Recreational Trails Program.

The Pennsylvania Recreational Trails Program (PRTP) provides funds to develop and maintain recreational trails and trail related facilities for motorized and non-motorized recreational trail use. Federal funding for the program is through the Federal Highway Administration (FHWA) and the Transportation Equity Act for the 21st Century (TEA 21).

In 2000, DCNR had approximately $2 million available for grants. This funding must be distributed among motorized, non-motorized, and diverse trail use, as follows:

- 40% minimum for diverse trail use
- 30% minimum for motorized recreation
- 30% minimum for non-motorized recreation

Matching fund requirements for Pennsylvania Recreational Trails Program Grants are 80% grant money, up to a maximum of $100,000, and 20% project applicant money. "Soft match" (credit for donations of funds, materials, services, or new right-of-way) is permitted from any project sponsor, whether a private organization or public agency (DCNR website, 2000).

2. Keystone Park and Recreation Fund.

The program funds the conservation of nature preserves and wildlife habitats and improvements to and the expansion of state parks, community parks and recreation facilities, historic sites, zoos and public libraries. The Keystone Fund is currently supported by a 15% allocation from the State Realty Transfer Tax revenues. Approximately $12 million was available in 2000 under the Community Grant Program and $1 million each in the Rails-to-Trails and Rivers Conservation grant programs. The grant also supports planning and technical assistance and acquisitions and development projects.

C. FEDERAL FUNDING

1. National Park Service Land and Water Conservation Fund.

Since the program's inception in 1965, almost 30,000 grants to states and localities have been approved for acquisition, development and planning of outdoor recreation opportunities in the United States. Grants have supported purchase and protection of 2,300,000 acres of recreation lands and development of nearly 27,000 basic recreation facilities in every state and territory of the nation (Land and Water Conservation Fund website, 2001).

2. Hometown Streets-Safe Routes to School.

Over the next four (4) years, the Pennsylvania Department of Transportation (PennDOT) will be managing the above-referenced reimbursement program of the Federal Highway Administration, which will reimburse municipalities for costs related to streetscapes, trails and sidewalks projects within downtown areas and along school routes. Eligible program activities for the Home Town Streets component of the program include sidewalk improvements, planters, benches, street lighting, pedestrian crossings, transit bus shelters, traffic calming, bicycle amenities, kiosks, and signage. Eligible program activities for the Safe Routes to School component include: sidewalks, crosswalks, bike lanes, trails, traffic diversion improvements, curb extensions, traffic circles and raised median islands

This is a reimbursement program, rather than a grant program; accordingly, project costs must be supported by the municipality until reimbursements are made after submission of invoices. The total funding available over the four (4) years to all municipalities is $200 million. Individual project costs may total up to $1 million. Twenty percent (20%) matching funds are required, and may be split over the total project costs, or the Township may opt to pay for all pre-construction activities, which generally equal about 20% of project costs.

Another grant program which may provide options for park and recreation funding is the Community Development Block Grant (CDBG), which may be used for certain types of capital projects for qualifying municipalities.

D. CONCLUSION.

The Upper Uwchlan Township Community Trail Project has strong governmental and residential support, and sufficient revenue sources that may support project development. Many of the Township's road rights-of-ways can be redesigned to accept either a multi-use trail, side paths or bike lanes, and certain roads can be signed as bike routes with no improvements except signage. Additionally, private land developers will construct certain trail segments as part of their projects, including the Waynebrook subdivision and the projects on the Frame and Shea tracts. Furthermore, Upper Uwchlan Township has a portion of the grant funds in hand to begin trail construction (Park Road Trail).