

Bucks County

BICYCLE

Master Plan

August 2012

Working for a Bicycle Friendly Bucks County



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Bucks County, Pennsylvania

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Executive Summary

In July of 2008, Bucks County created a Bicycle Task Force (BCBTF) which is comprised of ten interested members of the community committed to advocating and advancing bicycling and bicycle-related issues and to advise the Bucks County Commissioners on necessary recommendations which would advance bicycling opportunities throughout the County. As part of the recommendations, the Bicycle Task Force recommended that the County develop a County-wide Bicycle Plan.

Purpose of the Bicycle Master Plan

The purpose of the Bucks County Bicycle Plan is to inventory existing conditions, advance opportunities for the improvement and expansion of a broader network of multimodal routes serving existing residential and business areas of the County, enhance the outreach and education of bicycle safety and leverage the existing recreational resources in the communities at large.

A well-developed bicycle network provides opportunities for all types of riders and includes shared roadways, bike lanes, and shared use paths. A complete bikeway network will provide residents and visitors of Bucks County with a non motorized option to efficiently access local and regional points of interests. By providing opportunities for all types of riders, the master plan will allow for expanded bicycle facilities that will link important residential, work, intermodal, shopping, recreation, and tourist destinations.

This document is a Master Plan for an interconnected network of bicycle facilities. The purpose of this Master Plan is to:

- Provide a vision for a county-wide bicycle network with regional and local connections.
- Identify the most important bicycle generators and provide recommendations on the most appropriate facility to be developed between those destinations.
- Provide a resource for local municipalities, to assist with the planning and implementation of bicycle facilities across the County.
- Identify standards that improve safety for bicyclists, pedestrians and motorists.
- Identify priority roadways for bike lanes, compatible shoulders, and shared-use paths.
- Involve municipalities and other public and private sector partners in the County wide bike system in accordance with the role each wishes to play.
- Create an environment in which pedestrians and bicyclists within Bucks County have the ability to conveniently and safely ride for transportation, recreation, and fitness purposes.

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- Use the master planning process to create and enhance relationships and partnerships that will advance implementation.
- Develop strategies for education of cyclists and motorists that encourage people to bicycle more.

The Planning Process

Bucks County retained the consultant team of JMT and Toole Recreation Planning to prepare the Bucks County Bicycle Plan. This Master Plan was created through the use of a working group comprised of ten members of the Bucks County Bicycle Task Force (BCBTF) and a staff member from the Bucks County Planning Commission. Meetings were held with staff and consultants to develop the Bicycle Master Plan in a collaborative process.

The working group identified key stakeholders within the community, including members of organizations with an interest in bicycling, tourism, and recreation, within the County as well as other governmental agencies, and bicycling groups and clubs. These key stakeholders were interviewed to determine issues of concern, suggestions on the direction of the plan, recommendations and opportunities to develop the framework of the bicycle network.

Major Recommendations of the Plan

Throughout the planning process and development of the Bucks County Bicycle Master Plan, one common theme emerged: the Bicycle Plan's recommendations must be *realistic* and *focused*. A valid concern that served as the foundation for this plan was that there would be too many recommendations. Creating a series of small successes that would lead to larger successes appears to be key to advancement of bicycling in Bucks County.

Based upon this, the major recommendations of the Bicycle Plan were defined as the following:

- **Establish Connections:** The basis of all recommended bicycle routes should be the fact that the facility, whether on-road or off-road, is creating a connection between origin/destination points. This could include connecting a residential center with a commercial center or business district, creating a link to transit, connecting two or more downtown centers, creating a link to recreational facilities/parks or creating a link to another bicycle facility.
- **Local Bike Sheds:** The foundation for the overall bicycle network will need to be developed by the local municipalities through defining and implementing their own municipal or multi-municipal

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bicycle master plan. These master plans will define local “bike sheds,” which provide links and connections within a community.

- **Major Spines:** This would include a balance of on-road and off-road facilities that establish a network of north/south and east/west spines. The major spines would provide guidance to the local municipalities as they develop their “Bike Shed.” In addition, the major spines would serve as connections between the various “Bike Shed,” linking communities across the County.
- **Education:** Create a education program for bicycle safety.
- **Foster a Bicycle Friendly Culture:** Create an environment where it is common for bicycle and motorists to share the road.

Blueprint for Immediate Implementation

The proposed Blueprint for Implementation is built upon the foundation that the immediate implementation steps will need to be championed by the Bicycle Task Force. The Bicycle Task Force would serve as the catalyst and regional resource for the planning and development of bicycle facilities and programs across the county. The Task Force could use their meetings to serve as a forum for individuals and organizations to consider the advancement of bicycle facility and program initiatives. In this way, opportunities and issues can be identified and solutions and projects created through the collaborative process. The Task Force could serve as the testing ground for projects in the early planning stages and could help to nudge them along to implementation. This can cover the full gamut of projects such as outreach, education, encouragement and enforcement as well as in bicycle facility planning. Consideration should be given to re-naming the Task Force to something that helps promote the group as a resource for public and private partners.

Once the Task Force lays the foundation and the County progresses into a position of being able to take on more of a leadership role, the County should transition into a role as the champion of “Working for a Bicycle Friendly Bucks County.”

Utilizing this foundation, immediate implementation should be focused on three primary items:

- **Promotion and implementation of the priority spines.** Focus on developing all three priority spines, beginning with a spine that has the support, resources and recognition as an important county spine. The Doylestown to New Hope Spine emerged as the spine with interest and the greatest potential for successful completion. Municipalities and partners have been discussing this route for

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many years.

- **Promotion and development of municipal/multi-municipal bicycle plans.** Once the progress is made on the planning and development of the spines, the local municipalities along those corridors will become more open to the idea of bicycle planning within their own community, ultimately leading to the development of the local “bike sheds.” Development of the local “bike sheds” will be critical in the overall development of bicycle facilities across the County.
- **Education & Safety.** Ensuring the safety of motorists and cyclists as well as fostering the perception that bicycling is safe in Bucks County is essential to creating a bicycle friendly place. Improving safety and public perceptions about safety involves three key elements: education of both bicyclists and motorists, enforcement of regulations related to the unsafe use of roads, and promotion of bicycle awareness.

To advance these three primary items, it is recommended Bicycle Task Force establish three sub-committees for Bicycle Facilities; Education and Safety; and Partnerships Committee, with an emphasis on municipal government partners. The purpose of these sub-committees will be to advance the implementation of one of the three key items. In addition, it is recommended that the Task Force develop an annual work program to allow for their efforts to be focused on implementation of the plan.

It is anticipated that the County will support the Task Force as they advance the immediate implementation of the plan and continue to evaluate the overall level of involvement based upon the available resources within the County.

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Introduction



Bucks County has long been renowned as a world-class destination for scenic beauty, fascinating history and interesting cultural heritage. The County is home to nationally significant trails including the Delaware & Lehigh Canal National Heritage Corridor, the Highlands Trail and the East Coast Greenway. Many breathtaking and beautiful scenic routes have been mapped and documented in guidebooks which are so popular that local bookstores have a hard time keeping them in stock.



Capitalizing in on Cycling Efforts

There is a lot going on in the world of cycling in Bucks County. All 54 municipalities have parks, recreation and open space plans that to some degree deal with greenway and trail connections. Numerous municipalities have undertaken the connection of their communities via trails. Over 100 cycling events are held annually in Bucks County, to the extent that event organizers report overlapping routes. A major event that is held annually is the Uninvest Grand Prix. Through the development of the Bicycle Master Plan, Bucks County hopes to establish a way to tap into and build upon these efforts to maximize cycling initiatives in Bucks County and enhance the already desirable quality of life here.



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Purpose of the Bicycle Master Plan

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of Bucks County with a non motorized option to efficiently access local and regional points of interests. By providing opportunities for all types of riders, the master plan will allow for expanded bicycle facilities that will link important residential, work, intermodal, shopping, recreation, and tourist destinations.

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- Use the master planning process to create and enhance relationships and partnerships that will advance implementation.
- Develop strategies for education of cyclists and motorists that encourage people to bicycle more.

There is a growing demand to provide people with greater opportunities to walk or bike, more often and more conveniently. There are endless benefits of walking and biking for a community.

The Bicycle Plan is an implementation tool that will become a part of the Bucks County Comprehensive Plan. In addition, this plan will serve to complement the goals and objectives of the County Greenways and Trails Plan.

Vision Statement

The vision for the Bicycle Plan began with a review of the Bucks County Park and Recreation Plan of 1986. The 1986 plan outlined 23 Link Park sites that were previously identified in the County's 1974 Park Plan. The potential link parks provided connections and accessibility from population centers to park lands and were envisioned to provide safe and pleasant routes to destinations for both children and adults. The



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BCBTF members identified their vision for bicycling in Bucks County, which was reviewed by the public as a part of the public meetings conducted during the planning process.

Vision Statement:

Bicycling in Bucks County shall encompass a combination of shared roadways and shared use paths that provide a world-class bicycling experience. The network allows all levels of users, from children and families to long-distance riders, an opportunity to enjoy the scenic beauty found throughout the County. At the core of each bicycle facility is a safe route that provides recreation opportunities and transportation alternatives by connecting destination and mass transit. Through a strategic education / awareness program, both bicyclists and motorists shall understand and follow the practice of sharing of the road. The Bucks County's bicycle network promotes conservation of our natural resources and a healthier lifestyle for its users. Bicycling in Bucks County connects communities, people and places, while enhancing the quality of life and sparking a vibrant economy.

The Bicycle Plan aims to achieve this vision through the goals and objectives outlined below.

Project Goals and Objectives

The goals of the Bucks County Bicycle Master Plan are to :

- I. Develop an interconnected system that balances the transportation and recreational needs of cyclists.
 - Maintain a countywide perspective that focuses on the identified major spines of the countywide system.
 - Define major corridors for on road bike lanes, sharrows, bicycle routes, or other means.
 - Define major corridors for separated paths and trails.
 - Identify convenient connections from major spines to destinations, residential areas, employment centers, recreational facilities, schools, transit centers, central business districts, and adjacent planned and existing bikeways.
 - Define connections to regional bikeway systems and linkages to adjacent County and state bicycle facilities.
- II. Provide, encourage, and enhance bicycle tourism and economic development opportunities.
 - Enlist the support of the Visit Bucks County and the Chambers of Commerce in promoting the County as a “world class” destination for bicycling.



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- Seek opportunities, similar to the annual Univest Grand Prix bicycle race, for major events associated with bicycling to attract visitors and spark the local economy.
- III. Provide a balanced system of bikeways that accommodate a variety of skill levels.
- Provide a variety of shared use paths, bike lanes, and sharrows.
 - Create a network that accommodates a variety of short and long distance rides.
- IV. Provide a “tool kit” to guide the study and implementation of bicycle improvements across the County that includes:
- General engineering guidelines and design standards for public agencies, developers, and others.
 - Methodology for prioritizing early implementation projects to increase the amount of available bicycling opportunities as quickly as possible.
 - Listing of potential funding sources.
 - Resource lists of bikeway publications, key bicycle related websites and links including local Bicycle, Hiking and Trail Organizations.
 - A glossary of bikeway terminology.
- V. Promote education for overall bicycle safety and awareness.
- Work with existing partners to develop an approach for a comprehensive, coordinated, and consistent safety education and encouragement program.
 - Recommend policy changes and updates for County and Local Municipalities in educating bicyclists and motorists on safe bicycling.
 - Increase awareness about the health benefits of cycling.



Guiding Principles

The following principles have guided development of this plan:

USDOT Policy Statement on Bicycle and Pedestrian Accommodation

The United States Department of Transportation’s (DOT) policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including state DOTs, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide – including health, safety, environmental, transportation, and quality of life –

What is Smart Transportation?

Smart Transportation recommends a new approach to roadway planning and design, in which transportation investments are tailored to the specific needs of each project. The different contexts - financial, community, land use, transportation, and environmental - determine the design of the solution. The best transportation solution arises from a process in which a multi-disciplinary team, considering a wide range of solutions, works closely with the community. Inclusive of context-sensitive solutions (CSS), Smart Transportation also encompasses network connectivity, and access and corridor management. It will help both states and communities adapt to the new financial context of constrained resources.

Principles of Smart Transportation

1. Tailor solutions to the context.
2. Tailor the approach.
3. Plan all projects in collaboration with the community.
4. Plan for alternative transportation modes.
5. Use sound professional judgment.
6. Scale the solution to the size of the problem.

Source: Smart Transportation Guidebook - Planning and Designing Highways and Streets that Support Sustainable and Livable Communities; March 2008

transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.

The DOT encourages transportation agencies and local communities to go beyond minimum design standards and requirements to create safe, attractive, sustainable, accessible, and convenient bicycling and walking networks. Several suggested actions include:

- Considering walking and bicycling as equals with other transportation modes.
- Ensuring that there are transportation choices for people of all ages and abilities, especially children.
- Going beyond minimum design standards.
- Integrating bicycle and pedestrian accommodation on new, rehabilitated, and limited access bridges.
- Collecting data on walking and biking trips.
- Setting mode share targets for walking and bicycling and tracking these targets over time.
- Removing snow from sidewalks and shared-use paths.
- Improving non-motorized facilities during maintenance projects.
- Maintenance of roads for automobiles and bicycles.

PennDOT Smart Transportation Initiative

The Smart Transportation Guidebook - *Planning and Designing Highways and Streets that Support Sustainable and Livable Communities* as developed by Pennsylvania and New Jersey Departments of Transportation and published March of 2008, encourages the development of alternative transportation modes as one of the six principles of smart transportation. According to the guidebook:

The needs of pedestrians, bicyclists and transit users must be considered in designing all roadway projects. Sidewalk networks should be well connected with opportunities for regular, safe street crossings. On collector and arterial roadways, bike lanes or wide curb lanes can encourage people to bike rather than drive for short and moderate distance trips. If a roadway is designed to discourage vehicular speeding, it can be comfortably used by pedestrians and bicyclists alike. Transit friendly design should support a high level of transit activity. By encouraging alternative transportation, communities can break the pattern of sprawling suburbs with rapidly multiplying vehicular trips and congestion. It should be acknowledged that there are potential trade-offs between vehicular mobility and pedestrian, bicycle and transit mobility. A balance should be sought in attaining these goals on all projects.

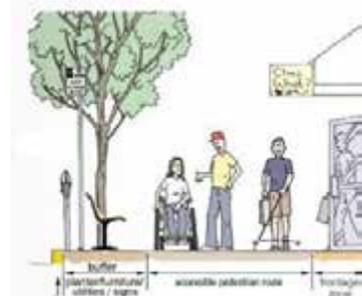
U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation, Regulations and Recommendations, March 11, 2010.

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Complete Streets

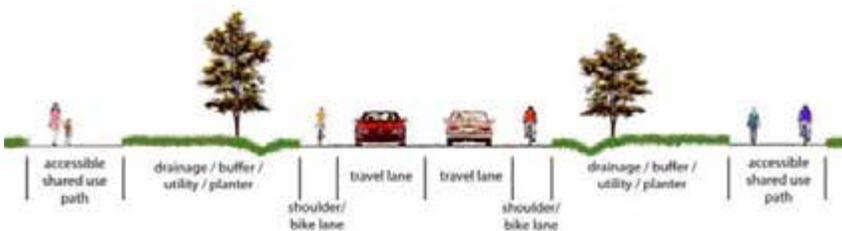
Pedestrians, bicyclists, motorists and riders of all ages and abilities must be able to safely move along and across a **“complete street.”** Creating complete streets means moving from streets primarily designed and maintained for automobiles to planning, designing, building and maintaining streets for all modes of transportation. Instituting a policy with an emphasis on complete streets requires providing an improved right-of-way designed to enable safe access and operation for all users. This policy requires necessary steps to ensure that streets and roads work for drivers, transit users, pedestrians and bicyclists, as well as for older people, children and people with disabilities. The benefits of this policy includes improved safety, health benefits associated with walking and bicycling, increased transportation options and improved air quality. Currently there are no municipalities within Bucks County that have a Complete Streets Ordinance. Communities tend to be more receptive to Complete Streets Initiatives than just bicycle improvements.

A well-planned pedestrian network is a basic component to an integrated transportation system that allows for connections to various modes of travel. Complete streets provide for all modes of transportation to meet travel needs unique to various landscapes such as urban, suburban and rural. A complete street has several common elements as described in the following table for each landscape:

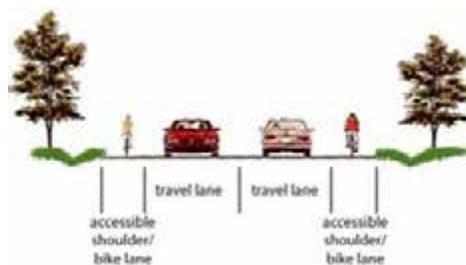


Urban Landscape (highest volume of pedestrian activity)

- Bicycle Lanes or Share the Road Signage
- Sidewalks with Accessible Pedestrian Access Route and Compliant Curb Ramps
- Crosswalks
- Pedestrian Refuge Islands
- Medians
- Bus Pull-off Areas
- Special Bus Lanes
- Accessible Bus Stops
- Accessible Bus Shelters as warranted
- Accessible Pedestrian Signals and Count Down Clocks



Suburban Landscape



Rural Landscape

Suburban Landscape (medium Volume of pedestrian activity)-

- Bicycle Lanes or Accessible Shoulders
- Share the Road Signage
- Sidewalks with Accessible Pedestrian Access Route and Compliant Curb Ramps
- Crosswalks as needed
- Pedestrian Refuge Islands
- Bus Pull-off Areas
- Accessible Bus Stops
- Accessible Bus Shelters as warranted
- Accessible Shared Use Pedestrian/Bicycle Paths or Trails

Rural Landscape (Lowest Volume of pedestrian activity)-

- Accessible Shoulders or Bicycle Lanes
- Share the Road Signage

The Planning Process



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The working group identified key stakeholders within the community, including members of organizations with an interest in bicycling, tourism, and recreation, within the County as well as other governmental agencies, and bicycling groups and clubs. These key stakeholders were interviewed to determine issues of concern, suggestions on the direction of the plan, recommendations and opportunities to develop the framework of the bicycle network.

The study was based upon an extensive public involvement process that included:

- Committee/work session meetings with the BCBTF.
- Key person interviews with representatives from each of the 54 municipalities, industrial development, tourism, law enforcement, school districts, county highway safety, bicycle clubs and organizations, bike shop owners, and event sponsors.
- Three public meetings in each sector of the County, Upper, Central, and Lower Bucks County.
- Park and Recreation Directors workshop meeting.
- Univest bike race survey.
- Focus group meetings with local bike clubs.
- Focus group meeting with Chambers of Commerce and Visit Bucks County.
- BCPC Open Space and Greenways Plan survey.

The purpose of the public participation process was to gather information, identify issues, seek out opportunities, build stewardship, and identify potential partners and stakeholders.

Findings of the Public Participation Process

- The plan must address recommendations for the entire County including Upper, Central and Lower Bucks.
- Safety is an overriding concern.
- Conflicts between bicyclist and motorists are a major problem.
- Build up the County's important and successful bicycle destinations: the D&L Towpath, Lake Galena, the State and County parks and the municipal bike traffic systems.
- Bucks County government must take an active leadership role in creating the County wide system of cycling.

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- While bicycle education and public awareness of bicycle safety emerged as a paramount issue, educational efforts are fragmented, participation in scheduled events is low, and providers of educational venues are discouraged.
- The roles of the municipal officials including managers, parks and recreation directors, park and recreation boards, planning commissioners and police chiefs are crucial to the implementation of the plan and advancement of bicycling.
- Making the case of the connection of bicycling with economical development must be made in order to support investment in bicycle facility development.

Major Recommendations of the Plan

Throughout the planning process and development of the Bucks County Bicycle Master Plan, one common theme emerged: the Bicycle Plan's recommendations must be *realistic* and *focused*. A valid concern that served as the foundation for this plan was that there would be too many recommendations. Creating a series of small successes that would lead to larger successes appears to be key to advancement of bicycling in Bucks County.

Based upon this, the major recommendations of the Bicycle Plan were defined as the following:

- **Establish Connections:** The basis of all recommended bicycle routes should be the fact that the facility, whether on-road or off-road, is creating a connection between origin/destination points. This could include connecting a residential center with a commercial center or business district, creating a link to transit, connecting two or more downtown centers, creating a link to recreational facilities/parks or creating a link to another bicycle facility.
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- **Education:** Create an education program for bicycle safety.
- **Foster a Bicycle Friendly Culture:** Create an environment where it is common for bicycle and motorists to share the road.

Existing Conditions

I'm so pleased to see that bicycling in Bucks is getting the attention it deserves. Just drive any road in the county on a nice weekend (and many weekdays as well) and you'll witness the bike riders as they pedal for exercise and transportation. I attempt to ride into Doylestown for the Farmer's Market, the library, shopping but it's not easy. I live on Ferry Rd which has NO room for safe riding. While I have developed an interesting route that keeps me mostly off Ferry, it does add several miles to the distance. A bike route connecting Peace Valley to town and beyond would benefit many. I also occasionally ride to work (the other side of Lansdale). While I know that statistically, I'll be ok, it's difficult to remember that when cars are whizzing (and honking) past at speeds over the limit as I cling to the edge of the broken pavement. Unfortunately, I won't be able to attend the meeting but thanks for reading this - please keep us informed. -

-Local resident comment submitted via the project website.

<http://www.buckscounty.org/government/departments/CommunityServices/PlanningCommission/BCGreenwaysPlan2011-Aug.pdf>

Bicycling in Bucks County Today

Bucks County is starting this Bicycle Master Plan where most Counties end: with a completely connected bike path 60 miles long from north to south completely off-road. The County has miles of trails. However, with the exception of the Delaware and Lehigh (D&L) Trail, most of the existing bikeways within Bucks County have been planned by individual or multiple municipalities working together to provide recreational opportunities to the community. As a result there are many isolated islands and fragmented sections of trails throughout the County, many of which end at municipal boundaries. While there are many miles of trails on the ground, they lack the interconnectedness that forms a network.

Over the last 30 years, bicycling opportunities in Bucks County has grown significantly. Of the 54 municipalities, 51 have existing trails within their boundaries. In 1995, DVRPC completed the Southeastern Pennsylvania Bicycle and Pedestrian Mobility Plan. The 1995 plan, which included a study area of Bucks, Montgomery and Chester Counties, noted that as of a previous study conducted in 1979, the three county area contained approximately 200 miles of bicycle facilities. Today Bucks County alone contains over 350 miles of existing bicycle facilities. In 1979 the 200 miles of trails inventoried for the region was considered a "rather extensive..., but fragmented" system. The study also noted that more than ten years later, this was still an apt description of southeastern Pennsylvania's bicycle network. This description is still applicable today.

County Wide Plans

The current policy guiding the development of bicycle facilities throughout Bucks County is the 1986 Parks and Recreation Plan. The plan was developed as a parks and recreation, as well as a linkages plan that still serves as the primary resource for the development of pedestrian and bicycle trails. While the plan provides a solid foundation for the current planning efforts, it is limited in its vision for a balanced bicycle network throughout Bucks County.

The County adopted a Greenway and Open Space plan in 2011. The plan provides a vision for greenway development and preservation of the open space throughout the County.

Existing Conditions

Municipal Planning Initiatives

The lack of a countywide perspective on bicycling has not impeded the progress of establishing bikeways at the municipal level. Many of the municipal comprehensive plans call for improved bicycle facilities and several municipalities have established hiker/biker task forces working to promote, provide and improve bicycling opportunities. There are several municipalities that are working or have already completed and adopted plans that call for development of shared use paths or on-road bicycle facilities. The recently adopted Tri Municipal Trail and Greenway Plan recommended the development of :

- 16.32 miles shared use paths and 4.48 miles of bike lanes in New Britain Township
- 3.26 miles shared use paths and 3.39 miles of bike lanes in Chalfont Borough
- 3.75 miles shared use paths and 2.0 miles of bike lanes in New Britain Borough

Landmark Towns Bicycling & Marketing Strategies

The Landmark Towns of Bucks County, Bristol, Morrisville, Yardley and New Hope, completed a planning effort focused on developing strategies to enhance and expand bicycle facilities and market existing bicycle facilities within and surrounding their region.

National and Regional Trails

There are also several joint municipal and regional planning initiatives underway as well including the East Coast Greenway, Landmark Towns Bicycle and Marketing Strategy, Route 202 Parkway, the Doylestown to New Hope Connection, planning for the Highlands Trails connections, and improvements to the D&L Trail.

Project Base Mapping

The process for mapping began with GIS data supplied by Bucks County, supplemented by maps and datasets from other sources, including Pennsylvania Spatial Data Access (PASDA) and PennDOT. The County maps have been arranged to summarize the current existing conditions and future plans inventoried.

GIS layers included into the maps are:

- County & Municipal Boundaries
- Roadways
- Railways

Bucks County contains approximately 4,500 miles of roadways.

Upper Bucks

*397 miles of state roads
871 miles of local roads*

Central Bucks

*266 miles of state roads
724 miles of local roads*

Lower Bucks

*600 miles of state roads
1,672 miles of local roads*

Existing Conditions

“Bucks County has the potential to be world class. The combination of scenic beauty and variety of terrain make it a unique place.”

- Local bicycle shop owner

- Streams & Water Bodies
- Existing Paths & Trails
- SEPTA Rail Lines and Locations
- SEPTA Bus Routes
- TMA Bucks rushbus Routes
- Historic Sites
- State & County Parks
- State Gamelands
- Utility Corridors

Major Population & Employment Centers

Bucks County encompasses an area of approximately 622 square miles and is the 36th largest County in Pennsylvania. The County is made up of three distinct areas: Upper Bucks, Central Bucks and Lower Bucks. Lower Bucks is the most densely populated area, and contains the highest percentage of employment centers and twice as many miles of roads as either of the other two regions of Bucks County. Central Bucks has a balance of urban and rural areas. Upper Bucks is more open and characterized as more rural with Towns and Hamlets than urban/suburban.

Regional Attractions & Destinations

One of the main reasons that bicycling in Bucks County has the potential to be a fantastic experience is the wealth of attractions and destinations that can be found within the County. The attractions range from local and county parks, amusement parks, historic sites, museums, performing arts center, major downtown centers and quaint and charming village centers. These attractions provide destination opportunities for day trips for both residents and visitors.



Multi Modal Connections

The existing transit operations within the County are focused within the Lower Bucks region. The primary transit service in the area is the Southeastern Pennsylvania Transportation Authority (SEPTA). SEPTA provides both rail and bus services within and around Bucks County. The Regional Rail service provided by SEPTA includes lines that connect Central and Lower Bucks with Montgomery County and the City of Philadelphia. SEPTA's bus transit service provides local connections with Central and Lower Bucks County. Additional transit services include Bucks County Transport's Doylestown DART and Bucks County Transportation Management Association's (TMA) rushbus.



The following maps show the Regional Trail Network (Map 1), the Existing & Proposed Bikeway Network (Maps 2-1 through 2-3) the Existing SEPTA Transit Routes (Maps 3-1 through 3-3). Map 2 and 3 have been divided into three 11"x 17" map sheets so they may be viewed at a legible scale within the report document.

Existing Conditions

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MAP 1 REGIONAL TRAILS NETWORK

LEGEND

- Existing Trails
- Planned and Proposed Trails and Trail Corridors
- Planned East Coast Greenway Route
- Greenspace Network
- Rural Conservation Lands
- Urban/Suburban Lands

Pennsylvania Trail Network

- | | | | |
|---------------------------------|----------------------------------|----------------------|-------------------------------|
| 1. Octoraro | 14. Pickering Creek | 27. Schuylkill River | 40. Pennypack |
| 2. Oxford - Avondale | 15. Uwchlan | 28. Manasawny | 41. North Delaware Greenway |
| 3. Big Elk Creek | 16. Horse Shoe | 29. West County | 42. Delaware Canal Towpath |
| 4. White Clay Creek | 17. County Seat | 30. Perkiomen | 43. Neshaminy Creek |
| 5. Delaware Arc | 18. Haver Run - Naaman Creek | 31. Sunrise | 44. Little Neshaminy |
| 6. Red Clay Creek | 19. Chester Creek | 32. Evanburg | 45. Route 202 Parkway |
| 7. Brandywine - Struble | 20. Ridley Creek | 33. Towamencin Creek | 46. Core Creek |
| 8. Brandywine - West Branch | 21. Newtown | 34. Liberty Bell | 47. Washington Crossing |
| 9. Buck - Atglen | 22. Darby - Cobbs | 35. Power Line | 48. Pennridge Area Network |
| 10. Chester Valley | 23. Cymryd Heritage Trail | 36. Cross County | 49. Tohickon Creek |
| 11. Welsh Mountain - St. Peters | 24. Route 291/13 | 37. Stony Creek | 50. Nockamixon |
| 12. Sow Belly - French Creek | 25. Tinicum - Ft. Mifflin | 38. Wissahickon | 51. Cocks Creek - Lake Towhee |
| 13. Brandywine - Marsh Creek | 26. Tidal Schuylkill River Trail | 39. Creshelm Valley | |

New Jersey Trail Network

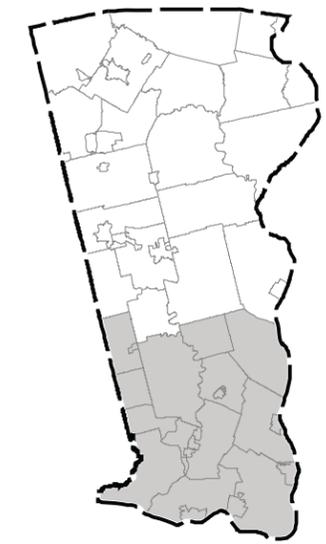
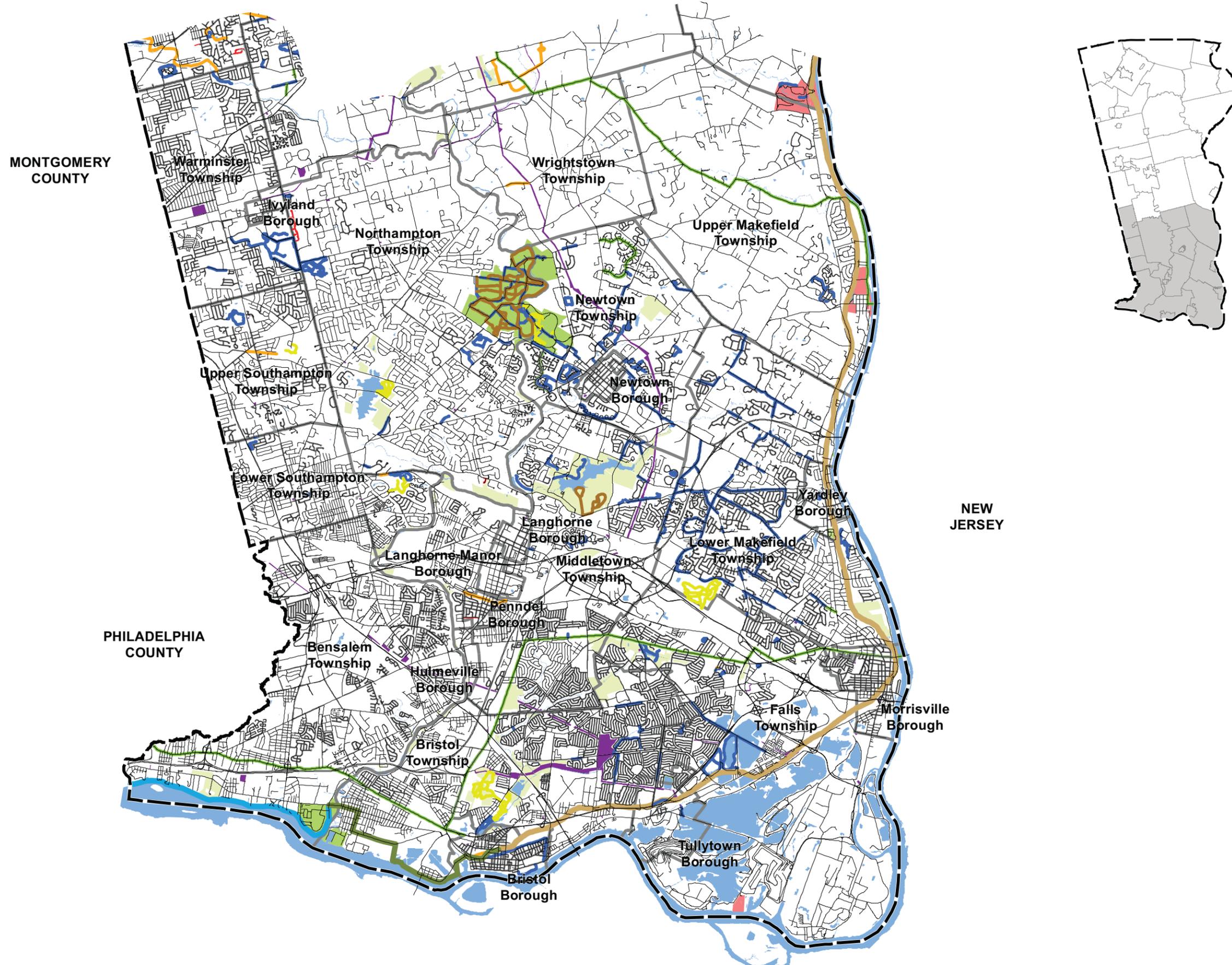
- | | | |
|--------------------------------|------------------------------|-------------------------|
| 52. Delaware and Raritan Canal | 60. Rancocas Creek | 68. Central Railroad |
| 53. Trenton - Princeton | 61. Mt Holly - Cherry Hill | 69. Mantua Creek |
| 54. Lawrence Hopewell | 62. River-to-Bay | 70. Raccoon Creek |
| 55. Assunpink Creek | 63. Camden Waterfront | 71. Gloucester County |
| 56. Crosswicks Creek | 64. West Jersey - Seashore | 72. Hospitality Branch |
| 57. Delaware River | 65. East Atlantic | 73. Bridgeton Secondary |
| 58. Kinkora | 66. Gloucester - Mt. Ephraim | 74. Little Ease |
| 59. Pemberton | 67. Big Timber | |



Note: This map depicts existing, planned, and proposed trails and trail corridors. The lines on this map depict generalized trail alignments. The regional map has not been endorsed by all of the respective counties.



DATA SOURCE: DVRPC 2009



MAP 2-1
EXISTING & PROPOSED
BIKEWAYS
"LOWER BUCKS COUNTY"

LEGEND

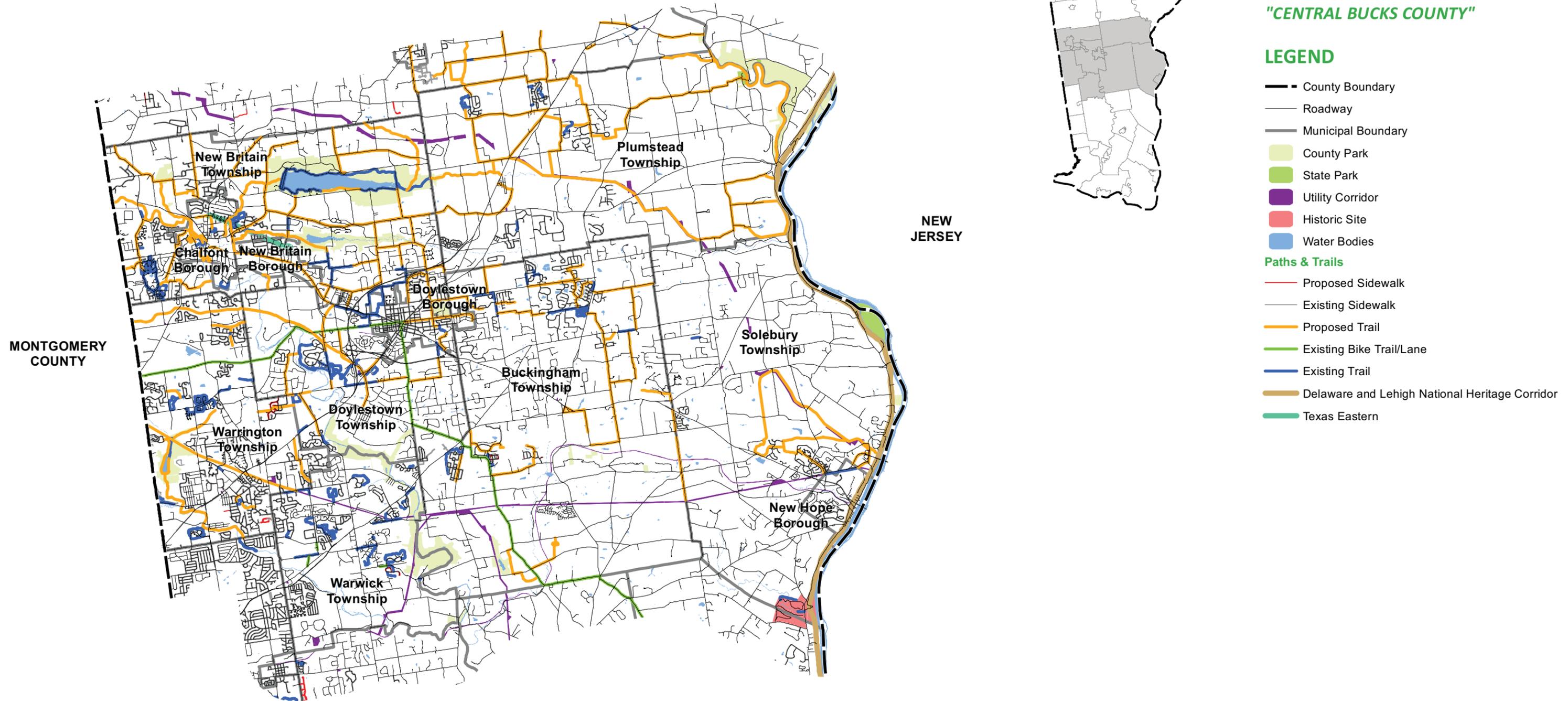
- County Boundary
 - Municipal Boundary
 - Roadway
 - County Park
 - State Park
 - Utility Corridor
 - Historic Site
 - Water Bodies
- Paths & Trails**
- Proposed Sidewalk
 - Existing Sidewalk
 - Proposed Trail
 - Existing Bike Trail/Lane
 - Existing Equestrian Trail
 - Existing Hiking Trail
 - Existing Trail
 - East Coast Greenway
 - Proposed East Coast Greenway
 - Delaware and Lehigh National Heritage Corridor



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



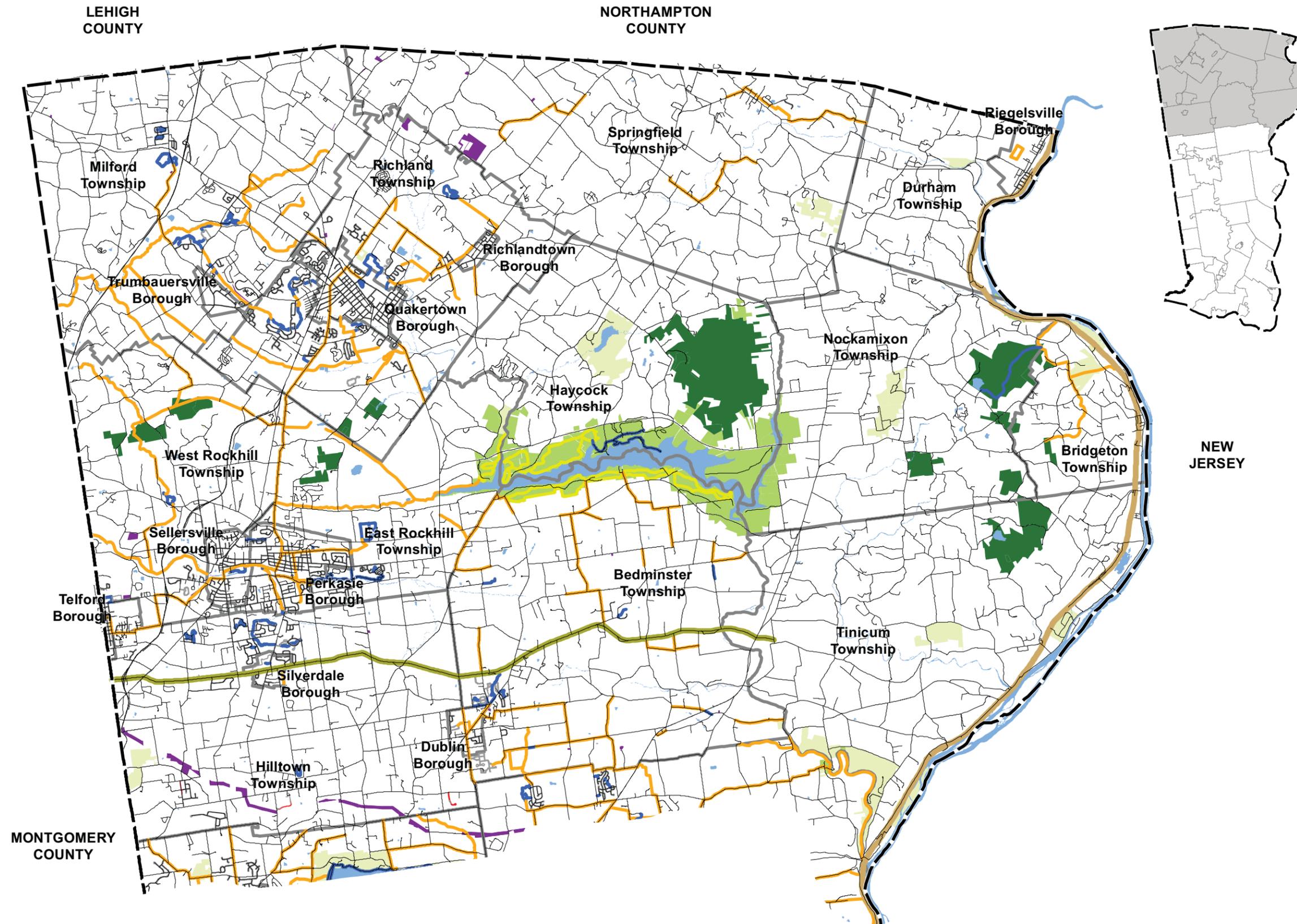
MAP 2-2
EXISTING & PROPOSED
BIKEWAYS
"CENTRAL BUCKS COUNTY"



- LEGEND**
- County Boundary
 - Roadway
 - Municipal Boundary
 - County Park
 - State Park
 - Utility Corridor
 - Historic Site
 - Water Bodies
- Paths & Trails**
- Proposed Sidewalk
 - Existing Sidewalk
 - Proposed Trail
 - Existing Bike Trail/Lane
 - Existing Trail
 - Delaware and Lehigh National Heritage Corridor
 - Texas Eastern



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



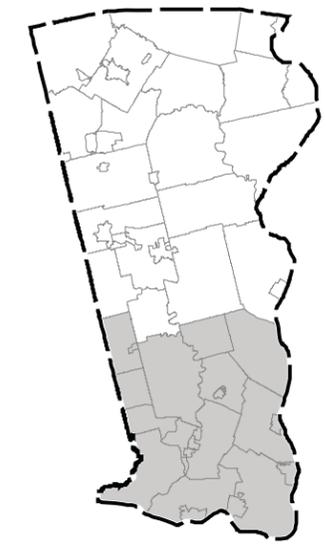
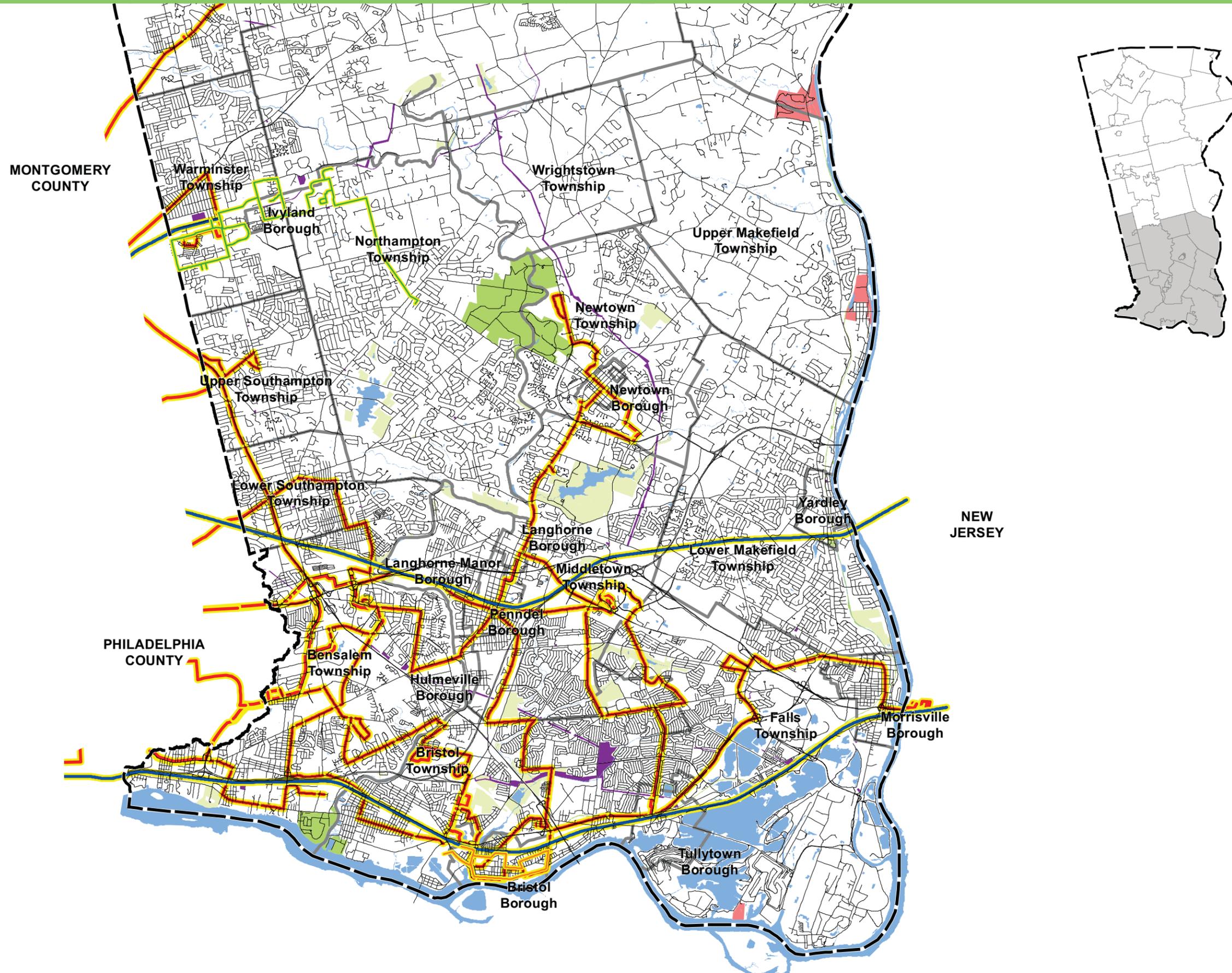
MAP 2-3
EXISTING & PROPOSED
BIKEWAYS
"UPPER BUCKS COUNTY"

LEGEND

- County Boundary
- Municipal Boundary
- Roadway
- County Park
- State Park
- State Gamelands
- Utility Corridor
- Water Bodies
- Paths & Trails**
- Proposed Sidewalk
- Existing Sidewalk
- Proposed Trail
- Existing Bike Trail/Lane
- Existing Hiking Trail
- Existing Trail
- Route 113 Heritage Corridor
- Delaware and Lehigh National Heritage Corridor



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



MAP 3-1
EXISTING SEPTA ROUTES
"LOWER BUCKS COUNTY"

LEGEND

- County Boundary
- Municipal Boundary
- Roadway
- SEPTA Rail Line
- SEPTA BUS Line
- Richboro-Warminster Rush Bus
- Bristol Rush Bus
- County Park
- State Park
- Utility Corridor
- Historic Site
- Water Bodies



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT

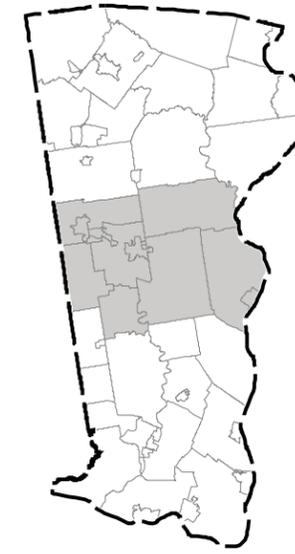


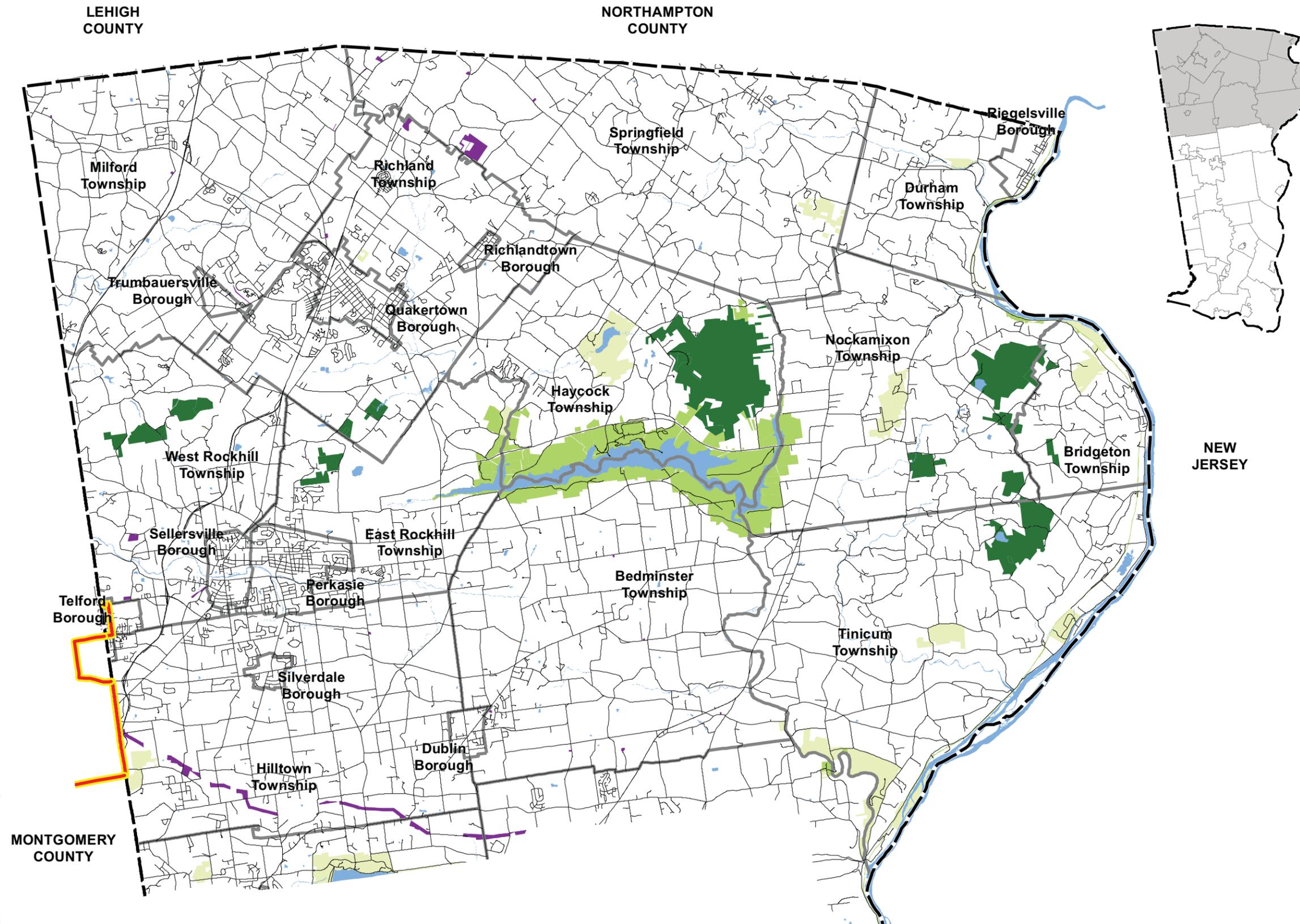
MAP 3-2

EXISTING SEPTA ROUTES "CENTRAL BUCKS COUNTY"

LEGEND

-  County Boundary
-  Roadway
-  Municipal Boundary
-  SEPTA Rail Line
-  SEPTA BUS Line
-  Richboro-Warminster Rush Bus
-  Doylestown DART
-  County Park
-  State Park
-  Utility Corridor
-  Historic Site
-  Water Bodies





MAP 3-3

EXISTING SEPTA ROUTES
"UPPER BUCKS COUNTY"

LEGEND

-  SEPTA BUS Line
-  County Boundary
-  Roadway
-  Municipal Boundary
-  Water Bodies
-  Utility Corridor
-  County Park
-  State Park
-  State Gamelands



NEW JERSEY

MONTGOMERY COUNTY

Miles



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT

Existing Conditions

Existing Bicycle Facilities & Programs

While the bicycle network within Bucks County is still taking shape, there are several successful facilities that have been or are proposed to be implemented throughout the County. Below are several of the existing and proposed facilities that provide riders at all levels an opportunity to enjoy the scenic beauty of Bucks County.



East Coast Greenway

The East Coast Greenway is as a trail and on-road system that covers nearly 3,000 miles from Canada to Key West, Florida. The greenway enters Pennsylvania and Bucks County from Trenton, New Jersey and goes through Morrisville, Tullytown, Bristol, Falls Township and Bensalem and onto Philadelphia.

Route 113 Heritage Corridor

The Route 113 Heritage Corridor provides a transportation and cultural link through historically significant towns, rolling landscape and green lands. The corridor begins at Route 611 in Bucks County and continues southwest into Montgomery County. All total, the corridor spans 30 miles along Route 113.

Delaware and Lehigh National Heritage Corridor

The D & L Trail is a 165 mile trail along the banks of the Lehigh and Delaware Rivers. The trail, within Bucks County follows the Delaware River from Bristol Borough to Riegelsville, and passes through Morrisville, Yardley, and New Hope.



Pennsylvania Bicycle Route E

PennDOT defines the state bicycle routes as “routes designed by experienced bicyclists to provide bicycle members of the traveling public who wish to traverse the state with a guide to some of the Commonwealth’s highways and rail-trails.” Bicycle Route E traverses Bucks County along Bristol Pike, Route 413 and Trenton Road in Lower Bucks County.

Highlands Trail

Planning partners, including local, state and County governments and individual planning groups are working to develop the Pennsylvania Highlands Trail Network (PHTN) across a total of 13 counties. When completed the Highlands Trail will stretch more than 130 miles through the Pennsylvania Highlands from the Delaware River to the Whiskey Springs Uplands, where it will connect with the Appalachian Trail and Maryland border. The PHTN Steering Committee (Bucks-Northampton-Lehigh Group) recognized the advantages of developing two main trunk routes, the most important being that one of those routes (Northern)

Existing Conditions

would be co-aligned on existing multi-use trails or trails that are under construction or “shovel ready.” This would allow a significant portion of the PHTN to be established relatively quickly. The other trunk route (Southern) will require more time to develop because of the need to establish landowner agreements and easements, but will offer a high quality hiking experience in a relatively secluded, mostly forested setting. The two distinct trail trunk routes would each begin at Riegelsville and be rejoined near Quakertown and Milford Township, Bucks County.

“The County must take a leadership position and let everyone attack at its own pace. There are many municipalities with lines on a map, but no one really understands how all these pieces fit together”.

- Township Manager

Local/Municipal Trails

Several of the local municipalities within Bucks County have bicycle plans. Some have joined forces and developed multi-municipal bicycle plans. Various municipalities have begun to implement their plans, both individually and collectively as a part of a multi-municipal effort. Example plans include:

Perkasie Borough	Doylestown Township
Doylestown Borough	New Britain Township
Chalfont Borough	New Britain Borough
New Hope Borough	Lower Makefield Township
Bensalem Township	Landmark Towns Bicycle Study
Lansdale Township (Currently being developed)	



Bucks County Park System Greenway Acquisition

Bucks County typically acquires land when dedicated through the development process or where houses are removed for flood mitigation. The County has developed a Greenway Plan, in conjunction with this Bicycle Plan, that identifies the greenways and is used as a guide for future land acquisition.



Realities of Bucks County

The topography of Bucks County presents both a challenge, as well as an opportunity. There is a good mix of level/rolling terrain, as well as rolling/hilly terrain. This provides opportunity for a wide variety of bicycle facilities that meet the needs and desires of all bicyclists.

A major concern within the County is the existing roadway network and its compatibility with on-road bicycle facilities. The roadways which present the most obvious form of connecting the major destinations throughout the County tend to be the most congested corridors. Of the roadways throughout the County that include adequate shoulder widths, the conditions of the shoulders vary and are not always conducive to bicycling. Many of the less congested back roads are narrow and that condition requires pedestrians and bikers to share the travel lanes with vehicles.

Existing Conditions

"I wish there was a safe route to work; I would ride my bike everyday."

- Local Resident

Municipal Overview Regarding Bikeways - Hard cold truths

All 54 municipalities within Bucks County were contacted to ascertain the level of support for bikeways in their individual communities, the status of current bikeway planning and considerations, and the obstacles and concerns for creating a countywide network for biking. The overall conclusion can be summed up in this statement from one of the Township Mangers.

"The County must take a leadership position and let everyone attack at its own pace. There are many municipalities with lines on a map, but no one really understands how all these pieces fit together."

Opinions regarding bikeways in Bucks County are varied. In general support for biking is more prevalent within the larger population centers. The level of existing and planned facilities is as diverse as the three areas of the County. Several municipalities have an established hiker/biker committee while in other municipalities, such committees have not yet emerged.

The main concerns identified by the Municipal Mangers are:

1. Safety
2. Funding
3. Maintenance

Further detail of the comments provided by the municipalities can be found in Appendix A.



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Demand for Bicycling

Bicycle Statistics

47% of Americans would like more bicycle facilities in their communities.

Most trips made are "short", with 49% less than 3 miles, 39% less than 2 miles, and 24% less than 1 mile.

Three hours of bicycling per week can reduce the risk of heart disease and stroke by 50%.

Adolescents who bicycle are 48% less likely to be overweight as adults.

In 2008, the bicycle industry in the United States sold close to \$6.0 billion in equipment and accessories.

Each year twice as many bicycles are sold in the United States than cars.

Numerous studies have shown that property values are higher near bike paths.

People could save more than \$10 per day by bicycling rather than using a motor vehicle.

Source: www.bikesbelong.org

The following section presents bicyclist needs in Bucks County, including a general summary of the needs and characteristics of bicyclists and an estimate of bicycle demand. Understanding the preferences of bicyclists is important for developing a plan that accommodates bicyclists of all ages and skill levels.

Bicycle Usage

The 2001 National Household Travel Survey is a U.S. Department of Transportation effort sponsored by the Bureau of Transportation Statistics and the Federal Highway Administration. This study indicates that 87% of all daily trips and 91% of people commuting to work use personal vehicles for their travels. Forty percent of all the daily trips were made by personal vehicles traveling less than 2 miles in length. Traveling by foot or bicycle rather than by personal vehicle can have a large impact on local traffic flows, environmental condition, and to one's health. Traveling by bike also reduces noise and emissions released into the air and water as compared to the use of automobiles. Although recreational bicycling is a growing trend, bicycle riders commuting to work has decreased by 105 riders or 0.05% of the commuting population from 1990 to 2000 in Bucks County.

Source: National Household Travel Survey, 2001

Bicycling in Bucks County is a tremendously popular activity. The D & L Trail is a major bicycle attraction within the County. Several bike clubs within the County conduct numerous rides for all different types of riders. These clubs include the Central Bucks Bicycle Club, Suburban Cyclists Unlimited, Bicycle Club of Philadelphia, Princeton Free-Wheelers, and the Bicycle Coalition of Greater Philadelphia. These clubs participate in daily rides throughout the County and region over roads in popular areas. Sometimes multiple rides are scheduled daily by length and experience level. Bicycling events range from the world class Univest Grand Prix to local rides at schools and parks, as well as fundraising and charity rides.

Types of Bicyclists

The "Guide for the Development of Bicycle Facilities" by the American Association of State Highway and Transportation Officials, 1999 provides a classification system for the types of bicycle riders. A 1994 report by the Federal Highway Administration used the following general categories of bicycle user types (A, B and C) to assist highway designers in determining the impact of different facility types and roadway conditions on bicyclists:

Demand for Bicycling

An updated AASHTO guide which represents a more comprehensive version of the current and popular national guide is in the review process and will be processed in the near future.

ADVANCED or experienced riders are generally using their bicycles as they would a motor vehicle. They ride for convenience and speed and want direct access to destinations with a minimum of detour or delay. They are typically comfortable riding with motor vehicle traffic; however, they need sufficient operating space on the traveled way or shoulder to eliminate the need for either themselves or a passing motor vehicle to shift position.



BASIC or less confident adult riders may also use their bicycles for transportation purposes, e.g., to get to the store or to visit friends, but prefer to avoid roads with fast and busy motor vehicle traffic unless there is ample roadway width to allow easy overtaking by faster motor vehicles. Thus, basic riders are comfortable riding on neighborhood streets and shared use paths and prefer designated facilities such as bike lanes or wide shoulder lanes on busier streets.

CHILDREN, riding on their own or with their parents, may not travel as fast as their adult counterparts but still require access to key destinations in their community such as schools, convenience stores and recreational facilities. Residential streets with low motor vehicle speeds, linked with shared use paths and busier streets with well-defined pavement markings between bicycle and motor vehicles, can accommodate children without encouraging them to ride in the travel lane of major arterials.

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

Types of Bicycle Facilities

Selection of a bicycle facility type is dependent on many factors, including the ability of the users, specific corridor conditions and facility cost. The descriptions below provide an overview of each facility type and general design. The types of bicycle facilities are provided from the “Guide for the Development of Bicycle Facilities” by the American Association of State Highway and Transportation Officials, 1999.

Shared Roadway (No Bikeway Designation)

Most bicycle travel in the United States now occurs on streets and highways without bikeway designations. This probably will be true in the future as well. In some instances, a community’s existing street system may be fully adequate for efficient bicycle travel, and signing



Demand for Bicycling

and striping for bicycle use may be unsuitable for bicycle travel at present, and it would be inappropriate to encourage bicycle travel by designating the routes as bikeways. Finally, some routes may not be considered high bicycle demand corridors, and it would be inappropriate to designate them as bikeways regardless of roadway conditions (e.g., minor residential streets). Some rural highways are used by touring bicyclists for intercity and recreational travel. In most cases, such routes should only be designated as bikeways where there is a need for enhanced continuity with other bicycle routes. However, the development and maintenance of 1.2-m (4 foot) paved shoulders with a 100-mm (4 inch) edge stripe can significantly improve the safety and convenience of bicyclists and motorists along such routes.



Signed Shared Roadway

Signed shared roadways designated by bike route signs, designate shared roadways and serve either to:

- A. Provide continuity to other bicycle facilities (usually Bike Lanes) or
- B. Designate preferred routes through high-demand corridors.

As with bike lanes, signing of shared roadways should indicate to bicyclists that particular advantages exist to using these routes compared with alternative routes. ***This means that responsible agencies have taken actions to ensure that these routes are suitable as shared routes and will be maintained in a manner consistent with the needs of bicyclists.*** Signing also serves to advise vehicle drivers that bicycles are present.



Bike Lane or Bicycle Lane

Bike lanes are established with appropriate pavement markings and signing along streets in corridors where there is significant bicycle demand and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists on the streets. Bike lanes are intended to delineate the right-of-way assigned to bicyclists and motorists and to provide for more predictable movements by each. Bike lanes also help to increase the total capacity of highways carrying mixed bicycle and motor vehicle traffic. Another important reason for constructing bike lanes is to better accommodate bicyclists where insufficient space exists for comfortable bicycling on existing streets. This may be accomplished by reducing the width of vehicular lanes or prohibiting parking in order to delineate bike lanes. In addition to lane striping, other measures should be taken to ensure that bicycle lanes are effective facilities. In particular, bicycle-safe drainage inlet grates should be used, pavement surfaces should be smooth, and traffic signals should be responsive to bicyclists. Regular maintenance of bicycle lanes should be a top priority, since bicyclists are unable to use a lane with potholes, debris or broken glass.

Demand for Bicycling

If bicycle travel is to be improved, special efforts should be made to ensure that a high quality network is provided with these lanes. However, the needs of both the motorist and the bicyclist must be considered in the decision to provide bike lanes.

Shared Use Path

Generally, shared use paths should be used to serve corridors not served by streets and highways or where wide utility or former railroad right-of-way exists, permitting such facilities to be constructed away from parallel streets. Shared use paths offer opportunities not provided by the road system. They provide a recreational opportunity or serve as direct commute routes. The most common applications are along rivers, ocean fronts, canals, utility right-of-way, former or active railroad right-of-way, within college campuses, or within and between parks. There may also be situations where such facilities can be provided as part of planned developments. Another common application of shared use paths is to close gaps in bicycle travel caused by construction of cul-de-sacs, railroads and freeways or to circumvent natural barriers (rivers, mountains, etc.). While shared use paths should be designed with the bicyclist's safety in mind, other users such as pedestrians, joggers, dog walkers, people pushing baby carriages, persons in wheelchairs, skate boarders, in-line skaters and others are also likely to use such paths.

Choosing the Appropriate Bicycle Facility

In selecting the proper facility, an overriding concern is to ensure that the proposed facility will not encourage or require bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road. The needs of both motorists and bicyclists must be considered in selecting the appropriate type of facility.

An important consideration in selecting the type of facility is continuity. Alternating segments of shared use paths and bike lanes along a route are generally inappropriate and inconvenient because street crossings by bicyclists may be required when the route changes character. Wrong-way bicycle travel has a higher potential for crashes on the street beyond the ends of shared use paths because of the inconvenience of having to cross the street.

Sidewalks are not acceptable for bicycling. However, in a few limited situations, such as on long and narrow bridges and where bicyclists are incidental or infrequent users, the sidewalk can serve as an alternate facility, provided the user dismounts his/her bicycle and walks along the sidewalk segment.

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

How Does Pennsylvania and Philadelphia Rank Nationally?

Ranking of Bicycling and Walking Levels

- Philadelphia, PA - 7th
- Pennsylvania - 13th

Ranking of Bike Safety Levels

- Philadelphia, PA - 21st
- Pennsylvania - 21st

Ranking of Bicycle / Pedestrian Fatality Rates

- Philadelphia, PA - 18th
- Pennsylvania - 21st

Annual Reported Bike Fatalities

- Philadelphia, PA - 3.7
- Pennsylvania - 17.0

Ranking of Bicycling to Work

- Philadelphia, PA - 14th
- Pennsylvania - 29th

Percent of Trips to Work by Bicycle

- Philadelphia, PA - 0.3%
- Pennsylvania - 11.0%

Ranking of Per Capita Funding for Bicycle / Pedestrian

- Philadelphia, PA - 27th
- Pennsylvania - 16th

Source: Bicycling and Walking in the United States Benchmarking Report, 2010

Note: Cities ranked within the study include the 50 largest cities in the United States according to the 2007 American Community Survey. New Orleans was added to the ranking even though it is not currently the 51 largest U.S. city but was included in this report for consistency and continuity with the 2007 Benchmarking Report.

General Statistics

In order to understand how and why bicycle facilities are used, a review of general statistics is necessary. Planning for new projects should take into account this information in order to maximize the use and success of each facility.

In August of 2008, the U.S. Department of Transportation, National Highway Safety Administration (NHTSA)¹ published the National Survey of Bicyclist and Pedestrian Attitudes and Behaviors based upon an extensive survey conducted across the United States. This survey was conducted among a representative sample of 9,616 U.S. residents age 16 and older during the summer of 2002.

¹Source: *National Highway Traffic Safety Administration, National Survey of Bicyclists Attitudes and Behaviors, 2008*

Appendix B provides a summary of the bicycling component of this survey. Also included in Appendix B is a summary of the Public Involvement Findings conducted during the planning process, as well as a summary of the bicycling component of the public opinion survey conducted as part of the Bucks County Open Space and Greenway Plan.

Benefits of Bicycling

The positive effects of biking as a healthy mode of transportation cross many aspects of our lives. Positive outcomes of biking can be expressed through the health of the environment, as well as the wellbeing of individuals who are physically active. A transportation system that is favorable to bicycling can gain advantages in terms of decreased traffic congestion and an improvement to the quality of life for the citizens. The economic benefits of bicycling include a reduced dependence on the automobile and an increased economic vitality of locations that have stressed bicycle mobility.

Source: www.bicyclinginfo.org / Benefits of Bicycling

Bicycling - Fundamental Means of Transportation

Bicycling is considered a form of active transportation. Until recently, bicycling had a much more invisible role in modern transportation planning. Traffic engineering has historically focused primarily on motorized transportation modes.

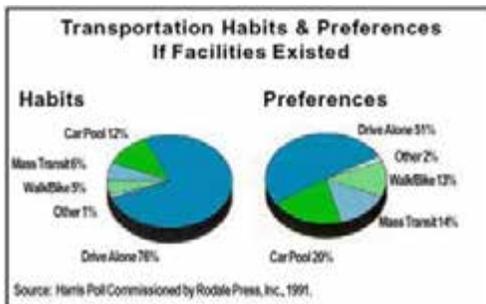
Motorized travel has made it possible for development patterns to spread out over a larger area. We are now able to cover longer distances that allow us to live far from work and daily activities. As a result, we have diminished the need to be near schools, recreation areas, shopping centers, and even our neighbors, making walking a less prac-

Demand for Bicycling

tical means of transportation. The very fabric of a traditional community has changed due to our ability to travel great distances. Such dependence on the vehicle has created many unintended consequences including:

- Residential developments located far from work and school which makes for long commutes and high energy consumption;
- A decreased interaction within the community and neighborhood which weakens our sense of place and belonging; and
- A lack of nearby destinations and accessible pedestrian facilities which results in walking less and generally leads to a more sedentary lifestyle.

As a result of these development patterns, users of non-motorized travel such as bicycling are often overlooked. Traffic engineering and design standards of past generations often treated bicyclists as impediments to an *efficient* roadway design. *Efficiency* was measured by how fast vehicles could move through a corridor in terms of capacity or the number of vehicles that the roadway can accommodate during a given time. *Travel cost* is measured by the value of the time spent traveling in a motor vehicle. Bicyclists tended to “slow down” the traffic and hence led to the *deterioration* of the performance of a roadway or a *poor* level of service. Bicyclists have often been sidelined in favor of constructing facilities that benefited only motorized vehicular travel. The traffic flow, or the moving speed of vehicles, was and has been the principal concern until recently.



Since the late 1980s, there has been tremendous progress in recognizing the importance of non-motorized travel. Research has been able to identify the values of bicycling in terms of physical activities and their associated health benefits, as travel options, creating a more *livable* environment. Recent national polls found that 52% of Americans would like to bicycle more. Therefore, communities are looking for ways to reshape neighborhoods to make it easier to bicycle. Studies suggest solutions that promote bicycling include: *improving facilities for biking, installing traffic calming measures to slow driver speeds, creating Safe Routes to School programs to encourage kids to bike to school, focusing development around transit stops, retrofitting sprawling neighborhoods and providing connections between neighborhoods.*

Source: Smart Growth America, "Measuring the Health Effects of Sprawl" (www.smartgrowthamerica.org/healthreports.html)

Benefits of Increased Levels of Biking

Mobility: Bicycling contributes to the safe and efficient movement of people and goods to their destinations.

Safety: Developing a connected and cohesive system of bicycle facilities on State-owned roadways and increasing educational and enforcement activities can help reduce injuries and fatalities.

Smart Growth: Smart Growth initiatives which include promoting development that provides citizens with transportation choices. The Plan is an important component of the Smart Growth program because it ensures the availability of opportunities for bicycling.

Health: There is documented evidence that bicycling provides health benefits and are excellent methods to add activity to increasingly sedentary lifestyles.

Environmental Benefits: Each time a person chooses to make a trip by bicycling instead of driving, that person prevents the creation of air and water pollution, consistent with the Chesapeake 2000 Agreement.

Source: Twenty Year Bicycle & Pedestrian Access Master Plan, MD-DOT, October 2002

Demand for Bicycling

Transportation Benefits

Bicycle facilities are necessary to form important connections between activity centers, population centers, shopping areas, parks and tourist attractions in Bucks County and across the State. Since all trips have a pedestrian component, creating a pedestrian-friendly environment will help improve mobility for everyone. Moreover, increased bicycling will help reduce traffic congestion, air and noise pollution, wear and tear on roads, consumption of fuel, crashes and property damage, and the need for additional roads, travel lanes, and parking.

In Decoding Transportation Policy & Practice #4 by the Surface Transportation Policy Partnership, it is noted that the Journey-to-Work data indicates commuters take, on average, 25.5 minutes to get to work, which is an increase of two minutes from 1990. It also shows that, as more Americans moved to sprawling areas with fewer transportation choices, a greater share of commuters drove alone to work, up from 73.2% to 75.7%. Working at home or telecommuting made the largest gains, growing from 3.0 to 3.3%. Transit share of commute trips declined by 11% over the last decade, from 5.3% to 4.7%.

Source: TDM Encyclopedia, Victoria Transport Policy Institute, www.vtppi.org

Environmental Benefits

“If the average American biked or walked to work or shopping once every two weeks instead of driving, we could prevent the pollution of close to one billion gallons of gasoline from entering the atmosphere every year.”

Motor vehicle pollution is a significant contributor to air quality. Therefore decreased dependence on motor vehicles, by means of walking, bicycling, or other alternative modes of transportation, will lead to improved air quality.

The U.S. Environmental Protection Agency (EPA) estimates that an average car produces 20.4 pounds of carbon dioxide per gallon of fuel used, with a total of over 300 million metric tons emitted annually by all cars and trucks in the United States. A four-mile round trip on foot or bicycle prevents about 15 pounds of air pollutants. Motor vehicle emissions represent 31% of the total carbon dioxide, 81% of carbon monoxide, and 49% of the nitrogen oxide released in the United States. Increased walking and bicycling, as alternatives to motor vehicle usage, can positively impact the environment in many ways, including:

- Decreased pollution, smog, and greenhouse gases.
- Decreased noise pollution from motor vehicle traffic.
- Decreased need for new streets, roads, and highways, which results in reduced usage of fossil fuels necessary for pavement.

Source: Harvard University, 2010, <http://www.stateoftheair.org/Clean Air Council, 2010>

Air Pollutants

Ozone: This lung irritant forms when sunlight interacts with nitrogen oxide (NO_x) and volatile organic compounds (VOC), both emitted by automobiles. Ozone is closely associated with vehicle travel.

Carbon Monoxide: A colorless, odorless, poisonous gas that results from incomplete burning of carbon in fuels, including those used in motor vehicles.

Greenhouse Gases: Gases that help trap heat in the atmosphere, contributing to global warming and climate change. The primary greenhouse gas is carbon dioxide (CO₂); others are methane (CH₄), chlorofluorocarbons (CFCs) and nitrous oxides (N₂O).

* Source: *New Data for a New Era*, SMARTRAQ.

Demand for Bicycling

Economic Benefits

Walking and bicycling have significant direct and indirect economic benefits to a community and its residents and businesses. Direct benefits include a reduction in the cost of fuel, decreased vehicle maintenance, and decreased costs associated with traffic accidents. Indirect benefits include a reduced need for new roads, reduced costs attributed to pollution, and increased tourism. The American Automobile Association has estimated the annual cost to operate an average sedan in the United States is \$7,834, compared to \$120 for a bicycle, and no cost to walk.

The Rails-to-Trails Conservancy offers many examples of economic benefits from the creation of trails. The following are a few examples of success from communities across the United States:

- Property values along Mountain Bay Trail in Brown County, Wisconsin have sold for an average price 9% higher than properties not located next to the trail.
- The National Association of Realtors conducted a survey in 2002 which ranked trails as the second most important community amenity.
- Leadville, Colorado reported an increase of 19% in sales tax revenues following the opening of the Mineral Belt Trail.

According to the League of American Bicyclists, the bicycling industry contributes an estimated \$133 billion a year to the U.S. economy. The industry supports over one million jobs and generates \$17.7 billion in federal, state, and local taxes. Billions are spent on meals, transportation, lodging, and entertainment during bicycle trips and tours throughout the United States.

Source: www.railstotrails.org & [The Economic Benefits of Investing in Bicycle Facilities, www.bikeleague.org](http://www.bikeleague.org)

Health Benefits

A moderate level of physical activity that includes bicycling has numerous health benefits. Bicycling is an ideal form of aerobic exercise that can be incorporated into daily activities such as biking to work, the store, church and school. Numerous studies have demonstrated that lack of exercise is a major factor contributing to obesity and major illnesses.

Considered one of the biggest public health challenges of our time, obesity has been declared an epidemic by the Centers for Disease Control (CDC). It is the nation's fastest rising public health problem, especially in children. One in seven children (5 million) is obese, and the majority of American adults (61%) are overweight or obese. A sedentary lifestyle ranks second only to smoking as a lifestyle risk for disease and premature death, contributing to more than 10% of all deaths in

Demand for Bicycling

the United States, representing direct economic costs of \$150 billion annually. Diabetes is obesity's accompanied epidemic, with rates increased 50% over the past decade. Type II diabetes, once called the adult-onset diabetes, is becoming increasingly common in children. Bicycling has similar health benefits to walking, but also provides increased mobility options for longer trips. When used as a replacement for a motor vehicle, bicycle use also reduces carbon emissions providing for a healthier environment for everyone, not just the rider.

Source: Richard E. Killingsworth and Jean Lamming (2001), "Development and Public Health; Could Our Development Patterns be Affecting Our Personal Health?" Urban Land, Urban Land Institute (www.uli.org).
Oscar H. Franco, et al. (2005), "Effects of Physical Activity on Life Expectancy With Cardiovascular Disease," Archives of Internal Medicine, Vol. 165 No. 20 (<http://archinte.ama-assn.org/cgi/content/abstract/165/20/2355>), Nov. 2005, pp. 2355-2360.
Surgeon General (1999), Physical Activity and Health, Center for Disease Control and Prevention (www.cdc.gov/nccdphp/sqr/sqr.htm). This document establishes recommended levels of physical activity.

Bicycle Demand

Bicycling has the potential to fill many travel needs while improving air quality and increasing mobility for people who do not have access to automobiles. While decreasing automobile congestion and enriching air quality are considerations, the bicycle is not being used extensively in the County. To determine the potential for bicycle commuting in this area, the commuting practices of commuters who travel 15 minutes or less to work were examined. One of the most under utilized transportation modes is the bicycle.

Bicycling accounts for a very small percentage of all commuter trips made in Bucks County. If bicycling is to become widespread throughout Bucks County, a move must be made to make the County a more bicycle friendly environment, including improved and additional facilities, additional bicycle amenities and increased education and safety opportunities.

Demand for Bicycling

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Countywide Bicycle Network & Facilities

Introduction

The vision for the Countywide Bicycle Network is comprised of varying levels of bicycle facility recommendations to create a network of major spines and spokes throughout the County. The network of major spines and spokes would not only connect communities, points of interest, and other origin/destination points throughout the County, but it should also serve as a connection to the surrounding counties, as well as the City of Philadelphia and New Jersey. It is clear that the most effective means for obtaining a Countywide Bicycle Network is through small victories and a focus on planning and implementation at the local/municipal level.

Major Spines

The intent of the major spines are to provide “connections” between transit centers, activity centers, tourist destinations, central business districts, recreation destinations and municipalities. A secondary goal of the network of major spines is to establish a group of bicycle facilities which provide coverage across the entire County.

The recommended network of major spines includes both on and off road bikeways that serve as connectors. These spines will serve to support a significant amount of long distance bikeway traffic for both recreational and transportation purposes. While the spines have been identified as both on-road and trail facilities, an individual spine could be implemented in the future as a combination of on-road and trail facility. The goal for the on-road portion of the major spines would be to create a safe bicycle environment which provides sufficient awareness to motorists that they need to share the road with bicycle riders. This would include dedicated bicycle lanes and combination of “share the road” signage and “sharrow” pavement marking. It is understood that the County bicycle network will take time, money and collaboration to implement.

The following provides a brief summary of each of the major spines that were identified through the planning process. Appendix C includes tables which provide a general analysis of the existing conditions for each of the on-road spines, including the number of travel lanes, typical shoulder widths, posted speed limits, on-street parking characteristics and general information.

Countywide Bicycle Network & Facilities

On-Road Facilities

- ◇ **1** — *State Bicycle Route E (Bristol Pike, Route 413 and Trenton Road) - Cornwells Heights to Morrisville (approximately 18.0 miles)*

The spine along Bristol Pike, Route 413 and Trenton Road is the current State Bicycle Route E and connects the City of Philadelphia/Bucks County line with Morrisville Borough, the Delaware and Lehigh National Heritage Corridor and the state of New Jersey. The corridor also connects the communities of Cornwells Heights, Eddington, Bristol, Hulmeville, Levittown and Morrisville.

Although the corridor is already identified as a state bicycle route, several improvements would greatly improve the overall safety of this facility. Key origin and destination points along the Route 413 and Trenton Road portion of the proposed spine include the Roosevelt Middle School, Bucks County Community College (Lower Bucks Campus), Sandburg Middle School, Schweitzer Elementary School and a community park in the Levittown area. The proposed bicycle facility along Bristol Pike (Route 13) provides a connection from the Cornwell Heights SEPTA Rail Station to the southernmost portion of the proposed trail spine along the Neshaminy Creek and the Route 413/Trenton Road spine. Other key origin and destination points along the corridor include the Eddington Rail Station, the Holy Ghost Preparatory School and the Croydon Rail Station.

The existing roadway facilities along Bristol Pike consist of one travel lane in each direction, with sections that include a third center turning lane. A majority of Bristol Pike has shoulders which are four feet or wider and posted speeds range from 35 to 40 MPH. Route 413 consists of two lanes at the southern end and four to five lanes north of Interstate 276. The Route 413 corridor includes shoulders of four feet or greater, except in a few select locations. The posted speed limit along Route 413 ranges from 35 to 45 MPH. Trenton Road consists primarily of two travel lanes and contains intermittent shoulders over four feet in width. The posted speed limit along Trenton Road is 35 MPH.

- ◇ **2** — *SR 0513/0413 (Hulmeville Road/Bellevue Avenue/Pine Street/Newtown-Langhorne Road) - Cornwells Heights to Newtown (approximately 11.5 miles)*

Countywide Bicycle Network & Facilities

The Route 513/413 facility would provide a connection for the Cornwells Heights community to the downtown core of Newtown. This proposed spine would intersect with the proposed trail spine along the Neshaminy Creek in the borough of Hulmeville, as well as the Yardley to Woodbourne spine in Woodbourne. Other key origin and destination points along the proposed Hulmeville Road spine include a variety of local athletic parks in Cornwells Heights and Bensalem, several transit stops, Cornwells Elementary School, Cecelia Snyder Middle School, Benjamin Rush Elementary School, Robert Shafer Middle School, Bensalem Township High School, Oliver Heckman Elementary School and the St. Mary's Medical Center.

The existing roadway facilities along Route 513 consist of one travel lane in each direction, with sections that include a third center turning lane. A majority of the facility does not have shoulders which are four feet or wider. Posted speeds range from 25 to 40 MPH.

The existing roadway facilities along Route 413 consist of one travel lane in each direction, with sections that include a third center turning lane or multiple turning lanes. A majority of the facility does have shoulders which are four feet or wider. Posted speeds range from 35 to 45 MPH.

- ◇ **3** — SR 2053 (Woodbourne Road/Oxford Valley Road/Levittown Parkway) Woodbourne to Levittown (approximately 5.3 miles) **(Priority Spine)**

The proposed Woodbourne to Levittown spine creates a link between the Woodbourne and Levittown SEPTA stations while providing another critical bicycle facility within the densely populated Lower Bucks County. While identified as an on-road spine, this facility could utilize off-road segments to complete the overall connection.

The existing roadway network along this spine consists of two lanes with turning lanes at intersections and along other segments of the corridor. The posted speed limit varies from 30 to 45 MPH and shoulders of four feet or greater exist along a good portion of the corridor.

- ◇ **4** — SR 0332 (Afton Avenue)/Yardley-Langhorne Road Spine - Yardley to Woodbourne (approximately 5.2 miles)

The Afton Avenue/Yardley-Langhorne Road spine would be a combination on-road and off-road trail facility that would con-

Countywide Bicycle Network & Facilities

nect the communities of Yardley and Woodbourne. Sections of this spine have been developed as shared-use paths adjacent to the roadway. The completion of this spine will serve to interconnect the existing paths, the communities of Yardley and Woodbourne, Core Creek Park, the D&L Trail and the Yardley and Woodbourne SEPTA Stations.

The existing roadway facilities consist of two travel lanes with occasional turning lanes. The posted speed limit ranges from 25 MPH in Yardley to 45 MPH between Yardley and Woodbourne. The shoulder widths along the proposed spine vary from minimal shoulder widths to widths over 12 feet.

- ◇ **5** — *SR 0532 (Buck Road/Washington Crossing Road) - Cross County Spine (approximately 12.4 miles)*

Buck Road/Washington Crossing Road (Route 532) provides a unique opportunity for a northeast/southwest cross county spine which connects the Delaware River, including the D&L Trail and the Washington Crossing Historic Park, with Montgomery County. The various communities the proposed Route 532 spine connects include Newtown, Lower Southampton and Trevese. Other key origin and destination points along the proposed spine include Council Rock High School and various transit stops.

The existing travel way consists primarily of one lane in each direction. There are two areas in which the road widens to four and even six lanes. These areas are near County Line Road to the south and within Newtown Township, near Newtown Borough. The shoulder widths vary depending on the area the spine is in. Within the more urban areas, the roadway includes shoulders greater than four feet, however, with the more rural locations, the shoulders are nearly non-existent.

- ◇ **6** — *SR 0413 (Durham Road) - Newtown to Buckingham (approximately 9.1 miles)*

The Route 413 (Durham Road) spine connects Newtown Borough and Buckingham Township, as well as intersects with two other proposed spines. This north/south spine provides the primary on-road link between the cores of Central Bucks County and Lower Bucks County. Other key origin and destination points along the spine include the Newtown Elementary School, Buckingham Elementary School and a variety of residential communities.

Countywide Bicycle Network & Facilities

The existing Durham Road corridor consists of two lanes in each direction with a variety of locations which include turning lanes. The only exception is with the borough of Newtown, in which the roadway varies from one to two lanes in each direction. A majority of the corridor for the Route 413 spine does not include shoulders at a width greater than four feet.

- ◇ **7** — *East/West Cross County Spine - Quakertown to Washington Crossing (approximately 30 miles)*

The proposed spine connecting Washington Crossing on the east side of the county to Quakertown on the west side of the county, and beyond to Montgomery County, is the longest of the proposed major spines. This spine is the major east/west cross county spine which goes through several communities, including Doylestown, Dublin and Quakertown, as well as intersects with several of the proposed on-road and trail spines. In addition, the east/west cross county connection would provide nearby access to three major parks, including Washington Crossing Historic Site, Peace Valley Park and Nockamixon State Park.

The east/west cross county spine is made up of several roads, including Routes 663 and 313 to the west/north and Forest Grove Road, Township Line Road, Pineville Road, Stoneybrook Road and Taylorsville Road to the east/south. To the west/north, the corridor consists of one lane in each direction with sufficient shoulder width; however, the posted speeds of 45 to 55 MPH pose the main area of concern. While to the east/south, the speeds of 30 to 45 MPH are more ideal for bicycle facilities, the existing minimal shoulder widths cause the most concern.

- ◇ **8** — *SR 0263 (York Road) (approximately 16.8 miles)*

The York Road (Route 263) spine provides a link between the east/west county spine to a planned bicycle facility along York Road in Montgomery County. This proposed spine also provides a connection between Doylestown, Warwick Township, Ivyland Borough and Warminster Township. Other key origin and destination points along this planned spine included the Warwick Square Shopping Center, Archbishop Wood High School and a variety of transit stops within Warminster.

Countywide Bicycle Network & Facilities

Route 263 consists of two lanes in each direction with a majority of this segment consisting of shoulders four feet or wider. The posted speed limit is 45 MPH.

- ◇ **9** — *SR 0202 (Doylestown-Buckingham Pike/York Road/Lower York Road) - Doylestown to New Hope (approximately 10.5 miles) (Priority Spine)*

The Doylestown to New Hope connection is one of the major spines that all who provided input on the plan felt was a priority connection. It is recommended that the connection through Buckingham and Solebury Townships be completed as an on-road facility. The connection is recommended for a variety of reasons, including creating a link to the Delaware River from Doylestown, Montgomery County and points to the west, as well as connecting major tourist destinations, and providing access to major regional and bicycle trails. Coordination and planning of this spine have begun and it is the recommendation of this plan that the County continue to work with the officials of the municipalities, PennDOT and other key stakeholders as a plan is developed.

The Route 202 corridor consists of two travel lanes, with some, but not many, locations with sufficient shoulder width for bicycling. The posted speed limit along the corridor varies from 35 to 50 MPH.

- ◇ **10** — *Pebble Hill Road/Green Street/Edison Furlong Road (approximately 3.2 miles)*

This short spine segment provides an additional spine within Central Bucks County and links Doylestown to the east/west cross county spine, as well as the York Road spine.

The roadway corridor of this planned spine consists of two travel lanes with minimal shoulder widths.

- ◇ **11** — *Lower State Road - Montgomery County Line to Doylestown (approximately 5.7 miles)*

The Lower State Road spine is a continuation of the Route 202 spine and provides a second major east/west connection between the river and Montgomery County. This spine segment connects Doylestown to planned bicycle facilities within Montgomery County. Key origin and destination points along this planned spine include Central Bucks West High School, Delaware Valley College and Mill Creek Elementary School.

Countywide Bicycle Network & Facilities

Lower State Road is a typical rural road within Bucks County that consists of one lane in each direction and minimal shoulder widths. The posted speed ranges from 25 to 45 MPH.

- ◇ **12** — *Mountain View Drive/Old Bethlehem Road - Nockamixon State Park to Northampton County (approximately 10.5 miles)*

The Mountain View Drive/Old Bethlehem Road spine provides a connection between Upper Bucks County and Northampton/Lehigh Counties. The primary attraction associated with this spine is the Nockamixon State Park. Establishing a facility which connects the park with the counties to the north could serve as an opportunity to increase visitors to the park and Bucks County. An additional component of this spine is to create a “loop” spine around Nockamixon Park. This segment of this spine has been identified as a Priority Spine. The goal of this priority spine would be to establish a bicycle facility that provides access to all areas of the park and allows an opportunity for local municipalities to define “spoke” facilities which tie into this planned spine.

The existing roadways along this corridor consist primarily of two lane roads with minimal to no shoulder. The posted speed limits range from 40 to 45 MPH.

Trail Facilities

The trail facilities identified below have been established based upon the overall planning process for the Countywide Bicycle plan as well as the County’s efforts on the Greenway plan. Bucks County has been working since 1986 to secure properties along the Neshaminy Creek. Further description of each of the trail spines can be found in the County’s Greenway Plan.

- ◇ **1** — *Neshaminy Creek Greenway*

A greenway/trail along the Neshaminy Creek would establish a major northwest/southeast link across the county. This facility would link major population areas, such as Chalfont, Doylestown, Langhorne, Hulmeville and Bensalem. It would also serve to connect various park facilities, including Neshaminy State Park and Tyler State Park. A final major benefit of a spine along the Neshaminy Creek would be the potential link/intersection with a variety of the planned on-road spines, as well as the Little Neshaminy Creek spine.

Countywide Bicycle Network & Facilities

◇ **2** — *Little Neshaminy Creek Greenway*

The trail spine along the Little Neshaminy Creek would provide a link between Central Bucks County and Montgomery County, connecting several recreational facilities within the county. The recreational facilities include the Bradford Reservoir Recreation Area and Kemper Park. In addition, the trail facility would run nearby to several residential communities.

◇ **3** — *Peace Valley Park to Delaware River*

The Peace Valley Park to Delaware River spine will serve as an off-road cross county spine connecting the communities of Chalfont and New Britain to Peace Valley Park and the Delaware River area. The exact path of trail would need to be established based upon right-of-way analysis.

◇ **4** — *Tohickon Creek Greenway*

The Tohickon Creek spine will provide an off-road link between the Delaware River and Nockamixon State Park. The corridor, which will primarily follow Tohickon Creek, will connect several small recreation areas along the spine. These include Traugers Park, Stover Myers Park, Ralph Stover Park, Tohickon Valley Park and Pleasant Valley Park.

◇ **5** — *Perkasie to Nockamixon State Park*

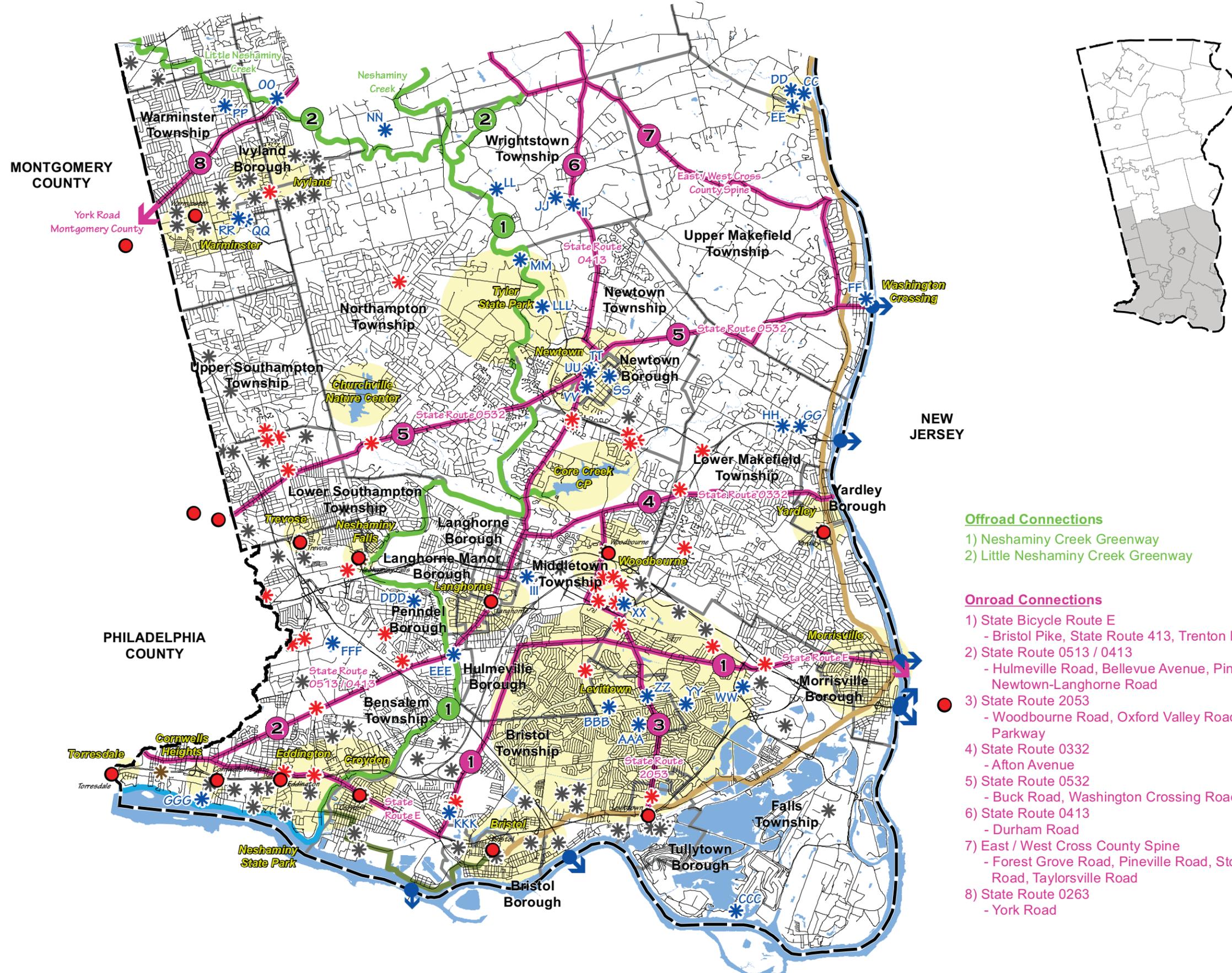
This trail spine will connect Perkasie to the east/west cross county on-road spine, as well as Nockamixon State Park.

◇ **6** — *Liberty Bell Trail*

This trail spine would be a segment of the Liberty Bell Trail, which is planned as a 25 mile rail trail corridor which will ultimately connect Quakertown with East Norriton Township in Montgomery County. The corridor partially follows along the Liberty Bell Trolley Route.

◇ **7** — *Quakertown Line Trail (Priority Spine)*

The Quakertown Line trail would provide an off-road spine along an existing SEPTA rail line north from Quakertown into Lehigh County.



MAP 4-1
COUNTY BICYCLE NETWORK
MAJOR SPINES
"LOWER BUCKS COUNTY"

LEGEND

- County Boundary
 - Municipal Boundary
 - Roadway
 - SEPTA Rail Stations
 - Points of Interest
 - Industrial Park
 - Office Park
 - Train Station
 - Destinations
 - Water Bodies
- Connections**
- Bridge Crossing
 - Primary Onroad Connection
 - Adjacent Municipal Onroad Connection
 - Offroad Connection
 - Adjacent Municipal Offroad Connection
- Paths & Trails**
- East Coast Greenway
 - Proposed East Coast Greenway
 - Route 113 Heritage Corridor
 - Delaware and Lehigh National Heritage Corridor

Offroad Connections

- 1) Neshaminy Creek Greenway
- 2) Little Neshaminy Creek Greenway

Onroad Connections

- 1) State Bicycle Route E
- Bristol Pike, State Route 413, Trenton Road
- 2) State Route 0513 / 0413
- Hulmeville Road, Bellevue Avenue, Pine Street, Newtown-Langhorne Road
- 3) State Route 2053
- Woodbourne Road, Oxford Valley Road, Levittown Parkway
- 4) State Route 0332
- Afton Avenue
- 5) State Route 0532
- Buck Road, Washington Crossing Road
- 6) State Route 0413
- Durham Road
- 7) East / West Cross County Spine
- Forest Grove Road, Pineville Road, Stoneybrook Road, Taylorsville Road
- 8) State Route 0263
- York Road

SEE LEGEND 4-4 FOR LISTING OF POINTS OF INTEREST.

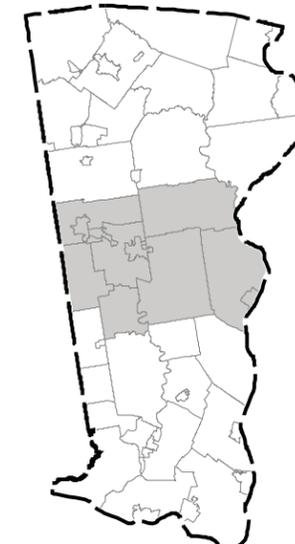
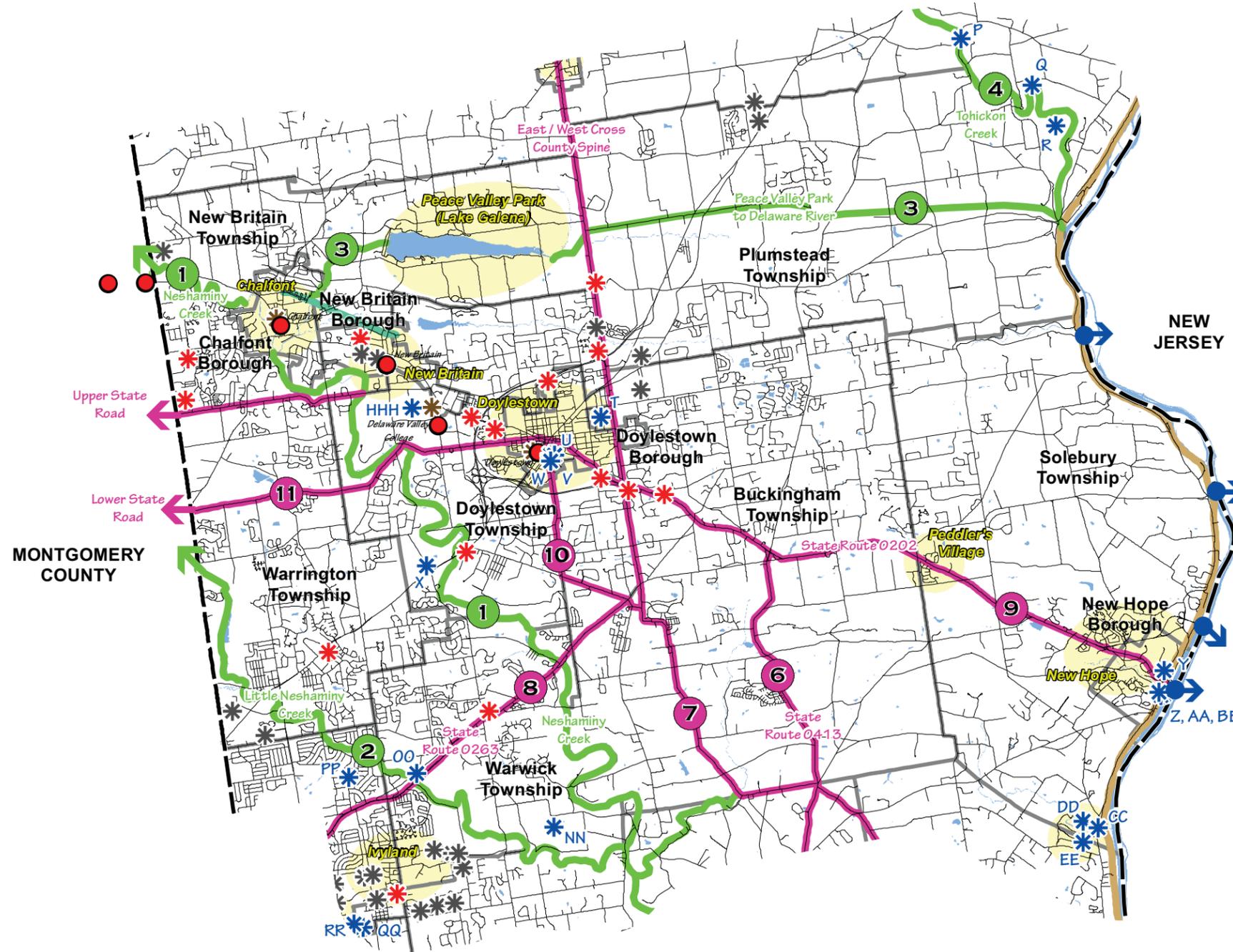


DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



MAP 4-2

COUNTY BICYCLE NETWORK MAJOR SPINES "CENTRAL BUCKS COUNTY"



LEGEND

- County Boundary
- Municipal Boundary
- Roadway
- SEPTA Rail Stations
- Points of Interest
- Industrial Park
- Office Park
- Train Station
- Destinations
- Water Bodies
- Connections**
- Bridge Crossing
- Primary Onroad Connection
- Adjacent Municipal Onroad Connection
- Offroad Connection
- Adjacent Municipal Offroad Connection
- Paths & Trails**
- Texas Eastern
- Delaware and Lehigh National Heritage Corridor

Offroad Connections

- 1) Neshaminy Creek Greenway
- 2) Little Neshaminy Creek Greenway
- 3) Peace Valley Park to Delaware River
- 4) Tohickon Creek Greenway

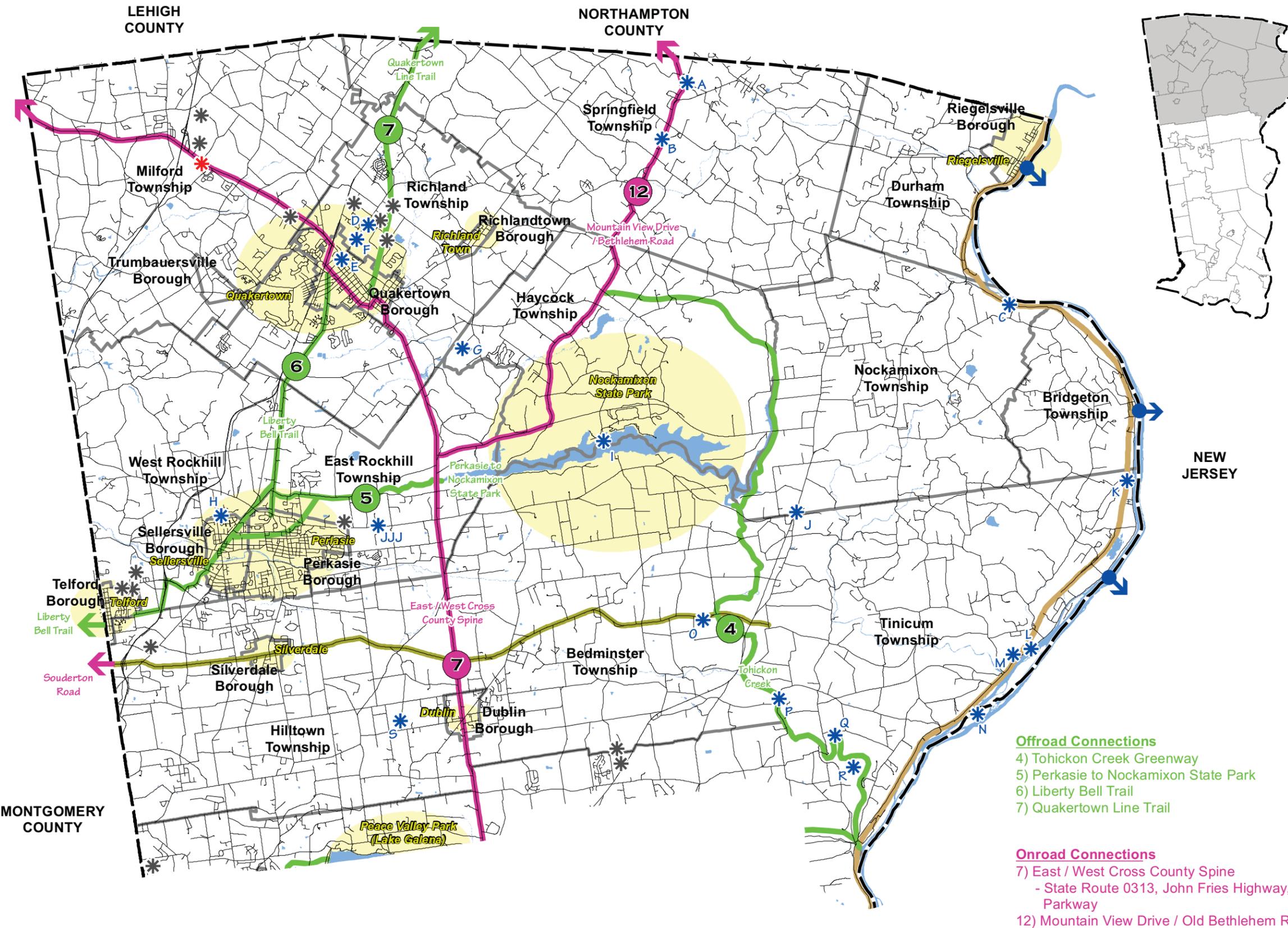
Onroad Connections

- 6) State Route 0413
- Durham Road
- 7) East / West Cross County Spine
- Swamp Road, Forest Grove Road
- 8) State Road 0263
- York Road
- 9) State Road 0202
- Doylestown-Buckingham Pike, York Road, Lower York Road
- 10) Pebble Hill Road, Green Street, Edison Furlong Road
- 11) Lower State Road

SEE LEGEND 4-4 FOR LISTING OF POINTS OF INTEREST.



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



COUNTY BICYCLE NETWORK MAJOR SPINES "UPPER BUCKS COUNTY"

LEGEND

- County Boundary
- Municipal Boundary
- Roadway
- SEPTA Rail Stations
- Points of Interest
- Industrial Park
- Office Park
- Train Station
- Water Bodies
- Destinations
- Connections**
- Bridge Crossing
- Primary Onroad Connection
- Adjacent Municipal Onroad Connection
- Offroad Connection
- Adjacent Municipal Offroad Connection
- Paths & Trails**
- Route 113 Heritage Corridor
- Delaware and Lehigh National Heritage Corridor

Offroad Connections

- 4) Tohickon Creek Greenway
- 5) Perkasio to Nockamixon State Park
- 6) Liberty Bell Trail
- 7) Quakertown Line Trail

Onroad Connections

- 7) East / West Cross County Spine
- State Route 0313, John Fries Highway, Doylestown Parkway
- 12) Mountain View Drive / Old Bethlehem Road

SEE LEGEND 4-4 FOR LISTING OF POINTS OF INTEREST.

Miles



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



LEGEND

A – Walking Purchase Monument North
B – Springfield 1892 Church School
C – Palisades
D – Upper Bucks YMCA
E – Liberty Hall
F – Upper Bucks County Health Department
G – Camp Tohikanee
H – Holiday House Recreation Area
I – Lake Nockamixon Fishing Pier
J – Walking Purchase Monument
K – Delaware Canal State Park HDQ
L – Stover Gallery
M – Sand Castle Winery
N – Treasure Island Scout Preservation BSA
O – Solowey Studio
P – Stover-Myers Mill
Q – High Rocks
R – Ockanickon Scout Reservation BSA
S – Green Hills Farm
T – Forthill
U – James A. Michener Art Museum
V – Mercer Museum
W – Bucks County Council BSA
X – Rodman House
Y – New Hope Steam Railway & Museum
Z – Delaware Canal Historic Site
AA – New Hope Information & Chamber of Commerce
BB – Bucks County Playhouse
CC – Thompson Neely House

DD – Bowmans Hill Wildflower Preserve
EE – Bowmans Hill Tower
FF – Washington Crossing Visitors Center
GG – WCHR Radio Tower
HH – I-95 Rest Area
II – Walking Purchase Monument South
JJ – Middletown Grange Fairgrounds
LL – Historic Octagonal Schoolhouse 1802
MM – Tyler International Hostel
NN – Rushland Ridge Vineyard & Winery
OO – Moland Historic House
PP – Warminster Recreation and Education Center
QQ – Ivyland Valley YMCA
RR – Federal Lands Reuse Authority
SS – Newtown Artesian Water Company
TT – Newtown Theater
UU – Chamber of Commerce
VV – Edward Hicks House
WW – Historic Fallsington Inc
XX – Sesame Place Amusement Park
YY – Galilee Pavilion
ZZ – Lower Bucks County YMCA
AAA – Salvation Army of Lower Bucks
BBB – American Red Cross
CCC – Pennsbury Manor Historical Site
DDD – Growden Mansion
EEE – Old Mill Flea Market
FFF – Philadelphia Park Race Track
GGG – Pen Ryn Mansion

HHH – Delaware Valley College
III – Philadelphia Biblical University
JJJ – Bucks County Community College
Upper Bucks Campus
KKK – Bucks County Community College
Lower Bucks Campus
LLL – Bucks County Community College
Newtown Campus

LEGEND 4-4

COUNTY BICYCLE NETWORK MAJOR SPINES

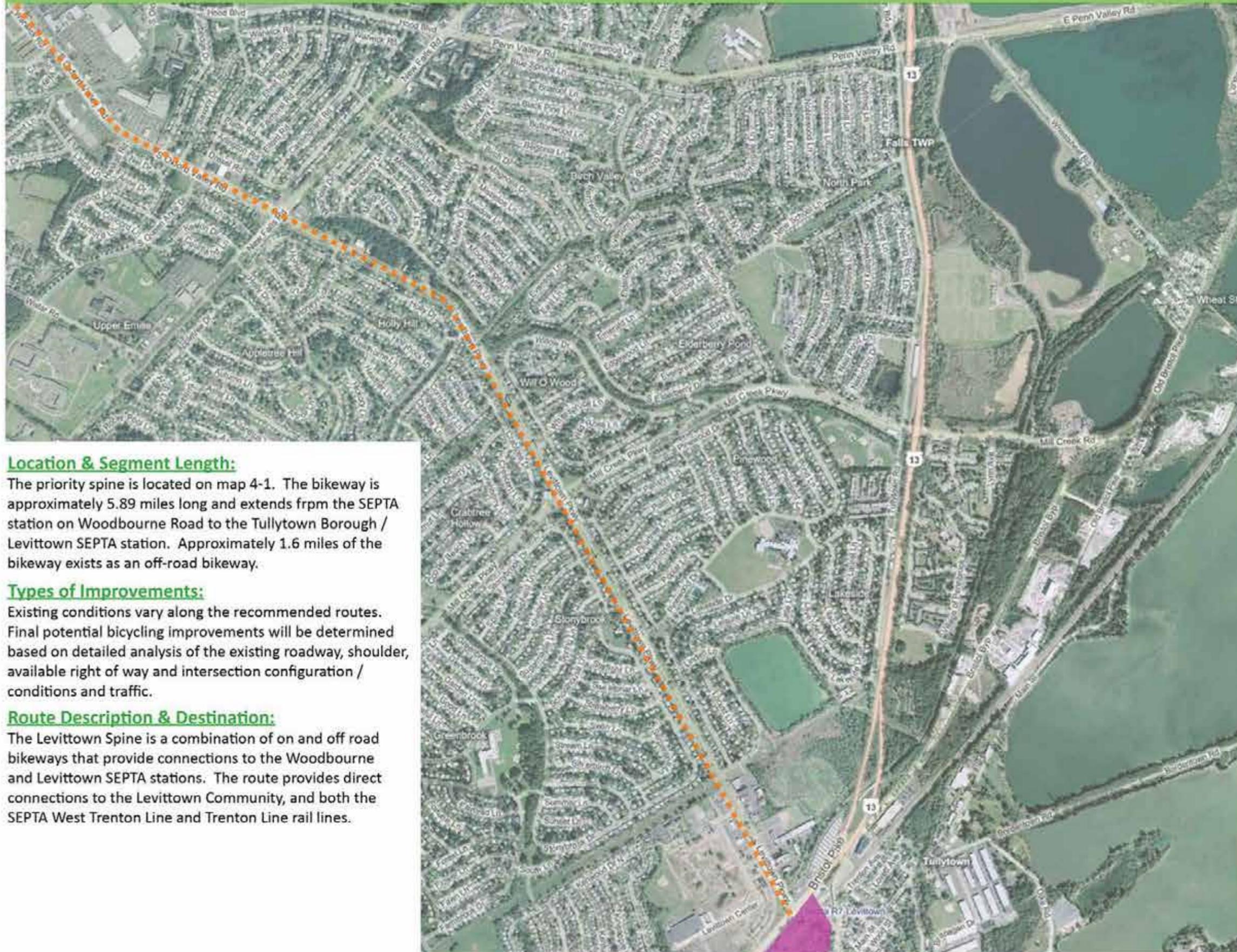


MAP 5-1

LEVITTOWN PARKWAY SPINE (SPINE #3) "LOWER BUCKS COUNTY"

LEGEND

-  Levittown SEPTA Station
-  Proposed Off-Road Bikeway Connection
-  Existing Off-Street Bikeway



Location & Segment Length:

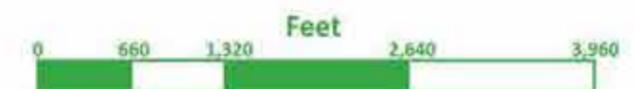
The priority spine is located on map 4-1. The bikeway is approximately 5.89 miles long and extends from the SEPTA station on Woodbourne Road to the Tullytown Borough / Levittown SEPTA station. Approximately 1.6 miles of the bikeway exists as an off-road bikeway.

Types of Improvements:

Existing conditions vary along the recommended routes. Final potential bicycling improvements will be determined based on detailed analysis of the existing roadway, shoulder, available right of way and intersection configuration / conditions and traffic.

Route Description & Destination:

The Levittown Spine is a combination of on and off road bikeways that provide connections to the Woodbourne and Levittown SEPTA stations. The route provides direct connections to the Levittown Community, and both the SEPTA West Trenton Line and Trenton Line rail lines.



DATA SOURCE: BUCKS COUNTY, PA; PASDA, PennDOT

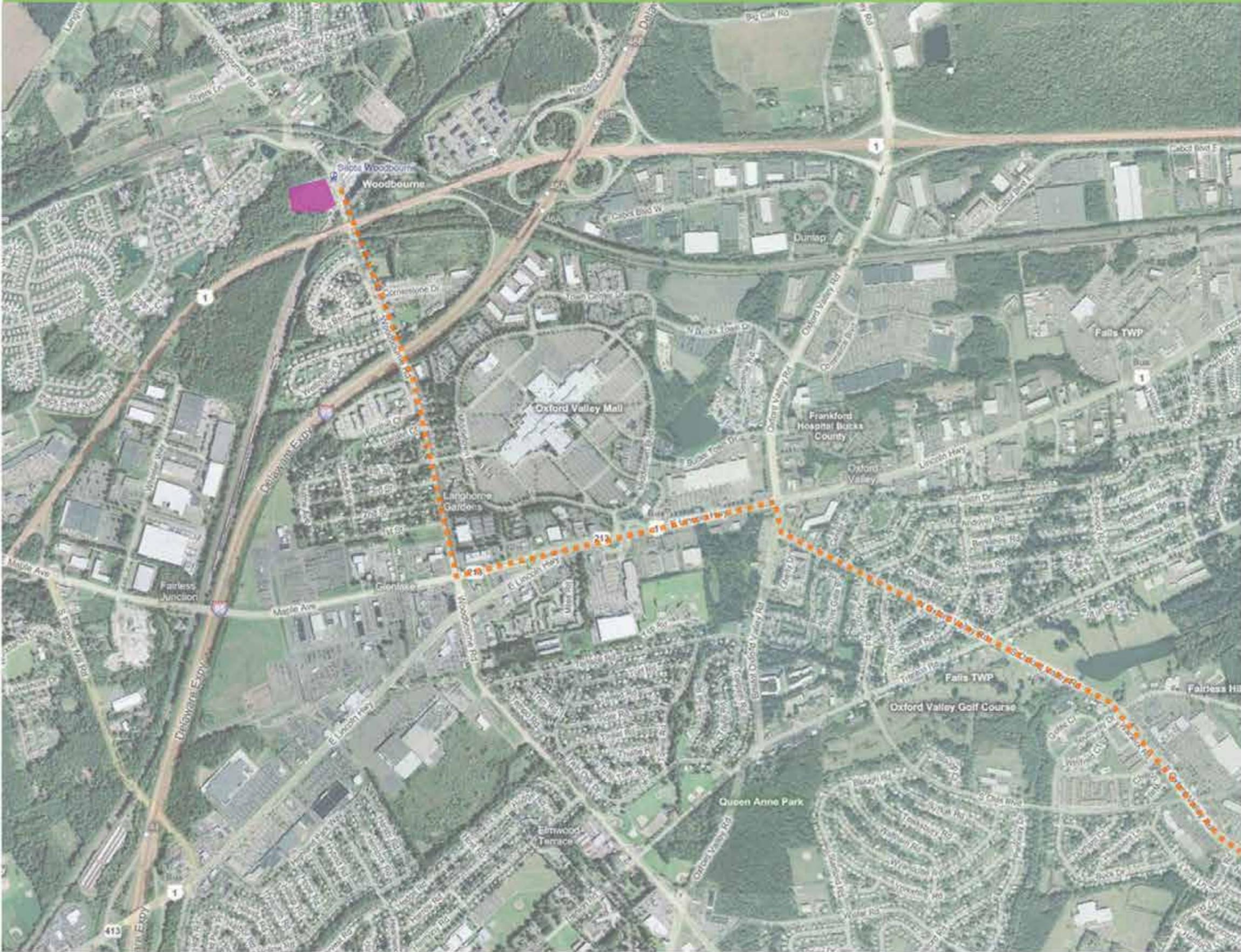


MAP 5-2

LEVITTOWN PARKWAY SPINE (SPINE #3) "LOWER BUCKS COUNTY"

LEGEND

-  Woodbourne SEPTA Station
-  Proposed Off-Road Bikeway Connection
-  Existing Off-Street Bikeway



DATA SOURCE: BUCKS COUNTY, PA; PASDA, PennDOT



MAP 6-1
DOYLESTOWN TO
NEW HOPE SPINE
(SPINE #9)
"CENTRAL BUCKS COUNTY"

LEGEND

- Proposed Off-Road Bikeway Connection
- Existing Off-Street Bikeway
- Alternate Off-Road Route
- Alternate On-Road Route
- Existing Trail
- Municipal Boundary

Information to be coordinated by work underway from Bucks County and municipal partners



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



MAP 6-2
DOYLESTOWN TO
NEW HOPE SPINE
(SPINE #9)
"CENTRAL BUCKS COUNTY"

LEGEND

- Proposed Off-Road Bikeway Connection
- Existing Off-Street Bikeway
- Alternate Off-Road Route
- Alternate On-Road Route
- Existing Trail
- Municipal Boundary

*Information to be coordinated
by work underway from Bucks
County and municipal partners*



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT

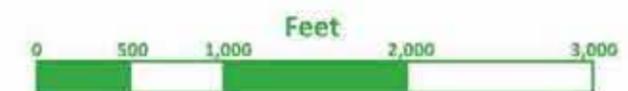


MAP 6-3
DOYLESTOWN TO
NEW HOPE SPINE
(SPINE #9)
"CENTRAL BUCKS COUNTY"

LEGEND

-  Proposed Off-Road Bikeway Connection
-  Existing Off-Street Bikeway
-  Alternate Off-Road Route
-  Alternate On-Road Route
-  Existing Trail
-  Municipal Boundary

**Information to be coordinated
by work underway from Bucks
County and municipal partners**



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



MAP 6-4
DOYLESTOWN TO
NEW HOPE SPINE
(SPINE #9)
"CENTRAL BUCKS COUNTY"

LEGEND

- Proposed Off-Road Bikeway Connection
- Existing Off-Street Bikeway
- Alternate Off-Road Route
- Alternate On-Road Route
- Existing Trail
- Municipal Boundary

Information to be coordinated by work underway from Bucks County and municipal partners



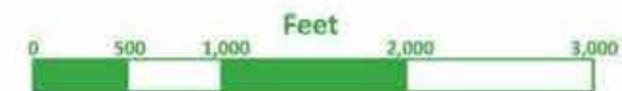


MAP 6-5
DOYLESTOWN TO
NEW HOPE SPINE
(SPINE #9)
"CENTRAL BUCKS COUNTY"

LEGEND

- Proposed Off-Road Bikeway Connection
- Existing Off-Street Bikeway
- Alternate Off-Road Route
- Alternate On-Road Route
- Existing Trail
- Municipal Boundary

Information to be coordinated by work underway from Bucks County and municipal partners





MAP 7-1
QUAKERTOWN LINE
(SPINE #7)
"UPPER BUCKS COUNTY"

LEGEND

- - - - - Proposed Bikeway Connection
- Municipal Boundary

Location & Length Segment:

The priority spine is located on Map 4-3. The Quakertown Line trail would provide a 5.15 mile off-road connection, along an existing SEPTA rail corridor, from Quakertown into Lehigh County.

Types of Improvements:

Existing conditions vary along the rail corridor. The proposed off-road facility would include rail to trail improvements. Required street crossings would include E. Mill Street, E. Pumping Station Road, California Road, Cherry Road and Springfield Street.

Route Description & Destinations:

Near Quakertown, the existing rails and ballast still exist along the corridor. North of California Road, the rails no longer exist and the corridor is vegetated. Key destinations include downtown Quakertown, Veteran's Park in Richland Township and Coopersburg in Lehigh County.



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT



MAP 7-2
QUAKERTOWN LINE
(SPINE #7)
"UPPER BUCKS COUNTY"

LEGEND

- Proposed Bikeway Connection
- Municipal Boundary



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT

Countywide Bicycle Network & Facilities

The following maps, Maps 4-1 through 4-4, provide the location of the various spines that have been described above. In addition, Maps 5, 6 and 7 provide a more detailed summary of the three priority spines.

Spokes

The key recommendation for the secondary routes, or “spokes,” is to move forward with the planned bikeways that have been identified through bicycle planning efforts by the local municipalities. Priority should be given to those routes that traverse along the major spine route or connect to the major spines.

Included in this recommendation is the promotion by the county for the local municipalities to complete local bicycle, bicycle/pedestrian and greenway plans. This could be completed by individual municipalities or through a collaborative effort of a number of adjacent municipalities. Completion of such plans at the local land multi-municipal level will establish the next layer in creating a complete bicycle network across and beyond Bucks County.

Suggested Connections

A secondary component to the spokes portion of the overall countywide bicycle network are “Suggested Connections.” The Suggested Connections, as shown on Map 9, were developed by the Bucks County Bicycle Task Force and other key stakeholders. The connections are routes that provide or have an opportunity to provide a safe bicycle facility for both transportation and recreational purposes.

Other Considerations

In addition to the priority spines, spokes and suggested connections, the County contains a few additional options for future trail connections. These include the various utility corridors and Newtown Line corridor. Traditionally, utility and rail corridors are an ideal opportunity for the potential development of trails. General coordination with the corridor owner and development of the use and maintenance agreements are the critical steps associated with trail development along a utility/rail corridor.

While the utility corridors and Newtown Line corridor provide a viable alternative for future bicycle facilities, they were not identified as a focus of this current study.

Countywide Bicycle Network & Facilities

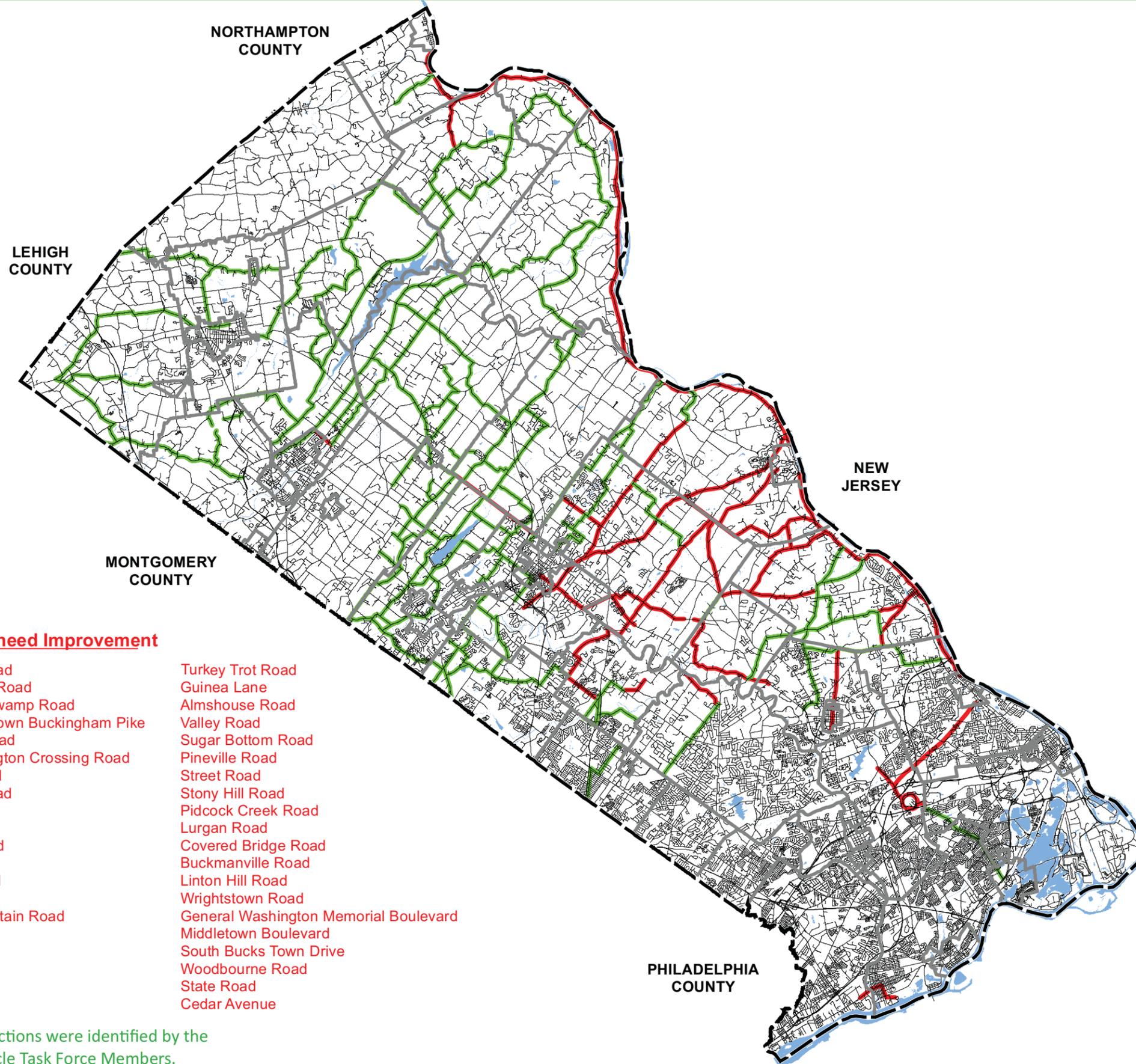
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MAP 8 SUGGESTED CONNECTIONS

LEGEND

- County Boundary
- Municipal Boundary
- Roadway
- Good Roadways
- Roadways that need Improvement
- Water Bodies



Roadways that need Improvement

- | | |
|--|---------------------------------------|
| Route 32 - River Road | Turkey Trot Road |
| Route 611 - Easton Road | Guinea Lane |
| Route 313 - West Swamp Road | Almshouse Road |
| Route 202 - Doylestown Buckingham Pike | Valley Road |
| Route 263 - York Road | Sugar Bottom Road |
| Route 532 - Washington Crossing Road | Pineville Road |
| Blooming Glen Road | Street Road |
| Burnt House Hill Road | Stony Hill Road |
| Green Street | Pidcock Creek Road |
| Pebble Hill Road | Lurgan Road |
| Edison Furlong Road | Covered Bridge Road |
| Forest Grove Road | Buckmanville Road |
| Mechanicsville Road | Linton Hill Road |
| Lower York Road | Wrightstown Road |
| Lower / Upper Mountain Road | General Washington Memorial Boulevard |
| Swamp Road | Middletown Boulevard |
| Mill Creek Road | South Bucks Town Drive |
| Sackettsford Road | Woodbourne Road |
| Watson Road | State Road |
| Rushland Road | Cedar Avenue |

*Suggested Connections were identified by the Bucks County Bicycle Task Force Members.



DATA SOURCE: BUCKS COUNTY, PA, PASDA, PennDOT

Countywide Bicycle Network & Facilities

Amenities

The user's experience associated with the overall bicycle network can be enhanced through the inclusion of amenities and facilities positioned at strategic locations. The following are examples of common facilities and amenities that should be considered as a bicycle facility is planned and designed.

- **Restrooms** - Restrooms are commonly associated with off-road facilities and should be focused to serve both a trail facility and existing or proposed recreation area.
- **Benches** - Benches, similar to restrooms, are more commonly associated with off-road facilities. Benches best serve the user when placed at trailheads and/or at strategic locations along the trail for resting.
- **Bike Racks** - The inclusion of bicycle racks within a downtown area show that bicycles and bicyclists are welcome and encouraged to stop and visit. Bike racks should also be included at trailheads for off-road facilities, transfer stations and other multi-modal centers.
- **Trash Receptacles** - Trash receptacles should be provided at trailheads or within a business district only. Trash receptacles should not be included along a trail corridor, as off-road facilities should be developed as a "carry in/carry out" facilities.
- **Guide Rail** - Guide rail is placed as necessary to control access and identify safety concerns, such as areas of steep side slopes, stream culverts, and road crossing.
- **Bollards** - Bollards should be placed at access points to control traffic and prohibit unauthorized vehicles entering off-road facility. The need of access by emergency, security, and maintenance vehicles should be considered when developing a design which includes bollards.
- **Signage** - Signs serve a variety of functions along both an on-road and off-road facilities. Along on-road facilities, regulatory and warning signs exist for both motorists and cyclists. Off road facilities commonly include mile marker signs, informational signs and interpretive signs. Both facilities could also include directional or wayfinding signage.

Recommendations

The foundation for success in implementing bicycle facilities across Bucks County will be laid by each of the local municipalities. The Bucks County Bicycle Plan establishes the long range vision for the major bicycle spines across the County, with the goal of creating a county-wide bicycle network. *However, to be able to achieve this long range vision, the foundation for the overall bicycle network will need to be*

Countywide Bicycle Network & Facilities

developed by the local municipalities through defining and implementing their own municipal or multi-municipal bicycle master plan.

During the planning process members of the BCBTF coined the term “**bike shed**” to describe the local framework for bike facilities within each of the local municipalities. Like a watershed whose system of drainage ways, streams and rivers are connected, local bike facilities serve the immediate area and is part of a larger interconnected network. Using these local “bike sheds” as the foundation, the local municipalities and County would then work together to establish the overall countywide vision through planning and implementing the segments of the major spines which connect the individual “bike sheds.”

- Local plans should be focused on creating a local bicycle network, which could also be identified as a local “bike shed.” Each of these individual “bike sheds” should be focused on establishing a bicycle network which provides a balance of both transportation and recreational bicycle facilities which best meet the desires and needs of the local communities.
- A component of the local plans should include an implementation strategy for segments of the major spines, identified as a part of this plan, which are located within their individual “bike shed.”
- Suggested connections must be evaluated as a part of the development of the local municipal plans and be incorporated as spokes as those plans are realized.
- Incorporate provisions in local plans that address continuity of bikeways across municipal boundaries.
- Comprehensive Plan updates should include a focus and priority on bicycle planning and implementation as a part of the overall transportation network in a municipality.

Other key recommendations for the development of the Countywide Bicycle Network include:

- Focus a portion of local municipal and county maintenance efforts on providing a clear/smooth surface along existing shoulders
- Install “share the road” signs and/or “sharrow” pavement markings
- Widen or re-mark existing roadway to include a minimum 4’ paved shoulder

Introduction

A successful countywide bicycle system in Bucks County will be rooted in partnerships. Throughout the public participation process for the plan, governmental entities, community organizations, businesses and citizens expressed the importance and willingness to work together in establishing a countywide system for bicycling. Both public and private sector representatives underscored the importance of officials at all levels of government being willing to commit to the establishment of safe and friendly places for people who live, work and visit here to ride bicycles for fun, fitness and transportation. Partnerships will include Bucks County, municipalities, private sector businesses, non-profit organizations, health and educational institutions, and community organizations. Federal, state, regional and local governmental entities manage facilities and services related to bicycling in Bucks County.

Federal Government

The Delaware & Lehigh Canal National Heritage Corridor Commission is a partnership project produced by the National Park Service's National Register of Historic Places, the Delaware & Lehigh National Heritage Corridor, the Pennsylvania Historical and Museum Commission, Steamtown National Historic Site, the National Conference of State Historic Preservation Officers (NCSHPO), and the National Alliance of Preservation Commissions (NAPC). The Commission provides technical support, grant funding, research and support for studies.

State Government

The implementation of a majority, if not all, of the suggested bicycle facilities will require coordination with a variety of state level agencies. The following is summary of the various agencies who will need to be brought along as partners as bicycle improvements are planned and implemented.

Bureau of State Parks

The Commonwealth of Pennsylvania operates five state parks in Bucks County: Neshaminy, Tyler, Nockamixon, Ralph Stover and the Delaware & Lehigh Canal State Parks. They are important locations and destinations for bicycling with cycling visitation at Tyler and Nockamixon approaching nearly 200,000 visitors annually. Neshaminy State Park managers have been involved in advancing the establishment of linkages to connect the East Coast Greenway through Bucks County.

Forging Partnerships

Pennsylvania Department of Conservation and Natural Resources

PADCNR has funded numerous parks and recreation, greenway and trail plans as well as construction projects for trails and bicycle facilities. PADCNR provides technical assistance and support for trails and greenways, which are in fact the top priority of the department. Their highest priority for trails includes trails of statewide and regional significance. DCNR funded a regional community bicycle-planning seminar in Central Bucks County in 2004 attesting to PADCNR's perspective that this area has provided a model for bicycle planning statewide.

PennDOT

PennDOT is a major player in the advancement or deterrence of road bicycle facilities in Bucks County. PennDOT policies on state roads determine if municipalities can install their desired bicycle improvements on state roads in their jurisdiction. PennDOT has a bicycle coordinator for the region who works at a much less than full-time capacity.

SEPTA

Since the bicycle plan is targeting transportation, major consideration needs to be given to multi-modal transit. SEPTA offers the opportunity to advance multi-modal transportation opportunities for people who live, work and visit here. Fitting trains to accommodate bicycles as well as safe parking for bicycles at train stations is key. Interviews with SEPTA officials found SEPTA to be most supportive of bicycling.

Bucks County

With a population of 625,249, Bucks County is the fourth most populous County in Pennsylvania. There are 54 municipalities and 13 school districts.

County Departments

Several departments have been involved in advancing bicycling in Bucks County. The Planning Commission was the lead agency in developing this bicycle plan in tandem with a greenway plan. The Parks and Recreation Department is involved in planning and development of the county link park system, planning and developing bicycle pathways in parks, supporting municipal planning for bicycle connections to county parks as well as in land acquisition for property that will form important trails and linkages. The Redevelopment Authority has been supportive of advancing bicycling as exemplified in their recent partnership with the PEC (Pennsylvania Environmental Council) and the Pennsylvania Bureau of State Parks in pursuing state funding to explore safe bicycle connections that will provide a critical link to the East Coast Greenway.

Forging Partnerships

Bucks County Bicycle Task Force

The Bucks County Commissioners established the BCBTF (Bucks County Bicycle Task Force). This is a citizens' advisory committee organized to advance a countywide bicycle network. BCBTF was instrumental in the development of this county bicycle plan and provided guidance and first hand knowledge on field work, mapping, bicycle network, and bicycle education. The task force also participated in public meetings, offered names and contact information for key stakeholders, critically reviewed documents and mapping and provided supporting documentation and plan materials.

Municipalities

A countywide bicycle system will traverse 54 municipalities unifying communities from Durham to Bensalem and Milford to Falls. Table 1 presents the municipalities of Bucks County along with information about the potential departments and advisory boards related to bicycling. The municipalities have already established several miles of bicycle pathways and have planned many more miles.

Parks and Recreation

There are 27 parks and recreation departments in the County and various Parks and Recreation Boards. The BCRC (Bucks County Recreation Council) is composed of the municipal parks and recreation directors and other interested municipal officials. BCRC meets bi-monthly to discuss issues and opportunities, share information and join in projects collaboratively. They met with the planning team for this bicycle plan and expressed their enthusiasm for a countywide bicycle system and their desire to participate in its planning and development. Interviews with municipal managers who have a parks and recreation director on staff generally indicated that their parks and recreation director would be the lead in bicycle planning.

Planning Commissions

Municipalities have a key role in helping to create bicycle systems by securing land and linkages for bicycle trails through the planning and land development process as well as in the Mandatory Dedication of Parkland and Trail Ordinances. Municipal elected officials, planners and planning commissions are key to negotiating these linkages with developers.

Safety and Security

Police Departments can be key partners in advancing a culture of safety. A few municipalities have police bicycle patrols. Police depart-

Forging Partnerships

ments also offer bicycle rodeos for children and youth in conjunction with school districts and parks and recreation departments.

**Table 1
Municipalities of Bucks County**

Bedminster Township	Langhorne Manor Borough	Richlandtown Borough
Bensalem Township	Lower Makefield Township	Riegelsville Borough
Bridgeton Township	Lower Southampton Township	Sellersville Borough
Bristol Borough	Middletown Township	Silverdale Borough
Bristol Township	Milford Township	Solebury Township
Buckingham Township	Morrisville Borough	Springfield Township
Chalfont Borough	New Britain Borough	Telford Borough
Doylestown Borough	New Britain Township	Tinicum Township
Doylestown Township	New Hope Borough	Trumbauersville Borough
Dublin Borough	Newtown Borough	Tullytown Borough
Durham Township	Newtown Township	Upper Makefield Township
East Rockhill Township	Nockamixon Township	Upper Southampton Township
Falls Township	Northampton Township	Warminster Township
Haycock Township	Penndel Borough	Warrington Township
Hilltown Township	Perkasie Borough	Warwick Township
Hulmeville Borough	Plumstead Township	West Rockhill Township
Ivyland Borough	Quakertown Borough	Wrightstown Township
Langhorne Borough	Richland Township	Yardley Borough

School Districts

Bucks County has 13 school districts. Interviews with the school districts found that some are involved with Safe Routes to Schools projects. A few school districts have bicycle safety projects or programs such as educational programs in conjunction with physical education classes, free and reduced helmet programs and bicycle rodeos. Table 2 presents the school districts.

Bensalem Township School District	Central Bucks School District	New Hope - Solebury School District
Bristol Borough School District	Council Rock School District	Palisades School District
Bristol Township School District	Morrisville Borough School District	Pennridge School District
Centennial School District	Neshaminy School District	Pennsbury School District
		Quakertown Community School District

Quasi-Public Organizations

Visit Bucks County

Visit Bucks County is the official tourism promotion agency for Bucks County. The agency's goal is to stimulate economic development through the spending of visitors in Bucks County for lodging, food, services and goods. A hotel tax helps to support the agency's mission of promotion of county assets, features, destinations, events, and other aspects of tourism. Target markets include individuals, meeting and conference planners, and sports tournaments. Bicycle tourism could be a new and an important venture for Visit Bucks County. Anecdotal information revealed that many people travel to Bucks County to cycle the iconic backcountry roads and the towpath of the Delaware & Lehigh Canal. They stay for multiple days and spend money on staying overnight and eating.

YM/YWCA's

There are three YM/YWCAs in Bucks County corresponding to the three major geographical areas of the county: Upper, Central, and Lower. The YM/YWCA's offer bicycle safety and educational instruction and activities.

Forging Partnerships

Regional Planning and Trail Organizations

Delaware Valley Regional Planning Commission

DVRPC (Delaware Valley Regional Planning Commission) conducts transportation, open space and recreation planning in southeastern Pennsylvania and southern New Jersey. This includes bicycle planning. DVRPC also conduct studies on the value of investment in open space, parks recreation and trails. Their recent publication, **The Economic Value of Protected Open Space in Southeastern Pennsylvania**, provides significant information on the economic value of open space with many good examples of benefits of trails.

Pennsylvania Environmental Council

PEC (Pennsylvania Environmental Council) protects and restores the natural and built environments through innovation, collaboration, education and advocacy. PEC believes in the value of partnerships with the private sector, government, communities and individuals to improve the quality of life for all Pennsylvanians. PEC is involved in regional bicycle projects in Southeastern Pennsylvania including working on connecting the East Coast Greenway through Bucks County.

Delaware River Joint Toll Bridge Commission

The Delaware River Joint Toll Bridge Commission provides safe, dependable and efficient river crossings between Pennsylvania and New Jersey. The Delaware River Bridge Commission is a significant supporter of advancing bicycling in Bucks County by providing funding for trail projects.

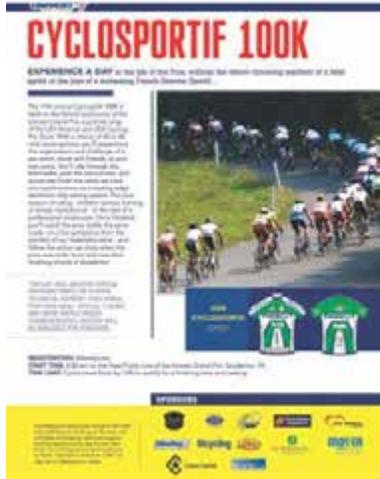
East Coast Greenway Alliance

The East Coast Greenway vision is for a long-distance, urban, shared-use trail system made up of existing trails and interior on road connectors between trails linking 24 major cities along the eastern seaboard between Calais, Maine and Key West, Florida traversing Bucks County near Neshaminy State Park in Lower Bucks County. It serves non-motorized users of all abilities and ages. A 3,000-mile long spine route will be accompanied by 2,000 miles of alternate routes that link in key cities, towns, and areas of natural beauty. This essential alternative transportation collector trail corridor provides cyclists, walkers, and other muscle-powered modes of transportation with a low-impact way to explore the eastern seaboard. Creating the Greenway is an enormous partnership undertaking that depends for its success on the involvement of hundreds of state and local government agencies, trail advocates, supporters, and other non-profit organizations.

Forging Partnerships

Appalachian Trail Club

The Pennsylvania branch of the ATC (Appalachian Trail Club) is coordinating work on establishing the Highlands Trail through Bucks County. The Highlands Trail extends from New York and New Jersey in a south-west direction toward Cumberland County and south of the Mason Dixon Line. ATC planners are working on alternative routes through Bucks County.



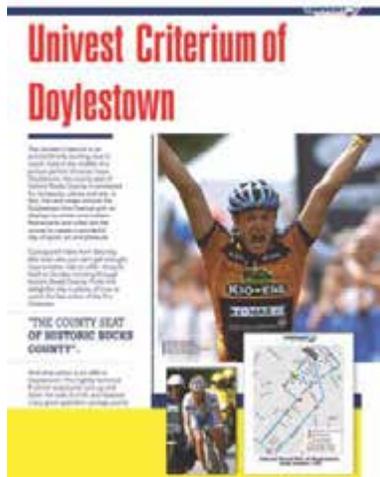
Bicycle Coalition of Greater Philadelphia

Founded in 1972, the Bicycle Coalition of Greater Philadelphia is a 501 (c)3 nonprofit organization that serves the Pennsylvania counties of Bucks, Chester, Delaware, Montgomery and Philadelphia as well as South Jersey and the state of Delaware. The organization's mission is to make bicycling better through advocacy and education by promoting biking as a healthy, low-cost, and environmentally-friendly form of transportation and recreation. The "Bike Coalition" was awarded recognition at the top bicycle advocacy organization in the USA.



Bicycle Clubs

Suburban Cyclists, Central Bucks Bicycle Club, Tri-County Cycling Club, Bucks County Racing Club, and the Bicycle Club of Philadelphia operate in Bucks County. They focus primarily on rides for club members. They are interested in and work to advance bicycle safety for riders. Central Bucks Bicycle Club raises funds through their events such as the Bucks County Covered Bridge Ride that they use to advance bicycling and safety in the area. They provide grants such as to the Emergency Medical Technician's to establish an emergency response team that responds on bicycles. The club funded the bicycles outfitted with emergency medical equipment. The bicycle-riding EMTs serve the public at special events by having the advantage of speedily reaching those in need of emergency medical attention in a way that is impossible for motorized vehicles.



SPARTA Cycling

SPARTA Cycling brings the international bicycle race sponsored by and known as the Univest Race annually that is based in Doylestown Borough. The world-class race is one of the top Pro-Am races in the USA. From its inception, the Univest Grand Prix has united the towns throughout Bucks and Montgomery counties for a weekend of community celebration while offering a unique showcase for the best young talent in cycling

Forging Partnerships

Private Organizations

Chambers of Commerce

Bucks County has six Chambers of Commerce: Upper Bucks, Central Bucks, Lower Bucks, Pennridge, Greater BucksMont and New Hope. The Chambers of Commerce serve their members by fostering a climate that supports the establishment, support and growth of local businesses. Several Chambers reported that they get frequent calls from people inquiring about where to go bicycling. The Upper Bucks Chamber provides bicycle maps for the Montgomery County Bicycle Trails, but not Bucks County, because there is no such map for Bucks County. There was consensus among the Chambers that having recreational opportunities, especially trails adds to the quality of life so vital in attracting businesses, thereby contributing to a vibrant economy.

Health Care Providers

Hospitals in Bucks County are actively engaged in public health care and disease prevention. There are seven hospitals in Bucks County as follows:

- **Aria Health Bucks County Campus**
Langhorne
<http://www.ariahealth.org>
- **Doylestown Hospital**
Doylestown
<http://www.dh.org>
- **Grand View Hospital**
Sellersville
<http://www.gvh.org>
- **Lower Bucks Hospital**
Bristol
<http://www.lowerbuckshospital.org>
- **St. Luke's Quakertown Hospital**
Quakertown
<http://www.mystlukesonline.org>
- **St. Mary Medical Center**
Langhorne
www.stmaryhealthcare.org

Examples of how hospitals get involved in supporting bicycle efforts include St. Mary Medical Center has implemented a bicycle sharing program and Doylestown Hospital supporting the Doylestown Bike & Hike Path and a proposed educational program for bicycle safety as part of a federal grant.

Forging Partnerships

Bicycle Shop Owners

Bicycle shop owners are major sources of information about bicycle opportunities and issues. They also have a vested interest in the establishment of a countywide bicycle network. Many are involved in community bicycle related events. Finding ways to involve them in a meaningful way that respects their time as busy business owners with limited time would be important.

Developers

Developers can be major partners in getting bicycle pathways constructed. Dealing with them in a positive manner in their early phases of planning would be advantageous in terms of bicycle pathway development.

Potential Bicycle Education and Safety Partners

The League of American Bicyclists certifies League Cycling Instructors who teach cyclists to ride safely and motorists to share the road. Involving the local instructors in addressing bicycle education countywide could help to carve out bicycle safety education on a strategic and sustained basis.

Summary Findings Regarding Partnerships

The planning process found well over 100 different organizations in the public and private sectors involved in some form of bicycling advancement in Bucks County. The success to date of bicycle pathways is largely the result of a variety of public and private partners valuing the importance of bicycling and reaching out to coordinate plans, policies, processes, development and maintenance.

Bicycle-related partnerships vary from long term and committed to more fragmented and loose relationships. Harnessing the large number of actively interested partners to work toward the common vision of a countywide bicycle system is a major opportunity of the plan. Together, the partners could work toward establishing a countywide bicycle system with a “Culture of Bicycling” in which bicyclists ride safely and motorists share the road.

Forging Partnerships

Recommendations

- Establish the BCBTF as the County Advisory Board organization responsible for orchestrating partnerships to advance the development of the countywide bicycle network. Engaging diverse partners will help to build capacity for implementation. BCBTF will promote and work to advance the development of the facilities, educational, enforcement, and encouragement of bicycling in Bucks County. Consider establishing sub-committees to address specific topics such as education. Consider the appointment of other key partners to BCBTF such as a liaison from BCRC.
- Provide the continuation of professional staff support for BCBTF through the Bucks County Planning Commission. Develop a plan for engaging partners in recognition that not everything can be accomplished at once. The first year of this plan should be established with goals, actions, timeframe and responsibilities for how designated partnerships would be established, enhanced and sustained, **as well as the initiation of work plans for early action projects.**
- A communication system should be established for partners to access and disseminate information and networking. This should be done through a combination of a website and other social media.
- Hold an annual bicycle summit for bicycle partners.
- Consider doing an annual “check-in” with partners to keep up-to-date on partner initiatives.
- Work with partners to generate information on the value of bicycling in Bucks County as a way to build support among elected and appointed officials and the general public.
- Consider creating a “speaker’s bureau” from partner organizations to provide knowledgeable willing people to speak at important events related to advancing the development of the county bicycle network.
- Use the partnerships as a way to build the “Culture of Bicycling” in Bucks County. It will take many people and organizations to put ubiquitous symbols throughout the county that convey that this is a place where people bicycle as a way of life.

Education, Encouragement, & Enforcement

Introduction

The Bucks County Bicycle Plan incorporates the traditional four E's of bicycle plans: Engineering, Education, Enforcement and Encouragement. The Engineering aspects of the plan are addressed as a portion of the "toolbox" appendix of this plan. This chapter addresses Education, Encouragement and Enforcement. A successfully implemented bicycle network will band together the physical aspects of the network along with programs to increase the awareness regarding bicycling, improve both safety and public perception about bicycle safety; encourage bicycling for transportation fun and fitness; and enforce Pennsylvania and municipal laws. Due to staffing limitations, use of the Internet as a tool to encourage the sharing of information about bicycle safety, programs and opportunities is recommended.

Education

Educating motorists and cyclists about safety and courtesy is one of the top priorities identified throughout the public involvement process. It also represents an opportunity for various providers of bicycle education and safety to work together in fostering countywide bicycle safety and courtesy. Interviews and research into bicycle education found numerous fine examples of educational outreach efforts regarding bicycle safety and education. This plan recognizes that the involvement of the growing number of organizations and individuals that are motivated to encouraging and promoting bicycling is critical to improving the bicycle friendly culture in Bucks County. These efforts however are fragmented, have limited public awareness, and sometimes, limited public participation. Since many organizations are already involved in some form of bicycle safety education, they would make good partners with the Bicycle Task Force. The Task Force could serve as the central clearinghouse of such programs in order to facilitate the sharing of information and facilitate the planning of events and programs in a way that would both support the programs and synthesize a "critical mass" of bicycle safety efforts that combined could promote awareness in an efficient and effective way that no one provider alone could accomplish. The following section details the organizations that are providing education and safety programs.

State Efforts

PennDOT distributes Pennsylvania Bicycle Driver's Manual "Street Smarts" by John S. Allen produced by the Rodale Press to new drivers. There are no questions on the driver's exam dealing with bicyclists on the road. One of the best things that PennDOT can do for bicycle education is to support and facilitate the construction and installation of bicycle facilities through policies, staff support and funding.

Education, Encouragement, & Enforcement

County Efforts

The Bucks County Parks and Recreation Department offers bicycle education classes.

The Bucks County Bicycle Task Force provides a strong presence at major events such as the Univest GrandPrix Race in Doylestown. The Task Force hosted a public information booth with interesting and valuable activities. Information at the booth included educational materials as well as fitting and providing bicycle helmets for youth and discussing their importance with parents.

School Districts

The 13 school districts were contacted to determine their level of effort in providing bicycle safety and education programs and activities. The findings included:

- Council Rock – Bicycle education may be part of the physical education curriculum.
- Neshaminy – Bicycles are used as part of the physical education curriculum.
- Palisades – Schools offer a helmet program in which helmets are distributed at no charge or at a discounted rate.
- Quakertown – The District works with the local police department in offering bicycle rodeos.

Various school districts are involved in Safe Routes to School and have received funding for this purpose.

Bicycle Organizations

The Bicycle Coalition of Greater Philadelphia offers a model curriculum for fifth graders.

The Bicycle Clubs that serve Bucks County residents indicated that they foster a climate of educating cyclists through their group rides so that riders experience on-the-ride educational information about proper bicycling behavior. In exchanges with motorists, they work towards providing information about sharing the road with cyclists.

The League of American Bicyclists certifies League Cycling instructors (LCI) for providing classes for safe cycling to bicyclists and sharing the road for motorists. Capitalizing on LCI resources within Bucks County will have positive impact on bicycle safety education in the region.

Findings on Bicycle Education

While it is essential that all users of public roadways understand and follow the laws and courtesy required for safe streets for both motor-

Example: Doylestown Bike and Hike Committee Education and Outreach

The Doylestown Bike and Hike Committee developed an educational tool kit for elementary schools in the Central Bucks School District. The kit contained training materials on bicycle safety for use by teachers. The Committee placed the kits in the library of each of the 15 elementary schools and informed the school teachers that they could go to the library at any time to the kit as part of an instructional program. The beauty of the concept lies in its convenience for teachers who could use it as part of an existing class, not as an add-on program which is difficult to do with the already packed academic schedules.

The Committee also obtained grant funding and support from PADCNR to hold a workshop for municipalities on how to undertake successful local trail planning and building projects. They highlighted the role of volunteers. Following the workshop, at least three municipalities undertook a bicycle planning project as a regional effort.

Education, Encouragement, & Enforcement

ized and non-motorized vehicles, there are numerous efforts in place but they are scattered and fragmented. No cohesive system of bicycle education or access to information about bicycle education is in place. Those interviewed suggested having a “go to” website for information on bicycle safety as well as classes and programs.

Current programs are primarily geared to bicyclists. The education of motorists regarding sharing the road is very challenging. Focus groups and on-site interviews at popular bicycle venues in Bucks County found that the chief concern among bicyclists is education of motorists regarding their responsibilities with respect to bicyclists. Many reported being grazed by vehicle side mirrors that came too close to the cyclist. Another common concern was the behavior of cyclists traveling in groups that rode in violation of state laws and assumed superior attitudes toward motorists. Combined these conditions result in dangerous road conflicts.

Bicycle education evokes thoughts of classroom and on-road instruction however, the trend in bicycle education is to recognize that creating a culture of more and more people to ride bicycles on roads and installing highly visible prevalent road improvements and signage is actually a very effective way to create awareness and build acceptance and tolerance of bicycles as road vehicles. Cities such as Portland that have the highest bicycling rates also have the lowest injuries and fatalities.

Overall the public engagement process for the Bucks County Bicycle Plan found that there is overwhelming consensus that more educational efforts for both cyclists and motorists on bicycle safety are needed.

Recommendations

Improve bicycle education safety education and awareness in Bucks County through partnerships with municipalities, community organizations and private enterprise.

The Bucks County Bicycle Task Force could establish a sub-committee on bicycle safety and awareness. The role of the sub-committee would be to facilitate information sharing about events and programs related to bicycle safety, identify needs and opportunities in bicycle education, and form partnerships with other organizations to advance education of cyclists and motorists. Activities could include the following. The level of involvement and participation of the sub-committee would be a function of the time volunteers have to contribute. The goal should be to undertake a few activities with a high likelihood of success at a high quality rather than numerous scattershot activities with only fair results.

Education, Encouragement, & Enforcement

- Establish a website for Bicycle Friendly Bucks County as the “go-to” site for information, programs, opportunities, event calendars, bicycle pathway maps that enables partners to post and the public to access.
- Develop a strategy for how the Sub-Committee/Bucks County Bicycle Task Force could be an organizing entity for bicycle safety and education programs. The Sub-Committee would not be a direct provider of educational programs but rather a facilitator of program provided by others and a promoter of those programs through information sharing and distribution.
- Coordinate with the Bucks County Recreation Council on bicycle education and safety through municipal parks and recreation departments.
- Consider establishing a website for the purpose of sharing information about bicycle safety and programs.
- Provide on the website examples of programs that work successfully elsewhere such as school based bicycle safety training for children and youth, bicycle ambassadors programs, ride to work day and other employment based programs, articles in municipal newsletters.
- Establish a partnership to plan and implement a countywide program to encourage cyclists to wear helmets.
- Create partnerships on bicycle education with the school districts, the colleges, the YMCA’s, bicycle shop owners, bicycle event planners, East Coast Greenway, State Parks, and Visit Bucks County.
- Develop an outreach plan to place articles in the newspapers and their online versions about bicycle safety.
- Participate in regional efforts such as with the Bicycle Coalition of Philadelphia, the Delaware & Lehigh Canal including Landmark Towns, the Appalachian Trail Club.
- Try to orchestrate a countywide day/week/month of recognition for bicycle safety with events, activities and media coverage by working with partners countywide in this effort. This could be timed with a high visibility event such as the Uninvest Race.
- Work with the libraries to have displays and materials available on bicycle safety.
- Work with the School Districts on Safe Routes to Schools.
- Strive to develop a countywide educational safety program targeted at adult bicyclists through the school districts, evening schools, community schools, community college, bicycle clubs and bicycle shops.
- Explore funding sources for bicycle education through federal and state grants as well as through sponsorships and private foundations.

Education, Encouragement, & Enforcement

Encouragement

Bucks County is in the service area of the Bicycle Coalition of Greater Philadelphia, one of the top advocacy groups in the nation. Having members in the coalition especially from the BCBTF is beneficial in creating awareness of trends, programs and initiatives that encourage more people to cycle.

Major initiatives are dealing with this topic as part of community planning and economic development efforts. For example, the Landmark Towns program under the auspices of the Delaware and Lehigh Canal National Heritage Corridor is developing a plan to increase awareness and bicycling through a plan unifying four river towns of New Hope, Yardley, Morrisville and Bristol.

Active healthy living goals can easily be achieved through the encouragement of citizens in using trails. Bicycling and walking is the most prevalent outdoor recreation activity with four out of five Americans engaging in these pursuits.

The plethora of bicycle events such as club rides, special events incorporating bicycling, events such as the covered bridge ride and the Steelman Triathlon and kids triathlons sponsored by several organizations help to motivate people in cycling. Both public organizations such as parks and recreation departments and school districts as well as private organizations such as YM/YWCA's sponsor these events.

The Univest Grand Prix Race is a particularly important means of inciting people to try out or expand bicycle riding. Not only the excitement of the race is important, but also important are the events around the race that are a lot of fun as well as inspiring. SPARTA Cycling, the race organizer, makes arrangements with area high schools to have their international teams decked out in racing gear visit the students. These visits have been very exciting events.

Working with health care providers can be an important way to encourage patients to ride bicycles for their own fitness and wellness. In some areas, physicians are now writing prescriptions for physical activity such as cycling although the prevalence of this has not been determined in Bucks County.

Physical improvements that support cycling are visible ways to encourage people to ride their bicycles. Dealing with cyclists concerns about bike theft can drive solutions ranging from bike racks and security to bicycle valets at special events where bicycle parking is monitored. This will help to increase bicycle ridership.

Education, Encouragement, & Enforcement

Findings on Encouragement

There are many programs that inspire cycling in Bucks County every year. These range from single bike rodeos at summer playground programs to bicycling as part of a physical education curriculum to the internationally renowned Univest Grand Prix Race. Finding a way to collect and distribute information on these various events in a timely manner and as a single “go to” website with links to other organizations would help to encourage more participation in cycling. Building upon the existing programs and getting the word out on destinations, bicycle facilities and related opportunities will help to advance the major goal of this plan which is to increase bicycle riding county wide safely.

Recommendations

The Bucks County Bicycle Task Force could serve as the centralized organization for the collection and distribution of information that encourages people to bicycle.

- Provide a map of places to bicycle in Bucks County.
- Provide maps of the iconic bicycle rides in Bucks County.
- Develop an Internet interactive bicycle route system for the website. Provide a way for cyclists to add their comments.
- Use the website developed by the Task Force for organizations and cyclists to post information about bicycle related programs, activities and events.
- Support Safe-Routes-to School Efforts.
- Support Doylestown Borough’s efforts to be designated as a Bicycle Friendly Community by the League of American Bicyclists. Consider using Doylestown Borough as an educational example of a bicycle friendly community. Work with the Borough in establishing cutting edge, state-of the art bicycle friendly improvements generated from ideas that other successful bicycle friendly cities around the world use. The idea would be to establish Doylestown as a model of developing a bicycle friendly community in an already developed municipality as an educational venue for bicycle planners in the region.
- Provide information to the townships and boroughs about how to make road improvements and suggested materials for these improvements to make roads attractive and safe for bicycling. Develop a strategy to provide this information in a way that is timely and well received so that it is used in annual planning and budgeting for road repairs and improvements.
- Provide planning assistance via the Bucks County Planning Commission to municipalities in their local comprehensive and parks and recreation planning and subdivision and land use planning for bicycle facility planning and securing the linkages required for continuous and connected pathways.

Education, Encouragement, & Enforcement

- Encourage multi-municipal bicycle planning via the Bucks County Planning Commission.
- Collect and distribute strategically information about the economic, health and transportation benefits of bicycling to Bucks County. Consider doing an economic analysis of selected pathways such as the D&L Towpath. Promote the findings.
- Work with Visit Bucks County staff to encourage and promote bicycle tourism in Bucks County.

Enforcement

In Pennsylvania, bicyclists have the same rights and duties as motorists. In Pennsylvania, law enforcement in municipalities is conducted by local and regional police forces as well as state police. To support enforcement some organizations such as York County have established trail ambassadors programs as a way of educating cyclists on bicycle use and courtesy as well as assisting them when they need help. Currently legislation has been introduced to pass a law requiring motorists to allow three feet to the side of a cyclist when passing.

Findings on Enforcement

Enforcement was found to be problematic in Bucks County with respect to bicycles. Coordination among local and regional law enforcement agencies would be an important goal. Developing a strategy for a unified approach to enforcement with respect to cycling and motorists sharing the road with bicycles could help to create the critical mass of and expected level of enforcement that would advance a culture of bicycling countywide. Police academies apparently do not conduct training regarding bicycling although various police forces send their officers for training for bicycle patrols. The level of support for bicycle facility development as well as bicycle events varies among police departments and municipalities. Since the police are key stakeholders in bicycle facility development, developing an outreach and educational strategy to encourage support from police department is essential to a successful countywide bicycle network.

Recommendations

- BCBTF and Bucks County and the municipalities should continue to work with PennDOT in creating bicycle supportive policies and funding.
- Increase bicycle education programs for/with municipal law enforcement by working with partners to identify a strategy on how to do this countywide. Consider a bicycle education pilot project.
- Work toward expanding safe routes to school programs.

Education, Encouragement, & Enforcement

Create a regional law enforcement group to carve out a sound and widespread program on enforcement and promotion of the enforcement program to the public.

Economic Development and Tourism

Bicycling as Economic Development

Bike-friendly cities, off-road paths, and scenic country roads that bicyclists can use for recreation fitness and transportation are good for people who live here - and visit here. Safe and attractive places to bicycle attract tourists. And tourism is critical to the economic well-being of Bucks County. It is one of our chief industries. It creates thousands of jobs and is a business generator. The tourism industry is a coalition of museums, wineries, golf courses, hotels, restaurants, attractions and many other tourism partners' largely made up of small businesses.

The top tourist attractions in Bucks County are Sesame Place, New Hope, Peddler's Village, and Doylestown. Events such as festivals attract people to the area. There are over 100 cycling events annually in Bucks County, including the international Univest Bicycle Race held in Doylestown. Major races such as at Nockamixon State Park attract participants that stay here for several days. However, the value of the impact of such events is not tracked yet. Bucks County does not have a research department to track bicycle tourism at this time. They do track overnight stays and numbers of events such as sports tournaments. However, discussions found that bicycling and bicycle tourism probably has a broader economic impact than the traditional method of measuring overnight stays. Consequently, it would be important to look at examples elsewhere of how bicycling

Research consistently documents the economic benefits of trails nationwide and most importantly in Pennsylvania. For example, 42 new businesses were created along the Great Allegheny Passage from Pittsburgh to Washington, D.C. York and Tioga Counties have conducted research on their trails yielding the findings that support the development of these trails as an investment rather than a cost for both counties.

Schuylkill River Trail

The Schuylkill River Trail is a multi-use pathway that follows the Schuylkill River from Pottstown to Philadelphia. Seven sections of the planned 125-mile trail are open with the longest continuous segment at 25 miles. The Rails-to-Trails Conservancy conducted a user and economic impact study of the Schuylkill River Trail in 2009. The findings include the following:

- Annual Visitation: 800,000
- Annual economic impact: \$3,628,000
- Average daily expenditure per person: \$9.07
- Average annual expenditure per person: \$406.31

Economic Development and Tourism

Overnight stays: About 18 percent of the survey respondents reported staying overnight in a hotel at an average daily cost of \$75.92. Most people staying overnight do so with family and friends.

York County

York County conducted studies in 1997, 1999, 2001, 2004, and 2007 on the benefit of the Heritage Rail Trail with the following findings:

- Annual visitation of 394,000 with 73% local visitors and 27% non-local.
- Four out of five visitors reported purchasing something during their bicycling outing.
- The average expenditure was \$13.28 (adjusted for 2011 value).
- The annual contribution to the local economy was \$4.01 million in 2007.

Tioga County

The Pine Creek Rail Trail in Tioga County, a rural northwestern Pennsylvania area, has 138,300 visitors annually.

- 69% are tourists and 31% local.
- 86% reported making a purchase during their visit.
- The average expenditure per visit was \$30.30.
- The annual contribution to the local economy is about \$3.6 million.

Why Bicycling is Important to Bucks County: Quality of Life

In 2009, Bucks County set forth an economic development plan, **Action Plan for Progress**, based upon the recommendations of the Bucks County Economic Development Advisory Board. The plan defines economic development as the process of improving a community's well being by job creation, business growth, income growth and improvements to the community that will enhance the quality of life and strengthen the economy. Standard indicators of the quality of life include wealth and employment, but also the built environment, physical and mental health, education, recreation and leisure time, and social belonging. As the Bucks County business owners indicated in the research for the economic development plan, quality of life was a primary factor in their decision to locate a business here. Recreation, cultural and arts opportunities are key considerations for corporations when deciding to locate or expand a business. Exciting places to be with many things to do are key to an invigorating work force. People want to live in places that offer recreation, good schools, culture and the arts. This is especially true of people in Gen X and Gen Y age groups (24 years old to 49 years old).

Attracting and Retaining Businesses

The top three factors in business owners' decision to locate in Bucks County were:

- Regional location
- Proximity to markets
- **Quality of life / community appeal**

Bucks County Economic Development Advisory Board Survey of business owners in 2009.

Economic Development and Tourism

Advancing Bucks County's Economic Development Goals

Creating a county wide bicycle system will help to advance the four of the six general goals for strengthening the Bucks County economy:

- **Maintain a high quality of life**
- **Create a good business climate**
- Build and retain a skilled workforce
- **Revitalize downtowns and main streets**
- Reuse vacant and underutilized industrial and commercial sites
- **Maintain diversity in the economy**

Cycling and walking have emerged as the top two recreational activities in surveys conducted for the Commonwealth of Pennsylvania for the State Outdoor Recreation Plan, Bucks County Greenways Plan, and numerous municipal parks, recreation and open space plans. Interviews, focus groups, and public meetings for the Bucks County Bicycle Plan consistently found the importance of establishing safe places for people to bicycle to those who live or visit here. In Bucks County, there are several local bicycle shops. These shops largely cater to a family oriented clientele that purchase bicycles and ancillary equipment for recreational and fitness riding oriented toward spending time with family and friends. Countless businesses serve cyclists providing "soft services" such as food, drink and lodging yet there are no organized bicycle tourism businesses in the County.

Cycling and Tourism

Who are those bicyclists?

Data from bicycle studies across Pennsylvania found the characteristics of bicycle tourists:

- Primarily age 30 to 55
- Professional - white collar jobs most with annual incomes of over \$60,000;
- Enjoy eating out, canoeing, camping, hiking, theatre, shopping, museums/historic sites, and water sports/swimming.

As part of the planning process, the planning team met with Visit Bucks County and the Chambers of Commerce from each area of the county, Upper, Central and Lower. Discussions revealed the importance of tourism to the County. Over seven million people visit Bucks County annually. The Upper Bucks County Chamber of Commerce Director reported on the many calls coming into the Chamber about where people can ride bicycles. The Upper Bucks Chamber of Commerce has been distributing Montgomery County Bicycle Trail Maps because so many people come in to ask where they can bicycle and it is the only information they have. These organizations need to be able to direct people to a clearinghouse of information on bicycle opportunities such as the Maps of Great Rides that the Bucks County Planning Commission is developing.

Efforts are underway under the auspices of the Delaware & Lehigh Canal National Heritage Corridor Commission to generate more tourism via Landmark Towns. Landmark Towns include the four riverfront communities of Bristol, Morrisville, Yardley and New Hope. Landmark Towns is developing a plan to create more tourism that will spur the

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economy of these four towns (and thereby Bucks County) through increased tourism, a major component of that plan and strategy is bicycling. Making these towns and the connections between them bicycle friendly has the potential for significant tourism advancement.

Visit Bucks County is the official regional tourism and visitors center for Bucks County. Visit Bucks County has hundreds of business partners many of which would benefit from bicycle tourism. These include the bed and breakfasts, restaurants, shopping areas and arts and cultural destination that have a direct tie to tourism. The idea of promoting bicycling as an extension to vacations, sports tournaments, arts events and so on could result in additional overnight stays. Visit Bucks is already promoting sports as an element of tourism. The sports tournaments generated 4,200 over night stays in 2011. Bicycling could have a similar role in Bucks County Tourism planning, marketing and delivery. In addition, Visit Bucks County provides grant funding with proceeds from the hotel tax to fund project and programs that advance tourism and generate overnight stays. Bicycling has a broader impact than overnight stays alone and should be viewed in the larger concept of economic development in supporting a wide range of businesses that include lodging as well as a host of other services and products. As research on trails in Pennsylvania has shown, most cycling-related expenditures are for food and hard goods such as bicycles, clothing, shoes, accessories, and bicycle supplies.

York County Rail Trail Authority and the Visitors Bureau

The York County Visitors Center supports a major portion of the York County Rail Trail Authority budget. In a ten year agreement, the York County Visitors Bureau funds \$50,000 annually with hotel tax proceeds to fund the Rail Trail Authority. This investment has resulted in over \$4 million annually in economic benefit to the businesses of York County. Because of this stable source of funding, the County has been able to employ a professional director for the Authority. Since 1990, the York County Rail Trail Authority has garnered 52 grants totaling \$4,951,000 and raised \$2,050,000 in donations. The organization captured 20 awards that have brought prestige, visitors and events to York County. Interviews with York County Commissioners, businesses, Planning Commission, Park and Recreation Department, donors, Authority Board members and citizens found that those interviewed attributed the high degree of success and economic benefit to having paid professional in place and the support of the Visitors Bureau that provided stable funding which has leveraged thousands of times over additional dollars, donations and good will.

Visit Bucks County and the Chambers of Commerce are very important partners in the development of the Bucks County Bicycle system. Past

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successes have shown that partnerships with the business community can be mutually beneficial.

One of the best examples of the synergy between business and getting bicycle systems established is Progress Fund's advocacy and support for the development of the Great Allegheny Passage. The Progress Fund supports economic development by lending needed capital and by providing technical assistance to underserved entrepreneurs in 39 counties in western and northern Pennsylvania. The Progress Fund's goal is to build wealth and create living wage jobs in its rural market area. The Progress Fund maximizes its impact by targeting businesses that see opportunity in the tourism industry or are family farmers who grow and sell "locally grown foods".

Attracting Tourists

Planning for bicycle tourism needs to be strategic, planned, organized, directed and evaluated. It is essential for towns to develop a plan and get ready for tourists through training and involvement of key stakeholders. Excellent customer service is essential in establishing a tourism destination. The following elements are crucial in attracting bicycle tourists:

- Branding;
- Marketing;
- Complete streets;
- Access to scenic roads, natural areas, waterfront, cultural and historic attractions;
- Restaurants, including regularly dispersed eateries and coffee shops;
- Sleeping accommodations with a hearty breakfast either provided or nearby;
- Bicycle repair shops and other interesting stores;
- Adequate and secure bicycle parking;
- Bicycle Rentals;
- Theatre, music and arts festivals; and
- Route maps and effective advertising.

Recommendations

- Incorporate bicycle tourism in Visit Bucks County tourism development strategies. Develop a plan for bicycle tourism. This should be a top priority and should expand as the system is developed. The County already has major cycling destinations including the Delaware & Lehigh Canal National Heritage Corridor towpath and the iconic backcountry roads in Upper Bucks County. As starting points, trail heads, proper signage, route

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maps, and projects such as Landmark Towns and pilot projects for this plan come on line, tourism marketing and promotion can be expanded.

- Incorporate the Bucks County Bicycle system as a strategy in the Bucks County economic development program.
- Conduct Studies of the economic benefits of bicycling on an applicable basis after a key area has felt an interest from the planning effort. Consider undertaking an economic benefits study of the D&L Towpath, the Doylestown Bike & Hike Path, the Perkasio bicycle system and/or bicycling events such as the Univest Race, the events in the state parks, and the bicycle club events.
- Make the case for the importance of trails and bicycle systems as an investment in the quality of life. Promote this information to targeted audiences including municipal officials, businesses, tourism vendors, local media outlets, websites of key stakeholders and others.
- Education is an essential component of bicycle tourism as well as every other aspect of this plan. Having Bucks County perceived as a safe, bicycle friendly place will be an essential feature of successful tourism. The idea of creating a “Culture of Bicycling” in Bucks County will ensure that this area will be a successful bicycle tourism destination far into the future.
- Have businesses include a focus towards the physical trails by opening the rear of buildings to trails.
- Organizing and distributing information can be the first step. Establishing a website, developing brochures, making the iconic Bucks County Ride Maps available. Research shows that the major impediment to people participating in recreation activities is that they don’t know about them.
- Use a sub-committee of the BCBTF to work on incorporating bicycling into tourism and economic development planning to mainstream bicycle tourism planning by bringing together organizations and individuals that work in these areas but have not yet folded bicycling into their efforts.
- Promote bicycling to the health care industry and providers in Bucks County. Cost savings through active healthy living gained by bicycling will save major health care costs benefitting our economy. Seek health care partners in the bicycle plan implementation.
- Work with the Visit Bucks County and the Chambers of Commerce to promote bicycling opportunities. This should be for both tourism and economic development purposes such as business recruitment. Provide information to hotels, bed and breakfasts, retail shops, service businesses such as salons and health care locations, and restaurants about bicycling opportunities.

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- Develop an outreach program to municipal elected officials about the economic benefit of bicycling and bicycle tourism. Information about how bicycle planning and the development of the network is an investment rather than a cost will help to develop supporters and advocates for it.

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Introduction

Bucks County is striving to be a locale where bicycling is a viable option for recreation, school, commuting, shopping and fitness trips as well as spurring tourism. A foundation of great bicycling facilities and programs has already been laid by a variety of public and private entities in Bucks County. Partners are collaborating like never before to leverage knowledge, skills, resources and capital toward the goal of establishing Bucks County as a bicycle friendly place. The Bucks County Bicycle Implementation Plan guides the establishment of new bicycle facilities throughout the area as well as the development and implementation of important programs to ensure safety for cyclists and motorists. It is essential to keep the momentum going as we shift from planning to the exciting and challenging work of implementing the Bucks County Bicycle Plan.

The numerous projects and programs recommended in this plan will take many years to carry out given staffing and funding limitations. Time is also required to engage the many public and private partners needed for implementation. Establishing a framework and approach for the beginning steps to implementing the plan will be crucial to assuring the future success of the plan.

Blueprint for Immediate Implementation

The proposed Blueprint for Implementation is built upon the foundation that the immediate implementation steps will need to be championed by the Bicycle Task Force. The Bicycle Task Force would serve as the catalyst and regional resource for the planning and development of bicycle facilities and programs across the county. The Task Force could use their meetings to serve as a forum for individuals and organizations to consider the advancement of bicycle facility and program initiatives. In this way, opportunities and issues can be identified and solutions and projects created through the collaborative process. The Task Force could serve as the testing ground for projects in the early planning stages and could help to nudge them along to implementation. This can cover the full gamut of projects such as outreach, education, encouragement and enforcement as well as in bicycle facility planning. Consideration should be given to re-naming the Task Force to something that helps promote the group as a resource for public and private partners.

Once the Task Force lays the foundation and the County progresses into a position of being able to take on more of a leadership role, the County should transition into a role as the champion of “Working for a Bicycle Friendly Bucks County.”

Implementation

Utilizing this foundation, immediate implementation should be focused on three primary items:

- **Promotion and implementation of the priority spines.** Focus on developing all three priority spines, beginning with a spine that has the support, resources and recognition as an important county spine. The Doylestown to New Hope Spine emerged as the spine with interest and the greatest potential for successful completion. Municipalities and partners have been discussing this route for many years.
- **Promotion and development of municipal/multi-municipal bicycle plans.** Once the progress is made on the planning and development of the spines, the local municipalities along those corridors will become more open to the idea of bicycle planning within their own community, ultimately leading to the development of the local “bike sheds.” Development of the local “bike sheds” will be critical in the overall development of bicycle facilities across the County.
- **Education & Safety.** Ensuring the safety of motorists and cyclists as well as fostering the perception that bicycling is safe in Bucks County is essential to creating a bicycle friendly place. Improving safety and public perceptions about safety involves three key elements: education of both bicyclists and motorists, enforcement of regulations related to the unsafe use of roads, and promotion of bicycle awareness.

To advance these three primary items, it is recommended Bicycle Task Force establish three sub-committees for Bicycle Facilities; Education and Safety; and Partnerships Committee, with an emphasis on municipal government partners. The purpose of these sub-committees will be to advance the implementation of one of the three key items. In addition, it is recommended that the Task Force develop an annual work program to allow for their efforts to be focused on implementation of the plan.

It is anticipated that the County will support the Task Force as they advance the immediate implementation of the plan and continue to evaluate the overall level of involvement based upon the available resources within the County.

Organizational Framework for Short and Long Term Implementation

Following the establishment of the foundation and the focus on the three primary implementation items, developing an organized frame-

Implementation

work for implementation will be crucial for successful implementation of the short and long term recommendations.

- **Short-Term Future:** Strategies identified as “Short-Term Future” are those which are very important to the success of bicycle-pedestrian planning in Bucks County and have relatively low implementation costs and/or staff time commitment. These strategies should be implemented within the next 3-5 years as time and funding are available.
- **Long-Term Future:** Strategies identified as “Long-Term Future” are those which are very important to the success of bicycle-pedestrian planning in Bucks County but relatively high implementation costs and/or staff time commitment. These strategies should be implemented within the next 5-10 years as time and funding are available.

This implementation will depend upon the involvement of many partners. The Bucks County Bicycle Plan is complex and unique. In contrast to other county bicycle plans that focus on off-road trails, the Bucks County Plan is a combination of an on-road and off-road system in which largely lies under the purview of the municipalities. How the plan will actually get implemented was a pervasive theme that emerged in the public participation process. Significant concerns that would affect plan implementation included limited staff at the county and municipal levels for bicycle planning, the lack of financial resources for facility development, and the support of elected and appointed officials required to take action on advancing the facilities that will make up the countywide bicycle system. Despite the concerns about lack of resources, there is plenty of evidence showing that many municipalities, regional and community organizations, and private sector partners are willing to work together in advancing Bucks County as a bicycle friendly locale.

Bucks County Bicycle Plan Implementation Partnership

In order to address concerns about plan implementation as well as to harness the many key stakeholders that want to get involved in advancing bicycling in Bucks County, the implementation plan is based upon an Implementation Partnership. The following diagram illustrates the collaborative nature of the organizational structure for the implementation of the Bucks County Bicycle Plan. Since the implementation of the Bicycle Plan will not be carried out by one organization but rather by a number of partners working together, the diagram offers a creative approach to implementation based upon the need to innovate and function on an "ad hoc" basis. Here, the Plan Implementation Partnership can bring in stakeholders from a variety of areas to form a creative,

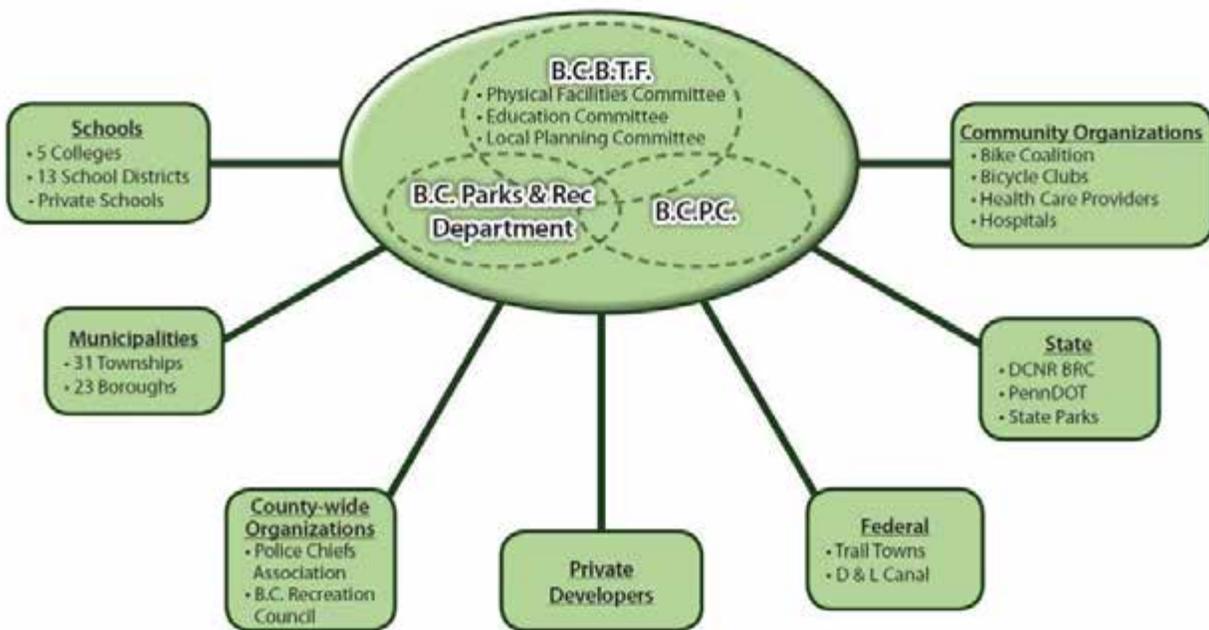
Implementation

dynamic team dedicated to a specific initiative. Decisions are decentralized, and power is delegated to wherever it's needed. The clear advantage of such a partnership-based organization is that it maintains a central pool of talent from which people can be drawn at any time to solve problems, seize opportunities, and work in a highly flexible way.

Participants typically would move from team to team as projects are completed, and as new projects develop. Because of this, the Partner-

Bucks County Bike Plan Implementation Partnership

... a collaboration of willing partners



ship can respond quickly to change, by bringing together skilled stakeholders able to meet new challenges.

Roles and Responsibilities

Identifying the roles and responsibilities of the various partners is an essential step in ensuring that the plan will be implemented. Assigning the projects, programs and specific tasks to a responsible party spurs commitment to carrying out the tasks successfully.

Bucks County - Establishing the position of Bicycle Coordinator to manage bicycle plan implementation is the preferred management method used successfully nationwide on county, regional and large city bicycle systems. However, the present economy and governmental hiring climate appear to make such a position unlikely presently.

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Therefore, it appears that the most suitable role for the County at this time is to continue in the role of the catalyst for the Bicycle Plan by using existing staff and county planning programs as well by supporting the work of the Bucks County Bicycle Task Force in advocating plan implementation and leveraging partners for specific projects and initiatives.

Planning Commission

- Continue to designate a Planner to support the efforts of the Bucks County Bicycle Task Force. Develop a description of the tasks the Planner will undertake. Assign a designated number of hours over the course of a year to support this effort.
- Continue to provide technical assistance to municipalities through the county's planning programs on incorporating bicycle planning in comprehensive and parks and recreation planning, zoning and land use planning.
- Serve as a clearinghouse of information and provide information to the municipalities about grant funding, assisting them where possible.
- Undertake or facilitate studies that document the economic benefits of bicycling in Bucks County.

Parks and Recreation Department

- Continue to pursue the land acquisition program that will advance the link park system recommended in Bucks County's Parks and Recreation Plan of 1986.
- Undertake plans and future development for pathways in the link parks.
- Continue to develop and maintain bicycle pathways in county parks.
- Continue to plan and provide bicycle safety programs.

Bucks County Public Safety / Police Training Center

- Include bicycle safety training and enforcement in its training programs for police officers.
- Consider the potential to become involved in planning a county-wide bicycle safety program that would be implemented as a collaboration of many partners. This would bring a countywide perspective to bicycle safety that could potentially harness many resources including organizations and grant funding.

Bucks County Bicycle Task Force - BCBTF is Bucks County's chief organizational entity to oversee the implementation of the Bucks County Bicycle Plan. BCBTF is advisory not policy making. The Task Force helps focus continuing attention and resources on the role of bicycles and bicycling for transportation, health, and the enjoyment of parks and other public facilities in Bucks County. The mission of BCBTF is to

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advise the Bucks County Commissioners, Planning Commission and Parks and Recreation Department on issues that affect cycling in Bucks County, including, but not limited to: safety, education, community involvement, awareness and promotion, and the development, operation and maintenance of on and off-street bicycle transportation and recreation facilities. For the purpose of plan implementation, BCBTF could establish sub-committees for the following specialty areas: education, enforcement, and bicycle facility planning. It is envisioned that BCBTF could develop into the “Point” or “go-to” organization for municipalities and other community organizations for assistance with their projects or programs. BCBTF meetings would serve as the forum for the identification of issues, opportunities and projects. Through a collaborative process in the meetings, the participants can decide upon potential actions, capacity to move them forward, assistance needed, and resources available for support. Since most pathway development will occur at the local level, one of the most important functions of the BCBTF is to address important issues of a regional level including policy issues such as the Bicycle Occupancy Permit, education of motorists and cyclists, and securing the involvement of partners in advancing the implementation of the plan.

Visit Bucks County - As the official convention and visitors’ bureau, Visit Bucks County would undertake promoting Bucks County as a bicycling destination. The organization would also provide information about the benefits of bicycling on tourism and economic impact in Bucks County.

Municipalities - It is important to underscore that this bicycle plan is aimed at involving willing partners, including municipalities. This plan does not require or mandate that municipalities participate. It merely sets forth a framework that identifies a countywide system. Municipalities will decide on their own if or how they wish to participate in the establishment of a countywide bicycle system. Because development of bicycle projects and programs occurs mainly at the municipal level, local jurisdictions hold the greatest share of the responsibility for developing bicycle networks. Bucks County does not own or plan to own any bicycle pathways that are outside of county parks. Aside from pathways in from the Delaware & Lehigh Canal towpath, all bicycle pathways in Bucks County are local facilities. The implementation of the Bucks County Bicycle System is highly dependent upon the townships and the boroughs recognizing and planning for bicycle facilities in comprehensive plans, parks and recreation plans and in their capital improvement and funding programs.

- Determine if and how they wish to participate in the development of a countywide bicycle system.
- Include bicycle planning in comprehensive plans as a transporta-

tion element.

- Include bicycle planning in parks and recreation plans.
- Facilitate and support the establishment of Community Bicycle Committees.
- Develop community bicycle plans.
- Work in collaboration with neighboring communities and counties in connecting bicycle facilities as well as in developing multi-municipal bicycle plans.
- Undertake the development of bicycle trail master plans.
- Include capital funding for bicycle facility development.
- Pursue grant funding.
- Involve the public in all aspects of bicycle planning and development to foster support, educate the public on the benefits of bicycle pathways, and respond to their concerns.
- Maintain bicycle facilities.
- Integrate road planning and improvements with bicycle planning to ensure safe and enjoyable road surfaces for cycling.
- **Police:** Enforce regulations to prevent and control dangerous or illegal behavior of motorists, bicyclists and pedestrians.
- **Parks and Recreation Departments and Boards:** Establish recreation programs, events and educational programs to foster active healthy living through bicycling and to promote bicycle safety for cyclists and motorists.

School Districts - School Districts would be responsible for the following:

- Pursuing Safe Routes to Schools.
- Offering Bicycle Safety Education.
- Fostering interest in active healthy living through bicycling perhaps as an after-school bicycling clubs or integrating bicycling into the physical education programs.

Delaware River Joint Toll Bridge Commission - The Commission could provide funding for capital improvements for bicycle facilities.

Commonwealth of Pennsylvania - State agencies are important partners in the implementation of the Bucks County Bicycle Plan.

PennDOT - Since PennDOT governs ground transportation in Pennsylvania, their policies affect bicycle planning and facilities. PennDOT would provide technical assistance, funding and problem resolution related to bicycling in Bucks County. Coordination with PennDOT will be essential on many projects.

Department of Conservation and Natural Resources - DCNR Bureau of Recreation and Conservation would continue to provide technical as-

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sistance and funding for bicycle planning and capital development. The Pennsylvania Recreational Trails Program (PRTTP) provides funds to develop and maintain recreational trails and trail related facilities for motorized and non-motorized recreational trail use.

National Park Service - The Landmark Towns group would coordinate on the development and implementation to link the river towns of Bucks County via bicycling, programs, events and awareness.

Organizations

In addition to governmental entities, many organizations in Bucks County would have an interest in implementing the Bucks County Bicycle Plan.

Bucks County Parks and Recreation Council - The Council could serve in the role of helping to develop educational programs, activities and events that advance bicycle safety. They could provide advice on multi-municipal bicycle planning, development and maintenance.

Visit Bucks County - The role of the visitors' organization would be to promote the County as a bicycling destination and to provide information about the economic benefits of bicycling in order to support the development of bicycle facilities.

Bucks County Chiefs of Police Association - The Police Chiefs can coordinate on enforcement issues related to safe bicycling. Developing a relationship between the BCBTF and the Chiefs could help to advance important bicycle planning and safety education efforts.

East Coast Greenway - The East Coast Greenway can be a potential partner in establishing the connections around Morrisville and lower Bucks County in creating the 3,000-mile path from Maine to Florida.

Bicycle Clubs - Suburban Cyclists, Central Bucks Bicycle Club, Tri-County Cycling Club, Bucks County Racing Club and the Bicycle Club of Philadelphia would provide support and funding for safety, education and encouraging people to ride bicycles. Their role in bicycle and motorist safety and etiquette is crucial.

Bicycle Coalition of Greater Philadelphia - The Coalition could provide information, advocacy and assistance on projects, issues and opportunities.

Health Care Providers - Hospitals and medical specialists can play an important role in funding and advocating safety and active healthy living through bicycling.

Bicycle Shop Owners - Shop owners can provide educational materials about safety, places to cycle and serves as advocates in getting the plan implemented through the development of key segments.

Private Developers - Private developers would be responsible for planning and providing bicycle pathways and access in their developments. Developers could also provide bicycle support facilities in commercial areas and in workplaces.

The following Master Plan Implementation Matrix summarizes the key recommendations of this plan. The plan is intended to be a working document, which is continuously monitored by the County and Task Force, and updated to create an environment in which bicyclists within the county and state have the ability to conveniently and safely walk and ride for transportation, recreation and fitness.

Master Plan Implementation Matrix - *GENERAL RECOMMENDATIONS*

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Bucks County should adopt the Bucks County Bicycle Master Plan.	* County				
Promote and work towards planning and implementation of the priority spines.	* Bicycle Task Force * County * Municipalities * PennDOT				
Promote bicycle master planning at the municipal/multi-municipal level to develop local “bike shed” plans. This would include coordination and development of informal or formal multi-municipal agreements.	* Bicycle Task Force * Municipalities * County				
Focus efforts on education opportunities on bicycle safety and motorist awareness.	* Bicycle Task Force * School Districts * Municipalities				
Re-tool the BCBTF to advance the Bicycle Plan. Establish sub-committees, focused on the Physical Facilities, Local Planning and Education. Also, build upon the dedicated, skilled and interested membership and make others aware of the resource the Task Force can be to the municipalities and others interested in developing a bicycle friendly Bucks County.	* Bicycle Task Force				

Master Plan Implementation Matrix - GENERAL RECOMMENDATIONS

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Appoint a responsible person (Bicycle Coordinator) charged with managing the implementation of the plan. Without someone dedicated and authorized to advance the plan it is likely to be extremely difficult to accomplish the potential benefits the County can reap from. Harnessing the great potential of volunteers requires a county presence to ensure consistency, direction and positive public relationships and image.	* County				
Focus a portion of the municipal and county maintenance efforts on providing a clear/smooth surface along existing shoulders.	* Municipalities * County * PennDOT				
Install "share the road" signs and/or "sharrow" pavement markings.	* Municipalities * PennDOT				
Widen or re-mark existing roadways to include a minimum of 4' paved shoulder.	* Municipalities * PennDOT				
Study right-of-way issues and evaluate securing the necessary easement for future bicycle facilities.	* Municipalities * County * Bicycle Task Force				

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Master Plan Implementation Matrix - *GENERAL RECOMMENDATIONS*

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Encourage local municipalities to name a bicycle liaison and/or develop a local bicycle task force. The bicycle liaison could be a designated staff person or an elected official tasked with coordinating with County and adjacent municipal staff.	<ul style="list-style-type: none"> * Bicycle Task Force * Municipalities * County 				
Encourage individual municipalities to enhance the countywide system of bikeways through the subdivision and land development process. The need for bicyclist and motor vehicles should be equally considered in all future development and planning projects. Of particular importance would be those projects that are along roads that currently have or are planned for bikeway improvements.	<ul style="list-style-type: none"> * County * Municipalities 				
Develop a bikeway development criteria matrix for further evaluation and prioritization of major spines and secondary routes. Criteria such as safety, links and accesses, potential uses, project obstacles, funding availability, and managing entity, sustainability, and public support, should be considered.	<ul style="list-style-type: none"> * Bicycle Task Force 				

Master Plan Implementation Matrix - FORGING PARTNERSHIPS (chapter 5)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Hold an annual Bike Summit for local municipalities and potential bike cycle advocates and supporters. The initial summit could be used to introduce the Bucks County Bicycle Master Plan. Future summits could be used to promote the plan and develop awareness, education, and partnerships.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Bicycle Clubs * Municipalities 				
Determine managing entity(s) for entire or partial bikeway segments. Determining who will own, monitor and manage the bikeway of bikeway segments will be critical to the overall long term success of implementation. Different entities may be responsible for each aspect of bikeway segments.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Municipalities 				
Establish a communication system for partners to access and disseminate information and networking. This should be done through a combination of a website and other social media.	<ul style="list-style-type: none"> * Bicycle Task Force * Bicycle Clubs * Bicycle Coalition * County 				

Implementation

Master Plan Implementation Matrix - <i>FORGING PARTNERSHIPS (chapter 5)</i>				
Action	Implementation Partners	Horizon		
		2012 - 2013	2014 - 2017	2018 - 2023+ On-going
Work with partners to generate information on the value of bicycling in Bucks County as a way to build support among elected and appointed officials and the general public.	<ul style="list-style-type: none"> * Bicycle Task Force * Bicycle Clubs 			
Organize and create a “Friends of Bicycling in Bucks County” would be an important consideration. A private non-profit organization could help to advance cycling in Bucks County in ways that government cannot and provide an enduring organization dedicated to cycling through change in political leadership, administration and BCBTF changes.	<ul style="list-style-type: none"> * Bicycle Task Force * Visit Bucks County 			
Develop a bikeway development criteria matrix for further evaluation and prioritization of major spines and secondary routes. Criteria such as safety, links and accesses, potential uses, project obstacles, funding availability, and managing entity, sustainability, and public support, should be considered.	<ul style="list-style-type: none"> * Bicycle Task Force 			

Master Plan Implementation Matrix - FORGING PARTNERSHIPS (chapter 5)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Conduct an annual “check-in” with partners to keep up-to-date on partner initiatives.	* Bicycle Task Force * County				
Create a “speaker’s bureau” from partner organizations to provide knowledgeable willing people to speak at important events related to advancing the development of the county bicycle network.	* Bicycle Task Force * County				
Use the partnerships as a way to build the “Culture of Bicycling” in Bucks County. It will take many people and organizations to put ubiquitous symbols throughout the county that convey that this is a place where people bicycle as a way of life.	* Bicycle Task Force * County * Municipalities				

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Master Plan Implementation Matrix - *FORGING PARTNERSHIPS (chapter 5)*

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Continue working with PennDOT to ensure that new projects and all renovations include consideration for bicycle facilities. Additionally, close coordination should be conducted between the County, Task Force, municipalities and PennDOT regarding the Bicycle Occupancy Permit (BOP). The focus of the coordination should be to ease the requirements/restrictions on the local project sponsors and establish a more manageable process.	<ul style="list-style-type: none"> * County * Bicycle Task Force * Municipalities * PennDOT 				
Work with existing bike clubs to promote existing biking opportunities.	<ul style="list-style-type: none"> * Bicycle Task Force * Bicycle Clubs * Visit Bucks County 				
Campaign to expand biking as a means of transportation with major employers within the county.	<ul style="list-style-type: none"> * County * Bicycle Task Force 				

Master Plan Implementation Matrix - EDUCATION, ENCOURAGEMENT & ENFORCEMENT (chapter 6)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Develop a strategy for how the Sub-Committee/Bucks County Bicycle Task Force could be an organizing entity for bicycle safety and education programs. The Sub-Committee would not be a direct provider of educational programs but rather a facilitator of program provided by others and a promoter of those programs through information sharing and distribution.	<ul style="list-style-type: none"> * Bicycle Task Force * Municipalities * County 				
Provide planning assistance via the Bucks County Planning Commission to municipalities in their local comprehensive and parks and recreation planning and subdivision and land use planning for bicycle facility planning and securing the linkages required for continuous and connected pathways.	<ul style="list-style-type: none"> * County 				
BCBTF and Bucks County and the municipalities should continue to work with PennDOT in creating bicycle supportive policies and funding.	<ul style="list-style-type: none"> * Bicycle Task Force * County * PennDOT 				
Coordinate with the Bucks County Recreation Council on bicycle education and safety through municipal parks and recreation departments.	<ul style="list-style-type: none"> * Bicycle Task Force * County 				

Implementation

Master Plan Implementation Matrix - EDUCATION, ENCOURAGEMENT & ENFORCEMENT (chapter 6)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Try to orchestrate a countywide day/week/month of recognition for bicycle safety with events, activities and media coverage by working with partners county-wide in this effort. This could be timed with a high visibility event such as the Univest Race.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Visit Bucks County 				
Strive to develop a countywide educational safety program targeted at adult bicyclists through the school districts, evening schools, community schools, community college, bicycle clubs and bicycle shops.	<ul style="list-style-type: none"> * Bicycle Task Force * Community Colleges * School Districts * Bicycle Clubs * Bicycle Shops 				
Work toward expanding safe routes to school programs.	<ul style="list-style-type: none"> * School Districts * Bicycle Task Force 				
Explore funding sources for bicycle education through federal and state grants as well as through sponsorships and private foundations.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Municipalities 				

Master Plan Implementation Matrix - EDUCATION, ENCOURAGEMENT & ENFORCEMENT (chapter 6)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Support Doylestown Borough’s efforts to be designated as a Bicycle Friendly Community by the League of American Bicyclists. Consider using Doylestown Borough as an educational example of a bicycle friendly community. Work with the Borough in establishing cutting edge, state-of the art bicycle friendly improvements generated from ideas that other successful bicycle friendly cities around the world use. The idea would be to establish Doylestown as a model of developing a bicycle friendly community in an already developed municipality as an educational venue for bicycle planners in the region.	<ul style="list-style-type: none"> * Bicycle Task Force * County 				
Provide information to the townships and borough about how to make road improvements and suggested materials for these improvements to make roads attractive and safe for bicycling. Develop a strategy to provide this information in a way that is timely and well received so that it is used in annual planning and budgeting for road repairs and improvements.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Municipalities 				

Implementation

Master Plan Implementation Matrix - EDUCATION, ENCOURAGEMENT & ENFORCEMENT (chapter 6)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Establish a partnership to plan and implement a county-wide program to encourage cyclist to wear helmets.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Bicycle Clubs * School Districts 				
Collect and strategically distribute information about the economic, health and transportation benefits of bicycling to Bucks County. Consider doing an economic analysis of selected pathways such as the D&L Towpath. Promote the findings.	<ul style="list-style-type: none"> * Bicycle Task Force * County 				
Develop an outreach plan to place articles in the newspapers and their online versions about bicycle safety.	<ul style="list-style-type: none"> * Bicycle Task Force 				
Increase bicycle education programs for/with municipal law enforcement by working with partners to identify a strategy on how to do this countywide. Consider a bicycle education pilot project.	<ul style="list-style-type: none"> * Bicycle Task Force * County 				
Work with the libraries to have displays and materials available on bicycle safety.	<ul style="list-style-type: none"> * Bicycle Task Force 				

Master Plan Implementation Matrix - *ECONOMIC DEVELOPMENT & TOURISM* (chapter 7)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
<p>Establish a website dedicated to the Bucks County biking initiatives. The website should include various aspects of biking:</p> <ul style="list-style-type: none"> ■ Designated routes. ■ Iconic Bucks County rides. ■ Planned facilities. ■ Interactive mapping that allows users to map their own preferences and the ability to share. ■ Information for tourist and locals. ■ Information for A, B, and C riders. ■ Bike education and safety. ■ Advocacy and local connections. ■ Provide appropriate bicycling amenities, such as bicycle lockers, at suitable transit and commuter locations. Include funding for such in capital improvement plans. 	<ul style="list-style-type: none"> * Bicycle Task Force * County * Visit Bucks County 				
<p>Have businesses turn to focus physically to the trail and open the rear of buildings to trails.</p>	<ul style="list-style-type: none"> * Visit Bucks County * Municipalities 				

Implementation

Master Plan Implementation Matrix - <i>ECONOMIC DEVELOPMENT & TOURISM</i> (chapter 7)				
Action	Implementation Partners	Horizon		
		2012 - 2013	2014 - 2017	2018 - 2023+ On-going
Develop a coordinated marketing plan for Bucks County as a “world class” bicycle destination.	<ul style="list-style-type: none"> * Visit Bucks County * Bicycle Task Force * County 			
Incorporate bicycle tourism in Visit Bucks County tourism development strategies. Develop a plan for bicycle tourism. This should be a top priority and should expand as the system is developed. The County already has major cycling destinations including the Delaware & Lehigh Canal National Heritage towpath and the iconic backcountry roads in Upper Bucks County. As starting points, trail heads, proper signage, route maps, and projects such as Landmark Towns and pilot projects for this plan come on line, tourism marketing and promotion can be expanded.	<ul style="list-style-type: none"> * Visit Bucks County * Bicycle Task Force * County 			
Conduct studies of the economic benefits of bicycling on an applicable basis after a key area has felt an interest from the planning effort.	<ul style="list-style-type: none"> * Municipalities * Bicycle Task Force 			

Master Plan Implementation Matrix - *ECONOMIC DEVELOPMENT & TOURISM* (chapter 7)

Action	Implementation Partners	Horizon			
		2012 - 2013	2014 - 2017	2018 - 2023+	On-going
Work with Visit Bucks County and the Chambers of Commerce to promote bicycling opportunities. This should be form both tourism and economic development purposes such as business recruitment. Provide information to hotels, bed and breakfasts, retail shops, service businesses such as salons and health care locations, and restaurants about bicycling opportunities.	<ul style="list-style-type: none"> * County * Bicycle Task Force * Visit Bucks County * Municipalities 				
Develop an outreach program to municipal elected officials about the economic benefit of bicycling and bicycle tourism. Information about how bicycle planning and the development of the network is an investment rather than a cost will help to develop supporters and advocates for it.	<ul style="list-style-type: none"> * Bicycle Task Force * County * Municipalities 				
Establish a committee to work on incorporating bicycling into tourism and economic development planning to mainstream bicycle tourism planning by bringing together organizations and individuals that work in these areas but have not yet incorporated bicycling into their efforts.	<ul style="list-style-type: none"> * Visit Bucks County * Bicycle Task Force * Bicycle Clubs 				

Implementation

Master Plan Implementation Matrix - <i>ECONOMIC DEVELOPMENT & TOURISM</i> (chapter 7)				
Action	Implementation Partners	Horizon		
		2012 - 2013	2014 - 2017	2018 - 2023+
				On-going
Promote bicycling to the health care industry and providers in Bucks County. Cost savings through active healthy living gained by bicycling will save major health care costs benefitting our economy. Seek health care partners in the bicycle plan implementation.	<ul style="list-style-type: none"> * Bicycle Task Force * Health Care Providers * Insurance Providers 			
Strive to earn the designation of a Bicycle Friendly Community.	<ul style="list-style-type: none"> * Bicycle Task Force * Municipalities 			
Tourism and local bike groups should coordinate and evaluate "Social Media" as a tool to promote bicycling in Bucks County.	<ul style="list-style-type: none"> * Bicycle Clubs * Visit Bucks County * Bicycle Task Force 			

Guidelines for Local Planning

The purpose of this toolbox is to provide local elected officials, business and community leaders with basic background information on bicycle planning.

Introduction

One of the major recommendations associated with this plan is the creation of smaller, local “bike sheds” that would eventually evolve to create the countywide bicycle network. Each of these individual “bike sheds” should be focused on establishing a bicycle network which provides a balance of both transportation and recreational bicycle facilities which best meet the desires and needs of the local communities. A component of each local plan is an implementation strategy for the major spines. Using these local “bike sheds” as the foundation, the local municipalities and County can then work together to establish the overall countywide vision through planning and implementing the segments of the major spines which connect the individual “bike sheds.”

The development of a “tool box” of general bicycling information was requested by the BCBTF to provide guidance for local municipalities. As a result, the following guidelines for local planning and implementation of bicycle facilities was developed. In addition, various reference materials are found in Appendix D to provide both public and private entities assistance in beginning to plan and implement bicycle improvements.

Understanding that funding and resource constraints may create challenges within a municipality, the following guidelines have been established based upon a volunteer approach with support and backing from the local elected officials and municipal leaders. ***As a result, the initial step in the development of a local “bike shed” should start with the establishment of a local bicycle task force.***

The local task forces, as modeled after the BCBTF, should include a small group of committed individuals, within a given municipality or a cluster of municipalities that are passionate about the advancement of bicycling in their community. Members of the local bicycle task force could include cyclists, influential citizens, elected or appointed officials, parks and recreation board members or staff, school district representatives and/or local planners/engineers. It is recommended that the size of the local bicycle task force range from six to twelve members.

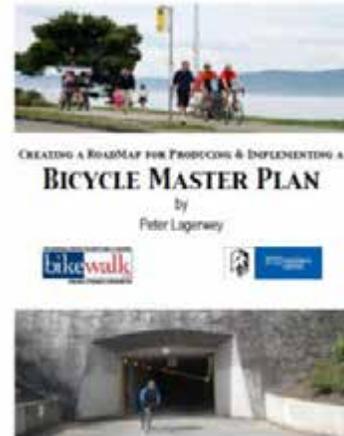
The development of a local bicycle task force should be done with the support and knowledge of the local leaders and elected officials. This initial step will provide a springboard into the overall plan development and implementation.

Guidelines for Local Planning

Once a local bicycle task force is established, the steps a municipality or a group of municipalities should follow include:

- **Preparing to Plan**
- **Developing the Plan**
- **Implementing the Plan**

These steps, as described in more detail within this chapter, are based upon the resource document *Creating a Road Map for Producing & Implementing a Bicycle Master Plan* by Peter Lagerwey, June 10th 2009. The complete report can be downloaded at http://www.bikewalk.org/pdfs/BMP_RoadMap.pdf.



Guidelines for Local Planning



Preparing to Plan

Once the need and desire for a municipal or multi-municipal bicycle plan is identified within a community and a local bicycle task force is formed, the municipal leaders within these communities must establish their goals, objectives and process for developing the plan.

	Action Step	Responsible Party	Timeline
1	Establish the need for the Plan	Elected Officials	-
2	Secure Funding	Elected Officials / Municipal Staff	2-4 Months
3	Establish Internal Project Management Team	Task Force / Municipal Staff	1-2 Months
4	Define Preliminary Goals & Objectives	Task Force	1 Month
5	Define Partnerships / Key Stakeholders	Task force	1 Month
6	Define Method for Creating the Plan	Elected Officials / Task Force	1 Month
7	Write RFP (if using a consultant)	Task Force / Municipal Staff	1 Month
8	Select a Consultant (if using a consultant)	Elected Officials / Task Force	1 Month
			8-12 Months

1. **Establish the need for the Plan.** The initial step associated with the “Preparing to Plan” phase is for the elected officials and local leaders to identify the need to promote the development of bicycle facilities within their community, as well as garner support to proceed with the planning process. The development of the local bicycle task force is a critical element of this action step.
2. **Securing Funding.** This refers to identifying resources and securing the necessary funding for the “Developing the Plan” phase. This step will vary among each individual municipality or group of municipalities. The sources of funding could include general funds, government grants or private funding, or a combination thereof. It is recommended that one of the first tasks taken on by

Guidelines for Local Planning

the local bicycle task force is to develop a funding strategy that analyzes the various resources and establishes a plan for funding the overall bicycle planning efforts.

3. **Establish Internal Project Management Team.** While the local bicycle task force will serve as the project steering committee, it will be essential for there to be a one to two person team that will function as the primary point of contact between the task force and the elected officials. It will be equally important to establish this project management team for the next phase, to serve as the point of contact between the task force and the consultant, if one is used to develop the plan.
4. **Define Preliminary Goals and Objectives.** The task force should work in collaboration with municipal leaders to define preliminary goals and objectives to serve as a guide as they move forward in developing the plan. These goals and objectives may be modified or more clearly defined during the next phase, but it is important that the task force define the preliminary goals and objectives to help with the vision.
5. **Define Key Partners and Stakeholders.** It is important to identify potential project partners and key stakeholders during the initial phase. Partners are best defined as individuals or entities that will be able to assist you during the process, as well as those you will be required to coordinate with during the planning and implementation phases. Examples of partners include, the County, neighboring municipalities, DCNR and PennDOT. Key stakeholders are others in the community that share a similar passion for bicycling and can provide valuable input and insight during the process. The list of partners and stakeholders does not have to be finalized during the "Preparing to Plan" phase, but it is beneficial to begin discussion on who the task force and municipal staff may need to coordinate with throughout the process.
6. **Define a Method for Creating the Plan.** The creation of the plan will be completed by one of three ways. The first includes plan development by the local bicycle task force and municipal staff. The second is through a consultant. The third is through a combination of a consultant and the task force/municipal staff. Each municipality our multi-municipal partnership will need to determine which of these three best fits their schedule, budget and overall needs.
7. **Develop a Request for Proposal (RFP).** The task force, in collaboration with municipal staff will need to develop a Request for Proposal (RFP) to solicit a consultant to complete the desired bicycle master planning efforts. The RFP should be written to address



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the preliminary goals and objectives established by the local bicycle task force and provide clear expectations on plan content, priorities and schedule. The RFP should include a clear explanation of the anticipated scope of services to be provided by the consultant. An example of a typical scope of services includes:

- Project Kick-off Meeting
- Data Collection/Existing Conditions Analysis
- Public Involvement Process
 - ◇ Task Force Meetings
 - ◇ Key Stakeholder Interviews
 - ◇ Public Workshop #1 - Community Feedback
 - ◇ Public Workshop #2 - Draft Plan Presentation
 - ◇ Elected Officials Meeting - Plan Adoption
- Refine Vision, Goals & Objectives
- Identify Priority Routes/Connections
- Identify Secondary Routes/Connections
- Establish an Implementation Strategy
- Develop Draft Master Plan
- Revise Draft Plan and Develop Final Plan

The RFP should also include a definition of the selection criteria, including the specific items and weighted values. Dependent on the funding source, specific RFP items may be required of the funding agency, and they should be clearly stated in the RFP. Sample RFP's for local bicycle master plans are provided in Appendix D.

9. **Select a Consultant.** The selection committee, comprised of elected officials, municipal staff and/or task force member, should complete a thorough review of the various proposal. The steps in the selection process are to include:

- Individuals Score Proposals Based Upon Selection Criteria
- Check References
- Conduct Interview
- Select a Consultant

The anticipated schedule for this phase is approximately eight to twelve months, but this could be longer if funding is not secured in the anticipated time frame.

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Developing the Plan

Through a collaborative planning process, this phase is focused on the development of the bicycle master plan. Communication is an essential element of this phase. It is important that there is clear and open channels between the local bicycle task force and the consultant and between the task force/consultant and the local community. Success during this phase includes the development of a bicycle master plan that provides immediate impact and defines an implementation approach that is clear and concise.



	Action Step	Responsible Party	Timeline
1	Project Initiation Meeting	Task Force	
2	Data Collection / Existing Conditions Analysis	Task Force / Consultant	2-3 Months
3	Refine Vision, Goals and Objectives	Task Force / Consultant	1-2 Months
4	Key Stakeholder Interviews / Focus Group Meetings	Task Force / Consultant	1-2 Months
5	Initial Public Meeting	Task Force / Consultant	1 Month
6	Development of Draft Bicycle Plan	Task Force / Consultant	3-4 Months
7	Set Priorities / Develop Implementation Strategies (Include discussion on accountability and evaluation)	Task Force / Consultant	1 Month
8	Public Meeting to Present Draft Plan	Task Force / Consultant	2-3 Months
9	Finalize Plan	Task Force / Consultant	1-2 Months
			12-18 Months

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1. **Project Initiation Meeting.** The project initiation meeting will allow for the establishment of the necessary lines of communication between the task force and the consultant's project management team. The goals of this meeting should include finalizing the scope of services and project approach, details pertaining to available materials and resources and defining the overall project schedule, including anticipated public meeting time frames.
2. **Data Collection & Existing Conditions Analysis.** This step is essential to ensure that all pertinent materials are provided to the project team as they begin the process of understanding the existing conditions within and surrounding the community. Existing data that may be relevant to the planning process includes GIS data, previously developed planning studies and the various municipal/multi-municipal comprehensive plans. This task will also include an assessment of the physical features in the project area and development of the project base mapping.
3. **Refine Vision, Goals & Objectives.** The project team and task force should work together to review the preliminary vision, goals and objectives developed during the initial planning phase and make the necessary refinements prior to presenting to the public.
4. **Key Stakeholder Interviews / Focus Group Meetings.** Using the list of project partners and key stakeholders developed during the "Preparing to Plan" phase, the project team should conduct a round of interviews and meeting with the focus on understanding the current needs and desired facilities within the community.
5. **Initial Public Meeting.** This initial meeting should be used to present the planning process to the local community, and provide them with an opportunity to voice their opinion on a variety of bicycle related issues in their region. This should include a review of the vision, goals and objectives, as well as an opportunity to provide valuable input into the bicycle needs in the area. While it is not necessary, the use of a project website or other social media outlets provide additional resources to reach local citizens.
6. **Development of Draft Bicycle Plan.** Utilizing the information gathered during the previous task, the project team would next begin the process of developing the draft bicycle network and draft bicycle plan. One of the key steps in this process is the identification of potential connections for bike

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paths. This could be a combination of off-road, on-road bikeways, and multi-use bikeways. Destinations where your citizens might want to get to on a bicycle should be identified and taken into consideration as the bicycle network is defined. Examples of key destination points include schools, parks, neighborhoods, commercial and shopping areas, cultural or historic sites, and paths in neighboring communities and beyond. The network should strive to link bikeways to safe facilities as close to home as possible. Residents should not have to load their bike into a car and drive to bikeways. The ultimate goal is to have every garage serve as a local “trailhead.”



Mark the trail corridors on the map. Strive to identify a main bicycle corridor that smaller pathways would link to.

The project team should field test the potential bikeways and identify the opportunities and issues associated with each connection. This should include identifying public and private property ownership of potential off-road corridors.

7. **Set Priorities / Develop Implementation Strategies.** It is recommended that the local plans identify a pilot project and other priority projects to provide guidance during the first few years of plan implementation. Priority bikeways should be a balance between public demand and ease of implementation. The primary goal of the implementation strategies is to identify implementable projects that will be successful and help to build support for future projects.
8. **Public Meeting to Present Draft Plan.** A final public outreach event should be conducted to present the draft and the overall implementation strategies to the community. Serving as the end task of the planning process, this final public meeting should be used as an opportunity to educate the public on the plan and how it will be implemented.
9. **Finalize Plan.** Based upon final review and general comments received at the final public meeting, the draft plan should be revised and prepared for adoption by the elected officials.

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Implementing The Plan

The implementation phase begins with the formal adoption of the bicycle master plan by the governing body. Following the adoption, the municipal staff and task force will work together to implement the pilot project(s) and work to secure additional funding to continue with the implementation process. It is key for those involved in the implementation process to take advantage of opportunities and continue to create success that build upon one another.

	Action Step	Responsible Party	Timeline
1	Adopt the Plan	Elected Officials	-
2	Undertake Pilot Project(s)	Elected Officials	12 - 24 Months
3	Seek & Secure Funding	Task Force / Municipal Staff	6 - 12 Months
4	Proceed with Plan Implementation Strategies	Elected Official	On Going
5	Document Success	Task Force / Municipal Staff	On Going
			On Going

1. **Adopt the Plan.** The transition from the “Development of the Plan” phase to the “Implementation Phase” will be marked by the adoption of the plan. This step will provide a statement to the community that the elected officials are fully supportive of the development of bicycle facilities in their region.
2. **Undertake Pilot Project(s).** The initial component of this step is to identify and secure funding for the pilot project(s) identified as a part of the planning process. It is important that pilot project(s) create an impact on bicycle facilities in the community and can be funded and implemented. It is not wise to identify a controversial project as a pilot project, instead, it is more beneficial to identify a project that is widely supported by the municipal residents.

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3. **Seek & Secure Funding.** This process will need to be an ongoing effort balanced between the municipal staff and the task force. It is recommended that one or two representatives be identified as the representatives to lead the efforts in seeking and securing funding. There are a variety of funding sources, as identified in Appendix D, which provide a resource in completing this task.
4. **Proceed with Plan Implementation Strategies.** This step begins with the continuation of the local bicycle task force. An annual work plan should be developed and reviewed on a quarterly basis. The work plan should identify available funding, potential funding opportunities and potential projects. The annual work plan should also establish specific, measurable goals with regards to the miles of bike lanes/trails, bicycle amenities and education strategies. The task force should continue to collaborate with the project partners and key stakeholders through this process.
5. **Document Successes.** Successes in implementation should be documented and used as building blocks to the development of the community's bicycle facilities. Successes will also aid in the development of bicycle plans within other communities, as they realized the impacts and benefits of your plan.



Additional reference materials are provided in Appendix D to assist with the development and implementation of bicycle master plans. The sections include:

- Section 1 Glossary of Terms
- Section 2 Useful Website Links
- Section 3 Design Standards (Vermont Agency of Transportation provided as a reference. Designers should also consult current FHWA & PennDOT standards, dependent on the location of the facility)
- Section 4 Bicycle Amenities
- Section 5 Bicycle Occupancy Permit (BOP)
- Section 6 Oil and Chip Roadways
- Section 7 Model Ordinances and Provisions for Bicycle Planning
- Section 8 Sample Easement Agreements
- Section 9 Trail Operations and Maintenance Planning
- Section 10 Funding

Municipal Managers Comments

The following summary statements highlight the key concerns and recommendations by the municipal leaders regarding development of a countywide bicycle master plan.

- All municipalities are required to update their Open Space Plans to be eligible for County Open Space grants. Some municipalities have included shared use paths and on road facilities in their trail and greenway plans as part of the update.
- A few municipalities have taken the initiative for developing bikeways within their borders and are beginning to plan beyond.
- Several municipalities are reluctant to buy into a countywide bike system. Without a strong commitment from the County the bicycle network will continue to be developed as fragmented pieces that reflect the needs of the individual municipalities rather than the County as a whole.
- A facilitator or bikeway coordinator was seen as essential role implement the proposed bicycle network.
- There was a strong desire to concentrate efforts toward those pieces already in place and being planned such as the Route 202 corridor and the Doylestown to New Hope connection, Levittown Parkway, D & L and Lake Nockamixon improvements.
- Economic development and connectivity between communities is more important to municipalities within Lower Bucks.
- Communities within Upper Bucks are reluctant to encourage biking. Safety was the primary reason noted due to the topography and nature of the winding country roads.
- Trails and greenways should continue past beyond municipal boundaries to assure an end at a logical terminus.
- PENNDOT was viewed with mixed reactions. Some municipalities reported a good working relationship with them while others commented it was impossible to get them to address existing issues with bridges and other infrastructure. PennDOT's requirement that the municipalities plow bike lanes was viewed as a major obstacle in further development of bicycle lanes
- There are a number of municipalities that do not want any bike facilities within their borders. While there may be support from the residents, the current leadership will not consider these facilities. One particular municipality recently requested that a fund-raising bike ride for diabetes be re-routed around the Township.
- Provide connections to regional trail systems.
- Landmark Towns desire a safe route into the heart of their respective downtowns.
- There is a mindset that bikeways are considered as a recreation facility. A number of municipalities requested that we discuss the

Appendix A

project with their park and recreation director and park and recreation board.

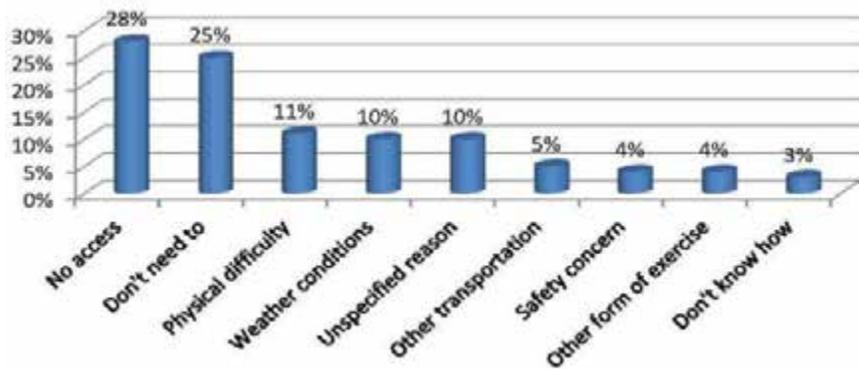
- In general all communities thought the Toolbox concept would be helpful in implementing the overall network. Requested items for the toolbox included:
 1. Description of the overall concept and how each municipality fits into the goals for development of the network.
 2. Provide recommendations for how multi-municipal bicycle planning could be completed.
 3. Guidance for development of individual sections within each municipality.
 4. Specific recommendations for each section of bikeways within a particular municipality including type of bikeway and right-of-way or easements required.
- This Bicycle Master Plan would best be implemented if it were developed as a capital improvement plan that addresses the immediate needs of on-road facilities with a secondary component for long term improvements.
- Montgomery County is the poster child for the development of a bicycle network.
- Bucks County bicycle network should be a “green network”.
- In the past people wanted loop trails; now they want linkages.
- Bucks County is a unique place. Individual town identities must be respected and incorporated into the overall vision for the bicycle network.
- The ultimate approvals for implementation will be at the municipal level. Several municipalities have already accepted the installation of on-road facilities and will continue to develop at the community level.
- There is an increased demand for organized bike rides throughout the County, specifically as fundraising efforts.
- There is a perception that experienced, on road riders are rude.

Survey and Public Involvement Findings

According to the 2008, the U.S. Department of Transportation, National Highway Safety Administration, nearly half of all adults, ages 21 and older, have bicycles available for their use on a regular basis. Younger persons, under age 21, have greater access than older persons, over age 65. Access to bicycles increases based on household income with 65% of persons with a household income over \$75,000 having access to a bicycle and only 29% of persons with a household income of less than \$15,000 having access to a bicycle.

During summer months, only 19% of persons in this national study indicated that they use their bicycle once a week or more, while 57% indicated that they never ride a bicycle. Over 82% of those persons who do not ride a bicycle during summer months do not have access to a bicycle. Of those persons who did ride a bicycle during summer months, the average number of days was 5.0 days in a 30 day period. Nearly 30% of persons reported they did not use a bicycle as they did not have access to one. Other reasons for reduced use of bicycles such as no need to bicycle, physical difficulties and weather conditions are shown in Figure B-1.

Figure B-1: Reasons For Not Bicycling More Often

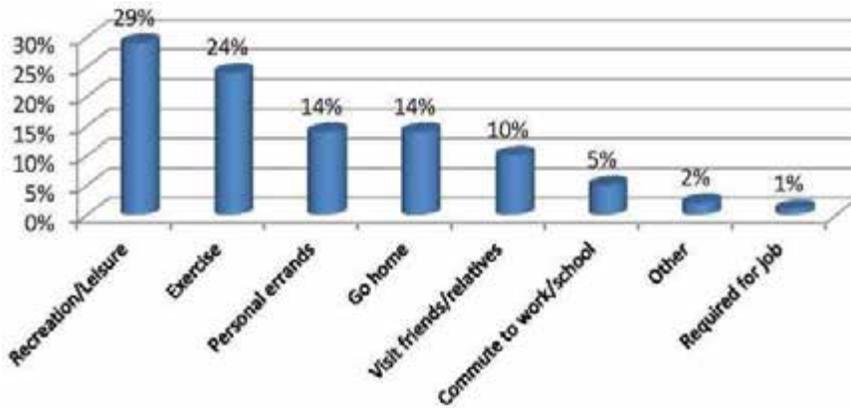


Source: National Survey of Bicyclist and Pedestrian Attitudes and Behavior, 2008

Nearly 90% of all bicycle trips begin at a residence, either the bicyclist's or someone else. Seven percent (7%) of trips began at a leisure or recreational site, including parks. The purpose of bicycling trips such as recreation, leisure, exercise, personal errands and commuting are shown in the Figure B-2.

Appendix B

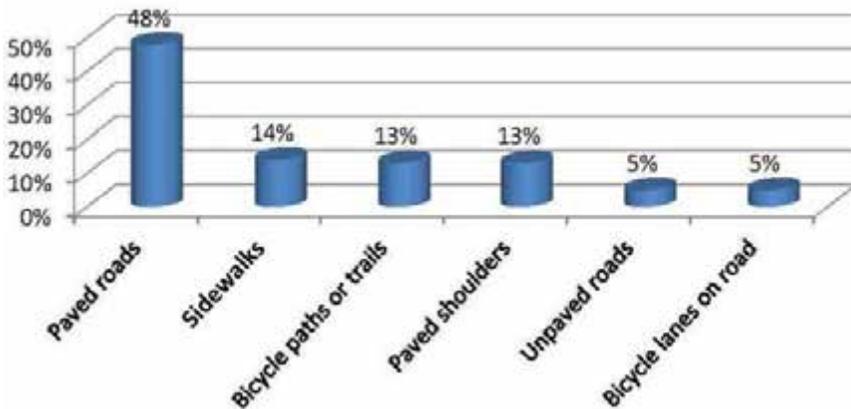
Figure B-2: Purpose of Bicycling Trips



Source: National Survey of Bicyclist and Pedestrian Attitudes and Behavior, 2008

Nearly 39% of bicycle trips were reported to be less than one mile; 19% were reported to be more than five miles; and 7% were over ten miles. Bicycle trips varied with respect to facility used, with nearly half of the trips being on paved roads and another 15% on paved shoulders. The breakdown of facility types is shown in Figure B-3.

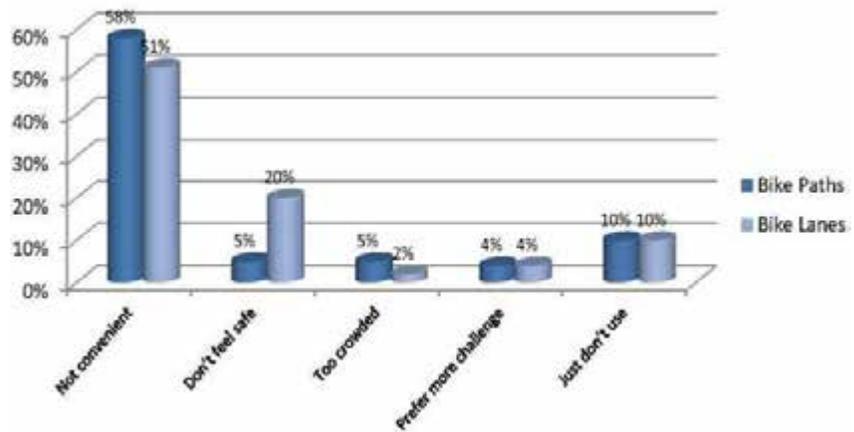
Figure B-3: Facility Type Used



Source: National Survey of Bicyclist and Pedestrian Attitudes and Behavior, 2008

Over half of bicyclists reported not using bicycle paths or bicycle lanes as they were either not convenient or available or did not go to the desired destination. The breakdown of reasons is shown in Figure B-4.

Figure B-4: Bike Path and Bike Lane: Reasons for Non-Use



Source: National Survey of Bicyclist and Pedestrian Attitudes and Behavior, 2008

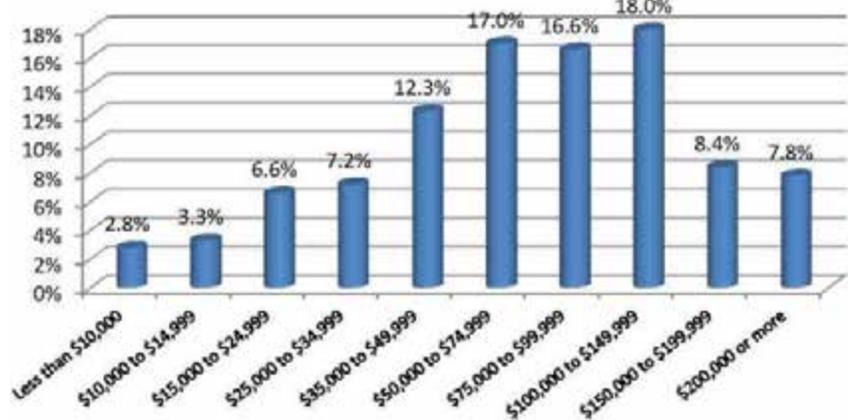
Studies have indicated that persons residing in households with lower incomes have decreased access to bicycles. Access to a bicycle rises with household income. According to a government survey of nearly 10,000 Americans:

- 29% of those with household incomes less than \$15,000 had regular access to a bicycle.
- 47% with incomes \$30,000-\$49,000 had access.
- 65% with incomes \$75,000 or more had access.

In Bucks County, the median income in 2008 was \$76,169. 6.1% of households had an income below \$15,000. This group most likely has the least transportation options and also has the least access to bicycles.

Source: www.bikesbelong.org / D. Royal and D. Miller-Steiger, 2008

Figure B-5: Household Income—Bucks County

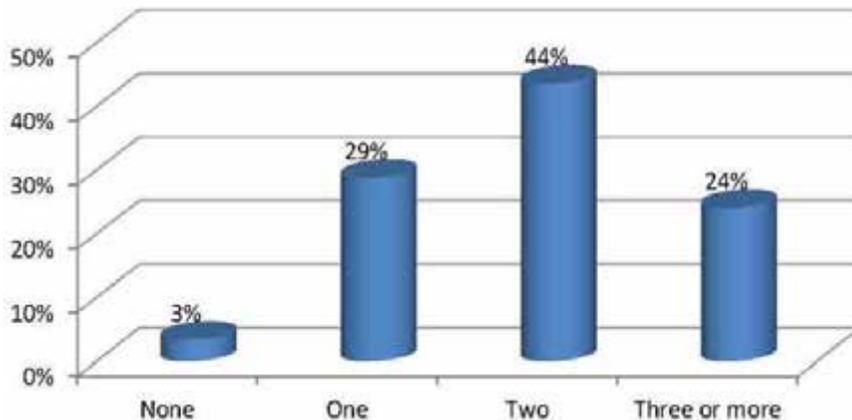


Source: U.S. Census Bureau, 2009

Appendix B

The 2009 American Community Survey reported that 3% of Bucks County residents do not have a vehicle available to them. These individuals are most likely reliant upon public transportation, walking, or bicycling to travel to their destinations.

Figure B-7: Vehicles Available—Bucks County



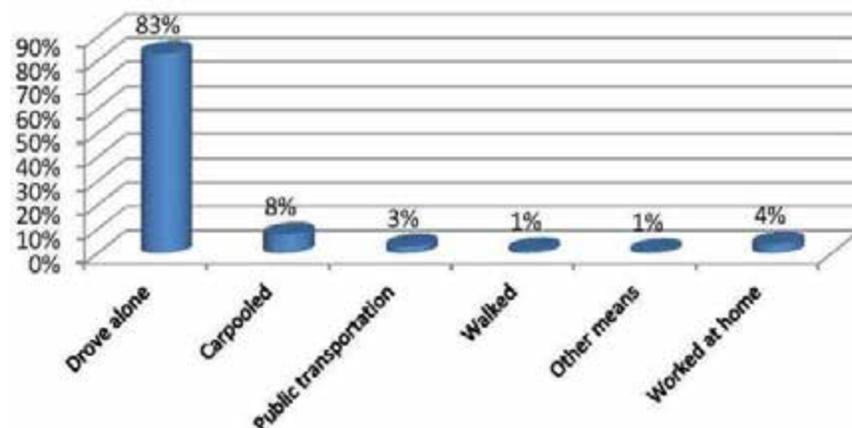
Source: U.S. Census Bureau, 2009

In the 2009 American Community Survey, only 1% of Bucks County residents reported walking to work another 1% reported using “other means” to commute, which would include bicycles.

The average North American bicycle commuter is a 39-year-old male professional with a household income in excess of \$45,000 who rides 10.6 months per year.

Source: Survey of North American Bicycle Commuters, Journal of the Transportation Research Board, 1997

Figure B-8: Commuting to Work—Bucks County

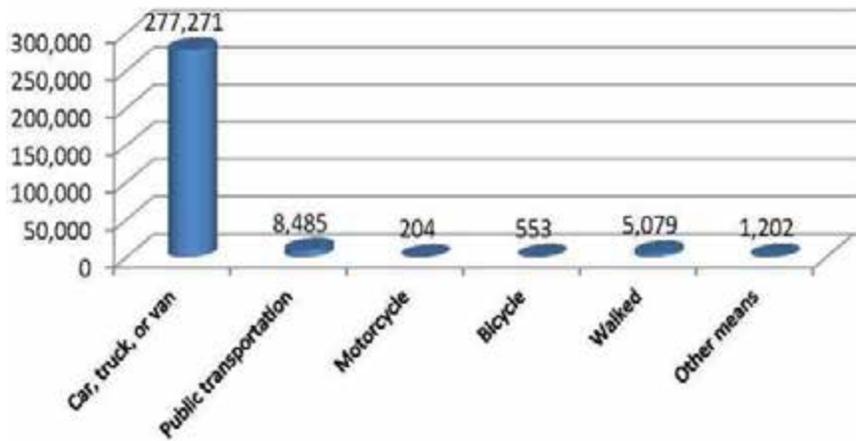


Source: U.S. Census Bureau, 2009

Appendix B

Of the 292,794 workers age 16 and older who commute to work, 553 (0.19%) reported using a bicycle and 5,079 (1.73%) reported walking. This data does not identify the number of commuters who use bicycles or walking as a secondary mode of travel to access their primary mode of travel (i.e., using a bicycle to ride to the bus stop or to meet a car-pool).

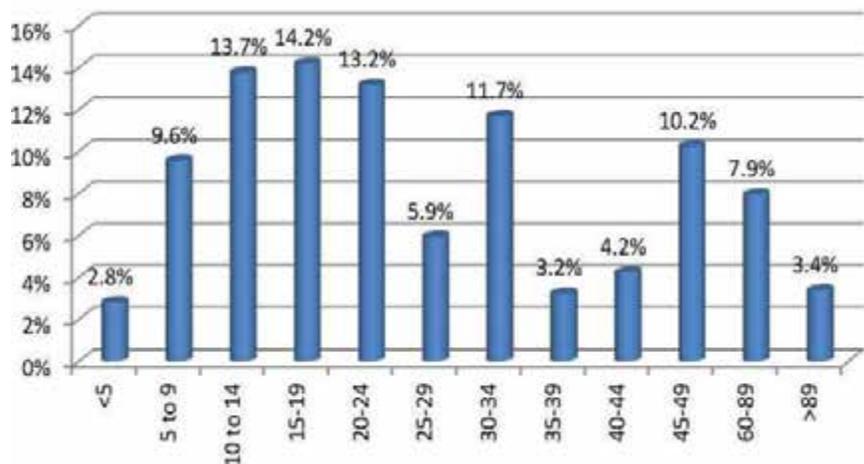
Figure B-9: Means of Transportation to Work—Bucks County



Source: U.S. Census Bureau, 2009

In Bucks County, 26.1% of commuters have a relatively short commute, less than 15 minutes. This suggests that commuting by bicycle or walking is a potential alternative some of the County's commuters.

Figure B-10: Travel Time (Minutes) to Work—Bucks County



Source: U.S. Census Bureau, 2009

Appendix B

Public Involvement Findings

Public input was the foundation of the Bucks County Bicycle Master Plan process and helps identify bicycle related needs. The following is a summary of the findings.

Bucks County Open Space & Greenways Plan Public Survey Results

Respondents indicated that the primary types of facilities that they use are Trails and Paths, Nature Centers, On-Road biking, and Picnic Areas/Pavilions with limited variation across Upper, Central and Lower Bucks County. Among users and non-users, Trails and Paths and On-Road bike lanes were the two facilities most wanted in the County. Across the County, only 20% of respondents felt that the County has enough trails and on-road bicycle lanes.

Five priorities stood out among survey respondents:

- Protection of animal and plant habitats and ecological greeways (43%)
- Protection of water resources (43%)
- Developing a regional trail system (40%)
- Preservation of farmland (39%)
- **Providing more bike lanes and paths (37%)**

Over 50% of respondents expressed that they would like to see more On-Road Bike Lanes, Off-Road Bike paths, Hiking Trails, Multi-use Trails, and Nature/Wildlife Trails.

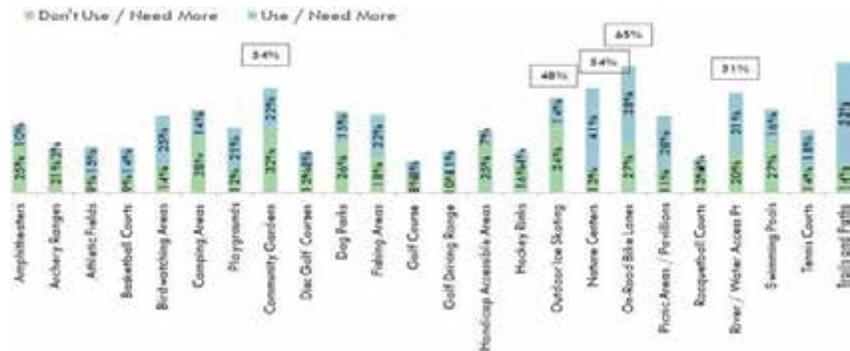
Developing a regional trail system was the third highest priority item when survey respondents were asked to prioritize among several open space priorities. Similarly, providing more bicycle lanes and paths was the fifth highest priority item. These ranked behind the top two priorities - preservation of water resources, the protection of plant and wildlife habitats, and the fourth priority - the preservation of farmland.

Among users and non-users in Central Bucks, Trails and On-Road bike lanes are the facilities most wanted in the county. Community gardens, Nature Centers, Outdoor Ice Skating, and Water Access points also rated high.

Appendix B

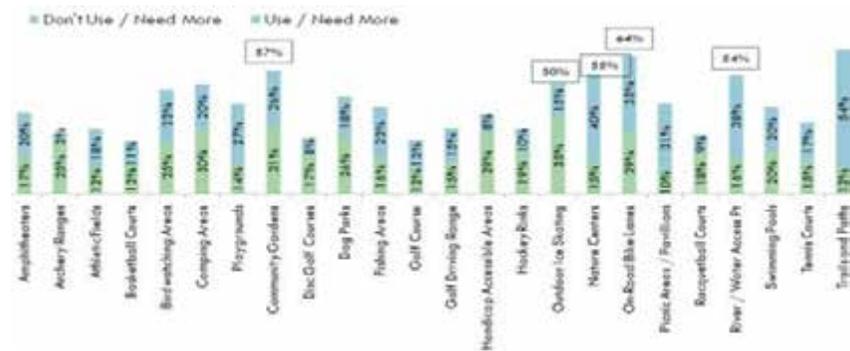
Lower Bucks

Among users and non-users in Lower Bucks, the park facilities cited as needing more include Trails, On-Road Bike Lanes, Community Gardens, Nature Centers, Outdoor Ice Skating, and Water Access Points.



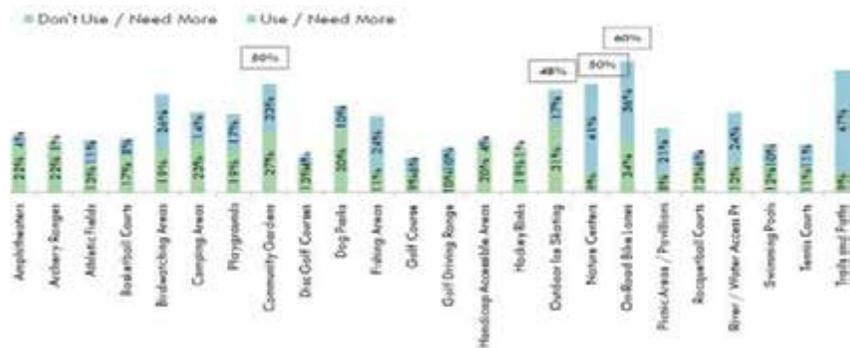
Central Bucks

Central Bucks expressed a higher preference for On-road Bike Lanes, Trails and Paths, Nature Centers, Community Gardens, Water Access Points.



Upper Bucks

In Upper Bucks, Trails and On-Road bike lanes are the facilities most wanted. However, the percentage expressing a need for these facilities was lower. Also, potentially due to the presence of Lake Nockamixon, water access points weren't rated as high.



Appendix B

Univest Race

Overview—Comments on bicycling in Bucks County was provided at a number of public venues including the Univest Grand Prix 2010 held in Doylestown, Borough on September 12, 2010. About 60 spectators provided comments on bicycling in Bucks County. They completed a questionnaire available at a booth on bicycling at the event..

Summary Findings— The main findings included:

- Fun is the top reason to bicycle
- One in three would consider using bicycling as a form of transportation in the future.
- Safety is the biggest concern.
- Bicycling lanes and share the road partnerships should be the priority in a Bucks County network.
- Two out of three recipients said a bucks county network is very important.
- Four out of five recipients would use a countywide bicycle network.

Tri Municipal Bicycle Plan Public Meeting

Overview—During a public open house for the Tri-Municipal Plan, participants completed a questionnaire regarding bicycling in the Tri-Municipal area. The following information depicts the opinions of the participants in the meeting.

Summary Findings — All of those who answered the survey either ride bicycles now (85%) or are interested in bicycling (15%). About 65% ride on a combination of roads and trails. Slightly more (40%) bicycle on trails compared with roads (35%). Only one in ten bicycle close to home. More than one in three drive to where they want to bicycle. Three out of four respondents bicycle for fun and fitness. A most important finding was that 40% want to be able to bicycle as transportation in the future. Respondents indicated that the following were the most important benefits of trails:

- Exercise – 90%
- Connectivity to surrounding – 80%
- Recreation – 75%
- Transportation – 55%
- Environmental Conservation – 50%

The major impediments to bicycling were traffic (50%), unsafe street crossings (45%) and personal safety concerns (40%). Lack of interconnections and an overall structure for a bicycling system were written in as blocks to bicycling.

Off-road bicycle trails were listed as a priority over on-road bicycle trails by a margin of two to one. All of the respondents listed off-road bicycle trails as a priority while only 50% listed on-road bicycle lanes as a priority. About 90 % indicated that off-road bicycle trails were a high priority.

A greenway and trail network is very important to the respondents. Seventy-five percent (75%) said it was very important while 25% said it was somewhat important. No one responded that it was not important or that they did not want it. About 75 percent (75%) said they'd be very likely to use the trail system with 35 percent (35%) being somewhat likely. One person indicated they'd like to use the trail system to walk.

Community connections were important to those interested in bicycling. Peace Valley Park/Lake Galena is an important destination. Connecting town centers, residential areas, school, parks, neighborhoods and getting to Doylestown Borough were listed as important. The respondents had a regional view of connections beyond the Tri-Municipal area.

Major On-Road Spines Data

As a part of the review of the existing roadways that have been identified as Major Spines, the project team developed the following tables for each of the proposed spines. The tables include data pertaining to the existing roadway conditions, including the following:

- Number of Travel Lanes
- Shoulder Widths
- On-Street Parking
- Speed Limit
- Surroundings (Rural, In Town, etc.)

1. State Bicycle Route E (Bristol Pike, Rt. 413 & Trenton Road) - Cornwells Heights to Morrisville

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
10	SR0013	County Line	Tennis Avenue	2 + Turn lane	Yes	No	No	35	Commercial / Residential w/parking lots, driveways, etc
20	SR0013	Tennis Avenue	Woodhaven Road	2 + Turn lane	No	Yes Partial	No	35	Commercial parking, sidewalks along sides, narrow shoulders
30	SR0013	Woodhaven - Off	Woodhaven - NB On	2 + Turn lane	Yes	No	No	35	Area between on/off ramps
40	SR0013	Woodhaven Road	Gravel Pike	2 + Turn lane	Yes	No	No	35	
50	SR0013	Gravel Pike	Williams Avenue	2 + Turn lane	No	No	No	35	Commercial, open w/driveways & access areas, narrow shoulders
60	SR0013	Williams Avenue	Woodbine Avenue	2 + Turn lane	No	No	No	35	Commercial area w/curb along roadway, narrow shoulders w/utility areas & drainage
70	SR0013	Woodbine Avenue	Arbitrary	2 + Turn lane	Yes	Yes Partial	No	35	Commercial area w/parking lot & access
80	SR0013	Arbitrary	132 On/Off	1 Eastbound 2 Westbound	Yes	No	No	35	On/off ramp area for Route 132
90	SR0013	132 On/Off	Arbitrary	2- Divided & turning lanes	Yes	No	No	35	Transition area - on/off ramps flat, wide shoulder
100	SR0013	Arbitrary	Bensalem Blvd	2 + Turn lane	Yes	No	No	35	Rural, commercial area, shoulder narrow in some areas, drainage issues
110	SR0013	Bensalem Blvd	Totem Road	2 + Turn lane	Yes Over 1/2	No	No	35	Varying shoulder width, but most area 4', driveway, parking lots
120	SR0013	Totem Road	Cedar Avenue	2 + Turn lane	Yes	No	No	35	Shoulders & sidewalks, wide & flat driveway access, etc.
130	SR0013	Cedar Avenue	Dorset Avenue	2 + Turn lane	Yes	Yes Partial	Yes Partial	35	Shoulders w/parking in some area. SEPTA lines along EB side 2nd half of section
140	SR0013	Dorset Avenue	Franklin Avenue	2 + Turn lane	Yes	No	No	40	Shoulder w/drainage, wide in some areas SEPTA along EB, Residential along WB

1. State Bicycle Route E (Bristol Pike, Rt. 413 & Trenton Road) - Cornwells Heights to Morrisville

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
150	SR0013	Franklin Avenue	Mark Road	2 + Turn lane	Yes	No	No	40	SEPTA line along EB, Residential along WB - Flat shoulder w/ some drainage
154	SR0013	Mark Road	Arbitrary	2 + Turn lane	No Only Eastbound	No	No	40	Road transition to 3 lane (2EB) w/no shoulder on WB side
170	SR0013	Arbitrary	Route 413	3 2 Eastbound 1 Westbound	No	No	No	40	Section with 413 near Bristol turn lanes go to the shoulders
140	SR0413	New Falls Road	Oakland Avenue	2	Yes	No	No	45	Flat Shoulders w/drainage / Some Vegetation / Guiderails
150	SR0413	Oakland Avenue	Silverbell Road	2	Yes	No	No	45	Shoulder w/vegetation / Ditches along side / Guiderail in some areas
160	SR0413	Silverbell Road	Deep Dale Drive	2	Yes	No	No	45	residential area w/guidrails in some places / Puddles
121	SR0413	New Falls Road	I-276	2 (4@ North End)	Yes Most Areas	No	No	45	4 lanes / 2 lanes / w/4 has no shoulder / Shoulder rough conditions
101	SR0413	I-276	Arbitrary	4+ Turn lane	No Only in Few Areas	No	No	45	Areas with shoulder have curb/guiderail along side, sidewalks & drainage
91	SR0413	Arbitrary	Wharton Road	4+ Turn lane	Yes	No	No	35	Wide, flat shoulders with sidewalks and some streetscaping, drains
71	SR0413	Wharton Road	Arbitrary	5 3 Southbound 2 Northbound	Yes	No	No	35	Shoulder / right turn lane along SB & NB curb, guiderail @ sections of NB
61	SR0413	Arbitrary	Bristol Borough Line	4+ Turn lane	Yes	No	No	35	Wide Shoulders w/drainage, driveways, curbs, sidewalks
51	SR0413	Bristol Borough Line	Route 13	4+ Turn lane	Yes	No	No	35	Commercial area / Shoulder became right turn lane
40	Trenton Road	Forsythia Drive	Forsythia Drive	2	No	No	No		Residential area, shoulder paved w/curbs along side, sidewalks, drainage
50	Trenton Road	Forsythia Drive	Queen Anne Creek	2	Yes	No	No		Residential area, paved shoulder w/guiderail & vegetation along side, turn lane in areas

1. State Bicycle Route E (Bristol Pike, Rt. 413 & Trenton Road) - Cornwells Heights to Morrisville

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
60	Trenton Road	Queen Anne Creek	Bristol Oxford Valley Road	2	Yes	No	No		Residential / Commercial area w/paved shoulders, guiderail & sidewalks
70	Trenton Road	Bristol Oxford Valley Road	Bedford Road	2	Yes	No Yes in some areas	No Yes in some areas		Residential area, width shoulders w/drains, sidewalks, curbs
80	Trenton Road	Bedford Road	Trenton Circle	2	Yes	Yes	Yes	35	Residential area w/paved shoulders, curb along sides, driveways
90	Trenton Road	Trenton Circle	Queen Anne Drive	2	Yes	Yes	Yes	35	Residential/School area, paved shoulder, curbs, sidewalks
100	Trenton Road	Queen Anne Drive	North Olds Blvd	2	Yes	Yes	Yes	35	Residential area w/paved shoulders, curb
110	Trenton Road	North Olds Blvd	Oak Lane Avenue	2	Yes	Yes	Yes	35	Residential area w/paved shoulder - bump outs for drainage

10. Pebble Hill Road/Green Street/Edison Furlong Road

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
30	Pebble Hill Road	Edison Furlong Road	Spring Valley Road	2	No	No	No	40	Rural area, no shoulder
40	Pebble Hill Road	Spring Valley Road	Cherry Lane	2	No	No	No	40	No shoulder, tree/poles along road, guiderail, rural area w/homes
50	Pebble Hill Road	Cherry Lane	Doylestown Limit	2	No	No	No	40	Varying shoulder widths, guiderail, poles, ditch, wall along roadway
60	Green Street	Doylestown Limit	Homestead Drive	2	No	No	No	25	Narrow/no shoulder, ditch, guiderail along roadway
10	Green Street	Homestead Drive	Ashland Street	2	No	Yes Portions	Yes Portions	25	No shoulder delination in area, rural, residential, school, speed bumps @ school
140	Edison Furlong Road	Saddle Drive	Pebble Hill Road	2	No	No	No	45	Varying width mainly narrow, guiderail
130	Edison Furlong Road	York Road	Saddle Drive	2	No York - Turning Lane Yes Turkey - Saddle	No	No	45	Varying widths, wider on WB side, turn lanes, driveways, ditches, poles, vegetation along roadway in narrow section
120	Edison Furlong Road	Forest Grove Road	York Road	2	Yes	No	No	45	Level shoulders, consistant widths

11. Lower State Road - Montgomery County Line to Doylestown

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
10	Lower State Road	County Line	Bradley Road	2	No	No	No	45	No shoulder, ditch, utility poles, rural area, passing zone
20	Lower State Road	Bradley Road	Street Road	2	No	No	No	45	No shoulder or gravel, rural area
30	Lower State Road	Street Road	Pickertown Road	2	No	No	No	45	No shoulder rural area, ditches along side
40	Lower State Road	Pickertown Road	Arbitrary	2	No	No	No	45	Small shoulder gravel w/drainage & ditch, rural
50	Lower State Road	Arbitrary	Bristol Road	2	No	No	No	45	Narrow shoulder, guiderail
60	Lower State Road	Bristol Road	Old New Road	2	No	No	No	40	Narrow, no shoulders, guiderails, drainage, rural area
70	Lower State Road	Old New Road	Almshouse Road	2	No	No	No	40	Narrow, no shoulder, ditches, rural area, bankes, poles
130	Almshouse Road	Lower State Road	Lower State / Almshouse Int	2	No	No	No	40	Narrow roadway, no shoulder, guiderail
80	Lower State Road	Almshouse Road	Wells Road	2	No	No	No	40	No shoulder, drop off on sides
90	Lower State Road	Wells Road	New Britain Road	2	No	No	No	40	No shoulder, drainage, rural area
100	Lower State Road	New Britain Road	Doylestown Limit	2	No	No	No	40	No shoulder, railroad crossing, rural area
51	State Street	Oakland Avenue	Court Street (WB)	1	No	Yes	Yes	25	1 way travel w/parking on sides, suburban, downtown commercial area
60	State Street	Oakland Avenue	Ashland Street (EB)	2	No	No	No	25	Sidewalks, curb on edge of road, suburban area
70	State Street	Ashland Street	East Street	2	Yes In portions 2nd 1/2	No	No	25	Transition from Suburban to Rural
80	State Street	East Street	202 on Int	2	Yes In portions	No	No	45	Area w/turn lanes, guiderail
84	State Street	202 On	202 Off	2	Yes	No	No	45	2 lane roadway w/shoulder
20	Court Street	Memorial Drive	Jefferson Street					25	
30	Court Street	Jefferson Street	Washington Street	2	No	No	Yes	25	Residential area, no shoulder, no striping

11. Lower State Road - Montgomery County Line to Doylestown

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
40	Court Street	Washington Street	Lafayette Street	2	No	No	Yes	25	Residential area, no shoulder, no striping
50	Court Street	Lafayette Street	West Street	2	No	Yes	No	25	Residential area, no shoulder, no striping
60	Court Street	West Street	Franklin Street	2	No	Yes	Yes	25	Residential area, no shoulder, no striping
70	Court Street	Franklin Street	State Street	2	No	Yes	Yes	25	

12. Mountainview Drive/Old Bethlehem Road - Nockamixon State Park to Northampton County

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0010	SR4101	Mountain View Drive	Black Birch Lane	2	No	No	No	40	Rural
0020	SR4101	Black Birch Lane	Creek	2	No	No	No	40	Bridge / Rural
0030	SR4101	Creek	Roudenbush Road	2	No	No	No	40	Rural
0040	SR4101	Roudenbush Road	Apple Road	2	No	No	No	40	Rural
0050	No Data Available								
0060	SR4101	Apple Road	West Sawmill Road	2	No	No	No	40	Rural
0064	SR4101	West Sawmill Road	Oak Lane	2	No	No	No	35	Rural / Wooded / Brush
0070	SR4101	Oak Lane	Pullen Station Road	2	No	No	No	40	Rural / Narrow Bridge
0080	SR4101	Pullen Station Road	Arbitrary	2	No	No	No	40	Rural
0084	SR4101	Arbitrary	Roundhouse Road	2	No	No	No	45	Rural
0090	SR4101	Roundhouse Road	Bridge Street	2	No	No	No	45	Bridge
0100	SR4101	Bridge Street	Route 212	2	No	No	No	45	Bridge
0170	SR212	Route 212	Pleasant View Road	2	No 1-2'	No	No	35	Town
0180	SR212	Pleasant View Road	Pleasant Hollow Road	2	No	No	No	45	Bridge
0190	SR212	Pleasant Hollow Road	Old Bethlehem Road	2	No 1-2'	No	No	45	Rural
0010	SR4065	Route 212	Route 412	2	No	No	No	45	Bridge
0160	SR412	Route 412	County Line	2	No 1-2'	No	No	45	Rural

2. SR 00513/0413 (Hulmeville Road/Bellevue Avenue/Pine Street/Newtown-Langhorne Road) - Cornwells Heights to Newtown

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0140	SR0513	Woodland Avenue	Comly Avenue	2	No	No	No	25 / 35	Railroad Crossing
0130	SR0513	Holly Avenue	Woodland Avenue	2	No	No	No	35	Town
0120	SR0513	Hulmeville Avenue	Holly Avenue	2	No	No	No	35	Town
0110	SR0513	Bensalem Blvd	Bellevue Avenue	2 + Turn lane	No	No	No	35	Bridge
0100	SR0513	Camel Avenue	Bensalem Blvd	2 + Turn lane	No North Yes South	No	No	40	Residential
0090	SR0513	Gibson Road	Camel Avenue	2 + Turn lane	No	No	No	40	Overpass
0080	SR0513	Mechanicsville Road	Gibson Road	2 + Turn lane	Yes	No	No	40	Bridge
0070	SR0513	Galloway Road	Mechanicsville Road	2 + Turn lane	No	No	No	40	School
0060	SR0513	Park Avenue	Galloway Road	2 + Turn lane	No	No	No	40	Mixed
0050	SR0513	Brookwood Drive	Park Avenue	2 + Turn lane	Yes 4'	No	No	40	School / Open
0040	SR0513	Brown Avenue	Brookwood Drive	2 + Turn lane	Yes 4'	No	No	40	Commercial / Residential
0030	SR0513	Village Green Blvd	Brown Avenue	2	No	No	No	40	Residential
0020	SR0513	Corry Avenue	Village Green Blvd	2 + Turn lane	No	North Yes North Yes	No	35 / 40	Residential
0010	SR0513	Route 13	Corry Avenue	2	No	No	No	35	Residential / School
0200	SR0413	South Pine Street	Comly Avenue	Turning lanes 2-1EW	No	No	No	35	Rural Town Setting
0211	SR0413	South Bellevue Avenue	East Gilliam Avenue	Turning lanes 4-2EW	No	No	No	35	Overpass
0220	SR0413	East Gillam Avenue	East Winchester Avenue	Turning lanes 2-1EW	No	No	No	35	Within Middletown
0230	SR0413	East Winchester Avenue	Old Mill Drive	2-1EW	Yes 4'	No	No	45	2 Underpass / Rural
0234	SR0413	Old Mill Drive	Bridgetown Pike	2-1EW	Yes 4'	No	No	45	Rural
0240	SR0413	Bridgetown Pike	Sunny Hill Drive	Turning lanes 2-1EW	Yes 8'	No	No	45	Bridge / Rural Residential

2. SR 00513/0413 (Hulmeville Road/Bellevue Avenue/Pine Street/Newtown-Langhorne Road) - Cornwells Heights to Newtown

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0250	SR0413	Sunny Hill Drive	Tollgate Road	Multiple turning lanes 2-1EW	Yes 4+ feet	No	No	45	Rural Residential
0260	SR0413	Tollgate Road	Arbitrary	Turning lanes 2-1EW	Yes 4-6	No	No	45	Rural
0271	SR0413	Newtown Bypass	Arbitrary	Multiple turning lanes 2-1EW	No	No	No	45	School

3. SR 2053 (Levittown Parkway) Woodbourne to Levittown

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0100	SR2033	Wood Lane	Wellington Drive	4-2EW	Yes 4'	No	No	35	2 Railroad Crossings / Bridge / Underpass
0090	SR2033	Wellington Drive	Maple Avenue	Multiple turning lanes 2 South 1 North	Southbound No Northbound Yes	No	No	35	Overpass
0080	SR2037	Maple Avenue	East Lincoln Avenue	2 South 1 North	No	No	No	40	Congested / Confusing
0150	SR2037	East Lincoln Avenue	Oxford Valley Road	Multiple turning lanes 4-2EW	No	No	No	40	Congested
0121	SR2029	East Lincoln Avenue	North Oxford Valley Road	4-2EW	No	No	No	-	Congested
0091	SR2053	Bristol Oxford Valley Road	Devon Road	4-2EW	No	No	No	40	Residential
0080	SR2053	Hood Blvd	Devon Road	Turning lanes 4-2EW	No	No	No	40	Overpass / Bridge / Path / Road Construction
0060	SR2051	South Queen Anne Drive	Hood Blvd	Multiple turning lanes 4-2EW	No	No	No	40	Traffic
0051	SR2051	South Queen Anne Drive	New Falls Road	Turning lanes 4-2EW	No	No	No	40	Traffic
0041	SR2051	New Falls Road	Crabtree Drive	4-2EW	No	No	No	40	Divided Highway
0030	SR2051	Willowood Way	Crabtree Drive	Turning lanes 4-2EW	No	No	No	40	Divided Highway
0020	SR2051	Pinewood Drive	Willowood Way	Turning lanes 4-2EW	No	No	No	40	Divided Highway
0015	SR2051	Pinewood Drive	Falls / Tullytown Municipal Boundary	Turning lanes 4-2EW	No	No	No	40 / 35	Divided Highway
0010	SR2051	Falls / Tullytown Municipal Boundary	Bristol Pike	Multiple turning lanes 4-2EW	No	No	No	35 / 15	School Zone / Divided Highway

4. SR 0332 (Afton Avenue)/Yardley-Langhorne Road Spine - Yardley to Woodbourne

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0330	SR0332	Cadwallader Road	South Delaware Avenue	2	No	Yes	No	25	Yardley / Bridge
0320	SR0332	Lehigh Drive	Cadwallader Road	2	Yes 4'	No	No	25	Bridge
210	SR2049	Patriot Drive	Lehigh Drive	2 + Turn lanes at intersections	Yes 4'	No	No	40 / 45	Rural Development
0204	SR2049	Disk Road	Patriot Drive	2 + occasional turn lanes on right	Yes 12'	No	No	45	Rural Development
0200	SR2049	Mirror Lake Road	Disk Road	2 + Turn lane	Yes 12'	No	No	45	Paths on Both Sides
0190	SR2049	Edgewood Road	Mirror Lake Road	2 + Turn lane	No	No	No	35	Wooded
0180	SR2049	Township Line Road	Edgewood Road	2 + Turn lane	West of 95 (West Yes 20' - East No) East of 95 No	No	No	35	Underpass 95 - Path along East Side West of 95
0170	SR2049	Mallard Lane	Township Line Road	2 + Turn lane	No	No	No	45	Residential
0160	SR2049	Woodbourne Road	Mallard Lane	2 + Turn lane	West Yes East No	No	No	45	Residential
0150	SR2049	Bridgetown Pike	Woodbourne Road	2	No	No	No	45	Rural

5. SR 0532 (Buck Road/Washington Crossing Road) - Cross County Spine

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0011	SR0532	County Line Rd	Franklin Avenue	4 + turn lane	No	No	No	35	Residential / Commercial
0020	SR0532	Franklin Avenue	Route 132	4 + turn lane	No	No	No	35	Goes Over 276 / Commercial
0030	SR0532	Route 132	Jay Street	4 + turn lane	No	No	No	35	Commercial
0040	SR0532	Jay Street	Albert Street	2 + Turn lane	No 3-4'	No	No	40	Residential
0050	SR0532	Albert Street	West Bristol Road	2	Yes 4'	No	No	40	Residential
0060	SR0532	West Bristol Road	Old Bristol Road	2	Yes 4'	No	No	40 / 25	Goes Under Train Overpass / Residential
0070	SR0532	Old Bristol Road	Rocksville Road	2	Yes 4-6'	No	No	40	Bridge
0080	SR0532	Rocksville Road	Twist Drive	2	Yes 4'	No	No	40	Residential
0090	SR0532	Twist Drive	Bridge	2	Yes 4-6'	No	No	45	Bridge
0100	SR0532	Bridge	Rolling Hills Drive	2	Yes 4-8'	No	No	45	Residential
0110	SR0532	Rolling Hills Drive	East Holland Road	2	Yes 4-6'	No	No	45	Residential / Rural
0120	SR0532	East Holland Road	Overpass	2	No Southbound 2' Yes Northbound 10'	No	No	45	Overpass
0130	SR0532	Overpass	Middle Holland Road	2 + Turning lanes @ intersections	Yes 6-8'	No	No	45	Bridge
0140	SR0532	Middle Holland Road	Neshaminy Creek Bridge	2	No	No	No	45	Bridge / Rural
0150	SR0532	Neshaminy Creek Bridge	Arbitrary	2	No Rural Yes 4'	No	No	45	Rural
0155	SR0532	Newtown Bypass	Arbitrary	4 - 6 lanes + Turning lanes included	Yes 4'	No	No	45	Heavily Traveled
190	SR0532	Durham Road	Bridge	2 + Turning lanes @ intersections	No	No	No	45	Rural
200	SR0532	Bridge	Linton Hill Road	2	Yes 4'	No	No	45	Rural
0210	SR0532	Linton Hill Road	Eldridge Road	2	No	No	No	45	Rural
0220	SR0532	Eldridge Road	Gauks Lane	2	No	No	No	45	Rural

5. SR 0532 (Buck Road/Washington Crossing Road) - Cross County Spine

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0230	SR0532	Gauks Lane	Highland Road	2 + Turning lanes @ intersections	No	No	No	45	Rural
0240	SR0532	Highland Road	Dolington Road	2 + Turning lanes @ intersections	No	No	No	35	Rural
0250	SR0532	Dolington Road	Old Dolington Road	2	No	No	No	35 / 45	Rural
0260	SR0532	Old Dolington Road	Meadowview Drive	2	No	No	No	45	Bridge / Rural
0270	SR0532	Meadowview Drive	Bridge	2	No 3-4'	No	No	45	Bridge / Rural
0280	SR0532	Bridge	Wrightstown Road	2	No 3-4'	No	No	45	Rural
0290	SR0532	Wrightstown Road	Bridge	2 + Turning lanes @ intersections	No	No	No	40	Bridge / Village Center
0300	SR0532	Bridge	Route 32	2	No	No	No	40	Path along Roadway / Town

6. SR 0413 (Durham Road) - Newtown to Buckingham

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0720	SR413	Creek	Dark Hollow Road	2	No 2-3'	No	No	-	Rural
0710	SR413	Twp Line Road	Creek	2	No 2-3'	No	No	-	Rural
0694	SR413	Arbitrary	Twp Line Road	2	No 2-3'	No	No	-	Rural
0690	SR413	Stump Road	Arbitrary	2	No 2-4'	No	No	-	Rural
0680	SR413	Groveland Road	Stump Road	2	No 2-4'	No	No	-	Rural
0670	SR413	Curly Hill Road	Groveland Road	2	No 2-4'	No	No	-	Rural
0660	SR413	Creek	Curly Hill Road	2	No 2-4'	No	No	40	Rural
0650	SR413	Ryan Road	Creek	2	No 2-4'	No	No	40	Rural / Wooded
0640	SR413	Point Pleasant Pike	Ryan Road	2	No 2-4'	No	No	40	Rural / Wooded
0620	SR413	Ridgeview Drive	Point Pleasant Pike	2	No 2-4'	No	No	40	Rural / Town
0610	SR413	Carversville Road	Ridgeview Drive	2	No 2-4'	No	No	40	Rural
0600	SR413	Cold Spring Creamery Road	Carversville Road	2 + Turn lane	No 2-4'	No	No	40	Rural / Suburban
0590	SR413	Hansell Road	Cold Spring Creamery Road	2 + Turning lanes @ intersections	No 2-4'	No	No	45 / 40	Rural / Suburban
0580	SR413	Danielle Road	Hansell Road	2 + Turning lanes @ intersections	No 3-4'	No	No	45	Rural / Suburban
0570	SR413	Paist Road	Danielle Road	2	No 3-4'	No	No	35	Rural / Suburban
0560	SR413	Church Road	Paist Road	2	Yes 9'	No	No	35 / 45	Rural / Suburban
0550	SR413	Anderson Road	Church Road	2	No 3-4'	No	No	45	Rural / Suburban
0540	SR413	Route 202	Anderson Road	Southbound turning lane 2-1EW	No 2-3'	No	No	35	Town
0530	SR413	Creek	Route 202	2 + Turning lanes @ intersections	No 3-4'	No	No	35	Bridge / Town
0520	SR413	Upper Mountain Road	Creek	2	No 2-3'	No	No	40	Railroad Crossing
0510	SR413	Upper Mountain Road	Upper Mountain Road	2	No 1-2'	No	No	40	Rural
0500	SR413	Upper Mountain Road	Upper Mountain Road	2	No 3-4'	No	No	40	Rural
0490	SR413	Spring Meadow Blvd	Upper Mountain Road	2 + turning lanes	No 2-3'	No	No	40	Rural

6. SR 0413 (Durham Road) - Newtown to Buckingham

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0480	SR413	New Hope Road	Spring Meadow Blvd	2 + turning lanes	No 2-3'	No	No	45	Rural Development
0470	SR413	Smith Road	New Hope Road	2	No 2-3'	No	No	45	Rural
0460	SR413	Twp Line Road	Smith Road	2	No 3-4'	No	No	35	Rural
0450	SR413	Arbitrary	Twp Line Road	2	Yes 4-5'	No	No	35	Rural
0434	SR413	Arbitrary	Arbitrary	2	No 3-4'	No	No	-	Rural
0430	SR413	Route 232	Arbitrary	2	Yes 4-10'	No	No	-	Rural Town
0420	SR413	Midland Road	Route 232	2 + turning lanes	Yes 4-8'	No	No	45	Rural
0410	SR413	Wrenwood Way	Midland Road	2	No 2-4'	No	No	45	Rural
0390	SR413	Wrightstown Road	Wrenwood Way	2	Yes 4-6'	No	No	45	Rural
0380	SR413	Stoopville Road	Wrightstown Road	2 + turning lanes	No 3-4'	No	No	45	Rural
0370	SR413	Worth Drive	Stoopville Road	Turning lanes 2-1EW 4-2EW	Yes 4-5'	No	No	45	Rural Development
0360	SR413	South Drive	North Drive	2-1EW Turning lanes 4-2EW	No 3-4'	No	No	45	Turning Lane @ Developments Wide Shoulder @ Developments
0350	SR413	Chatham Place	South Drive	Turning lanes 2-1EW	Yes 4-6'	No	No	45	Rural
0340	SR413	Cloverlee Lane	Chatham Place	Turning lanes 2-1EW	No 2-4'	No	No	45	Rural
0330	SR413	Newtown Bypass	Clovertree Lane	South 5 - 3-2 Mark 2-1EW	Yes 4-10'	No	No	45	2 lanes and turning lane south / 2 north @ intersection

7. East/West Cross County Spine - Quakertown to Washington Crossing

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0010	SR0663	County Line	Old Plains Road	2	Yes	No	No		Rural - wide shoulder, passing zone
0020	SR0663	Old Plains Road	Fels Road	2	Yes	No	No		Rural - wide shoulder, passing EB
0024	SR0663	Fels Road	Kline Mill Road	2	Yes	No	No		Rural - wide shoulder, no passing
0030	SR0663	Kline Mill Road	Brinkman Road	2	Yes	No	No		Rural - wide shoulder, passing zone
0040	SR0663	Brinkman Road	Arbitrary	2	Yes	No	No		Rural - wide shoulder, no passing
0050	SR0663	Arbitrary	Creek	4	Yes	No	No		Split - 2 lanes/side, wide shoulders
0060	SR0663	Creek	Arbitrary	4	Yes in areas w/no turning lanes	No	No		Split - 2 lanes/side, turning lanes & center turn lanes, left turn
0070	SR0663	Arbitrary	Arbitrary	2	Yes	No	No		Transition from 4 - 2 lanes, wide shoulder
0080	SR0663	Arbitrary	Allentown Road	2	Yes	No	No		wide shoulder, guiderail
0110	SR0663	Mill Hill Road	Commerce Drive	2	Yes	No	No		Rural-wide shoulder, turning lanes
0120	SR0663	Commerce Drive	Portzer Road	2	Yes	No	No		Rural-wide shoulder, turning lanes
0130	SR0663	Portzer Road	Old Bethlehem Pike	2	Yes	No	No		Rural-wide shoulder, turning lanes
0140	SR0663	Old Bethlehem Pike	PA Route 309 Int	4	No	No	No		Rural-wide shoulder, turning lanes
0281	SR0309	PA 663 Int	Park Avenue	4	No	No	No		Commercial Area, 2 lanes each way w/turning lane in middle
82	SR0313	Morgan Creek	Paletown Road	2	Yes	No	No	45	2 lane rural / transition, gutter on shoulder
92	SR0313	Paletown Road	Towhickon Creek	2	Yes Not at Bridge	No	No	45	Low shoulders, guide rail @ bridge
102	SR0313	Towhickon Creek	Sterner Mill Road	2	Yes	No	No	45 / 55	Low shoulder, houses along road guiderail @ bridge
112	SR0313	Sterner Mill Road	Arbitrary	2	Yes	No	No	55	Low shoulder, drains in shoulder rural area w/homes

7. East/West Cross County Spine - Quakertown to Washington Crossing

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
122	SR0313	Arbitrary	Arbitrary	2	Yes	No	No	55	Low shoulder, ditch along side, rural area, wooded w/homes
132	SR0313	Arbitrary	West Rock Road	2	Yes	No	No	55	Low shoulder, guiderail, homes along road
142	SR0313	West Rock Road	3 Mile Run Road	2	Yes	No	No	55	Low shoulder, sections w/guiderail, narrow @ bridge
152	SR0313	3 Mile Run Road	Ridge Road	2	Yes	No	No	55	Sloped shoulder, guiderails in sections, ditches along road
162	SR0313	Ridge Road	5th Street	2	Yes	No	No	55	Sloped shoulder, w/guiderails & drain, ditches
172	SR0313	5th Street	Old Bethlehem Road	2	Yes	No	No	55	Sloped shoulder, w/guiderails & drain, ditches
182	SR0313	Old Bethlehem Road	Schott Road	2	Yes	No	No	55	Sloped shoulder, w/guiderails & drain, ditches
192	SR0313	Schott Road	Arbitrary	2	Yes	No	No	55	Sloped shoulder, w/guiderails & drain, ditches
202	SR0313	Arbitrary	Creek Crossing	2	Yes	No	No	55	Sloped shoulder, w/guiderails & drain, ditches
212	SR0313	Creek Crossing	PA Route 113 Int	2	1/2 > 4' 1/2 < 4' near 113	No	No	45	Soft shoulder, guiderails, etc turn lanes @ intersection
222	SR0313	PA Route 113 Int	Rickert Road	2	1/2 > 4' 1/2 < 4' near 113	No	No	45	Turn lanes, guiderail, soft shoulder
232	SR0313	Rickert Road	Manor Drive	2	Yes	No	No	35	Sidewalk & curb on outside, corner, access/driveways
242	SR0313	Manor Drive	High Street	2	No	No	No	35	2-3' shoulder w/sidewalks along sides
252	SR0313	High Street	Arbitrary	2	No	No	No	35 / 45	Varying shoulder width - sidewalk in some areas, ditches, guiderails
262	SR0313	Arbitrary	Stump Road	2	Yes	No	No	45	Shoulders are generally 74: some narrow spots, rural areas w/homes
272	SR0313	Stump Road	Arbitrary	2	No	No	No	45	Sections of narrow shoulders, low areas, ditches, drain

7. East/West Cross County Spine - Quakertown to Washington Crossing

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
282	SR0313	Arbitrary	Curly Hill Road	2	No	No	No	45	Sections of narrow shoulders, low areas, ditches, drain
292	SR0313	Curly Hill Road	Creek Crossing	2	No	No	No	45	Narrow shoulders, guiderail, business access
302	SR0313	Creek Crossing	Arbitrary	2	No	No	No	45	Narrow, sloped shoulder, ditches, turn lanes
304	SR0313	Arbitrary	Ferry Road	2	No	No	No	45	Narrow shoulder, no shoulder in area turn lanes drainage
312	SR0313	Ferry Road	Sawmill Road	2	Yes	No	No	45	drainage in some areas, guiderails & turn lanes
322	SR0313	Sawmill Road	Business Park Entrance	2, 4 @ end	No	No	No	45	Narrow shoulder w/guiderail & turning lanes
332	SR0313	Business Park Entrance	Route 611	4	No	No	No	45	Narrow w/guiderail & turn lanes
342	SR0313	Route 611	Business Entrance	4	No	No	No	45	Shoulder is used for turn lanes & merge areas
352	SR0313	Business Entrance	Cold Spring Creamery Road	4 - start - Easton Road 2 - rest	No 1st 1/2 Yes 2nd 1/2	No	No	45	No shoulder in 1st half, wide shoulder in 2nd half
362	SR0313	Cold Spring Creamery Road	Neighborhood Drive	2	Yes for most	No	No	45	Wide shoulder in most areas, narrow w/drainage
372	SR0313	Neighborhood Drive	Route 202	2	Yes	No	No	45	Wide shoulder, some draining, guiderails
382	SR0313	Route 202	Cherry Lane	2	Yes	No	No	45	Wide shoulder, some draining, guiderails
392	SR0313	Cherry Lane	Spring Valley Road	2	Yes	No	No	45	Wide shoulder, drainage
402	SR0313	Spring Valley Road	PA 263 Int	2	Yes	No	No	45	Wide shoulder, drainage
60	Forest Grove Road	Swamp Road	Arbitrary	2	No	No	No	45	No shoulder, ditch along sides, narrow shoulder on WB side, rural area
50	Forest Grove Road	Arbitrary	Upper Mountain Road	2	No	No	No	45	No shoulder drop off @edge of road, vegetation, rural area w/homes
40	Forest Grove Road	Upper Mountain Road	Creamery Road	2	No	No	No	45 / 35	0-2' shoulders, poles, ditch along road, village/rural area, guiderail

7. East/West Cross County Spine - Quakertown to Washington Crossing

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
34	Forest Grove Road	Creamery Road	Arbitrary	2	No	No	No	45	Rural area w/homes, no shoulder, ditch/bank along road
30	Forest Grove Road	Arbitrary	New Hope Road	2	No	No	No	45	No shoulder, drop off @ edge of road, bank/ditch on edge of road
20	Forest Grove Road	New Hope Road	Smith Road	2	No	No	No	35	No shoulder, rural area, steep bank off road on both sides
14	Forest Grove Road	Smith Road	Mill Creek	2	No	No	No	35	No shoulder, rural area, steep bank off road on both sides
10	Forest Grove Road	Mill Creek	Township Line Road	2	No	No	No	35	Narrow/no shoulder, bridge over Mill Creek is 1 lane, ditch, vegetation along roadway, railroad tracks
0050	SR2115	Arbitrary	Durham Road	2-1EW	No	No	No	45	Rural
0054	SR2115	Arbitrary	Windy Bush Road	2-1EW	No	No	No	45	Rural
0010	SR2034	Windy Bush Road	Buckmanville Road	2-1EW	No	No	No	40	Rural
0020	SR2034	Buckmanville Road	Arbitrary	2-1EW	No	No	No	40	Rural
0024	SR2034	Arbitrary	Bridge	2-1EW	No	No	No	40	Rural / Residential
0030	SR2034	Bridge	Brownsburg Road	2-1EW	No	No	No	40	Bridge
0034	SR2034	Brownsburg Road	Bridge	2-1EW	No	No	No	40	Rural
0040	SR2034	Bridge	Eagle Road	2-1EW	No	No	No	40	Rural / Bridge
0050	SR2083	Pineville Road	Eagle Road	2-1EW	No	No	No	35	Rural / Residential
0060	SR2083	Eagle Road	Shannon Road	2-1EW	No	No	No	35 / 45	Rural
0070	SR2083	Shannon Road	Bridge	2-1EW	No	No	No	45	Rural
0080	SR2083	Bridge	Slack Road	2-1EW	No	No	No	45	Very narrow Bridge (1 1/2 Lanes)
0090	SR2083	Slack Road	River Road Route 32	2-1EW	No	No	No	45	Bridge / Rural Residential
0230	SR2071 Taylorsville Road	Route 32	Jonathan Way	2-1EW	No	No	No	45	Rural / Residential
0220	SR2071 Taylorsville Road	Jonathan Way	Kings Grant Drive	2-1EW	North Side Yes 8+ feet to to minimal farther west	No	No	45	Rural

7. East/West Cross County Spine - Quakertown to Washington Crossing

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0210	SR2071 Taylorsville Road	Kings Grant Drive	Heritage Hills Drive	2-1EW	North Side Yes 8+ feet	No	No	45	Rural / Wide
0200	SR2071 Taylorsville Road	Heritage Hills Drive	Bridge	2-1EW	Yes 8+ feet	No	No	45	Rural / Wide
0190	SR2071 Taylorsville Road	Bridge	Little Road	2-1EW	No	No	No	35	Residential / Commercial

8. SR 0263 (York Road)

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
0050	York Road SR0263	Norristown Road	Old York Road	Middle turning lane 4-2EW	Yes 4-10'	No	No	45	Commercial / Residential
0040	SR0263	Tennyson Drive	Norristown Road	Middle turning lane 4-2EW	Yes 6-10'	No	No	45	Residential
0031	SR0263	Tennyson Drive	West Street Road	Middle turning lane 4-2EW	Yes 6' West No South	No	No	45	Commercial
0020	SR0263	6th Avenue	West Street Road	Middle turning lane 4-2EW	No	No	No	45	Commercial
0010	SR0263	County Line Road	6th Avenue	Middle turning lane 4-2EW	No	No	No	45	Commercial

9. SR 0202 (Doylestown-Buckingham Pike/York Road/Lower York Road) - Doylestown to New Hope

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
180	SR0202	Swamp Road	Mechanicsville Road	2	Yes	No	No		Rural area, open shoulders, few turning lanes, ditches along shoulder
190	SR0202	Mechanicsville Road	Branches Lane	2	Yes	No	No		Rural area, open shoulders, few turning lanes, ditches along shoulder
200	SR0202	Branches Lane	Driveway	2	Yes	No	No	50	Village area, ditches, guiderails & turn lanes along in shoulder
210	SR0202	Driveway	Kavan Court	2	Yes	No	No	50	Rural area w/homes, drains, turn lanes, etc in shoulder
214	SR0202	Kavan Court	Durham Road (413)	2	Yes	No	No	50 / 35	Rural area, guiderail, drain along shoulder
220	SR0202	Rt. 413	Rt. 263	2	Yes	No	No	35	Split roadway, rural areas
230	SR0202	Rt. 263	Quarry Road	2	No Varies	No	No	40	Varying shoulder width, guiderails, drains, etc.
240	SR0202	Quarry Road	Hollicong Road	2	No Varies	No	No	40	Varying shoulders widths, driveways, commercial access, turn lanes
250	SR0202	Holicong Road	Byecroft Road	2	No	No	No	40	Rural area w/houses, narrow shoulders, ditch along sides
260	SR0202	Byecroft Road	Street Road	2	No	No	No	35	Varying shoulder width, sloping sides, guiderails, driveways, commercial/residential
270	SR0202	Street Road	Arbitrary	2	No	No	No	50	Varying shoulder width, sloping sides, guiderails, driveways, commercial/residential
280	SR0202	Arbitrary	Aquetong Road	2	No	No	No	50	Sloped shoulder w/ditch, driveways, commercial access, mix commercial/rural
290	SR0202	Aquetong Road	Lower Mountain Road	2	No	No	No	50	Gravel/black top shoulder, narrow, turn lanes, etc
300	SR0202	Lower Mountain Road	Reeder Road	2	Yes	No	No	50	Wide, level shoulders, commercial access, driveway

9. SR 0202 (Doylestown-Buckingham Pike/York Road/Lower York Road) - Doylestown to New Hope

Segment	Roadway	Limits		Number of Travel Lanes	Shoulder Width 4' or Greater	On Street Parking		Speed Limit	Status / Existing Conditions
		Start	End			NB / EB	SB / WB		
310	SR0202	Reeder Road	York Road	3 1 Eastbound 2 Westbound	No	No	No	50	turn lanes, driveways, commerical area

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Section 1—Glossary of Terms

ADT - Average Daily Traffic.

AASHTO - American Association of State Highway and Transportation Officials.

AASHTO Guide for the Development of Bicycle Facilities (1999) - A document recognized and used by public and private entities throughout the country to ensure safe, consistently designed and implemented bicycle facilities.

Bicycle - Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term “bicycle” for this publication also includes three and four wheeled human powered vehicles, but not tricycles for children.

Bicycle Facilities - A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically designated for bicycle use.

Bicycle Lane or Bike Lane - A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Bicycle Parking - An area dedicated and designed specifically for storing and locking a bicycle. Includes bicycle racks and bicycle lockers.

Bicycle Path or Bike Path - See Shared Use Path.

Bicycle Route - A bikeway that features appropriate directional and informational signage.

Bicycle Route System - A system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bike routes should establish a continuous routing, but may be a combination of any and all types of bikeways.

Bikeway - A generic term for any road, street, path or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles

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or are to be shared with other transportation modes.

Countywide Spines - Bikeways of countywide significance that provide connections to major destinations: municipalities, central business districts, town centers, employment centers, transit centers and regional parks and trails. Function as the skeleton for the County’s bikeway network.

Dual Bikeway - A roadway that features two types of bikeways: 1) shared use path and bike lanes; or 2) shared use path and shared roadway/travel lane. The roadway corridor accommodates both on-road and off-road bicycling.

Highway - A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

MUTCD - Manual for Uniform Traffic Control Devices. A document recognized and used by transportation agencies throughout the country to ensure consistently designed and implemented signs, pavement markings and other traffic control devices.

Rail-Trail - A shared use path, either paved or unpaved, built within the right-of-way of an existing or former railroad.

Right-of-Way - A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Right of Way - The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

Roadway - The portion of the highway, including shoulders, intended for vehicular use.

Rumble Strips - A textured or grooved pavement sometimes used on or along shoulders of highways to alert motorists who stray onto the shoulder.

Shared Roadway - A roadway which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or road with paved shoulders.

Shared Use Path - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, jog-

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gers and other non-motorized users.

Shoulder - The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use and for lateral support of sub-base, base and surface courses.

Sidewalk - The portion of a street or highway right-of-way designed for preferential or exclusive use by pedestrians.

Signed Shared Roadway (Signed Bike Route) - A shared roadway which has been designated by signing as a preferred route for bicycle use.

Traveled Way - The portion of the roadway for the movement of vehicles, exclusive of shoulders.

Unpaved Path - Paths not surfaced with asphalt or Portland cement concrete.

Source: “Guide for the Development of Bicycle Facilities,” American Association of State Highway and Transportation Officials, 1999.

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Section 2 .Useful Website Links

The following listing was compiled from these sources: *Bicycling and Walking in the United States 2010 Benchmarking Report*, www.bikewalk.org, and www.bicyclinginfo.org.

Advocacy Organizations

State and Local Advocacy Organizations

- See www.PeoplePoweredMovement.org to find your state or local bicycle and pedestrian advocacy organization

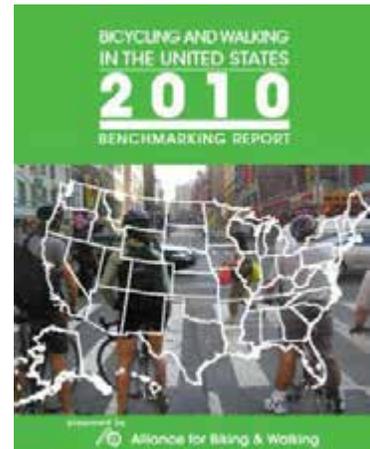
National Advocacy Organizations

- Adventure Cycling Association: <http://www.adventurecycling.org>
- Alliance for Biking & Walking: <http://www.PeoplePoweredMovement.org>
- America Bikes: <http://www.americabikes.org>
- America Walks: <http://www.americawalks.org>
- Association of Pedestrian and Bicycle Professionals: <http://www.apbp.org>
- Bicycling Information: www.bicyclinginfo.org
- Bikes Belong Coalition: <http://www.bikesbelong.org>
- Cities for Cycling: <http://nacto.org/cities-for-cycling/design-guide/>
- International Mountain Bicycling Association: <http://www.imba.com>
- League of American Bicyclists: <http://www.bikeleague.org>
- National Center for Bicycling and Walking: <http://www.bikewalk.org>
- National Complete Streets Coalition: <http://www.completestreets.org>
- Pedestrian and Bicycle Information Center: <http://www.walkinginfo.org>
- Rails to Trails Conservancy: <http://www.railtrails.org>
- Safe Routes to School National Partnership: <http://www.saferoutespartnership.org>
- US DOT Office of Livability: <http://www.dot.gov/livability/>

Education

Share the Road

- Colorado (3-2-1 Courtesy Code): <http://bicyclecolo.org/page.cfm?>



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- Maine (Share the Road): http://www.bikemaine.org/share_the_road.htm
- Minnesota (Share the Road): <http://www.sharetheroadmn.org>
- New York City (Give Respect/Get Respect): <http://bit.ly/6tp1C>
- San Francisco (Coexist): <http://www.sfbike.org/?coexist>
- South Carolina (Share the Road): <http://www.pccsc.net/sharetheroad.php>

Model Bicycle Education Programs

- Arizona Bike Safety Classes: <http://www.dot.pima.gov/tpcbac/SafetyClasses.htm>
- Arizona Education Guides: <http://www.azbikeped.org/education.html>
- Delaware: <http://bit.ly/mBFKZ>
- Connecticut: <http://bit.ly/3xxHOT>
- Florida: <http://www.floridabicycle.org/programs/education.html>
- Hawaii: <http://www.hbl.org/?q=node/126>
- Illinois: <http://www.bikelib.org/>
- Indiana: <http://www.bicycleindiana.org/education.html>
- Iowa: <http://www.iowabicyclecoalition.org/node/99>
- Kansas: <http://ksdot.org/burRail/bike/default.asp>
- Maine: <http://www.bikemaine.org/education.htm>
- Michigan: <http://www.lmb.org/pages/About/About.htm>
- Minnesota: <http://www.bikemn.org/>
- New York: <http://www.bikenewyork.org/education/classes/savvy.html>
- Oklahoma: http://okbike.org/index.php?option=com_content&task=section&id=6&Itemid=35
- Oregon: <http://www.ashland.or.us/News.asp?NewsID=512>
- Texas: <http://www.biketexas.org/content/view/908/789/>
- Vermont: <http://www.vtbikeped.org/what/safety.htm>
- Washington: <http://www.washcobtc.org/programs/index.php>
- West Virginia: <http://www.wvcf.org/home/>

Encouragement

Ciclovias/Sunday Parkways

- Baltimore: <http://www.baltimorespokes.org/article.php?story=20070821100331287>
- Chicago: <http://www.activetrans.org/openstreets>
- Cleveland: <http://www.clevelandbicycleweek.org/events/bike-work-day>
- Denver: <http://www.drcog.org/btwd2009/>
- Los Angeles: <http://bit.ly/6DkTd>

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- Louisville: <http://www.louisvilleky.gov/BikeLouisville/biketoworkday2009.htm>
- Miami: <http://bikemiamiblog.wordpress.com/>
- New York: <http://www.nyc.gov/html/dot/summerstreets/html/home/home.shtml>
- Oakland: <http://www.oaklandpw.com/page125.aspx>
- Portland: <http://www.portlandonline.com/Transportation/index.cfm?c=46103>
- San Francisco: <http://sundaystreetssf.com/>
- Seattle: <http://www.seattlecan.org/summerstreets/>

Promotional Rides

- Chicago's Bike the Drive: <http://www.bikethedrive.org>
- Iowa's Register's Annual Great Bicycle Ride Across Iowa: <http://ragbrai.com>
- Louisville's Mayor's Healthy Hometown Hike and Bike: <http://bit.ly/188Kob>

Healthy and Active Living

- Active Living Research: <http://www.activelivingresearch.org/>
- Centers for Disease Control and Prevention: <http://www.cdc.gov/HealthyYouth/index.htm>
- Healthy Kids, Healthy Communities: <http://www.healthykidshealthycommunities.org>
- Kaiser Permanente's Thrive Campaign: <http://thrivewithkp.org/>
- Policy Link: <http://www.policylink.org>
- Robert Wood Johnson Foundation Active Living by Design: <http://www.activelivingbydesign.org>

Maps

- Arizona Bicycle Maps: <http://www.dot.pima.gov/tpcbac/Publications.html#map> and <http://www.azbikeped.org/maps.htm>
- Colorado: <http://bicyclecolo.org/page.cfm?PageID=626>
- Delaware: <http://bit.ly/2yvA13>
- Denver: <http://www.bikedenver.org/maps/>
- Illinois: <http://www.dot.state.il.us/bikemap/STATE.HTML>
- Louisville: <http://www.louisvilleky.gov/BikeLouisville/IWantTo/existingbikelanes.htm>
- Maine: http://www.exploremaine.org/bike/bike_tours.html
- Michigan: <http://bit.ly/caNrl>
- Milwaukee: <http://www.ci.mil.wi.us/maps4460.htm>

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- Minneapolis: <http://www.ci.minneapolis.mn.us/bicycles/where-to-ride.asp>
- Minnesota: <http://www.dot.state.mn.us/bike/>
- New Hampshire: <http://www.nh.gov/dot/nhbikeped/maps.htm>
- New Jersey: <http://www.njbikemap.com/>
- New York: <http://www.nycbikemaps.com/>
- North Carolina: <http://www.ncdot.org/it/gis/DataDistribution/BikeMaps/>
- Ohio: <http://www.noaca.org/bikemaps.html>
- Oklahoma: <http://www.oklahomabicyclesociety.com/Maps/maphome.htm>
- Oregon: <http://www.oregon.gov/ODOT/HWY/BIKEPED/maps.shtml>
- Philadelphia: <http://www.bicyclecoalition.org/resources/maps>
- Portland: <http://bit.ly/IEzWp>
- San Francisco: <http://www.sfbike.org/?maps>
- Seattle: <http://www.cityofseattle.net/transportation/bikemaps.htm>
- Washington, DC: <http://www.waba.org/areabiking/maps.php>
- Wisconsin: <http://www.dot.wisconsin.gov/travel/bike-foot/bikemaps.htm>

Master Plans

Bicycle & Pedestrian Master Plans

- Arizona: <http://www.azbikeped.org/statewide-bicycle-pedestrian-intro.html>
- Atlanta: <http://www.atlantaregional.com/html/1769.aspx>
- Fort Collins: <http://www.fcgov.com/transportationplanning/tmp.php>
- Las Vegas: <http://www.rtcsonthernnevada.com/mpo/cycling/>
- Louisville: <http://www.louisvilleky.gov/BikeLouisville/bikefriendly.htm>
- Nashville: <http://bit.ly/2mXigT>
- Nevada: <http://www.bicyclenevada.com/>
- Oakland: <http://www.oaklandpw.com/page123.aspx>
- Raleigh: <http://bit.ly/lgZHj>
- Seattle: http://www.seattle.gov/transportation/pedestrian_masterplan/

Bicycle Master Plans

- Austin: <http://www.ci.austin.tx.us/bicycle/>
- Baltimore: <http://www.ci.baltimore.md.us/government/planning/bikeplan.php>
- Chicago: <http://bike2015plan.org/>

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- Columbus: <http://www.altaprojects.net/columbus/>
- Dallas: http://www.dallascityhall.com/pwt/bike_links.html
- Delaware: <http://bit.ly/1qfa1T>
- Denver: <http://bit.ly/LPBc5>
- Fresno: <http://bit.ly/11E7HM>
- Honolulu: <http://www.honolulu.gov/dts/bikeway/cov-toc.pdf>
- Kansas City: <http://www.kcmo.org/pubworks.nsf/web/kcbike1?opendocument>
- Los Angeles: <http://www.labikeplan.org/>
- Long Beach: <http://bit.ly/vFOTi>
- Louisville: <http://www.louisvilleky.gov/BikeLouisville/>
- Minneapolis: <http://www.ci.minneapolis.mn.us/bicycles/bicycle-plans.asp>
- New York: <http://www.nyc.gov/html/dcp/html/bike/mp.shtml174>
- Oahu: <http://www.oahubikeplan.org/>
- Portland: <http://bit.ly/17AeXX>
- Raleigh: <http://bit.ly/23D28Y>
- Sacramento County: <http://saccountybikeplan.webexone.com/login.asp?loc=&link=>
- San Diego: <http://bit.ly/1271Kl>
- San Francisco: <http://www.sfmta.com/cms/bproj/bikeplan.htm>
- Seattle: <http://www.cityofseattle.net/transportation/bikemaster.htm>

Pedestrian Master Plans

- Austin: http://www.ci.austin.tx.us/bicycle/ped_sum.htm
- Arlington: http://www.ci.arlington.tx.us/highlights/highlights_planning.html
- Chicago: <http://bit.ly/UEurn>
- Denver: <http://www.denvergov.org/TabId/395511/default.aspx>
- Kansas City: <http://www.kcmo.org/planning.nsf/plnpres/walkability>
- Minneapolis: <http://bit.ly/TFTqB>
- Oakland: <http://www.oaklandnet.com/government/Pedestrian/index.html>
- Portland: <http://www.portlandonline.com/transportation/index.cfm?c=37064>
- San Diego: <http://bit.ly/WsW5r>
- San Francisco: <http://www.sfmta.com/cms/wproj/28717.html>
- Seattle: http://www.seattle.gov/transportation/pedestrian_masterplan
- Washington: <http://www.tooledesign.com/projects/dc>

Statistics/Studies

General Information

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- Bikes Belong: <http://www.bikesbelong.org/statistics>
- Federal Highway Administration:
<http://www.fhwa.dot.gov/environment/bikeped>
- Fietsberaad (Netherlands): <http://www.fietsberaad.nl/index.cfm?lang=en§ion=Kennisbank>
- League of American Bicyclists:
<http://www.bikeleague.org/resources/reports/>
- Pedestrian and Bicycle Information Center:
<http://www.pedbikeinfo.org>
- Planetizen: <http://www.planetizen.com>
- NHTSA Bicycle and Pedestrian Safety Program:
<http://www.nhtsa.gov/pedestrians>
- Rails to Trails Conservancy: <http://www.railstotrails.org/ourWork/advocacy/activeTransportation>
- Smart Growth America: <http://www.smartgrowthamerica.org>
- Transportation for America: <http://t4america.org/resources>
- Victoria Transport Policy Institute: <http://www.vtpi.org/>

Mode Share (Bicycle and Pedestrian Counts)

- National Bicycle and Pedestrian Documentation Project:
<http://bikepeddocumentation.org>

Retailers/Industry

- Bikes Belong Coalition: <http://www.bikesbelong.org>
- National Bicycle Dealers Association: <http://www.nbda.com>

Policies

Advisory Committees

- Arizona Bicycle Advisory Committee:
<http://www.dot.pima.gov/tpcbac/>
- Arlington Bicycle Advisory Committee:
<http://www.bikearlington.com/bikeadv.cfm>
- Baltimore Bicycle and Pedestrian Advisory Committee:
<http://bit.ly/jcQ1Q>
- California Bicycle Advisory Committee:
<http://www.dot.ca.gov/hq/tpp/offices/bike/cbac.html>
- City of Columbus Bikeway Advisory Committee:
<http://www.bicyclecolumbus.com/>
- Denver Bicycling Advisory Committee: <http://bit.ly/QUqTZ>

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- Fresno Bicycle/Pedestrian Advisory Committee:
<http://bit.ly/1yWDmp>
- Fort Worth Bicycle and Pedestrian Advisory Committee:
<http://bit.ly/4oErIO>
- Houston Bicycle Advisory Committee: <http://www.bikehouston.org/>
- Los Angeles Bicycle Advisory Committee:
<http://www.bicyclela.org/AdvisoryBoard.htm>
- Miami-Dade Bicycle Pedestrian Advisory Committee:
<http://bit.ly/OR5pP>
- Minneapolis Bicycle Advisory Committee: <http://bit.ly/1a4qt4>
- Nashville Bicycle Pedestrian Advisory Committee:
<http://bit.ly/4wYc6A>
- Nevada: <http://www.bicyclenevada.com/board.html>

- Oakland Bicycle Advisory Committee:
<http://www.oaklandpw.com/Page124.aspx>
- Omaha Bicycle Advisory Committee: <http://bit.ly/o9III>
- San Antonio Bicycle Mobility Advisory Committee:
<http://bit.ly/7tSSsv>
- San Francisco Bicycle Plan:
http://www.sfgov.org/site/bac_index.asp?id=11525
- San Jose Bicyclist and Pedestrian Program: <http://bit.ly/tdtvF>
- Tucson Bicycle Advisory Committee:
<http://www.dot.pima.gov/tpcbac/>

Complete Streets

- Advice on complete streets campaigns:
<http://www.PeoplePoweredMovement.org/contact>
- The latest complete streets news: <http://www.completestreets.org>

Model Complete Streets Policies

- Guide to Complete Streets Campaigns:
<http://www.peoplepoweredmovement.org/publications>
- Examples of Complete Streets Policies and Guides:
<http://bit.ly/5ly15q>
- Chicago: <http://bit.ly/27HVSK>
- Louisville:
<http://www.louisvilleky.gov/BikeLouisville/Complete+Streets/>

Recreational Trails Programs

- American Trails: <http://www.americantrails.org/resources/trailbuild>
- Brandywine Conservancy:
<http://www.brandywinemuseumshop.org/catalog/index.cfm>

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- Chester County Planning Commission:
<http://dsf.chesco.org/planning/lib/planning/trailguide/trailguideentire.pdf>
- FHWA Recreational Trails Program:
<http://www.fhwa.dot.gov/environment/rectrails.index.htm>
- FHWA Trail Construction and Maintenance Handbook:
<http://www.fhwa.dot.gov/environment/fsupubs/07232806/index.htm>
- FHWA Trail Related Sites: <http://www.fhwa.dot.gov/environment/fsupubs/index.htm>
- Guidelines for Trail Development within Montgomery County, PA:
<http://www.atfiles.org/files/pdf/MontgomeryTrail2005.pdf>
- Pennsylvania Greenways Partnership: <http://www.pagreenways.org/toolbox/creatingconnections.pdf>
- Portland Parks and Recreation:
<http://www.atfiles.org/files/pdf/DesignGuidelinesPortland09.pdf>
- Professional Trail Builders Association:
<http://www.trailbuilders.org/resources/books1.html>

Police on Bicycles

- International Police Mountain Biking Association:
<http://www.ipmba.org>

Safe Passing Laws

- 3FeetPlease.com: <http://www.3feetplease.com/>
- Arizona: <http://azbikelaw.org/articles/ThreeFoot.html>
- Austin: <http://www.atxbs.com/?q=taxonomy/term/846>
- Delaware: <http://bikedel.blogspot.com/2009/07/three-foot-passing-law-passes-senate.html>
- Louisiana: <http://www.louisiana3feet.com/>
- Maine: http://www.bikemaine.org/ld1808_about.htm
- New Jersey: <http://www.njbike.org/Safe.html>
- New Orleans: <http://bit.ly/eVzY4>
- Oklahoma City: <http://bit.ly/46paAG>
- Texas: <http://www.biketexas.org/content/view/1229/896/>
- Tennessee: <http://www.tennessee3feet.org/>

Mandatory Helmet Laws

- Bicycle Helmet Safety Institute:
<http://www.helmets.org/mandator.htm>
- Arguments/Case Study Against Mandatory Bicycle Helmet Laws:
<http://bit.ly/1mu8N>

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- LAB Helmet Law Position: <http://www.helmets.org/labposit.htm>
- Arguments Against Mandatory Helmet Laws: <http://bit.ly/1d1nR2>
- NHTSA Arguments for Mandatory Helmet Laws: <http://bit.ly/s5DhX>

Safe Routes to School

- Safe Routes to School National Partnership:
www.saferoutespartnership.org
- The National Center for Safe Routes to School
www.saferoutesinfo.org
- Progress Reports: <http://www.saferoutesinfo.org/resources/tracking-reports.cfm>

Model Safe Routes to School Programs

- Boston: http://www.walkboston.org/work/safe_routes.htm
- California: <http://www.saferoutestoschools.org>
- Colorado:
<http://www.dot.state.co.us/bikeped/SafeRoutesToSchool.htm>
- Connecticut: <http://www.ctsaferoutes.ct.gov/>
- Delaware: http://deldot.gov/information/community_programs_and_services/srts
- Denver: <http://www.denvergov.org/DenverSafeRoutestoSchool/tabid/427939/Default.aspx>
- Florida: http://www.dot.state.fl.us/Safety/SRTS_files/SRTS.shtm
- Fort Collins: <http://www.fcgov.com/saferoutes/>
- Illinois: <http://www.dot.il.gov/saferoutes/saferouteshome.aspx>
- Indiana: <http://www.in.gov/indot/2956.htm>
- Iowa: <http://www.iowadot.gov/saferoutes/>
- Kansas: <http://www.ksdot.org/burTrafficEng/sztoolbox/default.asp>
- Kentucky: <http://www.saferoutes.ky.gov/>
- Louisiana: http://www.dotd.louisiana.gov/planning/highway_safety/safe_routes/
- Maine: <http://www.bikemaine.org/safeways/index.html>
- Massachusetts: <http://www.commute.com/schools.shtml>
- Michigan: <http://www.saferoutesmichigan.org/>
- Minnesota: <http://www.dot.state.mn.us/saferoutes/>
- Mississippi: <http://bit.ly/1iQixg>
- Missouri: <http://www.modot.mo.gov/safety/saferoutestoschool.htm>
- Montana: <http://www.mdt.mt.gov/pubinvolve/saferoutes/>
- Nebraska: <http://www.saferoutesne.com/>
- New Jersey: <http://www.state.nj.us/transportation/community/srts/>
- New Mexico:
<http://www.nmshtd.state.nm.us/main.asp?secid=15411>
- New York: <http://bit.ly/XVFMv>

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- North Carolina: <http://www.ncdot.org/transit/bicycle/saferoutes/SafeRoutes.html>
- Oklahoma: <http://www.okladot.state.ok.us/srts/index.php>
- Portland: <http://www.portlandonline.com/TRANSPORTATION/index.cfm?c=40511>
- South Carolina: <http://www.scdot.org/community/saferoutes.shtml>
- Texas: <http://www.saferoutestx.org/>
- Wisconsin: <http://www.dot.wisconsin.gov/localgov/aid/saferoutes.htm>

Provisions

Bicycle Parking

- APBP's Bicycle Parking Guidelines: <http://www.apbp.org/?page=Publications>
- Minneapolis: <http://www.ci.minneapolis.mn.us/bicycles/bikeparking.asp>
- StolenBicycleRegistry.com: <http://www.stolenbicycleregistry.com/links.php>

Bicycle and Pedestrian Facility Design

- Bicycle Facility Design: <http://www.bicyclinginfo.org/engineering/>
- Context Sensitive Solutions Clearinghouse: <http://contextsensitivesolutions.org>
- Pedestrian Facility Design: <http://www.walkinginfo.org/engineering/>
- Public Rights-of-Way Accessibility Guidelines: <http://www.access-board.gov/prowac/>

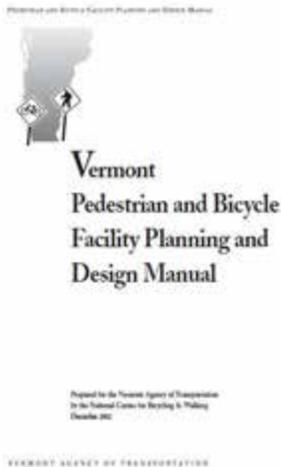
Sharrows

- San Francisco: <http://www.sfmta.com/cms/bproj/22747.html>
- Seattle: <http://www.cityofseattle.net/transportation/sharrows.htm>

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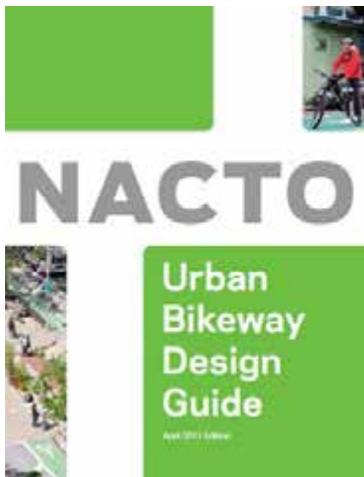
Section 3 Design Standards

All bikeways built in the county will be expected to meet the minimum ASSHTO standards for the Development of Bicycle Facilities. The updated ASSHTO guide scheduled for release in the upcoming year is expected to provide a more comprehensive approach to bicycle planning and design. One of the more comprehensive guides currently available is the 2002 Vermont Bicycle Facility Planning and Design Manual. This manual provides minimal standards and guidelines for bicycle facilities such as bike lane widths, pavement markings, crossings, landscaping and amenities, and maintenance. Two specific chapters that have been included in this report for reference are Chapters 4 and 5 which provide basic design criteria and planning guidelines for the development of on road bicycle facilities and shared use paths. The guidelines are presented in this toolbox for informational purposes only and do not cover all aspects and specific issues that may be encountered during design and development.



The complete manual as made available by VTrans can be accessed at www.aot.state.vt.us. Chapters 4 and 5 have been reprinted with permission from VTrans bicycle and Pedestrian coordinator.

In April 2011 the National Association of City Transportation Officials (NACTO) released the NACTO Urban Design Guide. This guide presents many unique and innovative solutions to addressing the need to provide complete streets in urban areas which often require non textbook solutions. The guide will be a useful reference for advocates in providing and improving bicycle transportation within Town Centers and in the more densely populated areas of the county.



The complete guide can be downloaded at <http://nacto.org/cities-for-cycling/design-guide/> until a final print version is available for purchase.

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4.1 Introduction

This chapter covers on-road bicycle facilities — bicycle lanes, wide curb lanes, paved shoulders, and shared lanes — as well as related improvements and enhancements. Bicycle facilities that are well separated from the roadway such as shared use paths are discussed in Chapter 5, Shared Use Paths. Guidance on rail-trail conversions and rails-with-trails is provided in Chapter 6, Rail Trails.

4.1.1 Application

Most bicycling occurs on existing streets and roads because these facilities connect all destinations directly. Bicycle use is allowed on all roads in Vermont except for limited access highways where bicycles are legally prohibited. Therefore, all highways, except those where bicyclists are legally prohibited, should be designed and constructed under the assumption that they will be used by bicyclists. Bicycles should be considered in all phases of transportation planning, new highway design, highway reconstruction, and capacity improvement and transit projects.

The most effective way to improve conditions for bicyclists and integrate them into the transportation system is to accommodate bicycle travel on all new and existing highways. Even if it were desirable to create a system of bikeways separated from the highway it would not be practical or affordable. Shared use paths and rail trails should be thought of as a complementary system of off-road routes for bicyclists and others that serves as an extension to the roadway network. Separated facilities should not be used to preclude on-road bicycle facilities. Rather they should be used to supplement on-road bikeways.

In general, low volume rural roads satisfactorily accommodate large numbers of bicyclists annually and could better accommodate cycling through the implementation of marginal improvements. On higher volume rural roads, paved shoulders provide increased operating width for bicyclists and motorists as do bicycle lanes on major streets in downtown and village settings. Wide curb lanes and shared roadways are used where width constraints prevent the development of separate lanes or paved shoulders of adequate width to serve bicyclists.

4.2 Design Considerations

4.2.1 Bicycle and User Characteristics

Bicycle Characteristics

Bicycle Styles and Dimensions. The three most popular styles of multi-gear adult bicycles available today are: the road bike (also called a touring or racing bike), the mountain bike (characterized by wide, fat smooth or knobby tires) and the hybrid bike (which blends the agility of the road bike and the durability and upright riding position of the mountain bike).

Variations of these styles abound with regard to gearing, passenger and baggage carrying capability, and rider position.

Monkton



Rutland



Lyndonville



Accommodating bicycles begins with the understanding that bicyclists vary greatly in age, skill, dimensions and needs.

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CHAPTER FOUR On-Road Bicycle Facilities

PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

Use the following criteria and the dimensions illustrated in Figure 4-1 to determine typical requirements for facility design and storage details:

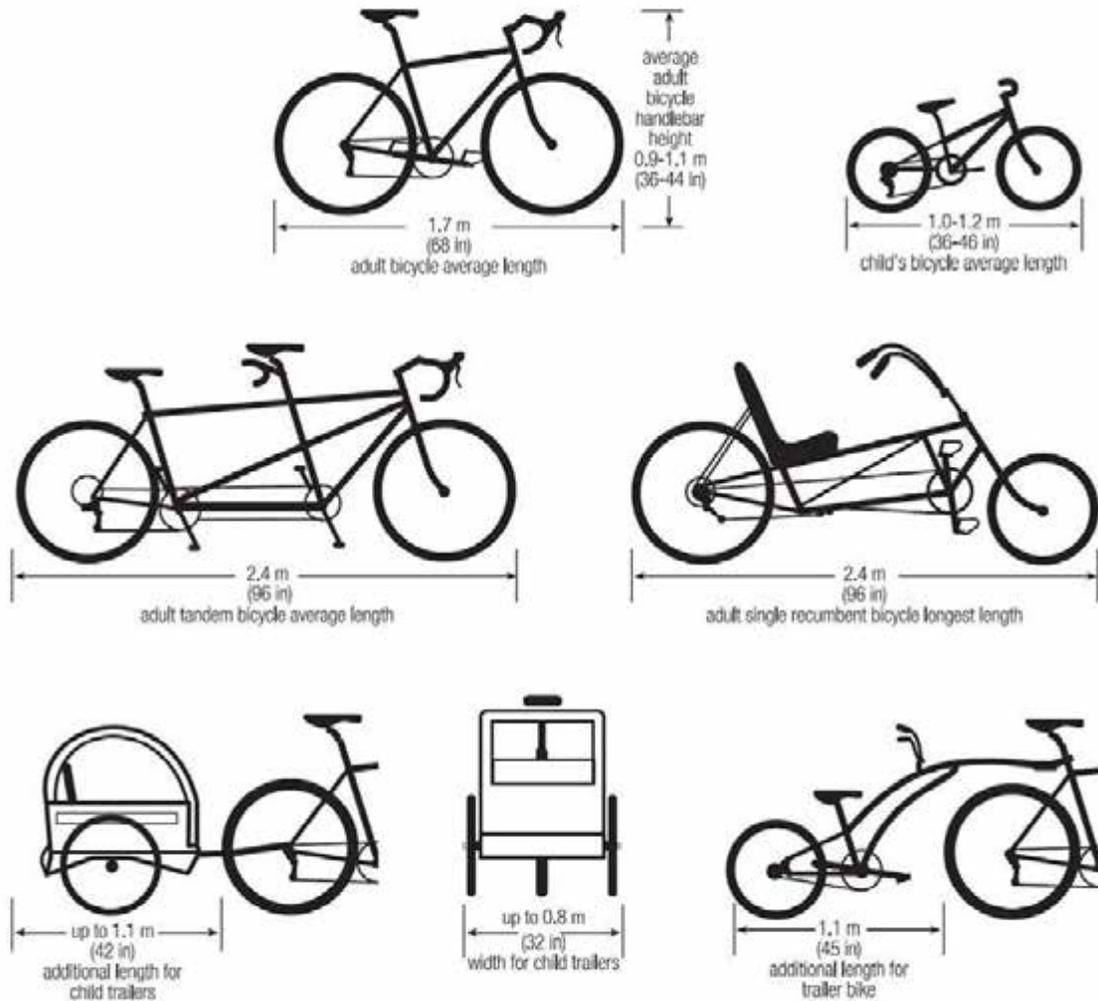


Figure 4-1.
Bicycle Styles and Dimensions.



An adult tandem bicycle averages 2.4 m (96 in) in length and can easily attain a speed in excess of 50 km/h (30 mph) on even a modest downhill.

Wheels and tires. The wheels and tires of a bicycle are narrow and sensitive to variations, imperfections and debris in the riding surface. In addition, the pressure in bicycle tires is high compared to other, larger vehicles. This makes bicycle tires more susceptible to damage and punctures from potholes, small pieces of glass, sharp stones and pieces of metal. Sensitive to these characteristics, bicyclists sometimes must suddenly swerve to avoid an obstacle in their path, a maneuver that may appear unpredictable or erratic to a motorist sharing the same lane.

Design considerations include:

- Minimal tire surface contact with the ground (as little as 2 sq cm or 0.3 sq in.).
- Road shock transmitted directly through the bicycle to the rider (many bicycles

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do not have suspensions systems).

- Sand, mud, algae, snow, wet or icy leaves, metal utility covers and decking, and skewed railroad tracks can precipitate a crash.
- Longitudinal seams and cracks (as narrow as 6 mm or 0.25 in) can cause loss of control.
- Surface edges and objects higher than 12 mm (0.5 in) can damage some rims or cause a crash.
- Underlying concrete roadways, which are common in Vermont, often create longitudinal cracks that wander on and off the shoulder and pose a significant hazard to bicyclists.

Brakes and braking.

Design considerations include:

- Reaction and braking times vary widely among users (allow 2.5 sec normal reaction time, allow 3.0 sec more for a surprised reaction time).
- Application of the brake and mechanical delay can account for 1.5 sec of additional braking time.
- Maximum deceleration for a bicycle is 17 km/s² (11 mph per sec).
- When rims are wet or coaster brakes are used, performance is 50 to 80 percent less efficient.

Steering. Bicyclists maintain balance by steering the front wheel of the bicycle under the combined center of gravity of both bicycle and rider.

Consequently, emergency or evasive steering maneuvers cannot be accomplished quickly by most bicyclists. The initiation of an intentional sudden turn is counter-intuitive (i.e., the rider must sharply steer the front wheel out from under the center of gravity in the opposite direction he or she intends to go to set up the sudden turn).

Design considerations include:

- Emergency turns cannot be accomplished as quickly on a bicycle as in an automobile.
- To initiate a turn the operator must first steer the bicycle in the opposite direction to set up a counter lean (precipitating a controlled fall).
- Allow 1.5 sec to set up a normal turn.
- Bicycles steer more slowly when heavily loaded.
- The lower the center of gravity the more stable the bicycle (high loads such as rider-mounted backpacks and bicycle-mounted child seats raise the center of gravity and make a bicycle less stable).

Tracking widths and grades. Due to steering wobble, bicyclists may track over a 1.0 m (40 in) width. An increase in climbing grade can generate more wheel wobble due to the slower speed, requiring even more operating width. Also, extra operating width on descents can allow bicyclists to more safely avoid debris or surface hazards at higher speeds. Therefore, where practicable, it is desirable to provide a paved shoulder or bicycle lane at least 1.8 m (6 ft) in width on uphill and downhill grades that exceed 5 percent to provide bicyclists with additional space for maneuvering.

With multi-gear bicycles, many bicyclists can comfortably manage 10 percent grades for short distances. Experienced bicyclists can accomplish steeper grades for much longer distances (e.g., the 13 percent grade on Vermont Route 132 between

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South Strafford and Sharon). Grades of 5 percent are the more common limit, with grades of 4 percent or less preferred by the majority of bicyclists.

Design considerations include:

- Average operating width on level terrain is 1 m (40 in).
- Average operating width over hilly terrain is 1.2 to 1.4 m (4 to 6 ft).
- Preferred grade is 4 percent (1:25) or less.
- Acceptable grades over limited distances range from 6 to 10 percent (1:16 to 1:10).

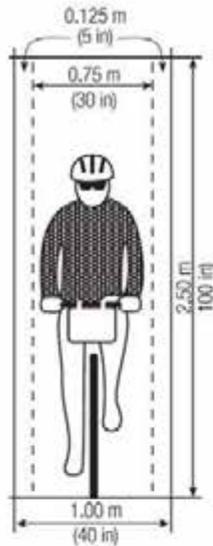
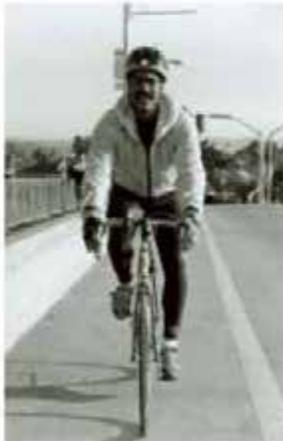


Figure 4-2.
Bicyclist's Operating Space



The slender profile of bicyclists may make them difficult for motorists to see, especially in complex visual situations.

User Characteristics

Although riders vary greatly in age, skill, dimensions and needs, the characteristics below encompass virtually all bicyclists:

Table 4-1.
User Characteristics and Speeds.

User Characteristics	Metric	English
Design viewing height	1.35 m	54 in
Center of gravity (adult, child varies)	0.84-1.02 m	33-40 in
Speeds (by age)	Metric	English
Child (4-8 years)	10-14 km/h	6-9 mph
Youth (9-12 years)	11-17 km/h	7-11 mph
Young adult (13-18 years)	13-24 km/h	8-15 mph
Adult	13-24 km/h	8-15 mph
Proficient adult	19-38 km/h	12-24 mph
Senior adult	13-24 km/h	8-15 mph
Cycling club pace lines	24-50 km/h	15-30 mph
Design speeds	Metric	English
Design speed (crossing intersections)	15 km/h	10 mph
Design speed (level terrain — paved)	30 km/h	20 mph
Design speed (unpaved)	24 km/h	15 mph
Design speed (downhill)	50 km/h	30 mph
Design speed (uphill)	8-19 km/h	5-12 mph

Profile and visibility. Most motorists involved in car-bicycle crashes report they did not see the bicyclist before the crash. Their slender profile (and sometimes low height) of bicyclists may make them difficult to see, especially in complex visual situations. The problem is even worse in low light conditions or at night. Bicyclists can improve their own visibility by making sure their bicycles are properly equipped with reflectors, wearing bright clothing, using retro-reflective fabrics, using flashing tail lights at night, and using headlights at night. However, motorists need to be on the lookout for bicyclists. Ultimately, increased bicycle use will result in increased motorist awareness.

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Considerations for design include:

- Bicyclists exhibit a thin or low profile.
- Their curbside location can reduce their being seen by overtaking, turning or parked motorists.
- Signs and stripes can warn motorists to expect increased bicycle use.
- Even when using lights, bicyclists are extremely difficult to detect under low light conditions or at night time.
- Motorists should be trained and expected to detect bicyclists more readily.

4.2.2 Bicycle Crash Types

Approximately 900 bicyclists are killed each year in motor vehicle crashes nationwide. This is but a fraction of the injuries that occur from car-bike crashes. According to *Pedestrian and Bicycle Crash Types of the Early 1990s (1996)*, 1991 data from the General Estimates System indicated that an additional 67,000 bicyclists reported injuries as a result of colliding with a motor vehicle. Many more injuries go unreported. A study by Stutts, et al. (1990) showed that fewer than two-thirds of bicycle-motor vehicle crashes were serious enough to require emergency room treatment.

In 1996, NHTSA sponsored additional research to further refine and update crash type distributions. This research resulted in a study, *Pedestrian and Bicycle Crash Types of the Early 1990s*, that identified 85 individual crash types, although, through assimilation, all crash types could be grouped into just three crash type groups: 1) specific circumstances; 2) the bicycle and motor vehicle on parallel paths; and 3) the bicycle and motor vehicle on crossing paths.

The **specific circumstances** group accounted for 7 percent of all crashes. Accident sub-types in this group were:

Table 4-2.
Bicycle Crash Types, Specific Circumstances Group.

Specific circumstances group	Percent
Crashes in parking lots and other non-roadway areas	3.7
Other “weird” types	3.2
Group total	6.9

The **bicycle and motor vehicle on parallel paths** group accounted for 36 percent of all crashes. Accident sub-types in this group were:

Table 4-3.
Bicycle Crash Types, Bicycle and Motor Vehicle on Parallel Paths Group.

Bicycle and motor vehicle on parallel paths group	Percent
Motorist turned or merged into path of bicyclist	12.1
Bicyclist turned or merged into path of motorist	7.3
Either operator on wrong side of street	2.8
Motorist overtaking bicyclist	8.6
Bicyclist overtaking motorist	2.7
Motorist loss of control	0.6
Bicyclist loss of control	1.8
Group total	35.9

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The **bicycle and motor vehicle on crossing paths** group accounted for 57 percent of all crashes. Accident sub-types in this group were:

Table 4-4.
Bicycle Crash Types, Bicycle and Motor Vehicle on Crossing Paths Group.

Bicycle and motor vehicle on crossing paths group	Percent
Bicyclist did not clear intersection	1.4
Motorist failed to yield	21.7
Bicyclist failed to yield, midblock rideout	11.7
Bicyclist failed to yield, intersection rideout	16.8
Motorist turning	0.7
Bicyclist turning	0.7
Crash occurred at intersection	4.1
Group total	57.1

Major findings of this study include:

- Driveways and other junctions account for 3 out of 4 crashes. Design facilities with this in mind.
- Young bicyclists under the age of 15 (and particularly 10 to 14) are over-represented in crashes with motor vehicles. Bicyclists older than 44 are over represented with regard to serious and fatal injury.
- Crashes with motor vehicles result in serious and fatal injuries 18 percent of the time.
- Two-thirds of bicycle-motor vehicle crashes occur during late afternoon and evening hours. Exposure is high during this period and visibility can be a problem.
- Two-thirds of the crashes occurred in urban areas.
- About 60 percent of road-related crashes occurred on two-lane roads.
- Roads with narrow lanes and higher speed limits are over-represented with regard to serious and fatal injury.

As a result of the study, the researchers concluded that a system-wide approach — including engineering, education and enforcement — is needed if the goals of the National Bicycling and Walking Study (refer to VTrans Bicycle Policy) are to be met.

4.2.3 Types of On-Road Bikeway Facilities and Treatments

The types of on-road bicycle treatments include:

- *Bicycle lane.* A portion of the roadway that has been designated by signs and pavement markings for preferential or exclusive use by bicyclists.
- *Wide curb lane.* A wider than normal travel lane that better accommodate bicycles and motor vehicles in the same lane while providing enough space for motorists to overtake and pass bicyclists without changing travel lanes.
- *Paved shoulder.* –The paved portion of the highway contiguous with the outside travel lane of the roadway that can be used by bicyclists as well as for the accommodation of pedestrians, stopped vehicles, emergency use and the lateral support of sub-base, base and surface courses.
- *Shared lanes.* Travel lanes with no additional width provided for bicyclists.
- *Incremental improvements.* Any change in infrastructure that benefits bicyclists.

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including bicycle-safe drainage grates, minimal additional width, signing, pavement markings, etc.

In addition, traffic calming techniques can effectively reduce the speed of motor vehicles along a roadway (refer to Chapter 7, Traffic Calming) and signs and pavement markings may be used to alert motorists of increased bicycling activity in certain locations, designate routes and convey information to bicyclists (see Chapter 8, Signs, Pavement Markings and Signals).

4.2.4 Selecting Appropriate Bicycle Facilities

The wide variation in ability, needs and desires among bicyclists can make it difficult to plan and design facilities that meet all the needs of these users.

Indeed, no one type of bicycle facility or highway design will suit all bicyclists and no bicycle facility can overcome a lack of bicycle operator skill. It is important to recognize that the choice of any one particular design will affect the type of rider that will be attracted to a facility, the level of use along the facility, and the level of access and mobility that will be afforded to bicyclists.

Design users. Accommodating bicyclists begins with the understanding that not all bicyclists are alike. The characteristic that best differentiates bicyclists is ability, which may be defined as a combination of skills, knowledge and judgment.

The Bicycle Federation of America estimates that one out of three people (100 million) in the United States own a bicycle, yet it is believed that fewer than 5 percent of these bicycle owners qualify as experienced or highly skilled bicyclists. Therefore, the vast majority of bicycle riders may be considered intermediate and novice bicyclists.

The 1994 FHWA report, *Selecting Roadway Design Treatments to Accommodate Bicyclists*, identified three general categories of bicycle user types (A, B and C) to assist highway designers in choosing different facility types for different roadway conditions for different types of bicyclists. AASHTO recognizes the same bicycle user types in their *Guide for the Development of Bicycle Facilities*.

The three general bicycle user types are:

Group A — Advanced Bicyclists

These bicyclists exhibit the following characteristics:

- Experienced riders.
- Have a level of comfort operating in traffic conditions.
- Use existing roadway system.
- Operate at maximum speed with minimum delay.
- Require minimal operating space on the roadway or shoulder to reduce the need for either the bicyclist or the motor vehicle operator to change position when passing.

Group A bicyclists are best served by:

- Wide outside lanes on urban arterials and collectors.
- Usable shoulders on rural highways.

Group B — Basic Bicyclists

Group B bicyclists exhibit the following characteristics:

- Casual or new adult or teenage riders.
- Less confident of their ability to operate in traffic without special provisions for bicycles.

The characteristic that best differentiates bicyclists is ability, which may be defined as a combination of skills, knowledge and judgment.



Group A bicyclists include experienced riders who have a level of comfort operating in traffic conditions.



Group B bicyclists are less confident of their ability to operate in traffic without special provisions for bicycles.

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On-Road Bicycle Facilities

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- Some will become advanced bicyclists, most will remain basic riders.
- Prefer low-speed, low traffic-volume streets or designated bicycle facilities.

Group B bicyclists are best served by:

- Extra operating space when riding on the roadway.
- Ensuring low speeds on neighborhood streets.
- Network of designated bicycle facilities (bicycle lanes, side-street bicycle routes and shared-use paths).
- Usable shoulders on rural highways.

Group C — Children

The bicycle riders that comprise Group C share these traits:

- Children, usually pre-teen riders.
- Roadway use initially monitored by parents.
- May not comply with traffic regulations.
- They (and their parents) prefer residential streets with low motor vehicle volumes and speed limits, and well-defined separation of bicycles and motor vehicles or separate pathways.

Group C bicycle riders are best served by:

- Ensuring low speeds on neighborhood streets.
- Extra operating space when riding on the roadway or facilities separated from motor vehicle traffic.
- Network of designated bicycle facilities (bicycle lanes, paved shoulders, side-street bicycle routes, shared use paths, and rail trails).
- Riding on a sidewalk where pedestrians are not endangered or when pedestrian activity is low.

The design values in this chapter are aimed at meeting the needs of all bicyclists including Group B and C riders.

As a goal, a particular bicycle facility design should be chosen to encourage use by the lowest caliber bicyclist expected to frequently use the facility. For basic adult and child bicyclists (Groups B and C), bicycle lanes, wide curb lanes and paved shoulders — facilities that provide extra operating space on a roadway — or an alternate route using neighborhood streets, or shared use paths and rail trails are the design treatments that are favored.

Often, physical constraints are encountered that prevent consideration of these types of facilities. Therefore, design treatments that consume less width may have to be considered. At a minimum, facilities that accommodate the needs of the more skilled Group A bicyclists — shared lanes, paved shoulders and wide curb lanes — should be used as a guide to selecting the minimum design treatment for *any* roadway on which accommodations for bicycles are provided.

Marginal improvements (refer to Section 4.7, Marginal Improvements) should be considered for all roadways on which bicycle use is not prohibited.

Supplemental Guidance

Two resources that can aid designers in the selection of appropriate on-road bicycle facilities are AASHTO's *Guide for the Development of Bicycle Facilities* and FHWA's *Selecting Roadway Design Treatments to Accommodate Bicycles*.



Group C bicycle riders include children and pre-teens who may not comply with traffic regulations.



As a goal, a particular bicycle facility design should be chosen to encourage use by the lowest caliber bicyclist expected to frequently use the facility.

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4.3 Bicycle Lanes

Bicycle lanes, also called “bike lanes,” are defined in the MUTCD as “a portion of a roadway that has been designated by signs and pavement markings for preferential or exclusive use by bicyclists.” They are most commonly used in urban or village settings where a designated bike facility will aid the orderly flow of motorist and bicyclist traffic. These settings typically include numerous driveways, turning movements or other potential conflicts that indicate that bike lanes are a good design option. Refer to VTrans Standard Drawings for design details.

Features of Bicycle Lanes

- Are not physically separated from travel lanes.
- Designated by signing and pavement markings (including lane striping and lane symbols).
- Intended for preferential or exclusive use of bicyclists.
- Provides increased operating width for bicyclists.
- Provides for more predictable movements of motorists and bicyclists.
- Motorists and bicyclists are less likely to veer out of their own lanes.
- Vary in width depending on conditions.

4.3.1 Design Considerations

- Bicycle lanes should be one-way facilities.
- Bicycle lanes should carry bike traffic in the same direction as adjacent traffic (i.e. on the right side of the street or road).
- Bicycle lanes should never be placed between a parking lane and the curb.
- Pavement surfaces should be level and smooth.
- Where drain inlets and utility covers are present in bicycle lanes, they should be bicycle-safe and adjusted flush with the roadway surface.
- Delineate bicycle lanes from motor vehicle lanes with a 150 mm (6 in) solid white stripe. For added distinction, a 200 mm (8 in) solid white stripe may be used.
- Bicycle lanes should be delineated from parking lanes with a 100 mm (4 in) solid white stripe where no parking lane stripes or tick marks exist.
- Short distance, two-way lanes may be considered where the need to make a double crossing of a busy street or use of a sidewalk might otherwise be required.
- Where bicycle lanes exist in advance of a roundabout terminate bicycle lane striping at the pedestrian crosswalk. See Sections 7.2.3 and 7.2.4 for additional design considerations at roundabouts.

Bicycle Lane Symbols

General design considerations and recommendations

- Designate bicycle lanes by signing, lane striping and lane symbols:
- Either a bicycle symbol (preferred) or a word legend (optional) may be used as a lane symbol.
- A directional arrow must be used in combination with the bicycle symbol or word legend.
- Center symbols in the bicycle lane.
- Place symbols on the far side of each intersection to alert drivers and bicyclists of the exclusive or preferential nature of the bicycle lane. Symbols shall be placed



Bicycle lanes, designated by signs, stripes and symbols, are intended for the preferential or exclusive use of bicyclists.

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Figure 4-3
Bicycle Lane Symbol and Signs

no closer than 20 m (65 ft) from the intersection or cross road. Supplementary symbols may be placed on the near-side of an intersection to warn bicyclists not to enter a bicycle lane on the wrong side of the road.

- Place additional symbols periodically along uninterrupted sections of the bicycle lane at the following rate:

For metric calculations

Multiply speed in km/h times 7 (e.g., 60 km/h X 7 = approx. 420 m);

For English calculations

Multiply speed in mph times 40 (e.g., 35 mph X 40 = approx. 1400 ft).

- In order to increase longevity of the symbol, do not place symbols in areas such as driveways where motor vehicles are expected to travel over the symbol.

The preferred bicycle lane symbol is as shown in Figure 4-3.

Refer to Section 8.3.2, Markings, in Chapter 8, Signs, Pavement Markings and Signals, for additional guidance on approved designs and placement of pavement markings and signs for bicycle lanes.

4.3.2 Width

The widths for bicycle lanes in village centers and urban environments appear in Tables 4-6 through 4-9. Greater widths may be required where higher traffic volumes, traffic speeds, heavy vehicles or limited sight distances exist. Also, the width of a bike lane may need to be adjusted where curbing, adjacent on-street parking or other features from which a bicyclist may shy away exist.

Additional bike lane width is recommended where there are 30 or more overtaking heavy vehicles per hour in a single outside lane. Use the following formula to calculate this from existing traffic data.

How to Calculate the Number of Overtaking Heavy Motor Vehicles per Hour in a Single Outside Lane.

Heavy vehicle volume is usually expressed in percent AADT. However, use of these percentages alone can be misleading. For example, as much as 25 percent of the traffic using a particular roadway may consist of heavy vehicles. But if the total traffic volume is low, fewer than 30 heavy or large vehicles may overtake a bicyclist within an hour's time. To compute the number of heavy vehicles that will overtake a bicyclist in one hour, use the formula below:

$$HV_{ot} = \frac{[AADT \times SP_v] [R_{tr} - R_b]}{[SP_t \times L] [R_{tr}]} \times HV\%$$

Where:

- HV_{ot} = Number of overtaking heavy vehicles per hour
- AADT = Total traffic volume (both directions)
- SP_v = Percent share of the traffic volume per study period (typically 0.4 or 40 percent)
- SP_t = Length of study period in hours (typically 7 hours from 9 a.m. to 4 p.m.)
- L = total number of travel lanes in both directions (typically 2 as trucks tend to travel in outside lanes)
- R_{tr} = Rate of the faster moving heavy vehicle (in miles per hour)
- R_b = Rate of slower moving bicycle vehicle (typically 10 miles per hour)
- HV% = Percentage of heavy vehicles (expressed in a percentage of AADT)

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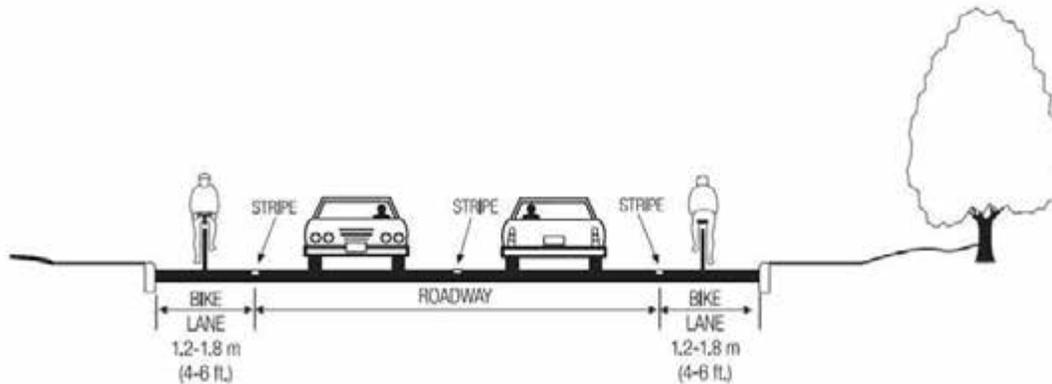


Figure 4-4.
Bicycle Lane, Curbed Street, No Parking.

Table 4-5.
Bicycle Lane, Curbed Street, No Parking

Minimum ^(a)	Conditions
1.2 m (4 ft)	Urban or village curbed street where parking is not permitted and bicycle lanes are provided next to the curb
Preferred ^(b)	Conditions
1.8 m (6 ft)	Where bicycle use is high, where in-line skaters are expected, or along grades over 5 percent.

^(a) Add 0.3 m (1 ft) on bridges or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane.

^(b) Width measured from the curb face to the center of the bike lane stripe.

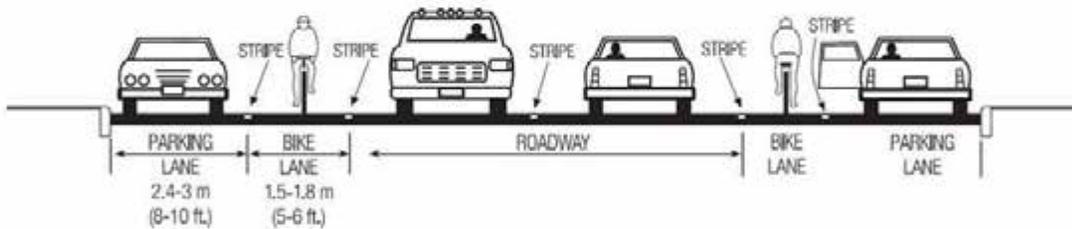


Figure 4-5.
Bicycle Lane, Curbed Street, with Parking.

Table 4-6.
Bicycle Lane, Curbed Street, with Parking

Minimum ^(a)	Conditions
1.5 m (5 ft)	Urban or village curbed street where a delineated parking lane is provided.
Preferred ^(b)	Conditions
1.8 m (6 ft)	Urban or village curbed street where a delineated parking lane is provided, where bicycle use is high, where in-line skaters are expected or along grades over 5 percent.

^(a) Add 0.3 m (1 ft) on bridges or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane.

^(b) Width measured from the curb face to the center of the bike lane stripe.

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CHAPTER FOUR

PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

On-Road Bicycle Facilities

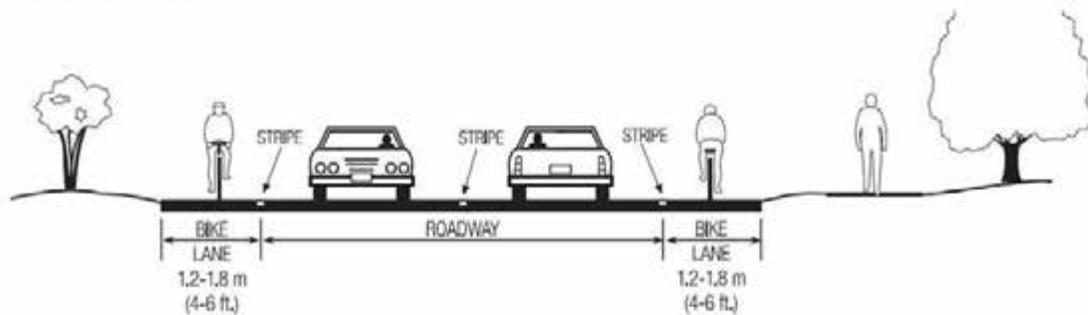


Figure 4-6.

Bicycle Lane, Street or Highway, No Curb, No Parking.

Table 4-7.

Bicycle Lane, Street or Highway, No curb, No Parking

Minimum ^(a)	Conditions
1.2 m (4 ft)	Ideal conditions (i.e., where certain edge conditions do not dictate additional bicycle lane width).
Preferred ^(b)	Conditions
1.5 m (5 ft)	Highways without curbs; vehicle speeds are 56 km/h (35 mph) or less.
1.8 m (6 ft)	Highways without curbs; where vehicle speeds exceed 56 km/h (35 mph).
1.8 m (6 ft)	Where bicycle use is high, where in-line skaters are expected or along grades over 5 percent.

^(a)Add 0.3 m (1 ft) on bridges or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane.

^(b)Width measured from the curb face to the center of the bike lane stripe.

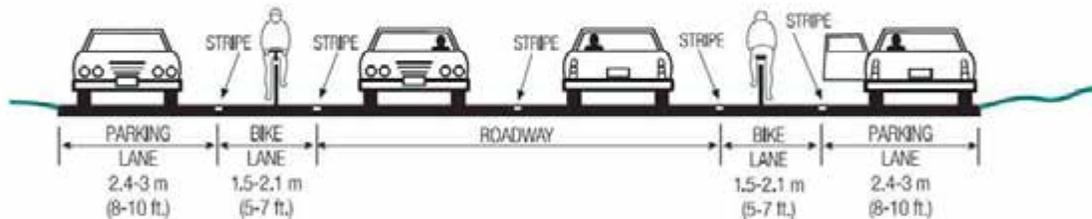


Figure 4-7.

Bicycle Lane, Street or Highway, No Curb, with Parking.

Table 4-8.

Bicycle Lane, Street or Highway, No Curb, with Parking

Minimum ^(a)	Conditions
1.5 m (5 ft)	Ideal conditions (i.e., where certain edge conditions do not dictate additional bicycle lane width).
Preferred ^(b)	Conditions
1.8 m (6 ft)	Highways without curbs; vehicle speeds are 56 km/h (35 mph) or less.
2.1 m (7 ft)	Highways without curbs; where vehicle speeds exceed 56 km/h (35 mph).
2.1 m (7 ft)	Where bicycle use is high, in-line skaters are expected or along grades over 5 percent.

^(a)Add 0.3 m (1 ft) on bridges or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane.

^(b)Width measured from the curb face to the center of the bike lane stripe.

4.3.3 Practices to Avoid

Avoid the following unsafe designs:

Left-side bicycle lanes. Do not locate a bicycle lane on the left side of a one-way street because it creates unexpected conflicts at intersections. A rare exception is when the number of conflicts can be substantially decreased, such as may be created by heavy bus traffic or unusually heavy right-turning movements, angled on-street parking, or where there are a significant number of left-turning bicyclists.

Two-way bicycle lanes. Do not use two-way bicycle lanes. A rare exception occurs on the left side of a one-way street when the number of conflicts can be substantially decreased. Refer to Section 4.3.6, Contra-flow Bicycle Lanes.

Bicycle lanes on one side of a two-way street. Do not place a bike lane in only one direction of travel on a two-way street. This can lead to wrong-way riding as bicyclists may perceive the facility to be intended for two-way use. If limited road space is available, it may be preferable to have wide outside lanes in both directions rather than one bike lane in one direction. The exception is when there is only adequate space for one bike lane on a street with a severe grade. In that case, placing a single bike lane in the uphill direction addresses the slower operating speed and greater operating space that will be exhibited by uphill bicyclists.

Bicycle use on bridge sidewalks. Where bridge sidewalks are wide enough for bicycle use, ramps that provide a lateral transition from the roadway to the sidewalk should be provided, especially where motor vehicle volumes and speeds are high, the bridge is long and the outside lanes or shoulders on the bridge are narrow. Ramps should be a minimum of 2.4 m (8 ft) in length and have flared edges as shown in Figure 4-8.

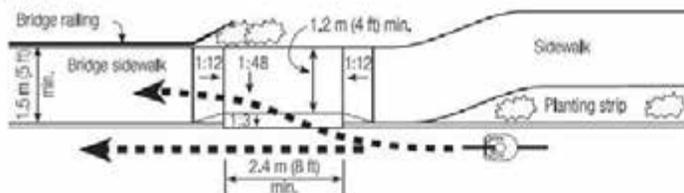


Figure 4-8.
Lateral Transition from Roadway to a Bridge Sidewalk.

Where bicycle use of bridge sidewalks is permitted, the minimum height of a bridge railing along a sidewalk is 1.05 m (42 in). Where extra safety is desired, the preferred height of a bridge railing is 1.35 m (54 in).

Extruded curbs. Do not use extruded asphalt curbs or rolled curbs to separate motor vehicles and bicycles for the following reasons:

- Both motor vehicles and bicycles can hit the curb, lose control, and cross into the path of the other user.
- Because asphalt curbs lack structural strength, they are easily broken if hit by motor vehicles or maintenance equipment, which may result in loose pieces of asphalt being scattered over the riding surface.
- At night, extruded curbs may be hard to see because they are usually the same color as the adjacent pavement. They also cast shadows on the lane, further reducing a bicyclist's visibility of the riding surface.
- Extruded curbs are difficult to maintain, are easily damaged by snow plows and trap and collect debris, sand and leaves.

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Reflectors and raised pavement markers. Do not use raised obstructions, such as reflectors or raised pavement markers to delineate a lane that bicyclists may use. These obstacles can deflect bicycle wheels and cause loss of control and create problems for maintenance workers.

4.3.4 Bicycle Lanes at Intersections

When a bicycle lane meets an intersection:

- Do not extend bicycle lane striping across pedestrian crosswalks.
- Do not extend bicycle lane striping through street intersections.
- Where crosswalks are not provided, stop bicycle lane striping prior to the near-side cross-street out of the path of turning vehicles. Resume striping on the far-side of the cross-street.
- Dotted guidelines may be extended through complex intersections or multi-lane roundabouts.
- At uncontrolled intersections where right-turning traffic volumes are low, solid bicycle lane striping may continue to the near-side of the cross-street.
- At uncontrolled intersections where right-turning traffic volumes are high or where a bus stop is located, use a dotted line with 0.6 m (2 ft) dots and 1.8 m (6 ft) spaces for the length of the bus stop. Resume solid striping at the far-side of the cross-street (refer to Fig. 4-9A).
- Where a bus stop is located on the far-side of an intersection, use a dotted line with 0.6 m (2 ft) dots and 1.8 m (6 ft) spaces for the length of the bus stop, usually 24 m (80 ft) (refer to Fig. 4-9A).

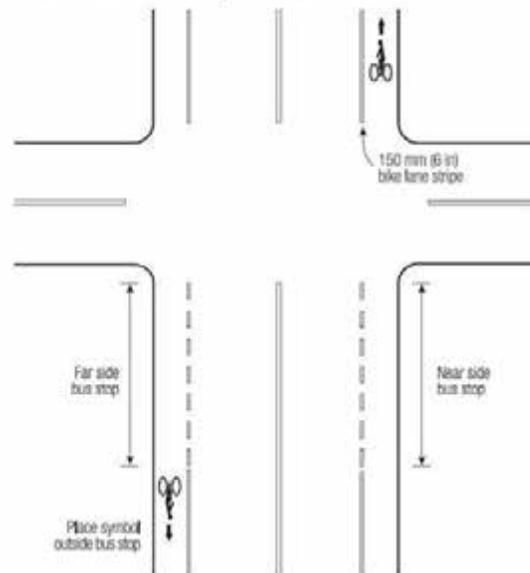


Figure 4-9A.

Typical Pavement Markings for Bicycle Lanes on a Two-Way Street with No Crosswalks.

- Where bicycle lanes exist in advance of a roundabout terminate bike lane striping at the pedestrian crosswalk. See Sections 7.2.3 and 7.2.4 for additional design considerations at roundabouts.
- At signalized intersections, consider placing detector loops in the bike lane to allow triggering of the signal (refer to Section 8.3.3 for a detailed discussion of this topic).

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- Where a bike lane is located adjacent to on-street parking, the parking lane should be delineated with either a 4 inch (100 mm) white line or white “tick” marks (refer to Fig. 4-9B)

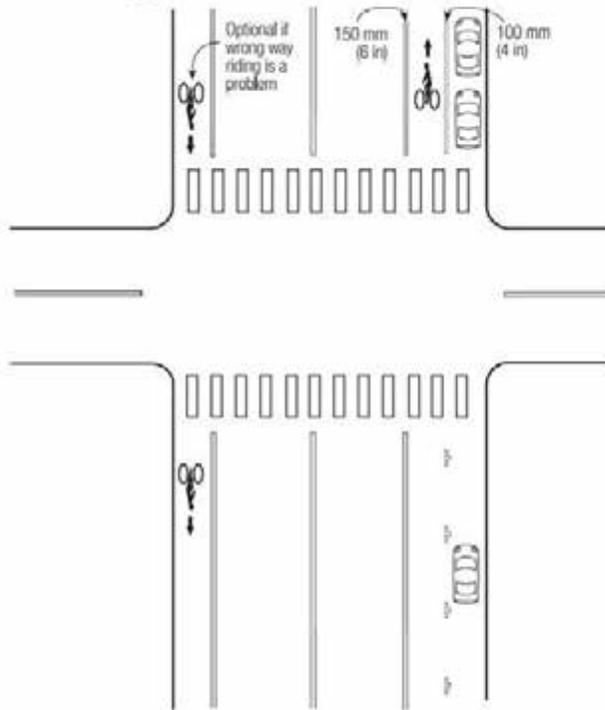


Figure 4-9B.
Typical Pavement Markings for Bicycle Lanes on a Two-Way Street with Crosswalks.

- At T-intersections where crosswalks are not provided, the bicycle lane striping on the side across from the T-intersection should continue through the intersection with no break (refer to Fig. 4-10A).

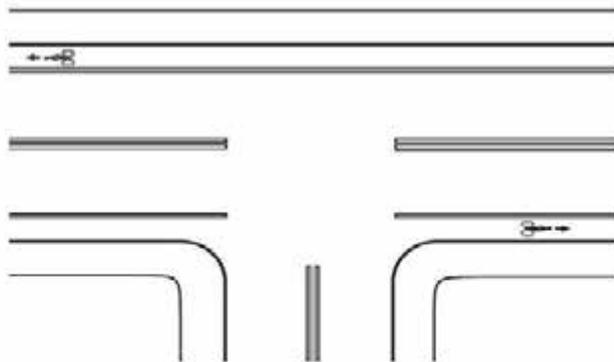


Figure 4-10A.
Typical Pavement Markings for Bicycle Lanes at a T-Intersection with No Marked Crosswalks.

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CHAPTER FOUR

On-Road Bicycle Facilities

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- At T-intersections where crosswalks are provided, the bicycle lane striping on the side across from the T-intersection should be discontinued only at the crosswalks (refer to Fig. 4-10B).

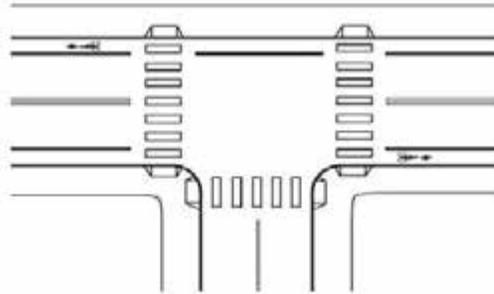


Figure 4-10B.

Typical Pavement Markings for Bicycle Lanes at T-Intersections with Marked Crosswalks.

4.3.5 Bicycle Lanes and Turning Movements

Conflicts between right-turning motorists and bicyclists proceeding straight through an intersection can be lessened by signing and striping:

- Signing and striping configurations which encourage bicyclists and motorists to cross paths in advance of an intersection, in a merging fashion, are preferred over those that force crossing paths in the immediate vicinity of the intersection.
- At intersections controlled by signals or stop signs and where right-turn lanes exist, use a dotted line with 0.6 m (2 ft) dots and 1.8 m (6 ft) spaces for the approach in lieu of solid striping. The length of the broken line is usually 15 to 60 m (50 to 200 ft).

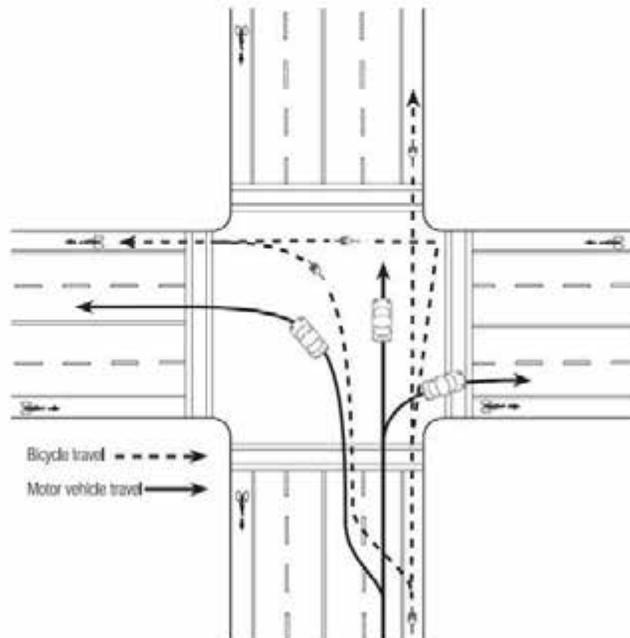


Figure 4-11.

Typical Bicycle and Motor Vehicle Movements at Major Intersections.

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- Left-turning bicyclists are permitted their choice of a “vehicular” turn (where the bicyclist merges leftward to the same lane used by left-turning motor vehicles, or a “pedestrian style” left turn (where the bicyclist proceeds straight through the intersection, stops at the far side of the intersection, turns left, then proceeds across the intersection again on the cross street). Refer to Fig. 4-11.
- Where there are numerous left-turning bicyclists, consider providing a left-turn bike lane to the right of the left most travel lane.
- Refer to Figure 4-12 A-B for additional pavement marking treatments where a through bicycle lane and right-turn lanes are provided.
- Bike lanes should never be placed to the right of right turn only lanes, as conflicts with motor vehicle traffic will result.
- Where insufficient width exists, place a separate through bicycle lane to the right of the motor vehicle through lane and include signs and pavement markings as shown in Fig. 4-12C.

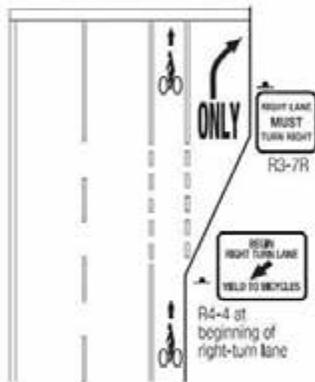


Figure 4-12A
Bicycle Lane with
Developed Right Turn Lane.

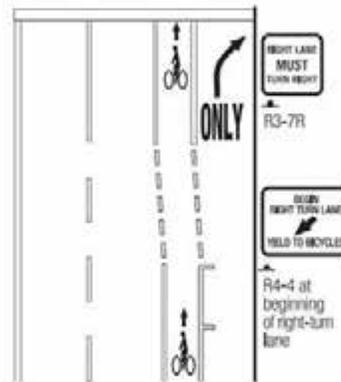


Figure 4-12B
Bicycle Lane and
Dropped Parking Lane.



Figure 4-12C
Intersection Widening without Bicycle Lane.

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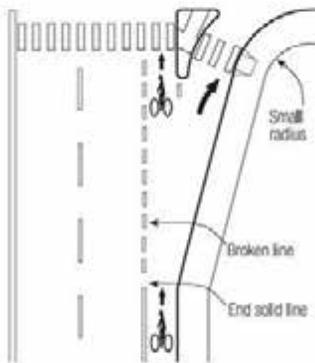


Figure 4-13A.
Dedicated slip lane and small radius curve.

Section 4.3.6 Interchange Areas

Where on-road bicycle facilities are provided, the area around interchanges can present a greater number of potential conflicts with motor vehicle traffic. This is especially true where on and off ramps diverge and merge with the road on which bike lanes are present. In most cases, the horizontal geometry of the ramps is such that motor vehicles exit or enter at relatively high speeds. The shallow angle of ramps also results in wide throats that present long distances in which motor vehicle and bicyclists are in potential conflict. There are design treatments that can increase the visibility of bicyclists by motorists, reduce the area where conflicts are present, and improve sight lines for bicyclists.

On-Ramps

At on-ramps, there are two design options to accommodate bike lanes. The first is to simply carry the bike lane across the throat of the ramp using dotted line and place additional signs in advance of the ramp (see Figure 4-13B). However, this option does not address all the concerns noted above. The second option is to provide an extension of the bike lane on its own alignment that brings it to a point on the ramp where bicyclists can cross at as close to a right angle as possible. Bicyclists then re-enter the bike lane at a point beyond the on-ramp merge area (see Figure 14-C). The location of the ramp crossing should consider the stopping sight distance requirements for vehicles entering the ramp.

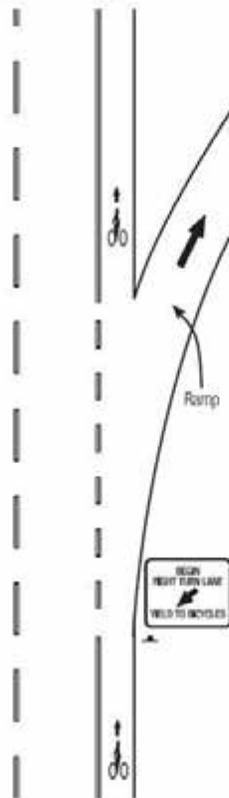


Figure 4-13B
On-ramp with bike lane signs and pavement markings.

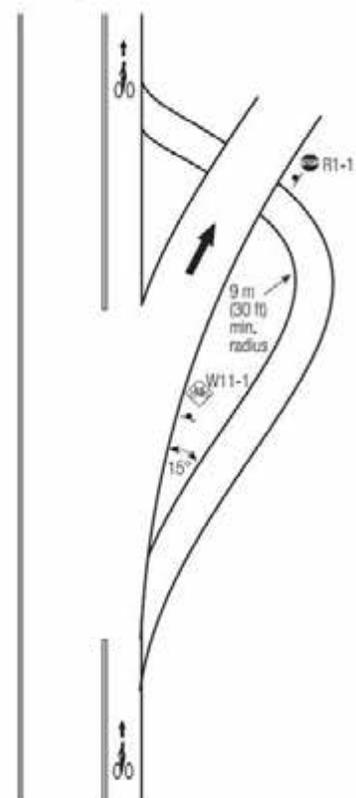


Figure 4-13C
On-ramp with extended bike lane to minimize conflicts.

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Off-ramps

Locations where off-ramps intersect a road with bike lanes pose a different set of problems. If the bike lane continues to the right of the travel lane up to the intersection with the off-ramp, bicyclists end up in the gore area between the travel lane and the ramp. This places them in an awkward position on the roadway. A more favorable design is to curve the bike lane within the gore so that it crosses the ramp at a right angle. Once across the ramp, bicyclists are then in their normal position on the right side of the roadway (see Figure 14-D).

Special Treatments

To help motorists and bicyclists recognize interchange areas as locations of higher than normal potential conflict, the use of colored bike lanes may be considered. If used, the color should extend for the full width of the bike lane and the 150 mm (6 inch) white line must still be provided. The colored markings should begin in advance of the first on ramp and carried through to the other side of the off ramp. Although the MUTCD does not discuss this treatment specifically, it does provide guidance on the use of different color pavement markings. Colored bike lanes cannot be white, yellow, blue or red. It is recommended that green be used for this application. Because this is considered an experimental pavement marking, a request to experiment must be submitted to FHWA.

High-speed ramps with large radii make crossing and merging maneuvers more difficult for bicyclists. Using a smaller turning radius or a compound curve for ramps and dedicated right-turn slip lanes can lower motor vehicle speeds and improve conditions for both bicyclists and pedestrians. Refer to Figure(s) 4-13A.

4.3.7 Contra-Flow Bicycle Lanes

Contra-flow bicycle lanes (one-way bicycle lanes that provide a legitimate way for bicyclists to ride against traffic flow) are not usually recommended because riding against the flow of traffic is contrary to traffic law and a leading cause of bicycle crashes with motor vehicles. However, there are special circumstances in which contra-flow lanes may be considered. These include:

- Where the contra-flow bicycle lane is very short (usually not longer than a city block or two).
- Where provision of a contra-flow bicycle lane provides a substantial savings in out-of-direction travel or direct access to high use destinations.
- Where safety along the contra-flow direction is greater than along the longer or more circuitous route.
- Where there are few or no intersecting driveways, alleys or streets on the contra-flow side of the street.
- Where bicyclists can safely and conveniently reenter the traffic stream at both ends of the section.
- Where a substantial number of bicyclists are already using the street.
- Where there is sufficient room to accommodate a bicycle lane. The preferred width of a contra-flow bicycle lane is 3.0 m (6 ft), but no wider.
- On a one-way residential street recently converted from a two-way street, especially where this change was made to calm traffic.

Additional recommendations for contra-flow lanes:

- Only one-way streets should be considered as candidates for contra-flow bicycle lanes.

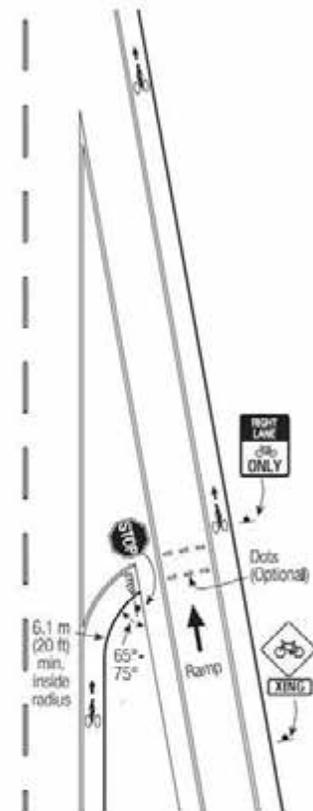


Figure 4-13D
Off-ramp with bike lane
signs and pavement
markings.

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CHAPTER FOUR On-Road Bicycle Facilities

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- Under no circumstances should a contra-flow bicycle lane be installed on a two-way street, even where the travel lanes are separated with a raised median. A contra-flow bicycle lane should be located on the left side of the motor vehicle lane(s).
- A contra-flow bicycle lane should be delineated from the motor vehicle lane(s) by a double yellow line consisting of two parallel 150 mm (6 in) solid yellow stripes, which indicates that the bicyclists are riding on the street legally, in a dedicated travel lane.
- Contra-flow bicycle lanes should be one-way bicycle lanes only. Where two-way bicycle travel is desired along a one way street, an additional bicycle lane should be provided to the right of the motor vehicle lane for bicyclists traveling with the flow of traffic.
- Contra-flow bicycle lanes should be no wider than 1.8 m (6 ft) to discourage motorists from using the contra-flow lane for parking or passing.
- Intersecting alleys, major driveways and streets should have signs indicating to motorists they should expect bicycle traffic on each side of the street.
- Existing signals should be fitted with special signals for bicyclists using bicycle sensitive detectors or push-buttons capable of being easily reached by bicyclists without having to dismount.

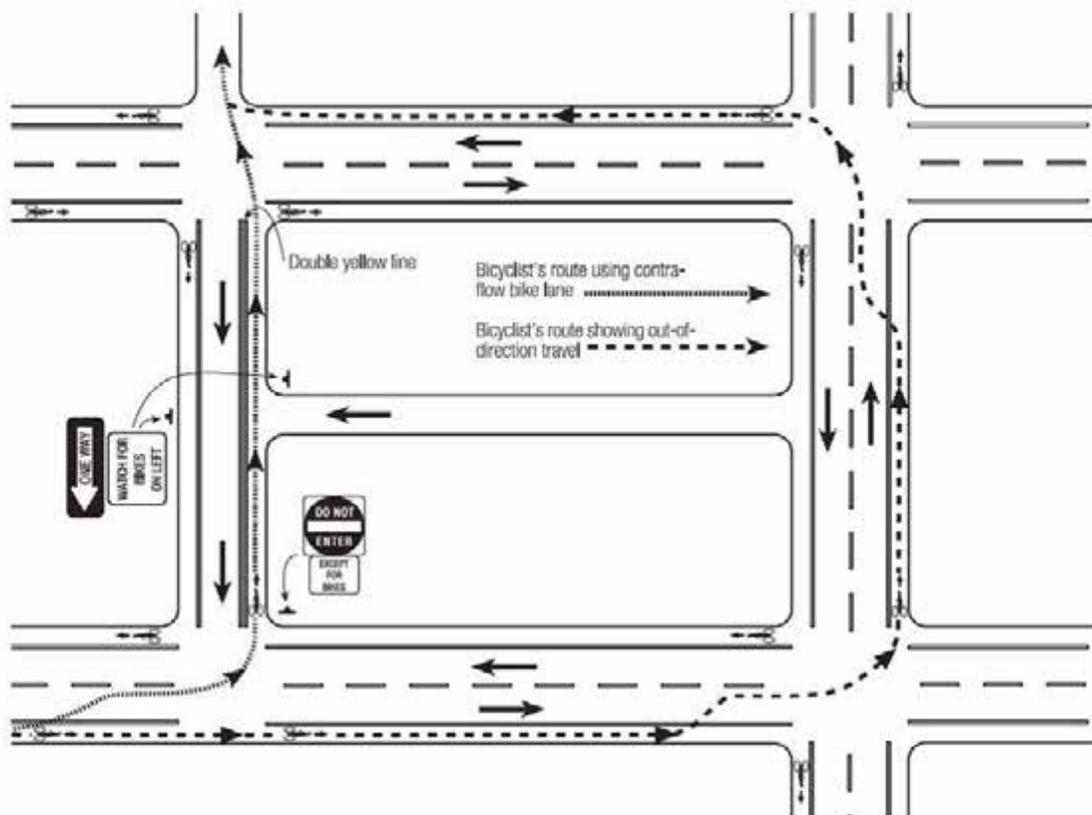


Figure 4-14.
Typical Signs and Pavement Markings for Contra-Flow Bicycle Lanes.

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4.3.8 Effect of Grades on Bicycle Lanes

Where grades exceed 1:20 (5 percent), it may be desirable to maintain a 1.8 m (6 ft) bicycle lane or paved shoulder as bicyclists need more space to accommodate wobble and maneuvering. This is especially important on uphill grades where bicyclists are moving slowly, have more difficulty maintaining a straight line of travel and the speed differential is usually greatest between motor vehicles and bicyclists.

4.4 Wide Curb Lanes

Wide curb lanes are suited for use in village or urban areas where insufficient widths for bike lanes exist. They are distinguished from bike lanes by the absence of signs or pavement markings which specifically designate them for bicycle use. The intent of wide curb lanes is to provide extra space to better accommodate bicycles and motor vehicles in the same lane while providing enough space for motorists to overtake and pass bicyclists without changing travel lanes.

4.4.1 Design Considerations

- Wide curb lanes are usually preferred in restrictive settings such as village centers and urban environments where shoulders or bike lanes cannot be provided.
- Where steep grades exist, additional operating width for bicyclists may be required.
- Provide a 100 mm (4 inch) white line or tick marks between wide curb lanes and on-street parking
- Widths greater than 4.2 m (14 ft) that extend continuously along a highway for long distances may encourage the undesirable operation of two motor vehicles side by side in one lane. In such situations, consider striping bicycle lanes or shoulders.

Restriping existing multi-lane facilities may result in enough room to install wide curb lanes where travel lanes and left-turn lanes can be narrowed or the existing number of lanes can be reduced (refer to Section 4.3.9, Reallocating Roadway Space). However, this should only be considered after careful review of traffic characteristics along the corridor and where supported by a documented engineering analysis.

4.4.2 Width

Refer to the Vermont State Standards for minimum widths of wide curb lanes. The widths are dependent on roadway classification, design speed and traffic volume and range from 3.6 m to 4.5 m (12 to 15 ft). Consideration should be given to providing additional width when large numbers of trucks are expected (i.e., 30 or more overtaking heavy vehicles per hour in an outside lane) or limited sight distances exist.



On uphill grades, a bicycle climbing lane or wide paved shoulder can provide slowly moving bicyclists with extra width to accommodate wobble and maneuvering.



Wide curb lanes are suited for use in village or urban areas where insufficient width for bike lanes exists.

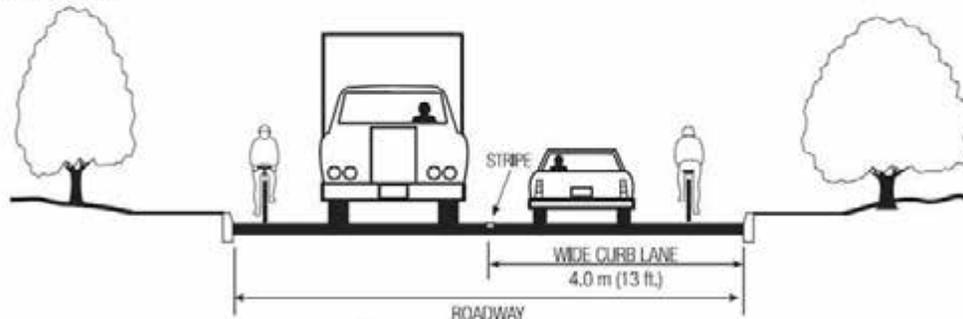


Figure 4-15.
Wide Curb Lane, No Parking.

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Notwithstanding the minimum widths in the VT State Standards, the preferred width of a wide curb lane where no on-street parking exists is 3.9 m (13 ft) and 4.2 m (14 ft) wide where on-street parking exists.

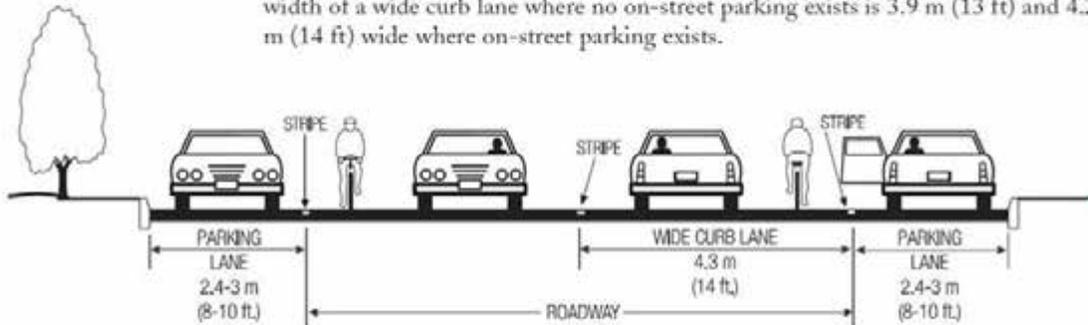


Figure 4-16.
Wide Curb Lane, with Parking.

Table 4-9.
Wide Curb Lanes, Street or Highway, with and without Parking

Minimum ¹⁾	Conditions
3.6 m to 4.5 m (12 to 15 ft)	Refer to the Vermont State Standards for minimum widths of wide curb lanes.
Preferred ¹⁾	Conditions
3.9 m (13 ft)	Preferred width, no on-street parking.
4.2 m (14 ft)	Preferred width, with on-street parking.

¹⁾ Add 0.3 m (1 ft) on bridges, or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane or where limited sight distances exist.

4.5 Paved Shoulders

Lowell



Paved shoulders can significantly improve operating conditions for motorists, bicyclists and pedestrians, especially in rural areas.

Width is the most critical factor affecting the ability of a roadway to accommodate both bicycles and motor vehicles. Paved shoulders are a type of facility that can provide additional pavement width adjacent to the outside lane of a roadway, thereby improving operating conditions for drivers of motor vehicles, bicyclists and pedestrians, especially in rural areas. Where paved shoulders are provided, the surface condition is critical to safe bicycling.

In Vermont, the majority of bicyclists typically use local roads and rural highways for long distance travel. Notwithstanding the ability of these roads to serve as shared use facilities (refer to Section 4.6), the development and maintenance of paved shoulders defined by an edge stripe can significantly improve the safety, convenience and comfort of bicyclists and motorists.

Benefits of Shoulders

Paved shoulders have many safety, capacity and maintenance benefits unrelated to bicycling. Most of these benefits also apply to shoulders on rural roads and to marked, on-street bicycle lanes on urban streets.

Safety. Highways with paved shoulders have lower accident rates because paved shoulders:

- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians.
- Provide space for disabled vehicles to stop or drive slowly.
- Provide space to make evasive maneuvers.
- Add a recovery area to regain control of a vehicle, as well as lateral clearance to

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roadside objects such as guardrail, signs and poles (highways require a “clear zone,” and paved shoulders give the best recoverable surface).

- Provide increased sight distance for through vehicles and for vehicles entering the roadway.
- Make the crossing pedestrian more visible to motorists.
- Contribute to driving ease and reduced driver strain.
- Provide for storm water discharge farther from the travel lanes, reducing hydroplaning, splash and spray to following vehicles, pedestrians and bicyclists.

Capacity. Highways with paved shoulders can carry more traffic because paved shoulders:

- Provide space for bicyclists and pedestrians to travel at their own pace.
- Provide more intersection and safe stopping sight distance.
- Provide space for disabled vehicles, mail delivery and bus stops.
- Allow for easier exiting from travel lanes to side streets and roads (also a safety benefit).
- Provide greater effective turning radius for trucks.
- Provide space for off-tracking of truck’s rear wheels in curved sections.

Maintenance. Highways with paved shoulders are easier to maintain because paved shoulders:

- Provide structural support to the pavement.
- Discharge water further from the travel lanes, reducing the undermining of the subbase and subgrade.
- Provide space for maintenance operations and snow storage.
- Provide space for portable maintenance signs.
- Facilitate painting of fog lines.

4.5.1 Design Considerations

- Refer to Vermont State Standards for minimum shoulder widths.
- To be useable by bicyclists, shoulders should be paved with the same surfacing materials as the adjacent roadway travel lane.
- Provide an additional 0.3 m (1 ft) of paved shoulder width where guardrail, bridge railing or other lateral obstructions are present.
- Additional shoulder width should be considered on uphill grades in excess of 1:20 (5 percent) to give slow-moving bicyclists needed maneuvering space, thus decreasing conflicts with faster moving motor vehicle traffic.
- Additional shoulder width should also be considered where downhill grades exceed 1:20 (5 percent) for longer than 1 km (0.6 mi).
- Provide additional width where high volumes of truck traffic are anticipated.
- The use of rumble strips decreases the usability of a shoulder by bicycle traffic (refer to Section 4.7.4, Rumble Strips).
- Delineate paved shoulders from motor vehicle lanes with a 100 mm (4 in) solid white edge line.
- Maintain shoulder widths when adding vehicle passing lanes.
- Provide greater shoulder width where guardrail or other fixed objects are close to the road.

4.5.2 Width

Refer to the Vermont State Standards for minimum widths of paved shoulders to accommodate bicycles. Notwithstanding the minimum values as stated in the Vermont State Standards, as a general rule a paved shoulder width of at least 0.9 m (3

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ft) is preferred to accommodate less experienced bicyclists and to provide additional width beyond the travel lane.

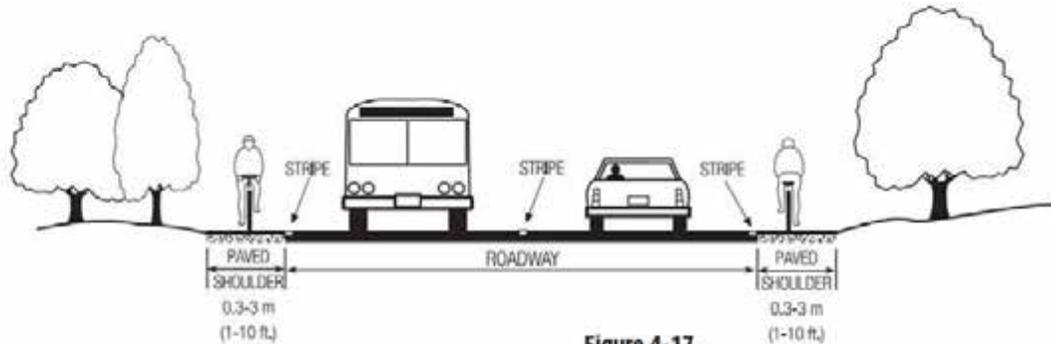


Figure 4-17.
Paved Shoulders.

Table 4-10.
Paved Shoulders.

The following widths are preferred, unless the Vermont State Standards call for a greater width given design conditions.

Preferred ^{III}	Conditions
1.1 m (3 ft)	Average conditions (i.e. where traffic or edge conditions do not dictate additional bicycle lane width).
1.2 m (4 ft)	Preferred shoulder width from the edge of an outside travel lane to the face of a guardrail, curb or other roadside barrier and to fully accommodate the operating width of a bicycle (refer to Figure 4-2).
1.5 m (5 ft)	On highways with steep up-grades where bicyclists require additional maneuvering width or where downgrades exceed 1:20 (5 percent) for a distance of 1 km (0.6 mi) or more.
1.5 m (5 ft)	On highways where there are 30 or more heavy vehicles per hour in the outside lane.

^{III} Usable width measured from the center of the edge line to the unbroken outside edge of the pavement.

4.6 Shared Lanes

Middlebury



Many of Vermont's low volume streets and lightly traveled local roads adequately accommodate bicycles and motor vehicles in shared lane situations without special provisions for either mode.

To a large extent, most of the bicycling that has taken place in Vermont, and can be expected to take place well into the future, occurs with motor vehicles and bicycles sharing a roadway without the benefit of bicycle lanes, wide curb lanes or paved shoulders. In certain situations — such as along low volume, (AADT < 1,000) residential streets; or lightly traveled roads in scenic, rural locations; or along unpaved roads — it may be unnecessary and even undesirable to provide bike lanes, wide curb lanes or paved shoulders to accommodate bicyclists. In the VTrans report, *Bicycle Touring in Vermont & Vermont's Scenic Byways Program* (1995), bicycle tour operators expressed a concern that “improving” roads that attract touring bicyclists might destroy the “nature” of quiet back roads they intentionally seek for their tours.

Where adding an extra foot or two in roadway width is not an option, features such as bicycle-safe drainage grates and bridge expansion joints, improved railroad crossings, smooth pavement, adequate sight distances, and signal timing and detector systems that respond to bicycles can make roadways more conducive to bicycle travel.

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4.6.1 Design Considerations

- Bicyclists and motor vehicles share same roadway.
- Common on neighborhood streets and rural roads and highways.
- Many existing neighborhood village and downtown streets and local roads can adequately accommodate bicycles and motor vehicles without special provisions for either mode.
- Where conditions such as limited sight distance exist, driver awareness may be increased by the use of standard warning signs.

Shared roadways are most often used by:

- More experienced bicyclists on rural roads. The best conditions exist where traffic volume is very low (≤ 500 ADT), where a low number of critical events (i.e., when an overtaking motor vehicle meets an oncoming motor vehicle in the presence of a bicyclist also using the roadway) are likely to occur, and where good sight distance is available.
- Less experienced bicyclists including children when traveling on low-volume neighborhood streets where fast moving vehicles or through traffic is not a factor.
- All levels of bicyclists on short segments of highway in village and downtown centers with constrained right-of-way, where pedestrians may be expected in higher numbers, traffic speeds are no higher than 40 km/h (25 mph) and short blocks allow bicyclists to share the road despite high traffic volumes.

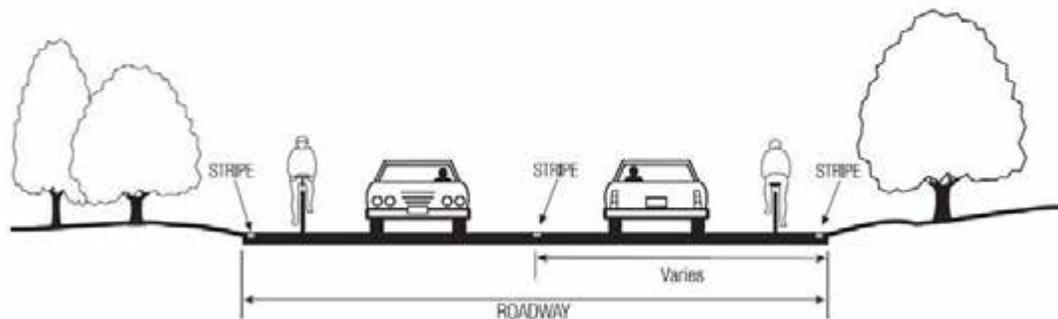


Figure 4-18.
Shared Lanes.

4.6.2 Width

Width is the most critical factor affecting the ability of a roadway to accommodate both bicycles and motor vehicles in shared lane situations. Refer to Vermont State Standards for minimum shared lane widths.

In general, 2.8 m (11 ft) is considered to be the minimum width to accommodate experienced bicyclists and motorists in rural areas in low volume situations. Greater widths may be required to accommodate less experienced bicyclists or all bicyclists where higher traffic volumes, traffic speeds, heavy vehicles, or limited sight distances exist.

In village and downtown centers with on-street parking, at least 6 m (20 ft) of combined width for the travel lane and parallel parking stall is desirable. For angled parking, more width is required depending on the angle but generally 9 m (30 ft) is desirable.

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Pittsford



Many bicyclists prefer the low traffic volumes, exceptional scenery and variations in terrain offered by Vermont's unpaved roads.

4.6.3 - Unpaved Roads

Many bicyclists prefer the riding experience offered by the unpaved roads in Vermont. These roads often have very low volumes and offer exceptional scenery and variations in terrain. There are no specific design considerations related to accommodating bicycling on unpaved roads. Because of the low volumes, no additional width is recommended. In the event that there is a particular hazard along an unpaved road (e.g., sharp curve, narrow bridge), bicyclists will benefit from the warning signs that are posted for all traffic on these roads.

Unpaved roads, like all roads, require regular maintenance. The most important consideration for accommodating bicycling on unpaved roads is the surface condition. This is not an issue particular to bicycling, as all users of the road desire a smooth surface free of irregularities. To maintain a smooth road surface on unpaved roads, proper drainage is critical. This is provided by constructing and maintaining adequate ditches and by adequately grading and compacting the road. For additional information about properly maintaining unpaved roads, refer to the Vermont Better Backroads Manual.

4.7 Incremental Improvements

When bike lanes, wide curb lanes or paved shoulders are not feasible, and to improve conditions in shared lane situations, it is often possible to significantly improve the bicycling experience through the implementation of incremental roadway improvements.

From the bicyclist's perspective, as little as 0.6 m (2 ft) of usable riding surface to the right of a roadway edge stripe on major arterial and collector streets and roads can provide an improved operating environment while improving highway capacity.

Next, if it is still not possible to provide any type of bicycle facility using the existing width, evaluate segments for whether:

- Any extra paved space can accommodate incremental improvements.
- The condition of the shoulder can be improved.
- Overly-wide motor vehicle lanes can be narrowed to minimum widths prescribed by the Vermont State Standards.
- The number of motor vehicle lanes can be reduced such as in the case of a roadway that has more than two existing lanes which may be built beyond existing or projected capacity (refer to 4.8, Reallocating Roadway Space).
- Parking can be eliminated.

Implementation of traffic calming (refer to Chapter 7) can also reduce the speed of motor vehicles through physical changes to the vertical or horizontal alignment of the roadway. Speed humps, islands, bulb-outs, and roundabouts are common traffic calming devices.

Other incremental improvements include:

- Bicycle-safe drainage grates (refer to Section 4.9.1).
- Bicycle-friendly railroad crossings(refer to Section 4.9.2).
- Pavement surfaces free of irregularities.
- Bicycle-oriented signs and bicycle-sensitive traffic detection devices (refer to Chapter 8).
- Encouraging through-traffic and large trucks to travel on a few limited corridors.

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- Use of limited signing to indicate to motorists that bicyclists are present in significant numbers.
- Slip-resistant durable pavement markings.
- Roadway maintenance including removal of accumulated dirt, broken glass and other debris (refer to Chapter 9).
- Reducing and enforcing posted speed limits.

4.8 Reallocating Roadway Space

Restriping Multi-Lane Roadways

To accommodate bicycle lanes, wide curb lanes or paved shoulders along roadways where widening is impractical, an opportunity may exist to narrow or reduce the number of motor vehicle travel lanes or parking lanes. This may be especially true where roadway capacity exceeds demand. Engineering studies and citizen support should be developed before the number of lanes or parking spaces is reduced. Lane and shoulder widths must meet the minimum dimensions as outlined in the Vermont State Standards.

Where traffic volume, speed or other conditions warrant, four-lane highways can be reduced to two-lane designs using raised medians or turning medians. The remaining space can then be used for bicycle lanes or wide curb lanes as space permits. Refer to Figure 4-19A

Where traffic volume, speed or other conditions warrant, three-lane highways can be reduced to two-lane designs if the center two way left turn lane is removed or replaced with raised traffic separators. The remaining space can then be used for bicycle lanes or wide curb lanes as space permits. Refer to Figure 4-19B

Westfield, NY



Where traffic volume, speed or other conditions warrant, four-lane highways can be reduced to two-lane designs using raised medians or turning medians.

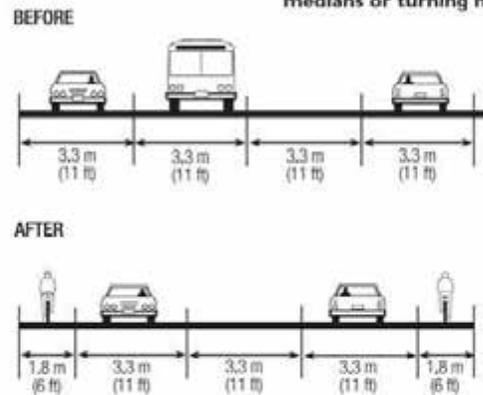


Figure 4-19A.
Going From Two Travel Lanes in Each Direction to One Each Direction with Continuous Two-way Left Turn Lane.

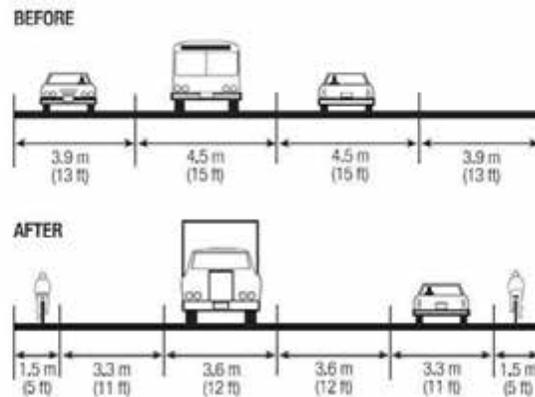


Figure 4-19B.
Going From Two Travel Lanes with Median to No Median.

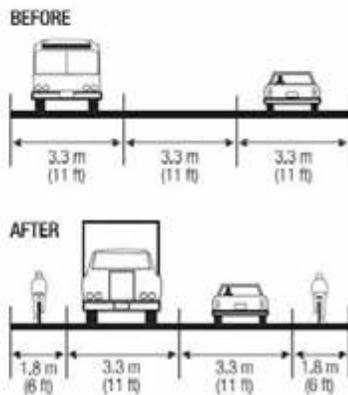


Figure 4-19C
Narrowed Four-Lane Section to Add Bicycle Lanes.

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Reevaluating Existing On-street Parking

A highway's primary function is to move people and goods. Removing or reconfiguring on-street parking may also provide opportunities for gaining additional roadway space for bicycle lanes or wide curb lanes. However, because adjacent business owners or residents may be affected by such a move, careful research is needed before making recommendations that affect parking.

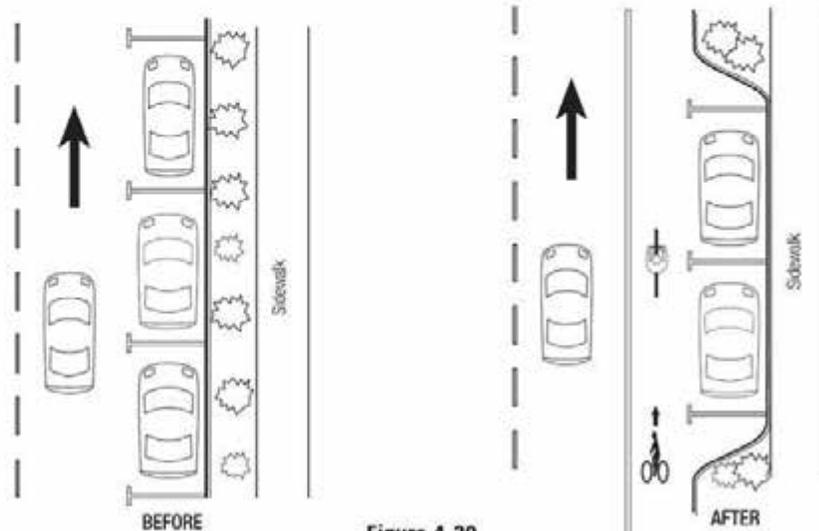


Figure 4-20.
Reevaluating the Need for Parking.

Alternatives to the elimination of parking spaces include: narrowing the parking lanes, removing parking on only one side of a roadway, or changing from diagonal parking to parallel parking. If a green strip of sufficient width exists, a portion of the strip can be converted to on-street parking to make room for bike lanes.

4.9 Other Considerations for On-road Bicycle Facilities

4.9.1 Drainage and Drainage Grates

Drainage grates and utility covers can cause problems for bicyclists. Raised or sunken drainage grates or utility covers can stop or divert a bicyclist's front wheel, causing wheel damage or resulting in a crash. A related problem involves old-style parallel bar drainage grates, which can trap the front wheel of a bicycle causing the bicyclist to be pitched over the handlebars.



Parallel bar drain grates should be replaced with modern bicycle-safe and hydraulically efficient models such as the “vane” or “honeycomb” grates.

Uneven Grates and Utility Covers

Grates and covers that are not level with the roadway surface should be brought to the proper grade by raising or lowering the device. Newly paved surfaces should be feathered within a maximum of 15 mm (0.5 in) of the cover height to make grates and covers nearly flush with the finished surface of the roadway. Refer to VTrans Standard Drawings D-9M, D-9, D-10M, D-10, D-11M and D-11.

Bicycle Safe Drain Grates

Parallel bar drain grates should be replaced with modern bicycle-safe and hydraulically efficient models such as the “vane” or “honeycomb” grates. Where re-

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placement cannot be accomplished immediately, square parallel bar drain grates should be realigned so that the bars are perpendicular to the direction of normal bicycle travel.

Numerous bicycle-safe drainage grate designs have been developed that eliminate the dangers of the parallel bar grate, while at the same time maintaining hydraulic efficiency. Refer to VTrans Standard Drawings.

When it is possible to do more than simply replace a grate, curb inlets or offset grates can move the inlet out of the way entirely, thus improving the operating width of the roadway for both bicycles and motor vehicles. Care should be taken to minimize cross slopes, which, if excessive, can throw bicyclists toward the curb. Care should also be taken to provide a wide enough throat on the recessed curb so that it catches water and the effectiveness of snow plowing and/or removal is not compromised. This is a particularly important on steeper grades.

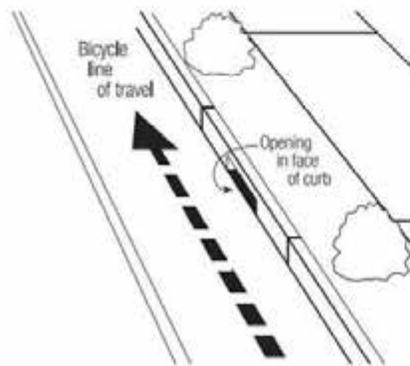


Figure 4-21.
Recessed Drainage Grate.

Parallel bar grates may also be retrofitted with steel straps welded perpendicularly to bicycle travel at 15 cm (6 in) on center to keep bicycle wheels from falling between the parallel bars of the grate. This approach, however, is temporary as motor vehicle traffic can loosen the straps causing an even greater hazard to bicyclists.

4.9.2 Railroad Crossings

Gaps between railroad tracks and the roadway pavement (called the “flangeway”) can divert the front wheel of a bicycle causing the bicyclist to lose control of the bicycle and crash. The problem is most serious when the tracks are at an acute or obtuse angle (less than 45 degrees or more than 135 degrees) to the roadway and the tracks. The more acute or obtuse the angle, the more hazardous a crossing is for bicyclists. Wet weather can exacerbate the problem, making tracks more slippery than in dry weather.

In addition to problems presented by diagonal tracks, uneven surfaces can also cause bicyclists to fall. Rail crossings take a constant and significant beating from both motor vehicle and train traffic. As a result, crossings may be very rough and uneven. Timbers may break up or shift, and asphalt may crumble, mound into large bumps, or develop pot holes and crack.

All public railroad crossing designs should be approved by the VTrans Rail Division and the railroad operator.

To improve a railroad crossing for bicyclists, provide a paved approach and departure for them to cross the rails as near a right angle as possible without veering

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Figure 4-25
Sign warning bicyclists of
railroad tracks



**Rubberized flangeway fillers
can smooth railroad track
crossings for bicyclists.**

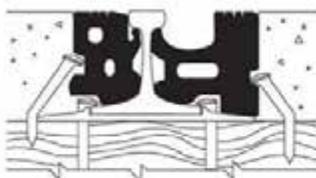


Figure 4-24.
Railroad Flange Filler.

into traffic. This often involves providing a widened approach and departure area at crossing locations as shown in Figures 4-22 and 4-23. When physical improvements are not feasible, appropriate warning signs should be installed in advance of the crossing (refer to Chapter 8, Signs, Pavement Markings and Signals). VTrans has developed a specific warning sign for hazardous railroad crossings as shown in Figure 4-25.

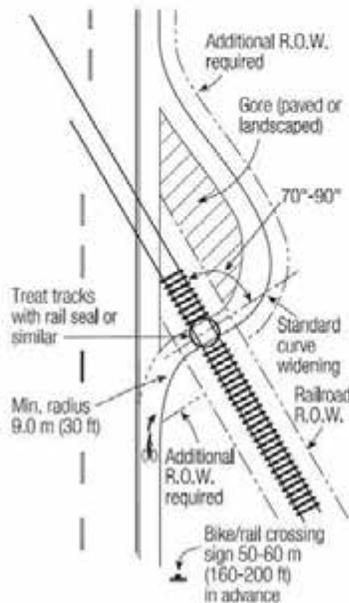


Figure 4-22.
Ridable Railroad Crossing
for Acute Angle.

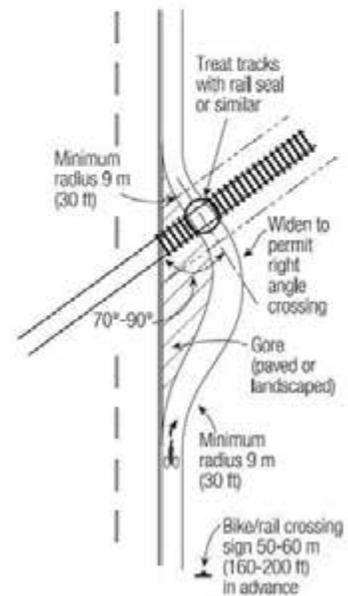


Figure 4-23.
Ridable Railroad Crossing
for Obtuse Angle.

To provide a smooth crossing for bicyclists, commercially available rubberized flangeway fillers can be installed adjacent to the inside edge of the track; however, this technique is suitable for low speed rail lines such as might be found in an industrial rail yard or rail car loading zone. Since a train's wheel must compress the flangeway filler, it is essential that the train be moving very slowly, otherwise a derailment could occur.

The best solution is to replace timber and untreated crossings with a concrete crossing. Concrete crossings could decrease long-term maintenance costs while greatly improving bicyclists safety. Refer to VTrans Standard Drawings for details of concrete crossings.

If a crossing is particularly hazardous (less than 45 degrees or greater than 135 degrees) and no physical improvement is possible in the near term, install appropriate warning signs if warranted (refer to Figure 4-25).

4.9.3 Bridges and Undercrossings

Because bicycle use for transportation is largely dependent upon convenience and access, any barrier that requires bicyclists to travel long distances out of direction is a serious disincentive. Common barriers include natural features such as rivers, streams and ravines, as well as man-made features such as highways and railroads. In such cases, bridges or underpasses may be the only way to overcome the

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barrier and ensure continuity of the transportation network for bicyclists.

Where on-road accommodation for bicycles has been provided, the approach width of the bicycle facility should be carried across a bridge or through a tunnel. It is recommended that an additional clear space of 0.6 m (2 ft) be provided along the entire length of the bridge or underpass. Where frequent use by inexperienced riders or children is expected it may be appropriate to include a wide sidewalk in the design or provide a supplemental facility physically separated from the roadway facility.

Surface Conditions

As with all surfaces on which a bicycle will be operated, the surface of a bridge deck should be smooth. There are features common to bridges that can be a hazard to bicyclists. These features include expansion joints, longitudinal gaps, longitudinally grooved pavement, and metal grating (commonly found on draw bridges).

The most critical area for bicyclists is the right-most portion of the bridge in both directions. Where feasible, potentially hazardous surfaces should be discontinued in the area near the right edge of the traveled way for a width of at least 1.2 m (4 ft). Where traffic volumes and speed are high, the width of the smooth surface should be increased.

Other possible treatments include, covering expansion joints with a beveled-edge non-skid steel plate attached to one side, covering longitudinal gaps with a non-skid surface or filling them with a weatherproof sealant.

Metal grate bridge decking can cause a bicyclist to lose control, particularly if the deck is wet or the bicyclist is inexperienced. Filling the voids with lightweight concrete is one solution that can successfully ameliorate the problem. The width of the treatment should be as described above for other hazardous surfaces.

At a minimum, where potentially hazardous conditions exist on bridges, suitable warning signs for bicyclists should be installed on the bridge approaches. It is recommended to use the Bicycle Warning sign (W11-1) with a supplemental plaque advising the type of hazard (refer to Figure 4-26 for an example).

Covered Bridges

Reduced light levels inside a covered bridge can make it difficult for motorists to see bicyclists and for bicyclists to see gaps between wooden floor boards that could trap the front bicycle wheel causing a crash. Where an even surface cannot be provided or maintained, warning signs may be provided to alert bicyclists of an uneven deck. Where feasible, a separate parallel walkway or bridge can improve conditions for motorists, bicyclists and pedestrians.

Bridges and undercrossings built exclusively for bicyclists and pedestrians are discussed in Chapter 5, Shared Use Paths.

4.9.4 Rumble Strips

Rumble strips are used to alert motorists when they begin to traverse from travel lanes onto the shoulder, however, rumble strips can have a serious negative effect on bicycle traffic. Rumble strips placed on highway shoulders decrease the ability of bicyclists to use the shoulder. Rumble strips are a serious safety concern for bicyclists.

Rumble strips take up available paved shoulder width and may force bicyclists to use the travel lane. Bicyclists attempting to initiate a turn, avoid obstructions on the shoulder or traveling downhill at a high rate of speed can lose control of the bicycle



Figure 4-26.
Rumble Strip Warning Sign.

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and crash if forced to cross a rumble strip. Current VTrans policy is to use rumble strips only on limited access highways only (where bicyclists cannot legally ride).

In the event that more widespread use of rumble strips in Vermont occurs, the following design should be used to minimize their negative impact on bicyclists:

- Provide a minimum clear path of 0.3 m (1 foot) from the rumble strip to the traveled way.
- Provide 1.2 m (4 feet) clearance from the rumble strip to the outside edge of the paved shoulder, or 1.5 m (5 feet) clearance to an adjacent guardrail, curb or other obstacle.
- Provide a gap pattern that provides periodic portions of smooth pavement allowing bicyclists to enter or leave the travel lane when necessary. Smooth gaps 3.7 m (12 feet) in length should be continuously placed along rumbled sections at intervals of 12.2 m (40 feet) to 18.3 m (60 feet).

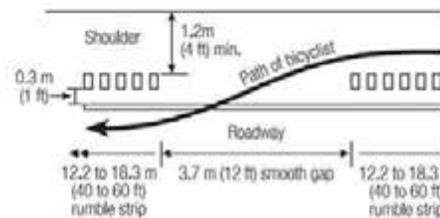


Figure 4-27.
Rumble Strips.

Provide smooth gaps if rumble strips must be used.

- Do not install rumble strips where existing conditions do not allow the minimum desirable clearance (1.2m [4 ft]) or alternative solutions such as decreasing the width of the rumble strip are not possible.
- Where rumble strips are proposed on roads used by bicyclists, increased maintenance of the shoulder should be undertaken to assure a clear path of travel for bicyclists.

4.9.5 Guard Rails

Guard rail design and placement can affect the safety of bicyclists. Designers should consider the impact of guardrail on shoulder width available for use by bicyclists.

Due to the low height of guard rails, bicyclists may topple over the rail and be injured by guard rail posts and mounting hardware.

Where guard rails are placed along a highway or shoulder, they should be set back a minimum distance of at least 0.8 m (2 ft) from the edge of the roadway or shoulder pavement to maintain a clear shy space for bicyclists (and pedestrians). If this cannot be achieved, the effective usable shoulder width is reduced.

The VTrans 2000 “Study of Guardrail Selection Criteria for Vermont Highways” acknowledges the potential impact of guard rail on bicyclists. Where shoulder width is minimal (less than 3 feet) and traffic volumes are greater than 2000 ADT, the study suggests that guardrail systems with narrower profiles (such as 3-cable or box beam) be used to minimize encroachment on available shoulder width. An additional benefit of these alternative guard rail systems is that they are more aesthetic than standard steel W-beam guardrail.

4.9.6 Work Zones and Temporary Traffic Control

Where bicyclists are traveling on a road and a temporary traffic control zone is provided in accordance with the latest version of Part 6 of the MUTCD, they should be expected to traverse the work zone as part of the normal traffic flow. Contractors should consider the needs of bicyclists in establishing and maintaining work zones such that conditions particularly hazardous to bicyclists (e.g. rough surfaces, excessive drop offs, and longitudinal cracks) are avoided. For a more detailed discussion, refer to Section 8.3.4.

4.10 *Additional Measures to Improve On-road Bicycling*

There are a number of additional measures that can be taken to improve the on-road bicycling experience. These include:

- Bicycle parking devices (refer to Chapter 9, Landscaping and Amenities).
- Accommodating bicycles on public transportation.
- Keeping existing roadways in good condition (refer to Chapter 10, Maintenance).
- Adding shoulders when repaving.
- Using materials that result in smooth surfaces on unpaved roads.
- Using appropriate signs in high bicycle-traffic areas (refer to Chapter 8, Signs, Pavement Markings and Signals).
- Erecting and maintaining signs that identify the names of intersecting roads at every intersection.
- Using appropriate interstate, U.S. route, state route or local route marker signs in advance of roundabouts to alert all road users where to “exit.”

4.10.1 Bicycle Route Maps

Maps designed for bicyclists exist in many forms. In order of increasing complexity, they can:

- Outline short, recreational loop rides.
- Describe the bike route system of a locality (refer to Chapter 2, Planning for Pedestrians and Bicyclists).
- Offer information to bicycle commuters on the most direct routes to various employment centers.
- Define a particular long-distance touring route and provide information about services and attractions along the route.
- Indicate the suitability for shared use of streets and roads by bicycles and motor vehicles throughout a given urban or rural highway system.

The cost of producing, printing and distributing bicycle maps can be much less than the cost of installing and maintaining signs along a route. Defining the function of the map and identifying the primary user group for whom the map is intended will help to determine the type of map which should be produced. Additional discussion of Bicycle Route Maps can be found in Chapter 2, Planning for Pedestrians and Bicyclists..

4.11 *Additional Resources*

Consult the following resources for the broadest coverage of issues relating to the planning and design of on-road bicycle facilities:

Appendix D - Local Planning “Toolbox”

CHAPTER FOUR On-Road Bicycle Facilities

PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

- *A Policy on Geometric Design of Highways and Streets, Fourth Edition*, 2001 (The Green Book). American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.
- *Bicycle Touring in Vermont and Vermont's Scenic Byways Program*, (1995). VTrans Project and Development Division, Local Transportation Facilities Section, National Life Building, Drawer 33, Montpelier, VT 05633-5001.
- *Flexibility in Highway Design*, 1997. FHWA, HEP 30, 400 Seventh Street SW, Washington, DC 20590.
- *Florida Bicycle Facilities Planning and Design Handbook*, Revised 1999. Florida Department of Transportation, Pedestrian and Bicycle Program, State Safety Office, Mail Stop 82, 605 Suwannee Street, Tallahassee, FL 32399-0450, Phone: (850) 487-1200.
- *Guide for the Development of Bicycle Facilities*, 1999.. American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.
- *Highway Capacity Manual, Special Report 209*, 2000. Transportation Research Board, Box 289, Washington, DC 20055, Phone: (202) 334-3214. Next Edition: FHWA Research Program project has identified changes to HCM related to bicycle and pedestrian design.
- *Implementing Bicycle Improvements at the Local Level*, (1998), FHWA, HSR 20, 6300 Georgetown Pike, McLean, VA.
- *Manual on Uniform Traffic Control Devices*, 2000. Federal Highway Administration (FHWA), available from ITE, ATSSA and AASHTO.
- *Oregon Bicycle and Pedestrian Plan*, 1995. Oregon Department of Transportation, Bicycle and Pedestrian Program, Room 210, Transportation Building, Salem, OR 97310, Phone: (503) 986-3555.
- *Pedestrian and Bicycle Crash Types of the Early 1990s* (1996). Published by Federal Highway Administration (FHWA). Available from National Technical Information Service, Springfield, VA 22161, Phone: (703) 487-4650.
- *Selecting Roadway Design Treatments to Accommodate Bicyclists*, 1993. FHWA, R&T Report Center, 9701 Philadelphia Ct, Unit Q, Lanham, MD 20706. (301) 577-1421 (fax only).
- *Study of Guardrail Selection Criteria for Vermont Highways*, (2000). VTrans Project Development Division, National Life Building, Drawer 33, Montpelier, VT 05633-5001.
- *Vermont Better Backroads Manual*, November (1995). Goerge D. Aiken and Northern Vermont Resource Conservation and Development Councils. Available from Vermont Local Roads Program, St. Michaels College and George D. Aiken RCD.
- *Vermont State Standards*. VTrans Project Development Division, National Life Building, Drawer 33, Montpelier, VT 05633-5001.

Appendix D - Local Planning “Toolbox”



5.1 Introduction

Off-road corridors shared by pedestrians, bicyclists and other non-motorized users are referred to as *shared use paths*. Formerly shared use paths were called “multi-use paths” or “bike paths.” This manual uses the following definitions:

Path (or pathway) – an unpaved walkway sidewalk, or shared use path (whether paved or unpaved).

Sidewalk – a paved portion of a street between the curb lines or the lateral lines of a roadway, and the adjacent property lines, intended for use by pedestrians (refer to Chapter 3, Pedestrian Facilities).

Shared use path – a facility for pedestrians, bicyclists and other users that is physically separated from motorized vehicular traffic by open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths are typically used by more than one type of user, such as pedestrians, joggers, people in wheelchairs, skaters, bicyclists, cross-country skiers, and where permitted equestrians and snowmobiles.

The tremendous variety in paths and their users makes uniform standards elusive. Guidelines written to accommodate a specific type of user may not meet the needs of another user. In practice, most trails serve several user types and are, therefore, shared-use paths. Consider the needs of all potential user groups when planning and designing a shared use path.

5.1.1 Application

Well-planned and designed shared use paths can provide excellent access and mobility when they complement a network of sidewalks and on-road bicycle facilities. They make connections, can go where roads do not and present a pleasant environment away from traffic including:

- Shortcuts between residential neighborhoods (i.e., between cul-de-sacs and dead-end streets), parks, schools, and business areas.
- Access to areas served only by controlled-access highways where pedestrians and bicycles are prohibited.
- Access to areas not well served by roads such as streams, lakes, rivers, greenways, abandoned or active railroad and utility rights of way, college campuses, and planned unit developments and community trail systems.
- A training ground for child and adult bicyclists.
- An attractive alternative to the street for less experienced bicyclists.

5.2 Planning Considerations

5.2.1 Characteristics

Successful shared use paths share many of these characteristics:

- Continuous separation from motor vehicle traffic.
- Frequent access points.
- Increased levels of safety and security.



Every path is a unique blend of place and the people who use it.

Appendix D - Local Planning “Toolbox”

CHAPTER FIVE Shared Use Paths

PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

Because shared use paths are located away from traffic, often in natural settings, they offer an aesthetic experience that attracts bicyclists and pedestrians.

Burlington



- Scenic qualities.
 - Connectivity to a variety of land uses.
 - Well-designed street and driveway crossings.
 - Potential for shorter trips.
 - High levels of activity.
 - Uniform design and good engineering.
 - Informative signing and marking.
 - Context sensitive design and aesthetics.
 - Regular inspection and maintenance.
 - Potential for making an economic contribution to the community.
1. **Continuous separation from motor vehicle traffic.** Physical separation from motor vehicle traffic is the hallmark of a shared use path. The separation allows path users to avoid the congestion, pollution, noise and intimidation they may perceive from motor vehicles, and reduce the potential for some types of crashes if properly located and designed. Continuous separation from traffic is essential to minimize conflicts with motor vehicles at street and driveway crossings. For this reason, shared use paths are frequently located along riverbanks, greenbelts, railroads, and utility rights-of-way because of the low incidence of conflicts that occur along such corridors. They can also be located in highway corridors.
 2. **Frequent access points.** Balance the need for limited crossings with adequate access. If a shared use path is to serve pedestrians and bicyclists well, there should be convenient access to the local street network. Access points that are spaced too far apart will require users to travel out-of-direction to enter or use the path. Terminate paths where they are easily accessible to the street system such as at controlled intersections or at the end of a cul-de-sac or dead-end street. Frequent access also improves response time of emergency vehicles to incidents on the path.
 3. **Increased levels of safety and security.** Keep the personal safety and security of intended users in mind. Illumination and clear sight distances improve visibility. Frequent access encourages use and reduces isolation. Refer to Section 5.2.13 for a discussion of how design features can affect security.
 4. **Scenic qualities.** Because shared use paths are located away from traffic, often in natural settings, they offer an aesthetic experience that attracts pedestrians and bicyclists. Many communities consider paths as “linear parks” that help define neighborhoods and enhance livability.
 5. **Connectivity to a variety of land uses.** Paths should not be isolated facilities. They should link shopping areas, parks, schools, employment centers and other community facilities with residential neighborhoods.
 6. **Well-designed street and driveway crossings.** While shared use paths provide segregation from motor vehicle traffic along most of their length, they inevitably intersect with roadways and driveways and thus conflict with motorized traffic. Good design is especially important at path junctions with roadways and drive ways to enhance operations, and to minimize

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conflicts and potential crashes. Refer to Section 5.3.8 for a discussion of crossings.

7. **Potential for shorter trips.** Shared use paths may offer shorter trip lengths than the road network by making connections between dead-end streets and cul-de-sacs, or as shortcuts through undeveloped areas or open spaces, or as a bypass around signalized intersections.
8. **High levels of activity.** Activity created by locating pedestrian and bicycle facilities in close proximity to housing and businesses has been shown to increase safety of all concerned. Despite fears of some property owners, paths have not attracted crime into adjacent neighborhoods. To the contrary, proximity to shared use paths is frequently touted by real estate developers and salespeople as an attractive benefit to potential homeowners and a sales plus.
9. **Uniform design and good engineering.** Paths that attract different types of users should be built to a standard that accommodates various uses with minimal conflict. Designing a facility to a low standard can save money initially but can lead to problems when a facility becomes popular. Successful shared use paths exhibit uniform design and good engineering. While there are similarities between the design criteria for shared use paths and highways (e.g. horizontal alignment, sight distance requirements, signing and markings), other criteria (e.g., horizontal and vertical clearance requirements, grades and pavement structure) are dictated by the characteristics of the various path users and are substantially different from those of motor vehicles. Be aware of the similarities and differences between different path users and motor vehicles and of how these similarities and differences influence the design of shared use paths.
11. **Informative signing and marking.** Because shared use paths often stray from familiar landmarks, good signing may be required to orient, inform and direct path users along a path. Other signs should direct users to and from a path at junctions with the street system.
12. **Context sensitive design and aesthetics.** Path design should be sensitive to the natural surroundings in which they are located. Preserve and complement natural features to the maximum extent possible, and design path features and amenities to reflect the human scale of the user.

Attempt to make a facility as “continuously interesting” as possible by creating variety in the shared use path:

 - A path that follows natural terrain is more interesting than one that is straight.
 - Clumps of trees arranged naturally are more interesting than trees placed in a straight line.
 - Color can be added through different types of vegetation.
 - Water features are always interesting.
 - Periodic views and openings that reveal a middleground and background are more interesting than views that contain the foreground only.
 - Leeways or variations in the width of a path can also create interest while providing a place for people to rest or wait for friends.
 - Curved lines are more appealing than straight lines in natural areas.
 - Artificially created berms or mounds can add vertical interest.
13. **Regular inspections and maintenance.** Regular sweeping and repair is essential. Separation from motor vehicle traffic can reduce some maintenance problems, such as sweeping away debris that accumulates on roadways. Leaves will

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need sweeping, vegetation will need to be cut back, and surface and subsurface repairs will be needed. Refer to Chapter 10, Maintenance.

14. Potential for making an economic contribution to the community.

Shared use paths can make a significant contribution to local economies by attracting vacationing bicyclists and pedestrians to communities that provide places for bicycling and walking safely removed from busy roads and streets. Investments in shared use paths and rail-trails can also increase adjacent property values and improve the overall livability of a community.

5.2.2 Accessibility

Shared use paths should be designed to meet the needs of the widest possible range of users, including people with disabilities. This means that they provide a continuous, unobstructed path of travel for the disabled.

If the ability to comply with the requirements of the ADA is in question, designers should check with the U.S. Architectural and Transportation Compliance Board (Access Board).

Accessibility of a path depends not only on the design of the path itself but also upon the accessibility and availability of facilities and features associated with a shared use path, including:

- Parking areas.
- Path entrances.
- Path destinations.
- Scenic viewpoints.
- Interpretive displays.
- Facilities such as rest areas, restrooms, shelters, drinking fountains etc.

Plan path facilities and features to correspond with the on-path conditions, user needs and expectations, and the desired path experience.

Until recently, guidance for providing trail accessibility was derived from the American with Disabilities Act Accessibility Guidelines (ADAAG). However, direct application of the ADAAG provisions for accessible routes of travel has been found to be inappropriate for many shared use paths. For a greater level of detail on how to make sidewalks, street crossings, paths and trails more usable for all pedestrians, consult *Designing Sidewalks and Trails for Access, Part II: Best Practice Design Guide* (FHWA, 2001). This guide provides design details and alternative treatments for making sidewalks and shared use paths accessible to all users.

5.2.3 Minimizing Conflicts Between Path Users

During the design phase of a project it is important to identify the intended users of the project and the various needs they may have. Accommodating these needs can have a significant impact on design features of the project. For example, surface type is a major determinant of who will use the project (i.e., unpaved surfaces will discourage in-line skating and roller skiing while at the same time encourage equestrian or snowmobile uses). It should also be noted that permitted uses on a project may be dictated by the funding source used to develop a project.

The safety and enjoyment of a shared use path can decline when conflicts among users occur. Conflicts stem from many sources:

- Personal expectations.
- Overcrowding.
- Clashes between different path user skill levels and speeds.

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- Attitudes toward other types of users.
- Dominance by one user group.
- Intrinsic differences in movement patterns.

Although these issues are complex, good planning and design can greatly decrease conflicts. Some techniques for minimizing conflicts between path users include:

- Limiting path use by regulation and enforcement.
- Limiting path use by design.
- Accommodating different types of users through design.
- Accommodating different types of users through path courtesy and education.

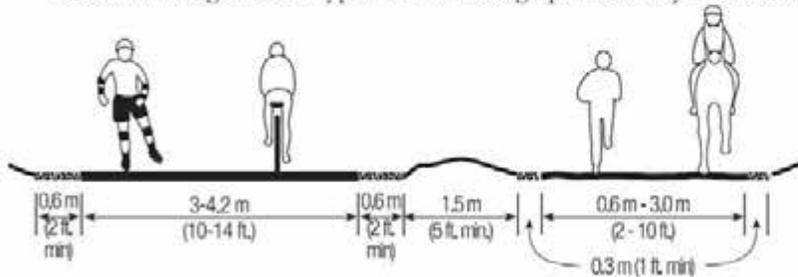


Figure 5-1.
Paved Shared Use Path With Separate Soft Surface Trail.

Limiting path use by regulation and enforcement. One way to limit certain types of path use is through regulation. The unofficial use of paths by motor vehicles (including power assisted bicycles, mopeds, ATVs, motorcycles, farm tractors, cars and trucks) should be prohibited and strictly enforced. The use of motorized wheelchairs, snowmobiles, emergency vehicles and maintenance vehicles should be permitted as appropriate. As is the case with all regulation, enforcement is needed to make sure that actual use occurs in accordance with rules and ordinances that apply to the intended use.

Limiting path use by design. Although pedestrians, bicyclists, equestrians, and other users get along on many shared use paths, the potential for conflict is high. Where it is desired that path use be limited to pedestrians and bicyclists only, gates, stiles and fences can effectively limit vehicles from accessing the path. (Refer also to Section 5.3.8, Managing Motor Vehicle Access).

Where it is desired to discourage certain types of users such as in-line skaters, roller skaters, and skate boarders the use of unpaved surface materials that are incompatible with these uses should be considered.

Accommodating different types of users through design. The preferred approach is to accommodate different non-motorized user types through design. For a shared use path to accommodate a large variety and number of users, it needs to be as wide as necessary, preferably with a broad firm surface and clear shoulders on each side of the path. It may be advisable to separate users by designating lanes in the path or by creating parallel and separate paths (such as an unpaved bridle path for equestrians or a jogging path for runners). Features that can help to improve the safety and convenience of shared use paths are discussed in Section 5.3, Design.

Accommodating different types of users through path courtesy and education. Conflict between users can also be managed by promoting courtesy along the path.

South Burlington



A paved shared use path with a separate soft surface trail for joggers and equestrians can minimize conflicts between path users.

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CHAPTER FIVE Shared Use Paths

PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

Safety and etiquette are responsibilities shared by everyone. A path etiquette educational campaign can help develop a positive ethic among users. Common educational tools include:

- *Signs.* Safety signs are one of the simplest and most effective ways to promote courtesy because they convey important information quickly. Where conflicts arise post a uniform system of operating and advisory signs at regular intervals along a shared use path. Present one message per sign and keep the message simple so children and adults can understand it. Repeat basic safety and operating rules such as “Bicyclists use bell or voice when passing,” “All users keep right,” and “Bicyclists yield to pedestrians.”
- *Printed materials.* Brochures, pamphlets and newsletters displayed along the path, at trailheads and at information stations can help educate trail users and cultivate a positive user ethic.
- *Special Events.* Safety days and other special events are an enjoyable way to promote safety and etiquette.
- *Presentations.* Presentations at recreation clubs, schools, and civic organizations not only help educate people about path courtesy but offer opportunities to promote the shared use path as well.

South Burlington



Shared use paths should not be located immediately adjacent to roadways as this requires at least half the bicyclists using the facility to ride against traffic. Instead, locate paths away from the roadway as seen in the distance.

5.2.4 Avoid Placing Shared Use Paths Next to Roadways

Shared use paths are not a substitute for street improvements even if there is sufficient space to locate a path adjacent to the roadway. Experienced bicyclists often find it less convenient to ride such paths compared with the streets, particularly for utilitarian trips where speed and access are high priorities. **Some operational problems with paths adjacent to roads are:**

- Some bicyclists will be riding against the normal flow of traffic contrary to the rules of the road.
- When the path ends, bicyclists riding against traffic may continue riding on the wrong side of the street. Wrong-way travel by bicyclists is a major cause of bicycle/motor vehicle crashes.
- At intersections, motorists entering or crossing the roadway often do not notice bicyclists approaching from their right, as they are not expecting any traffic from that direction. Motorists turning to exit the roadway may likewise fail to notice bicyclists. Refer to Figure 5-2.

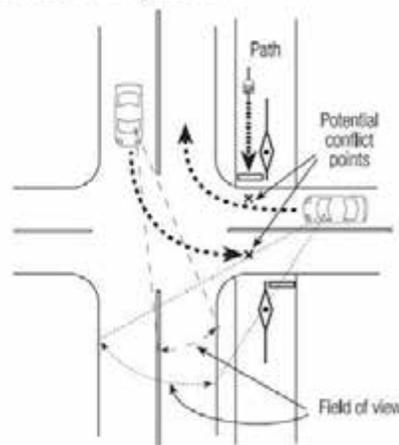


Figure 5-2.
Potential Conflict Points.

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- Barriers used to separate motor vehicle traffic and bicycle and pedestrian traffic can obstruct motorists, bicyclists and pedestrians vision alike, reduce access along the street and path, and complicate maintenance of both facilities.
- Snow plowed from an adjacent roadway can obstruct path use if the path is not simultaneously plowed along with the street.

Where the following conditions exist it may be appropriate to provide a shared use path within or adjacent to a highway right-of-way used by motor vehicles:

1. Location and Need

- No reasonable alternative alignment exists for bicycle and pedestrian facilities on nearby parallel routes or on an independent alignment.
- The adjacent roadway is a heavily traveled, high-speed, high volume roadway where on-road bicycle facilities may contribute to unsafe conditions for the design bicyclist.
- Bike lanes, wide curb lanes, paved shoulders, or sidewalks are not a feasible alternative.
- Increased levels of pedestrian activity and bicycle usage along the corridor are anticipated.
- The majority of origins and destinations are on one side of the road.
- There is a commitment to provide a continuous non-motorized system throughout the corridor.
- The total cost of providing the proposed path is proportionate to the need.
- The expected users (design bicyclist) for the project are inexperienced bicyclists (Group C) or pedestrians. Refer to Chapter 4, section 4.2.1 for a complete discussion of design bicyclists.

2. Separation and Conflicts

For shared use paths in highway corridors, consider the following guidelines:

- A minimum horizontal separation of 1.2 m (4 ft) for curbed and 1.5 m (5 ft) for uncurbed sections or an appropriate barrier between the edge the shoulder (whether paved or unpaved) and the shared use path is provided. Refer to Section 5.3, Design.
- Landscaping or natural vegetation buffer the path from noise and splash of motor vehicles. Alternately, a drainage ditch or swale with maximum side slopes of 1:3 can be provided at the edge of a 0.6 m (2 ft) shoulder.
- The path can be terminated on streets where bicycle and pedestrian facilities are provided.
- Potential driveway and intersection conflicts are minimized or mitigated.
- The path has sufficient width, to accommodate the expected users.

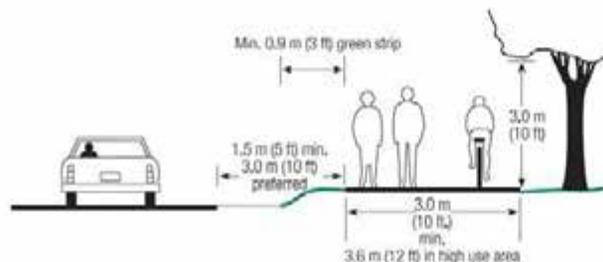


Figure 5-3.
Shared Use Path, Separation from Roadway in Uncurbed Section.

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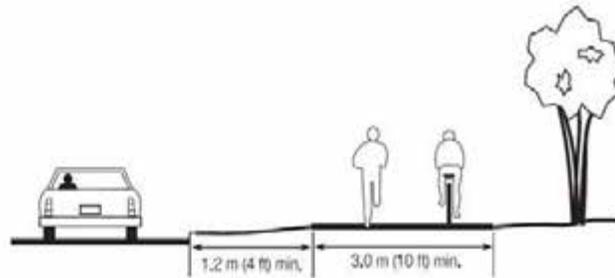


Figure 5-4.
Shared Use Path, Separation from Roadway in Curbed Section.

3. Access

If a shared use path is located in a highway corridor, consider the following factors to decide on which side of the road it should be placed:

- Access to all destinations served by the adjacent roadway is available and convenient for path users.
- There is adequate access to local cross-streets and other facilities along the route.
- Any needed grade-separation structures do not add substantial out-of-direction travel for path users.
- Popular origins and destinations (such as neighborhoods, schools and parks) exist or are planned throughout the corridor.

5.2.5 Avoid the Use of Sidewalks for Shared Use Paths

Sidewalks are pedestrian facilities designed for pedestrian speeds and maneuverability. They should not be used as shared use paths unless they conform to the minimum dimensional characteristics of paths because:

- Sidewalks rarely have adequate clear space for multiple users. The potential for conflicts between pedestrians traveling at low speeds and bicyclists traveling at higher speeds are high.
- Pedestrians often cross sidewalks to reach adjacent buildings or parked cars and do not expect bicyclists to cross their path.
- Poles, benches, trees, and other obstacles are often located in the sidewalk area further restricting the available width of the sidewalk.
- At intersections, motorists will not expect bicyclists (who may be traveling at higher speeds than pedestrians) to enter the crosswalk area. Sight distance may be impaired by buildings, walls, property fences and shrubs along sidewalks, especially at driveways, which is more problematic for higher speed bicyclists.

Consider sidewalk bikeways only for limited durations along short sections of sidewalk where no other bicycle facility alternative exists or unless the sidewalk width conforms to the minimum dimensional characteristics for a shared use path.

5.3 Design Considerations

The key design guidelines for shared use paths include:

- User requirements.
- Widths and clearances.

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- Pavement sections and surfaces.
- Cross slope and drainage.
- Grades.
- Side slopes, fencing and barriers.
- Design speed, horizontal alignment and stopping sight distance.
- Roadway crossings.
- Managing Motor Vehicle Access.
- Structures.
- Signing and marking.
- Supplemental facilities.
- Security. (Refer to Chapter 9)
- Lighting. (Refer to Chapter 9)
- Maintenance (refer to Chapter 10).
- Vegetation and Landscaping (refer to Chapter 9).

5.3.1 User Requirements

Shared use paths attract people of all ages, with capabilities ranging from slow-moving pedestrians to fast-moving bicyclists. Added to the mix may be in-line skaters, skateboarders, scooters, joggers, baby carriages, dogs, and even horses. Each type of path user has its own set of user requirements. Refer to Chapter 4, On-road Facilities for dimensional requirements and diagrams. For details regarding user requirements and accommodating equestrian, snowmobile, snowshoe or cross country users refer to Chapter 6, Rail Trails.

Pedestrians

The design of paths and the surrounding environment is important to all pedestrians, but it is particularly important to people with disabilities. Shared use paths should seek to minimize the constraints within the natural environment and avoid creating new constraints. The use of standard accessibility standards for sidewalks and crossings plus the guidelines in this manual should satisfy the needs of most pedestrians.

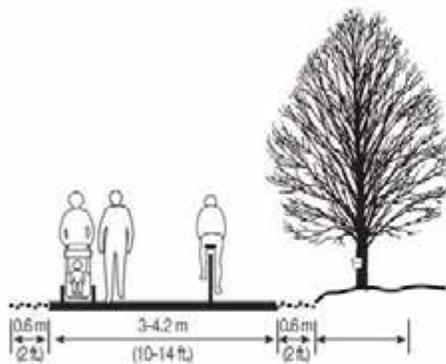


Figure 5-5.
Shared Use Paths Accommodate a Variety of Users.

A width of at least 3.0 m (10 ft) allows two pedestrians and a bicyclist traveling in the opposite direction to pass comfortably as illustrated in Figure 5-5.



Burlington - Burlington Bike Path



Brunswick, ME



Shared use paths attract people of all ages and abilities. Each user has his or her own set of requirements.

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Bicyclists

Because riding on a path away from motor vehicles can be so appealing, shared use paths attract bicyclists whose age, skill and experience vary greatly.

Bicyclists use a wide variety of equipment including road bikes, hybrids, mountain bikes, tandems, trailers and trailer bikes, recumbents, tricycles (including hand bicycles) and even quadracycles (surreys). The most important characteristics of bicycles to the path designer are their sensitivity to surface texture and grade, their operating width (1.2 m [4 ft]), and the high speeds they can reach, especially on long paved downhill sections (over 50 km/h or 30 mph).

Skaters

Skaters include in-line skaters, roller skaters and skateboarders. Many scooters also use skate wheels. While there are differences in the operating characteristics among these various types of skaters, they are similar enough to consider as one design category.

The small wheels of skates, typically 72 to 80 mm (2.8 to 3.1 in) diameter, make skaters especially sensitive to surface debris and irregularities, a factor that may be used to advantage where it is desired to prohibit skating in certain locations.

In-line skaters and scooters require at least as much lateral clearance as bicyclists, and may use as much as 1.8 m (6 ft) of width for operating space. The stopping ability of skaters is less than that of bicyclists, perhaps by 50 percent or more for novice skaters. To compensate for long braking distances, provide a level surface at least 9.0 m (30 ft) in advance of intersections, and a sight line of at least 30 m (100 ft) to accommodate beginning skaters.

Other Users

Equestrian and snowmobile requirements are discussed in Chapter 6, Rail Trails.



In-line skaters require at least as much lateral clearance as bicyclists and may use as much as 1.8 m (6 ft) of width for operating space.

5.3.2 Widths and Clearances

Design dimensions for shared use paths can vary greatly by the type of facility, levels of use they receive and the setting in which they are located.

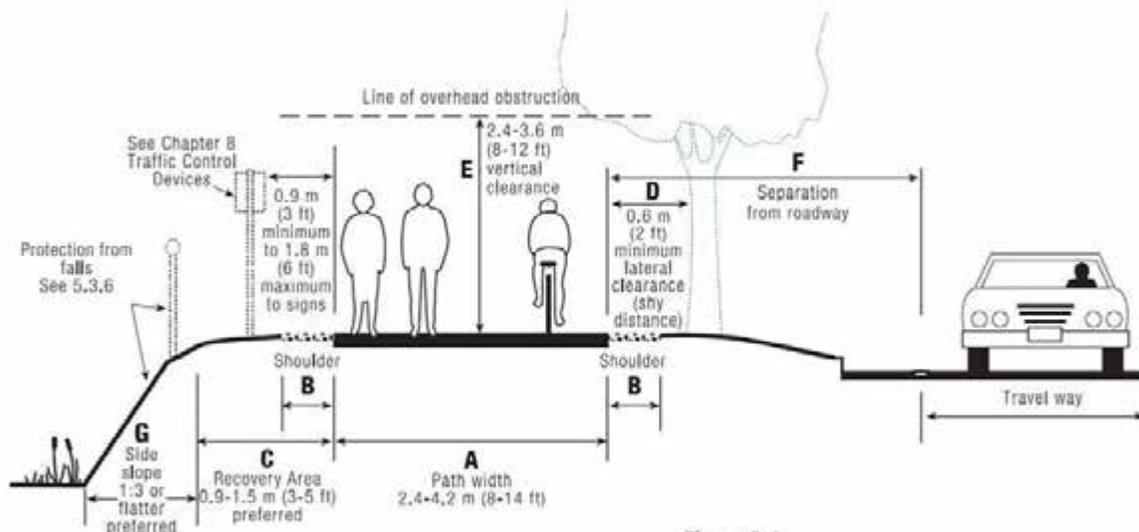


Figure 5-6.
Shared Use Path, Typical Widths and Clearances.

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Path width (Dimension 'A')

Design dimensions for shared use paths can vary greatly by the type of facility, levels of use they receive and the setting in which they are located. The recommended dimensions for path widths of a variety of shared use paths are listed in Table 5-1.

Table 5-1.
Path Widths of Shared Use Paths (Dimension 'A').

Path Type	Minimum Path Width	Preferred Path Width
Paved Shared Use	2.4 m (8 ft)	3.0 to 4.3 m (10 to 14 ft)
Unpaved Shared Use	2.4 m (8 ft)	2.4 to 3.0 m (8 to 10 ft)
One-way Shared Use (rare)	1.5 m (5 ft)	1.8 m (6 ft)
Paved pedestrian-only	1.5 m (5 ft)	1.8 m (6 ft)



A combined path width greater than 4.2 m (14 ft) may be needed for separated bicycle, horse or running lanes. The minimum width of 2.4 m (8 ft) for shared use paths is recommended only when the following conditions prevail:

- Bicycle traffic is expected to be low, even on peak days or during peak hours.
- Pedestrian use of the facility is not expected to be more than occasional.
- Good horizontal and vertical alignment provides safe and frequent passing opportunities.
- The path will not be subjected to maintenance vehicle loading conditions that would cause damage to the edge of the pavement.
- No practical alternative design exists.
- Applicable path sight distance requirements can be met.
- For limited distances of up to 61.0 m (200 ft) to bypass a physical barrier (i.e., building, water body or other immovable objects).

Shoulders (Dimension 'B')

Shoulders provide pull-off, resting or passing space and should be graded to a maximum slope of 1:6. The preferred width of a shoulder on both sides of a shared use path is 0.6 m (2 ft).

Recovery Area (Dimension 'C')

A graded area of varying widths with a maximum slope of 1:6 from the edge of the path provides a recovery area for bicyclists who may ride off the path.

Table 5-2
Recovery Area Widths

Slope	Unpaved Surface		Paved Surface		Barrier Recommendations
	Minimum	Preferred	Minimum	Preferred	
1:4 or flatter	0	0.6 m (2 ft)	0	0.9 m (3 ft)	Generally no barrier necessary
1:3	0.6 m (2 ft)	0.9 m (3 ft)	0.9 m (3 ft)	1.2 m (4 ft)	If vertical drop 1.5 m (5ft) or greater, consider use of barrier unless preferred recovery area provided
1:2	0.9 m (3 ft)	1.5 m (5 ft)	1.2 m (4 ft)	1.5 m (5 ft)	If vertical drop 1.2 m (4ft) or greater, consider use of barrier unless preferred recovery area provided
Steeper than 1:2	1.5 m (5 ft)	>1.5 m (5 ft)	1.5 m (5 ft)	>1.5 m (5 ft)	If minimum recovery area not provided, barrier is necessary

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Where conditions necessitate the use of less than the minimum width for lateral or vertical clearance, seek approval for less clearance through the VTrans Design Exception Process

The width of the recovery area varies with the steepness of the adjacent side slope and the surface material of the path. Refer to Table 5-2 for additional details. If the minimum recovery area cannot be obtained a suitable barrier should be provided as described in section 5.3.6. If a side slope adjacent to the recovery area is a hard surface or has a hazard such as running water at its base, additional recovery area width or barrier protection along the top of the slope may be necessary. Similarly, if a side slope is on the outside of a curve on a downgrade, additional recovery area or barrier protection may be necessary.

Lateral Clearance (Dimension 'D')

The minimum clear “shy” distance to provide clearance from trees, poles, walls, fences, guardrails or other lateral obstructions (measured from the edge of the path) is 0.6 m (2 ft). Where space allows, the preferred shy distance is 0.9 m (3 ft). Note that the distance from the edge of the path to the nearest edge of a sign is a minimum of 0.9 m (3 ft) and a maximum of 1.8 m (6 ft) as prescribed by the MUTCD.

Vertical Clearance (Dimension 'E')

The minimum vertical clear distance to obstructions along a path is 2.5 m (8 ft). Where space allows, the preferred vertical clear distance is 3.0 m (10 ft). However, where equestrian use is permitted vertical clearance should be a minimum of 3.6 m (12 ft) and where snowmobile groomers are anticipated a vertical clearance of at least 3.0 m (10 ft) is desirable.

Provide continuous vertical clearance above all paths. Where maintenance and emergency vehicles use the path, or where there are under crossings or tunnels, provide the necessary vertical clearance dimension.

Separation from Roadways (Dimension 'F')

The minimum separation and buffer zone width between a roadway and a path in a curbed section is 1.2 m (4ft) and 1.5 m (5 ft) in an uncurbed section. In an uncurbed section at least 0.9 m (3 ft) of the 1.5 m (5 ft) buffer should be a green strip (see Chapter 3, section 3.4.3 Roadway Separation for a discussion of buffer zones and green strips. Where space permits, maximize separation between a path and the edge of an adjacent roadway. Where adequate physical separation cannot be obtained, physical barriers of sufficient height may also be provided as discussed under Side Slopes, Bridge Railings, Barriers, and Fencing in Section 5.3.6, below.

Side Slopes (Dimension 'G')

In general, fill slopes adjacent to shared use paths should be as flat as possible. Flatter slopes are less likely to require protective barriers, provide an area that errant bicyclists or other path users can traverse, and are generally less hazardous than steeper slopes. However, it is recognized that where paths are at significantly higher elevations than adjacent property, flat slopes may result in excessive overall project footprints. The surface material of the slope has an impact on path user safety, should users leave the path. Grassed or vegetated slopes are preferred versus crushed stone or rock (rip-rap) slopes.

5.3.3 Pavement Sections and Surfaces

A shared use path should support the largest maintenance and emergency vehicles expected to use the facility. Construct paths in accordance with VTrans Standard Drawings A-78M and A-78 (to be developed) listed in the Appendix.

In general, paths have asphalt pavement surfaces or consist of other hard-surface materials. Recreational trails and paths in rural or semi-primitive settings can be constructed of materials that blend with the natural setting. However, regardless of

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the surface material used the material must comply with the ADAAG requirements for firmness, stability and slip-resistance. See table 5.3 for a listing of ADAAG complaint surfaces.

Concrete

Although not currently used in Vermont, Portland cement concrete surfacing for paths is known best for long-term use. It is the hardest of all path surfaces and is most often used in urban areas with severe climate changes or where flooding or heavy use is expected. Where concrete is used consider providing a soft-surface parallel path for runners or equestrians. A broom finish significantly improves the slip resistance of concrete. The use of concrete for paths in Vermont is not envisioned except in special circumstances.

Asphalt

Asphalt (bituminous concrete) surfacing for paths is also an acceptable all-weather surface. Asphalt works well on paths that are used for bicycle commuting or in-line skating. However, under low snow conditions cross-country skiers and snowmobilers may find that snow melts more quickly on asphalt surfaces because the dark pavement absorbs heat from the sun. Also, the edges of an asphalt path can be more easily damaged than concrete by maintenance or emergency vehicles, or frost differential during the winter months.

Crossings

At unpaved roadway or driveway crossings of paved shared use paths, pave the roadway or driveway at least 3.0 m (10 ft) on each side of the crossing to reduce the amount of gravel that may be scattered along the path by motor vehicles. The pavement structure at the crossing should also be designed to adequately sustain the expected vehicle loading at the crossing location.

Sub-base

Consider the effects of freeze-thaw cycles on the path. Determine the need for any special provisions with a soils investigation of the load-carrying capabilities of the native soils, unimproved shoulder or former railroad bed (if ballast has been removed).

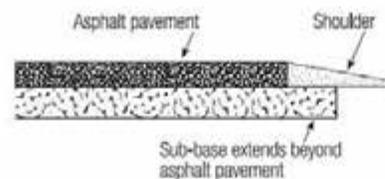


Figure 5-7.
Sub-base, Asphalt Pavement.
Extend sub-base beyond asphalt pavement.

A good sub-base, such as compacted aggregate material or fully compacted native soil (if structurally suitable) provides structural support of the path. If a path is constructed over a poor sub-grade, excavation to remove wet, organic or otherwise unsuitable material, treatment with soil-cement or application of a geotextile fabric may be required.

Remove all organic material, including roots, when preparing the sub-grade. The application of a soil sterilant or lime at the sub-grade level may be required to control the growth of new vegetation. Paths built in wooded areas typically require special attention. Roots of trees and shrubs can pierce the surface of the path or

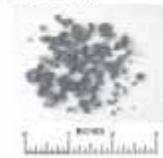
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Aggregate too large for any use. Boöbe Spur Rail Trail, Newport, Vermont (before replacement)



Aggregate suitable for mountain bikes, marginal for hybrids, but too large for road bikes. Confederation Trail, PEI, Canada.



Aggregate suitable for all bikes and wheelchairs. Youghioghony Trail, Ohioyle, Pennsylvania.



Stone dust, suitable for bikes and wheelchairs. School St., Essex, New York

cause it to heave and break apart. Preventive methods include removal of vegetation and realignment of the path away from trees.

Unpaved Surfaces

Although hard, all-weather pavement surfaces are preferred on many paths, many operating agencies have found that compacted crushed aggregate as a surface material is less costly to install than asphalt or concrete. In addition, equestrians, joggers and other users prefer unpaved surfaces. Consideration should be given to unpaved surfaces in rural or natural settings. Table 5-3 illustrates the ability of different materials to meet ADAAG requirements.

Also, skaters are not drawn to unpaved paths and bicyclists' speeds are lower, making the path more comfortable for other users. However, in areas that are subjected to frequent or even occasional flooding or drainage problems, or in areas of steep terrain, unpaved surfaces may be more prone to erosion.

When unpaved crushed aggregate surfaces are used, spread a 10 cm (4 in) layer of material no larger than 8 mm (3/8 in) in diameter over a prepared sub base consisting of at least 15 cm (6 in) of crushed gravel over a suitable sub grade, and compact it with a roller. Care should be taken to match the size of the crushed aggregate materials with the expected use of the path and to ensure even gradation of

Table 5-3.
Suitability of Surface Materials for Shared Use Paths.

Surface Material	Firmness	Stability	Slip Resistance (dry conditions)
Asphalt	firm	stable	Slip resistant
Concrete	firm	stable	Slip resistant*
Soil with Stabilizer	firm	stable	Slip resistant
Soil with High Organic Content	soft	unstable	Not slip resistant
Crushed rock (3/4" minus) with Stabilizer	firm	Stable	Slip resistant
Crushed Rock w/o Stabilizer	firm	stable	Not slip resistant
Wood Planks	firm	stable	Slip resistant
Engineered Wood Fibers – that comply with ASTM F1951	Moderately firm	Moderately stable	Not slip resistant
Grass or Vegetative Ground Cover	Moderately firm	Moderately stable	Not slip resistant
Engineered Wood Fibers - that do not comply with ASTM F1951	soft	unstable	Not slip resistant
Wood Chips (bark, cedar, generic)	Moderately firm to soft	Moderately stable to unstable	Not slip resistant
Pea Stone or 1-1/2" minus Aggregate	soft	unstable	Not slip resistant
Sand	soft	unstable	Not slip resistant

Source: Adapted from Federal Highway Administration *Designing Sidewalks and Trails for Access, Part II, Best Practices Design Guide.*

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aggregate material with enough fines to ensure compaction. In no case should the maximum diameter of the crushed aggregate exceed 8 mm (3/8 in). Refer to VTrans Standard Drawings for Shared Use Paths for additional details.

For supplemental parallel jogging or equestrian paths, materials such as wood chips or natural (earth) surfaces may be used provided the main path consists of an accessible surface.

5.3.4 Grades

Shared use paths can be designed and constructed with various grades, depending on the level of accessibility being served and type of user anticipated.

On paths intended for use by pedestrians, grades should not exceed 5 percent to accommodate wheelchair users. ADA does allow for steeper grades, but requires provision of level “staging areas” at regular intervals.

Keep grades on paved shared use paths to a minimum, especially on long inclines. Grades greater than 5 percent are undesirable because the ascents are difficult for many path users to climb and the descents cause some path users to exceed the speeds at which they are competent or comfortable. On some shared use paths, where terrain dictates, designers may need to exceed the 5 percent grade recommended for short sections. As a general guide, the following grade restrictions and grade lengths are suggested:

- 5-6 percent for up to 240 m (800 ft)
- 7 percent for up to 120 m (400 ft)
- 8 percent for up to 90 m (300 ft)
- 9 percent for up to 60 m (200 ft)
- 10 percent for up to 30 m (100 ft)
- 11 percent or more for up to 15 m (50 ft)

(Source: 1999 AASHTO Guide for the Development of Bicycle Facilities)

If steeper segments are incorporated into the shared use path, the total running grade that exceeds 8.33 percent should be less than 30 percent of the total path length.

Where excessive path grades cannot otherwise be avoided, consider use of the following techniques:

- For paths with high levels of use, on steep grades, provide an additional 0.6-1.2 m (2-4 ft) of path width to provide room for slower bicyclists to dismount and walk.
- Use signs to alert bicyclists of the maximum percent of grade.
- Increase lateral clearances and recovery area dimensions.
- Provide a series of short switchbacks or level landing areas to contain the speed of descending bicyclists.
- Install a yellow centerline to better delineate travel lanes.

Additionally, if a stop condition is present at the bottom of an excessive grade a greater than minimum stopping sight distance should be used for design.

5.3.5 Cross Slope and Drainage

If water is allowed to stand on paved path surfaces, algae may grow in warm weather and ice may form in winter months. The recommended maximum pavement cross-slope grade is 2 percent (1:48) on paved surfaces, to meet ADA requirements and to provide positive drainage. Bank curves to no greater than 2 percent superelevation with the low side on the inside of the curve to help bicyclists main-

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tain their balance. On unpaved paths cross-slope can be as great as 5 percent, however less slope is preferred.

Sloping in one direction instead of crowning the path is preferred and usually simplifies the drainage and surface construction. On paved paths, a smooth surface is essential to prevent ponding. Pay particular attention to drainage on unpaved paths to avoid erosion.

Where shared use paths are constructed on hillsides, place ditches of suitable dimensions on uphill sides of the paths to intercept hillside drainage.

If tying into a closed storm water system, provide catch basins with drains where needed to carry the intercepted water away from the path. Locate drainage grates and utility covers at the outside edge of the path and flush with the path surface or off the path entirely. Install bicycle-safe drainage grates whenever catch basins are used in conjunction with shared use paths (refer to VTrans Standard Sheet D-15 and D-16). Set grates and utility covers flush with no raised edges, no greater than 1.3 cm (0.5 in) below the surface of the surrounding pavement.

To help prevent erosion in the area adjacent to the path, include methods for preserving the natural ground cover (i.e., seeding, mulching and sodding of adjacent slopes, swales and other erodible areas).

5.3.6 Barriers, Bridge Railings and Fencing

The placement of physical barriers adjacent to a shared use path serves many purposes including safety and security, protection from falls, screening of adjacent uses, separation of adjacent roadway or other conflicting uses (i.e., active rail line), vertical or grade separation, enhanced aesthetics (via berms, landscaping and plantings).

Design Considerations for Barriers

The design and selection of barriers adjacent to shared use paths is dependent on several factors including their intended function (i.e. protection from falls, separation of adjacent uses, delineation of property boundaries or screening), safety, proximity to the path, aesthetics and overall continuity of barrier type(s) within a path corridor.

Determining the Need for Protective Barriers

When the grade drops away severely from the shoulder of a pedestrian or bicycle travel way, protection from falls (provided by vegetation, fencing, or other physical barriers) may be required.

Determine the need to include protection along a shared use path on a case-by-case basis after evaluating the following factors:

- **Amount of recovery area available.** If an adequate recovery area (Dimension 'C' of Figure 5-6) is provided as outlined in Table 5-2, the need for a protective barrier is lessened.
- **Height.** The greater the height of a drop-off, the greater the need for protection. A protective barrier may be required when a vertical drop from the path surface to the base of the slope is more than 1.2 m (4 ft) in height,
- **Steepness of the slope.** Where the side slope is 1:3 or greater, the need for a protective barrier may be increased, unless the side slope material is forgiving (see next factor) or a suitable recovery area is provided.
- **Side-slope material.** If the material used on a side slope is grass, the need for protection is lessened. Shrubbery may also lessen the need for a physical barrier.

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Riprap is considered a harmful material where the need for a protective barrier is increased.

- **Nature of hazard on or at the base of the slope.** If the consequences of colliding with a protective barrier would be less than the consequences of a crash at the bottom of a drop-off, a protective barrier should be strongly considered.

Where protection is required, provide it along the full extent of the grade drop.

Barrier Types

Fences. Fences are the most common types of physical barriers used on shared use paths. When using fencing as a barrier any number of fencing types that meet the minimum requirements for height are acceptable including, wooden, picket fence, pipe railing, wrought iron decorative fencing or vinyl-coated chain link.

Walls. Retaining walls should not be placed closer than 0.6 m (2 ft) from the edge of the path. High walls should be terraced back from the edge of the path shoulder since they may be out of scale with creating a pedestrian friendly environment. Blank walls may be screened with landscaping or designed with an attractive face or artwork. Wall materials may also vary from cast in place concrete or precast concrete, masonry or laid up stonewalls.

Vegetation. Trees, bushes or other sturdy vegetation capable of stopping a fall may be used as a barrier if new or existing individual plants are continuously spaced no greater than 1.8 m (6 ft) on center within 3.0 m (10 ft) of the path along the full extent of the grade drop. The density and species of plants in a vegetative barrier determine how effective the barrier can be in deterring access and protection from falls. Planted barriers typically take a few years before they become effective barriers and may need to be augmented with other temporary barriers. Where existing natural vegetation exists every effort should be made to avoid damaging the natural vegetation during the construction phase of a project. Vegetation also provides a visual barrier that helps channelize path users to the main path surface.

Guardrail or Jersey Barrier. Where concrete “Jersey” type barriers or guardrail are used as protective barriers (i.e., between a roadway and an adjacent path or sidewalk) placement of a railing or fencing on top of the barrier may be necessary to achieve the required minimum barrier height of 1.05 m (3 ft 6 in). When used in this scenario the barrier must also meet the applicable NCHRP cash test requirements for the adjacent roadway.

When any of these barrier types are used for purposes other than protection (such as right of way delineation, screening or others) and they are located outside the recovery area of the path, the required barrier heights do not apply.

Barriers and Fencing Height

Protective hand railings, barriers and fencing that are independent of bridges should be at least 1.05 m (3 ft 6 in) high. Where a bicyclist’s handlebar may come into contact with a fence or barrier, a smooth, wide rub-rail should be centered at a height of 0.9 m (3 ft). Hand railings, barriers and fencing in locations where cross-country skiing or snowmobiling is not anticipated should be designed to allow as much sunlight as possible to fall upon the path so snow and ice may melt as quickly as possible. An important design feature of barrier adjacent to paths is to flare the leading end of the barrier away from the path so that it does not become a hazard itself.

Delineation

In some cases, a section of a shared use path may be located immediately adjacent to a driveway, parking lot or other improved surface. In these cases, it can be

Ohioville, PA



When closely spaced, trees, bushes or other sturdy vegetation capable of breaking and stopping a fall may be used in lieu of railings or fences

South Burlington



Equip protective railings where bicycle use is expected with rub rails centered at an average handlebar height of 0.9 m (3 ft).

Ohioville, PA



A simple railing can offer protection where a vertical drop along a path is more than 1.2 m (4 ft) in height.

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A shared use path may be delineated from a driveway, parking lot or other improved surface through the use of guardrail, fence or low landscaping.

hard to determine where the path ends and the adjacent facility begins. One way to delineate the two facilities from each other is through the installation of a physical feature, such as guardrail, fence or low landscaping. When a guardrail or fence is used for this purpose (i.e., not as a barrier to protect from hazards or falls), it does not need to meet the minimum height requirements for fencing as long as it is located with adequate lateral clearance from the path. When delineating the right-of-way with fencing it is recommended that woven wire mesh or traditional chain link fencing be used.

Barriers Adjacent to Roadways

Where a guardrail is used as a barrier between a path or sidewalk and an adjacent facility and the back of the rail is 1.2 m (4 ft) or less from the edge of the path, a pipe rail or wooden rub rail should be mounted on the backside of the guardrail. When a W-beam guard rail with timber posts is used, and the sidewalk or path is 1.2 m (4 ft) or less from the back of the post, one of the following treatments of bolt ends should be used:

- Trim back the bolt flush with the face of the nut, or
- Countersink washers and nuts 25 to 38 mm (1 to 1½ in) deep.

Bridge Railings

The minimum height of a protective bridge railing is 1.05 m (3 ft 6 in). Where wintertime use of a shared use path is likely, the minimum height of a protective bridge railing is 1.35 m (4 ft 6 in). Railings on bridges should be designed so that a 15 cm (6 in) diameter sphere cannot be passed through the bottom 70 cm (27 in) of the bridge railing and a 20 cm (8 in) diameter sphere cannot be passed through the portion of the bridge railing above 70 cm (27 in). Additionally, bridge railings should be designed to discourage climbing.

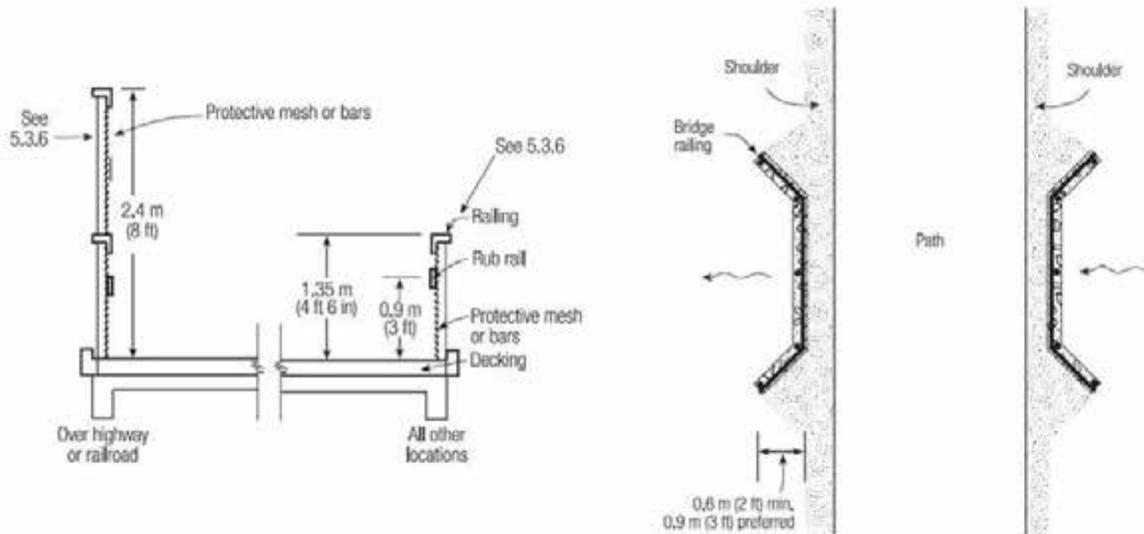


Figure 5-8.
Bridge Railings.

Where a path bridge spans a highway or railroad track a 2.4 m (8 ft) high barrier fitted with wire mesh to the full height of the barrier may be provided along both

sides of the bridge to deter objects from being thrown from the path onto the facility below. This option should only be installed where this has been determined to be a problem.

5.3.7 Design Speed, Horizontal Alignment and Stopping Sight Distance

Engineering guidelines for bicycle design speed, horizontal alignment and stopping sight distance contained in AASHTO’s 1999 edition (or current version) of the *Guide for the Development of Bicycle Facilities* are hereby made a part of this manual. Refer to the AASHTO Guide for relevant data tables and formulas. A brief summary of these topics is provided below.

Design Speed

Design shared use paths for a selected speed that is at least as high as the preferred speed of experienced (Group A) bicyclists. In general, this requires using a design speed of 30 km/h (20 mph) for paved or hard surface paths. Lower design speeds should not be selected to artificially lower user speeds. When a downgrade exceeds 4 percent for up to 240 m (800 ft) or more a design speed of 50 km/h (30 mph) should be used for such sections.

On unpaved paths, where bicyclists tend to ride more slowly, a lower design speed of 25 km/h (15 mph) may be used. Where the steeper grades on an unpaved path dictate, a higher design speed appropriate for conditions should be used.

Cross-slope/Super Elevation

Since most shared use paths built in the United States must also meet the requirements of the Americans with Disabilities Act (ADA), ADA guidelines require that cross slopes not exceed 2 percent (1:48) on paved surfaces and 5 percent (1:20) on unpaved surfaces. For most shared use paths, the maximum superelevation rate will be 2 percent (1:48). When transitioning a 2 percent (1:48) superelevation, provide at least 7.5 m (25 ft) transition distance between the end and beginning of consecutive and reversing horizontal curves.

Horizontal Alignment

The horizontal alignment, or curvature, of a path is dependent on the design speed, lean angle of bicycles and cross slope or superelevation of the path. The maximum practical lean angle of a bicycle is 25 degrees (before a pedal strikes the ground) and most bicyclists are not likely to lean more than 15 to 20 degrees. The AASHTO Guide for the Development of Bicycle Facilities (AASHTO Bike Guide) gives the following equations for calculating a minimum curve radius for different speeds and lean angles:

For Metric Units:

$$R = \frac{0.0079 V^2}{\tan A}$$

Where:

- R = Minimum radius of curvature (m)
- V = Design Speed (km/h)
- A = Lean angle from the vertical (degrees)

For English Units:

$$R = \frac{0.067 V^2}{\tan A}$$

Where:

- R = Minimum radius of curvature (ft)
- V = Design Speed (mph)
- A = Lean angle from the vertical (degrees)

The AASHTO Bike Guide also provides formulas for calculating curve radii when the lean angle approaches 20 degrees and the radius becomes more of a function of superelevation, coefficient of friction between the path and bicycle tires and bicycle speed. However, since the majority of path users are less experienced bicyclists and use of the previous equations yield slightly more conservative values, these

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will be used. The following table gives minimum curve radii for different design speeds:

Table 5-4
Desirable Minimum Radii for Paved Shared Use Paths Based on 15 Degree Lean Angle

Design Speed (V)		Minimum Radius (R)	
km/h	(mph)	m	(ft)
20	(12)	12	(36)
25	(15)	18	(56)
30	(20)	27	(100)
40	(25)	47	(156)
50	(30)	74	(225)

Where project constraints such as right-of-way, topographical or environmental resources require that curve radii smaller than those shown in Table 5-4 be used, standard curve warning signs and supplemental pavement markings, such as centerline stripes should be installed in the vicinity of the curve. Widening the path through the area of the curve can further mitigate the negative effects of sharp curves. It is not necessary to provide a STOP or YIELD condition where these curves are located. However, it is common for paths to incorporate less than minimum radius curves as they approach a STOP condition. In that case apply the guidance as stated above.

Stopping Sight Distance

Adequate stopping sight distances provide bicyclists with an opportunity to see and react to the unexpected. The 1999 AASHTO *Guide for the Development of Bicycle Facilities* contains tables for minimum stopping sight distance for various conditions. These tables can be found in the Appendix of this manual.

Where there is an sight obstruction on the inside of a curve that restricts sight distance consider:

- Widening the path through the curve.
- Installing a yellow centerline stripe.
- Installing a curve ahead warning sign in accordance with the MUTCD, or some combination of these alternatives.

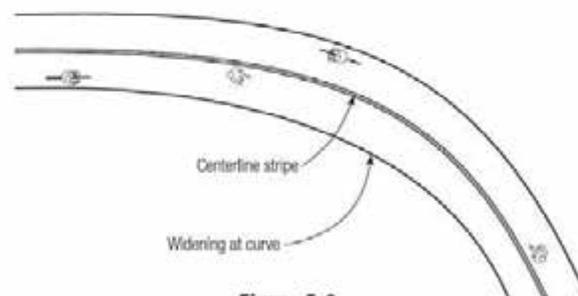


Figure 5-9.
Plan View of Shared Use Path Striping.

5.3.8 Roadway and Railroad Crossings

Path users are particularly vulnerable where a shared use path crosses a roadway. Consideration should be given to providing signing, lighting, pavement markings and other design elements to enhance safety at all shared use path and road crossings.

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Minimize roadway and driveway crossing points as much as possible. Grade separation of paths is not generally feasible, therefore paths must connect to the street system and destinations in a safe and convenient manner.

An overall guiding design principle is that path/roadway intersections should be designed to look and function like regular road intersections, so that motorists and path users know what to expect and how to operate around the intersection. Refer to VTrans Standard Drawings - Path/Road Crossing Details and Shared Use Path Pavement Markings and Sign Details - for design details of intersections. Intersections should be designed using the following additional considerations:

User Considerations

- Design for the full spectrum of path users, young and old, slow and fast, pedestrians, bicyclists, skaters, and others.
- When assigning rights-of-way, give path users at least the same rights as the motoring public and provide clear right-of-way assignment.
- Provide positive guidance for path users and motorists to ensure full awareness of the intersection; for example, identify the crossing and who has the right of way.
- Design to assist the path user in looking in the direction of the potential hazard.
- Consider the potential for sun blinding.
- Consider lighting.
- Be consistent in design.

Physical Features

- Align the path as close to perpendicular to the road as possible, but not less than 70°.
- Minimize conflicts and separate conflicting movements.
- Design unavoidable conflicts to occur at right angles.
- Optimize sight triangles, with consideration for stopping, intersection crossing and decision sight distances. Make conflicts clearly visible.
- Reduce motor vehicle speed through traffic calming techniques as appropriate.
- Minimize path user crossing distance with a median refuge island or by narrowing the roadway as appropriate.
- Provide adequate staging and refuge areas for path users.
- Avoid obstacles and visibly highlight unavoidable obstacles.

Access

- Treat every road as a potential path entrance and exit point, integrated with sidewalks and on-street bicycle facilities as appropriate.
- Discourage unauthorized motor vehicle intrusion onto the path while enabling emergency, patrol and maintenance vehicle entry.

Signals

- At signalized intersections, minimize path user delay by minimizing traffic signal cycle time.
- Provide adequate signal crossing time for design pedestrians.
- At pedestrian-activated signals, consider the need for audible or vibro-tactile features.
- Consider the affect of vehicle turning movements on nearby path crossings.

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Pavement Markings at Path Crossings

Where shared use paths cross roadways, designers need to decide whether the crossing should include pavement markings. There are three ways to treat a path crossing:

- Use no pavement markings at the crossing location.
- Mark the crossing with standard pedestrian crosswalk markings.
- Mark the crossing with dotted guidelines, as indicated in the MUTCD.

One difference between a standard crosswalk marking and the dotted guideline is that use of the standard crosswalk marking will legally define the crossing as a crosswalk (VSA Title 23 Chapter 1 §4 (7) B). If a standard crosswalk is used, appropriate warning and advance warning signs need to be installed. It is standard practice to place crosswalks as close to perpendicular to traffic as possible. For details of both marking types, refer to Chapter 8, Signs, Pavement Marking and Signals.

Path users should be expected to use caution when crossing a roadway and pavement markings should only be provided where needed to raise motorists' awareness of the presence of a crossing or to provide path users with additional crossing guidance.

Designers should consider the following factors when deciding what level of marking is appropriate:

- Anticipated path volume.
- Traffic volume of the road being crossed.
- Number of lanes being crossed.
- Design or posted speed of the road being crossed.
- Anticipated types of path users.

Designers should also refer to the table in Chapter 3, Pedestrian Facilities for guidelines on appropriate locations for marked crosswalks. Marked crosswalks can be used to provide guidance to path users when the continuation of a path on the other side of the road is unclear. Where vehicle ADT exceeds 9,000 or the speed limit is 60 km/h (40 mph) or above, consideration should be given to locating the path crossing at a location where motorists are more likely to expect crossing movements or adding traffic control devices to facilitate safe crossings for path users.

Crossing multi-lane roadways

Where three or more lanes are being crossed, a marked crossing with a refuge island should be provided. The safety of path users will be more greatly enhanced by the installation of a refuge island than by only marking the crossing.

At-grade path/roadway crossings may be categorized into three main types:

- Mid-block.
- Parallel path.
- Complex intersection.

Each of these types may cross any number of roadway lanes, divided or undivided, with varying speeds and volumes, and may be uncontrolled, or more typically, sign or signal controlled. Medians and refuge islands may be part of the design.

Mid-Block Crossings

Mid block crossings are situations in which the path crosses a roadway far enough from any other intersection so as to be considered an independent intersection.

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Ideally, path crossings should be at right angles to the roadway. Where the path alignment approaches a roadway alignment at an angle, provide an optimal 90-degree path approach and crossing as shown in Figure 5-10. If right-of-way is a constraint in providing for design speed curvature, the crossing may be angled a maximum of 75 degrees, thus reducing right-of-way requirements. This slight compromise will lengthen a crossing by only 4 percent.

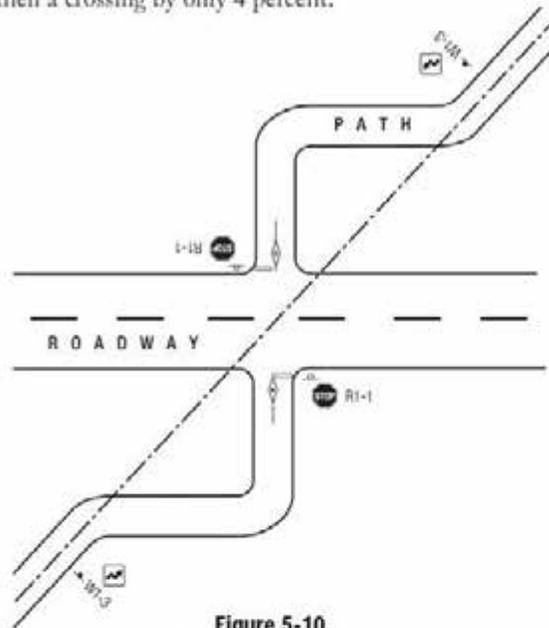


Figure 5-10.
Diagonal Mid-block Roadway Crossing.

Parallel Path Crossings

Parallel path crossings occur where a path closely parallels a roadway and crosses another roadway near the intersection. With this configuration, the path user is faced with potential conflicts with vehicles turning from the parallel roadway and the crossed roadway.

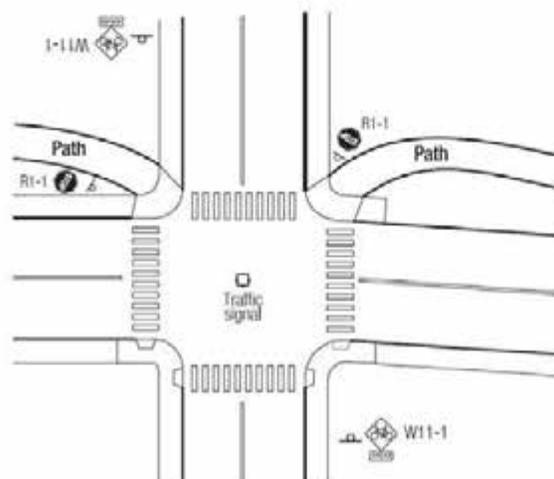


Figure 5-11A.
Parallel Path Roadway Crossing Using Existing Crosswalk.

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Figure 5-11B

Parallel Path Roadway Crossing. Provide Separation Between Path Crossing and Intersection

The major road may either be the parallel or the crossed roadway. Right-of-way assignment, traffic control devices and separation distance between the roadway and path greatly affect the design of this type of intersection. When this situation occurs two design options exist:

- Bring the path up to the intersection and encourage the use of existing crosswalks as shown in Figure 5-11A, or
- Increase separation between the path and road crossing and the intersection (see Figure 5-11B).

Further complicating the situation is the possibility of the conflicts being unexpected by both path users and motorists. Clear sight lines across corners are especially necessary.

Where a path crosses a roadway at an intersection, improve the path alignment to increase the visibility of approaching path users. This may be accomplished by curving the path slightly, so that it is not parallel to the adjacent roadway as shown in Figure 5-11A.

Complex Intersection Crossings

Complex intersection crossings include a variety of configurations at which the path crosses directly through or near a roadway intersection and there may be any number of vehicular turning movements. View the junction from the perspective of

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both the path user and motorist, and pay careful attention to potential conflicts from turning motor vehicles.

In certain situations a two-step crossing for path users may help isolate conflicts. This is typically done where, because of alignment constraints, the path-roadway intersection is skewed markedly from the 90-degree optimum and path realignment is not possible. If another intersecting roadway complicates the situation, a two-step crossing can establish right angle or nearly right angle maneuvers to simplify the crossing. Where an original path alignment would appear to be a more direct route to path users, use controls (such as path alignment and signs) to encourage path users to use the two-step crossing instead of the most direct route.

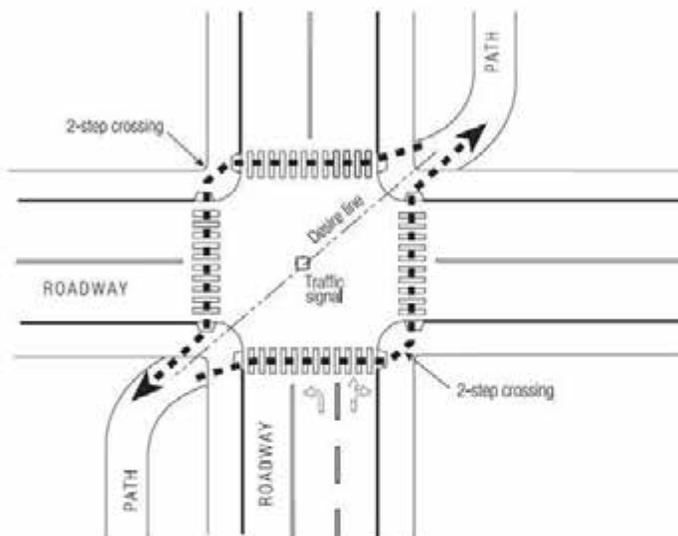


Figure 5-12.
Complex Intersection Crossing.

Complex intersection crossings have many configurations and no single solution applies. Follow the principles of good intersection design listed above assisted by sound engineering judgment.

Medians and Refuge Islands

Medians and refuge islands make it easier for path users to cross busy roadways. Consider refuge islands when one or more of the following conditions apply:

- High volumes of roadway traffic result in long delays to path users,
- Road width results in excessive exposure to traffic,
- The crossing will be used by a number of people who cross more slowly, such as the elderly, school children or people with disabilities, or
- When crossing three or more travel lanes.

Design refuge islands large enough to accommodate platoons of users, including groups of pedestrians, bicycles, tandem bicycles (which are considerably longer than single bicycles, especially if they are towing a child trailer), wheelchairs, people with baby strollers and equestrians (if this is a permitted path use).

The refuge island width should be a minimum of 2.4 m (8 ft) with a preferred width of 3.0 m to 3.7 m (10 to 12 ft) depending upon path usage. Angle the opening

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in the refuge island at 30 degrees so that path users waiting in the refuge island are forced to observe oncoming traffic in the far travel lane(s) of the roadway before completing the crossing. Provide adequate space so that those in the refuge island do not feel threatened by passing motor vehicles while waiting to finish the crossing.

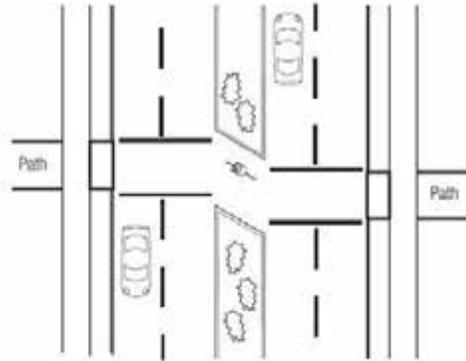


Figure 5-13.
Roadway Crossing with Median.

5.3.9 Managing Motor Vehicle Access

Where paths intersect with the road network, provision should be made to restrict motor vehicles from entering the path. Refer to VTrans Standard Drawing Railroad/Road Crossing Details for details. Unauthorized vehicles can be discouraged from entering paths through the use of gates, splitter islands, short curb radii, and bollards.

Gates

Gates can be designed to allow passage for pedestrians and bicycles while barring access to motor vehicles. However, gates are the least effective way to limit unauthorized vehicle use because they can also limit authorized users, they are expensive to maintain and they are vulnerable to vandalism.

Splitter Islands

Motor vehicles can be restricted from entering paths through the use of a split path configuration. In this configuration, a two-way path branches into two one-way paths just before it reaches the roadway, making it difficult for a motor vehicle to gain access to the path. If the area between the one-way paths is designed with low vegetation and no fixed objects, emergency vehicles can drive over the splitter island if it becomes necessary to gain access to the path. When splitter islands are used appropriate signing and striping for path users should be provided.

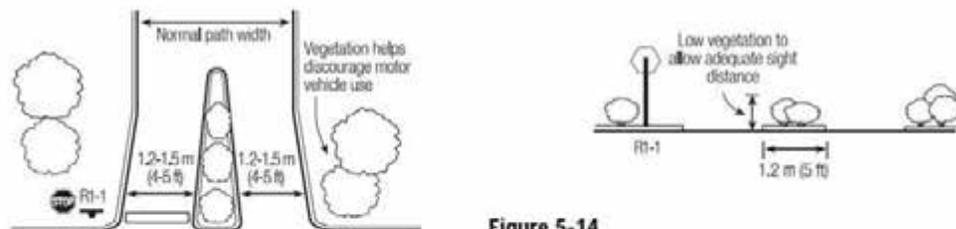


Figure 5-14.
Splitter Island.

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Short Curb Radii

Short curb radii 1.5 m (5 ft) in length make it difficult for motorists to enter a path from a roadway.

Bollards

Bollards (barrier posts) may be used to limit vehicle traffic on paths. However, bollards can be a hazard, particularly under low light conditions to bicyclists who do not see or expect them.

Space bollards at least 1.5 m (5 ft) apart to permit easy passage by bicyclists, bicycle trailers and wheelchair users. Where unauthorized motorized use such as ATV's and snowmobiles are a problem a minimum of 0.9 m (3 ft) separation is recommended. However, reduced bollard spacing should only be considered where a specific problem has been identified. On two-way facilities, a single bollard should be centered in the path. If more than a center bollard is needed, an odd number of posts should be used, with the outside bollards placed outside the edge of the paved area at the path edges.

Bollards, when used, should also be set back from the intersection by 1.5 m – 3.0 m (5-10 ft) behind the path stop bar and should include a Type II object marker on both sides for nighttime visibility. Where bollards are used on paved paths pavement markings around the bollards should be provided as shown in Figure 5-15.

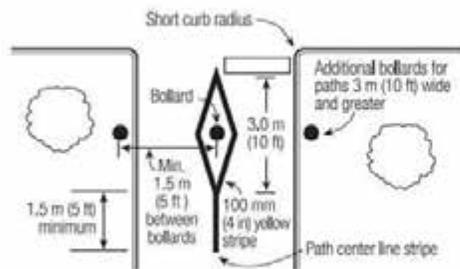


Figure 5-15.
Bollards.

Bollards may be used to manage motor vehicle access.

Chicanes

There is a type of barrier that is not recommended for use where a shared use path crosses a roadway. This barrier type includes chicanes or “bicycle mazes” that require bicyclists to dismount and negotiate the barrier one person at a time. Chicanes can pose a hazard to path users for the following reasons:

- Like bollards they place a physical obstruction within the path of users. However, the maze-like effect of a chicane can greatly increase the probability of a crash.
- A chicane creates an obstacle for path users crossing the street which increases the likelihood that platoons of path users may be trapped in the roadway and exposed to traffic longer than a traditional stop condition.
- To adequately accommodate the varying dimensions of path users including tandem bicycles, bicycles with trailers, wheelchair users, the visually impaired or equestrian users, the dimensions of the chicane may be such that the maze effect is lost, thus reducing its intended effect.
- Path users may divert away from the chicane and bypass it altogether.

Brunswick, ME



Bollards may be used to manage motor vehicle use ...

Brunswick, ME



... but need to be designed to permit access for maintenance and emergency vehicles.

Beebe Plain - Beebe Spur Rail Trail



Wood bollards help maintain a rustic appearance.

Confluence, PA



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PEDESTRIAN AND BICYCLE FACILITY PLANNING AND DESIGN MANUAL

- Chicanes limit authorized emergency and maintenance vehicle access to the path.

For these reasons chicanes are not recommended for use where a shared use path crosses a roadway. Designers should design intersections using the concepts and guidance provided in section 5.3.8 and general transportation design principles. Designing intersections that look and function like traditional vehicle intersections supports road and path user expectations. Problems associated with at-grade path crossings often relate to motorists' expectations of entries onto the roadway. The best practice is to follow established principals of intersection design and provide signing, lighting, pavement markings and enforcement, if problems occur, to enhance safety at path roadway intersections.

5.3.10 Structures

Structures such as bridges or underpasses can provide continuity along a shared use path.

In most cases, the rail-to-rail clear bridge width should equal the approach width plus a shy distance of 0.6 m (2 ft) on each side of the bridge. In rare instances it may be appropriate to reduce the shy distance to 0.3 m (1 ft) on each side. However, this should only be done if all of the following criteria are met:

- Overall path use is expected to be low.
- Bicycle traffic is expected to be low, even on peak days and hours.
- To reduce the total footprint of the project.
- Where frequent stopping of path users on the structure is not anticipated.
- When adapting an existing structure.
- Approaches to the bridge provide adequate sight distance.
- Good horizontal and vertical alignment is provided.

Carrying a clear area across a structure has two advantages. First, the clear width provides the minimum horizontal shy distance from the railing or the barrier, and second, it provides needed maneuvering space to avoid conflicts between path users who may have stopped on the structure. Therefore, in most cases the minimum structure width would be 3.6 m (12 ft) rail to rail.

In establishing the design clearances of shared use path structures, plan for access by maintenance, patrol and emergency vehicles. Similarly, vertical clearance should be designed with such vehicles in mind. In any case, a minimum vertical clearance of 2.4 m (8 ft) is required for all structures. A vertical clearance of 3 m (10 ft) is preferred. Where snowmobile grooming equipment is anticipated, a 3 m (10 ft) clearance is desirable, as is a 3.6 m (12 ft) clearance for equestrian users.

Bridges

Bridges are among the most challenging design elements of shared use paths because each one is site specific. Safety is the primary concern in bridge design. Determine its design load (or structural capacity to support and withstand predictable weights and forces during its projected life span) through engineering analysis.

Many paths use prefabricated bridges, which are pre-engineered, constructed off-site, delivered to the site by the manufacturer for final assembly, and placed onto footings by a crane. Bridge design should accommodate light duty maintenance and emergency vehicles. The current practice for shared use path bridges is H10 loading or a 10-ton load for a two-axle vehicle.

An important element of the overall bridge design is its approach. For safety reasons, and because bridges tend to be a natural stopping point for path users,

Shaw



Many trails use prefabricated bridges, which are pre-engineered, constructed off-site, delivered to the site by the manufacturer, and lifted onto appropriate footings by a crane.

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approach railings should extend at least 4.5 m (15 ft), or for the full extent of the steep side slope, from each end of the bridge and should be flared out where possible. Avoid sharp curves and 90 degree turns at bridge approaches.

If decking is used on a bridge, place it transversely across the bridge (90 degrees to the direction of bicycle travel) to avoid joints that may trap and stop a bicycle wheel. Construct bridge railings in accordance with the guidance provided in Section 5.3.6.

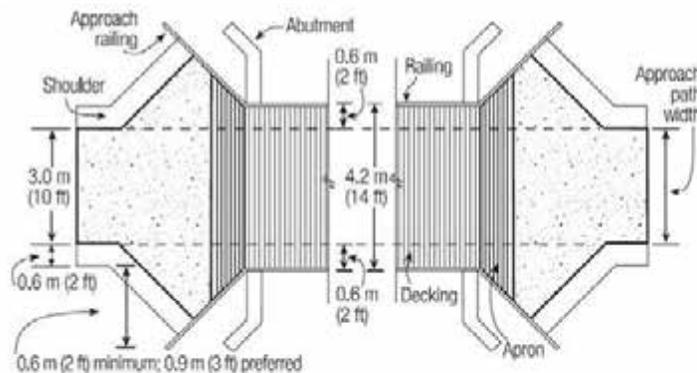


Figure 5-16.
Bridge Decking and Approaches.

Where it is necessary to retrofit an existing highway bridge to accommodate a shared use path, consider several alternatives in the context of the existing bridge geometrics.

One option is to carry the shared use path along one side of the bridge. This method is preferred where:

- The bridge facility will connect to a path at both ends.
- Sufficient width exists on that side of the bridge or can be obtained by narrowing or restriping the motor vehicle travel lanes.
- Provisions are made to physically separate path users from motor vehicle traffic.
- The capacity of the structure will permit cantilevering a shared use path off the existing roadway bridge.

Another option is to provide either wide curb lanes or bicycle lanes over the bridge. This may be advisable where:

- The shared use path transitions into bicycle lanes at one end of the bridge and
- Sufficient width exists or can be obtained by narrowing or restriping the motor vehicle travel lanes.

This option should only be exercised if the bike lane or wide outside lane can be accessed without increasing the potential for wrong-way riding or inappropriate crossing movements.

Because of the large number of variables involved in retrofitting bicycle facilities onto existing bridges, compromises in desirable design criteria are often inevitable. The width to be provided is best determined by the designer, on a case-by-case basis, after thoroughly considering all the variables.

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Underpasses and Overpasses

There are both advantages and disadvantages to underpass and overpass structures.

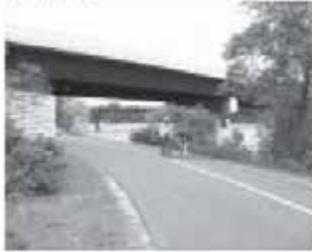
Underpasses provide an opportunity to reduce approach grades as the 3 m (10 ft) clearance is less than the clearance required for a path over a roadway or railroad. If a roadway is elevated, an under crossing can be constructed with little or no change in grade. Therefore, under crossings are often less expensive to build.

Under crossings, however, may present security problems due to the reduced visibility and light levels. An open, well-lit structure may cost as much as an over crossing. Underpasses may also require drainage if the low point is at a lower elevation than the surrounding terrain.

A vertical clearance of at least 3 m (10 ft) is preferred for under crossings. However, a minimum clearance of 2.4 m (8 ft) may be acceptable if a greater clearance is not needed for maintenance or emergency vehicles, and users approaching the structure have an unobstructed view all the way through the underpass. Illumination is needed in under crossings where visibility is poor, however, light fixtures should be designed to withstand vandalism.

Overpasses are more open and present fewer security problems. However, overpasses typically require longer approaches to achieve the standard 5 m (17 ft) clearance required over most roadways and 7 m (23 ft) over most railroad tracks. When the depth of the overpass structure is taken into account, approach ramps configured at a 5 percent grade could be required as much as 150 m (500 ft) in each direction, or as much as 300 m (1,000 ft) overall.

Brunswick, ME



A vertical clearance of at least 3 m (10 ft) is preferred for undercrossings.

Oriskany, PA



Brunswick, ME



Shared use paths should include frequent rest areas and benches, preferably shaded from the elements seasonally.

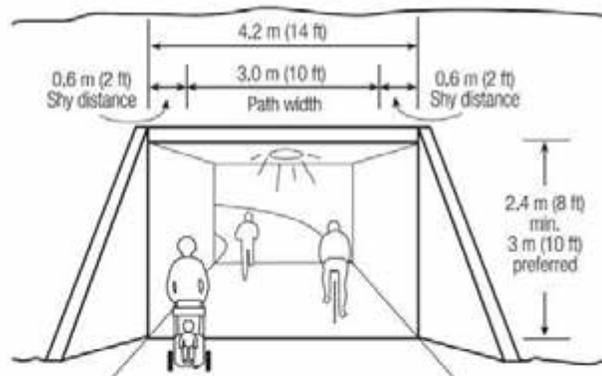


Figure 5-17.
Shared Use Path Underpass.

5.3.11 Supplemental Facilities and Amenities

As with other pedestrian facilities, shared use paths should include frequent rest areas and benches shaded from the sun. Picnic tables also add to the attractiveness and usefulness of a path. Other amenities may include lighting, drinking fountains, mile markers etc. Refer to Chapter 9, Landscaping and Amenities for guidance regarding amenities.

5.4 Construction Zones and Temporary Access

If construction on or adjacent to a shared use path is necessary, consideration should be given to the provision of temporary traffic controls to warn and direct path users and to allow workers to safely achieve their task. Continuity of the access provided by the path is a key consideration in establishing temporary traffic controls. For a more detailed discussion, refer to Section 8.4.4.

5.5 Additional Resources

Consult the following resources for the broadest coverage of issues relating to the planning and design of shared use paths:

- *Designing Sidewalks and Trails for Access: Best Practices Design Guide*, Federal Highway Administration, 2001.
- *Guide for the Development of Bicycle Facilities*, American Association of State Highway and Transportation Officials (AASHTO), Washington, DC, 1999.
- *Manual on Uniform Traffic Control Devices*, Millennium Edition, Federal Highway Administration, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, 2000.
- *Trail Intersection Design Guidelines*, Florida DOT, available via the Internet, 1996.
- *Trails for the Twenty-First Century*, Second Edition, Rails-to-Trails Conservancy, 1100 17th Street, N.W., Washington, DC 20036.
- *Universal Access to Outdoor Recreation: A Design Guide* (USDA Forest Service and the PLAE).

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Section 4 Bicycle Amenities



Boardwalk

Wood surface trails, or boardwalks, are often required when constructing trails through wetlands or other wet areas.

Wood surface trails must be designed with 42” to 54” rails for surface heights over 30”. For surface heights below 30” a rail is still a good idea to protect bicyclists and pedestrians.

Surface decking should be constructed of wood or alternative recycled products and should have a thickness of at least 2”. The foundation is typically constructed using wooden posts or piers of other moisture resistant material.



Railings and Fences

Railings and fences provide protection to bicyclists and pedestrians in hazardous or potentially hazardous areas, such as wetlands, parking areas, changes in adjacent elevation, and adjoining rail lines.

The design of a specific rail or fence is dependent on the type of hazard being protected from. Railings and fences are typically 42” to 54” in height and are often split-rail design.



Trail Bridge

Bridges are often necessary to provide access over waterways along trails. The type and design of bridges is dependent on the type of waterway and the required span length.

Bridges can be constructed on site or prefabricated and can be constructed of many different materials. Design and material will be dependent on the project budget as well as long term maintenance goals.



Trail Overpass

Trail overpasses provide access over larger features, often highways, railroads, and other large obstructions. Overpasses are usually extremely expensive and should only be considered when all other options have been determined to be unfeasible.

Overpasses must be designed by license professional and each design will be dependent on the specifics of the particular project.

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Trail Underpass

Underpasses are a method of crossing larger features, often arterial roads, railroads, and other large obstructions when other options are not feasible. As with overpasses, underpasses need to be designed by an engineer. Existing structures, such as rail tunnels, may also be considered when deemed safe by an engineer.



Underpasses require considerable planning with respect to lighting, drainage, and safety. Longer underpasses are often areas of safety concern for bicyclists and pedestrians.

Trail Heads

Trail heads are usually established near transportation routes and commercial areas and often serve as a starting point, ending point, or rest stop for a trail. Trail heads can include parking areas, trash receptacles, information kiosks, and trail maps. Larger trail heads may also include restrooms, water fountains, bicycle racks, and sometimes small bicycle or pedestrian related retail shops.



Cost can range significantly based on the size, provided amenities, and design.

Benches

Benches are a nice amenity along paths and trails as well as all other bicycle and pedestrian facilities. Benches can be provided by themselves or in combination with covered shelters, picnic areas, rest areas, or other amenities.

Trash Receptacles

Trash receptacles are one amenity that is often controversial with respect to bicycle and pedestrian facilities. Many trails have a “carry in, carry out” policy where trash receptacles are not provided and users are required or encouraged to take all trash with them when they leave the facility. This policy decreases required maintenance and encourages a more environmentally friendly environment. However, without trash receptacles, some users will discard trash wherever they see fit. Projects should be reviewed individually to determine whether receptacles should be provided based on the anticipated use of the facility.



If trash receptacles are provided, consideration should be given to en-

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sure the design and construction are appropriate for the environment, that they are resistant to animals, and they have an appropriate capacity based on the frequency of maintenance and collection. Where practical, recycling options should also be provided with trash receptacles.

Lighting



Lighting should be considered for trails or facilities which are open to the public from dusk to dawn. As lighting requires additional upfront project cost as well as ongoing maintenance, consideration should be given during the planning stage of a project to determine hours of operation. As it is often difficult to prevent access to trails during after-hours, lighting may be necessary in certain portions of a facility based on anticipated usage.

Lighting in off-road areas away from development is usually not appropriate as it takes away from the natural environment. Consideration should be given to environmentally friendly alternatives, such as solar-powered lighting, and LED or other low usage lighting where appropriate.

Proposed lighting should also be reviewed with respect to potential disturbances to neighboring properties and natural wildlife.

Bike Sharing



Bike sharing is an amenity which is growing in popularity, especially in major urban areas. European cities such as Copenhagen, Stockholm, Helsinki, Paris and others have much experience with this concept. American cities such as Washington, D.C. and Denver have also implemented such systems. The city of Philadelphia recently completed a concept study to determine the potential success of a bike share program.

The basic concept of bike sharing is to make bicycles available for shared use by those who do not own, or have other access to, bicycles. Bike sharing programs can be run by local community groups or non-profit organizations, as well as municipalities and public-private partnerships. Bike sharing can be simple operations with bicycles available at a park office, or can be very sophisticated with automated vending machines in various locations throughout a city or community.

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Bicycle Parking (Racks and Lockers)

Bicycle parking can be as simple as providing bicycle racks in appropriate locations or can be as sophisticated as having attended bike parking facilities with security and personal amenities.

Simple bicycle parking should be planned with respect to design and location so racks are provided in a convenient and safe location. The design of the racks should be carefully considered to ensure a user’s ability to safely and securely attach their bicycle to the rack. In general, a simple inverted “U” rack is the most preferred design by bicyclists as it provides secure attachment points for the frame and front tire. Traditional “comb” racks with vertical slots for a front tire are not encouraged as they do not provide support for the bicycle and do not provide secure attachment points for the bicycle frame.

While bicycle racks are appropriate for short term parking, secure parking may be required for longer term parking such as bus or train stations where a bicycle may remain unattended on a consistent basis for several hours or more. In such cases, bicycle lockers, such as the one shown in the above photo, may be appropriate. In larger urban areas, as well as some parks and recreation areas, attended facilities may be appropriate, where bicycles can be safely stored. These facilities often include other amenities such as lockers and showers for the bicyclists .

The association of Pedestrian and Bicycle Professionals has recently released an update to the 2002, first edition Bicycle Parking Guidelines. The 2010, second edition is a more comprehensive resource that addresses the many innovation sin bicycle parking including event bicycle parking, sheltered bicycle parking, tricycle transit centers, maintenance, site planning and sample parking requirements and rates. www.apbp.org.

Bicycle Stations

Bicycle stations are amenities which can provide supplies for bicyclists, such as air, bicycle tubes, and patch kits. Bike stations can be as simple as a booth at a facility or as sophisticated as the “Trek Stop” shown in the photos to the right. Trek is a bicycle company which is test marketing their new concept in several cities throughout the country. Bicycle stations are also seen as temporary amenities at community events and bicycle rides and are often run by local organizations, bike clubs, or bike shops.



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Bicycle Access – Public Transportation

Providing a means for users of public transportation to take their bicycle along with them is vital to encouraging the use of bicycles and public transportation. Users can ride to the public transportation site, then ride a bus or train, then complete their trip on their bicycle. Most public transportation providers now provide bicyclists the ability to take their bicycle with them, usually with front mounted bicycle racks on buses.

Public transportation should be monitored to ensure their programs allow for the transport of bicycles in a safe and convenient manner.

Public Art

Art along trails, paths, and other facilities can provide many advantages to the community, including:

- 1) Aesthetic enhancement to the facility.
- 2) A place for local artists to display their work.
- 3) An encouragement for bicyclists and pedestrians to use a facility.
- 4) Functionality with some doubling as places to sit, relax or play.

Parking Areas

Parking areas are an amenity which may be appropriate in certain locations where bicycle or pedestrian facilities are destination oriented; where one would need to drive to a facility in order to make use of it. Not all bicycle and pedestrian facilities need parking. As bicycle and pedestrian activities are promoted as a way to enhance quality of life and to create a healthy community, the promotion of driving to a facility and the creation of impervious parking areas are often counter-productive.

New facilities should be analyzed with respect to the user types, existing links to the facility, availability of nearby parking, potential parking partnerships (shopping center, schools, etc...), and availability of public transportation to the facility.

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Section 5..Bicycle Occupancy Permit (BOP)

BOP ! to the Issue !



Most of us have probably never heard of the BOP... But you will be surprised how this little word can have a BIG effect... Here's how:

Bike Lanes

Bike lanes, traffic calming, safe routes to school, streets that welcome activity and interaction, streets that don't kill children but welcome them – this is the future.

The past? Being able to zoom up our streets at 50 miles per hour, just to get to the next traffic light. Sedentary lives detached from healthy activities and movement. Using up non-renewable energy sources. Clogging up streets with private cars at the expense of the community through which they pass, without giving a thought about how our everyday actions affect the world around us – as if the world were something detached from us, something in another galaxy, far, far away...

With an eye toward the future, some very cool bike lanes are being installed all over the United States – not only in Portland Oregon and New York City – but also in Indianapolis, in Philadelphia, in Doylestown, and in many other communities around us.



Bike lanes are not just for the avid biker. More and more, they are being designed for the casual user – for you and me, and for our moms and dads, and spouses and kids. Safer designs are being implemented, buffered from high speed traffic and with better street crossings, which also protect pedestrians. And the bike lanes are connecting us not only to our corner grocery store, or to the neighborhood or community next door – but also to a regional trail network in Southeast Pennsylvania, southern New Jersey, and northern Delaware.

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Bike lanes are a cheap and effective way to change the way traffic moves in your community – and, in combination with streetscape and street crossing improvements, can make your community safer and a better place to live.

The PA Department of Transportation encourages implementation of bicycle lanes thru its overarching **Smart Transportation Policy**. Amongst its many other recommendations, including construction of “Complete Streets”, the policy states that “due to limitations of shared use paths [in other words, trails], states and local governments should emphasize bike lanes and compatible shared roadways to accommodate bicycle use.”

Yet, PennDOT is not “bopping” to its own rhythm! While at the top levels PennDOT wants to see Smart Transportation happen, when it comes time to build bike lanes the issue becomes one of penny-pinching and fear of lawsuits. That is where the Bicycle Occupancy Permit (BOP) comes in...

The Bicycle Occupancy Permit (BOP)

The Bicycle Occupancy Permit (BOP) is a permit that PennDOT requires all municipalities to sign if they want to stripe bike lanes located on state roads. The two main issues that municipalities have with the terms of the BOP are maintenance and liability:

Maintenance: The BOP requires individual municipalities to accept full responsibility (and cost) for maintaining bike lanes on state owned roadways, including snow removal, pavement markings, and signs. Most municipalities are not willing to accept the maintenance responsibilities because it is redundant with PennDOT’s work, requires arduous coordination with PennDOT that is not practical (for both PennDOT and the municipality), and could result in significant costs for an individual municipality – each municipality, for example, might have to train from scratch new maintenance crews that would sit idle for most of the year.

Most municipalities are small, and do not have the resources to take on these tasks. In addition, even if they did, they would be duplicating PennDOT’s own efforts. For example, PennDOT might send snow plows out to remove snow for the vehicular travel lane, and then a municipality would have to send another snow plow out to remove the snow that the first plow stacked up on the bike lane...

It is already PennDOT’s responsibility to maintain the existing roadway and existing markings – the additional cost of maintaining a few more pavement markings and signs for a bike lane would be negligible. The most cost-effective and practical solution would be for PennDOT to continue to maintain the entire street using its existing resources.

Liability: The BOP requires individual municipalities to accept full liability for any issues associated with the bicycle lane on state owned roadways.

For example, if there is an accident in the bike lane, the municipality would be liable. The liability of the bike lane could require municipalities to take out additional insurance, which could be a significant cost. Most municipalities are not willing to accept this additional exposure and liability.

These issues are magnified if bicycle lanes cross multiple municipal boundaries Can you imagine 50 snow plows removing snow along a road?...

How to Solve the Issue?

The Pennsylvania Environmental Council, PA Walks and Bikes, the Bicycle Coalition of Greater Philadelphia, and many local and regional agencies are currently engaged in negotiations with PennDOT to find acceptable alternatives to the BOP maintenance and liability constraints. In additional, in the meantime, PEC and DVRPC are available to provide technical assistance for municipalities that might want to install bike lanes – maybe in your community?.

If you would like to be kept informed about this issue or want more information about how to install bike lanes, please contact Spencer Finch at sfinch@pec.pa.org or John Boyle at john@bicyclecoalition.org .

Memo Collated by: Spencer Finch – PEC; Josh Kams – PA Walks & Bikes; Alex Doty – Bicycle Coalition of Greater Philadelphia; Hans Van Naerssen – Bicycle Coalition / PPAC; Phil Etlinger – Doylestown; and other contributors.



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Creating healthy, sustainable communities by making bicycling and walking safer, more convenient and more enjoyable

The Pennsylvania Code is inhibiting the installation of bike lanes

More and more communities in Pennsylvania want to include bike lanes on their roads, but state regulations limit both PennDOT and local municipalities from developing projects best suited to local needs on state roads. The problem has been exacerbated by inconsistent application of the regulations across the state.

Title 67, section 212.5 of the PA Code requires that local authorities be responsible for installing, maintaining and operating all pavement markings for bicycles, such as the bicycle lane symbol. This section is enforced through the Bicycle Occupancy Permit (BOP), which the municipality must adopt by resolution. If the municipality chooses to have wide, paved shoulders instead of bike lanes, none of these requirements apply. The BOP is not required in Philadelphia or Pittsburgh.

The BOP is not aligned with PennDOT’s Smart Transportation Guide, Bicycle and Pedestrian Master Plan, and Design Manual, which encourage the use of bike lanes.

The two main issues that municipalities have with the terms of the BOP are maintenance and liability. These issues are magnified if bicycle lanes cross municipal boundaries because each municipality will have to approve and accept the terms of the BOP.

The requirement of the BOP has resulted in the withdrawal of plans for bike lanes in many communities. Furthermore, other bike lane projects have been completed or are currently under construction where no BOP has been required.

Recommendations to facilitate the development of quality, safe bike lanes

Update the PA Code

The existing regulations presume that all bike lanes will be new construction additions to the roadway. Many bike lane projects, however, are reconfigurations of the existing infrastructure. They do not require new construction; only paint and signage are needed.

If the PA Code is amended to remove this provision, PennDOT and local municipalities will have the freedom to determine who holds responsibility for maintenance and liability on a case-by-case basis to fit each project.

Approve Modern Design Standards

The new NACTO Urban Bikeways Design Guide provided cities and towns with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists. These innovative solutions should be approved for use in Pennsylvania.

Appendix D - Local Planning “Toolbox”

Section 6 Chip Sealing

Chip sealed roadways are common to Bucks County. This treatment is used on many local roadways especially on rural roads which receive less average daily trips (ADT). “Oil and chip” as it is more commonly referred to in this area, is a method used primarily on the older and more deteriorated road surfaces to seal minor surface cracks, and extend the life of the roadway. According to the Ohio Department of Transportations Fact Sheet on Chip Sealing, chip seals provides the opportunity to maintain the roads for very low cost. A chip seal is about one fourth to one fifth the cost of a conventional asphalt overlay. By extending the time between asphalt overlays, chip seals result in lower costs over the long term. By placing a chip seal sooner than an asphalt overlay would be placed, the traveling public benefits from roads maintained in better conditions.

However for bicycling, chip sealing is an undesirable surface treatment that leaves a rough surface for bicycling. The use of chip sealing should be discouraged on roadways that have been identified in this plan for bicycling.

In areas where chip sealing must be used the procedures set forth in PennDOT Publication 408 Specifications Manual must be strictly adhered to.



Image courtesy of : <http://bikerchickswc.blogspot.com/>

Appendix D - Local Planning “Toolbox”

Section 7 Model Ordinances and Provisions for Bicycle Planning

Land use regulations can be an effective tool for supporting the development of bikeways. Both Lower Makefield Township in Bucks County and New Hanover Township in Montgomery County have successfully utilized language in their respective land use regulations to develop bicycle facilities by:

Lower Makefield Township was successful in developing bikeways as part of the townships peak growth years by requiring all new developments to develop bikeways. Most hubs within the township including many schools and parks are connected by a system of bikeways as envisioned in the adopted master plan of 1999.

New Hanover has also been very successful in developing bikeways through use of the land development process. Their subdivision and land development ordinance outlines minimum construction standards but also is flexible enough to offer waivers and development opportunities to enhance bikeways throughout the township.

Sample language from both Lower Makefield and New Hanover Townships’ Land Use and Subdivision Plans are provided on the following pages for reference.

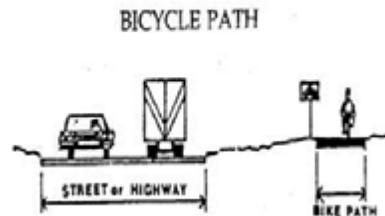
Appendix D - Local Planning “Toolbox”

Lower Makefield Model Ordinance for Bicycle Planning

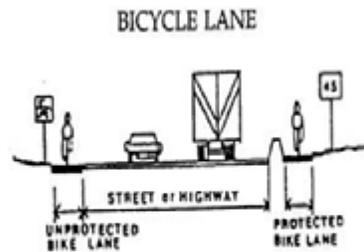
§834. BIKEWAYS.

1. Bikeway Definitions.

BICYCLE PATHS - bikeways laid out on private property, public right-of-way or open space and recreational areas.



BICYCLE LANES - paved bikeways located adjacent to the paved surface of a roadway, street or highway or on the shoulder of a roadway, street or highway and are delineated by signs or markings. The cartway is widened or wide enough to provide a travel lane for bicycle use. The bicycle lane may or may not be separated from the motor vehicle travel lane by a barrier.



BICYCLE ROUTES - bikeways located in the area of a public roadway, street or highway which is specifically designated and marked by appropriate directional and informational signs. The travel lane(s) of the cartway is shared by bicycles and motor vehicles.



2. Bikeway Requirements. All subdivisions and land developments shall be required to establish bike paths, bike lanes and bike routes unless waived by the Board of Supervisors. [Ord. 97-7]
3. Construction Standards. All bike paths, bike lanes and bike routes shall be constructed or installed in accordance with the following standards:

Appendix D - Local Planning “Toolbox”

A. Bike Paths.

- (1) The near edge of the path shall not be less than 4 feet from the face of the curb along any street. Where this setback cannot be accomplished, a suitable physical barrier shall be provided.
- (2) The width of the path shall be 8 feet. The Board of Supervisors may permit variations in this width and may permit the installation of bicycle paths in lieu of sidewalks.
- (3) Bicycle paths shall as near as possible follow the contour lines of the particular area where the paths are to be installed.
- (4) Curb ramps, the same width as the bike path, shall be installed to permit the crossing of intersecting streets. Curb ramps shall have a maximum slope of six to one with sides having maximum slope of two to one.
- (5) The vertical clearance from the bicycle path surface to overhead obstruction shall be not less than 10 feet.
- (6) The bicycle path shall be constructed of 4 inch aggregate base of either gravel, crushed stone or slag with 2 inch asphalt binder coarse and a 1 inch wearing course. Where a bike path is integrated with a sidewalk system, concrete may be substituted, in accordance with the Chapter titled "Pedestrian Facilities" of the *PennDOT Design Manual*, Part 2, or any amendments thereto. [Ord. 99-3]
- (7) All bike paths shall be constructed in such a manner to insure adequate and proper drainage and to prevent the bike path from being inundated by surface drainage.
- (8) The entire design and construction of the bike paths shall be in accordance with good engineering practice and shall be subject to the approval of the Township Engineer and PennDOT publication 408.
- (9) To ensure adequate sight distance, the minimum centerline radii for horizontal curves shall be 65 feet. [Ord. 99-3]
- (10) Curves shall not produce excessive flatness in grade. There shall be no dips, cross-gutters, bumps or humps in the surfacing. [Ord. 99-3]
- (11) The minimum stopping sight distance shall be 150 feet. [Ord. 99-3]
- (12) Grades shall not exceed 5 percent, except that steeper grades may be permitted for short lengths not exceeding 200 feet in length, where natural contours provide conditions for minimal grading at steeper grade. [Ord. 99-3]
- (13) Inlet grates for stormwater systems shall be designed to accommodate bicycle tires. [Ord. 99-3]

Appendix D - Local Planning “Toolbox”

B. Bike Lanes.

- (1) A bike lane shall not be installed on roads, streets or highways which have a posted speed in excess of 45 miles per hour.
- (2) The minimum width of the bike lane where no curb is present shall be 4 feet for one way bike traffic. When the bike lane is adjacent to a curb or on streets with parking, the minimum width shall be 5 feet.
- (3) Bicycle lanes shall be marked with rumble strips or with bright painted stripes. Either method of marking shall be placed at least 4 feet from the outer edge of the pavement and be 6 inches wide. [Ord. 99-3]
- (4) Bicycle lanes on State roads shall conform to regulations of the Pennsylvania Department of Transportation.
- (5) Where a roadway, street or highway is widened to include a bicycle lane, the added pavement area shall be installed in accordance with the street construction requirements of the Township.

C. Bicycle Routes.

- (1) A bicycle route shall not be installed on roads, streets or highways where the posted speed limit is in excess of 25 miles per hour.
- (2) Where a bicycle route is designated by the Board of Supervisors, the roadway, street or highway shall be painted with symbols or posted with signs designating the bicycle route.

4. Signs and Markings. All signs and markings required pursuant to the terms of this Chapter shall conform to the standards set in the *Manual on Uniform Traffic Control Devices for Streets and Highways*, 1988 (MUTCD), U.S. Government Printing Office, or subsequent amendments, and PennDOT regulations. [Ord. 99-3]

(Ord. 3/29/1990B, §833; as amended by Ord. 97-7, 10/13/1997; and by Ord. 99-3, 6/28/1999, §§21-24)

Appendix D - Local Planning “Toolbox”

New Hanover Model Ordinance for Bicycle Planning

§ 178-48 Bikeway requirements.

A.

All subdivisions or land developments in any zoning district shall be required to establish bike paths in accordance with the Township Official Map.

(1)

Bicycle paths are off-street bikeways laid out on private property, public right-of-way or open space and recreational areas.

(2)

Bicycle lanes are lanes located on the paved surface of a roadway, street or highway or on the shoulder of a roadway, street or highway.

(3)

Bicycle routes shall be that area of a public roadway, street or highway which is specifically designated and marked as directed by the Board of Supervisors from time to time in accordance with the Township Official Map.

B.

Bikeway construction standards. All bike paths, bike lanes and bike routes shall be constructed or installed in accordance with the following standards:

(1)

Bike paths shall conform to the following construction standards:

(a)

The near edge of the path shall not be less than five feet from the face of the curb along any street, unless physical conditions require it to be closer, in which case this requirement may be modified.

(b)

Where the bike path abuts or is in close proximity to an arterial and collector street, the width of the path shall be eight feet. On all other streets, the width of the path shall be six feet. The Board of Supervisors may from time to time permit variations in this width and may permit the installation of bicycle paths in lieu of sidewalks.

(c)

Appendix D - Local Planning “Toolbox”

Bicycle paths shall as near as possible follow the contour lines of the particular area where the paths are to be installed.

(d)

Curb ramps the same width as the bike path shall be installed to permit the crossing of intersecting streets; curb ramps shall have a maximum slope of six to one with sides having maximum slope of two to one.

(e)

The bicycle path shall be constructed of four-inch aggregate base of either gravel, crushed stone or slag with two-inch asphalt surface coarse.

(f)

All bike paths shall be constructed in such a manner to ensure adequate and proper drainage and to prevent the bike path from being inundated by surface drainage.

(g)

The entire design and construction of the bike paths shall be in accordance with good engineering practice and shall be subject to the approval of the Township Engineer.

(2)

Bike lanes: construction standards. All bike lanes shall adhere to the following construction standards:

(a)

A bike lane shall not be installed on roads, streets or highways which have a posted speed in excess of 45 miles per hour.

(b)

The minimum width of the bike lane where no curb is present shall be four feet for one-way bike traffic; when the bike lane is adjacent to a curb, the minimum width shall be five feet.

(c)

Bicycle lanes shall be marked with bright paint stripes at least four feet from the outer edge of the pavement and approximately six inches wide.

(d)

Bicycle lanes on state roads shall conform to regulations of the Pennsylvania Department of Transportation.

Appendix D - Local Planning “Toolbox”

(e)

Where a roadway, street or highway is widened to include a bicycle lane, the added pavement area shall be installed in accordance with the street construction requirements of the Township of Lower Makefield.

(3)

Bicycle routes shall adhere to the following standards:

(a)

A bicycle route shall not be installed on roads, streets or highways where the posted speed limit is in excess of 35 miles per hour;

(b)

Where a bicycle route is designated by the Board of Supervisors of Lower Makefield Township, the roadway, street or highway shall be painted with symbols or posted with signs designating the bicycle route, in accordance with PennDOT standards.

C.

Establishing bike lanes and bike routes. The Board of Supervisors may from time to time designate bike lanes and bike routes in accordance with this chapter and in accordance with the Township Official Map.

D.

Bikeway signs and markings. All signs and markings required pursuant to the terms of this chapter shall conform to the standards set forth in the manual on Uniform Traffic Control Devices, United States Government Printing Office (1971), or subsequent amendments.

Appendix D - Local Planning “Toolbox”

Section 8 Sample Easement Agreements

RW-317A
Agreement of Sale (Easements)
Pages 15-2 through 15-4

RW-317
Deed of Easement
Pages 15-5 through 15-7

RW-317F
Deed (Fee Simple)
Pages 15-8 through 15-10

RW-317AF
Agreement of Sale
(Fee Simple)
Pages 15-11 through 15-13

RW-341
Temporary Easement for Construction Purposes
Pages 15-14 through 15-15

RW-317A Agreement of Sale (Easements)

RW-317A (9/06)
18-K-570

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION



ROW OFFICE PROJ. NO.	
COUNTY	
S.R. - SECTION	
MUNICIPALITY	
PARCEL NO.	
CLAIM NO.	
CLAIMANT	

AGREEMENT OF SALE (Easement)

Made on _____ by _____ owner(s) of property affected by the construction or improvement of the above mentioned State Route, _____ heirs, executors, administrators, successors and/or assigns, hereinafter, whether singular or plural, called the SELLER, and the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called the COMMONWEALTH,

WITNESSETH:

WHEREAS the COMMONWEALTH _____ a plan in the Recorder of Deeds Office of the aforesaid County indicating its authorization to condemn property for the above highway from the aforesaid property; and

WHEREAS the parties hereto have agreed that, in lieu of condemnation, the SELLER will convey to the COMMONWEALTH a _____ and other estate(s) as designated, if any, from the property or portion thereof required by the COMMONWEALTH.

NOW, THEREFORE, in consideration of the sum of (\$ _____) Dollars and other good and valuable consideration, the SELLER hereby agrees to sell and convey to the COMMONWEALTH and the COMMONWEALTH agrees to purchase a _____ and such other estate(s), if any, as designated on the plot plan attached hereto and made a part hereof and set forth below.

BEING a portion of the property conveyed or devised to the SELLER by _____ of _____, dated _____, recorded in _____. This conveyance contains _____ and is identified on Commonwealth plans as Parcel _____, together with the improvements, hereditaments and appurtenances to the said easement, except those which may be agreed below to be retained by the SELLER, free and clear of all liens, charges, delinquent taxes and assessments, and of all leases, agreements and other encumbrances which the SELLER has the right to terminate or remove. The SELLER will assign to the COMMONWEALTH all of the SELLER'S right, title and interest in those leases, agreements, and other encumbrances which cannot be terminated or removed. The SELLER will warrant GENERALLY the property interest to be conveyed.

Reserving, however, to the GRANTOR the right to deep mine minerals and remove gas and oil within the areas hereunder acquired from a minimum depth to be determined by the COMMONWEALTH, from mine shafts or by means of wells located off the right-of-way.

All expenses of examination of the title and of preparation and recording of the deed shall be paid by the COMMONWEALTH. Payment of the purchase price shall be made within ninety (90) days of the date of this agreement.

RW-317A Agreement of Sale (Easements)

RW-317A (9/06)

Claim Number

Claimant

Date

Page 2 of 3

From and after the execution of this instrument, the COMMONWEALTH, its agents and contractors, shall have the right to enter upon the premises to be conveyed for making studies, tests, soundings, and appraisals.

The SELLER does further remise, release, quitclaim and forever discharge the COMMONWEALTH or any agency or political subdivision thereof or its or their employees or representatives of and from all suits, damages, claims and demands which the SELLER might otherwise have been entitled to assert under the provisions of the Eminent Domain Code, 26 Pa.C.S. § 101 et seq., for or on account of this conveyance and any injury to or destruction of the aforesaid property of the SELLER through or by reason of the aforesaid highway construction or improvement, except damages, if any, under Section 710 (Limited Reimbursement of Appraisal, Attorney and Engineering Fees) and Section 711 (Payment on Account of Increased Mortgage Costs) of the Eminent Domain Code; provided, however, that if relocation of a residence or business or farm operation is involved, this release shall likewise not apply to damages, if any, under Section 902 (Moving Expenses) and/or Section 903 and/or 904 (Replacement Housing) of the Eminent Domain Code.

The SELLER does further indemnify the COMMONWEALTH against any claim made by any lessee of the aforesaid property who has not entered into a Settlement Agreement with the COMMONWEALTH.

RW-317A Agreement of Sale (Easements)

RW-317A (9/06)

Claim Number

Claimant

Date

Page 3 of 3

The Parties have executed or caused to be executed these presents, intending to be legally bound thereby.

INDIVIDUALS

ENTITIES*

SELLER:

(Name of Entity)

BY: _____

BY: _____

* Use this block for a corporation, partnership, LLC, government entity, school district, church, trust, club, association, POA, attorney-in-fact, executor, administrator or any other entity. See R/W Manual Section 3.06.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BY: _____
District Right-of-Way Administrator

RW-317 Deed of Easement

Prepared By:

Return To:

Site Location:

RW-317 (7/07)

**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION**



ROW OFFICE PROJ. NO.	
COUNTY	
S.R. - SECTION	
MUNICIPALITY	
PARCEL NO.	
CLAIM NO.	
CLAIMANT	

DEED OF EASEMENT

THIS INDENTURE, made _____ by _____ owner(s) of property affected by the construction or improvement of the above mentioned State Route, _____ heirs, executors, administrators, successors, and/or assigns, hereinafter, whether singular or plural, called the GRANTOR, and the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called the COMMONWEALTH,

WITNESSETH:

WHEREAS the COMMONWEALTH _____ a plan in the Recorder of Deeds Office of the aforesaid County indicating its authorization to condemn property for the above highway from the aforesaid property; and

WHEREAS the parties hereto have agreed that, in lieu of condemnation, the GRANTOR will convey to the COMMONWEALTH a _____ and other estate(s) as designated, if any, from the property or portion thereof required by the COMMONWEALTH,

NOW, THEREFORE, in consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration, the GRANTOR does hereby grant and convey to the COMMONWEALTH a _____ and such other estate(s), if any, as designated on the plot plan attached hereto and made a part hereof and set forth below,

BEING all or a portion of the same property conveyed or devised to the GRANTOR by _____ of _____, dated _____ and recorded in _____. This conveyance contains _____ and is identified on COMMONWEALTH plans as Parcel _____, together with the improvements, hereditaments and appurtenances thereto and the GRANTOR warrants GENERALLY the property hereby conveyed.

RW-317 Deed of Easement

RW-317 (7/07)

 Claim Number

 Claimant

 Date

Page 2 of 3

Reserving, however, to the GRANTOR the right to deep mine minerals and remove gas and oil within the areas hereunder acquired from a minimum depth to be determined by the COMMONWEALTH, from mine shafts or by means of wells located off the right-of-way.

The GRANTOR does further remise, release, quitclaim and forever discharge the COMMONWEALTH or any agency or political subdivision thereof or its or their employees or representatives of and from all suits, damages, claims and demands which the GRANTOR might otherwise have been entitled to assert under the provisions of the Eminent Domain Code, 26 Pa.C.S. § 101 et seq., for or on account of this conveyance and any injury to or destruction of the aforesaid property of the GRANTOR through or by reason of the aforesaid highway construction or improvement, except damages, if any, under Section 710 (Limited Reimbursement of Appraisal, Attorney and Engineering Fees) and Section 711 (Payment on Account of Increased Mortgage Costs) of the Eminent Domain Code; provided, however, that if relocation of a residence or business or farm operation is involved, this release shall likewise not apply to damages, if any, under Section 902 (Moving Expenses) and/or Section 903 and/or 904 (Replacement Housing) of the Eminent Domain Code.

The GRANTOR does further indemnify the COMMONWEALTH against any claim made by any lessee of the aforesaid property who has not entered into a Settlement Agreement with the COMMONWEALTH.

Certificate of Residence

I hereby certify the Grantee's precise residence to be:

715 Jordan Avenue, Montoursville PA 17754

Witness my hand this _____ day of _____, _____

Agent for the Commonwealth of Pennsylvania
Department of Transportation

RW-317 Deed of Easement

RW-317 (7/07)

Claim Number _____

Claimant _____

Date _____

Page 3 of 3

The GRANTOR has executed or caused to be executed these presents, intending to be legally bound thereby.

INDIVIDUALS

ENTITIES*

GRANTOR:

(Name of Entity)

BY: _____

BY: _____

* Use this block for a corporation, partnership, LLC, government entity, school district, church, trust, club, association, POA, attorney-in-fact, executor, administrator or any other entity. See R/W Manual Section 3.06.

INDIVIDUAL

ENTITY

STATE OF PENNSYLVANIA
COUNTY OF _____

On this _____ day of _____, 20____,
before me, _____,
the undersigned officer, personally appeared _____
_____, known to me
(or satisfactorily proven) to be the person(s) whose
name(s) _____ subscribed to the within instrument,
and acknowledged that _____ executed the
instrument for the purposes contained in it.

In witness whereof, I hereto set my hand and official
seal.

[Signature]

[Title]

[Seal]

STATE OF PENNSYLVANIA
COUNTY OF _____

On this _____ day of _____, 20____,
before me, _____, the undersigned
officer, personally appeared _____
_____, who acknowledged _____ self
to be the _____ [title] of
_____ [name of entity],
and that as such _____
_____ [title], being authorized to do so,
executed the foregoing instrument for the purposes
contained in it by signing on behalf of the entity as
_____ [title].

In witness whereof, I hereto set my hand and official seal.

[Signature]

[Title]

[Seal]

RW-317F Deed (Fee Simple)

Prepared By:

Return To:

Site Location:

RW-317F (7/07)
18-K-560

**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION**



ROW OFFICE PROJ. NO.	
COUNTY	
S.R. - SECTION	
MUNICIPALITY	
PARCEL NO.	
CLADM NO.	
CLADMANT	

**DEED
(Fee Simple)**

THIS INDENTURE, made _____ by _____ owner(s) of property affected by the construction or improvement of the above mentioned State Route, _____ heirs, executors, administrators, successors, and/or assigns, hereinafter, whether singular or plural, called the GRANTOR, and the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called the COMMONWEALTH,

WITNESSETH:

WHEREAS the COMMONWEALTH _____ a plan in the Recorder of Deeds Office of the aforesaid County indicating its authorization to condemn property for the above highway from the aforesaid property; and

WHEREAS the parties hereto have agreed that, in lieu of condemnation, the GRANTOR will convey in fee simple and such other estate(s) as designated, if any, to the COMMONWEALTH the property or portion thereof required by the COMMONWEALTH,

NOW, THEREFORE, in consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration, the GRANTOR does hereby grant and convey to the COMMONWEALTH

- In fee simple the premises described by metes and bounds in exhibit "A".
- In fee simple that portion of the aforesaid premises designated as required right-of-way or as acquired in fee simple for other purposes on the plot plan attached hereto and made a part hereof; and those areas, if any, designated as required for easement purposes as identified by the plot plan and set forth below.

RW-317F Deed (Fee Simple)

RW-317F (7/07)

 Claim Number

 Claimant

 Date

Page 2 of 3

BEING all or a portion of the same property conveyed or devised to the GRANTOR by _____ of _____, dated _____ and recorded in _____. This conveyance contains _____ and is identified on COMMONWEALTH plans as Parcel _____, together with the improvements, hereditaments and appurtenances thereto and the GRANTOR warrants GENERALLY the property hereby conveyed.

RESERVING, however, to the GRANTOR the right to deep mine minerals and remove gas and oil within the areas hereunder acquired from a minimum depth to be determined by the COMMONWEALTH, from mine shafts or by means of wells located off the right-of-way.

The GRANTOR does further remise, release, quitclaim and forever discharge the COMMONWEALTH or any agency or political subdivision thereof or its or their employees or representatives of and from all suits, damages, claims and demands which the GRANTOR might otherwise have been entitled to assert under the provisions of the Eminent Domain Code, 26 Pa.C.S. § 101 et seq., for or on account of this conveyance and any injury to or destruction of the aforesaid property of the GRANTOR through or by reason of the aforesaid highway construction or improvement, except damages, if any, under Section 710 (Limited Reimbursement of Appraisal, Attorney and Engineering Fees) and Section 711 (Payment on Account of Increased Mortgage Costs) of the Eminent Domain Code; provided, however, that if relocation of a residence or business or farm operation is involved, this release shall likewise not apply to damages, if any, under Section 902 (Moving Expenses) and/or Section 903 and/or 904 (Replacement Housing) of the Eminent Domain Code.

The GRANTOR does further indemnify the COMMONWEALTH against any claim made by any lessee of the aforesaid property who has not entered into a Settlement Agreement with the COMMONWEALTH.

Certificate of Residence

I hereby certify the Grantee's precise residence to be:

Witness my hand this _____ day of _____, _____

Agent for the Commonwealth of Pennsylvania
Department of Transportation

RW-317F Deed (Fee Simple)

RW-317F (7/07) 6000241000 Rodney A. Bedow and John M. Snyder Page 3 of 3
 Claim Number Claimant Date

The GRANTOR has executed or caused to be executed these presents, intending to be legally bound thereby.

INDIVIDUALS

 Rodney A. Bedow

 John M. Snyder

ENTITIES*

GRANTOR:

 (Name of Entity)

BY: _____

BY: _____

* Use this block for a corporation, partnership, LLC, government entity, school district, church, trust, club, association, POA, attorney-in-fact, executor, administrator or any other entity. See R/W Manual Section 3.06.

INDIVIDUAL

STATE OF PENNSYLVANIA
 COUNTY OF _____

On this _____ day of _____, 20____,
 before me, _____,
 the undersigned officer, personally appeared _____
 _____,
 _____, known to me
 (or satisfactorily proven) to be the person(s) whose
 name(s) _____ subscribed to the within instrument,
 and acknowledged that _____ executed the
 instrument for the purposes contained in it.

In witness whereof, I hereto set my hand and official
 seal.

 [Signature]

 [Title]

[Seal]

ENTITY

STATE OF PENNSYLVANIA
 COUNTY OF _____

On this _____ day of _____, 20____,
 before me, _____, the undersigned
 officer, personally appeared _____
 _____, who acknowledged _____ self
 to be the _____ [title] of
 _____ [name of entity],
 and that as such _____
 _____ [title], being authorized to do so,
 executed the foregoing instrument for the purposes
 contained in it by signing on behalf of the entity as
 _____ [title].

In witness whereof, I hereto set my hand and official seal.

 [Signature]

 [Title]

[Seal]

APPROVED AS TO FORM AND LEGALITY:

 For Chief Counsel

RW-317AF Agreement of Sale

RW-317AF (7/07)
18-K-580

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION



ROW OFFICE PROJ. NO.	
COUNTY	
S.R. - SECTION	
MUNICIPALITY	
PARCEL NO.	
CLAIM NO.	
CLAIMANT	

AGREEMENT OF SALE (Fee Simple)

Made on _____ by _____ owner(s) of property affected by the construction or improvement of the above mentioned State Route, _____ heirs, executors, administrators, successors and/or assigns, hereinafter, whether singular or plural, called the SELLER, and the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called the COMMONWEALTH.

WITNESSETH:

WHEREAS the COMMONWEALTH _____ a plan in the Recorder of Deeds Office of the aforesaid County indicating its authorization to condemn property for the above highway from the aforesaid property; and

WHEREAS the parties hereto have agreed that, in lieu of condemnation, the SELLER will convey in fee simple and such other lesser estate(s) as designated, if any, to the COMMONWEALTH the property or portion thereof required by the COMMONWEALTH.

NOW, THEREFORE, in consideration of the sum of (\$ _____) Dollars and other good and valuable consideration, the SELLER hereby agrees to sell and convey to the COMMONWEALTH and the COMMONWEALTH agrees to purchase
 in fee simple the premises described by metes and bounds in Exhibit "A"
 in fee simple that portion of the aforesaid property designated as required right-of-way or as acquired in fee simple for other purposes on the plot plan attached hereto and made a part hereof; and those areas, if any, designated as required for easement purposes as identified by the plot plan and set forth below.

Being all or a portion of the same property conveyed or devised to the SELLER by _____ of _____ dated _____, recorded in _____. This conveyance contains _____ and is identified on COMMONWEALTH plans as Parcel _____, together with the improvements, hereditaments and appurtenances thereto, except those which may be agreed below to be retained by the SELLER, free and clear of all liens, charges, delinquent taxes and assessments, and of all leases, agreements and other encumbrances which the SELLER has the right to terminate or remove. The SELLER will assign to the COMMONWEALTH all of the SELLER'S right, title and interest in those leases, agreements, and other encumbrances which cannot be terminated or removed. The SELLER will warrant GENERALLY the property interest to be conveyed.

Reserving, however, to the SELLER the right to deep mine minerals and remove gas and oil within the areas hereunder acquired from a minimum depth to be determined by the COMMONWEALTH, from mine shafts or by means of wells located off the right-of-way.

All expenses of examination of the title and of preparation and recording of the deed shall be paid by the COMMONWEALTH. Payment of the purchase price shall be made within ninety (90) days of the date of this agreement.

RW-317AF Agreement of Sale

RW-317AF (7/07)

 Claim Number

 Claimant

 Date

Page 2 of 3

Loss or damage to the property by fire or other casualty shall be at the risk of the SELLER until possession of the property has been delivered to the COMMONWEALTH. The SELLER may continue to insure the property after possession has been delivered until title has passed to the COMMONWEALTH under this agreement, any insurance policy(ies) on such building(s) shall be amended to provide for payment thereunder (by means of a standard mortgage clause) to the COMMONWEALTH of the amount paid to the SELLER under this agreement.

The SELLER is assured that the COMMONWEALTH will not require vacation of the property for at least ninety (90) days from the execution of this agreement.

The SELLER will receive a NOTICE TO VACATE at least thirty (30) days before possession will be required by the COMMONWEALTH.

SELLER may remain in possession, on a rent free basis, until _____ after which date SELLER will pay rental to the COMMONWEALTH in the sum of \$ _____ per month, in advance, beginning _____, on a month-to-month basis until possession has been delivered. It is understood and agreed that the SELLER may relocate at their convenience prior to this date. From and after the execution of this instrument, the COMMONWEALTH, its agents and contractors, shall have the right to enter upon the premises to be conveyed for making studies, tests, soundings, and appraisals. The SELLER agrees to execute the Department's Lease Agreement, Form RW-670. Upon the expiration of one year, the amount of rental may be changed at the discretion of the COMMONWEALTH.

The SELLER does further remise, release, quitclaim and forever discharge the COMMONWEALTH or any agency or political subdivision thereof or its or their employees or representatives of and from all suits, damages, claims and demands which the SELLER might otherwise have been entitled to assert under the provisions of the Eminent Domain Code, 26 Pa.C.S. § 101 et seq., for or on account of this conveyance and any injury to or destruction of the aforesaid property of the SELLER through or by reason of the aforesaid highway construction or improvement, except damages, if any, under Section 710 (Limited Reimbursement of Appraisal, Attorney and Engineering Fees) and Section 711 (Payment on Account of Increased Mortgage Costs) of the Eminent Domain Code; provided, however, that if relocation of a residence or business or farm operation is involved, this release shall likewise not apply to damages, if any, under Section 902 (Moving Expenses) and/or Section 903 and/or 904 (Replacement Housing) of the Eminent Domain Code.

The SELLER does further indemnify the COMMONWEALTH against any claim made by any lessee of the aforesaid property who has not entered into a Settlement Agreement with the COMMONWEALTH.

RW-317AF Agreement of Sale

RW-317AF (7/07)

Claim Number

Claimant

Date

Page 3 of 3

The Parties have executed or caused to be executed these presents, intending to be legally bound thereby.

INDIVIDUALS

John M. Snyder

ENTITIES*

SELLER:

(Name of Entity)

BY: _____

BY: _____

* Use this block for a corporation, partnership, LLC, government entity, school district, church, trust, club, association, POA, attorney-in-fact, executor, administrator or any other entity. See R/W Manual Section 3.06.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BY: _____
District Right-of-Way Administrator

RW-341 Temporary Easement for Construction

RW-341 (9/06)
18-k-2310

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION



ROW OFFICE PROJ. NO.	
COUNTY	
S.R. - SECTION	
MUNICIPALITY	
PARCEL NO.	
CLAIM NO.	
CLAIMANT	

**TEMPORARY EASEMENT
FOR CONSTRUCTION
PURPOSES**

THIS INDENTURE, made this _____ Day of _____, by _____ Owner(s) of property affected by the construction or improvement of the above mentioned transportation improvement, heirs, executors, administrators, successors and/or assigns, hereinafter, whether singular or plural, called the OWNER, and the Commonwealth of Pennsylvania, Department of Transportation, hereinafter called the COMMONWEALTH,

WITNESSETH:

WHEREAS the COMMONWEALTH _____ a plan in the Recorder of Deeds Office of the aforesaid County indicating its authorization to condemn real property for the above transportation improvement from the aforesaid property; and

WHEREAS the parties hereto have agreed that, in lieu of condemnation, the OWNER will grant to the COMMONWEALTH a temporary easement for construction purposes from the aforesaid property,

NOW, THEREFORE, in consideration of the sum of (\$ _____) Dollars, the Owner hereby grants to the COMMONWEALTH a temporary easement for the purpose of undertaking the above construction or improvement, said easement to extend to the area shown on the plot plan attached hereto and made a part hereof and to authorize the entry and re-entry of employees, agents and contractors of the COMMONWEALTH upon said area to do any and all work necessary for the completion of the project, including the removal of any buildings and/or other structures located on the area covered by the easement; provided, however, that, upon completion of the project, the COMMONWEALTH shall be obligated to restore the area covered by the easement to a condition commensurate with that of the balance of the property of the OWNER, such restoration to include removal of debris, filling of holes left by the removal of buildings or structures, draining, filling and/or capping of wells, cesspools and septic tanks; grading and sowing of grass. The estimated completion date of the construction or improvement is _____. The temporary easement for construction area is _____.

The OWNER does further remise, release, quitclaim and forever discharge the COMMONWEALTH or any agency or political subdivision thereof or its or their employees or representatives of and from all suits, damages, claims and demands which the OWNER might otherwise have been entitled to assert under the provisions of the Eminent Domain Code, 26 Pa.C.S. § 101 et seq., for or on account of this conveyance and any injury to or destruction of the aforesaid property of the OWNER through or by reason of the aforesaid construction or improvement.

RW-341 Temporary Easement for Construction

RW-341 (9/06)

Claim Number

Claimant

Date

Page 2 of 2

The Parties have executed or caused to be executed these presents, intending to be legally bound thereby.

INDIVIDUALS

ENTITIES*

OWNER:

(Name of Entity)

BY: _____

BY: _____

* Use this block for a corporation, partnership, LLC, government entity, school district, church, trust, club, association, POA, attorney-in-fact, executor, administrator or any other entity. See R/W Manual Section 3.06.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BY: _____
District Right-of-Way Administrator

Appendix D - Local Planning “Toolbox”

Section 9. Bikeway Operations & Maintenance Planning

Undertaking Bikeway Maintenance

The ability to maintain and preserve existing and proposed bikeways is a significant factor in sustaining and increasing bicycling in the County. It is important that long term maintenance cost be considered and accounted for in the development of all bikeways to ensure their long term success. Maintenance generally falls into two categories, cyclical or routine maintenance and systematic maintenance.

Routine maintenance includes practices to make the bikeways safe, clean and attractive including the removal of all debris, trash, litter, undesirable and unsafe structures, vegetation and other foreign matter. Systematic maintenance includes making physical improvements to a bikeway over time to keep in save and may include general pavement repairs, restriping, sign replacement or the addition of amenities such as trail heads, additional points of public access, rest areas, and other activity areas.

All bikeways should be maintained in a clean and usable condition at all times. The primary concern for maintenance is first and foremost public safety. Nearly equal in concern is the desire to maintain bikeways as a continuous even and clean surface. All bikeways should be maintained in a safe and usable manner. Rough edges, severe bumps or depressions, cracked or uneven pavement, gullies, rills and damaged tread surface should be repaired immediately.

Sample Maintenance Program

Task	Frequency
Trail pavement marking replacement	One to two years
On-street pavement marking replacement	One to two years
Pavement sealing/potholes	Five – 15 years
Sign replacement/repair	1- 3 years
Clean drainage system	Annually
Pavement sweeping	Monthly
Shoulder mowing	Monthly
Plowing	As needed
Litter pick up and removal	As needed
Inspect crossings, bridges & abutments, and boardwalks.	Annual inspection after major storms Regular, formal in spection of bicycle lanes

Appendix D - Local Planning “Toolbox”

Furniture maintenance	Annually
Tree pruning for vertical clearance	Annually
Fallen tree removal	As needed
Fencing maintenance	Annually
Natural resource management program	To be developed and implemented
Fencing maintenance	Annually
Natural resource management program	To be developed and implemented

Appendix D - Local Planning “Toolbox”

Section 11 Funding Sources

The Conservation Fund

2009: \$500 - \$2,500 per applicant

The Conservation Fund funds projects to which community leaders collaborate and plan for strategic conservation, building a network of connected greenways for people and wildlife. Funds include bridge financing from a revolving fund as a critical tool that allows recipients to act quickly on conservation opportunities. <http://www.conservationfund.org/>

Community Development Block Grant Program

CDBG funds help strengthen Pennsylvania communities by expanding affordable housing opportunities, creating jobs, stabilizing neighborhoods and improving overall quality of life. The program provides financial and technical assistance to communities for infrastructure improvements.

National Highway System
2009: \$6.3 million

National Highway System funds may be used to construct bicycle transportation facilities and pedestrian walkways on land adjacent to any highway on the National Highway System, including Interstate highways. Funds are subject to the overall Federal-aid obligation limitation. <http://www.fhwa.dot.gov/safetealu>

Surface Transportation Program
2009: \$6.6 million

The Surface Transportation Program (STP) (23 U.S.C. 133) provides the greatest flexibility in the use of funds. STP funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as maps, brochures, and public service announcements) related to safe bicycle use and walking. <http://www.fta.dot.gov/funding/grants>

Congestion Mitigation and Air Quality Improvement Program
2009: \$1.8 million

Congestion Mitigation and Air Quality Improvement Program has the objective of improving the Nation’s air quality and managing traffic congestion. CMAQ projects and programs are often innovative solutions to common mobility problems and are driven by Clean Air Act mandates to attain national ambient air quality standards. Congestion Mitigation and Air Quality Improvement Program funds may be used for pedestrian and bicycle facilities and promotional activities that encourage bicycle commuting. <http://www.fta.dot.gov/funding/grants>

Recreational Trails Program
2009: \$690 million (over next 6 years)

Recreational Trails Program funds may be used for all kinds of walking and bicycle trail projects. The objective is to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Of the funds apportioned to a State, 30 percent must be used for motorized trail uses, 30 percent for non-motorized trail uses, and 40 percent for diverse trail uses. <http://www.dot.state.pa.us/PennDOT/Districts/district6.nsf/District%206-0%20Homepage? Open Frame set>

Appendix D - Local Planning “Toolbox”

Federal Highway Program. Provisions for pedestrians and bicyclists are eligible under the various categories of the Federal Lands Highway Program in conjunction with roads, highways, and parkways. Priority for funding projects is determined by the appropriate Federal Land Agency or Tribal government. Funds are available till September 2010. <http://flh.fhwa.dot.gov/>

Federal Highway Program

2009: \$223.4 million

National Scenic Byways Program funds may be used for construction along a scenic byway of a facility for pedestrians and bicyclists. These Federal funds administered by the PennDOT are available for up to 80% of the project cost, matched by at least 20% funding from the project sponsor. With exception to Statewide projects, sponsors may request no more than \$100,000. Byways can be sponsored by a county or municipal government, a private non-profit agency, or a community group. <http://www.bywaysonline.org/grants>

National Scenic Byways Program

2009: \$5.7 million awarded

Job Access and Reverse Commute Grants for transportation coordination projects such as creating Transportation Management Associations with coordinated efforts to assist low-income commuters and improving pedestrian access to, bicycle-related services to, and safety at, transit stops are also recommended projects that directly affect transportation services. Funds come from TEA-21. www.fta.dot.gov/funding/grants/grants

Job Access and Reverse Commute Grants

2009: \$339 million nationwide;

High Priority Projects and Designated Transportation Enhancement Activities identified by Section 1602 of TEA-21 include numerous bicycle, pedestrian, trails, and traffic calming projects in communities throughout the country. <http://www.fhwa.dot.gov/safetealu>

High Priority Projects and Designated Transportation Enhancement Activities

Federal Transit Program allows the Urbanized Area Formula Grants, Capital Investment Grants and Loans, and Formula Program for Other than Urbanized Area transit funds to be used for improving bicycle and pedestrian access to transit facilities and vehicles. Eligible activities include investments in "pedestrian and bicycle access to a mass transportation facility" that establishes or enhances coordination between mass transportation and other transportation. TEA-21 also created a similar Transit Enhancement Activity program with a one percent set-aside of Urbanized Area Formula Grant funds designated for, among other things, pedestrian access and walkways, and "bicycle access, including bicycle storage facilities and installing equipment for transporting bicycles on mass transportation vehicles". Funds are *managed by regional MPO* (Title 49 U.S.C. (as amended by TEA-21). <http://www.fhwa.dot.gov/environment/bikeped>

Federal Transit Program

2009: \$286 billion

2010-15: SAFETEA-LU Projections: House/Senate Committees propose \$400-\$500 billion in new Surface transporta-

Highway Safety Programs. Pedestrian and bicyclist safety remain priority areas for State and Community Highway Safety Grants funded by the Section 402 formula grant program. A State is eligible for these grants by submitting a Performance plan (establishing goals and performance measures for improving highway safety) and a Highway Safety Plan (describing activities to achieve those goals).

Highway Safety Programs

2009: \$7.6 million was available in Highway Safety Program

Appendix D - Local Planning “Toolbox”

Highway Safety Research and Development (Section 403) program

2009: \$7.6 million was available in Highway Safety Program

Funds assist with research, development, demonstrations and training to improve highway safety (including bicycle and pedestrian safety) and are carried out under the Highway Safety Research and Development (Section 403) program. Relies upon TEA-21 programs for implementation projects. <http://safety.fhwa.dot.gov/>

Public Lands Highway Discretionary

2009: \$102 million

The Public Lands Highway Discretionary program is to improve access to and within the Federal lands of the nation. The program has been continued with each highway or transportation act since then, and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, Public Law 109-59) continues the program through FY 2009. Other eligible projects include transportation planning for tourism and recreational travel, adjacent vehicular parking areas, interpretive signage. Acquisition of necessary scenic easements and scenic or historic sites, and provision for pedestrians and bicycles. <http://www.fhwa.dot.gov/discretionary/plhcurr3.cfm>

Transportation and Community and System Preservation Program

2009: \$61.25 million

TCSP includes transportation projects that integrate transportation, community, and system preservation plans and practices that: Improve the efficiency of the transportation system of the United States, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments, ensure efficient access to jobs, services, and centers of trade, examine community development patterns and identify strategies to encourage private sector development patterns and investments that support these goals (funded through SAFETEA-LU, Public Law 109-203). <http://www.fhwa.dot.gov/tcsp/>

Clean Air Transportation Communities: Innovative Projects to Improve Air Quality and Reduce Greenhouse Gases

(Current funding level unavailable)

The program strives for climate change and improve transportation/air quality issues and promotes pilot projects that have a high potential to spur innovations in the reduction of transportation-related emissions and vehicle miles traveled (VMT), at the local level and throughout the United States. EPA is particularly interested in projects that incorporate at least one of the following: smart growth efforts that reduce transportation-related emissions, commuter choice, and cleaner vehicles/green fleets. Available financial assistance ranging from \$50,000 up to \$300,000 to each recipient, in the form of cooperative agreements. Projects must utilize “Moves 2010” program model. <http://www.epa.gov/fedrgstr/EPA-AIR/>

Clean Communities on the Move (technical assistance)

(Current funding level unavailable)

A partnership driven approach to clean air and smart transportation. Program initiatives provide a broad range of innovative programs ranging from promoting smart parking meters and car sharing to cutting individual car use, promoting bicycle usage, alternative fuel technologies, and providing electric hook ups at truck stops to cut diesel engine idling. The program supported community-based marketing efforts to raise awareness about public transit and alternative fuel technologies and helped local planners model the air impacts of smart growth development patterns. <http://www.resourcesaver.com/file/toolmanager/CustomO93C337F65837.pdf>



Bucks County Bicycle Master Plan

August 2012

Appendix D - Local Planning “Toolbox”

The Fund funds projects to which community leaders collaborate and plan for strategic conservation, building a network of connected greenways for people and wildlife. Funds include bridge financing from a revolving fund as a critical tool that allows recipients to act quickly on conservation opportunities. <http://www.conservationfund.org/>

The Conservation Fund
2009: \$500 - \$2,500 per applicant

The Bikes Belong Grant Program strives to put more people on bicycles more often by funding important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S. These projects include bike paths and rail trails, as well as mountain bike trails, bike parks, BMX facilities, and large-scale bicycle advocacy initiatives. <http://www.bikesbelong.org>

Bikes Belong Grant Program
2009: \$180,000/year
Funding limit/applicant: \$10,000
Next Round: Feb. 2010

Grants to non-profit organizations for outdoor recreation and conservation. www.rei.com/aboutrei.grants

REI grant program
2009: \$2 million

Kodak awards small grants up to \$2,500 to stimulate planning and design of American greenways. http://www.conservationfund.org/kodak_awards