PEDESTRIAN AND BICYCLE PLAN

PHILADELPHIA

PCPC

PHILADELPHIA WALK BIKE

PHILADELPHIA CITY PLANNING COMMISSION / OCTOBER 2010

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PEDESTRIAN AND BICYCLE PLAN

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INTRODUCTION

Walking and bicycling are important facets of a city's mobility, economic development, public health, and environmental sustainability. They are especially important modes of transportation for children, the elderly, and people who cannot afford to own and maintain a car. Walkability and bikeability are important in attracting tourists and new residents, and more than one-third of all households in the City of Philadelphia do not have any cars at all. Active modes of transportation like walking and biking provide many people with an affordable way of incorporating physical exercise into their daily routine, helping to fight obesity and related chronic diseases. Walkable and bikeable communities make it more convenient for people to know their neighbors, and add more "eyes on the street" to make them safer. When people walk or bike instead of driving, less air pollution is the result, and everyone can breathe more easily.

While many sections of Philadelphia are traditionally walkable, and while the bike lane network has improved the safety and comfort of bike travel, there are still many gaps in the network of pedestrian and bicycle facilities. Improving the connectivity of these networks will provide more direct, convenient and safe travel routes for walking and bicycling; provide more travel choices and reduce dependency on automobiles; and strengthen community by increasing opportunities for neighbors to interact.

This Plan is Philadelphia's first Pedestrian Plan, but it serves as an update to the City's Bicycle Network Plan, completed in 2000. By 2009, more than 200 miles of City streets incorporated bike lanes. The new bike lanes, together with the expansion of the Schuylkill River Trail, have helped to support a significant growth of bicycling in recent years. However, certain areas of the City were never well covered due to physical constraints of the narrow streets and the many demands on them.

The study area for this phase of the Plan includes Center City, South Philadelphia, North Philadelphia, and Northwest Philadelphia (See Map 1). These are the areas of the City with the most pressing issues relating to the bicycle and pedestrian networks. The Plan also includes City-wide policy recommendations. The Plan identifies strategies to increase the number and frequency of people walking and bicycling in the City by improving the connectivity, safety, convenience, and attractiveness of the pedestrian and bicycle networks. Pedestrian-oriented recommendations will promote a safe, comfortable, efficient, and attractive pedestrian transportation system. The proposed expanded bikeway network will make bicycling safer and more convenient, and will help to promote a wider recognition and acceptance of bicycling as a transportation mode.

Beyond recommendations for improvements to the walking and bicycling networks, the Plan sets forth a framework for pedestrian and bicycle planning, development and maintenance that includes:

- A street classification system with design standards for sidewalks based on the inter-play between roadway function, pedestrian activity, and adjacent land use;
- A set of policies to enhance walking and bicycling facilities and improve safety education for all travelers in the City; and
- Strategies for implementing bicycle and pedestrian network recommendations.

MAP 1

Plan Study Area

BACKGROUND:

The development of this pedestrian and bicycle plan comes at a time when the City is well-positioned to address non-motorized transportation needs. A rich policy context and set of on-going programs provide a strong foundation for Plan development and implementation. The City organization and staffing provide the needed depth and breadth to improve walking and bicycling networks, with support and encouragement from advocacy organizations such as the Bicycle Coalition of Greater Philadelphia.

POLICY CONTENT:

This Plan builds on and will support several major City policy and planning initiatives, including Complete Streets, Greenworks Philadelphia, and Philadelphia 2035:

Complete Streets Executive Order.

In June 2009, Mayor Nutter laid the policy foundation for a transportation system that balances the needs of all users with the Complete Streets Executive Order. It directs all City departments and agencies to give full consideration to the safety and convenience of all users of the transportation system, whether pedestrians, bicyclists, public transit users or motor vehicle drivers; and to place a high priority on the safety of those traveling in the public right of way, particularly the safety of children, the elderly, and persons with disabilities. The Mayor's Office of Transportation and Utilities will develop and publish a Complete Streets Design Manual, which will draw from, and build on, recommendations of this Plan.

Mayor Nutter announces Complete Streets policy

Greenworks Philadelphia.

Released by the Mayor's Office of Sustainability in April 2009, Greenworks Philadelphia is an ambitious, comprehensive framework to make Philadelphia the greenest city in the United States by 2015. It sets 15 targets to improve the City's environment and encompasses more than 150 initiatives. Together, they are intended to reduce the City's vulnerability to rising energy prices, limit its environmental footprint, and reposition its workforce and job development strategies to build on Philadelphia's competitive advantages in the emerging green economy. Non-motorized transportation modes are included in or affected by several of Greenwork's targets:

Target 6:
Improve Air Quality toward Attainment of Federal Standards (Increase number of bike racks)

Target 9:
Provide Park and Recreation Resources within 10 minutes of 75% of Residents (includes riverfront trail projects)

Target 11:
Increase Tree Coverage toward 30% in all Neighborhoods by 2025 (Street trees provide buffer and shade for pedestrians but may compete for limited sidewalk space)

Target 12:
Reduce Vehicle Miles Traveled by 10% (initiatives include Pedestrian/Bicycle Plan, on- and-off-street bicycle facilities, expanded bike parking, increased traffic calming)

Target 13:
State of Good Repair to achieve 70% of City assets in good repair (street repaving important for smooth biking surfaces; upgraded bridges include sidewalks)

GREENWORKS PHILADELPHIA

Philadelphia 2035.
The Comprehensive Plan, now in the works by the City Planning Commission, is part of an integrated planning and zoning process. Organized around three major themes -- Thrive, Connect, and Renew -- this "blueprint for the future" includes a long-range citywide plan and 18 strategic district plans, at the same time that the Zoning Code Commission is working on a new Zoning Code. The district plans will provide the basis for zoning remapping, using the new zoning classifications and following the goals, principles, and recommendations of the comprehensive plan. Transportation recommendations in Philadelphia 2035 draw on recommendations in this Plan.

CONCURRENT PROJECTS AND PROGRAMS:

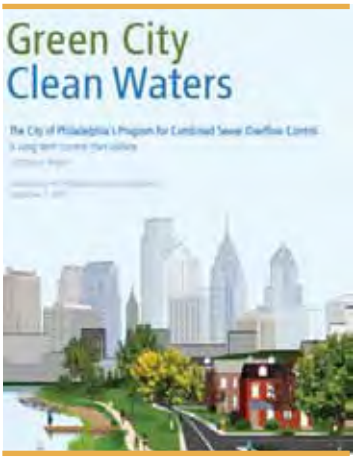
In addition to the policy initiatives described above, Philadelphia's pedestrian and bicycle networks are affected by a number of other concurrent and complementary efforts.

GreenPlan Philadelphia and Green 2015.
Philadelphia has recently completed a long-range plan to connect residents, workers, and visitors with sustainable green open space. Improvements and access to the trail system were a focus of public comments on the plan. Green 2015 is the action plan of the Philadelphia Department of Parks and Recreation to add 500 acres of new open space by 2015.

"Get Healthy Philly".
The Philadelphia Department of Public Health was awarded $15 million from the U.S. Department of Health and Human Services to promote healthy nutrition and increased physical activity. The grant will be used to make healthy foods more available and affordable, and to promote increased bicycling and walking in a variety of ways, including bicycle and pedestrian safety education, implementation of additional bike lane conversions, pedestrian and bicycle counts, and funding the extension of this Plan to cover the rest of the City.

Curb ramp installation.
Philadelphia is partnering with PennDOT to replace non ADA-compliant curb ramps.

Green City, Clean Waters (Stormwater Management plan).
City engineers are avoiding the cost of boring large stormwater tunnels or greatly expanding sewage plants to hold the overflow for subsequent treatment by instead dealing with rainwater "where it lands."[1] Philadelphia proposes to invest $1.6 billion within 20 years to manage rainwater through "green infrastructure" comprised of rain gardens, green roofs, porous pavement, planted curb extensions, vegetated parking-lot swales and new trees. The plan can complement some pedestrian and bicycle network needs. For example, curb extensions that improve street crossings for pedestrians can also include vegetation.



Neighborhood plans and studies.
Nearly four dozen recent plans, studies, and road safety audits address physical improvements to the pedestrian and bicycle networks as major topics or minor recommendations. Taken together, this work provides a context for recommendations in the Plan, demonstrating the need for new policies as well as the physical changes to improve walking and bicycling. More information on the implications of this work for the Plan is provided in the "Plan Development" section.

DVRPC Bicycle-Bus Conflict Area Study.
This 2009 study, aimed at increasing compatibility between bicycle use and bus ridership in Philadelphia, reviewed how other cities resolve bus-bicyclist conflicts and proposes one design and one policy solution. More information on the study and its impact on future bicycle facilities is included in Chapter 7, Bicycle Network Recommendations.

[1] http://smartgrowth.org/news/article.asp?art=7286&state=39

PLANNING, BUILDING AND MAINTAINING THE PEDESTRIAN AND BICYCLE NETWORKS

Three City agencies share the primary responsibilities for the planning, design, and maintenance of the City's pedestrian and bicycle networks:

- The Mayor's Office of Transportation and Utilities is responsible for coordinating all improvements to the pedestrian and bicycle networks. The City's full-time Pedestrian and Bicycle Coordinator, hired in 2008, is housed in this office.

- The City Planning Commission, in addition to being responsible for the development of this Plan, integrates proposed changes to the pedestrian and bicycle networks with development proposals and with neighborhood and district level planning efforts.

- The Streets Department is responsible for the construction and maintenance of those elements of the pedestrian and bicycle network in the public right-of-way, as well as for permitting alterations to the right-of-way by private property owners. The department's responsibilities include engineering of roadway and bridge improvements; design of traffic controls including signals, signs, and pavement markings; and maintenance of roadways and bridges (including plowing and salting), as well as traffic controls and street lights.

These three agencies work together on projects with shared objectives. A recent example is the Spruce and Pine Crosstown Bicycle Connector Pilot Project, which provided buffered bike lanes on one-way paired streets in Center City. While the Mayor's Office of Transportation and Utilities was the lead agency for the project, the Planning Commission and Streets Department collaborated in selection of the route and design, in community outreach, in implementation of the lanes, and in assessing the impact for both bicyclists and motorists.

Other agencies whose work affects walking and bicycling include the City's Police Department, Parks and Recreation, and Water Departments; the Delaware Valley Regional Planning Commission (DVRPC), the Southeastern Pennsylvania Transportation Authority (SEPTA), and the Pennsylvania Department of Transportation (PennDOT).

Accessibility for People with Disabilities.

Various agencies and departments in Philadelphia are responsible for planning for people with disabilities. The City's pedestrian planning efforts are influenced by the federal Americans with Disabilities Act (ADA). The ADA's implementing regulations require that all new and altered facilities—including sidewalks, street crossings, and related pedestrian facilities in the public right-of-way—be accessible to and usable by people with disabilities. The Americans with Disabilities Act Accessibility Guidelines (ADAAG) provide guidance for the design and construction of accessible pedestrian facilities. The United States Access Board will soon be issuing Public Rights-of-Way Access Guidelines (PROWAG) that will provide greater guidance regarding how issues of accessibility should be addressed along streets and highways where it may not be possible to provide the type of accommodations that can be included in new or reconstructed facilities.

PLAN DEVELOPMENT:

This Plan is a collaborative effort of the City of Philadelphia, the project Steering Committee, and citizens who provided input at public meetings and through an on-line survey. Recommendations reflect multiple approaches, including:

- Determining existing conditions through field work, a review of recent studies and plans, public comment;

- Drawing on current best practices for pedestrian and bicycle travel that provide safe and desirable travel environments;

- Connecting physical recommendations with a new policy framework and the new context-sensitive street classification system; and

- Understanding how to reconcile potential conflicts in pedestrian and bicycle network needs.

Steering Committee.
The planning process for the Philadelphia Pedestrian and Bicycle Plan was guided by a Steering Committee representing City agencies, DVRPC, SEPTA, the Bicycle Coalition of Greater Philadelphia, and other stakeholders. Steering Committee members are listed at the beginning of the Plan. This group met throughout the Plan's development, both as a committee of the whole and in sub-committees focused on specific policy recommendations. During the Steering Committee's September 2008 kick-off meeting, goals for the Plan were discussed. In response to the question, "In your personal opinion, if this Plan could only accomplish one thing, what would it be and why?" five themes emerged. These themes, listed below, were developed into a vision statement, goal statements and measures for each goal. They are elaborated in Chapter 2 of the Plan.

- Improve ***Safety*** for all pedestrians and bicyclists
- ***Encourage*** walking and bicycling to promote healthy, active living and to enjoy the associated economic and environmental benefits
- Increase the ***Connectivity*** of the bikeway and walking networks
- Promote and enhance the role of sidewalks and streets as the ***Public Realm***
- Garner ***Recognition*** for Philadelphia as a leader in pedestrian and bicycle achievement

The Steering Committee also reviewed and commented on other elements of the Plan including the proposed Street Types, pedestrian and bicycle demand and needs analyses used to guide network recommendations, and the recommendations themselves.

Existing Conditions Phase.

Existing Studies.
Nearly four dozen plans and studies document existing conditions of neighborhoods, corridors and travel patterns in Philadelphia. This work, completed by the City Planning Commission, the Delaware Valley Regional Planning Commission, community organizations, the Bicycle Coalition of Greater Philadelphia and others, was grouped into 6 areas: Walking Reports and Studies; Bicycling Reports and Studies; Shared-Use Trail Plans and Studies; Neighborhood/Area Plans and Studies; Corridor Plans and Studies; and Policy and Strategic Plans. Recommendations for pedestrian improvements, bicycle facilities, and access to transit described in these documents provided a rich source of information for developing and refining recommendations in this Plan. Recurring issues are shown in Table 1 and a complete summary of the plans and studies is included in Appendix A.

Table 1: Needs from Recent Studies

Pedestrian Network	Sidewalks	Improve overall condition Fill in gaps in network Increase walking space/clear width Provide buffers from traffic
	Crossings	Reduce crossing distances Install curb extensions Install pedestrian signals Add pedestrian-oriented signal timing Improve lighting Improve safety at uncontrolled intersections and mid-block crossings
Bicycle Network	Facilities & Intersections	Add more bicycle facilities Improve facility maintenance Create connections between facilities Improve safety at intersections

Field Work.
In addition to existing conditions information provided in recent plans and studies, extensive field work was completed to determine the status of the current bicycle network and areas to expand the network. Field work for pedestrian recommendations focused on typical conditions and challenges, augmented by the review of recent plans and studies, and local knowledge of the project team.

Field analysis was a major component of the bicycle recommendations of this Plan. The consultant team drew on knowledge of bicycling conditions in the study area to determine initial priorities for investigation. Consultant staff then bicycled or drove the study area to understand the existing bicycle network and identify opportunities to expand the network. During these field surveys, consultant staff examined elements affecting bicyclists such as:

- Roadway width
- Parking
- Connectivity
- Interactions with transit

The importance of public input.
Philadelphia residents and workers participated in developing this Plan in several ways. First, a Plan Website provided information on all public meetings and was a place where people could download maps and other information. The project offered an on-line survey to understand attitudes, perspectives and recommendations about walking and bicycling in Philadelphia. Open for six weeks, the survey attracted nearly 1,800 respondents.

Six open houses also created opportunities for input. The sessions were held across the study area to provide easier access for all residents and workers. Four open houses in April and May 2009 were part of the project's existing conditions assessment. Presentations included typical Philadelphia walking and bicycling conditions, and facilities and examples of how walking and bicycling could be improved. Participants worked in small groups to mark up maps and collect ideas, comments, problems and suggestions. Two more open houses were held in April 2010 to present the draft recommendations to the public.

PLAN OUTLINE:

The Plan is comprised of eight chapters beginning with the vision, goals and measures for pedestrian and bicyclist travel in Philadelphia, in Chapter 2. Chapter 3 describes existing conditions for walking and bicycling in Philadelphia, including the extent and condition of facilities, crashes, and the demand for walking and bicycling in different areas of the City. Chapter 4 presents a new set of Street Types that recognizes adjacent land use characteristics and levels of pedestrian activity as well as roadway function and includes new sidewalk design standards. Chapter 5 presents the new policy recommendations for pedestrian and bicycle facilities; health and safety programs and activities; and managing and monitoring the non-motorized transportation system. Pedestrian Network Recommendations are outlined in Chapter 6 through a series of general improvements for a select number of corridors and individual locations. Bicycle Network Recommendations follow in Chapter 7 and include a description of seven facility types and a discussion of issues to consider when implementing bicycle facilities. Chapter 8 focuses on implementation. The Plan's Appendix section includes the complete review of current plans and studies, the Policy Papers in their entirety, details on the demand and needs analysis and other supporting materials.

CHAPTER 2
PLAN VISION, GOALS AND MEASURES

The project Steering Committee crafted a vision for the Plan, along with five goals and measures or target outcomes for each goal[2]. Tracking progress towards these goals is an important element of Plan implementation. The Steering Committee recommends that a system for tracking and reporting on Plan goals be established because information and data for the measures listed under each goal may not be readily available in a single agency or City department.

The Plan vision describes travel on foot and by bicycle in livable, vibrant Philadelphia:

> The Pedestrian and Bicycle Plan envisions a Philadelphia in which walking and biking are an integral part of daily life, and vital components of a first class multi-modal transportation system. Philadelphia residents, workers and visitors consider traveling on foot or by bike to be a safe, effective, and accessible choice; one of the benefits of being in the City. Our transportation system supports other City goals for sustainability, active living, economic and community development.

Goals supporting this vision relate to Safety, Encouragement, the Public Realm, Connectivity, and Recognition. The ultimate measures of success will be increased bicycling and walking, and reduced incidence of pedestrian and bicycle crashes.

Goal 1: Improve SAFETY for pedestrians and bicyclists

Philadelphia's recently adopted Complete Streets Policy requires that all transportation facilities be designed with attention to the needs of all users, including the most vulnerable. Improvements to the design, operation, and maintenance of streets, sidewalks, and intersections will reduce pedestrian and bicycle crashes. Public safety campaigns, combined with enforcement, can foster a higher level of predictability among all users of the roadway. Bicyclists should feel safe riding in the street as the law requires.

Measures

- Number of bicycle and pedestrian crashes
  - **Reduce fatalities 50% by 2020**
  - **Reduce injuries 50% by 2020**
- Number of pedestrian and bicyclist education programs in schools
- Number of traffic safety education programs for all users and enforcement authorities

Goal 2. ENCOURAGE biking and walking to promote healthy, active living and to enjoy the associated economic and environmental benefits.

Philadelphia's sidewalks and bikeways should be inviting to potential walkers and bikers. Walkable neighborhoods that provide access to daily destinations such as schools, stores, and recreation within a short distance of home have demonstrated economic benefits. Many short auto trips could be replaced by biking or walking trips, with resulting benefits for residents' health and fitness and reductions in air pollution.

Measures

- Increase in the commuting mode share for:
  - **Bicycling from 1.6% to 6.5% by 2020**
  - **Walking from 8.6% to 12% by 2020**
- Regular pedestrian and bicyclist counts:
  - **Triple bicyclist volume at key locations**
  - **Increase pedestrian volume at key locations by 50%**
- DVRPC Household Travel Survey
  - **Increase total of Walk, Bicycle, and Transit by 10%**

[2] Items in bold under Measures are target outcomes.

Goal 3. Promote and enhance the role of sidewalks and streets as the PUBLIC REALM

Re-envision and establish sidewalks and streets as public space for people to enjoy. Sidewalks are the part of the street environment where pedestrians should feel safe from vehicles and free to move in comfort. The level of pedestrian amenities, maintenance and management should be raised to make the sidewalks and streets a vital part of the City's civic life and accessible to all.

Measures

- Rate of violations found during sidewalk audits
- Level of public and private funding committed to the sidewalks

Goal 4. Increase the CONNECTIVITY of the bikeway and walking networks

Filling in the gaps in the sidewalk and bicycle lane networks will make it easier to walk or bicycle to neighborhood destinations such as stores, schools, parks, recreation centers, and libraries, and to make connections with the transit system. Extending the networks, including separated paths and trails, will also enable more Philadelphians to commute to work on foot or by bicycle.

Measures

- Miles of bike lanes added
- Critical sidewalk gaps connected
- Miles of off-road trails added (exclusive of sidewalk trails)
- Crossing improvements

Goal 5. Garner RECOGNITION for Philadelphia as a leader in bicycle and pedestrian achievement.

Recognition comes from external entities and from those who live and work in Philadelphia. Many Philadelphia neighborhoods are already recognized as among the most walkable and bikeable in the country. However, the City can gain additional recognition by increasing intermodal connections between its various travel modes and by trying or pioneering new engineering practices or policies.

Measures

- Reach League of American Bicyclists platinum level by 2013
- Seek Walk Friendly Community award from Pedestrian and Bicycle Information Center
- External "mentions" and references in news articles, blogs, magazines, etc.

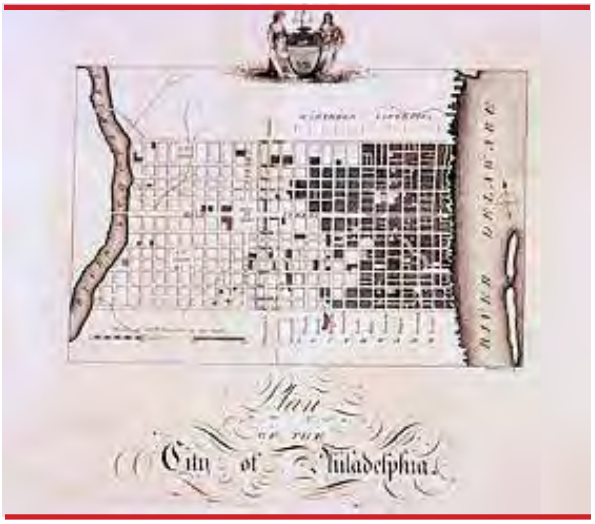
CHAPTER 3
EXISTING CONDITIONS

This chapter highlights existing conditions for walking and bicycling in Philadelphia, providing information on the extent, quality, and condition of facilities, crash data; and an analysis of demand for walking and bicycling in different areas of the city.

OVERVIEW

A city's history plays a significant role in how we move through it. William Penn and Thomas Holmes' grid for Center City Philadelphia, created in the 17th century, still exists today and is in many ways the streetscape's most defining characteristic. Philadelphia has one of the most walkable downtowns in the nation, with nearly 17,000 people walking to work on a daily basis. Much of the study area replicates the grid layout, which provides a rich network of connections for vehicles and pedestrians alike. Most parts of the study area that were developed before World War II are well-supplied with sidewalks, except for some sections of the Northwest, especially those that are close to parkland. The majority of study-area streets are narrow and relatively easy to cross on foot. However, the narrow streets that are so pedestrian-friendly pose real challenges in terms of developing a bike-way network. Dedicating space specifically for bicyclists means taking it away from either traffic lanes or parking lanes.

Areas of the city that were developed after World War II tend to be less pedestrian friendly. Here the roads are wider, with more lanes and longer blocks, less well-connected, and often missing sidewalks. Although the roads often are wide enough to accommodate bike lanes, these neighborhoods are not necessarily much more bicycle-friendly than older areas without bike lanes, because traffic speeds are typically higher and the intersections may be large, complex, and intimidating.



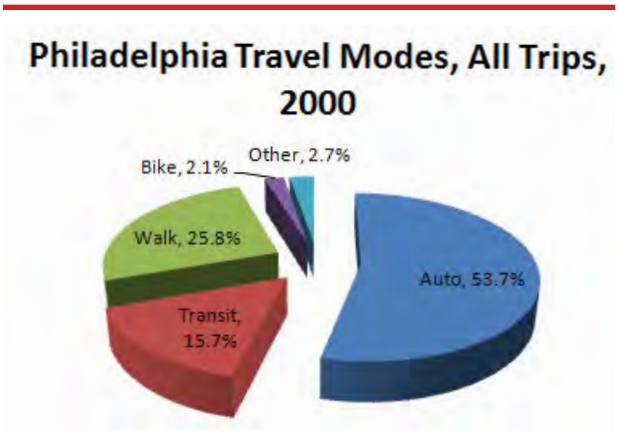
Graphic 1. Birch's View: Plan of Philadelphia

Besides the post-war neighborhoods, the parts of the City that are the most difficult for walking and bicycling are industrial areas. Some of these, especially along the waterfront, are being redeveloped for residential and commercial uses that could generate much more pedestrian and bicycle activity.

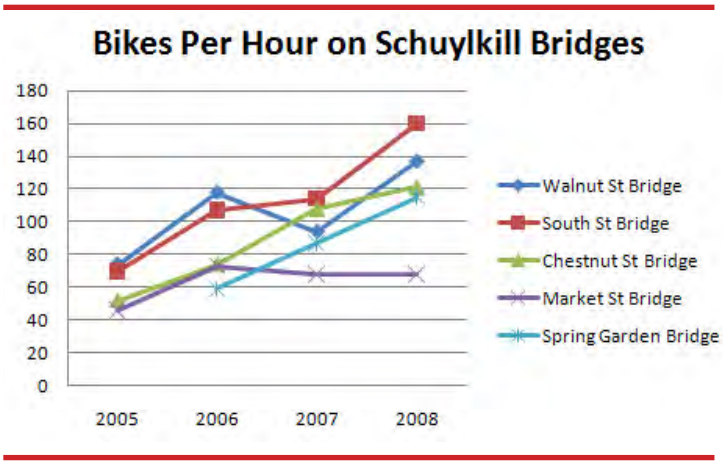
Philadelphia's transportation network is used by 1.5 million residents, plus commuters and tourists. Nearly 26% of all trips are walk trips (based on DVRPC's 2000 Household Travel Survey - see Graphic 2) and about 8% of work trips are walk-only. Most other work trips, particularly transit trips, have a walking component. Safe pedestrian access to transit is critical for all and especially the growing elderly population.

Though the bicycle mode share is small, it is growing rapidly. With the release of the 2008 American Community Survey figures, Philadelphia claimed first place among the top ten cities in America, as the bicycle commute share climbed to 1.6%[3]. This growth in bicycle commuting mirrors the increased counts of bicyclists on the Schuylkill River bridges over the period from 2005 to 2008. Current initiatives to improve air quality and promote active living are increasing walking and bicycling rates, and the city's population decline that began in the 1950's appears to be reversing[4]. As a result, the ability of the existing pedestrian and bicycle networks to safely and comfortably handle more users is being challenged.

[3] Graphic of Double Dutch: Bicycling Jumps in Philadelphia from Bicycle Coalition of Greater Philadelphia.
[4] http://www.philly.com/philly/news/homepage/20091202_Hey__Philly__You_re_bigger_.html



Graphic 2. Philadelphia Travel Modes: All Trips



Graphic 3. Bikes per Hour on Schuylkill Bridges

Roadway Classification

The study area includes a full range of roadway types, including residential streets, arterial roads, and expressways. These roads provide the basic network for walking and bicycling throughout the city. Most Philadelphia streets have sidewalks on at least one side; however, sidewalks are missing on some streets. A summary of the characteristics of each road class and the total linear miles in the study area is included in Table 2. The City's roadway classification is similar to the functional classification of the Federal Highway Administration, which must be used for certain funding purposes. A major recommendation of this Plan, presented in Chapter 4, is the addition of a new street classification system to be used for pedestrian planning: a set of street types that incorporate adjacent land use and levels of pedestrian activity along with vehicular function.

Table 2: Roadway Miles in the Study Area by Functional Classification

		Miles
Functional Classification	Low-Speed Ramp On- and off-ramps connecting expressways to street network.	12
	Major Arterial Provides service to through or long trips. Typically a multi-lane road and usually divided. High traffic volumes.	93
	Minor Arterial Provides service for moderate length trips. Medium to high volume traffic.	172
	Collector Provides traffic circulation within neighborhoods and small areas. Connects local roads to arterial system. Lower traffic volumes than arterials.	354
	Local Mainly provides access to abutting properties. Low traffic volumes.	449
	Non Travel Roads that are closed to traffic or cannot be driven on.	18
	Total	**1.098**

A Walkable City

Philadelphia is considered to be a walkable city, compared to most other cities. For the past several years, WalkScore has ranked Philadelphia as the 5th most walkable city in America. Prevention Magazine rated Philadelphia 4th most walkable in 2004.

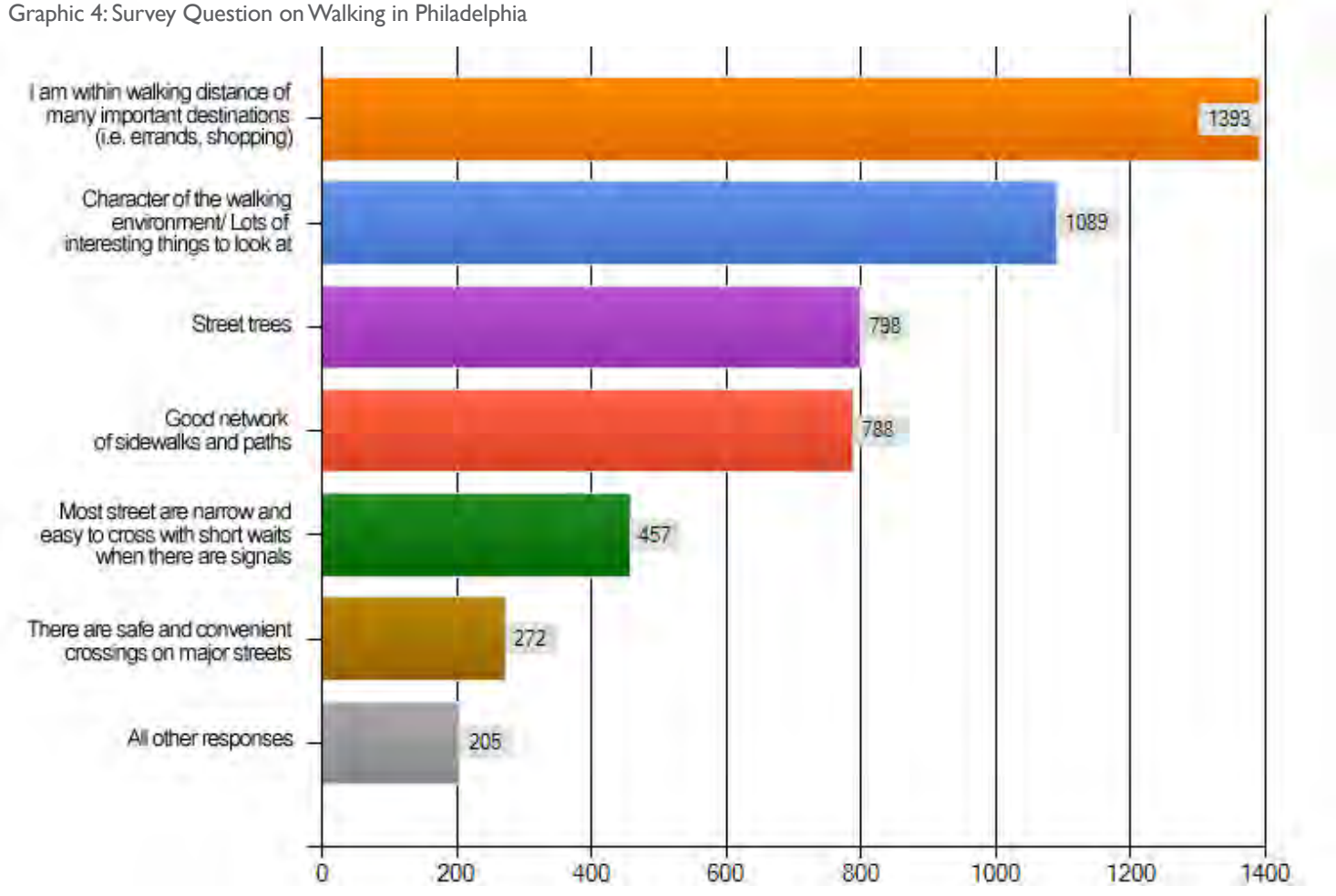
Five major factors contribute to Philadelphia's walkability:

- The mixed land use of Philadelphia neighborhoods means that destinations are often within walking distance.
- The sidewalk network is extensive, particularly in older parts of the City.
- Most streets are narrow, making crossing easier.
- The typically short (60-second) traffic signal cycles reduce pedestrian wait time at street crossings.
- Block lengths in many neighborhoods are short, allowing for direct foot access to destinations.

This picture of Philadelphia's walkability was confirmed by those completing the web-based questionnaire conducted as a part of this Plan. In response to the question "What do you like MOST about walking in Philadelphia?" nearly 80% of respondents said they were within walking distance of important destinations and over 60% indicated that the City's character offered an interesting walking environment. The good network of sidewalks and paths was cited by 45% as what they liked most, a tie with street trees for third place. A complete summary of the web-based questionnaire is in Appendix B.

According to the questionnaire responses, Philadelphians most often use the pedestrian network to get to the bus stop or transit station, to shop and complete other errands, and to see friends and family. The mode share of commuting to work on foot varies within the study area, generally depending on the density of jobs and residences.

Graphic 4: Survey Question on Walking in Philadelphia



Existing Pedestrian Facilities

The range of existing pedestrian facilities in Philadelphia includes a few generously wide sidewalks in Center City, narrower sidewalks with grass buffers in neighborhoods, streets with trolley tracks, and walking trails in and around Fairmount Park and other areas. Despite its overall walkability, the presence, quality, and connectivity of the pedestrian network varies greatly throughout the City and affects pedestrian comfort and safety. This variety is often a function and result of land use, urban design, and the age and characteristics of a particular sidewalk or intersection. This section discusses specific elements of the pedestrian network in Philadelphia that impact pedestrian safety and walkability.

Philadelphia's transportation system includes sidewalks, curb ramps, crosswalks, signals and signs, and trails. The pedestrian environment is shaped by this infrastructure, as well as by elements like parks, civic land uses, availability of transit, and private development. The pedestrian experience can be broken down into two distinct categories. The first is the pedestrian's experience walking along roadways, and the second is the experience of crossing roadways. Selected elements that impact this experience in Philadelphia are described briefly below. A number of these elements, particularly those in the second category, also affect bicyclists.

Along the Roadway

A pedestrian's experience walking along the streets and roadways in Philadelphia is influenced by a variety of factors, such as:

- ***Sidewalks:*** Sidewalks are the central component of the pedestrian network. Sidewalks and walkways should provide a continuous system of accessible paths for pedestrians.
- ***Buffers:*** A pedestrian's safety and comfort in the roadway environment is significantly affected by the width and quality of the buffer between the sidewalk and the roadway, on streets with heavy traffic volumes. Buffers such as on-street parking, street trees, curbs, bike racks, and landscaping can enhance the pedestrian experience by separating the vehicular traffic lanes from the pedestrian space on the sidewalk.
- ***Obstructions:*** Items reducing the clear width for pedestrian travel along sidewalks affect sidewalk functionality. Food carts, street trees, planters, café tables and retailers' merchandise can contribute to a lively and attractive pedestrian environment, but appropriate space for these items is needed.
- ***Access to Transit:*** Sidewalk connectivity in the proximity of bus stops provides access to these stops for all riders, especially important to older residents and those with disabilities.
- ***Vehicular intrusions:*** Sidewalks are often interrupted by driveways and lay-by lanes. The former introduce conflict zones into the sidewalk, while the latter reduce the sidewalk width, in most cases substantially. Illegal sidewalk parking is common in many parts of Philadelphia, often forcing walkers into the street.
- ***Construction Zones:*** Current construction zones range from complete sidewalk closure to fully protected access.
- ***Bridges:*** Bridges can serve as either connections or barriers in the pedestrian network.
- ***Access to Trails:*** There are 41 miles of major multi-use trails in Philadelphia. Pedestrian access to trails is predominantly provided via street crossings and at trailhead locations.
- ***Pedestrian Bridges/Underpasses:*** Pedestrian bridges and underpasses separate pedestrian traffic from motor vehicle traffic, allowing pedestrians to cross busy streets by eliminating potential conflicts. However, pedestrians are often reluctant to use them, either because of the extra time it would take, or because of security concerns.
- ***Maintenance:*** Maintenance of sidewalks is a critical issue. The sidewalk inventory and condition assessment to be undertaken in Phase 2 of this Plan will provide important information regarding sidewalk maintenance issues throughout the City.

Across the Roadway

In addition to continuous sidewalks, safe street crossings are a critical component of an accessible pedestrian network. Important factors in determining a pedestrian's experience crossing a roadway include intersection geometry and the character of the road. The following is a general synthesis of intersection considerations that affect pedestrians.

- ***Intersection Geometry:*** Intersection geometry is a critical element affecting accessibility and pedestrian comfort crossing streets. Skewed intersections that result in obtuse angles (larger than 90 degrees) allow motorists to make right turns across the pedestrian travel way at higher speeds, while often interfering with pedestrians' ability to see turning traffic.
- ***Crosswalks:*** Crosswalk markings are used to alert motorists to locations where they should expect pedestrians and to identify a designated crossing location for pedestrians. A crosswalk may be marked or unmarked since, legally, crosswalks exist at all intersections, unless specifically prohibited.
- ***Pavement Condition:*** The pavement condition of crosswalks, curb ramps and corners also affect pedestrian safety and comfort. All pavement areas should be ADA-compliant, using PROWAG recommended standards.
- ***Curb Ramps:*** ADA-compliant curb ramps ensure the pedestrian network is accessible for all users and creates a more useful network for pedestrians traveling with strollers, rolling luggage and carts.
- ***Width and Number of Lanes:*** The wider the road that must be crossed, the longer the pedestrian is exposed to the possibility of being hit while crossing. Multiple travel lanes create the possibility of "multiple threat" crashes, where one vehicle yields but blocks the view of another vehicle that then hits the pedestrian.
- ***Pedestrian Crossing Islands:*** In locations with longer crossing distances (i.e., more than two lanes) and/or higher vehicle speeds, pedestrian crossing islands benefit pedestrians by providing a refuge. In particular, pedestrian crossing islands have been shown to increase safety for pedestrians crossing multi-lane roadways at un-signalized crossings[5].
- ***Curb Extensions:*** Curb extensions (or curb bumpouts) shorten the distance pedestrians must cross, while at the same time increasing their visibility to motorists. By narrowing the curb-to-curb width of a roadway, curb extensions help reduce motor vehicle speeds and improve pedestrian safety.
- ***Traffic Signals and Stop Signs:*** Traffic controls have a significant impact on a pedestrian's experience crossing the roadway. Particularly important is the distance between controlled intersections, since few pedestrians will walk very far to reach an official crosswalk.
- ***Signal Timing:*** It is essential to provide signals that are phased and timed to allow pedestrians of all abilities to cross the roadway, including those who are typically slower (children, senior citizens, people with limited mobility). At the same time, signal delay must be minimized in order to reduce the amount of illegal and unsafe crossing that occurs when pedestrians get impatient waiting for the signal to change.
- ***Lighting:*** Pedestrians can be adversely affected by low-light conditions. In fact, two-thirds of pedestrian fatalities occur between dusk and dawn[6]. Lighting is important at intersections and mid-block crossings, particularly in locations near transit stops.
- ***Signage and Striping:*** Signage and striping support other infrastructure and signal elements of the pedestrian's travel across the roadway. They inform pedestrians of the crossing location and alert motorists of the presence of pedestrians. Stop bar placement is intended to create appropriate space between motor vehicles stopped at a controlled intersection and pedestrians walking in the crosswalk. Overall, signage and striping should be well-placed and conform to current MUTCD standards.

Other factors affecting the pedestrian network in Philadelphia include the presence of bicycle facilities along and across the roadway, and whether a street is one-way or two-way.

[5] Zegeer et al., February 2002

[6] http://www.tfhrc.gov/safety/pedbike/pubs/03042/part2.htm

Pedestrian Network Needs

Sidewalks are the backbone of the pedestrian network, as pedestrians do most of their traveling on them. Thus, the sidewalk is the space where pedestrians should be able to move freely and comfortably. Most Philadelphia sidewalks are relatively narrow and many, especially on older, narrow streets, are cluttered with encroachments or parked vehicles.

The quality of Philadelphia's sidewalk network has not kept pace with the needs of pedestrians over the past 30 years. Property owners in the State of Pennsylvania are responsible for the maintenance and repair of sidewalks that abut their property. Although this law is not unusual, it means that sidewalks are the only major element of the public right-of-way that is not a public responsibility. The laws requiring property owner maintenance are seldom enforced.

The city has neither a dedicated source of funding for sidewalk repair nor a line item in the capital budget, even for publicly-owned sidewalks (except those in Fairmount Park). Thus, outside of targeted streetscape projects in some commercial corridors, the overall quality of sidewalks has declined over the years from a lack of funding.

Public input, including open houses and the questionnaire, revealed a number of concerns regarding maintenance and management of sidewalks and street crossings in Philadelphia. Some of the concerns noted:

- Drivers not yielding or stopping for pedestrians
- Unattractive streets and sidewalks
- Sidewalk encroachments including construction, food trucks and cafes
- Poor sidewalk surface quality and ADA-compliance issues
- Drivers running red lights
- Diagonal streets forming wide asymmetrical intersections

Public input also highlighted many locations in need of improvements, including neighborhood streets, crossing highway interchanges, sidewalks on bridges or overpasses, major streets with heavy pedestrian traffic, and near destinations such as transit stations, schools, parks and recreation facilities, shopping and retail locations, and tourist destinations.

A Bikeable City

In 2009, Philadelphia received a Bronze Bicycle-Friendly Community Award from the League of American Bicyclists, and Mayor Nutter set a goal of winning a Platinum award by 2013. Progress towards these goals is due in no small measure to the hard work of the Bicycle Coalition of Greater Philadelphia, which was named the 2010 Advocacy Organization of the Year by the Alliance for Biking and Walking.

Bicycle Ambassadors promote bicycling and explain rules of the road.

Existing Facilities

The 2000 Philadelphia Bicycle Network Plan identified a network of recommended bike lanes and bicycle friendly streets. Bike lanes were recommended primarily on collector and arterial streets where there was sufficient width. Most of the bike lanes could be established without removing parking or significantly impacting motor vehicle capacity. Many of the facilities were established through the City's street resurfacing program. The linear miles of bike lanes in the study area by functional classification are noted in the Table 3.

While more than 200 miles of bike lanes were established city-wide over the past ten years, the lanes are often interrupted when a street narrows or conditions change. As a result, accommodations are discontinuous in many parts of the city. Partly as a result of the limited number of options available to designers of the day, the improvements to bicycle-friendly streets identified in the 2000 plan were basically limited to the installation of "Share the Road" signs. Since the completion of the previous plan, new design standards for accommodating bicycles in the roadway have been developed that can help close these gaps in the original network.

Input from the Steering Committee, the public open houses, and the web-based questionnaire revealed a number of general concerns regarding bicycling in Philadelphia.

Some of the concerns are noted below:

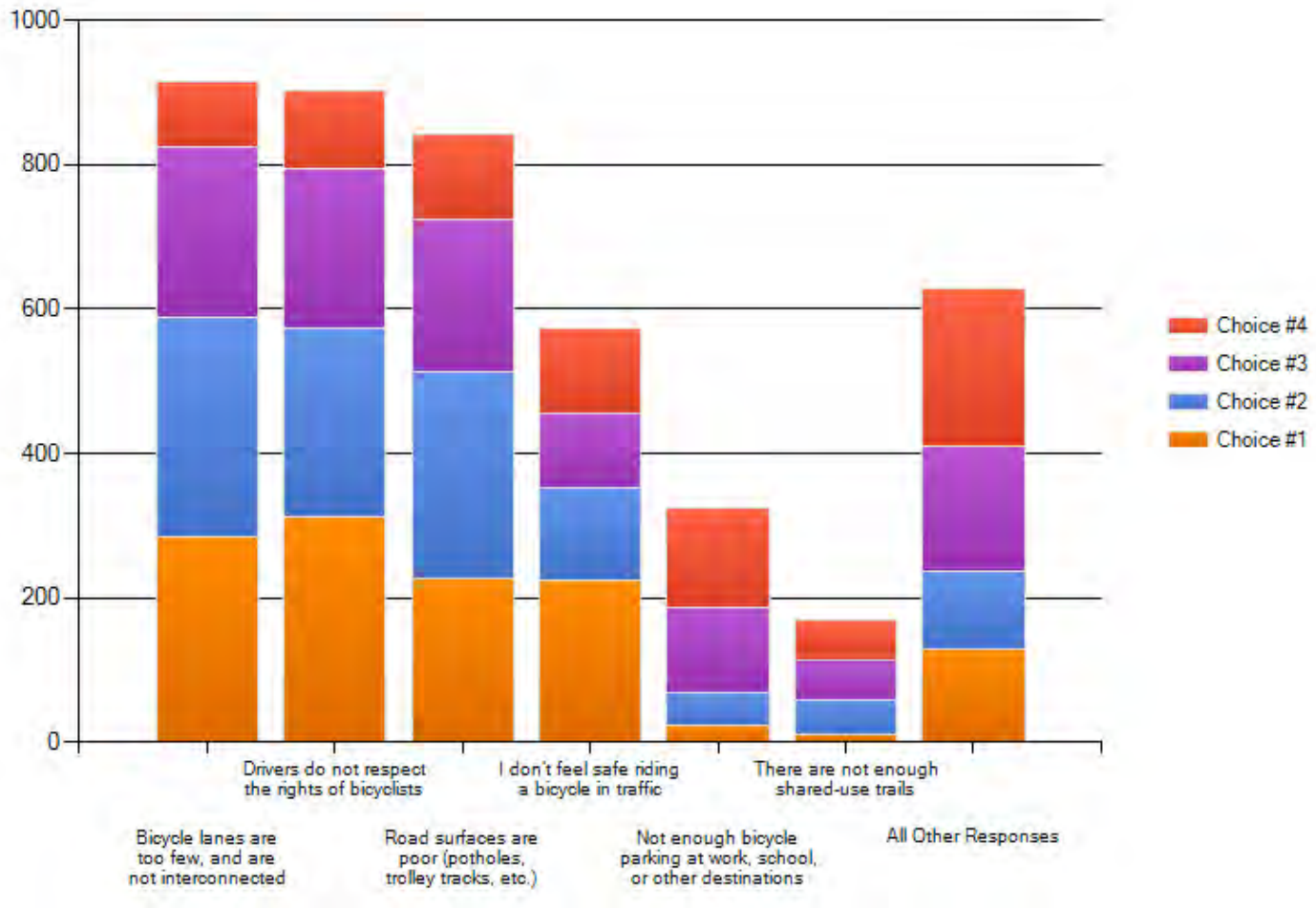
- Lack of direct East/West and North/South routes
- Driver behavior
- Poor road surfaces
- Sidewalk and wrong-way riding are frequent problems
- Concerns about safety in traffic
- Lack of bike parking

A complete summary of the web-based questionnaire is in Appendix B.

Table 3: Existing Bike Lanes in the Study Area by Functional Classification

Functional Classification	Miles
Low-Speed Ramp	0.3
Major Arterial	28.7
Minor Arterial	22.7
Collector	8.4
Local	1.1
Total	61.2

Graphic 5: Survey Question on Biking in Philadelphia



Pilot Projects

Spruce/Pine Lane Conversion. In the spring of 2009, the city conducted a pilot project to add bicycle lanes on Spruce Street and Pine Street through Center City. The project required reducing each street from two traffic lanes to one to create space for bike lanes with painted buffers. These new facilities on Spruce and Pine represented the first dedicated cross-town bikeway between Spring Garden Street and Washington Avenue.

The city conducted public outreach and measured the impacts on vehicle traffic with before and after traffic counts and surveys. The number of bicycles using the streets increased significantly, while other impacts were minimal. Based on the success of the pilot, the lanes will be permanently installed when the streets are resurfaced in 2010. However, reported problems with extended vehicle stopping and parking in the bike lanes continue to be concerns.

Bus-Bike interface. The city has also experimented with a shared bike and bus lane on Chestnut Street in Center City. As turning vehicles are also permitted to use the lane, and because there is a general lack of enforcement against vehicles illegally using the lane, it is often congested and not attractive for cycling.

Graphic 6. Buffered Bike Lane Design on Spruce and Pine Streets

Trail Connections

Improvements to the Schuylkill River Trail and new connections between the trail and Center City have recently been built or are planned:

- New access ramps to the trail at Chestnut and Market Streets
- Walnut Street Gateway: enhancing the Walnut Street bridge for bicyclists and pedestrians
- Improved at-grade rail crossings at Race and Locust Streets
- A new grade-separated crossing over the CSX tracks at 25th and Spruce Streets
- Extension of the trail south from Locust Street to South Street via a boardwalk
- A ramp connection from the new South Street Bridge to the trail
- The Grays Ferry Crescent section of the trail
- A connection of the trail from the northern end of the Manayunk Canal at Shawmont Avenue with the northernmost section of the Schuylkill River Trail in Philadelphia, at Port Royal Avenue

Many of the planned projects will be funded through $17.2 million in TIGER grants[7] awarded in 2009 .

Pedestrian and Bicycle Crash Data

According to the 2010 Benchmarking Report by the Alliance for Biking and Walking, Philadelphia is the 9th safest city (of 51) for pedestrians. Dangerous by Design ranks the Philadelphia metro area as the 15th safest of 52 major regions. Both use the Pedestrian Danger Index, which compares the average pedestrian fatality rate with the percent of residents who walk to work. In terms of bicycling safety, Philadelphia was ranked 21st safest by the Benchmarking Report, using a similar index for bicycling. These indices, following discussion and maps, are based on traffic crashes where a pedestrian or bicyclist was involved in a collision with a motor vehicle. These crashes do not cover the whole universe of bicycle and pedestrian injuries. An analysis of hospital emergency department data concluded that "as many as 31 percent of bicyclist injuries and 53 percent of pedestrian injuries occur in non-roadway locations, and would not be captured by State crash data." [8]

Traffic fatalities of both pedestrians and bicyclists have been fairly stable over the past 12 years. However, pedestrian injuries have declined by 25% over the same time frame. Nevertheless, the issue of pedestrian and bicycle safety remain at the forefront of planning efforts in the City. For example, pedestrian and bicycle safety are included in the emphasis areas for DVRPC's Regional Safety Action Plan, and the City has recently formed a Bicycle and Pedestrian Safety Task Force. Maps 2 and 3 show pedestrian and bicycle crashes in the study area between 1990 and 2005.

[7] http://blog.bicyclecoalition.org/2010/02/phillys-portion-of-23-million-tiger.html

[8] See Injury to Pedestrians and Bicyclists: An Analysis Based on Hospital Emergency Department Data, USDOT, FHWA Report #: FHWA-RD-99-78, Tables 64 and 65.

The Streets Department has researched long-term trends in pedestrian crashes. One study tracked pedestrian injuries and fatalities over a 75-year period. It highlighted significant traffic engineering initiatives that helped contribute to the reduction in crashes over the last century. Some of these initiatives are noted below.

- All-way stop signs installed in the 1970s, resulting in a 50% decline in pedestrian fatalities and 40% decline in pedestrian injuries in the City
- Removal of unwarranted traffic signals (that had been installed in the 1960s) and replacement with all-way stops
- Signing the perimeter of all elementary schools for No Parking During School Hours, which helped reduce dart-out injuries among children age 5 to 9 from 14 per week to 3 per week
- Thermoplastic pavement markings, including continental crosswalks
- Adjustment of traffic signal timings in 1994-1995 to include all-red phases and adequate pedestrian crossing times

The Department also did an analysis of 54 intersections in the City that each had more than 2 pedestrian crashes per year in the early 1990's. These intersections tended to share the following characteristics:

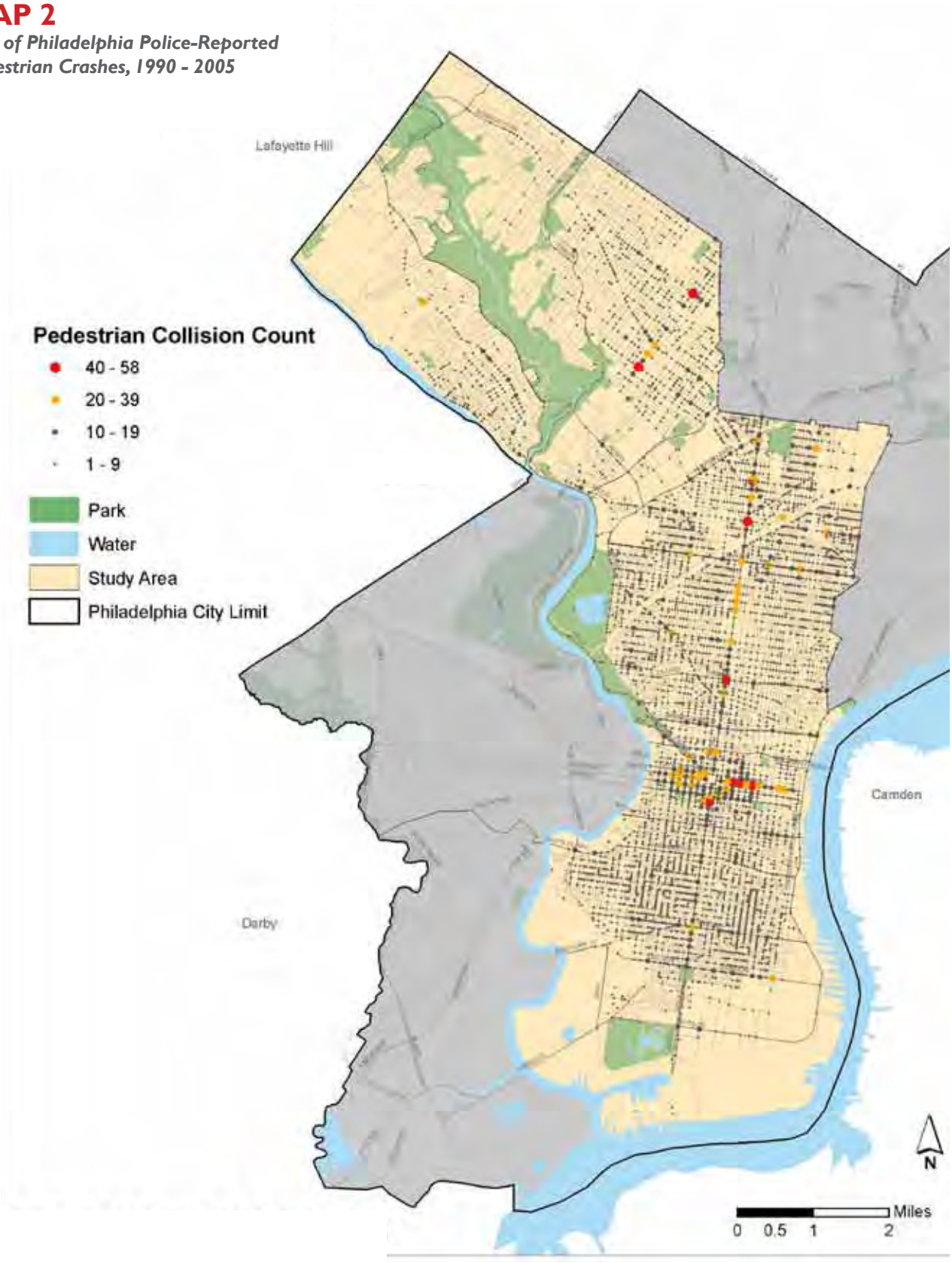
- Traffic volumes 20,000 per day or higher (46 locations)
- At least one intersecting street 60 feet or wider (42 locations)
- SEPTA surface lines intersect (42 locations)
- Commercial shopping strip (35 locations)
- SEPTA Subway/Elevated stop (23 locations)
- 3 or more streets intersect (9 locations)

The number of crashes does not necessarily reflect the safety of an intersection. The rate of crashes more accurately balances the number of crashes against the volume of pedestrian activity. Many of the high crash locations are associated with high pedestrian concentrations.

Broad Street (mainly North Broad) was the location of the largest number of the high pedestrian volume/high crash intersections, and Market Street had the second highest number. The Delaware Valley Regional Planning Commission (DVRPC) prepared a crash analysis of North Broad Street using the Pedestrian and Bicycle Crash Analysis Tool developed by the National Highway Traffic Safety Administration. Key findings of the North Broad Street crash analysis were that two out of five crashes happened "when a motorist, either moving straight or turning, failed to give way to a pedestrian crossing the roadway in either a marked or unmarked crosswalk. Such crashes occur disproportionately after dark." Based on this, the DVRPC study suggested that "significant reductions in pedestrian crashes might be achieved by enhancing the lighting of crosswalk areas and targeting enforcement of yield-to-pedestrian laws".

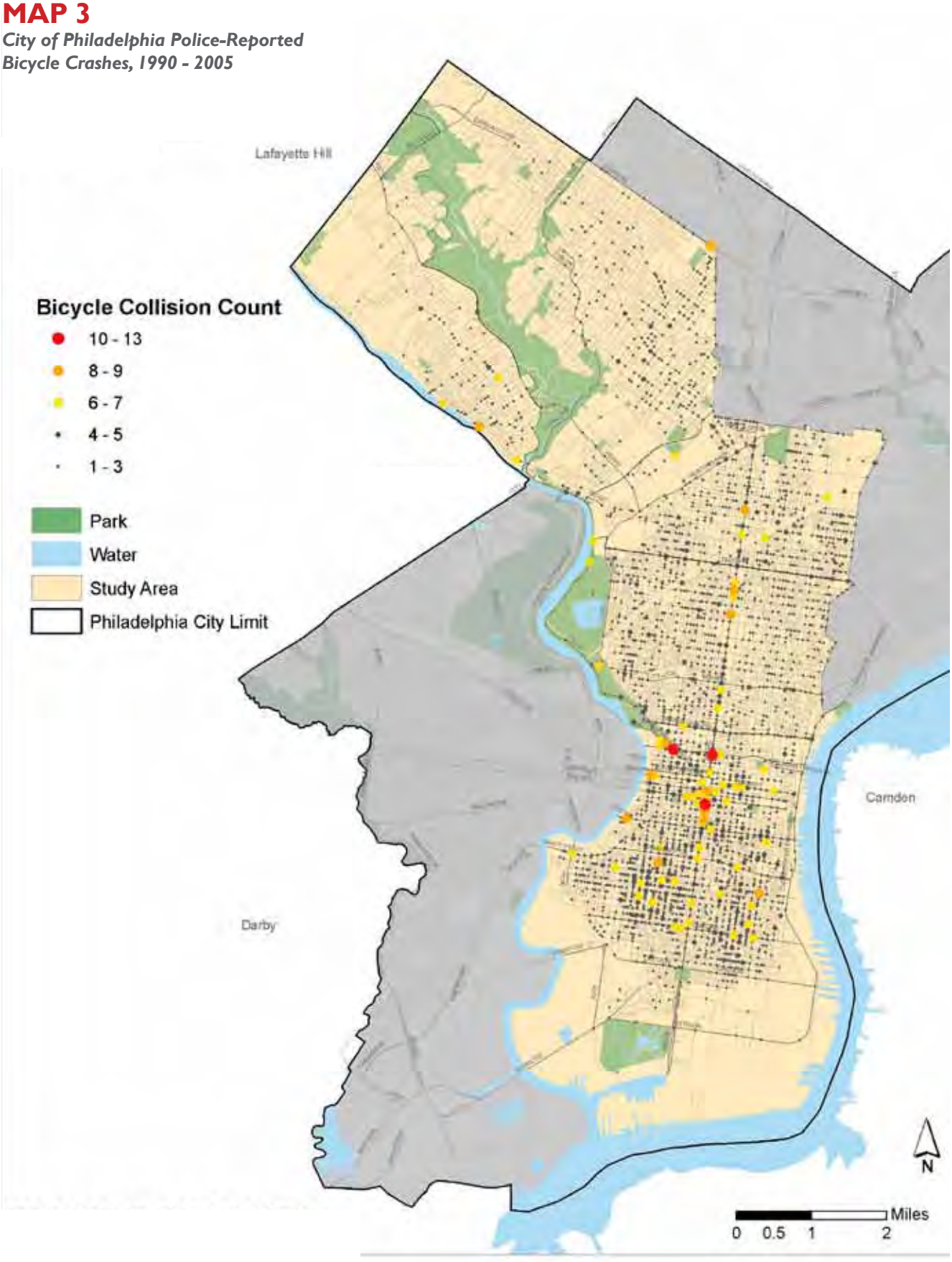
MAP 2

City of Philadelphia Police-Reported Pedestrian Crashes, 1990 - 2005



MAP 3

City of Philadelphia Police-Reported Bicycle Crashes, 1990 - 2005



DEMAND AND NEEDS ANALYSIS

This project included separate demand and need assessments for walking and bicycling. GIS mapping and analysis was used to identify areas where the most pedestrians and bicyclists can be expected, as well as locations where the pedestrian and bicycle networks may need improvement. These analyses are described briefly below.

Demand Analysis

Demand analysis begins with the identification of existing destinations in Philadelphia to which people can be expected to walk or bicycle. While the destinations are similar for walkers and bicyclists, the pedestrian and bicycle demand maps are different because travel distance affects the two modes differently. The analyses take into account both the destinations to which people walk or bicycle and the distances people will travel to these destinations.

Pedestrian Demand Analysis.

Population and employment densities are the starting point for the demand analysis, in that they serve as general proxies for all home-based and work-related trips. Additional destinations that create pedestrian demand include colleges and universities, tourist attractions, schools, transit facilities, retail corridors, community services, and parks. Destinations located close to each other create greater demand, suggesting the need for pedestrian-supportive infrastructure.

The demand analysis includes high, medium and low generators, reflecting the fact that different types of destinations generate different levels of activity. For example, SEPTA and PATCO stations are likely to generate more pedestrian and bicycle traffic than places of worship. The analysis also accounts for the distance people are willing to walk to and from different types of destinations. It recognizes that these distances are not the same for all pedestrian generators. For example, people may be more likely to walk farther to a transit station than to a coffee shop.

Table 4 shows the ten types of generators used to determine pedestrian demand in the study area. The resulting locations were grouped by the expected volume of pedestrian trips (high, medium and low), then scored by how far pedestrian would walk to or from the generator. The analysis used distances of 1/8, 1/4 and 1/2 mile, generally scoring high, medium and low generators within set ranges. Map 4 shows the result of the pedestrian demand analysis. Areas with higher scores, i.e., greater pedestrian demand, considered "hot spots", are shown as the darker green areas on the map.

Table 4: Pedestrian Demand Generators

Pedestrian Generators	Destinations		Weight		
			1/8 Mile	1/4 Mile	1/2 Mile
	High Generator	University or College	15	10	5
		Major Generators / Tourist Destination	15	10	5
		SEPTA Rail Station & PATCO; Greyhound Bus Station	10	7	5
	Medium Generator	School	7	5	1
		Major Retail and entertainment	7	5	1
		Medium Tourist Destination	7	5	1
		Hospital	5	1	0
		Community Service	7	5	3
		Major Park Entrance	7	5	3
	Low Generator	Places of Worship	2	1	0

The demand analysis reflects the relative amounts of pedestrian activity that are anticipated in different parts of the city. Evaluating potential pedestrian demand allows the City to focus investments in locations that will benefit the greatest numbers of people. This information can inform the selection and prioritization of a range of pedestrian improvements such as sidewalks, curb ramps, and crosswalks.

Bicycle Demand Analysis.

A similar approach was used to take a snapshot of bicycle demand based on the density of bicycle trip generators. Overall, a bicyclist will travel farther to destinations that may be beyond a distance that a person may walk, with distances of up to three miles being within a relatively comfortable range.

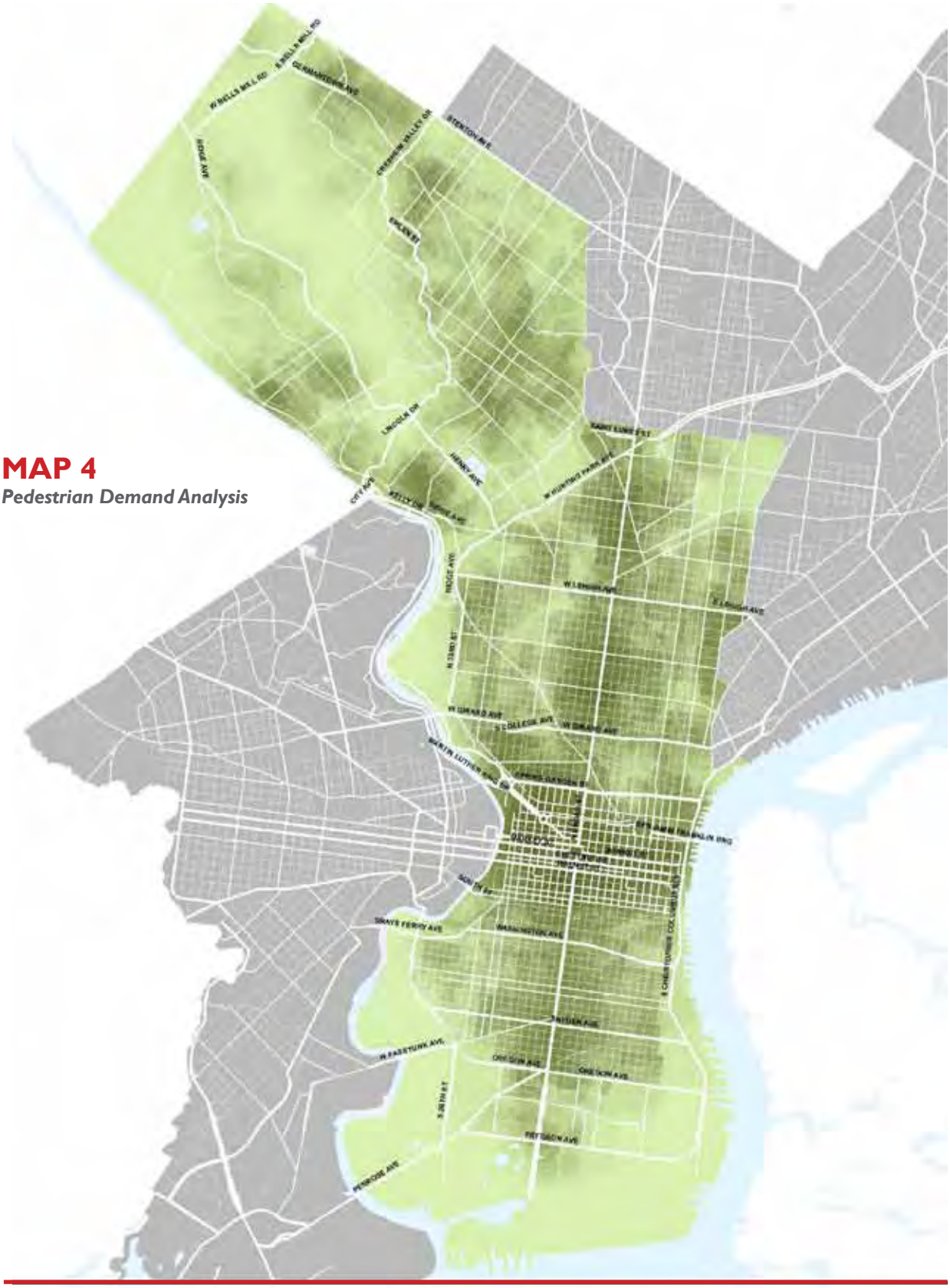
Table 5 shows the ten types of generators used to determine bicycle demand in the study area. The resulting locations were grouped by the expected volume of pedestrian trips (high, medium and low), then scored by how far bicyclists would travel to or from the generator. The analysis used distances of 1/2 mile, 1 mile, and 1 1/2 miles, generally scoring high, medium and low generators within set ranges. Map 5 shows the result of the bicycle demand analysis. Areas with higher scores, i.e., greater demand, considered "hot spots", are shown as the darker purple areas on the map.

Table 5: Bicycle Demand Generators

Bicycle Generators	Destinations		Weight		
			1/2 Mile	1 Mile	1 1/2 Miles
	High Generator	University or College	15	10	5
		Major Generators / Tourist Destination	15	10	5
		SEPTA Rail Station & PATCO; Greyhound Bus Station	10	7	0
		Major Park Entrance	15	10	5
	Medium Generator	School	7	5	0
		Major Retail and entertainment	7	5	1
		Medium Tourist Destination	7	5	1
		Hospital	5	1	0
		Community Service	7	5	1
	Low Generator	Places of Worship	2	1	0

MAP 4

Pedestrian Demand Analysis



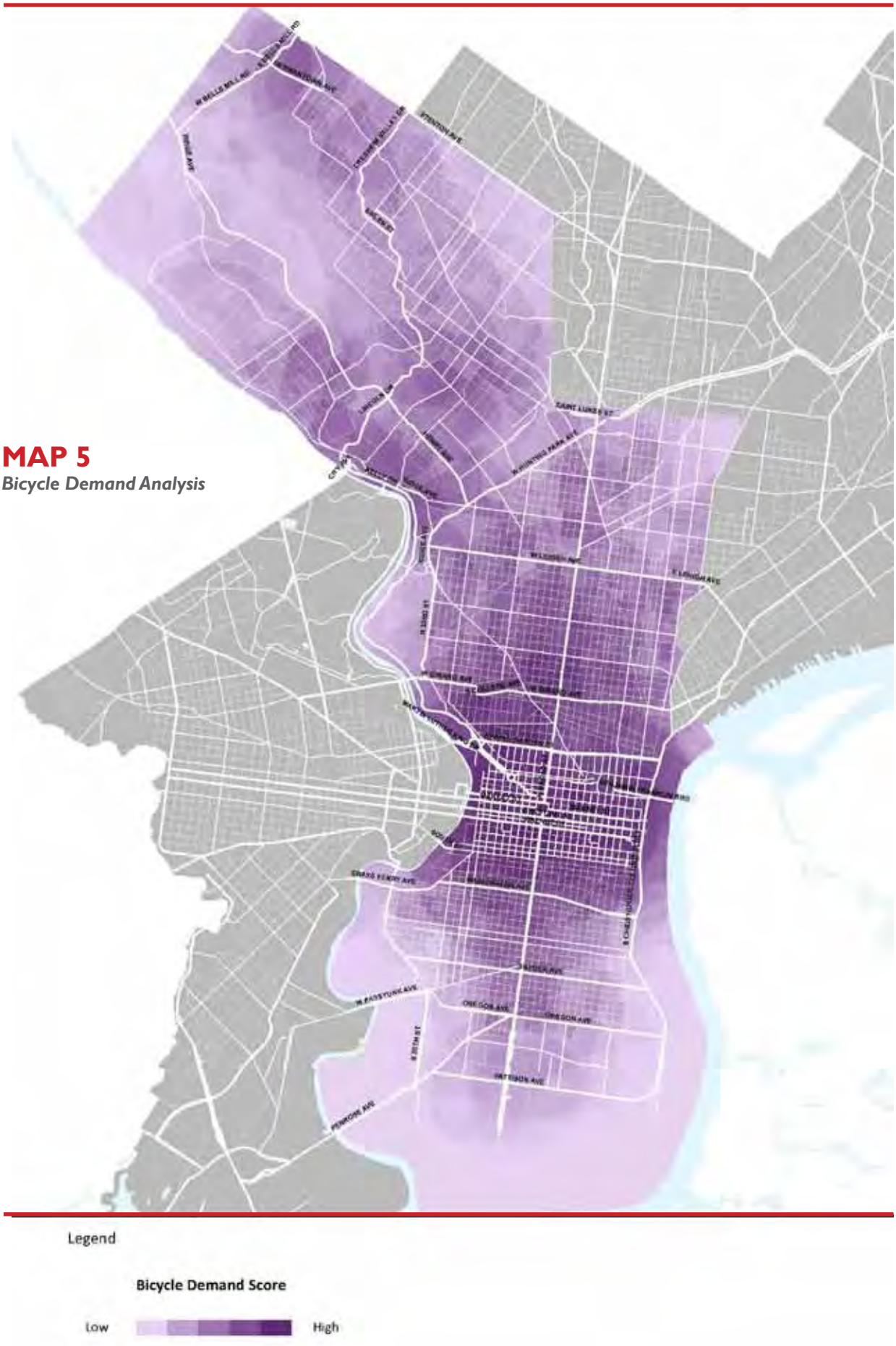
Legend

Pedestrian Demand Score

Low — High

MAP 5

Bicycle Demand Analysis



Needs Analysis

Needs analysis determines the areas where infrastructure improvements may be needed. A set of factors used to represent needs are assigned a weight. As with demand analysis, the number and relative severity of factors at a location results in a greater need. This section describes needs for both pedestrian and bicycle facility improvements.

Pedestrian Needs Analysis.

A needs analysis was undertaken to determine where the pedestrian network most needs improvements. Certain existing conditions that may create unsafe conditions for pedestrian travel were scored and mapped. The needs analysis focused on conditions at intersections using the following factors:

- intersection width (i.e., pedestrian crossing distance)
- distance between signalized or 4-way stop intersections (i.e., likelihood of pedestrians crossing mid-block)
- intersection signal control
- pedestrian crashes at intersections

Table 6 shows how points were assigned to these characteristics that negatively impact crossing conditions. By grouping these roadway characteristics together, the study team was able to compare conditions throughout the study area. An intersection with a higher number of total points indicates that it is more difficult to cross than an intersection with a lower number of total points. Pedestrian network needs based on these factors are shown in Map 6. The map reflects anticipated levels of crossing comfort on different roads in Philadelphia. Understanding how intersections compare to each other helps to prioritize potential projects. Map 8 in Chapter 6 combines the demand and need analyses, and factors in traffic volume levels, plus information from the project questionnaire and open houses, along with prior studies, to select corridors and spot locations for further study and recommendations for improvement.

Table 6: Pedestrian Intersection Needs

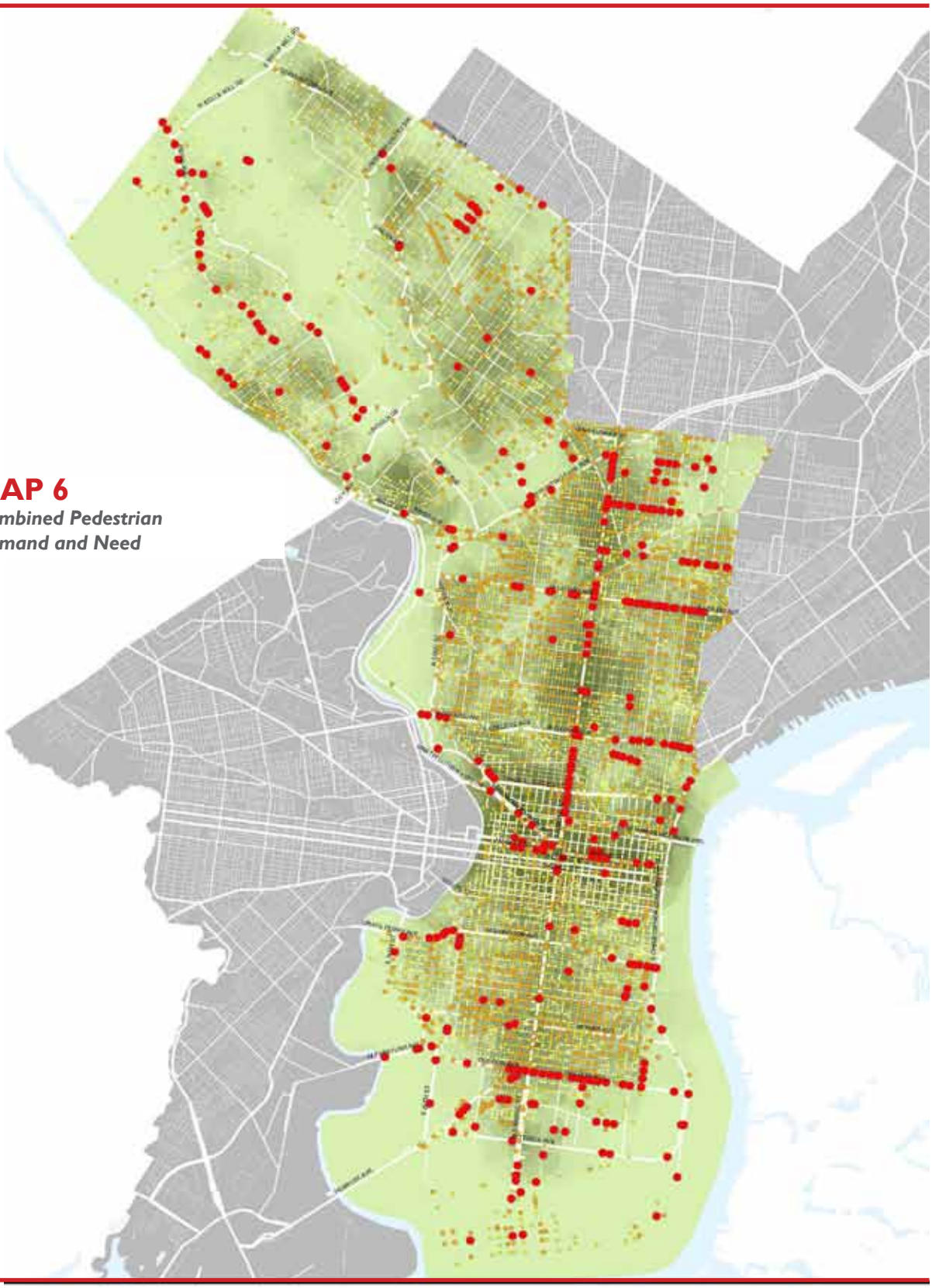
	Unit of Assessment		Weight
Pedestrian Intersection Needs	Distance between SignalizedIntersections	0 - 500 Feet	0
		501 - 1000 Feet	2
		1001 - 2000 Feet	4
		2001 + Feet	5
	Maximum Crossing Distance (estimated)	0 - 24 Feet	0
		24 - 40 Feet	2
		41 - 50 Feet	4
		51 - 60 Feet	6
		61 + Feet	8
	Signal Control	Signal	-3
		All Way Stop	-1
		None	3
	Number of Crashes at intersections (1990 - 2005)	0	0
		1 - 5	2
		5 - 10	5
		11 - 20	7
		21 +	10

Bicycle Needs Analysis.

For bicycles, the demand score combined with the existing network reveals numerous gaps and areas that are underserved by bikeways. This is illustrated by Map 7. Field evaluation of existing facilities also found many existing bike lanes faded and in need of maintenance. Recommendations for locations to enhance conditions for bicycling were developed with input from staff, consultants, Steering Committee and the public. Field study was conducted to assess general conditions and study those areas that need new connections to key destinations (e.g. trail access point, university) and improved access across barriers (e.g. hills, rivers, expressways, rail lines, utility corridors). Recommendations for improving the bicycle network are provided in Chapter 7.

MAP 6

Combined Pedestrian Demand and Need



Legend

Pedestrian Demand Score

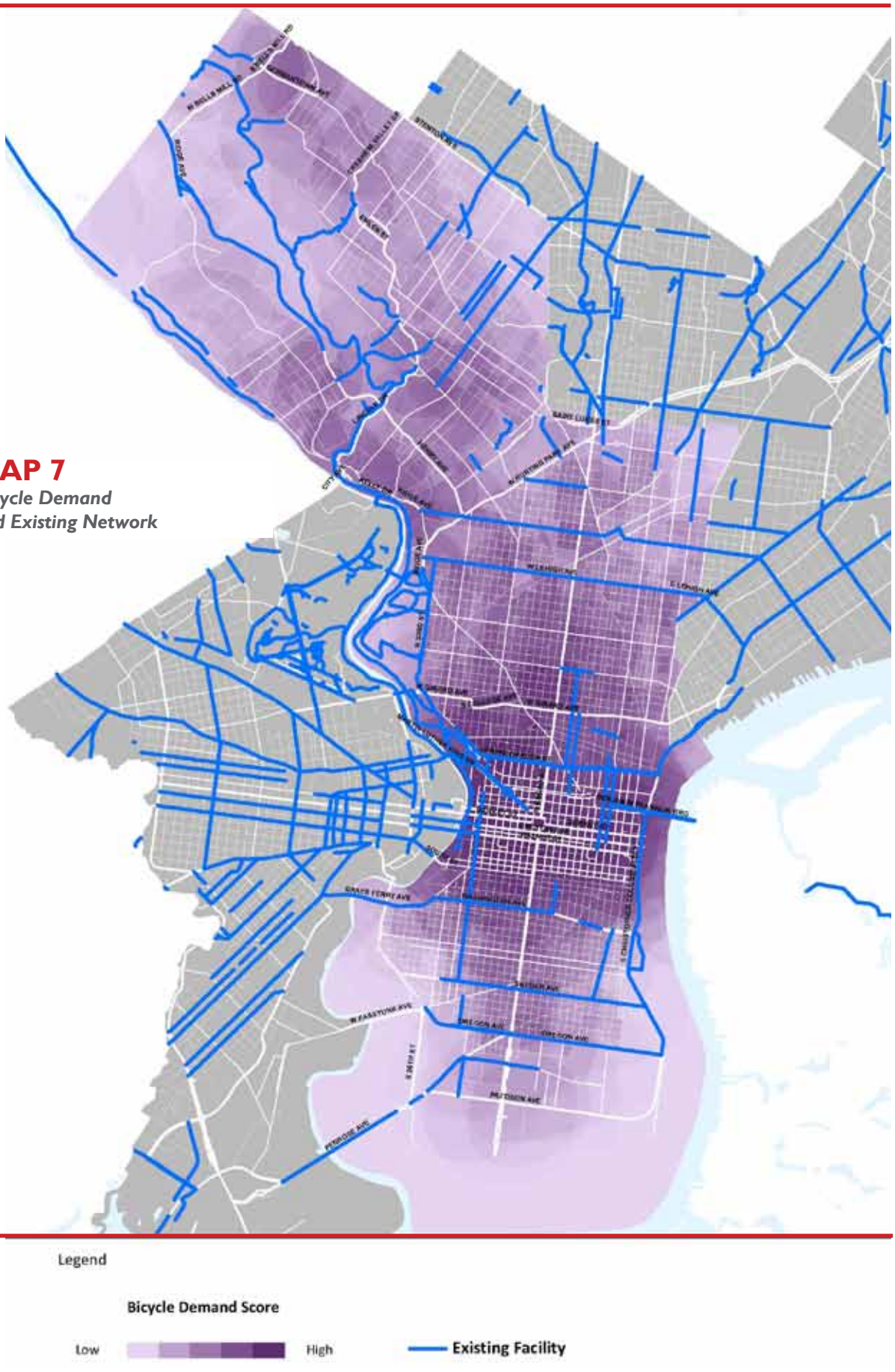
Low — High

Intersection Need Score

Low — High

MAP 7

Bicycle Demand and Existing Network



CHAPTER 4
RECOMMENDATION: SREET TYPES AND SIDEWALK DESIGN STANDARDS

Many communities have found it useful to adopt a street classification system that is broader than the traditional functional classification. As described in Chapter 3, the existing functional classification of roadways is based primarily on the needs and characteristics of motor vehicle travel. Adoption of a new street classification system does not mean that the functional classification is abandoned; but simply that the more context-sensitive street classification becomes an additional planning tool. For this Plan, new street types were developed to facilitate pedestrian planning, particularly the creation of sidewalk design standards. The new classification system takes into account the traditional roadway classification, but adds land use characteristics, including density of development, along with pedestrian activity levels.

Table 7: Street Types by Miles

Street Type	Miles
High-Volume Pedestrian	4.5
Civic / Ceremonial Street	13.6
Walkable Commercial Corridors	20.8
Urban Arterial	130.0
Auto-oriented Commercial/Industrial	29.8
Park Road	5.2
Scenic Drive	13.9
City Neighborhood	378.0
Lower Density Residential	119.6
Shared Narrow	24.4
Local	345.0
Total	1,085

Eleven street types are included in the new classification: Civic Ceremonial, High-Volume Pedestrian, City Neighborhood Street, Walkable Commercial Corridor, Urban Arterial, Auto-Oriented Commercial/Industrial, Scenic Drive, Park Road, Low Density Residential, Local, and Shared Narrow Street. Table 7 shows the number of miles by street type; Table 8 describes the characteristics of each street type, along with recommended sidewalk width standards. Each street type also has a designation of pedestrian or vehicle significance: from high to low. These designations are intended to provide guidance when choices must be made between vehicular and pedestrian needs. The street types and sidewalk design standards should be incorporated into the proposed Complete Streets Design Manual to ensure that all City regulations acknowledge and support pedestrian needs.

Maps 7a, 7b, and 7c show all streets in the study area with the new street types. A street's type may change from one block to the next. For example, the Walkable Commercial Corridors type only applies to the length of a street with a minimum amount of commercial use. Similarly, the Civic/Ceremonial designation only applies to streets that have a civic, symbolic, or ceremonial function (e.g.., the length of the Mummers Parade route on South Broad Street).

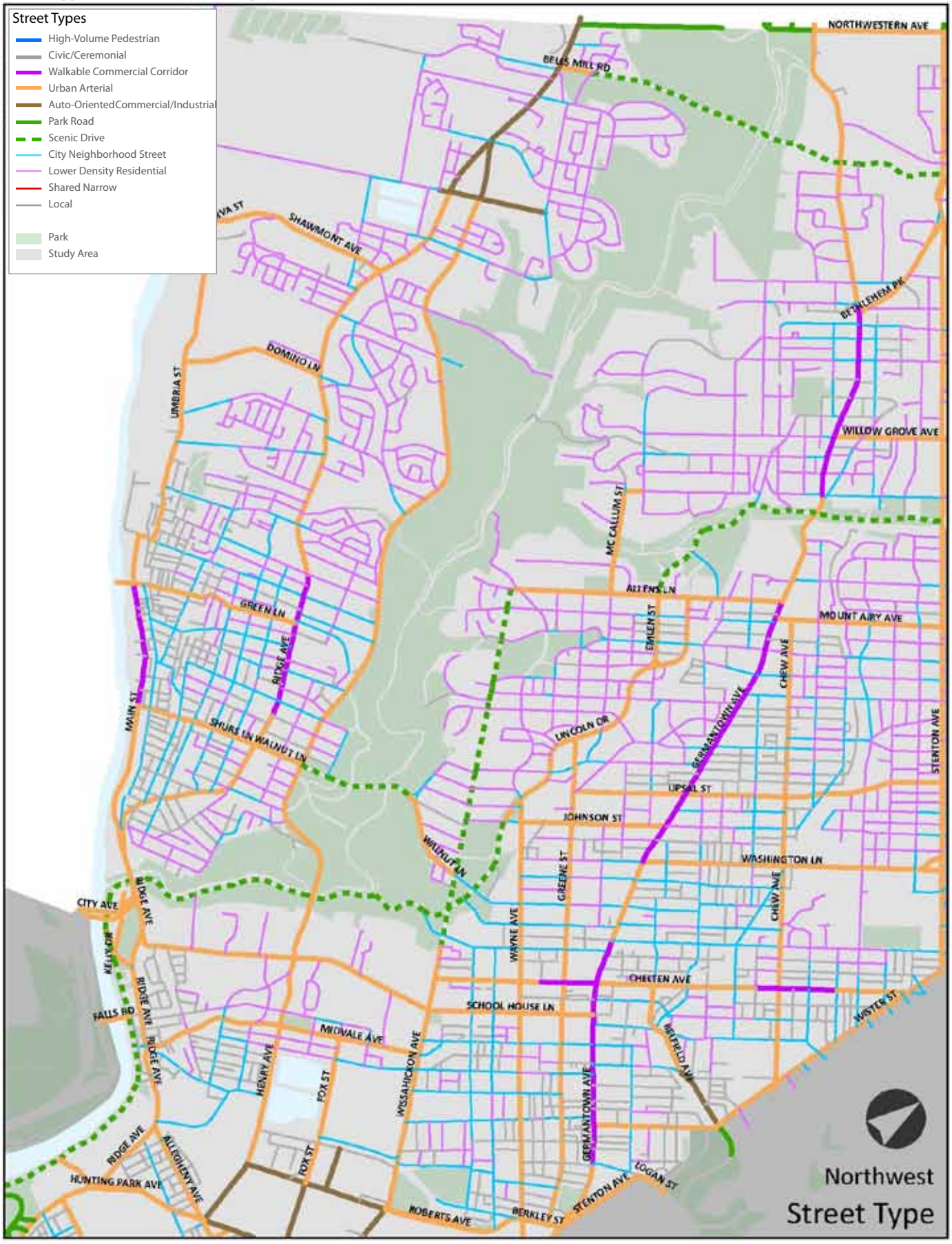
Street Type	Description	Pedestrian Significance	Vehicle Significance	Functional Roadway Classification	
		Pedestrian and Vehicle significance rank a street's significance to that mode, suggesting the mode receiving priority when conflicts exist.			
High-Volume Pedestrian	Important as pedestrian destinations or connectors serving large numbers of pedestrians. The threshold of 1200 pedestrians per hour using these streets is based on mid-day counts.	High	High to Medium	Major Arterial or Minor Arterial	
Civic/ Ceremonial	Small number of streets with great symbolic importance and major ceremonial functions that play a unique role in the life of the City. The sidewalks operate as generous pedestrian promenades.	High	High	Major Arterial	
Walkable Commercial Corridor	Active commercial corridors with pedestrian-friendly physical development pattern. Most buildings are set at the street line.	High	High to Medium	Major Arterial, Minor Arterial or Collector	
Urban Arterial	Major and minor arterials that carry through traffic and usually have surface transit routes. May have more travel lanes and higher speeds, compared to neighborhood streets.	Medium	High	Major Arterial or Minor Arterial	
Auto-Oriented Commercial/ Industrial	Auto- oriented development pattern; not pedestrian-friendly, not likely to attract high levels of pedestrian activity other than for roads with transit routes/stops, i.e., at activity nodes.	Low	High	Major Arterial or Minor Arterial or others as selected	
Park Road	Local park road with lower speed limits; functions for transportation within the park. May have a shared-use side-path.	High to Medium	Medium	Collector or Local	
Scenic Drive	Major arterial with scenic view along parks or waterways with higher speed traffic. A shared-use side-path is often appropriate for pedestrian travel.	High to Medium	High to Medium	Major Arterial or Minor Arterial or others as selected	
City Neighborhood Street	Majority of grid streets in Center City, South Philadelphia, and North Philadelphia. Fronts of buildings typically meet the street line (edge of sidewalk).	Medium	Medium	Minor Arterial or Collector	
Lower Density Residential	Streets in residential areas where dwellings are set back from the sidewalk.	Medium	Low	Collector or Local	
Shared Narrow	Very narrow local streets, primarily in older areas of the City that are part of the walking network. Both streets and sidewalks tend to be narrow, and pedestrians can walk in the street comfortably. Parking precluded with cartway of 13' or less.	Medium	Low	Local	
Local	Smaller streets in residential or non-residential neighborhoods. Parking provided on at least 1 side and sidewalks are usually present. This classification includes service streets and minor residential streets.	Low	Low	Local	

Table 8 : Street Types and Sidewalk Width Standards

Typical Land Use, Other Characteristics	Sidewalk Width Standards			
	Total Width	Walking Zone (minimum clear width)	Furnishing Zone	Building Zone
Commercial, mixed use, higher density residential (R10+)	16′ recommended	8′ min. or half sidewalk width, whicheverisgreater	5′ for Major Arterials; 4′ for Minor Arterials if no parking adjacent	No minimum
High density, governmental, cultural, institutional, and retail. Some of the first mapped streets, grand buildings, parade routes	20′ recommended	10′ min. or half sidewalk width, whicheverisgreater	5′ minimum	No minimum
Retail, commercial, mixed use, residential, some institutional	12′ minimum	6′ min. or half sidewalk width, whicheverisgreater	4′ minimum for Major or Minor Arterial if no parking adjacent	No minimum
Commercial, mixed use, higher density residentioal (R10+)	12′ minimum	6′ min. or half sidewalk width, whicheverisgreater	5′ for Major Arterials; 4′ for Minor Arterials if no parking adjacent	No minimum
Automobile services, drive-ins, “big-box” retail and shopping centers set back significantly from the street, industrial	12′ minimum	6′ min. or half sidewalk width, whicheverisgreater	5′ minimum	No minimum
Parks		5′ min. if sidewalk. If side-path, width depends on expected use, but not less than 8′, terrain permitting	3′ minimum	3′ of clear ROW needed on side of path opposite the road
Parks or waterways. May include low density residential with heavy tree canopy		6′ min. walkway if separate from bikeway. Need for separation and width of shared use path depends on expected volumes	5′ for Major Arterials; 3′ otherwise	3′ of clear ROW needed on side of path opposite the road
Commercial, mixed use, higher density residential (R10+)	12′ minimum	6′ min. or half sidewalk width, whicheverisgreater	3-4′ recommended	No minimum
Residential, some retail, recreational or institutional	10′ minimum	5′ minimum	4′ minimum for new development; should be permeable	Building setback serves as building zone
Mostly Residential, ADT less than 500 ROW no wider than 30′		5′ minimum	3.5′ for new development in residential areas only	No obstructions beyone the line of steps or stoops
Residential, some retail, recreational or institutional	8′ recommended	5′ minimum	3.5′ for new development in residential areas only	No obstructions beyone the line of steps or stoops

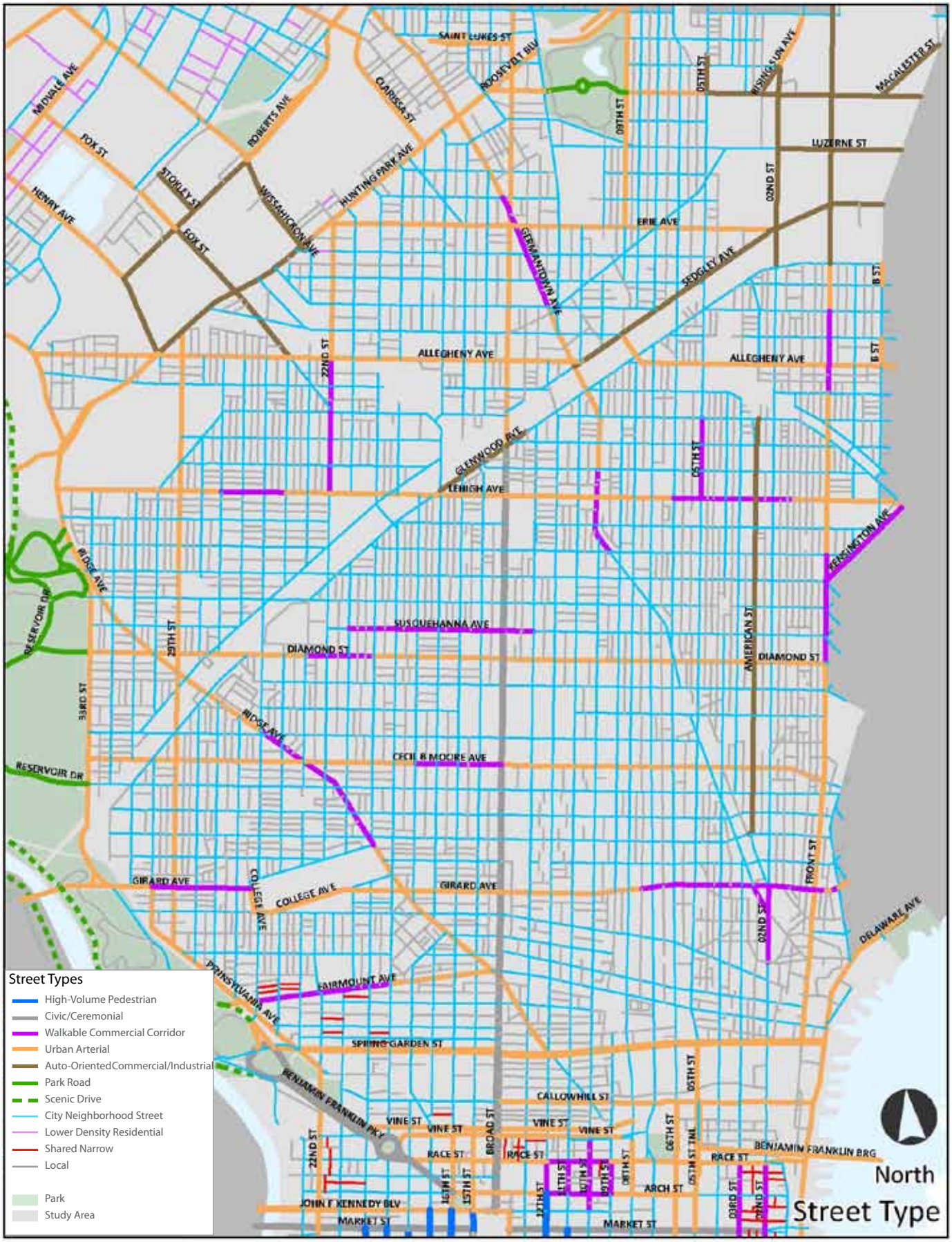
MAP 8a

Street Type, Northwest Philadelphia



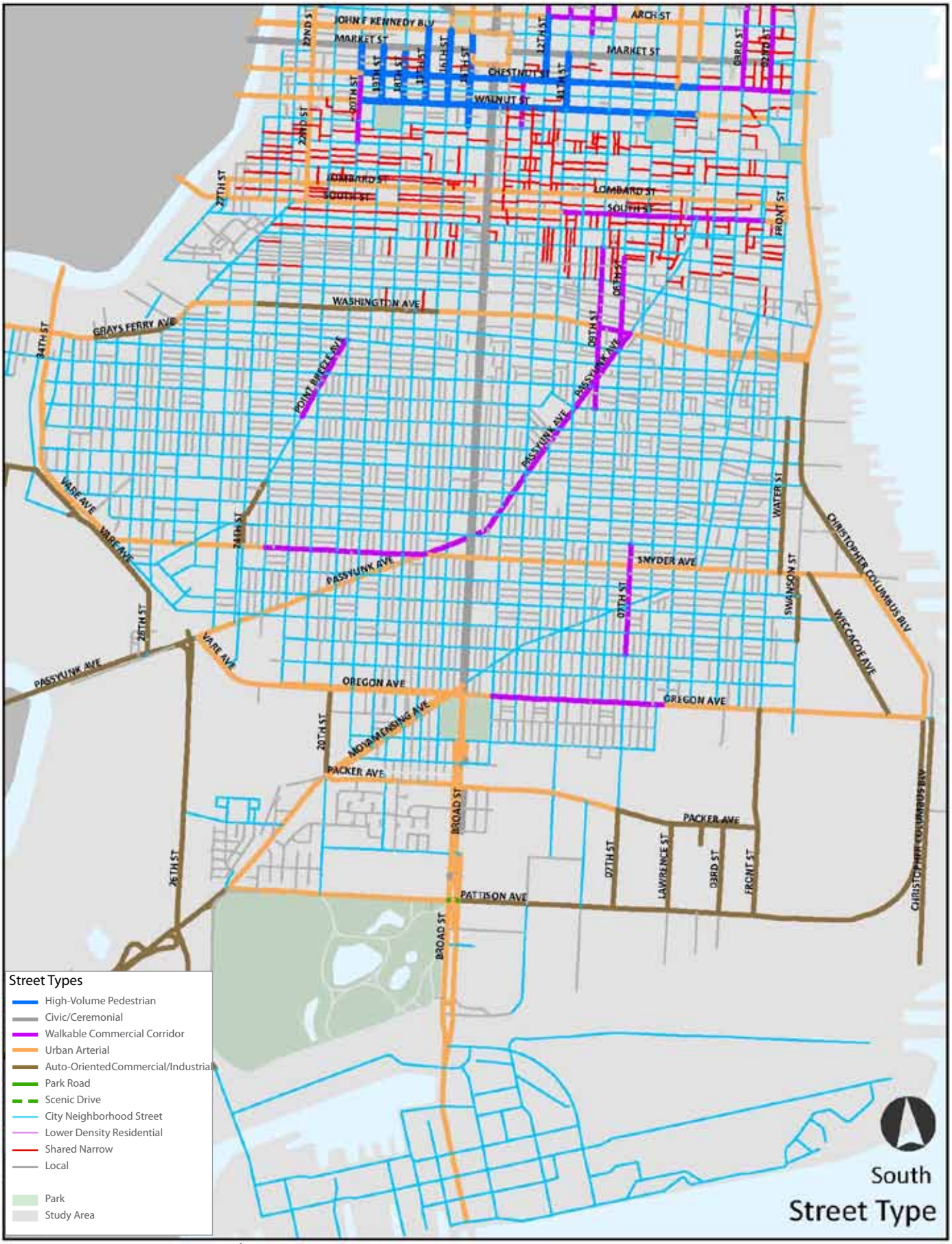
MAP 8b

Street Type, North Philadelphia



MAP 8c

Street Type, South Philadelphia



SIDEWALK ZONES AND WIDTH STANDARDS

Each street type includes a set of design standards for sidewalk width. The sidewalk is divided into three zones for the purpose of design guidelines: the Walking Zone, the Furnishing Zone, and the Building Zone.

Because accommodating pedestrian flow is the primary function of sidewalks, an adequate ***Walking Zone*** is the most important design standard for the sidewalk. The average width of a pedestrian is 2 1/2 feet, without encumbrances such as bags and umbrellas. Two people need 5 feet of sidewalk width and, when encountering another person, will need about 8 feet to pass without dropping into single-file. When walking near walls, fixed obstructions or the curb, extra space called "shy distance" is needed.

The ***Walking Zone*** standard ideally depends on the number of pedestrians using or expected to use a particular sidewalk. In general, 5 feet of clear width for the Walking Zone should be the minimum for any new construction in low to moderate density areas. For sidewalks with relatively intensive pedestrian use, either in commercial corridors or in row house neighborhoods, six feet or half the total sidewalk width (whichever is greater) is the minimum recommended width for the Walking Zone. On streets having very heavy pedestrian volumes, 8 feet or half the total sidewalk width (whichever is greater) is the recommended minimum Walking Zone.

For the few streets with great symbolic importance and major ceremonial functions: Broad Street, Market Street, and the Benjamin Franklin Parkway, 10 feet should be provided in the Walking Zone. This will allow a truly generous pedestrian space, where one couple approaching another couple will be able to pass easily without anyone having to drop into single file. Some exceptions to the minimum Walking Zone are provided to accommodate street trees, storm water planters, and transit shelters; however, these exceptions are limited and minimum ADA dimensions must always be met.

Graphic 7. Sidewalk Zones

Two people take up 5 feet of width.

Three people take up 8 feet of width

The ***Furnishing Zone*** serves many functions: a safety buffer from traffic; a space to plant grass and street trees and absorb storm water runoff; storage space for snow and trash cans; and space for street furniture such as transit shelters, honor boxes, and bike racks, to name just some of the most important uses. The importance of the Furnishing Zone varies depending on the adjacent land use, the speed and volume of traffic, and the presence of parking at the curb. For major arterials, a minimum 5-foot Furnishing Zone is recommended to ensure adequate separation of pedestrians from motor vehicles. The Furnishing Zone usually requires at least 3 feet just to accommodate utilitarian objects such as fire hydrants, utility poles, and road signs.

The ***Building Zone*** is the area of the sidewalk immediately adjacent to the building face, wall or fence marking the property line, or in less dense residential areas, a lawn. Minimum width standards cannot be recommended for the Building Zone, because of this variability. However, the Building Zone is often significant, either because of architectural elements, such as steps, stoops, bay windows, or planters, or because the property owner wants to use the Building Zone for commercial purposes, for example, a sidewalk café or sidewalk sales. On streets where numerous permanent encroachments into the Building Zone already exist, the recommended standards would allow new encroachments to the extent that they respect the prevailing alignment of the existing encroachments.

Table 8, on pages 28 and 29, shows the recommended sidewalk width standards. For each street type, a minimum Walking Zone is recommended to allow for pedestrian comfort and safety based on the expected level of pedestrian activity. Minimum Furnishing Zone widths are recommended for most street types, with the intent of buffering pedestrians from higher volume roadways and for accommodation of appropriate sidewalk furnishings. Recommendations are also provided for total sidewalk width in most cases. The recommended total sidewalk width is typically greater than the sum of the minimum Walking Zone and the minimum Furnishing Zone; this could permit either of those zones to be wider, or it could allow for a Building Zone, for which minimums are not specified.

Green Infrastructure
The City Water Department 's Green City, Clean Water plan will add "green infrastructure" to streets and sidewalks. Street trees can provide an important environmental and a esthetic asset to city streets, but proper installation is important to ensure that trees do not create pinch points or tripping hazards. Techniques include: using walkable tree grates; placing trees in curb extensions; and using structural soil to allow more room for roots to grow under the siedwalk

USING THE NEW STREET TYPES

The new street types are intended to inform planning decisions when altering existing streets and sidewalks and when reviewing new streets and sidewalks as part of development projects. The sidewalk design standards are especially useful in establishing the recommended total width of sidewalks and the minimum clear width for the Walking Zone. While the standards include minimum widths for the Furnishing Zone, in many cases there will be difficult decisions about allocating space between the Furnishing Zone and the Building Zone. Major factors affecting these decisions will be the nature of the adjacent land use and whether or not parking is permitted at the curb.

Impact on Current Streets
Since the City's sidewalk network is mostly in place and widening sidewalks would be difficult due to the constraints of the built environment, many sidewalk widths will probably not be changed, even though they do not meet the standards. Nevertheless, the standards can be used to prevent further deterioration of walking conditions and to ensure that new development provides a better quality sidewalk environment.

The new design standards should be applied to the development of new sidewalks and the reconfiguration of old sidewalks wherever feasible. The sidewalk standards also can be used, in many cases, to limit sidewalk encroachments to ensure an adequate Walking Zone. Many sidewalk encroachments are currently legal and would probably be grandfathered if the law were changed to a stricter standard. However, a significant number of sidewalk encroachments are not legal and could be removed or made smaller with better enforcement of existing laws and regulations.

This cafe leaves room for only one pedestrian.

Not enough space for customers and pedestrians.

In this Plan.

The new street classification is reflected in this Plan in several ways. First, street types were incorporated in the pedestrian network demand analysis to determine locations generating pedestrian travel. In addition, bicycle facility recommendations were cross-referenced to street types after completing the bicycle network recommendations. While street types did not drive the type of bicycle facility recommended, Table 9 shows that each type of bicycle facility is more or less best suited to a handful of street types. For example, Bicycle-Friendly Streets were most often designated on City Neighborhood Streets, which frequently have parking on both sides and only one travel lane. Shared Roadways are most appropriate for Local Streets, and to some degree Lower Density Residential, because of their low volume of motor vehicle traffic.

Table 9: Recommended Bikeways by Street Type

Street Type	Miles of Bikeway Recommended		Predominant Type	% of Total*
	High-Volume Pedestrian	2	Shared Marked Lane	89%
	Civic / Ceremonial	3	Shared Marked Lane	71%
	Walkable Commercial Corridor	9	Shared Marked Lane	74%
	Urban Arterial	62.5	Shared Marked Lane Bike Lane	71% 20%
	Auto-Oriented Commercial/Industrial	10.2	Bike Lane Shared Marked Lane	48% 40%
	Park Road	1	Shared Roadway	100%
	Scenic Drive	3.2	Shared Marked Lane Bike Lane	60% 40%
	City Neighborhood Street	99	Shared Marked Lane Bicycle Friendly Bike Lane	42% 30% 27%
	Lower Density Residential	25	Shared Marked Lane Shared Roadway	57% 20%
	Shared Narrow	5		NA
	Local	5	Shared Roadway	51%
	*Percent of total bikeways recommended on street types.			

Finally, the street types were used in the development of pedestrian improvement recommendations. Recommendations for intersections on Walkable Commercial Corridors included curb extensions, new or improved crosswalks, and a new signal. Recommendations to improve crossings of Urban Arterials included the provision of median refuges or channelization islands.

CHAPTER 5
RECOMMENDATIONS: PEDESTRIAN AND BICYCLE POLICIES

A set of new policies is included in this Plan to create a more supportive context for bicycle and pedestrian transportation. The policies are complementary to recommendations for physical improvements to the pedestrian and bicycle networks, and the new Street Types. They address the limitations and gaps in existing policies, guidelines, regulations, and operating procedures. Policy changes to improve conditions for walking and bicycling fall into four areas:

- Pedestrian Network Design
- Bicycle Network Design
- Health and Safety
- Management and Monitoring

Members of the project Steering Committee, working in sub-committees, developed the policies. The final set of policies is the result of an iterative process that began with a list of policy issues and was informed by best practices in other cities. Over the course of the project, Steering Committee members determined the final set of policies that would address the most pressing needs.

Each of the 22 policy papers begins with a summary of the current policy and practice. A goal and supporting objectives are established for each policy, followed by recommended strategies. Resources used to develop the policy papers are listed at the end. The full policy papers are included in Appendix C of this Plan. The goals of each of the four policy subject areas are summarized below, and Tables 12 through 15 list the key recommendations.

Pedestrian network design.
The major elements of the pedestrian network are sidewalks and street crossings. The sidewalk is where pedestrians do most of their traveling and is the space where they should be able to move freely and feel safe from collisions with vehicles including bicycles. The goal for the sidewalk network is to provide an attractive pedestrian environment that includes adequate space to walk comfortably, separated from vehicles, and to accommodate amenities and necessary utilities. Vehicular intrusion of driveways and lay-by lanes should be minimized. Goals for street crossings include improved safety and pedestrian comfort through better design of intersections and pedestrian signals. Providing frequent crossing opportunities and minimizing delay at traffic signals will reduce the temptation to jaywalk. The policies also address requirements for sidewalks in new development and filling gaps in the City's sidewalk network.

> Pedestrians seek means to cross many streets without going more than 150 feet out of the way. For this reason, well-designed towns orchestrate convenient crossing points each 300 feet.
>
> Dan Burden
> Distinguished Lecture presentation, Transportation Research Board, 2001

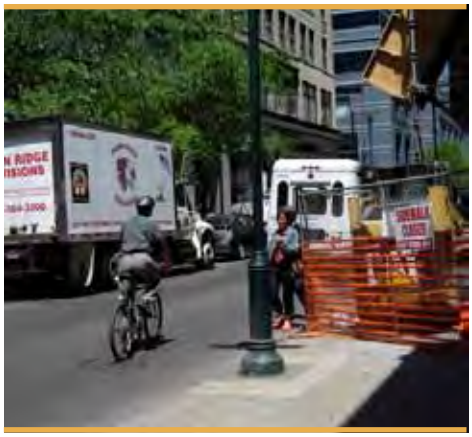
Bicycle network design.
These policies address measures to accommodate bicyclists in the public right-of-way, bicycle parking, and access to public transit. A primary goal is to establish up-to-date and comprehensive bikeway and shared lane design guidelines for City agencies and their consultants working on street and bridge projects in Philadelphia. Since the majority of bicycle crashes occur at intersections, the adoption of tested engineering measures that can reduce conflicts and confusion at intersections is a key objective. The provision of convenient, secure bicycle parking is an important factor in encouraging bicycle ridership, and many recommendations are included to this end. Easy bicycle access to transit stations and vehicles will help to promote both modes of travel and reduce automobile use.

Bicycle signal and left-turning vehicle, New York

Health and Safety.
These policies address the non-engineering aspects of an effective pedestrian and bicycle network: education, enforcement, and encouragement. Improved pedestrian and bicyclist safety requires increased enforcement of traffic laws regulating the interaction between motorists, bicyclists, and pedestrians. However, many people are not familiar with how the laws apply to bicyclists and pedestrians. Safety education is critical so that all users understand and recognize their role in the transportation system. Education policies also cover training of staff whose jobs affect pedestrian and bicyclist safety. Encouragement recommendations seek to promote physical activity and improve community health through increased levels of walking and bicycling. The "safety in numbers" phenomenon suggests that improved safety will also be a result of growing pedestrian and bicycling activity.

Bike Philly 2009 attracted over 3,000 riders.

Management and Monitoring.
Policies in this category cover management aspects of the transportation system that affect pedestrians and bicyclists, and data collection mechanisms to support evaluation needs. Goals for better management include improved maintenance for the bicycle and pedestrian networks; safe, convenient, and accessible pathways for pedestrians and bicycles around or through construction sites; and improved enforcement of laws and regulations to manage sidewalk encroachments including vendor carts, sidewalk cafes, and honor boxes. Bicycle detour routes and convenient, secure places to store bicycles in commercial buildings are also recommended to increase safety and ridership. Monitoring goals include the collection of accurate and consistent data on bicycling and walking activity, and better crash data collection and analysis so that safety countermeasures may be effectively designed.



Sidewalk closed due to construction.

Beyond the Plan.
Several of the recommended policies have been adopted by the City and are already in use. An ordinance to require bicycle parking with most new development was passed by City Council in the spring of 2009, based on recommendations of the Steering Committee. Another revision to the code, passed in the spring of 2010, allows the Streets Department to grant permits for bike racks instead of requiring an ordinance of Council. While this change was necessary to implement the bike parking ordinance, it also is a recommendation of the policy paper on Management of Sidewalk Encroachments. A Bicycle and Pedestrian Safety Task Force was formed in the summer of 2010; this was one of the recommendations of the Health and Safety Subcommittee. Most recommendations in the policy papers, however, still need to be implemented, as discussed in Chapter 8.

Table 10: Pedestrian Network Policy Recommendations		
Pedestrian Network	Sidewalk Design Guidelines	• Establish a sidewalk zone system with minimum dimensions for the Walking Zone and for the Furnishing Zone, which also buffers pedestrians from traffic. • Tie new sidewalk standards to the proposed street classification system so that the standards will reflect the nature and levels of pedestrian activity.
	Sidewalk Furnishings	• Encourage street trees and sustainable street furnishings to control storm water and heat island effect. • Accomodate necessary utility infrastructure. • Allow for amenities that enhance the pedestrian environment. • Accommodate commercial enterprises that enliven the street life of the neighborhood.
	Street Crossings	• Maintain a robust crosswalk network. • Install ADA-compliant curb ramps at all marked and unmarked crosswalks • Establish a policy for the use of crosswalks at uncontrolled locations, including a "toolbox" of engineering treatments for locations where crosswalk markings alone are not sufficent. • Revise subdivision regulations to allow curb radii smaller than 15 feet in new residential developments where truck, bus and other large vehicle traffic will be infrequent. • Increase installation of curb extensions (bumpouts), and include plantings where possible. • Establish guidelines for the use of raised medians for pedestrian refuge areas • Where expressway ramps enter the urban street network, design intersections with attention to pedestrian and bicyclist safety. • Avoid multiple turning lanes wherever possible.
	Pedestrian Signals	• Expand the use of pedestrian signals. • Convert signals to countdowns at a rate of 30 per year until all have been converted. • Develop criteria for when to use audible pedestrian signals, based on 2009 MUTCD recommendations. • Test new technologies for traffic control such as Rapid Flash Beacons, HAWK Crossings (High-intensity Activated crossWalk), and Automated Pedestrian Detection. • Keep signal cycles as short as possible. • Ensure that clearance intervals are properly timed. • Develop criteria for Leading Pedestrian Intervals.
	Driveways and Lay-Bys	• Limit the width, number and location of driveways. • Strictly limit lay-by lanes to protect sidewalk space for pedestrians. • Limit parking pads or garages in the front of houses, except where front parking is the predominant existing pattern both in the adjacent neighborhood and on the specific block.
	Requirements for Sidewalks in New Development	• Require sidewalks in new developments to follow the recommended sidewalk design standards for total width and minimum width of the Walking Zone and the Furnishing Zone. • Promote sustainable development practices for new sidewalks through the use of permeable sidewalk surfaces and plantings in the Furnishing Zone.
	Sidewalk Retrofit	• Establish guidelines for requiring property owners to build or replace missing sidewalks.

Table 11 : Bicycle Network Policy Recommendations		
Bicycle Network	Bicycle Network Design	• Develop a Philadelphia Complete Streets Design Manual to replace the Bike-Friendly Design Guidelines Manual and other street design guides currently used by the Streets Department. • Draw on latest best practices for full array of bikeway facilities, including currently used facilities and emerging designs.
	Bicycle Treatment at Intersections	• Implement advanced stop bars ("bike boxes") at intersections with high bicyclist and motor vehicle volumes, especially on multi-lane arterials and where bicyclists must switch lanes to turn. • Carry bike lanes across right-turn lanes by marking them as solid green. • Install signage at conflict points. • Implement mixing zones, a combinations of a bike lane and a right turn lane within a constrained right-of-way. • Install chevrons or dashed lines across intersections.
	Bicycle Parking	• Add bike racks at a rate of 1,500 per year for five years to bring the total of City-installed bike racks to 10,000. • Establish a permanent "Request-a-Rack" program. • Convert existing meter posts to create space for locking two bicycles when the Parking Authority replaces metered parking with parking kiosks. • Create bike parking in street parking spaces. • Establish bike stations convenient to commuters. • Create bicycle parking opportunities for employees at Philadelphia International Airport. • Encourage SEPTA to provide bike parking shelters at commuter stations and transfer stations. • Encourage SEPTA and AMTRAK to provide secure, long-term bicycle parking. • Make secure bicycle parking a requirement for obtaining a special events permit. • Require the provision of bike parking at a rate of 1 space for every 100 attendees to retrofit large public assembly buildings for cultural and sporting events through the City Property Maintenance Code.
	Bicycle Access to Transit	• Encourage SEPTA to install bicycle securing devices inside all rail vehicles. • Integrate bike stair channels on stairways in public transit facilities to provide access to platforms in new construction and during major renovations. • Adopt universal design principles wherever possible at regional rail and rapid transit stations. • Post signs inside transit vehicles to explain where bicycles may be stored. • Post signs at transportation facilities indicating bike parking locations and elevators. • Explore development of a Boston-style bicycle car on the Regional Rail system for tourism use.

Table 12 : Health and Safety Policy Recommendations		
Health and Safety	Education	• Enhance and expand current education programs focusing on pedestrian and bicycle safety. (Bicycle Ambassadors, Safe Routes Philly, formerly BEEP) • Target specific audiences including new college students, older Philadelphians, and non-English speakers. • Create an awareness campaign emphasizing the rules of the road pertaining to bicycles and pedestrians as a part of the larger transportation community. • Improve training of staff whose jobs affect pedestrian or bicyclist safety, in order to implement the Plan. • Educate bicyclists on strategies and techniques for safe bicycle locking.
	Enforcement	• Improve enforcement of traffic and parking laws that affect pedestrians and bicyclists. • Establish a Philadelphia Pedestrian and Bicycle Safety Committee to develop safety education campaigns and improve enforcement of traffic laws. • Improve training of police officers and PPA personnel on traffic and parking laws as they relate to bicyclists and pedestrians. • Design enforcement campaigns that target locations with high rates of pedestrian or bicycle crashes, and campaigns to target behaviors the endanger bicyclists and pedestrians. • Expand use of camera enforcement for red-light running to more locations. • Use police officers on bicycles to discourage bike lane incursions by motor vehicles, and in enforcing traffic violations by bicyclists. • Use pedestrian sting operations to increase compliance of Yield to Pedestrian laws. • Reduce incidence of bicycle theft. • Update Philadelphia laws to conform to state traffic laws and the Uniform Vehicle Code regarding bicycling and walking, except where different rules are appropriate to Philadelphia's urban conditions. • Repeal the "mandatory sidepath law" that prohibits bicycling in the street if an adjacent sidepath is available.
	Encouragement	• Develop a marketing campaign to promote the benefits of walking and bicycling, partnering with Philadelphia Department of Public Health. • Implement recommendations of Bike Sharing study. • Conduct and expand events to encourage bicycling and walking - Bike Philly, Bike Month, Walk and Bike to School Day, International Cycling Championship, a Cyclovia.[1] • Distribute materials encouraging residents and visitors to experience the City of Philadelphia by foot and pedal, including maps and self-guided walking and biking tours. • Update the City's bicycle map at least every other year. • Update the City's bicycling website and create a walking website. • Develop directional signage for commonly traveled bicycle routes.

[1] A Cyclovia (Cyc 'lo via) n., can be defined as "A Spanish word meaning temporary closure of a network of streets to cars, and opening the streets to people who bike, walk, skate and participate in fun, free activities." http://www.cycloviatucson.org/welcome

Table 13: Management and Monitoring Policy Recommendations		
Management and Monitoring	Construction Disruption	• Construction sites should be inspected regularly to ensure compliance with City Code and regulations. The Streets Department should have control over inspections of street and sidewalk rights-of-way at construction sites, including the power to issue citations, fines, and stop-work orders. • Ensure that any sidewalk shed or sidewalk closure allows for safe pedestrian passage around and/or through the construction area. • Protect bikeways from disruption due to temporary street closures.
	Management of Sidewalk Encroachments	• Revise the Code to clarify and improve laws protecting pedestrians from sidewalk encroachments including sidewalk cafes, vendor carts, newsstands, honor boxes, planters, etc. • Create an interagency Public Space Committee to advise the Streets Department and the proposed Civic Design Review Committee on permit applications for sidewalk encroachments. • Revise the code to establish a new structure of fees and fines, a process to revoke licenses and permits after repeated violations, and a reinstatement fee. • Facilitate public reports about encroachments to 311 by creating a standard sign with specifics about the law and the permit. • Strenghtn the renewal application process. • Develop sidewalk markings to delineate the area permitted to be occupied by moveable sidewalk encroachments such as sidewalk cafes, vendor carts, and honor boxes. • Mark a corner clear zone 10 feet on either side of crosswalks prohibiting all encroachments except transit shelters and equipment essential to vehicular and pedestrian safety and flow. • Develop a program with the Bicycle Coalition, Center City District, and the City to reduce damages to street trees from illegal bicycle parking.
	Pedestrian Network Maintenance	• Set standards for acceptable sidewalk conditions. • Require sidewalk inspection when properties are sold. • Commit City funds to the maintenence of publicly owned sidewalks. • Develop a network of "priority clearance sidewalks" to ensure that major pedestrian pathways and access points are cleared early and regularly during snowstorms.
	Bicycle Network Maintenance	• Establish standards for maintenance of bikeways including replacement of worn pavement markings and damaged signs, sweeping away debris, repaving streets and repairing potholes. • Develop a snow removal policy for bike lanes and multi-use paths.
	Bicycle Detours	• Require responsible agency/department to prepare detour plans for bicycles on multi-use sidepaths, bridge walkway sidepaths or arterial roads with bike lanes. • Penalize contractors who illegally block bike lanes or multi-use sidepaths. • Require in-kind repair or replacement of bike lanes damaged by construction.
	Bicycles in Buildings	• Develop an ordinance that requires building managers with freight elevators to allow bicycle access upon request from a tenant. • Encourage building managers to increase off-street parking operations.
	Crash Reporting and Records	• Request changes to the Commonwealth crash report form to include information needed for analysis of pedestrian and bicycle crashes. • Bicycle-bicycle crashes and bicycle-pedestrian crashes should by included in the crash database, as should single bicycle crashes resulting in injury or death. • Improve the precision of crash analysis for better focus on countermeasures. • Combine pedestrian and bicycle count data with crash data to evaluate the relative danger in different locations.
	Pedestrian and Bicyclist Counts	• Seek assistance through DVRPC for counts using new equipment they have recently procured. • Request that DVRPC's Household Travel Survey be repeated on a recurring 10-year cycle. • Require that all intersection traffic counts conducted as part of traffic studies submitted to the City, including studies prepared by developers, include pedestrian and bicycle counts. • Work with DRPA to install an automatic counter on the Ben Franklin Bridge.

CHAPTER 6
RECOMMENDATIONS: PEDESTRIAN NETWORK

This chapter describes conceptual design recommendations for improving the pedestrian network in the study area. Improvements are based on three assumptions:

- Accommodating pedestrian travel needs is an important value for the city
- Engineering improvements will be made within the existing right-of-way
- Education and enforcement are important elements of an improved pedestrian network

The recommendations are based on current best practices, and address a number of common issues along the roadway and crossing the roadway. The recommendations are aimed at reducing barriers to pedestrian travel by increasing pedestrian safety, convenience and overall comfort.

The locations for pedestrian network improvements were based on the demand and needs analysis, the questionnaire, previous studies, and traffic counts. Twenty-two corridors and individual locations were identified for a closer look at issues affecting pedestrian comfort and safety. All recommendations offer conceptual solutions that may be appropriate to the locations studied and for other areas of the city.

A word on policy recommendations

This chapter of the Plan primarily discusses physical changes to the pedestrian network. These recommendations complement the policy recommendations discussed in Chapter 5 which address sidewalk design, street crossings, education, and enforcement. Engineering improvements can do much to improve walking conditions for pedestrians. Combining these projects with regular education and enforcement programs can reduce the rate of crashes and encourage more walking.

Chapter Organization

This chapter describes common issues for pedestrians drawn from the priority corridors and individual locations. A summary table describes how pedestrians are affected by each issue, lists the elements of the infrastructure that affect each issue, and offers a series of recommendations to mitigate the issues. A photo-gallery of recommended best practice solutions for each issue follows the table.

Philadelphia-specific case studies or vignettes complete the chapter. The vignettes represent more than one issue, as most locations have multiple concerns. Each vignette includes a description of the location and identifies engineering concepts that may improve conditions for pedestrians. Conceptual-level recommendations for improving conditions at all of the priority locations are provided in a table found in Appendix D. As with all conceptual-level recommendations, further study and analysis will be needed to determine how to proceed.

Overview of Recommendations

The recommended treatments (also called countermeasures) appropriate for each issue fall into three main categories: signalization, geometric and signs/markings/operational.[1]

Signalization treatments use traffic signals to increase the safety and comfort of pedestrians crossing the street. Example treatments include improving signal timing to current standards and modifying signal phasing to include a Leading Pedestrian Interval (LPI).

Geometric treatments create or modify existing physical features in the right-of-way. Example treatments include installing a raised median and creating a modern roundabout.

Signs/Markings/Operational treatments are those that do not fall into the other two categories. Example treatments include intersection lighting, right-turn-on-red prohibition, enforcement programs, and parking restrictions.

Countermeasures in each of these categories address both "across the roadway" and "along the roadway" needs, as described in Chapter 3. One or more of the treatments may be appropriate for a given location, based on a careful review of the travel patterns for all modes of transport.

Pedestrian network issues in Philadelphia for which these countermeasures may be appropriate are listed in table 14. Each row includes a description of the issue, infrastructure elements and recommended treatments.

[1]The Federal Highway Administration developed a list of countermeasures with the goal of reducing crash rates and crash severity. See: http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/index.cfm

MAP 9

No.	Corridor Name	A	B
1	Ridge	Bells Mill Rd	Midvale
2	Henry	Port Royal	Abbottsford
3	Germantown	Chestnut Hill Ave	Logan
4	Lincoln	Wissahickon	McCallum
5	Allegheny	B	Ridge
6	Erie	Front	Broad
7	North Broad	Spring Garden	Hunting Park
8	Girard	Frankford	Broad
9	Pennsylvania	22nd	26th
10	Vine	Broad	22nd
11	JFK	15th	20th
12	Parkway	16th	18th
13	Market	Front	20th
14	Columbus	Tasker	Frankford
15	Grays Ferry	Washington	34th
16	Washington	Grays Ferry	Passyunk
17	Passyunk	Broad	5th
18	Oregon	Front	17th
	Individual Location		
19	Germantown-Ontario-Rising Sun-Old York Rd		
20	Kelly Drive: Boathouse Row-Lemon Hill		
21	Eakins Oval/PMA Area: Eakins Oval to 25th		
22	Ben Franklin Bridge approach area: Callowhill-6th-Race-4th		

	Issues	Description	Infrastructure Elements
Across the Roadway	Inadequate or missing crossing facilities, including mid-blockcrossings.	Pedestrians are encouraged to cross the street at intersections, especially where some type of traffic control is present (i.e., stop signs or signals). Where traffic controls and crosswalks are missing or obsolete, the effectiveness of the pedestrian network is diminished. Signals and geometric treatments work in conjunction with crosswalks at intersections to improve safety and comfort. Mid-block crossings also need adequate crossing facilities.	Signalization • Traffic signals • Pedestrian Signals • Signal timing and sequencing Geometric • Pedestrian crossing islands • Curb extensions Signs/Markings/Operational • Crosswalks • Lighting • Signage
	Insufficient time to cross intersection	Pedestrians often feel that they do not have enough time to cross at signalized intersections. The 2009 Manual on Uniform Traffic Control Devices calls for signal timing to be based on assumptions of slower walking speed than was used in the past, i.e., reducing the rate of travel from 4 feet per second to 3.5 feet per second.	Signalization • Signal timing • Pedestrian Signals Geometric • Curb to curb distance, based on intersection geometry • Curb extensions • Pedestrian crossing islands and medians
	Wide or diagonal intersections	Regardless of the intersection size or shape, the shortest pedestrian crossing distance generally offers the greatest safety for pedestrians; i.e., reduces the likelihood of a crash with a motor vehicle. Streets that intersect at angles other than 90° create either wide or narrow corners. Wide corners allow motorists to turn without slowing down. When making a right hand turn, motorists must look back and over the left shoulder -- a maneuver that is difficult to execute and diverts a motorist's attention from potential pedestrians in the crossing just ahead. When making left hand turns, motorists may also fail to observe pedestrians as they move easily through a wide turn.	Signalization • Pedestrian signals • Signal timing and sequencing Geometric • Intersection geometry • Pedestrian crossing islands and median crossing islands Signs/Markings/Operational • Signage • Crosswalks
	Complex intersections	Intersections where three or more streets come together create challenges for all modes of travel. Many of the challenges of wide or diagonal intersections may be present at complex intersections. Another type of complex intersection is an offset intersection which looks like two T-intersections almost, but not quite, across from one another. Being the most vulnerable, pedestrians may find it difficult to travel through complex intersections comfortably and safely. Pedestrians may need to cross more streets and be aware of more motor vehicles, especially at crossings without traffic controls that are synchronized with the whole intersection.	Signalization • Signal timing and sequencing Geometric • Intersection geometry • Number of streets to cross • Pedestrian crossing islands and median crossing islands Signs/Markings/Operational • Crosswalks • Right turn on red • Signage
	Excessive auto-orientation	Excessively auto-oriented streets are any streets where the speed or volume of traffic is inappropriate for the adjacent land use. These streets often have 4 or more travel lanes, traffic volumes over 10,000 per day, and posted speeds of 35 mph or more. Motorists may travel at speeds greater than the posted speed limit. In general, pedestrians crossing streets with excessive auto-orientation do not feel comfortable or safe because of the width of the crossings and the speed and volume of traffic. Motorists often fail to yield to pedestrians in crosswalks, especially when turning. Signalized intersections providing traffic control for pedestrian crossings often are too far apart, forcing pedestrians to walk excessively long distances to a protected crossing.	Signalization • Traffic signals • Pedestrian signals Geometric • Curb extensions • Median islands Signs/Markings/Operational • Crosswalks • Lighting • Right turn on red • Cameras
Along the Roadway	Excessive auto-orientation	Streets with heavy traffic volumes, high speeds, or excessive widths are uncomfortable for pedestrians to walk along, particularly if the sidewalks are directly adjacent to the roadway instead of buffered by a Furnishing zone, curb parking, or a bike lane. The intrusion of frequent driveways is another problem typical of such streets, forcing pedestrians to be alert for vehicles turning across their path. Where speeds are high and driveways are wide, turning motorists are unlikely to yield to pedestrians.	Geometric • Sidewalks • Buffers • Access management Signs/Markings/Operational • Signage • Cameras
	Insufficient sidewalk capactiy	Missing, undersized, or blocked sidewalks may force pedestrians to walk in the roadway, at great risk to themselves, and disrupting traffic flow.	Geometric • Sidewalk presence and width • Transit stops Signs/Markings/Operational • Minimum clear width Walking zone (control of encroachments) • Furnishing and Building zones

Table 14: Overview of Pedestrian Recommendations

Types of Recommendations		
Signalization • Add pedestrian signals where missing • Signalize currently uncontrolled intersections at select locations • Install second pedestrian signal in medians at wide crossings	Geometric • Install pedestrian refuge in median • Install curb extensions to decrease crossing distance and slow turning vehicles	Signs/Markings/Operational • Add crosswalks or upgrade to high visibility crosswalks to increase motorists' awareness of crossing pedestrians and highlight desired crossing locations • Add Stop signs at select locations • Install Rapid Flash Beacon at select locations.
Signalization • Increase the length of time a walk signal is provided • Program a leading pedestrian interval into the signal cycle	Geometric • Reduce the crossing distance with curb extensions and pedestrian crossing islands or medians • Narrow travel lanes and tighten turning radii at intersections to accommodate curb extensions and raised medians where possible, incorporating green streets elements	
Signalization • Program a leading pedestrian interval into the signal cycle	Geometric • Create intersections with 90° angles • Install raised center medians and triangular medians that incorporate pedestrian crossing facilities • Consider feasibility of a modern roundabout	Signs/Markings/Operational • Stripe high visibility crosswalks • Narrow travel lanes to calm traffic
Signalization • If more than two phase signal, allow pedestrians to cross on all phases where crossing is safe • Consider separate pedestrian phase for offset intersections	Geometric • Consider closing approaches • Install medians to channel traffic and provide pedestrian refuges	Signs/Markings/Operational • Stripe high visibility crosswalks and install signage alerting motorists to the presence of pedestrians • Change two-way streets to one-way streets to reduce confusion at intersections. • Prohibit right turn on red
Signalization • Create mid-block crossings with appropriate warnings for motorists and protections for pedestrians – may require pedestrian-activated signal	Geometric • Narrow travel lanes at intersections and reduce turning radii, where possible. Radii must be adequate for bus turns where present • Install pedestrian refuge in median	Signs/Markings/Operational • Stripe high visibility crosswalks with signage alerting motorist of the presence of pedestrians • Install enforcement cameras calibrated for pedestrian safety needs • "Don't Block the Box" program • Prohibit right turn on red • Upgrade lighting at crosswalks
	Geometric • Widen sidewalks • Install buffers between sidewalk and travel lane • Use traffic calming treatments • Identify appropriate opportunities for access management (reducing the number and width of driveways)	Signs/Markings/Operational • Re-stripe curb lane to allow parking, if demand exists • Install speed cameras and permanent speed feedback signs
	Geometric • Resolve sidewalk gaps, especially near schools, transit stops and park entrances • Extend the sidewalk at transit stops to provide additional space for transit rider alighting and boarding • Install bollards or bike racks at curb line to prevent parking on the sidewalk	Signs/Markings/Operational • Maintain minimum clear width standards through encroachment enforcement program • Require sufficient capacity through redevelopment process

PHOTO-GALLERY OF RECOMMENDED ENGINEERING TREATMENTS

The following pages match photos of some of the recommended solutions to pedestrian issues listed in Table 14. The photos are from communities in the Northeast, including Philadelphia.

Across the Roadway: Inadequate or missing crossing facilities

Pedestrian crossings can be improved by adding pedestrian space at the edges of a street or in the middle of the street. Medians and triangular channelization islands create space in the middle of the street. Curb extensions do the same on the edge of the street. Signage alerts both motorists and pedestrians of crossing locations. Newer treatments, such as the Rapid Flash Beacon (RFB), can be installed independently of an intersection signalization system and provide additional protection for pedestrians.

This intersection in a residential neighborhood is used by pedestrians traveling to shopping, schools, bus stops, and recreation facilities. The curb extension reduces the crossing distance for pedestrians and offers a safe crossing location. Signage and a high visibility crosswalk supplement the curb extension and alert motorists to the presence of pedestrians.

The next set of photographs show a mid-block crossing that provides access to a rail station. The station entrance is in between two intersections and a mid-block crossing was established to create a safe way for pedestrians to access the station entrance. Motorists are alerted ahead of time to the mid-block crossing, which is beyond the overpass and somewhat out of view. The raised median with vegetation and trees helps slow down traffic. The crossing is well-signed for pedestrians and motorists.

Rapid Flash Beacons use LED technology in combination with crosswalk warning signs. The RFB design differs from the traditional flashing beacon by utilizing a rapid flashing frequency (60 times per second versus 1 per second), brighter light intensity, and the ability to aim the LED lighting. Activated by pedestrians prior to crossing, the rate at which the light flashes has been shown to increase the rate of compliance of motorists stopping or yielding to pedestrians in a crosswalk. This crossing includes a Rapid Flash Beacon and a crosswalk street sign. This particular RFB unit is equipped with a flashing light to alert pedestrians when it has been activated.

Across the Roadway: Insufficient time to cross

Pedestrians, especially older people, often say that they don't have enough time to cross at traffic signals. This may be the result of variation in walking speeds; a lack of understanding of the meaning of traditional pedestrian signals; and vehicles that run red lights or don't yield when turning. "Pedestrian clearance" refers to that phase of the pedestrian signal when the flashing Don't Walk or flashing Hand symbol is displayed. During this phase, pedestrians are not supposed to start crossing but, if they have already stepped off the curb, are free to complete their crossing without interference from cross traffic.

Guidance adopted in the 2009 "Manual on Uniform Traffic Control Devices" (MUTCD) calls for pedestrian clearance times to be based on a walking speed of 3.5 feet per second. This is a change from the previous standard of 4 feet per second. Where pedestrians travel more slowly than 3.5 feet per second, the MUTCD recommends that a slower walking speed be considered in determining the pedestrian clearance time. The issue of insufficient time to cross may be mitigated by reducing the crossing distance with curb extensions, or by using medians that provide a pedestrian refuge so that pedestrians may take two signal cycles to cross.

Countdown signals use the pedestrian clearance phase to display numbers showing pedestrians exactly how many seconds they have left to cross until the solid Don't Walk appears and cross traffic will start to move. Countdown signals have been found to be more informative and to help pedestrians make better judgments about when it is safe to cross, so they have now been adopted as standard practice by the City in accordance with the requirements of MUTCD.

One solution included in Table 14 is to program a Leading Pedestrian Interval (LPI) into the signal cycle. An LPI adds four seconds to the walk time before the green light for motor vehicles. Besides providing additional time for pedestrians to cross the street, the four-second head start makes pedestrians more visible to motorists, allowing them to enter the intersection before vehicles begin turning. LPIs are used on a selective basis. Not all crossings at an intersection or all intersections along a corridor need additional crossing time. Countdown signals should be installed first, and a study of pedestrian and motorist behavior should be made before deciding whether to use this technique.

The intersection of Market Street (Civic-Ceremonial Street type) and 20th Street (High-Volume Pedestrian Street) in Philadelphia
accommodates high levels of both motor vehicle and pedestrian traffic. An LPI was installed to ensure pedestrians were visible to turning vehicles. No Turn on Red signs deter motorists from turning as pedestrians proceed across the intersection in advance of the green light.

LPIs can also be used at intersections adjacent to schools, especially where more than two streets form the intersection. The signal timing at the crossing below right was adjusted to include an LPI during arrival and dismissal. The LPI assists the crossing guard to guide students across the intersection and onto school property.

At 20th & Market, Pedestrians have Walk signal while light is red for vehicles.

Across the Roadway: Wide or Diagonal Intersections

Pedestrians experience the challenge of crossing these intersections in several ways. Long crossing distances increase exposure time to collisions, especially for slower pedestrians. The wider corners allow motorists to turn without slowing down, and drivers may be less likely to yield right-of-way to crossing pedestrians. At narrow corners, sight angles of less than 90° force pedestrians to look over their shoulder to see if a vehicle is turning into the crosswalk. All these effects are magnified when the streets are wide.

Among the recommended treatments are reconfiguration of intersections with islands and medians to shorten crossing distances, tightening turning radii, and making approaches closer to 90°. Signage can also be used to alert users of potential conflicts that may not be easily visible. Examples of reconfigurations of wide or diagnol intersections are shown here.

The example below narrows the distance across a wide T-intersection of two well-traveled roads in a residential neighborhood. Both a straight center median and a raised triangular median narrow the pedestrian crossing distance. The center median slows traffic at the crosswalk by narrowing travel lanes in both directions. The triangular median extends the sidewalk along the roadway. This median is heavily planted, enhancing aesthetic appeal as well as safety. Existing drainage remains intact, as the triangular median was designed to create a channel between the existing curb and the curb of the median.

The next example is a large, asymmetrical intersection with long crossing distances. Channelizing islands create shorter crossing distances for pedestrians, increase their visibility to motorists, and adjust the angle at which motorists approach the intersection. Vegetation was incorporated wherever possible, including at storm water drainage inlets.

New York City has narrowed wide intersections in downtown areas to reduce pedestrian crossing distances. This photo shows a wide pedestrian refuge with bollards along the Grand Concourse.

Across the Roadway: Complex Intersections

Intersections of more than three streets can create challenges for pedestrian safety and comfort, especially when traffic controls and other pedestrian crossing facilities do not meet pedestrian needs. Issues for pedestrians usually include all the problems of Wide or Diagonal Intersections, plus an increase in the number of streets to cross and a larger intersection diameter, which increases vehicle orientation and reduces overall pedestrian visibility and comfort.

A second type of complex intersection is the offset intersection, which occurs when two separate cross streets intersect a roadway within a very close proximity to each other, but do not directly line up. The result is two separate "T" intersections, and two separate crossings for pedestrians, with complex vehicular movements. Drivers may consider the cross streets as a continuous path of travel and be less aware of pedestrians. Appropriate traffic control and crosswalk placement may be challenging.

The example to the right was the busiest intersection in the South Bronx. A 5-legged intersection was reconfigured to add bike lanes and a bus-only lane, along with 15,000 square feet of pedestrian space. The project led to the lowest crash rate in a decade.

Across the Roadway: Excess Auto-Orientation

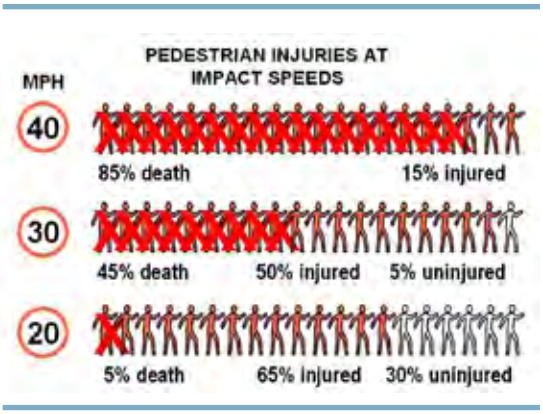
The intersection pictured to the right has an auto-oriented commercial street bisecting two residential neighborhood streets. The distance between controlled intersections is more than 600'. Traffic calming treatments were installed to reduce the auto-orientation and increase pedestrian safety and comfort. A raised median, high visibility crosswalks and signage were installed to alert motorists of the presence of pedestrians and to show pedestrians the safest location to cross the street.

The example to the right is on a street with high traffic volume, well-used bus routes, and pedestrians traveling both across and along the roadway. Compliance with the posted speed limit is encouraged by the traffic signal automatically turning red when motorists exceed the speed limit. Over time, the average speed is gradually reduced. This treatment offers an interesting element of peer pressure among motorists, and may create additional opportunities for pedestrians to cross the street when the signal changes to red. The overall sequencing of this traffic signal needs to be coordinated with other traffic signals along the corridor.

Along the Roadway: Excess Auto-Orientation

Pedestrians walking along streets with excessive auto-orientation usually do not feel safe, especially if the sidewalks are not buffered from traffic by a landscaped strip or parked cars. The heavier the traffic volume and the higher the speed of adjacent traffic, the less comfortable pedestrians will feel.

Another problem with excessively auto-oriented streets is the proliferation of driveways. Driveways are low volume intersections. They require curb cuts which intrude across the pedestrian walking area. Pedestrians have the legal right-of-way while walking across all driveways unless they are controlled by a traffic signal. However, motorists are unlikely to yield to pedestrians crossing wide driveways that allow vehicles to turn into them at speeds over 10-15 mph, placing them at risk of being struck by a vehicle. The design of the driveway influences driver behavior and pedestrian comfort.



Graphic 8. Pedestrian Injuries at Impact Speeds

Measures to mitigate the discomfort pedestrians feel when walking along excessively auto-oriented streets include changing the way motor vehicles travel along the roadway, i.e., traffic calming; creating space between the sidewalk and travel lanes to buffer the effect of motor vehicle traffic on pedestrians; and reducing the impact of driveways.

Six examples are included here. Each example includes at least one element aimed at mitigating the effect of motor vehicle traffic on pedestrians.

The first example calms traffic with a rounded and textured center median along curves, narrowing the roadway. Note the shared lane marking on this street.

The second example is a street with a heavily used bus route. Buffered sidewalks along this street serve neighborhood residents; the travel lanes carry motorists traveling within and through the neighborhood. Because motorists routinely exceed the posted speed limit, a permanent speed feedback sign was installed.

Another example of an approach to calming traffic and increasing the pedestrian-friendliness of a street is here. The main street shown in this neighborhood in an arts and restaurant district is marked by high arches with lights that are illuminated at night. The treatment serves to change the character of an otherwise busy street into one that emphasizes a slower pace of movement for all modes. The street is striped with a center left turn lane and shared marked lanes for bicyclists.

This example is a treatment that may be used to add buffer space between the sidewalk and traffic. This street is an arterial running through a series of residential neighborhoods. In this particular case, the sidewalk already has a landscaped buffer but, because the street is wider than needed, raised and planted islands were added for traffic calming purposes in sections of the street where there is no parking. At curves, reflectors are embedded in the islands to alert motorists to their presence.

The next two examples involve mitigation of the effects of poorly designed driveways. Reducing the number of driveways along a roadway can take a long time. Shorter term treatments that mitigate the effect of driveways can be implemented, however. The two photos at left show a retrofit that was made to a gas station driveway. The overly wide entrance driveway was organized into two one-way entrances, with flexible bollards used to separate them, while also defining the pedestrian Walking Zone and alerting motorists to the presence of pedestrians.

Multi-lane roadways without medians present particular challenges to both pedestrians and motorists, as motorists turning left into a driveway are focused on finding gaps in oncoming traffic. While focusing on gaps in traffic, the motorist's sight lines of potentially conflicting pedestrians are blocked by approaching vehicles. Motorists often accelerate rapidly to clear a gap on multi-lane roadways which puts the pedestrian at risk when walking along the roadway.

In the long run, the review and approval process for new development should include access management to limit driveway entrances and exits. Even when the number of access points is limited, two-lane driveways provide the same effect on pedestrians as a two-lane road. This photo shows how the pedestrian network was maintained across the driveway of a large apartment complex situated on a multi-lane roadway. The center median prohibits motorists from turning left into the driveway.

Along the Roadway: Insufficient Sidewalk Capacity

Some roads lack sidewalks altogether, while others have skimpy and intermittent sidewalks. Sidewalks in areas with high levels of pedestrian use may not be wide enough to accommodate all users. Areas with strong transit ridership and land uses that generate pedestrian traffic are likely examples of this supply-demand mismatch. In some locations, sidewalks are blocked partially or completely by sidewalk encroachments or by parked vehicles. Where sidewalks are missing, inadequate, or blocked, pedestrians are forced to walk in the street, at risk to themselves, and potentially disrupting vehicular traffic flow.

The photograph to the right is an example of additional sidewalk capacity created for a bus stop. The addition of a buffer with tree lawn also helps to reduce the impervious surface of the street, and it is walkable.

Sidewalks can be protected from vehicular encroachment, such as illegal parking, by installing bollards or other physical barriers. The photograph below is an example from 15th Street in Philadelphia.

PHILADELPHIA-SPECIFIC VIGNETTES

The following section presents a series of vignettes of typical pedestrian problem areas found throughout the study area. The vignettes are drawn from the priority corridors identified in the demand and needs analysis (see Chapter 3). The vignette approach describes the pedestrian issues present at a specific location and suggests potential treatments that can be adapted to other locations with similar challenges.

Each vignette includes a photograph and a brief overview of existing conditions at the location, including an assessment of the impact on pedestrians. The street types for each street in the selected location are identified[2] , and the relevant issues summarized in Table 14 in this chapter are listed. Potential treatments for the most important issues are listed separately. Each potential treatment is classified as Signalization (S), Geometric (G), or Signs/Markings/Operational (SMO), also described earlier in this chapter.

Regardless of the issue or potential treatments, the process for determining whether to modify existing infrastructure should include an analysis of elements such as traffic patterns and volumes, pedestrian desire lines, traffic controls, SEPTA routes and stops, current land use, and any anticipated changes in land use or traffic patterns. It will also require consultation with the local community.

[2] See Chapter 4 for more information on the Street Types and Sidewalk Design Standards.

LOCATION

Ridge Avenue, Henry Avenue, and
Cathedral Road Intersection

Street Type:
Ridge Avenue and Henry Avenue
- Auto-Oriented Commercial/Industrial Streets;

Cathedral Road
- City Neighborhood Street

OVERVIEW

Speeds on Henry Avenue and Ridge Avenue routinely are higher than the limit of 35 mph. A large retirement community on the west side of Ridge generates trips to a major shopping center on the east side. Bus stops on the south side of the intersection generate more trips. Residents have complained about the lack of time to cross Ridge and Henry. A raised median divides the south crossing in two; each side has four travel lanes plus a bike lane. The longest crosswalk (of Ridge) is 65', requiring 19 seconds of clearance time under the standard in the 2009 MUTCD. The north crossing, where Ridge is seven lanes wide, has no crosswalk. The signal cycle is 80 seconds, with the pedestrian crossing of Ridge and Henry getting 20 seconds. There are no pedestrian signals. Pedestrians crossing westbound must look over their right shoulder to see cars turning left from the shopping center onto Ridge southbound. Some pedestrians cross out of the crosswalk, directly to the bus stop; this makes them less visible to turning vehicles.

ISSUES

Across the Roadway: Inadequate or Missing Crossing Facilities
Across the Roadway: Insufficient Time to Cross Intersection

POTENTIAL TREATMENTS

- Increase the Cathedral Road phase of the signal to meet new minimum pedestrian clearance time. (S)
- Install pedestrian signals with countdowns, including in the median. (S)
- Increase size of channelizing island to reduce crossing distance across north side of Ridge Avenue. (G)
- Install fence or hedge around landscaped nose of raised median to discourage pedestrians from cutting across it to get to the bus stop on the west side of Ridge Avenue. (G)
- Reduce turning radii on southwest and southeast corners of the intersection. (G)
- Reduce oversized southbound left turn lane to accommodate a raised pedestrian refuge island in north crossing of Ridge Avenue. (G)
- Add crosswalk on north crossing of Ridge Avenue. (SMO)
- Install warning signs for motorists to Yield to Pedestrians when Turning. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Germantown Avenue and
Durham Street Intersection

Street Type:
Germantown
- Walkable Commercial Corridor

Durham
- Local

OVERVIEW

Durham Street intersects Germantown Avenue in two places, creating two separate T intersections, 50 feet apart. Durham is one-way eastbound with a stop sign at its approach to Germantown. None of the street crossings includes a marked crosswalk. The southern intersection, with East Durham, is approximately 250 feet from the signalized intersection of Germantown with Mt. Pleasant Avenue. The northern intersection with West Durham is about 390 feet from the signal at Mt. Airy Avenue. Germantown is constructed of Belgian block and concrete surfaces that present challenges for marking crosswalks.

ISSUES

Across the roadway: inadequate or missing crossing facilities
Across the roadway: complex intersection

POTENTIAL TREATMENTS

- Install pedestrian-activated Rapid Flash Beacons at new Germantown Avenue crosswalk. (S)
- Add curb extensions on both sides of Germantown Avenue between the two intersections extending the width of the crosswalk. (G)
- Mark high visibility crosswalks across both Durham Street crossings. (SMO)
- Mark a single, 35' wide, high visibility crosswalk across Germantown Avenue just south of the West Durham Street approach. On concrete, a black epoxy base may be used with white markings on top for contrast. (SMO)
- Remove parking along both sides of Germantown Avenue between the two legs of Durham Street (approximately 3 spaces). (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Allegheny Avenue,
Hunting Park Avenue and
Henry Avenue Intersection

Street Types:
Allegheny Avenue
- Urban Arterial

Hunting Park Avenue
- Urban Arterial
- Auto-Oriented Commercial/Industrial

Henry Avenue
- Auto-Oriented Commercial/Industrial

OVERVIEW

This is a six-legged, star-like intersection, with long diagonal pedestrian crossings. Henry Avenue has a four lane approach to the intersection, including a double right turn. The crosswalk is 90 feet long. Allegheny Avenue has a through lane and a left turn lane in each direction, plus one parking lane, and bike lanes. The longest crosswalk is 75 feet. Hunting Park Avenue approaches have three lanes with a dedicated turn lane, and the longest crosswalk is 90 feet. The signal cycle is 90 seconds; there are no pedestrian signals. The Hunting Park eastbound approach with its left turn has an advance green over Hunting Park westbound. This left turn move conflicts with the pedestrian crossing of Henry Avenue. High school students at the northeast corner between Allegheny and Hunting Park cross to restaurants on the southwest and northwest corners. The recent Hunting Park West study recommends residential mixed use redevelopment on both sides of Henry Avenue with retail frontage and a road diet. Numerous bus routes traverse the intersection.

ISSUES

Across the roadway: inadequate or missing crossing facilities
Across the roadway: wide or diagonal intersection
Across the roadway: complex intersection

POTENTIAL TREATMENTS

- Install pedestrian signals with countdowns. (S)
- Consider Leading Pedestrian Intervals on crossings with significant turning conflicts: Henry Avenue, eastbound Hunting Park, eastbound Allegheny. (S)
- Consider rebuilding the intersection as a signalized traffic circle. (G)
- Shorten Allegheny Avenue crossings by shadowing the parking lane with curb extensions. (G)
- Shorten Henry Avenue crossing distance by adding a pedestrian refuge island in the crosswalk. (G)
- Consider pulling long angled crosswalks back to make them more perpendicular and shorter. This must be done with care for visibility. Add Yield to Pedestrians When Turning signs. (SMO)
- Restripe high visibility crosswalk across 30th Street. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Erie Avenue and
Front Street Intersection

Street Types:
Auto-Oriented Commercial/Industrial

OVERVIEW

Erie Avenue and Front Street are both wide two-way streets and the intersection is slightly skewed. Erie has trolley tracks in the middle but these are not in service. St. Christopher's Hospital is at the southeast corner and generates pedestrian traffic as employees walk to nearby restaurants for lunch. The turning radii on three of the four corners allow high speed right turns. Channelizing islands make the crosswalks on the north and south sides of the intersection disjointed and indirect. The northeast channelizing island allows excessively wide right turns where motorists have a Yield sign, but may not expect pedestrians because the crosswalk is so far out of line from the sidewalk. Sidewalk parking on the northwest corner blocks the very narrow walkway. There are no pedestrian signals. The signal cycle is 60 seconds, split evenly between the two streets. There are bike lanes on Front.

ISSUES

Across the roadway: inadequate or missing crossing facilities
Across the roadway: wide or diagonal intersections
Across the roadway: excessive auto-orientation
Along the roadway: insufficient sidewalk capacity

POTENTIAL TREATMENTS

- Add pedestrian signals with countdowns. (S)
- Tighten corner radii. (G)
- Evaluate need for channelized right turns; remove if possible. (G)
- Pull northwest corner curb toward the cartway and add barriers to prevent motor vehicle parking on the sidewalk. (G)
- Alternatively, consider a modern roundabout. (G)
- Install saw tooth Yield markings in advance of crosswalks in slip lane at northeast channelizing island. (SMO)
- Relocate north side bus stop to safer location, possibly a far side stop. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Girard Avenue from 2nd Street to Front Street

Street Type:
Girard Avenue and 2nd Street
- Walkable Commercial Corridors

Front Street
- Urban Arterial

Hancock, Mascher, and Howard Streets
- Local Streets

OVERVIEW

This section of Girard Avenue is a developing area with new restaurants, bars, and a supermarket under construction between 2nd Street and Hancock Street. Girard has trolley service, but motor vehicles may share the track area. The distance between the traffic signals at Front and 2nd is unusually long: approximately 960 feet. Between Front and 2nd, five streets intersect Girard on the north side, and four on the south side. Mascher Street is closest to the middle of the block, although it does not connect directly across Girard to the south. Hancock and Howard Streets are next closest to the midpoint, and both directly connect across Girard. Hancock has no vehicular approach to Girard but is used by many pedestrians, as it is the street connecting to the Piazza mixed use development further south on 2nd Street at Germantown Avenue. Hancock is also used by westbound vehicles turning left to access the Piazza.

ISSUES

Across the Roadway: inadequate or Missing Crossing Facilities

POTENTIAL TREATMENTS

- Add new traffic signal on Girard Avenue, at a location to be determined, based on observation of pedestrian and vehicular movements after the supermarket is opened, probably Hancock Street or Howard Street. (S)
- Stripe high visibility crosswalks at new signal. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

John F. Kennedy Boulevard and
15th Street Intersection

Street Type:
JFK Boulevard
- Urban Arterial;

15th Street
- Urban Arterial
- High Volume Pedestrian Street

OVERVIEW

The major issue for pedestrians at this intersection is conflicts with turning vehicles; specifically, vehicles turning right from 15th onto JFK Boulevard. The width of both streets allows vehicles to maintain higher speeds when turning, and motorists and bicyclists often fail to yield the right-of-way to pedestrians. The right lane of 15th is an exclusive turn lane, but motorists often turn right from the second lane as well, exacerbating the problem. Some pedestrians attempt to cross all the way from the Municipal Services Building at the northeast corner to City Hall at the southeast corner on one signal cycle, which is difficult. The large channelization island allows safe crossing, but requires most pedestrians to take two signal cycles to cross. Gridlock that blocks crosswalks during the walk phase slows down all traffic, regardless of mode, and can result in illegal behavior by pedestrians, motorists, and bicyclists. Gridlock has been addressed with the use of traffic police at this intersection for several months.

ISSUES

Across the roadway: excessive auto-orientation

POTENTIAL TREATMENTS

- Consider installation of a Leading Pedestrian Interval for the crossing of JFK Boulevard. (S)
- Install a channelization island incorporating the crosswalk between the right turn lane and the adjacent through lane on the 15th Street approach. (G)
- Reinforce the "Don't Block the Box" campaign with accompanying pavement striping and targeted motorist education. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Pennsylvania Avenue
Spring Garden Street, and
23rd Street Intersection

Street Type:
Pennsylvania Avenue, Spring Garden Street
- Urban Arterials

23rd Street
- City Neighborhood Street

OVERVIEW

This is a complex intersection with seven legs, just off Eakins Oval. East-west Spring Garden Street enters the Oval here and one leg is the entrance to the Spring Garden tunnel. Pennsylvania Avenue runs from southeast to northwest along a series of apartment buildings and serves as an important parking resource. 23rd Street is a north-south street with two travel lanes. The signal cycle has three phases and there are no pedestrian signals. The crossings of both Spring Garden and Pennsylvania Ave. are quite long and some median refuges are inadequate. The most challenging crossing is on the north side of the intersection, where pedestrians must cross when Spring Garden traffic moves. Vehicles in the right lane may go straight, bear right into the tunnel, or turn right onto Pennsylvania Ave. Pedestrians making this crossing with traffic cannot see turning vehicles. Once they reach the median, they can't see the traffic signal.

ISSUES

Across the roadway: wide or diagonal intersection
Across the roadway: complex intersection

POTENTIAL TREATMENTS

- Add pedestrian signal indicators with countdowns on all long crossing and in the medians. (S)
- Add a Leading Pedestrian Interval to the north side crossing of Pennsylvania Avenue. (S)
- Reconfigure the tunnel entrance and Pennsylvania Avenue median north of the intersection to force Spring Garden Street traffic headed to the tunnel to turn right, then left, instead of accessing it straight through the intersection. (G)
- Extend curbs at the corner of Parkway House to shorten long crosswalks of Pennsylvania Avenue and Spring Garden Street. (G)
- Widen pedestrian refuge in the center of Spring Garden Street crossings to at least 6 feet. (G)
- Post eastbound Spring Garden Street approach to intersection with Yield to Pedestrians when Turning sign. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

LOCATION

Passyunk Avenue, Morris Street, and 12th Street Intersection

Street Type:
Passyunk Avenue
- Walkable Commercial Corridor

12th and Morris Streets
- City Neighborhood Streets

OVERVIEW

This is a three-way, signal-controlled complex intersection. The signal cycle is 60 seconds long, divided approximately equally between Passyunk Avenue, 12th Street, and Morris Street. The sharp right turn from northbound Passyunk to southbound 12th is rarely used, but it creates pedestrian hazards when it is used. The turn is not necessary since motorists wanting to turn south from Passyunk can use alternate routes nearby. Drivers turning south from Morris Street to 12th may be surprised by the red light at Passyunk. Several crosswalks are missing or faded. The crossings of Passyunk on the west side of 12th and of 12th on the southeast side of Passyunk are excessively long, due to the sharp angles of the intersection. There is a painted triangle just south of Morris to channelize traffic, but motorists ignore it, and the markings have been worn away.

ISSUES

Across roadway: inadequate or missing crossing facilities
Across roadway: insufficient time to cross
Across roadway: complex intersection
Across roadway: wide or diagonal intersections

POTENTIAL TREATMENTS

- Add a curb extension between Passyunk Avenue and 12th Street at southern end of the intersection to shorten crossing distances across both streets. (G)
- Provide seating on enlarged curb extension (approximately 4,000 additional SF of space added) (G)
- Build raised pedestrian refuge and channelizing island on painted median in middle of intersection. (G)
- Add curb extensions to shorten crossings and prevent vehicles from parking in crosswalks. (G)
- Restripe faded crosswalks. (SMO)
- Stripe missing crosswalks at Morris Street crossing with 12th Street and Passyunk Avenue. (SMO)

Key to Treatments: S=Signalization, G=Geometric, SMO=Signs/Markings/Operational

CHAPTER 7
RECOMMENDATIONS: BICYCLE NETWORK

The Plan recommends establishing an interconnected network of bikeways and trails that serves all the neighborhoods in the study area. The Plan builds upon existing facilities and is designed to support a tripling in bicycling activity by the year 2020.

A word on policy recommendations

This chapter of the Plan discusses primarily physical changes to the bicycle network. These recommendations complement the policy recommendations in Chapter 5 targeted for bicycle network design, intersection treatments, bicycle parking, and access to transit, along with education, enforcement and encouragement. Engineering improvements can go a long way towards enhancing overall conditions for bicycling by upgrading the connectivity of streets and trails and, indirectly, by changing motorist behavior. Combining engineering projects with education, enforcement and encouragement programs can reduce the number of crashes and increase the number of trips made by bicycle. Elements of the policy recommendations are noted in this chapter, including education and enforcement campaigns targeting both motorists and bicyclists.

Chapter Organization

This chapter starts by describing different types of bikeways that can be constructed or marked to accommodate bicyclists. Maps 9a, 9b, and 9c show all Bicycle Network Recommendations, illustrating how these types of facilities can be used to establish an interconnected bicycle network to serve the study area and connect to adjoining portions of the City and region. The chapter concludes with a discussion of six issues that should be considered as bicycle facilities are implemented, in order to support successful operation of the facilities. The six issues are:

- Intersection Improvements
- Bike Lanes on One-Way Streets
- Conflicts with On-Street Parking
- Bicycles and Transit
- Bicycle-Specific Signage
- Sidewalk Bicycling

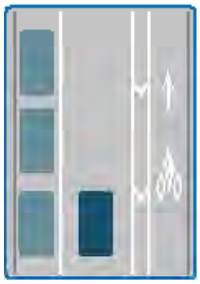
Specific facility types are recommended for most segments of the expanded bicycle network. However, specific recommendations for some street segments that are anticipated to be part of the expanded bicycle network could not be made within the limits of this study. These locations are labeled "Additional Study Required." These streets and corridors serve as key connectors in the street network but have significant constraints that preclude an appropriate, cost- effective solution for bicycling. Improvements for bicyclists should be considered as a part of future projects when the facility is rehabilitated. A few locations that required more detailed discussion are included in Appendix E.

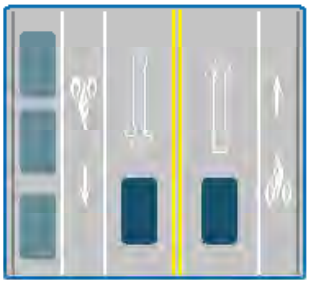
Descriptions of Recommended Types of Bikeway

The Plan recommends a network of different types of bikeways, each of which is described in this chapter. The recommendations reflect the desire to provide a high level of bicyclist comfort and mobility, while balancing the demands from multiple users for limited street space. The recommendations are intended to be cost-effective, and on-street recommendations generally involve retrofitting the roadway through signs and pavement markings.

Table 15. Bicycle Facility Types

BICYCLE LANES





OPTIONS
Experimental colored treatment to deter parking where parking/stopping in bike lane may be an issue.

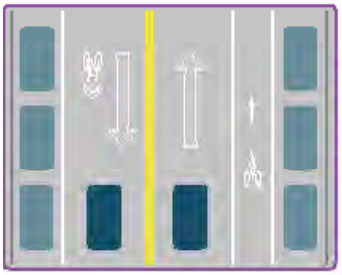
Left side placement on routes with transit.

CONTRA-FLOW BICYCLE LANES

DESCRIPTION
Two way for bikes, 1 way for other vehicles

EXAMPLES
College Ave
Vare Ave

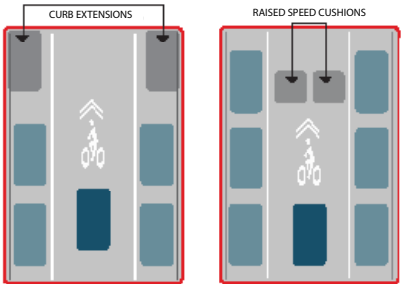
CLIMBING LANES



DESCRIPTION
Bike lane in uphill direction
Marked shared in lane in downhill

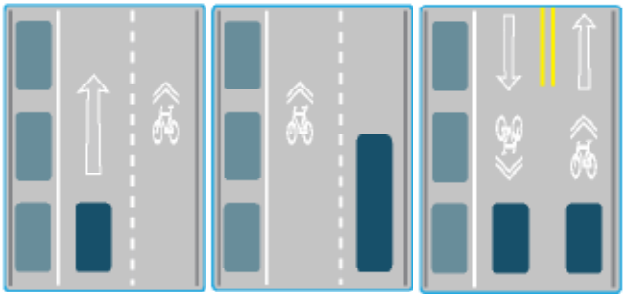
EXAMPLES
Midvale Ave

BICYCLE FRIENDLY STREET



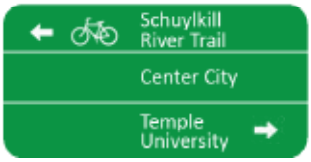
DESCRIPTION
Shared-use;
Street not wide enough for vehicles to pass bicycles
Bicycle -friendly traffic calming (e.g. speed cushions)
Often one-way pairs for routing

MARKED SHARED LANES

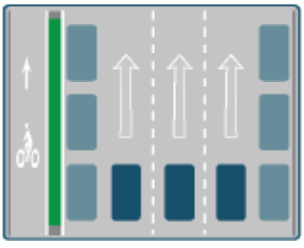


DESCRIPTION
Shared-use;
Marking used to indicate positions
Marking may be on left side or both sides
Often one-way pairs for routing

NETWORK SIGNS



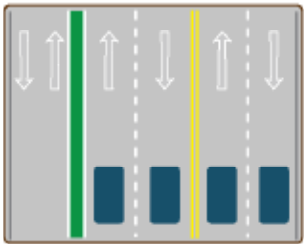
CYCLE TRACK



DESCRIPTION
1-way, bicycle-only
Physically separated

EXAMPLES
JFK Boulevard
Market Street

SIDE PATH



DESCRIPTION
Two way shared use
Parallel to roadway

EXAMPLES
Columbus Blvd
Hunting Park (West of Ridge)
Lincoln Drive

Bike Lane.
A bike lane is a pavement marking that designates a portion of a roadway for the preferential or exclusive use of bicycles. This designation creates an on-road facility that is markedly different from a Marked Shared Lane or Shared Roadway (see previous page). Bike lane markings are dashed where vehicles are allowed to merge into the bike lane, such as for right turns or at bus stops. Bike lanes are recommended on two-way arterial and collector streets where there is enough width to accommodate a bike lane in both directions, and on one-way streets where there is enough width for a single bike lane. Implementation considerations include the following:

- Bike Lanes should be a minimum of 4' wide when speeds are low, there is no on-street parking, and when not abutting a vertical curb; and a minimum of 5' wide when next to on-street parking, or when prevailing operating speeds are 30 mph or higher.
- Additional bike lane width increases separation from parked and moving vehicles, improves user comfort, and allows for bicycles to pass without leaving the bike lane. Where possible, Philadelphia provides bike lanes that are 6' wide.
- A striped hatched area may also be provided between the bike lane and the travel lane to provide additional separation and buffering between bicyclists and motorists.
- Consideration should be given to the likelihood that, in areas of significant vehicle congestion, the provision of additional width may result in the bike lane being used illegally by motor vehicles.
- On narrow streets with abutting land uses creating a high demand for both parking and short-term loading activity, such as taxis, passenger drop-off, or unloading of groceries, it may be necessary to allow motor vehicles to use the bike lane for loading and unloading activities on a limited basis.

What is a Bikeway?

Bikeway is a term that refers to most facilities designed for travel by bicycle. Facilities include on-road striping, signage, signals and geometric features.

Table 15 depicts each type of bikeway recommended in this plan.

Climbing Lane.
A bikeway design for a two-way street that has a steep slope and insufficient width to permit bike lanes to be marked in both directions. A bike lane (climbing lane) is provided in the uphill direction to accommodate slow moving bicyclists and a marked shared lane is provided in the downhill direction, requiring bicyclists to travel with motor vehicles. See the Marked Shared Lane description later in this chapter.

Contra-flow Bike Lane.
A Contra-flow Bike Lane is a bike lane marked on an otherwise one-way street to serve bicyclists traveling in the opposite direction. Bicyclists traveling in the same direction as motor vehicles can be provided with a marked shared lane or a bike lane. If a bike lane is provided, it may be located on the right side of the street, or it may be located on the left side of the street, abutting the contra-flow bike lane. Special provisions should be made at intersections to alert other roadway users of the contra-flow condition. Transitions at the beginning and end of a contra-flow bike lane should be well marked and require signage that exempts bicycles from one-way street regulations.

Cycle Track.
A bicycle facility that is physically separated from both the roadway and the sidewalk. A cycle track may be constructed at the same grade as the street by using a combination of striped buffers, on-street parking and bollards to define the bicycle space, or it may be constructed at the elevation of the top of the curb between the curb and the sidewalk. Cycle tracks are often difficult to implement due to the amount of space required. Cycle tracks can provide users with a high level of comfort and may be appropriate on wider streets where double parking and/or higher vehicle speeds are a problem. On two-way streets, cycle tracks should be designed for one-way operation in the same direction as adjacent traffic. On one-way streets, a cycle track on the left side of the street can allow for two-way bicycle operation, with the reverse direction operating as a contra-flow lane. Implementation considerations include the following:

- Successful use of this design typically requires removal of parking spaces near intersections to provide adequate sight distance and, depending on operations, may require separate bicycle signals. If the modifications necessary to ensure safe design cannot be fully implemented, a standard bike lane should be implemented instead of a cycle track.
- Care must also be taken to ensure the design of a cycle track does not complicate drainage, maintenance, deliveries or emergency services.
- When located on a street that has transit service, raised in-street passenger loading islands should be installed between the transit stop and the cycle track. Special care is required to ensure that bicyclists don't present a threat to transit users and that the loading island is accessible from the sidewalk for those having mobility or visual disabilities. On one-way streets with bus routes, the cycle track should be located on the left side of the street to avoid the conflict with transit vehicles and users.
- At intersections with heavy turn volumes, the addition of bicycle signals should be considered to separate bicycles and turning vehicles.

Note: The Plan recommends that the City initially implement cycle tracks on JFK and Market Streets in Center City from 15th to 20th streets. These streets are recommended because they are wide one-way streets, which simplifies intersection conflicts, and allows the cycle track to be placed on the left side where it will not interfere with bus operations. The Pennsylvania Environmental Council has recieved funding for a feasibility study of cycle tracks on Spring Garden Street in Center City. This is more complicated than the Market and JFK proposal since it is a two-way street. If a cycle track on Spring Garden Street is deemed feasible, and is implemented successfully, then consideration could be given to establishing cycle tracks on other streets with existing bike lanes such as Oregon Avenue and Washington Avenue.

Bicycle-Friendly Streets. [1]
A street, or series of contiguous streets, that has been modified to discourage high speed motor vehicle traffic while accommodating through bicycle traffic becomes a Bicycle-Friendly Street. This treatment is intended primarily for residential streets. In the study area, this type of bikeway is recommended for narrow streets, often having only one traffic lane and parking on both sides. Bicycle-Friendly Streets should apply a "tool box" approach by considering a range of mid-block and intersection improvements aimed at making the corridors more attractive for bicycling and less attractive to fast or high volume motor vehicle traffic.

It is recommended that this type of facility be implemented within the framework of a larger community process that considers neighborhood traffic management and parking impacts. In some cases, special pavement markings and signs may be sufficient to designate the bikeway. Bicycle-friendly streets are also ideal locations to incorporate sustainable design features such as street trees and rain gardens compatible with the City's storm water management program (Green City, Clean Waters).

Potential modifications include bicycle-friendly traffic calming. Where speed humps are an appropriate countermeasure, they should be installed with a bicycle-friendly profile. Curb extensions (bumpouts) at intersections can contribute to improved visibility of bicycles and pedestrians, but care should be taken to ensure that bumpouts do not extend beyond parked cars and pose a hazard for bicyclists. Other potential intersection treatments include traffic circles, raised crosswalks and intersections, and bike boxes at key intersections.

[1] This type of facility shares some characteristics with 'Bicycle Boulevards', but is not a classic Bicycle Boulevard.

Marked Shared Lanes.
Shared Lane Markings may be used to designate a bicycle facility on a street without sufficient width for bike lanes. A shared ane marking (also known as "sharrows") is a pavement marking symbol that is used to indicate the most appropriate position for a bicyclist to ride. Shared lane markings direct bicyclists away from the door zone of parked cars and alert motorists of appropriate bicyclist positioning. The use of shared lane markings also encourages safe passing of bicycles by motorists. The markings also provide a wayfinding benefit to bicyclists on routes that have numerous turns or changes in direction. Shared lane markings are not appropriate on streets with speed limits greater than 35 mph. A variation of this treatment is the Priority Shared Lane Marking that is currently being studied by the Federal Highway Administration in Long Beach, CA, and Salt Lake City, UT, to increase the effectiveness of sharrows. Based on the outcomes of these pilots and other relevant studies, Philadelphia should consider the use of priority shared lane markings in appropriate contexts.

Shared Roadway.
A Shared Roadway consists of a lower volume, lower speed street that is compatible with bicycling without any geometric changes, pavement markings or signage, with the exception of bicycle network signs where appropriate. Shared roadways will often be residential streets but can also be located in commercial or institutional areas. Park roads can also often operate as shared roadways.

Sidepaths.
A widened sidewalk along one side of the street can be considered a Sidepath. Unless designated as being appropriate for bicycle use, bicycling on sidewalks is prohibited in Philadelphia. Designation of a Sidepath requires review by the Philadelphia City Planning Commission and approval by the Streets Department, which must ensure that the facility is safe for bicyclists and will not negatively impact sidewalk users. Sidepaths may not be appropriate in areas of high pedestrian activity unless there is space to successfully manage conflicts. Sidepaths generally will be operated as mixed use facilities, but in some locations with high volumes of pedestrians, it may be appropriate to separate bicycle and pedestrian traffic. Separation may also require some enforcement. Implementation considerations include the following:

- 10' is the minimum recommended width for sidepaths. In areas with low anticipated use, sidepaths may be as narrow as 8' where there are significant constraints.
- Sidepaths are suitable for locations with few cross streets, where it is desirable to provide the highest level of comfort and separation from traffic, and to provide a connection to similar facilities i.e. trails.
- On-street facilities should also be provided where appropriate and feasible, even with a sidepath present.

Trails.
A Trail is a type of facility that is physically separated from motor vehicle traffic by an open space or barrier or is located in an independent right-of-way. Trails are usually shared with other non-motorized users including pedestrians, skaters, wheelchair users or joggers. Trails are primarily located in parks and include several user types. Major trails in Philadelphia include: Pennypack Park Trail, Wissahickon Trail, the Schuylkill River Trail, and many unpaved trails in Fairmont Park.

ISSUES TO CONSIDER WHEN IMPLEMENTING BICYCLE FACILITIES

Intersection Improvements.
The majority of motor vehicle crashes involving bicycles occur at intersections. Intersection improvements for bicycles should be considered as a part of all bikeway improvement projects in addition to general street redesign, safety improvements or upgrades. Good intersection design makes bicycling more attractive and reduces crashes and injuries. The following guidelines should be used to supplement other city, state, and national standards.

- Provide a clear and obvious path for bicyclists at intersections. Extend bike lane markings to the stop bar in advance of intersections. Where there are significant turning conflicts or longer crossings, extend the bicycle markings through the intersection with a combination of either dotted lines or shared lane markings. Selective removal of parking spaces may be needed to provide adequate visibility and establish the width for bike lanes at approaches to intersections.
- Reduce conflicts between through bicyclists and turning motor vehicles. Consider dedicated turn lanes in addition to bike lanes. Add advanced stop bars with bike boxes.
- Signal timing and design should accommodate bicycles. Ensure that signal intervals allow bicyclists adequate time to safely enter and cross intersections. Equip all actuated signals with a method to detect bicycles (such as loops, video or microwave detectors). Signal timing and signal changes should be designed to reduce delay for all users, considering the fact that bicyclists, like pedestrians, are intolerant of delay.
- Consider bicycle signals at locations with heavy conflicts between bicycle and vehicle movements, including cycle tracks, or at locations where conflicts with cyclists may not be apparent. Bicycle signals are separate signals positioned to control bicycle movements through an intersection and provide a dedicated phase for bicyclists. Bicycle signals should be coordinated with pedestrian movement wherever possible in order to increase safety and minimize overall delay.

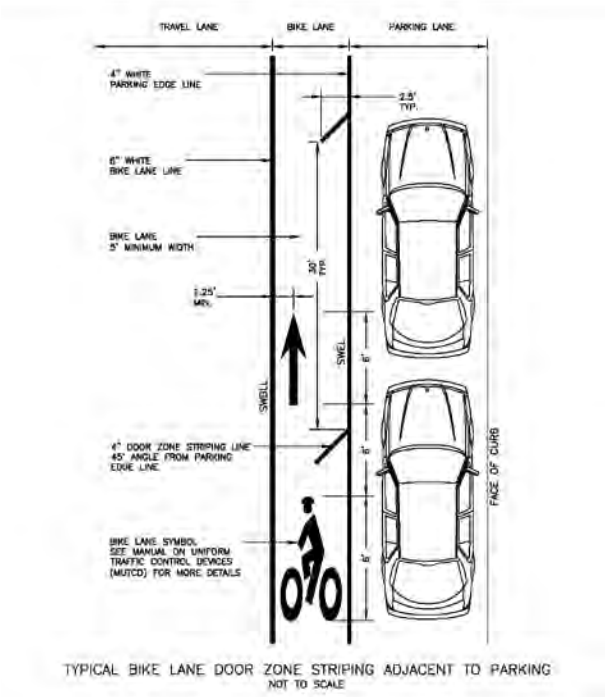
Bike Lanes on One-way Streets.
On one-way streets, bike lanes usually are placed on the right side of the roadway, just as is done on two-way streets. In some cases, however, it may be appropriate to consider placing bike lanes on the left side of a one-way street for one or more of the following reasons:

- Bus operations on the right side of the street create conflicts with bicyclists and can place bus passengers at risk of being hit by bicyclists.
- Locations that need to accommodate a priority bicycle movement (e.g. left turn to another bicycle facility).
- At locations where high parking turnover is combined with narrow lanes, bicyclists will generally experience fewer conflicts with opening doors while riding on the left side due to the location of the driver door.
- At locations where a street changes from one-way to two-way operations, the designer should exercise caution as bicyclists operating on the left side may be positioned incorrectly at intersections. In this situation, it is recommended that the bike lane be placed on the right side of the roadway or designed to transition to the right side in advance of where the change occurs. This may be done with a combination of bike boxes and merging signage in appropriate locations.

Conflicts with On-Street Parking.
While on-street parking provides many benefits, it can create conflicts for bicycling under certain conditions. Bicyclists report experiencing problems with motorists' double parking in bike lanes or shared lanes, parking or stopping in curb-side bike lanes, and opening motor vehicle doors into the bicycle's path, creating a "dooring" risk. The following strategies should be considered:

Reduce Risk of "Dooring"

- Increase education for motorists on the fines for not checking to make sure it is safe before opening motor vehicle doors.
- Educate bicyclists on the importance of riding away from the area where motor vehicle doors can be expected to open.
- Install markings to guide bicyclists to ride outside the door zone in constrained corridors with on-street parking.
- Install left-side bike lanes (fewer openings of passenger side door of motor vehicles).
- Conduct safety campaigns to remind motorists to check for any approaching vehicles including bicycles before opening doors. In Pennsylvania, and most states, the Vehicle Code requires persons in vehicles to determine that they will not interfere with the movement of traffic before opening a door.



Graphic 9. Bike Lane Placement vis-à-vis Door Zone

Reduce Parking in Bike Lanes

- Install signs to alert motorists of fine for parking in bike lane.
- Increase ticketing of illegally parked motor vehicles.
- Install colored bike lane markings.
- Install cycle tracks.
- Employ curbside management strategies, such as performance parking[2] , that increase turnover and improve availability of curb space.

Note however that operators of motor vehicles may use bike lanes to load or unload passengers or goods unless prohibited from doing so by regulatory signage. Any such use of the bike lane for loading must be kept to the minimum time necessary and drivers are required to yield to bicyclists when entering or exiting the curb lane for loading purposes.

[2] 'Performance parking' or variable-rate parking is based on the idea that parking spaces in desirable locations and at desirable times are more expensive than less desirable locations. Variations of performance parking include escalating rates based on duration of parking.

Bicycles and Transit.
Reducing conflicts between bicycles and transit was an important consideration in developing the recommended bicycle network. The DVRPC Bicycle-Bus Conflict Area Study (2009) provides a detailed analysis of the interactions between bicycles and transit vehicles in shared rights of way. In addition, trolley tracks in the study area present a hazard to bicyclists – it is relatively easy to trap a bicycle wheel in the trolley track, a type of crash that can result in serious injury.

In a city as dense as Philadelphia, with as much transit and bicycle use in such a compact area, bicycle and transit use will overlap. Many of the streets that are the most attractive for developing a bicycle network are streets that also feature well-used transit routes. In these locations, design and operational strategies can help to minimize conflicts. The following recommendations to reduce conflicts between bicycles and transit vehicles should be considered when installing bikeways on streets shared with transit.

- Ensure transit stops are of sufficient length to allow transit vehicles to pull fully to the curb. Transit stops that are not long enough to permit the transit vehicle to pull fully to the curb can contribute to conflicts with bicycles.

- Enforce parking restrictions at transit stops. Vehicles illegally parked in transit stops can also prevent vehicles from being able to pull fully to the curb and can contribute to conflicts with bicycles.

- Install bike facilities on the left side of one-way streets included in the bike network with an overlapping transit route. Buses operate on the right side of the roadway except when turning left, and they must load and unload passengers from doors on the right. Left side bike facilities can reduce "leapfrogging" between bike and buses and prevent conflicts at stops and prevent crashes between bicyclists and passengers entering or exiting a bus.

- Where bicycle routes are located on streets with streetcars, bicycle facilities should be designed to separate bicyclists from tracks as much as possible. Parallel streetcar rails can trap bicycle wheels and can quickly flip a bicycle or throw a bicyclist off his or her bicycle.

- Where a bicycle route crosses streetcar tracks, the crossing should be designed to encourage a crossing angle as close to perpendicular as possible. This design will help reduce the chances that a bicyclist's wheel will get caught in the tracks when crossing.

- Educate transit vehicle operators and bicyclists. Education can help reduce conflicts between these users.

Bicycle-Specific Signage.
Bicycle signage accomplishes several functions such as way-finding, alerting users to a change in conditions, or addressing specific safety problems. Beginning with the 2009 edition of the MUTCD, use of the bike lane identification is no longer required. Lines and symbols are the primary identifiers of bike lanes. Thus, while signs are often necessary, in other instances their use should be weighed against the likelihood they will contribute to sign clutter and may provide little benefit to users. When installed, all bicycle-specific signage should be installed in accordance with current MUTCD standards.

In addition to signs required by the MUTCD, the following optional uses are recommended:

- Guide signage that provides bicyclists directions and distances to destinations.
- When bike lanes transition to Marked Shared Lanes, signs should be used to alert bicyclists and motorists of the change.
- The use of "May use full lane" signs are recommended in conjunction with Marked Shared Lanes in areas where the combination of narrow width, higher speeds and volumes contribute to conflicts between bicyclists and motorists.
- No Parking in Bike Lane signs (including information on fines) (See Conflicts with On-street Parking)
- Contra-flow lanes should be accompanied with signs and pavement markings at intersections alerting pedestrians and motorists to look for bicycles travelling in both directions.
- Temporary education signs should be considered for new facilities (i.e. contra-flow lanes, bike boxes, cycle tracks, etc.)

Sidewalk Bicycling.
Sidewalks in Philadelphia, most of which are narrow, are intended for pedestrians. The Philadelphia City Code prohibits bicyclists, except for children under 12, from riding on sidewalks unless a sidewalk has been designated as appropriate for bicycle use. Under limited circumstances, (see Sidepaths described above) the Streets Department, after City Planning Commission review, may allow bicyclists to ride on specially designated sidewalks.

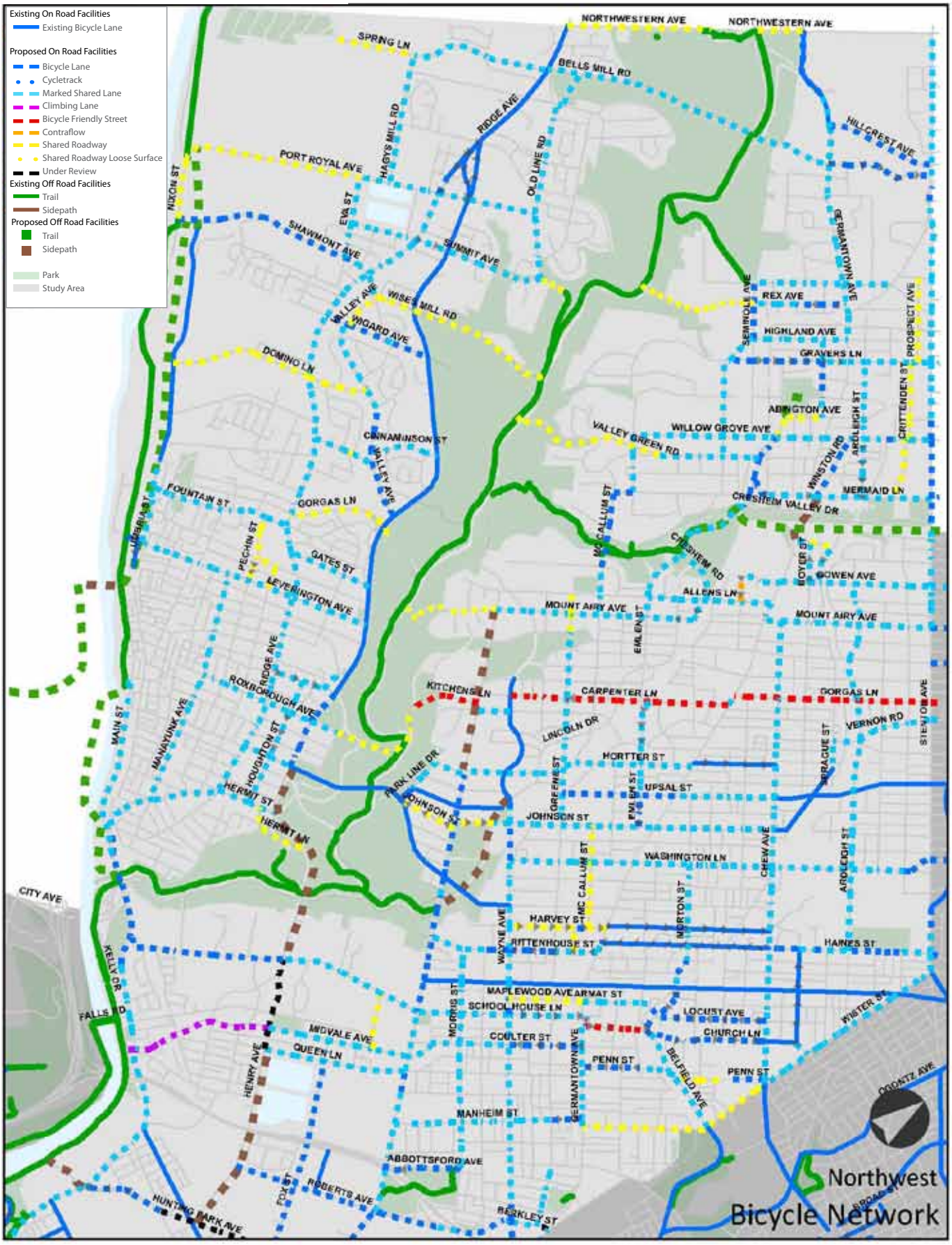
In much of the study area, sidewalk bicycle riding poses a nuisance and potential safety hazard to pedestrians and to bicyclists. Older pedestrians, in particular, are discomfited by bicyclists on sidewalks, because these pedestrians are more vulnerable and may have experienced many "near-misses". Although bicyclists often feel safer riding on the sidewalk, studies have found this behavior actually is almost twice as dangerous as cycling in the street, and riding against traffic on the sidewalk over four times as dangerous.

Sidewalk riding is a complex issue with many contributing factors and countermeasures. Bicyclists often ride on the sidewalk in a desire to travel to a specific destination quickly and directly. Sidewalks can be inviting in many contexts when compared to high speed or heavily trafficked roads; a sidewalk with no pedestrians on it will be especially inviting in this situation. The stress that comes from the competition for road space between motorists and bicyclists, and harassment of bicyclists by motorists, are also contributing factors, as are ignorance of the law and lack of enforcement. People who have moved to Philadelphia from other cities or nations may have been taught that they should ride on sidewalks rather than roadways; indeed, laws in other jurisdictions may have required it.

Establishing well marked bikeways has been shown to reduce sidewalk bicycling by providing attractive, comfortable, and legal accommodations. Where bikeways cannot be provided on major destination routes, bicyclists should be alerted to the presence of parallel routes with signs and markings at key intersections to direct bicyclists who might otherwise ride on the sidewalks. Selected, targeted enforcement should also be considered where sidewalk bicycling is a persistent problem.

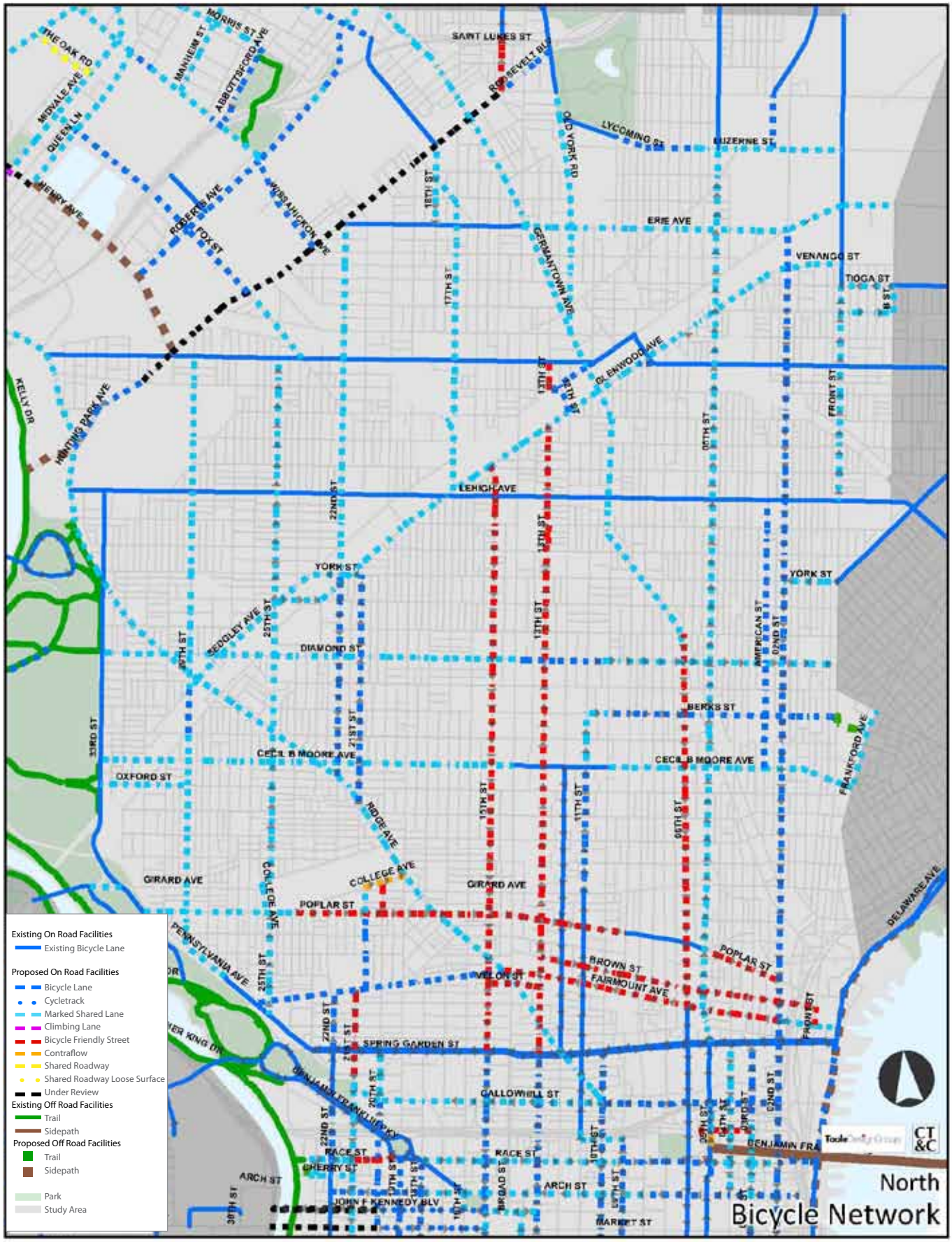
MAP 10a

Bicycle Network Recommendations by Type



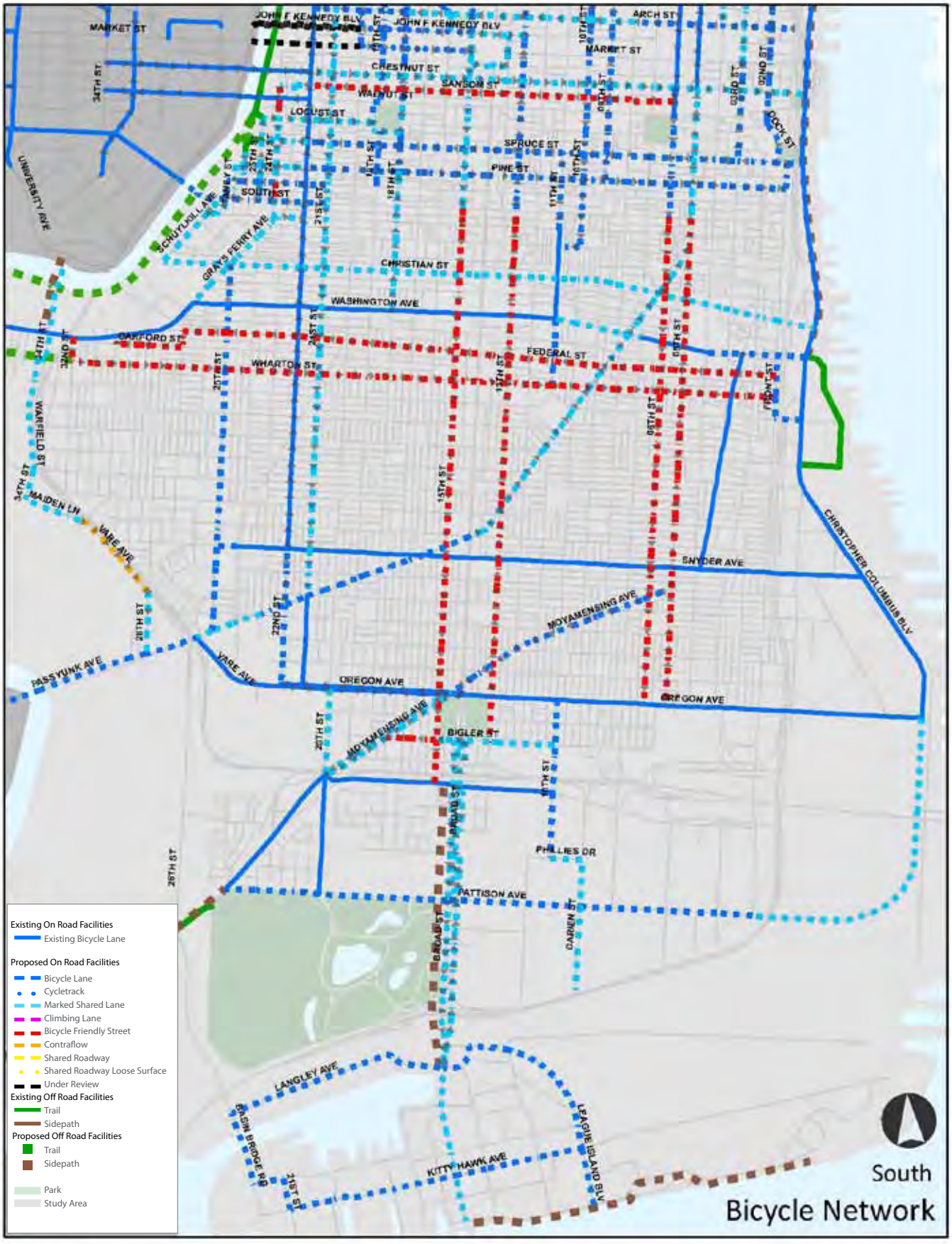
MAP 10b

Bicycle Network Recommendations by Type



MAP 10c

Bicycle Network Recommendations by Type



CHAPTER 8
PLAN IMPLEMENTATION

The recommendations in this Plan provide a basis for going forward with improvements to the pedestrian and bicycle networks. Pedestrian network recommendations will promote a safe, comfortable, efficient, and attractive pedestrian transportation system. The proposed expanded bikeway network will make bicycling safer and more convenient, and will help to promote a wider recognition and acceptance of bicycling as a transportation mode. The recommended policies, new street types, and sidewalk design standards should also enhance the effectiveness of the City's transportation system for walking and bicycling.

Very often, bicycle and pedestrian improvements are not accomplished as stand-alone projects, but are incorporated into larger roadway and/or streetscape improvement projects. For this reason, it is difficult to develop phasing plans for the Plan recommendations, although some suggestions for phasing are included here. It will be necessary to remain flexible and open to opportunities for implementing Plan recommendations and related pedestrian and bicycle improvements. For example, the American Recovery and Reinvestment Act of 2009 (i.e., federal stimulus program) has provided substantial amounts of funding for both the City and PennDOT to undertake resurfacing programs. Such programs can create opportunities to add bike lanes or shared lane markings after the streets are paved; but this will not happen unless resources are devoted to the necessary traffic analysis, design, and pavement marking.

FUNDING

Funding for pedestrian and bicycle improvements can come from a broad variety of sources. Funding the physical improvements will mostly come from traditional transportation sources, through the federal surface transportation program and state and City capital programs. Certain designated programs that are part of the federal transportation program may be particularly important for implementing pedestrian and bicycle plan recommendations. These include the Transportation Enhancements (TE), Safe Routes to School (SRTS), and the Congestion Mitigation and Air Quality Improvement (CMAQ) programs. The current transportation authorization, SAFETEA-LU, has expired, and federal funding programs may change when a new authorization is passed by Congress. This may open up new opportunities for funding pedestrian and bicycle improvements. The Federal Transit Administration provides funding for transit projects, which may include pedestrian and bicycle access improvements. The National Highway Transportation Safety Administration is another source of federal funds, typically used for safety education and enforcement programs.

A newer source of funds has opened up in recent years due to the health community's concern for active living. The U.S. Department of Health and Human Services has funded a major share of Phase 2 of the Pedestrian and Bicycle Plan, as well as pedestrian and bicycle counts for two years, extended funding for Safe Routes to School educational activities, and other education and enforcement programs.

Aside from PennDOT, which is the conduit for all federal and state transportation funds, potential state sources of funding for pedestrian and bicycle improvements include the Department of Community and Economic Development and the Department of Conservation and Natural Resources.

Although City capital funds are extremely limited, the capital program does include funding for pedestrian and bicycle network improvements. The largest single line item in the capital program is for street resurfacing, a project that is quite important to bicyclists. Not only is the surface quality important for riding comfort and safety, but bike lane markings cannot be applied to roadways where the surface is in poor condition. The City's capital program also includes the only project specifically dedicated to sidewalks, in Fairmount Park. The capital program often includes funding for commercial corridor streetscape projects through the Commerce Department.

Property owners and business improvement districts may also share in the cost of improvements, especially if the improvements provide access to their properties. The Center City District used this approach in 1995 to float a major bond issue to repair sidewalks. The City installed new, pedestrian-scale street lights throughout the district as its contribution to the improvement project.

Funding is also needed for data collection and evaluation programs, and maintenance of the pedestrian and bicycle network GIS systems developed for this Plan. This funding should be provided in the City's operating budget.

GENERAL APPROACHES TO IMPLEMENTING PLAN RECOMMENDATIONS

- Re-convene and institutionalize the Bicycle and Pedestrian Advisory Task Force to monitor progress on the implementation of physical improvements and policy changes recommended in the Plan, and to advise the City on new pedestrian and bicycle issues as they arise. An ongoing advisory group, with representatives from City agencies, advocacy groups, business improvement districts, community development corporations, educational institutions, and other organizations with an interest in walking and bicycling, can help ensure that opportunities for implementation of Plan recommendations are not overlooked.
- Coordinate pedestrian and bicycle recommendations to avoid potential conflicts and take advantage of opportunities for dual improvements. Examples of treatments that require special consideration and careful design include bicycle signals at intersections with cycle tracks, raised crosswalks, and bicycle-friendly streets with curb extensions.
- Act on opportunities to make pedestrian and bicycle network improvements, whether through specific spot improvements, as part of corridor projects (such as resurfacing, restriping, or streetscape projects), or as part of development/redevelopment projects.
- Establish a collaborative relationship with parallel and complementary projects, such as storm water management (Green City, Clean Waters) and curb ramp replacement.
- Pursue additional funding to program the design and construction of pedestrian and bicycle improvements on a priority basis.

IMPLEMENTING NON-NETWORK RECOMMENDATIONS

The policy recommendations, including the street types and sidewalk design guidelines, are an integral part of achieving the Plan's vision and goals. The policy statements and street classification system will be used to guide pedestrian and bicycle network recommendations for the rest of the City in Phase 2 of the Plan. Several of these recommendations have already been implemented and should be regarded as "Early Action" items. For example, the new bicycle parking law and the ordinance that allows bike racks to be installed by permit of the Streets Department are making bike parking more widely available in the City. The conversion of parking meter poles to bike racks is also increasing the availability of bike parking. Other Early Action items are an ordinance that allows bicycling on designated sidewalks and the formation of the Bicycle and Pedestrian Safety Task Force.

One of the avenues for implementation of the non-network recommendations is the Complete Streets Design Manual. This project of the Mayor's Office of Transportation and Utilities will incorporate and further detail the recommendations of the Plan so that they will become standard policy for the City in future design of streets, sidewalks, and traffic control. It will also be essential to provide training for City engineers and planners responsible for improvements to the public right-of-way to ensure that they are fully aware of the new standards and policies in the Complete Streets Design Manual.

Other priorities for implementation of non-network recommendations include:

- Formation of a Public Space Committee to advise the Streets Department and proposed Civic Design Review Committee on permit applications for sidewalk encroachments.
- An ordinance to allow benches and other routine encroachments by Streets Department permit, rather than requiring Council approval.
- An ordinance to authorize the Streets Department to adopt minimum pedestrian clear width standards based on the recommendations in the Plan and tied to the new Street Types, which may be revised from time to time.
- An ordinance to eliminate the mandatory sidepath rule.
- Regulations to ensure that any sidewalk shed or sidewalk closure allows for safe pedestrian passage around or through construction areas.
- Creation of bike parking in street parking spaces.
- A public safety education campaign promoting legal and courteous behavior among all transportation users.
- A request to DVRPC to conduct its Household Travel Survey on a recurring 10-year cycle.
- An increase of pedestrian and bicycle counts to monitor trends in non-motorized travel.

IMPLEMENTING PEDESTRIAN NETWORK RECOMMENDATIONS

The initial concepts for priority corridors and individual locations are based on a review of current conditions and issues identified through public input, recent studies, and Steering Committee recommendations. Development of conceptual recommendations into buildable schemes will require engineering and land use analysis, as well as coordination with the local neighborhood.

Once an analysis points to the need for improvement, implementation does not need to be a stand-alone project. Pedestrian network improvements are often accomplished by diverse means, including piggy-backing onto other projects, such as corridor signalization or lighting upgrades, resurfacing, or streetscape projects, and negotiating improvements with developers.

While there are no Early Action pedestrian projects, there are many pedestrian improvements already planned by the City, including the conversion of all pedestrian signals to countdowns, and upgrading pedestrian signal timing to reflect current MUTCD standards. New signals, street lighting, and median refuges are being installed along North Broad Street, and PennDOT is working on plans for safety improvements for Lehigh Avenue, Erie Avenue, and Allegheny Avenue. These measures will all increase pedestrian safety and comfort. Another major effort that is ongoing is the upgrade of the ADA-compliant ramps. This holds the possibility of collaboration with the Water Department's program to expand "green infrastructure." If corners and drainage must be reconstructed, opportunities exist to create curb extensions that will serve multiple purposes, including enhanced pedestrian safety.

When funding is limited and pedestrian projects must compete against one another, as is often the case with streetscape enhancement, a means of prioritizing between projects will be needed. Project prioritization should reflect the relative benefit to the pedestrian network, balanced with the ease with which improvements can be made. The Plan goals can be used to identify benefits to the pedestrian network from proposed improvements. An improvement can be ranked according to factors such as whether it: expands the overall network; removes a gap or barrier; increases safety; increases comfort; or connects to a school, transit stop or station, or a park entrance. Factors contributing to the ease of implementing improvements include: the timeframe to complete; availability of funding; complexity of design; and potential opposition by adjacent property owners.

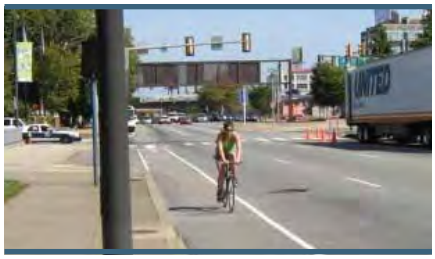
IMPLEMENTING BICYCLE NETWORK RECOMMENDATIONS

Bikeway recommendations in this Plan are based on an assessment and analysis of current conditions. While providing the highest level of bicyclist comfort (e.g. wide or buffered bike lanes or cycle tracks) may be desirable, it is often not feasible given the current street widths and the need to balance demands for traffic lanes and parking or loading.

These conditions can change, however, so each street should be assessed at the time of implementation to determine the appropriate level of bicycle accommodation the street can support. Increases in the number of bicyclists and changes in traffic or parking patterns may make additional design options feasible in the future.

There are three primary strategies for creating space for on-street bicycle accommodations:

- Narrow the width of travel and parking lanes.
- Reduce the number of travel lanes (Road Diet).
- Change curbside management to reduce, remove or consolidate parking; or to revise parking or travel restrictions.



A suggested phasing plan for the Bicycle Network recommendations is shown on Map 11 on next page. Early Actions for the bicycle network include the Spruce/Pine bike lane conversion project and the recent installation of bike lanes on Berks Street: these are included in the Phase 1 map. The Phase 1 proposal also includes bikeways on 13th and 15th Streets, to address the demand for bicycle accommodation in the Broad Street corridor, and a series of connections between the Spruce/Pine bike lanes and the South Street Bridge, due to open in November 2010.

The phasing will inevitably need to be adjusted to take advantage of opportunities and address changes in conditions as they happen. Regardless of phase, the impacts of reducing vehicle capacity need to be balanced in areas with significant congestion. The implementation of bicycle lanes in Center City that require the reduction of vehicle capacity should be phased in over time. Traffic analysis should be conducted to model the impacts of reducing capacity, in order to develop the most appropriate design.

MAP 11

Bicycle Network Recommendations by Phase