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North Delaware Riverfront Greenway • Design Guidelines

Delaware River City Corporation
Arsenal Business Center, Building 1
5301 Tacony Street, Box 215
Philadelphia, PA 19137
215-537-8400
www.drcc-phila.org

Fred Moore, Holmesburg Civic Association

Contents

INTRODUCTION

BACKGROUND

Working with public and private sector partners, the City of Philadelphia has made development along the North Delaware River a priority over the last six years. The shared vision is to reuse vacant industrial land for new mixed-use development and to create new urban infrastructure that will connect existing neighborhoods to a revitalized and restored riverfront. As part of this initiative, a Greenway will be constructed along the Delaware River shoreline, incorporating a continuous riverfront trail and "green river road," a system of parks and open space, and improved connector streets to existing and planned neighborhoods. An initial plan to envision the potential of the North Delaware Riverfront and Greenway was completed in 2001[1]. In 2005, the Pennsylvania Environmental Council (PEC) completed a master plan ("North Delaware Riverfront Greenway"[2]) for the greenway system that was endorsed by the Philadelphia City Planning Commission (PCPC) in October 2006.

The nonprofit Delaware River City Corporation (DRCC) was established in 2005 to coordinate the implementation of the plan and to subsequently take responsibility for maintenance and operation of the Greenway as sections are completed. DRCC is working closely with several Philadelphia City agencies, including the PCPC, Recreation Department, Housing Authority (PHA), Fairmount Park, Commerce Department, Streets Department and Water Department (PWD) to facilitate the necessary coordination.

Planning initiatives along the North Delaware Riverfront continue today. In 2008, the New Kensington Community Development Corporation completed a plan for portions of the riverfront through the New Kensington neighborhood[3] and PCPC examined five North Delaware Riverfront rail stations including their connections to the waterfront[4]. A study of potential trail alignments through sections of private property is anticipated by late 2009[5]. Other studies underway include a river conservation plan for the Delaware Direct Watershed by PWD and an ecological survey of the North Delaware Waterfront by PEC. These studies will continue to inform implementation decisions for the North Delaware Riverfront Greenway.

For simplicity and clarity, the following terms, defined below, are used throughout this document:

Greenway: The overall network of trail and recreational spaces along the North Delaware Riverfront.

Trail: The system of pedestrian and bicycle paths within the Greenway.

Path: A segment of the pedestrian and bicycle trail system. Primary paths make up the main trail, while secondary paths provide access to and from the primary path.

1 *North Delaware Riverfront, Philadelphia: A Long Term Vision for Renewal and Redevelopment,* Field Operations, 2001.

2 *North Delaware Riverfront Greenway Master Plan and Cost Benefit Analysis,* conducted by Greenways Inc., Econsult Corporation, and Schelter & Associates, 2005.

3 *New Kensington Community Development Corporation Riverfront Plan,* Wallace Roberts and Todd, 2008.

4 *North Delaware Riverfront Rail Urban Design Study,* Interface Studio and Consultants, 2008.

5 *Pennsylvania Environmental Council North Delaware Greenway Gaps Feasibility Study,* Pennoni Associates, 2009.

Existing Conditions:

Threshold

Path

Gateway Street

Connector Street

NORTH DELAWARE RIVERFRONT GREENWAY

The Greenway will extend from Allegheny Avenue north to Poquessing Creek (Philadelphia/Bucks County line) along eleven miles of riverfront and will connect to the existing and expanding trail system along the Delaware Riverfront (Figures 1, 2, 3, p. 6). The North Delaware Riverfront Greenway (NDRG) will also be part of a larger system of regional, state, and national greenways. NDRG will be a segment of the Delaware River Heritage Trail, a loop trail from Trenton south through Pennsylvania, crossing the Delaware River on the Tacony Palmyra Bridge and returning north to Trenton through New Jersey. NDRG will also be part of a statewide network of planned greenways in Southeastern Pennsylvania. NDRG will be a segment of the East Coast Greenway, a 3,000 mile trail running from the United States/Canadian border at Calais, Maine to Key West, Florida.

When completed, NDRG will consist of a combination of paved off-road and roadside paths and associated public and private open space. The speed of implementation, and ultimately the success of this trail system, will depend on the coordination of public and private investment, design, planning and construction.

DESIGN

This document establishes required criteria for the construction of the Greenway by providing design guidelines to developers and others who will be responsible for its implementation.

The design criteria are not meant to limit creativity; in fact, it is understood that different sections of the NDRG will vary in character. The requirements outlined in this document are intended to ensure a level of consistency along the Greenway as well as to ensure that the DRCC will be able to assume the maintenance for the different segments. This requires that elements selected for use along the Greenway be consistent, vandal resistant and of high quality and low maintenance.

IMPLEMENTATION

To facilitate implementation of the trail, spaces along, or connecting to the NDRG have been categorized into four zones according to their function and use.

- *Thresholds*
- *Paths*
- *Gateway Streets*
- *Connector Streets*

Developers, planners and designers of new construction projects shall incorporate these guidelines into their designs by identifying the use zone(s) that new construction creates and implementing the requirements for each zone. Site improvements for materials, furnishing configurations, plant selection and location are tailored to each Greenway Use Zone (Figure 4, p. 7). Developers and designers shall also review all prior and ongoing studies of the North Delaware Riverfront to ensure they are familiar with current plans, recommendations and site specific requirements. Public and private parcels (as of May 2009) along the Greenway are illustrated in Figure 5, p. 7.

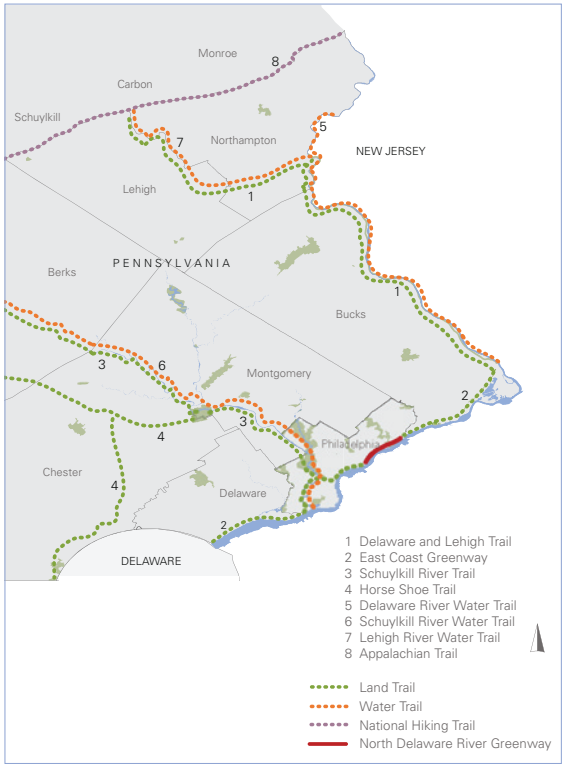

Figure 1. Regional Trail Systems

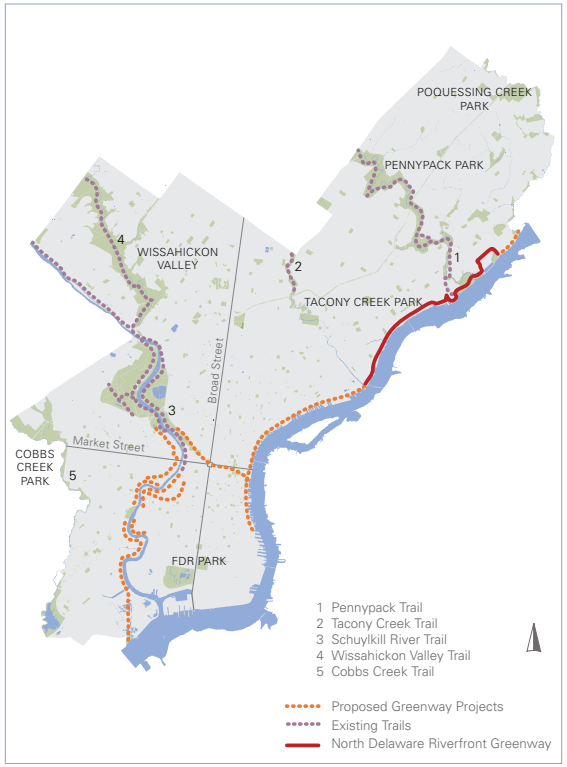

Figure 2. Philadelphia's Trail System

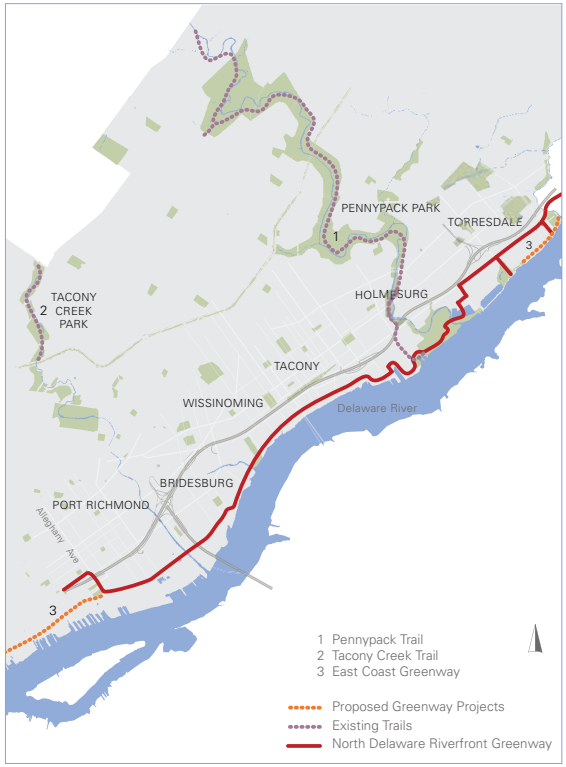

Figure 3. NDRG and the Local Trail System

Lager Raabe Skafte Landscape Architects

REEVALUATION

These guidelines are not meant to be a static document. Periodic internal reviews by DRCC and future consultants will be necessary to determine whether desired goals are being met, manufacturer's information and materials are current, and to address conditions unknown at the time of this writing.

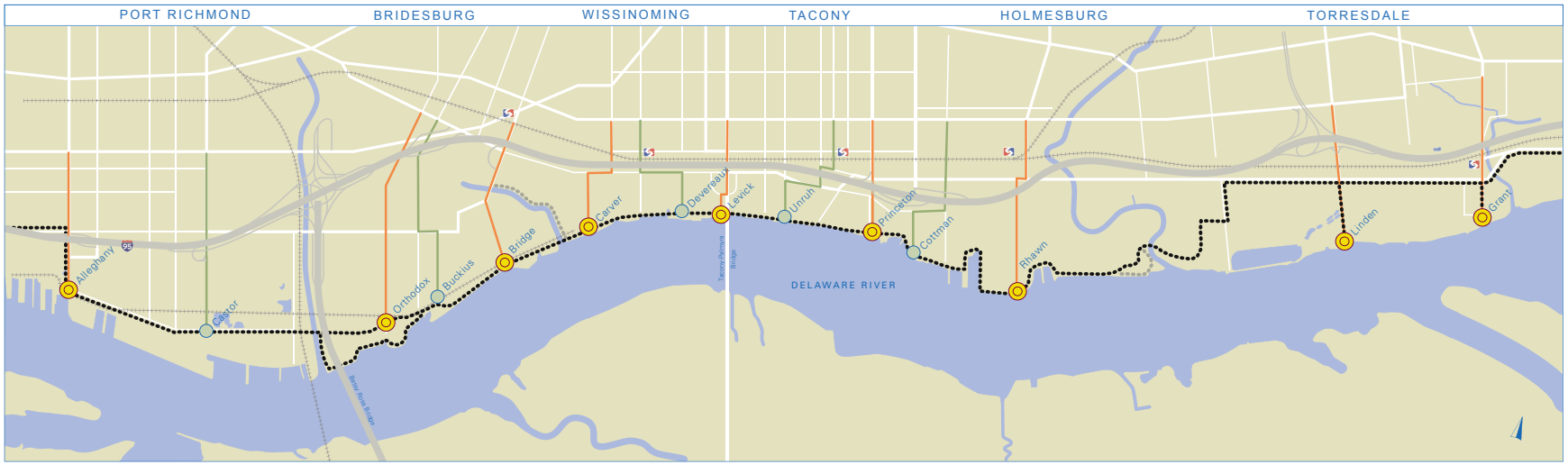

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Figure 4. Greenway Use Zones and Path Layout

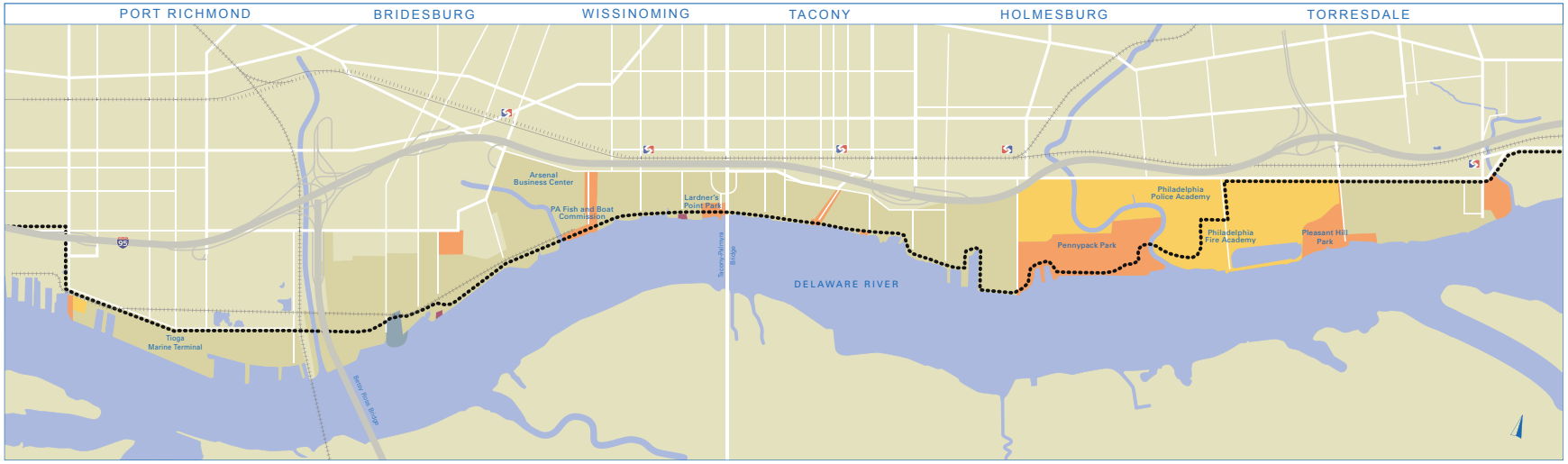

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Figure 5. Property Ownership (May 2009)

DESIGN REVIEW AND REGULATIONS

In spring of 2006 the City of Philadelphia's Managing Director's Office assembled a working group to encourage consistent design treatment along the City's riverfront trail system. The Philadelphia City Planning Commission, Fairmount Park, Recreation Department, Streets Department and Water Department are all stakeholders in the North Delaware Riverfront Greenway. DRCC believes PCPC has design review responsibility for the Greenway and PWD has regulatory authority for the Greenway. The Recreation Department, Fairmount Park and Streets Department have agency oversight over the construction of the Greenway (Figure 7, p. 10).

The City of Philadelphia is currently undergoing changes to the review process for new development, including a several-year process to rewrite the City's zoning code. These changes are intended to streamline the process for developers and ensure adequate public input. With the adoption of the new code, it is expected that developers will be responsible for initiating the PCPC review process for their proposals.

PCPC will utilize the design criteria in this document to evaluate planned development under the riverfront zoning classifications listed below. In addition, these guidelines are intended to be consistent with PWD's stormwater management regulations. Pertinent zoning and stormwater management regulations are summarized below.

WATERFRONT REDEVELOPMENT DISTRICT ZONING (WRD)

In July of 2005 Philadelphia City Council passed a new zoning district classification called the Waterfront Redevelopment District. WRD requires a 50 foot setback from the top of the riverbank, including a dedicated 20 foot right-of-way for pedestrian, bicycle and/or vehicular traffic. This district is a stand-alone classification, and is encouraged for all large developments on the Riverfront (Figure 6, p. 9). WRD text may be reviewed at http://www.amlegal.com/library/pa/philadelphia.shtml. Other zoning links and resources may be accessed at http://www.zoningmatters.org/phila/resources.

DELAWARE RIVER CONSERVATION DISTRICT (DRCD)

In order to extend the 50 foot setback to all properties along the North Delaware Riverfront, including those currently zoned as industrial, Philadelphia City Council introduced the Delaware River Conservation District in May 2009. This overlay creates a 50 foot setback for public open space along the Delaware River between Allegheny Avenue and the Bucks County line.

STORMWATER MANAGEMENT REGULATIONS

The Philadelphia Water Department administers stormwater regulations that require a stormwater management plan with special provisions creating an easement along the Delaware River. Existing bulkheads may remain; however the regulations encourage native plants and the development of a natural vegetated shoreline at least 10 feet wide to improve water quality, moderate flooding, and filter stormwater runoff before it enters the River.

For additional information on stormwater management regulations and the permit approval process refer to http://www.phillyriverinfo.org/PWDDevelopmentReview.

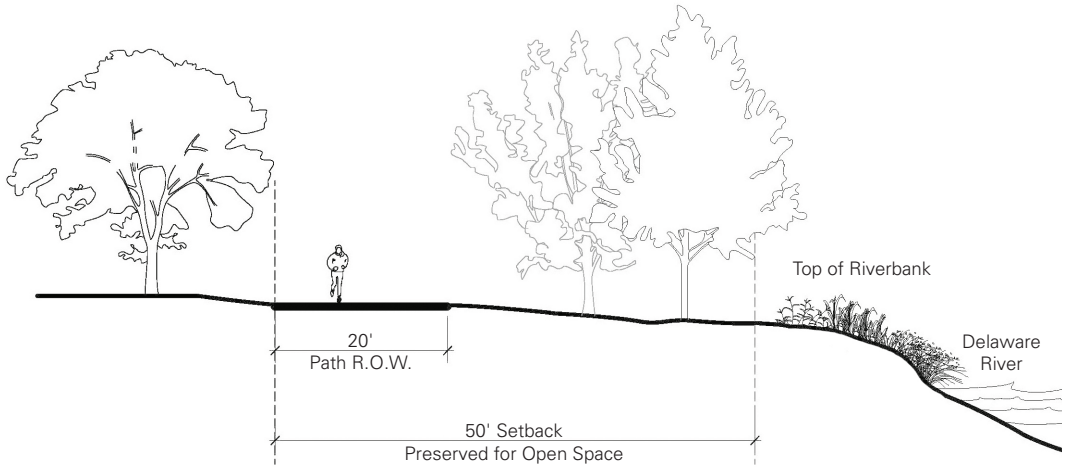


Figure 6. Required Waterfront Redevelopment District Setback and Trail Easement

Figure 7. North Delaware Riverfront with Greenway Alignment


Grant Avenue

GREENWAY USE ZONES

To facilitate the implementation of the trail, spaces along, or connecting to the NDRG have been catagorized into Greenway use zones (Figure 4, p. 7). Each of these zones support different activities and require the provision of specific types and arrangements of site improvements as described below:

- **Thresholds** - *Trailheads and secondary entrances to the North Delaware Riverfront Greenway.*
- **Paths** - *Paved areas and boardwalks for pedestrians and bicycles that form the trail system along the North Delaware Riverfront. The Greenway consists of a series of primary and secondary paved/boardwalk areas.*
- **Gateway Streets** - *Streets perpendicular to the Delaware River that connect adjacent neighborhoods to the trailheads of the Greenway. SEPTA train stations are either located along or are directly accessible to these streets.*
- **Connector Streets** - *Streets perpendicular to the Delaware River that connect adjacent neighborhoods to the secondary entrances of the Greenway. These streets tend to serve the local community.*

THRESHOLDS

Thresholds provide access to the Greenway. There are two types of Thresholds: trailheads and secondary trail entrances.

Trailheads are the primary entrances to the Greenway with support facilities for trail users including a clearly marked entry point, picnic and information areas, and limited parking. Trailheads are more than a space to pass through and will function as places for Greenway users to meet, relax and orient themselves. While not required it is recommended, that whenever possible, restroom facilities be provided at trailheads.

The Greenway includes nine trailheads, located at the following Gateway Streets (listed from south to north, Figure 4, p.7):

1. *Allegheny Avenue (at Pulaski Park)*
2. *Orthodox Street*
3. *Bridge Street*
4. *Carver Street (at the Arsenal Boat Launch - PA Fish and Boat Commission)*
5. *Levick Street*[1] *(at Lardner's Point Park)*
6. *Princeton Avenue (at the Tacony Boat Launch - PA Fish and Boat Commission)*
7. *Rhawn Street (at Pennypack on the Delaware Park)*
8. *Linden Avenue (at Pleasant Hill Park)*
9. *Grant Avenue (at Glen Foerd)*

1 The trailhead at Levick Street is fully designed as part of the design for Lardner's Point Park, prepared by the Pennsylvania Environmental Council and Fairmount Park.

As key entrances to the Greenway, all trailheads are required by law to be ADA accessible and shall be structured to facilitate four main activities:

- *Trail Entry*
- *Trail Information and Navigation*
- *Picnicking and Resting*
- *Parking*

As Greenway use increases, consider the addition of restroom facilities. The nine trailhead sites differ in size, layout and surrounding context. Given the individual nature of each trailhead site, the design and layout of the trailheads shall be developed in consultation with the DRCC.

Secondary Trail Entrances are access points to the trail with fewer amenities than trailheads. Located at the end of Connector Streets, these entrances will mostly serve local users.

The Greenway includes five Secondary Trail Entrances located at the end of the following streets (listed from south to north, Figure 4, p. 7):

1. *Castor Avenue*
2. *Buckius Street*
3. *Devereaux Street*
4. *Unruh Avenue*
5. *Cottman Avenue*

TRAILHEADS:

DESIGN AND LAYOUT
- Develop in consultation with DRCC
- ADA accessible
- Activities: Trail Access, Information, Picnic, and Parking

REQUIRED SITE FURNISHINGS
- Benches (p. 30)
- Picnic Tables (p. 32)
- Lighting (p. 35)
- Trash Receptacles (p. 31)
- Bicycle Racks (p. 35)
- Trail Map, Directional and Interpretive Signage and Community Bulletin Board (pp. 28-29)
- Bollards (p. 34)
- Pet Waste Bag Dispensers (p. 37)

RECOMMENDED SITE FURNISHINGS
- Restroom Facility (p. 36)
- Drinking Fountain (p. 36)

OTHER
- Path and Street Intersections (p. 22 - 23)

SECONDARY TRAIL ENTRANCES:

REQUIRED SITE FURNISHINGS
- Trail Identification and Directional Signage (pp. 28-29)
- Lighting (p. 35)
- Trash Receptacles (p. 31)
- Bicycle Racks (p. 35)

RECOMMENDED SITE FURNISHINGS
- Benches (p. 30)

PATHS

Paved paths and boardwalks for pedestrian and bicycle use form the trail system that makes up the Greenway along the North Delaware Riverfront. Paths are generally located adjacent to the Riverfront although some segments are adjacent to roadways. Primary paths are the spine of the trail. Secondary paths provide access to the primary paths from adjacent private or public properties, or are smaller paths that deviate from the primary path. The trail is multi-use, bicyclists and pedestrians share the same paved surface.

Basic path design criteria include requirements for public safety as outlined in the American Association of State Highway and Transportation Officials (AASHTO) guidelines for bicycle facilities. Compliance with AASHTO guidelines is a requirement for all segments of the Greenway. Publications and resources may be accessed at http://www.transportation.org.

PATHS:

DESIGN AND LAYOUT
- Develop in consultation with DRCC and Fairmount Park

PRIMARY PATHS
- Path Dimensions and Materials (pp. 18-22)
- Path Intersections (pp. 23-24)
- Greenway Zone Planting (pp. 26-27)
- Signage (pp. 28-29)
- Trash Receptacles (p. 31)
- Benches (p. 30)
- Bicycle Racks (p. 35)

SECONDARY PATHS
- Path Dimensions and Materials (pp. 18-21)
- Path and Street Intersections (pp. 22-23)
- Signage (pp. 28-29)

OPTIONAL SITE FURNISHINGS
- Picnic Tables (p. 32)
- Restroom Facilities (p. 36)
- Lighting (p. 35)

GATEWAY STREETS

Gateway Streets which serve as the primary throughfares to the Greenway (Figure 4, p. 7) run perpendicular to the Delaware River, and connect adjacent neighborhoods to the Greenway trailheads. Gateway Streets will direct and facilitate visitors' multi-modal access to the Greenway and shall have a distinct visual and physical identity conveying their connection to the Greenway.

Developers shall work closely with Delaware River City Corporation, the Philadelphia City Planning Commission, Streets Department and Water Department to design streetscapes that meet the following goals:

- *Streets shall be "Complete Streets,"[1] designed to support safe use and access by pedestrians, bicyclists, motorists and transit users.*
- *Streets shall have visual cues that identify them as streets that lead to the Greenway.*
- *Streets shall promote connections between key assets in the surrounding community.*
- *Streets shall use progressive stormwater management techniques.*

GATEWAY STREETS REQUIREMENTS:

DESIGN AND LAYOUT
- Develop in consultation with DRCC, PCPC, Streets Department and PWD
- Support "Complete Streets"
- Provide visual cues to the Greenway
- Facilitate connections
- Incorporate stormwater management "Best Practices"
- Create a distinct identity
- Promote access to trailheads

REQUIRED SITE FURNISHINGS
- Directional signage
- The following site furnishings are not required to adhere to the NDRG Guidelines, but should be consistent among all Gateway Streets. Selection of the following should be made in consultation with DRCC, PCPC, Streets Department and PWD.
  - Lighting
  - Trees and Planting
  - Trash Receptacles
  - Benches
  - Bicycle Racks

1 Refer to http://www.completestreets.org for additional information.

Complete Streets

The design of "Complete Streets" ensures safe use and access to the street by pedestrians, bicyclists, motorists and transit users. Gateway Streets shall be designed with safe sidewalks, bicycle lanes, a vehicular right-of-way, frequent crossing opportunities, median islands, curb bump-outs and comfortable and accessible transit stops to meet the needs of users of all ages and abilities.

Refer to specific streetscape improvements recommended in previous and on-going studies as noted in the Introduction of this document (p. 4).

Visual Cues

It is anticipated that many Greenway users will need guidance in locating trailheads. Therefore, to help direct visitors, Gateway Streets, shall have a distinct image and identity to differentiate them from predominately local streets. Provide one or more of the following visual cues:

- *Clear, unobstructed views to the River's edge*
- *Directional signage to the Greenway*
- *Continuous street trees or planting beds*
- *Banners identifying the Greenway*

Connections to Key Streets

The design of Gateway Streets shall promote and support connections to other area attractions, such as local business districts, historic properties, cultural institutions, parks and mixed-use developments.

Provide connections to these assets with:

- *Directional signs, area maps and banners*
- *Easy access to local streets*

Stormwater Management

The Philadelphia Water Department has been actively pursuing progressive stormwater management initiatives in the City with a goal to reduce the amount of runoff entering the City's storm sewers. Improvements to city streets are required to explore opportunities for alternatives to traditionally designed storm sewer inlets, including the use of bioswale planting, tree pits enhanced to allow water storage and forms of permeable pavement. Refer to PWD's current Stormwater Manual for specific information about types of, and requirements for, stormwater improvements. PWD resources may be accessed at http://www.phillyriverinfo.org.

CONNECTOR STREETS

Connector Streets (Figure 4, p. 7) run perpendicular to the Delaware River and connect adjacent neighborhoods to the Greenway's secondary trail entrances. These streets predominately serve local residents and shall also support safe access for pedestrians, bicyclists, motorists and transit users to the Greenway.

Work closely with the Delaware River City Corporation, the Philadelphia City Planning Commission, Streets Department and Water Department to design a streetscape that meets the goals previously described for "Complete Streets" and provides visual cues to the Greenway's Secondary Trail Entrances.

CONNECTOR STREETS:

DESIGN AND LAYOUT

- Develop in consultation with DRCC, PCPC, Streets Department and PWD
- Support "Complete Streets" objectives
- Provide visual cues to the Greenway
- Promote access to secondary trail entrances

REQUIRED SITE FURNISHINGS

- Directional signage
- The following site furnishings are not required to adhere to the NDRG Guidelines, but should be consistent among all Connector Streets. Selection of the following should be made in consultation with DRCC, PCPC, Streets Department and PWD.
  - Lighting
  - Trees and Planting
  - Trash Receptacles
  - Benches
  - Bicycle Racks

DESIGN GUIDELINES

PATH LAYOUT

Path paving along the Greenway is selected with safety in mind for bicyclists, pedestrians and exercise enthusiasts. Path dimensioning and placement considers the sensitivity of the Riverfront environment with the choice of a boardwalk option to minimize earth disturbance. Paths are designed to manage bicycle, pedestrian and vehicular traffic safely. Providing a consistent paving material simplifies overall maintenance.

PATH DIMENSIONS AND MATERIALS

To unify the Greenway, consistent dimensioning and materials are designated for the primary and secondary paths. Primary paths are wide enough to accommodate a standard travel lane of 6 feet in each direction. The narrower secondary paths require a shared lane. Primary paths are divided into two types: waterside or roadside, according to location. Refer to Figure 4, p. 7 to identify the primary and secondary path types that correspond to specific trail segments.

All primary paths shall be paved with asphalt, except in sensitive areas, as determined by DRCC, where boardwalks are required. Waterside paths shall be located within the trail right-of-way designated within the 50 foot setback measured from top of the riverbank (Figure 6, p. 9). Pave all secondary paths with asphalt although other materials including gravel, mulch or stabilized stone fines may be used if approved by DRCC.

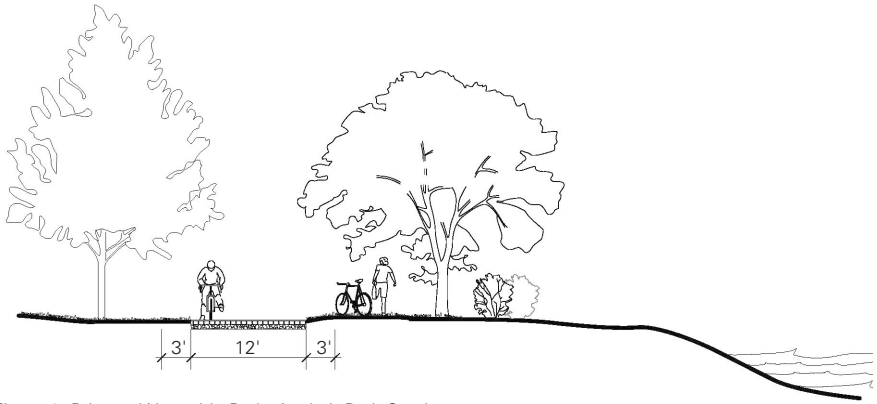


Figure 8. Primary Waterside Path: Asphalt Path Section

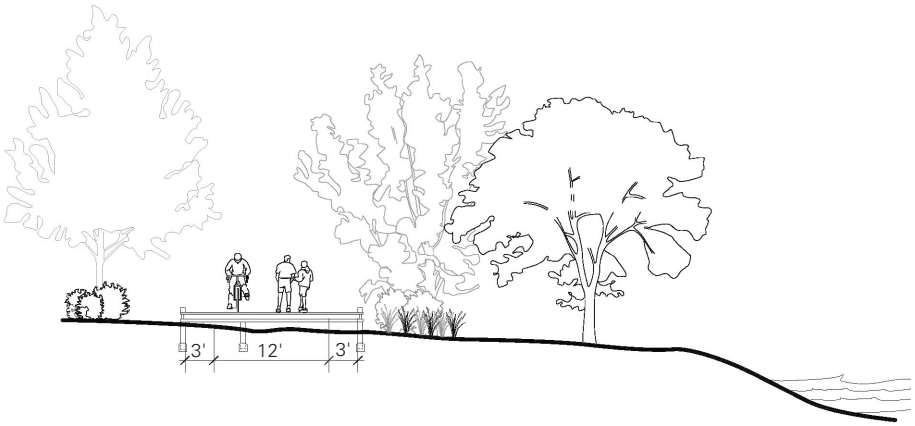


Figure 9. Primary Waterside Path: Boardwalk Path Section

Primary Path - Waterside

Width:	*12' wide path with a 3' shoulder on either side, Figures 8 and 9*
Curve radii:	*17-20' minimum*
Slopes:	*<5% lengthwise slope*
	2% maximum cross slope
Material:	*Asphalt or boardwalk of sustainably harvested wood or recycled composite material*

The primary waterside path width is based on the AASHTO requirement of 12 feet minimum with an additional 3 feet of clear zone in anticipation of heavy trail use. The path shall be marked to accomodate two, one-directional travel lanes.

The minimum radius for curves is 17 to 20 feet, with the smaller radius permitted near intersections with cross traffic. In general, the maximum lengthwise slope for the path is to be less than 5 percent with steeper slopes permitted for short distances in accordance with AASHTO guidelines.

The cross slope shall be a maximum of 2 percent in one direction, usually towards the River, unless innovative stormwater solutions are used. Shoulders shall have a maximum slope of 1:6. For asphalt paved paths, the 3 foot shoulders are required to be pervious. For boardwalk paths, the shoulders shall be constructed out of boardwalk material. All required and optional site furnishings shall be placed outside the 3 foot shoulder area.

The minimum vertical clearance shall be 8 feet with 10 feet if possible to allow access for emergency vehicles.

Consider the distance needed for bikers to see obstacles including pedestrian and road crossings in the design of the alignment of the path. Avoid blind spots resulting from the path passing beneath bridge abutments or other barriers, or where unavoidable, address through design features. Consider placing barriers to prevent hiding areas, and mirrors to extend sight distance.

Primary Path - Roadside

Width:	*12' wide path with 8' streetside median and a 3' shoulder, Figure 10 and 11*
Curve radii:	*17-20' minimum*
Slopes:	*<5% lengthwise slope*
	2% maximum cross slope
Material:	*Asphalt*

The primary roadside path width shall be marked to accommodate two, one-way recreational travel lanes, allowing for bicycles to pass pedestrians each way. An 8 foot median containing trees and lawn shall create a buffer between the adjacent roadway and path. A 3 foot pervious shoulder shall be located on both sides of the 12 foot path. The 8 foot median may include the 3 foot required shoulder. All required and optional site furnishings shall be placed outside of the 3 foot shoulder area.

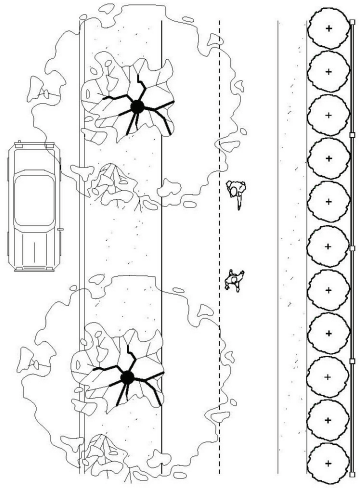


Figure 10. Primary Roadside Path Plan

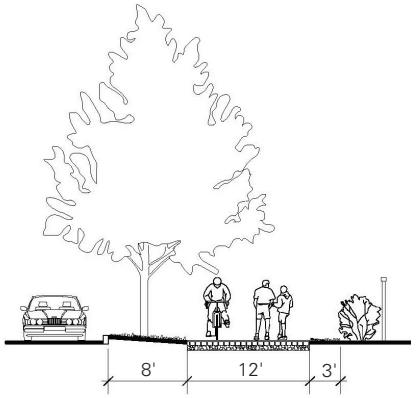


Figure 11. Primary Roadside Path Section

As with the waterside path, the minimum radius for roadside path curves is 17 to 20 feet, with the smaller radius permitted near intersections with cross traffic. In general, the maximum lengthwise slope for the path shall be less than 5 percent with steeper slopes permitted for short distances in accordance with AASHTO guidelines. The cross slope for the path shall be a maximum of 2 percent in one direction.

The minimum vertical clearance shall be 8 feet with 10 feet if possible, to allow access for emergency vehicles.

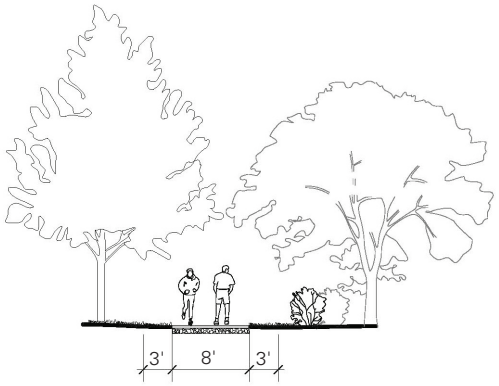


Figure 12. Secondary Path

Secondary Path

Width:	*8' wide path minimum, with a 3' shoulder on either side, Figure 12*
Material:	*Asphalt preferred. Gravel, mulch or stabilized stone fines may be used.*
Edge:	*Steel edging for gravel, mulch or stabilized stone fines*

Secondary paths provide access to the primary path for pedestrians or bicyclists from adjacent private or public facilities. For durability and low maintenance asphalt is the preferred paving material although gravel, mulch or stabilized stone fines may also be used.

Gravel, mulch and stabilized stone fines provide permeable pavement solutions. Mulch may be used if access is desired in an area where soils should not be disturbed, such as wooded areas where roots of surrounding vegetation may be near the surface. Although this type of path has less impact on adjacent parkland and soils, extra maintenance is required.

Mulch shall be placed directly on top of the ground and new material to maintain the alignment shall be added on a regular basis. Regardless of the material used on paths, shoulders shall be pervious.

PATH AND STREET INTERSECTIONS

The Greenway alignment intersects with major and minor streets along its route. In order to maintain visual and physical continuity, the following guidelines shall be implemented. Primary roadside paths shall be striped at major intersections/crossing points (Figure 13), to help direct users. Where primary waterside paths cross city streets, it is expected that the city street will be a connector street or the end of a street. Refer to the Figures 13 and 14 for design considerations for primary path intersections. At intersections with secondary paths, primary waterside paved paths shall continue through to prevent unexpected unevenness in the trail surface and to define the trail. Boardwalk paths shall also continue through, where possible. Where not possible, clear markings shall be indicated to ensure path continuity. Confirm all intersection layouts and alignments with DRCC.

Primary entrances to the Greenway at trailheads shall be accessible to the neighborhoods they serve either by Gateway Streets or secondary paths. Intersections at these points shall be designed in consultation with DRCC to support the design of the trailhead as well as the goals and the distinctive character of the Gateway Street at which it is located.

When designing connections between the Greenway and the nearby street network, the primary roadside path shall not be considered a replacement for a bicycle network along city streets. The Greenway is a supplement to the street bicycle network.

To prevent unauthorized use by vehicles, access to the Greenway shall be controlled through the installation of bollards or access gates at parking areas where a high volume of visitors use the road network to enter or leave the park. The installation of plantings of tightly spaced trees or fencing adjacent to access points may help direct traffic and prevent vehicles from circumventing the bollards or gates.

Approval by the Pennsylvania Public Utility Commission (http://www.puc.state.pa.us) may be required where the Greenway intersects with railroad tracks.

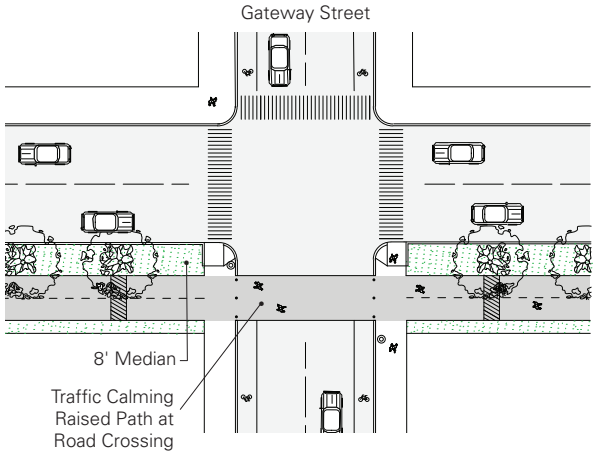


Figure 13. Roadside Primary Path and Street Intersection

Intersection Design Considerations

1. Consider how bicycles arrive and depart from the Greenway.
2. Design intersections to prevent bicycle traffic from entering against vehicular traffic. Provide pedestrian access from paths to sidewalks. Provide accessible route between parking and sidewalks.
3. Consider a side lane to permit bicycles to exit the trail without breaking traffic laws; discourage use of sidewalks by bicycles.
4. Provide bicycle lanes to the Greenway on the public street network that are a minimum of 5 feet in width.
5. Provide traffic control signs and markings in accordance with *Manual of Uniform Traffic Control Devices*[1].
6. Install removable bollards on either side of all trail entrances to bar unauthorized vehicles from parking.
7. Install removable bollards with contrasting color and reflective tape at vehicle access points, spaced 4 -5 feet apart.
8. Consider using a textured detectable warning paving strip. Provide transition or raise trail to emphasize trail crossing to motorists.
9. Illuminate trail/vehicular intersections, using light levels from 2 to 5 lux[2]. Consult Illuminating Engineering Society Standards (http://www.ies.org).
10. Locate parking lot access and install access gates, where necessary to minimize trail/vehicular conflicts.
11. Consider clear sight lines across open space; avoid planting and other obstructions that provide places for intruders to hide.
12. Provide guardrails where vehicles operate adjacent to trail, 6 foot minimum, from path edge.
13. Provide contrasting zebra striping on paths to indicate approaching intersection, based on bicycle sight lines and stopping distance as calculated by the project Civil Engineer. Provide vehicle crossing signage and flashing stop signal for bicyclists and pedestrians on paths approaching roadways.

1 Published by the Federal Highway Administration. http://www.fhwa.dot.gov

2 Lux refers to the apparent intensity of light hitting or passing through a surface. The lux takes into account the area over which the luminous flux is spread. 1 lux = 1 lumen / sq. meter.

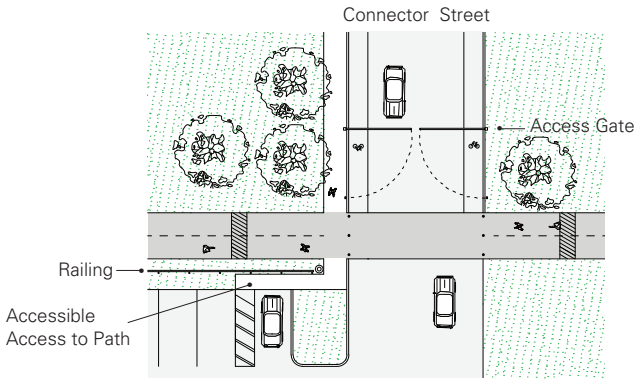


Figure 14. Waterside Primary Path and Street Intersection

PLANTING

Trees, shrubs and groundcover will add to the aesthetic identity and temperate environment of the Greenway. The selection of plants will play a critical role in the health of the Riverfront ecosystems and larger estuary watershed.

The North Delaware Riverfront is located within the upper estuary of the Delaware Estuary Watershed, an area from Trenton, NJ to the Pennsylvania-Delaware border (Figure 15). While freshwater tidal wetlands are relatively rare across the United States, they are characteristic of this region. Unfortunately most of these wetlands have been lost over the past hundreds of years and those that still exist are at risk[1].

Certain areas along the North Delaware Riverfront have been targeted for wetland restoration. Consult with DRCC and Fairmount Park to coordinate proposed planting with planned restoration projects.

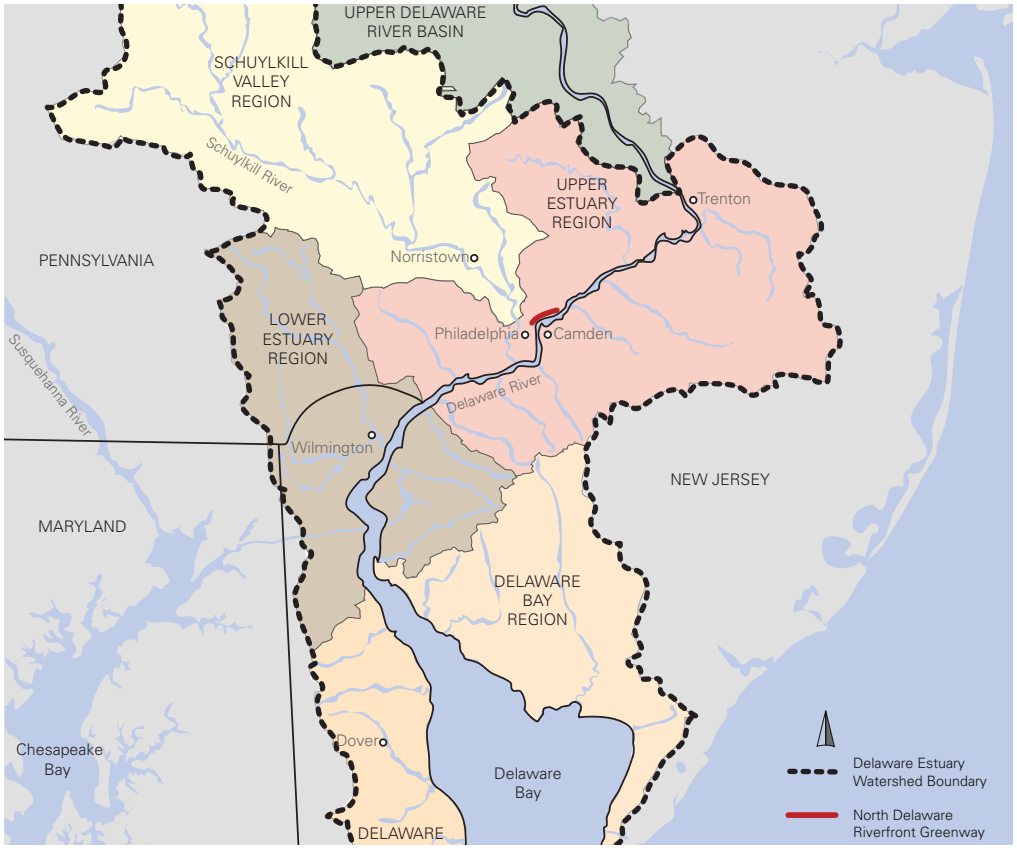


Figure 15. Delaware Estuary Watershed

1 *Partnership for the Delaware Estuary: A Watershed of Distinction Brochure, Facts and Figures,* published by the Partnership for the Delaware Estuary, Inc. Wilmington, DE. http://www.delawareestuary.org

PLANTING ZONES

Areas between the trail and the Riverfront have been divided into three sections, corresponding to three different zones of the riverbank: Low Marsh, High Marsh and Upland. The Low Marsh Zone is nearest to the River's edge and supports plant species adapted to standing and fluctuating water levels. The High Marsh Zone generally begins with an abrupt bank of 1 to 3 feet above the mean low water (or tide). The High Marsh Zone supports a slightly drier group of plants, but still tolerates fluctuating water levels. The Upland Zone is the highest elevation and generally supports plants adapted to drier conditions (Figure 16, p. 26).

Recommended plant species are listed by zone. The listed trees and shrubs are native to Philadelphia and likely historically occurred on the coastal plain. The suitability of a particular species for a zone may vary depending on the actual planting conditions on a site (e.g., soil moisture, soil texture, soil pH, level of disturbance). Therefore, plant selection shall be developed in consultation with DRCC, Fairmount Park and PWD to ensure a comprehensive approach to riverfront and wetland restoration. DRCC, Fairmount Park and PWD may make exceptions to the low and high marsh plant guidelines in areas deemed not appropriate for wetland plants.

PLANTING DENSITY

Planting density should be roughly 600 plants per acre for woody plants, ranging from 2/3 trees and 1/3 shrubs to 1/3 trees and 2/3 shrubs. Generally, the larger the site, the higher the number of plant species specified. For example, potential minimum quantities may be:

- 1,000 - 5,000 square feet - choose at least four different species per zone
- 5,000 - 10,000 square feet - choose at least seven species per zone
- > 10,000 square feet - choose at least ten different species per zone

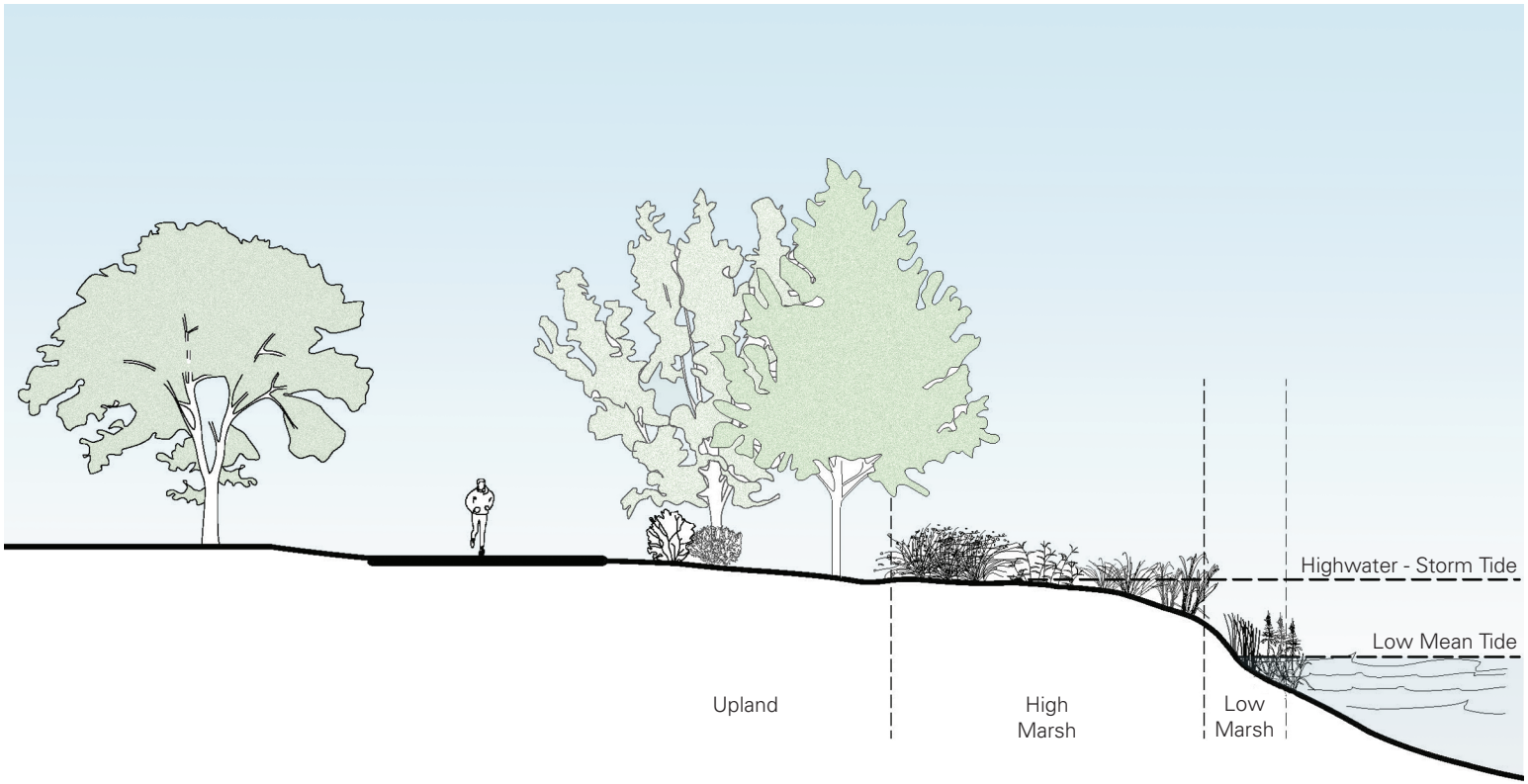


Figure 16. Planting Zones

Low Marsh Zone Plants*

Trees

Acer rubrum (Red maple)
Quercus bicolor (Swamp white oak)
Salix nigra (Black willow)

Shrubs

Alnus serrulata (Smooth alder)
Aronia arbutifolia (Red chokeberry)
Baccharis halimifolia (Grounsel-tree)
Cephalanthus occidentalis (Buttonbush)
Cornus ammomum (Silky dogwood)
Rosa palustris (Swamp rose)
Salix eriocephala (Heart leaved willow)
Salix exigua (Silky willow)
Salix sericea (Sandbar willow)

High Marsh Zone Plants*

Trees

Acer saccharinum (Silver maple)
Betula nigra (River birch)
Carpinus caroliniana (Hornbeam)
Fraxinus pensylvanica (Green ash)
Liquidambar styraciflua (Sweetgum)
Platanus occidentalis (American sycamore)
Populus deltoides (Eastern cottonwood)
Quercus palustris (Pin oak)
Quercus phellos (Willow oak)
Ulmus americana (American elm)

Shrubs

Aronia melanocarpa (Black chokeberry)
Cornus amomum (Silky dogwood)
Cornus racemosa (Gray dogwood)
Euonymous americanus (Strawberrybush)
Sambucus canadensis (Common elderberry)
Physocarpus opulifolius (Ninebark)
Ribes americanum (American black currant)
Viburnum dentatum (Southern arrowwood)
Viburnum recognitum (Northern arrowwood)
Zanthoxylum americanum (Toothachetree)

Upland Zone Plants*

Trees

Carya cordiformis (Bitternut hickory)
Celtis occidentalis (Hackberry)
Crataegus mollis (Downy hawthorn)
Diospyros virginiana (Persimmon)
Juglans nigra (Black walnut)
Populus deltoides (Eastern cottonwood)
Quercus falcata (Spanish oak)
Tilia americana (Basswood)

Shrubs

Amelanchier canadensis (Serviceberry)
Cornus racemosa (Gray dogwood)
Corylus americana (Hazelnut)
Crataegus coccinea (Red-fruited hawthorn)
Crataegus crus-galli (Cockspur hawthorn)
Crataegus pruinosa (Frosted hawthorn)
Euonymous americanus (Strawberry bush)
Myrica pensylvanica (Northern bayberry)
Rhus copallina (Winged sumac)
Rhus glabra (Smooth sumac)
Rhus typhina (Staghorn sumac)
Rosa caroliniana (Carolina rose)
Rosa virginiana (Virginia rose)
Sambucus canadensis (Common elderberry)
Symphoricarpos orbiculatus (Coralberry)
Viburnum dentatum (Southern arrowwood)
Viburnum prunifolium (Black haw)

* Plant lists provided by Fairmount Park

SIGNAGE

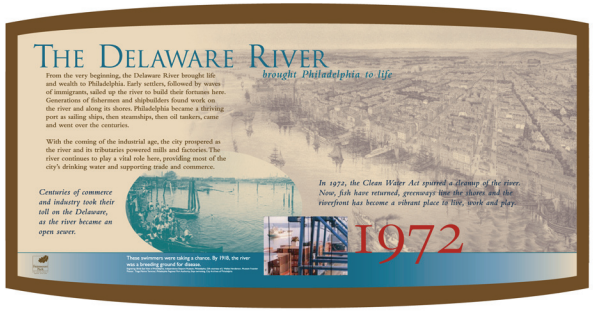
Fairmount Park and the Pennsylvania Environmental Council have completed an interpretive signage program for application to the length of the Greenway. A centerpiece of the sign program includes a series of interpretive signs, already adopted by Fairmount Park, to highlight historic, industrial and environmental sites along the Riverfront.

The signage program includes a general plan for the location of approximately 70 of these interpretive signs as well as additional way finding and directional signage. Prototypical signs were designed and examples of the trail map, parking sign, community bulletin board, directional and interpretative signage are illustrated below.

As sections of the trail are designed, the specific signage for that segment will be designed. The exact location and type of sign will be reviewed and approved by DRCC and Fairmount Park and be constructed according to sign program specifications.

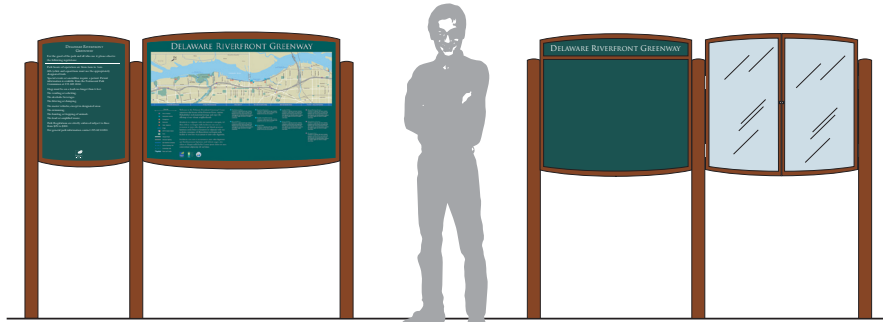
The signage plan includes the following components:

- *Directional Signs– to indicate directions and distances to destinations, located along the trail*
- *Bulletin Panel – to be placed at trailheads and to be used as a community bulletin board*
- *Maps – placed at trailheads and major trail intersections to provide information to trail users, including trail grades and slopes along with a rated system that meets ADA requirements*
- *Regulatory Signs – placed at trailheads and major trail intersections to display park rules and regulations*
- *Interpretive Signage – placed along the trail to highlight important sites*
- *Milepost Markers – placed every 1/2 mile along the trail to allow for trail location identification*

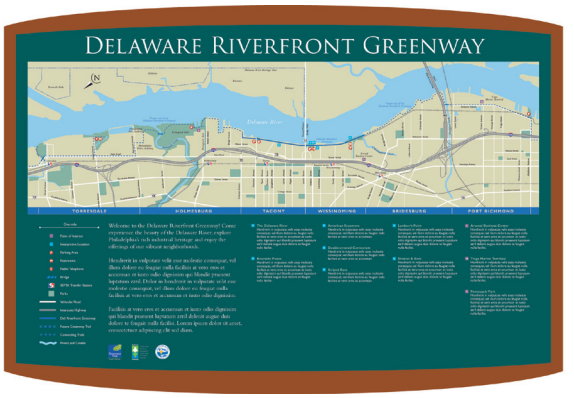


Interpretive Signage

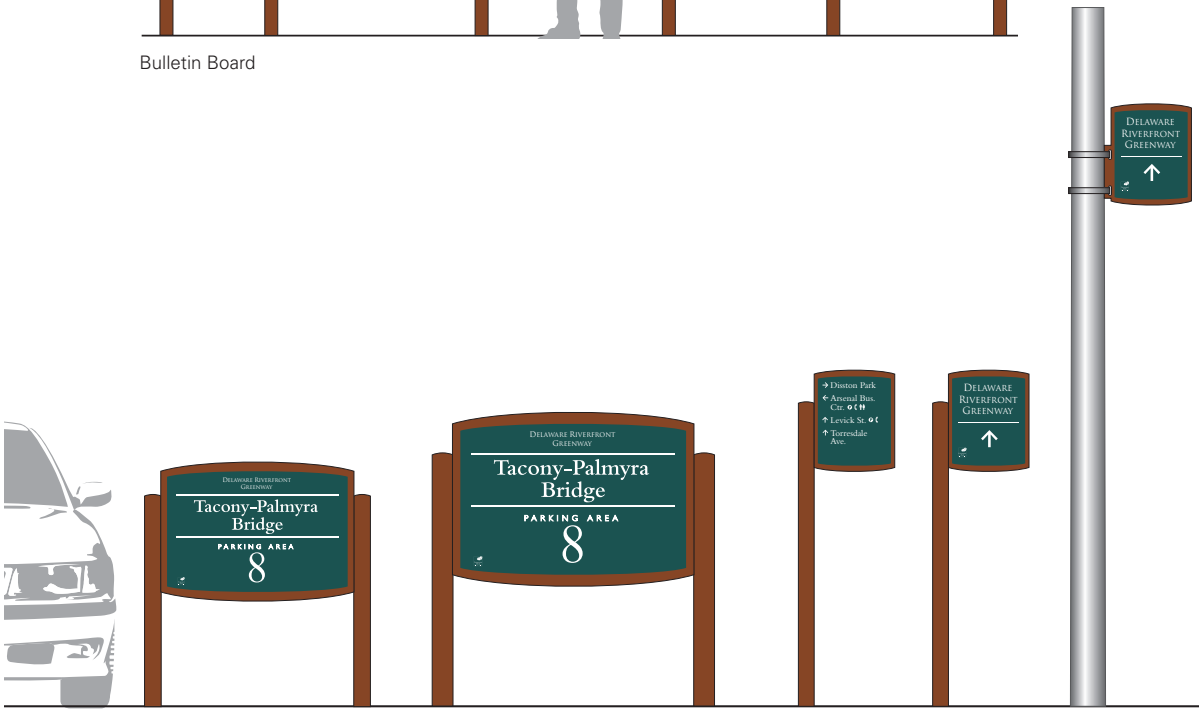
Signage design by Cloud Gehshan Associates



Bulletin Board



Trail Map



Parking and Directional Signs

Signage design by Cloud Gehshan Associates

SITE FURNISHINGS

Site furnishings will contribute to the sense of place along the North Delaware Riverfront Greenway by creating an overall aesthetic and identity. They will help define an accessible, comfortable and safe environment for Greenway users and convey an appropriate use of spaces. Site furnishings for the Greenway have been chosen with attention to style, comfort, cost and maintenance. Environmentally sustainable strategies have been incorporated where possible. To facilitate this goal, information about the site furnishings recycled material content or other environmentally responsible information has been included herein. All furnishings shall be placed outside the 3 foot shoulder edge along paths.

DuMor 160 Series, in black

Dumor 164 Series, in argento

Benches

Benches throughout the Greenway shall be the DuMor 160 and 164 Series or DRCC approved equivalent. Specify the DuMor 160 or 164 Series with the center arm rest. Benches are required at all Thresholds and along all primary paths. The placement of benches on secondary paths is optional. Benches shall be placed at a minimum of 5 feet from the edge of the path in groups or at areas with a view of the River. Set benches in concrete footings on a concrete pad that extends a minimum of 2 feet beyond the dimensions of each bench or bench grouping. Provide additional space adjacent to bench groupings to facilitate pull up space for persons in wheelchairs. Provide a paved path for wheelchair access to each grouping of amenities.

MODEL

Model 160 (back) / 164 (backless)
Material: Steel
Color: Black or Argento
Length: 6' or 8'
Center Arm: Required

MANUFACTURER

DuMor, Inc.
PO Box 142
Mifflintown, PA 17509
800-589-4018
http://www.dumor.com

DuMor uses steel sheet, plate and tubing obtained from integrated mills which use at least 25 percent post consumer and post industrial scrap in their production processes.

All other items, such as flat bar, rounds and angles, are produced by electric furnace mills utilizing 100 percent post-industrial and internal scrap metal.

Trash Receptacle

Trash receptacles throughout the Greenway shall be Victor Stanley Ironsides S-42 or DRCC approved equivalent. Trash receptacles are required at all Thresholds and along all primary paths. Placement of trash receptacles along secondary paths is optional.

Locate receptacles with attention to pedestrian circulation and vehicular circulation regarding trash and snow removal. Trash receptacles shall be black, 36 gallon capacity, top loading freestanding standard cans. All receptacles shall have inner liners and be surface mounted on concrete pads.

The Ironsides S-42 trash receptacle contains steel bar material obtained from domestic electric furnace mills. At least 98 percent of the mills' steel composition is obtained from recycled scrap metal. The primary raw material used for the manufacture of the inner plastic liner is recycled resin.

MODEL

Ironsides S-42, top loading
Material: Steel
Color/Finish: Powdercoat Black
Size: 36 Gallon
Mount: Surface Mount

MANUFACTURER

Victor Stanley
PO Drawer 330
Dunkirk, MD 20754
800-368-2573
http://www.victorstanley.com

Dumor 76 Series

Duor 100 Series

Picnic Tables

Picnic tables along the Greenway shall be the DuMor Series 76PL and 100PL with recycled plastic or DRCC approved equivalent. Picnic tables are required at all trailheads and shall be provided as part of a grouping of two picnic tables and one trash receptacle. The tables shall meet all current Federal Regulations for the disabled including those in the Americans with Disabilities Act.

Picnic tables shall be set on a concrete pad that connects to the primary path to allow for wheelchair accessibility.

Tables shall be surface mounted with a surface plate to ensure a strong ground mount, yet limit the damage to the concrete pad if removal is necessary.

The DuMor picnic tables contain high density polyethylene raw material which is derived from post consumer bottle waste, such as milk containers. The finished rigid board stock material contains over 90 percent recycled post consumer waste by weight.

MODEL

Picnic Table 76PL or 100PL
Material: Slats - Recycled Plastic
Frame - Steel
Color: Slats - Redwood
Frame - Powdercoat Black
Length: 6' or 8'
Mount: Pedestal with Surface Plate
Other: Wheelchair Accesssible

MANUFACTURER

DuMor, Inc.
PO Box 142
Mifflintown, PA 17509
800-589-4018
http://www.dumor.com

Bulkhead Railings along Schuylkill River Park Trail in Philadelphia

Pipe Railings along Schuylkill River Park Trail in Philadelphia

Railings

Railings along the Greenway shall be used as needed for public safety, fall protection, trail management and security. All AASHTO guidelines for riverbank construction and prevailing codes shall be followed. Consideration of the views and access to the water's edge shall be maximized at all times. DRCC shall determine specific requirements and placement for all types of railings along the Greenway.

At a minimum, pipe rail shall be installed 5 feet from the path edge under the following conditions:

- the vertical drop exceeds 6' and the slope is 2:1 - 3:1
- the vertical drop is 4' to 6' and the slope is 1:1 - 2:1
- the vertical drop is 1'to 4' and the slope exceeds 1:1

Decorative railings shall be used for special promenade areas or parks adjacent to the water. At a minimum, railings shall be 42 inches high, sandblasted stainless steel and include stainless steel mesh infill panels. Railings shall comply with all applicable codes. Decorative railings shall be installed along new bulkheads in areas where heavy public use is anticipated and where the level of the bank below poses a fall hazard.

Bollard

Bollards shall be the Fairweather Site Furnishings B4-B Bollard or DRCC approved equivalent. All bollards shall have a removable mount and be installed at path intersections to prevent general vehicular traffic from using the trail, and at locations along the trail that need to be closed for certain periods.

Bollards shall also be placed between parking areas and the trail and at other locations where vehicles could possibly cross the trail.

MODEL

B4-B Bollard
Material: Steel
Color: Black
Diameter: 6"
Height: Install at 30" inches
Mount: Removable

MANUFACTURER

Fairweather Site Furnishings
1525 Vivian Court
Port Orchard, WA 98367-6400
800-323-1798
http://www.fairweathersf.com

Fencing

Black vinyl coated chain link fencing with zinc mesh shall be installed where public open space abuts a hazard, such as a rail bed, roadway, or other use where public access would pose a safety or security concern.

It may be necessary to erect additional fencing along the Greenway for special conditions, such as the segment north of Pennypack Park, where a tall chain link fence (10 foot minimum) shall be used to prevent unauthorized entry to the areas behind the Police Academy and firing range. Confirm security fence location requirements with DRCC.

MODEL

Vinyl Coated Chain Link Fence
Fence Fabric: Thermally fused vinyl coated steel chain link, ASTM F668-type 2B with a galvanized 9GA steel core.
Mesh Size: 2", 9 gauge fabric
Color: Black

MANUFACTURER

Anchor Fence, Inc.
6500 Eastern Ave.
Baltimore, MD 21224
800-229-5615
http://www.anchorfencecompany.com

SonneLITER light along Schuylkill River Trail in Reading, PA

Lighting

Lighting along the Greenway shall be the Se'lux SonneLITER solar powered lighting system or DRCC approved equivalent. Lighting is required at all trailheads. Placement along primary and secondary paths is optional. All light poles shall be 12 feet high. If located along a primary or secondary path, lights shall be placed off the path and outside of the 3 feet shoulder to allow for uninterrupted circulation. Hours of operation should be three hours after sunset and one hour before sunrise.

Solar lighting avoids the expense of bringing power to the site, minimizes the disturbance to the soil and requires minimal maintenance. DRCC may consider other lighting options on a case by case basis.

MODEL

SonneLITER Series SDS2
Material: Die Cast Aluminium
Color/Finish: Galvanized
Mount: Single or Double Mounting

MANUFACTURER

Se'lux Corp
PO Box 1060, 5 Lumen Lane
Highland, NY 12528
845-691-7723
http://www.selux.com/usa

Bicycle Rack

Bicycle racks shall be the Bicycle Parking Project Bicycle Hitch 2 or DRCC approved equivalent. Bicycle racks are required at all Thresholds and along all primary paths.

Multiple bicycle racks shall be placed near all entrances and located out of the primary circulation route.

The Hitch 2 bicycle rack is locally manufactured by a Philadelphia based company.

MODEL

Bicycle Hitch 2
Material: Steel
Color: Black
Mount: Embedded

MANUFACTURER

Bicycle Parking Project
PO Box 7342
Philadelphia, PA 19101
215-990-7832

Restroom Facility

Restroom facilities are recommended at all trailheads and along primary paths. Restroom facilities along the Greenway shall be the Bio-Sun Sunflower 7B2B prefabricated waterless restroom, or DRCC approved equivalent. All restrooms shall be provided with sanitary hand cleanser. The use of commercial power is strongly recommended to support the function of the waterless restroom. In cases where commercial power is not available, the longer length of the building must be oriented to the solar south to facilitate the use of photovoltaic power.

MODEL

Bio-Sun Sunflower 7B2B Waterless Restroom
Size: 18'x15'x11' Prefabricated unit with 6'-9' basement
Power: 100 Amp
Material/Finish: Stone clad, weathered edge.
door color-7784, charcoal gray grillwork, frame
Interior: Dividers-Moonlight granite
Walls: Pallet tan and trim
Floors: Moonlight granite match
Other: Men - 2 urinals, 1 toilet and 1 sink
Women - 3 toilets and 1 sink.

MANUFACTURER

Bio-Sun, Inc.
Millerton, PA 16936
800-847-8840
http://www.best-composting-toilet.com

Drinking Fountain

Drinking fountains are recommended at trailheads and along primary paths.

Drinking fountains shall be the Haws 3500D Street Smart Series.

Pedestal fountains with ground level pet drinking fountains are encouraged. All drinking fountains shall meet all current Federal Regulations for the disabled including those in the Americans with Disabilities Act.

MODEL

Haws 3500 D Street Smart Series
Material: Stainless Steel
Color/Finish: Powdercoat Black

MANUFACTURER

Haws Corporation
1455 Kleppe Lane
Sparks, NV 89431
775-359-4712
http://www.hawsco.com

Pet Waste Bag Dispenser

Pet waste bag dispensers along the Greenway shall be Zero Waste USA, JJB008 dispenser or DRCC approved equivalent. Pet waste dispensers are required at all trailheads and secondary trail entrances. Placement of pet waste bags along primary and secondary paths is recommended. Bags shall be biodegradable and enable user to remove only one bag at a time to reduce overall bag usage.

The Zero Waste bags are made from 100 percent oxo-bio-degradable material. The bag will naturally breakdown and disintegrate within six to twelve months to allow the pet waste contents to naturally bio-degrade.

MODEL

JJB008 Dispenser
Material: Aluminum
Color/Finish: Forest green, powder coat
Bags: 600 bags, Zero Waste Technology Straps
Post: U-channel Green Post
Mount: Surface mount

MANUFACTURER

Zero Waste USA, Inc.
DBA JJB Solutions, Inc.
424 Commerce Lane, #6
West Berlin, NJ 08091
800-813-4869
http://www.jjbsolutions.com

ACKNOWLEDGEMENTS

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Sarah Thorp, *Former Executive Director*

Paul Lonie, *Project Manager*

DESIGN GUIDELINES TASK FORCE

Fairmount Park

Philadelphia Water Department

Commerce Department

Streets Department

Philadelphia City Planning Commission

Department of Recreation

Delaware River City Corporation

Department of Public Property/ Capital Program Office

EDITOR

Lager Raabe Skafte Landscape Architects, Inc.