

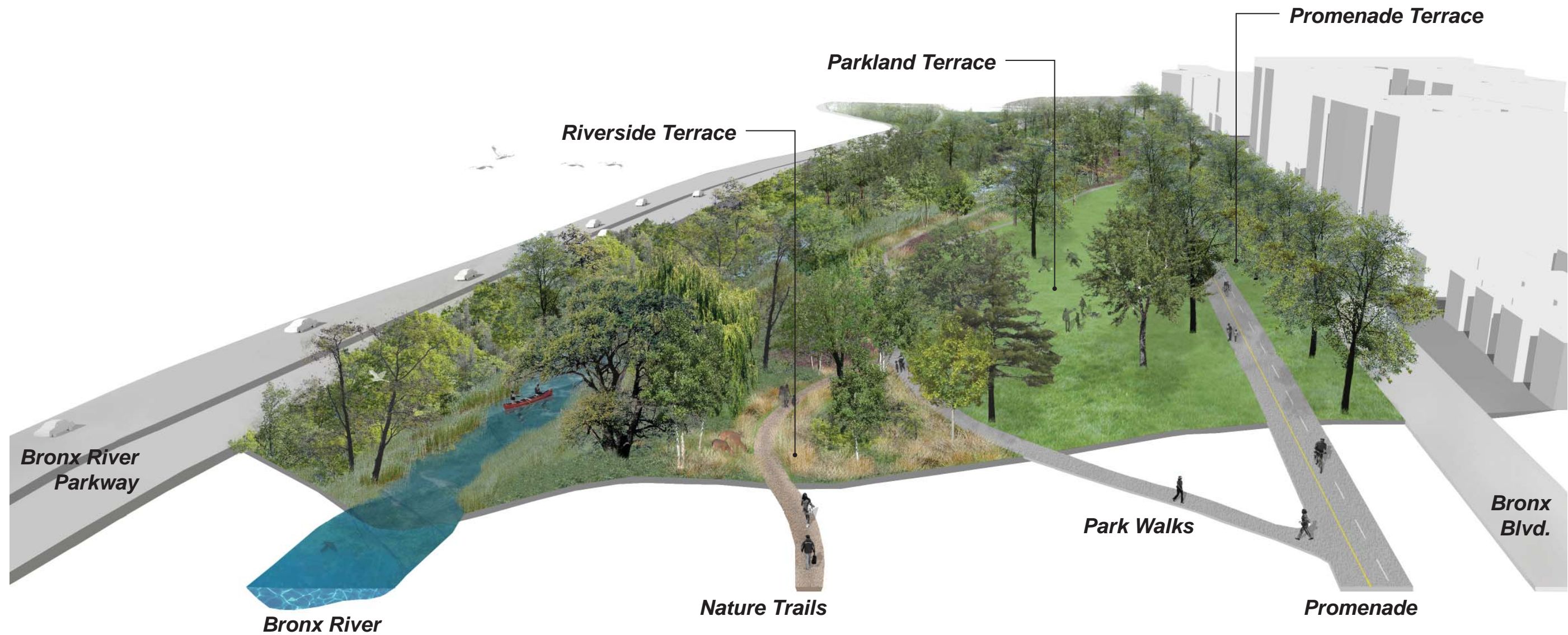
## Circulation as a Management Framework

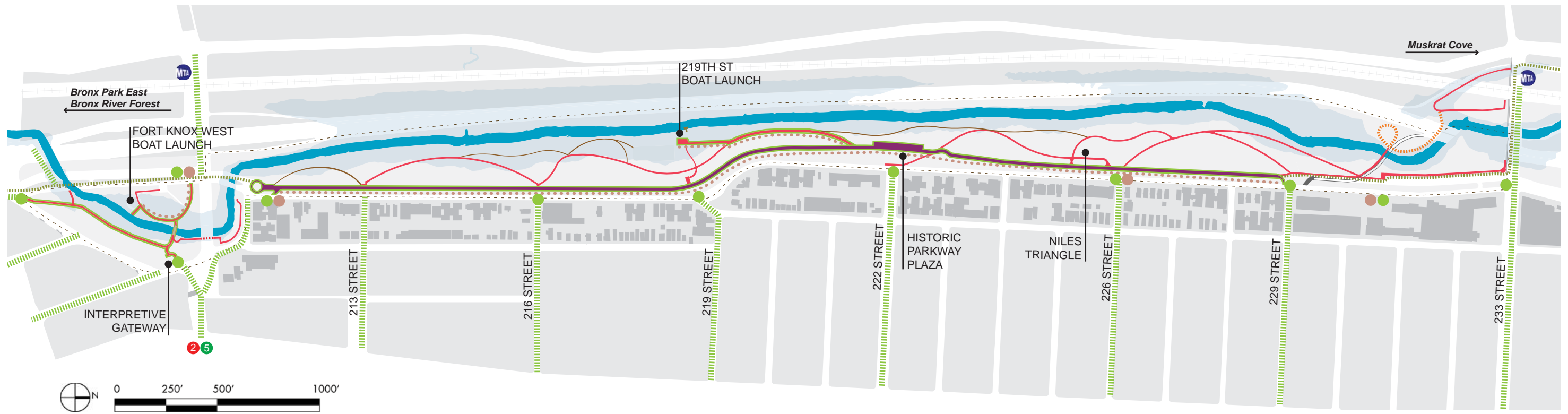
The proposed circulation within Shoelace Park supports multiple design strategies, guiding the feet through a layered landscape experience with a rich sense of place. The pathway system improves access and safety, and creates a framework for program organization, stormwater management strategies and the vegetation management of the park.

The tiered pedestrian path system creates a dynamic park experience with three different types of paths, varying in alignment, width and material: *Promenade*, *Park Walks*, and *Nature Trails*. Straight paths encourage fast movement and exercise, while meandering paths suggest a slower stroll through the park and closer enjoyment of the landscape.

As described on page 51, the park paths in the middle terrace zone (*Park Walks*) are designed to guide the flow of water from higher elevations to the Bronx River. As water flows alongside the paths toward low points, the pitch of the paths will direct water to low points along the western (river) side of the path toward treatment best management practices (BMPs). This arrangement creates a teaching opportunity as well, with stormwater BMPs highly visible located next to the paths.

The paved *Park Walks* will also mark the borders of landscape eco-types, which are located based on topography and proximity to the river. This creates situations of experiential richness, where visitors to the park experience two landscape types simultaneously. This is contrasted with the *Nature Trails*, which provide a more immersive ecological experience through a restored forested buffer along the river.





### Pedestrian Circulation

The design proposes a hierarchy of pedestrian paths in order to create a dynamic yet structured experience of the park. The system mimics the upper, middle and lower terraces within the park landscape – the *Promenade Terrace*, the *Parkland Terrace*, and the *Riverside Terrace* – and works in conjunction with topography. Mindful of the forty percent of the park within the 100-year floodplain, those paths that fall within the floodplain are designed to withstand periodic inundation. The path hierarchy is composed of:

- The *Promenade* – an active, multi-use path for pedestrians, joggers, cyclists and roller bladers
- *Park Walks* – eight-foot-wide paved connecting paths
- *Nature Trails* – approximately six foot wide boardwalks and non-paved riverside paths that highlight vegetation and wildlife

### Bicyclist Circulation

This plan adopts a locally-advocated new bikeway route along 222nd Street to connect to the park and the *Promenade*. The *Promenade* will be the only path that has lanes designated exclusively for cyclists. This configuration, completely separate from vehicular traffic, meets Class I requirements. All other paths within the park will be designated as “No Biking”.

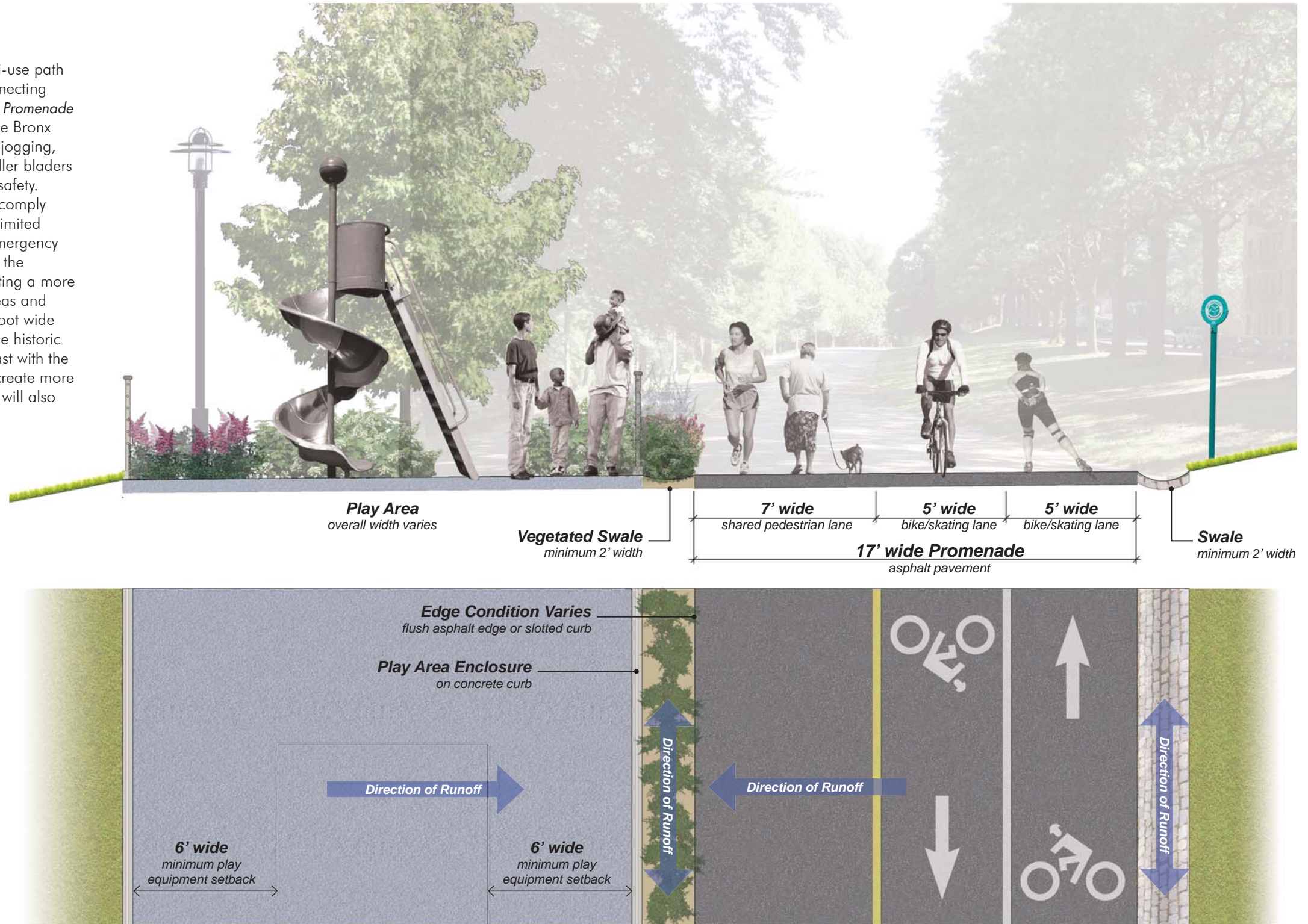
### Circulation

#### Legend

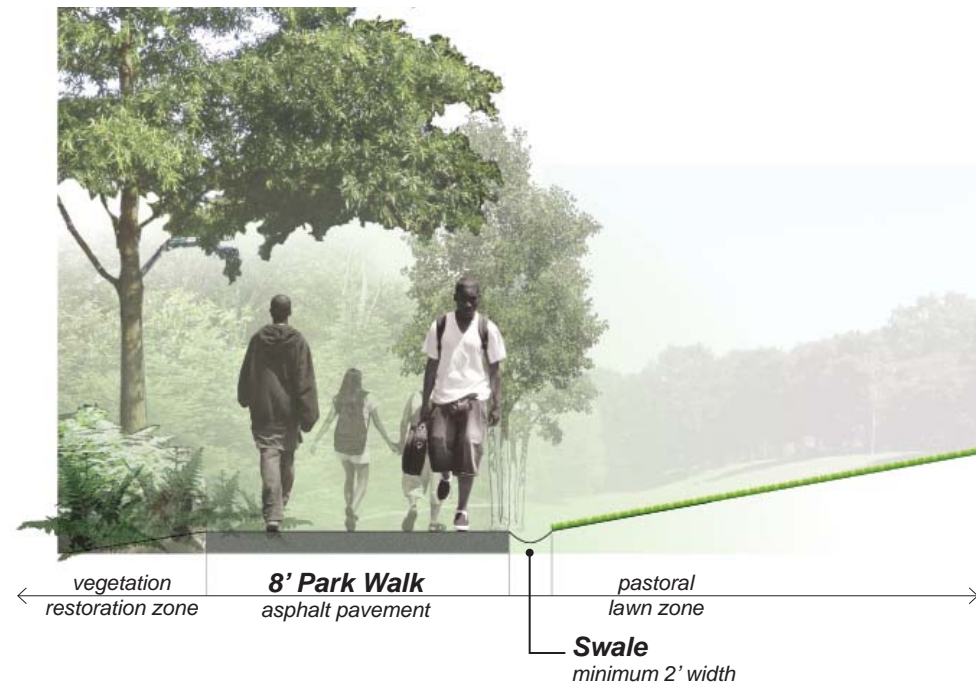
- |                     |                                  |
|---------------------|----------------------------------|
| Bronx River         | Neighborhood Access              |
| Floodplain          | Greenway Extension (Short Term)  |
| Promenade           | Greenway Extension (Long Term)   |
| Park Walks          | Restricted Vehicular Circulation |
| Nature Trails       | Restricted Vehicular Entrance    |
| ADA Accessible Path | Vehicular Circulation            |
| ADA Entrance        | Train/Subway Services            |
| Relocated Slip Road |                                  |

The Promenade

The *Promenade* will be a seventeen-foot-wide paved multi-use path and is part of the larger Bronx River Greenway path, connecting Shoelace Park to the entire length of the Bronx River. The *Promenade* utilizes the existing forty-foot-wide original road-bed of the Bronx River Parkway, and is a tree-lined path ideal for strolling, jogging, biking and roller blading. Separate lanes for bicyclists/roller bladers and pedestrians/joggers will be demarcated to enhance safety. The entire length of the *Promenade* is accessible and will comply with standards set by the American with Disabilities Act. Limited vehicular traffic will be permitted for maintenance and emergency vehicles only. The *Promenade* design reduces the width of the existing multi-use greenway path by more than half, creating a more intimately scaled space framed by expanded planting areas and new park features. The alignment of the new seventeen-foot wide paved pathway may gently curve within the flat area of the historic forty-foot road-bed. This undulating alignment will contrast with the north-south alignment of the historic Oak trees and will create more flexibility to practically deal with local site conditions and will also allow broader areas of stormwater capture and planting.



Illustrative section and plan showing one possible alignment of the seventeen-foot wide *Promenade* at a play area



### Park Walks

These eight-foot-wide paved paths will be the primary pedestrian routes between the *Promenade Terrace*, the *Parkland Terrace*, and the *Riverside Terrace*. The *Park Walks* connect the *Promenade* to *Nature Trails* and provide access to the Bronx River.

- The *Park Walks* will be coordinated with stormwater management for the park, with conveyance best management practices (BMPs), such as a swale, on the uphill side directing water to treatment BMPs at lower elevations.
- Where topography allows, these paths will be accessible to people with physical disabilities in accordance with the guidelines set by the American with Disabilities Act (ADA). *Park Walk* routes leading to the boat launches at 219th street and Fort Knox West will be ADA compliant.
- The *Park Walks* will delineate landscape eco-types, separating vegetative restoration zones from pastoral zones.



### Nature Trails

These approximately six-foot-wide boardwalks or non-paved paths will provide informal access to the Bronx River and the riparian landscape restoration areas.

- *Nature Trails* will be an educational resource for school groups and nature enthusiasts, providing access to the Bronx River, native vegetation and wildlife, and bird-watching.
- Where the *Nature Trails* correspond with low points that are frequently inundated, boardwalks will raise the path above finished grade. These boardwalks will become destinations, by providing a unique vantage of the river and wildlife.
- *Nature Trails* will be a supplementary route that allow visitors the choice to further explore the restored native landscapes.
- Environmental educational signage can be incorporated along the *Nature Trails* to further deter visitors from walking through landscape restoration areas and protect fragile restoration plantings.

**The master plan recommends a riverside greenway connection to Muskrat Cove as a long-term alternative and asks that New York State Department of Transportation take this route into consideration in any future reconstruction of the Bronx River Parkway bridge at this location.**

## Access and Safety

### Pedestrian Safety and Access

Park safety and access work hand-in-hand. A prime design consideration is to improve safety and accessibility at park entrances. Street crossings into the park will be upgraded and key park entrances will be modified to better relate to pedestrian crosswalks and comply with American with Disabilities Act (ADA) standards. Where possible, ramped curb cuts at park entrances along the western curb line of Bronx Boulevard should be located directly across from existing curb cuts at the eastern curb or otherwise be located to minimize crosswalk lengths. Further traffic studies are recommended to determine the feasibility of incorporating additional stop signs at intersections with crosswalks leading to park entrances.

ADA accessible conditions will be evenly distributed along the entire length of Bronx Boulevard - located at the 211th, 213th, 219th, 222nd, 229th, and 233rd Street entrances. As the primary circulation path along the entire eastern edge of Shoelace Park, the *Promenade* plays an important role in the accessibility of the park. The entire length of this multi-use greenway path will be accessible to people with disabilities and strollers. Within the park, textural surfaces will be installed where pedestrian paths (*Park Walks* and entrances) meet the *Promenade* to improve safety conditions at crossings of this multi-use path.

### Fort Knox Access

ADA accessible routes will be provided at the northwest entrance to Fort Knox West with two additional accessible entrances at Fort Knox East. A pedestrian foot bridge will be constructed near the former location of two historic bridges that have since been demolished. The accessible new bridge will be instrumental in improving the circulation between the two sides of Fort Knox Park, which are separated by the Bronx River. The existing street configuration creates round-about access for these users.

An opportunity also exists to extend and formalize the existing path beneath the Gun Hill Road overpass on the east bank of the river. North of the overpass, this new paved path will follow the east bank of the river at the base of an existing retaining wall before connecting to street level at a new staircase at the southeast corner of the intersection of 211th Street and Bronx Boulevard. This lower path will improve pedestrian connectivity between the two parks and allow for a more contiguous riverside path.

### Connections to the Bronx River Greenway

The short-term northern Bronx River Greenway connection, north of 229th Street, will direct bicyclists north from the *Promenade* across an existing northbound on-ramp to the Bronx River Parkway. The master plan recommends the reconfiguration of this on-ramp to calm traffic and allow for safer passage of bikes and pedestrians (refer to diagrams on facing page). Users would then proceed north on a shared public sidewalk. North-bound greenway users will then continue west across the south side of the 233rd Street bridge, turn north to cross 233rd Street at the signaled intersection at Webster Avenue, and continue approximately 400 feet to a shared greenway path that leads to Muskrat Cove and beyond. The Bronx River Greenway connection to Westchester County is on-street here along Webster Ave.

The long-term goal of developing a riverside linkage at the northern terminus of the *Promenade*, and the existing Bronx River Greenway (at the area known as Muskrat Cove) will require coordination with New York State Department of Transportation (NYSDOT), New York City Department of Transportation (NYCDOT) and other city agencies. The preferred long-term route will pass over the Bronx River at the existing Bronx River Parkway on-ramp bridge. A path will then circle around 180 degrees to lead beneath this same bridge and continue along the western side of the river, passing beneath the Parkway bridge. At this point, the path will veer away from the river and follow a paved park path that continues north uninterrupted beneath the Metro North line and the 233rd Street overpass. The primary advantage of this preferred route is the creation of a greenway linkage that stays primarily within parkland and avoids crossing at the major intersection of 233rd Street. However, this link is currently impossible because siltation of the Bronx River has reduced clearance under the Bronx River Parkway bridge too much to allow the development of a bike path. Any future design solution would need to evaluate the ecological impacts on the river and maintenance challenges (i.e. on-going clearing of silt from paths).

The connection to the Bronx River Greenway at the south will extend along a shared public sidewalk on the west side of Bronx Boulevard from 211th Street south and continue approximately one-thousand-feet before re-entering parkland just north of the Rosewood playground within Bronx Park East.

## Vehicular Circulation

Shoelace Park is a vehicular-free zone with the exception of limited maintenance, operational and emergency vehicles. Vehicle access points from Bronx Boulevard will include: 211th Street, 226th Street, and the path adjacent to the south side of the parkway on-ramp at 230th Street.

The length of the *Promenade* between the 211th Street entrance and the 229th Street entrance will be accessible to restricted vehicle traffic. A paved *Park Walk* that spurs off of the multi-use greenway path just south of the historic parkway plaza will be designated as a shared (pedestrian and vehicular) path to allow for New York City Department of Parks & Recreation and Bronx River Alliance vehicular access to the 219th Street boat launch. The boat launch at Fort Knox West will also be accessible to official vehicles on a *Park Walk* that starts at the western park boundary adjacent to Bronx Boulevard (refer to master plan graphic on pages 40 and 41).

### Improvements at 229th Street and Bronx River Parkway On-ramp

Currently, there is no formal entrance to the park at the intersection of 229th Street and Bronx Boulevard. The awkward configuration of three conditions: the intersection at 229th Street and Bronx Boulevard; the slip road turn-off (that leads to the parkway on-ramp); and the terminus of the *Promenade*, combined with a significant change in grade, create hazardous circulation conditions at this neighborhood entrance. These conditions are worsened by the adjacent street parking on the western side of the slip road.

The proposed relocation of the slip road turn-off will create safer conditions for pedestrians crossing at the intersection of 229th Street and Bronx Boulevard – the primary entrance for school groups coming from Public School 103. Moving the north-bound turn-off approximately 130-feet to the north will allow for the creation of a formal pedestrian entrance at the intersection of 229th Street and Bronx Boulevard, and an improved transition to the Bronx River Greenway.

The current “Y” road alignment at the Bronx River Parkway North on-ramp (that allows both north and south bound cars to enter the Parkway) requires pedestrians and cyclists to cross two lanes of traffic at the curved portion of the roads and/or traverse a center island that is non-accessible due to a continuous raised curb condition. Two large on-ramp signs further impede pedestrian circulation across the island and add to the visual complexity of the area.

Proposed circulation improvements include “normalizing” the intersection of the slip road and the parkway on-ramp. The recommendation to create a “T” intersection at this location requires further traffic studies. A painted crosswalk and curb cuts will further enhance safety and accessibility of the greenway crossing at this intersection.

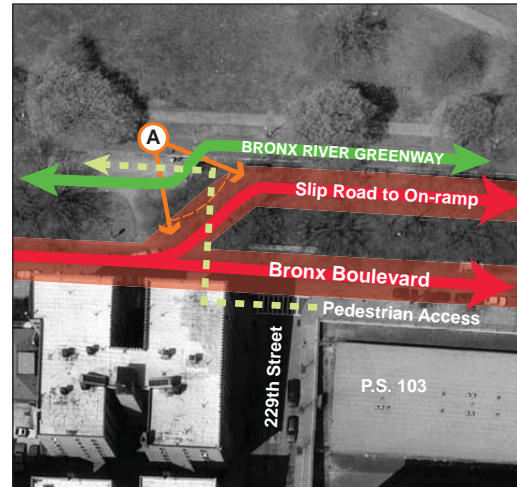


Figure 1: Existing conditions at slip road turn off at 229th Street

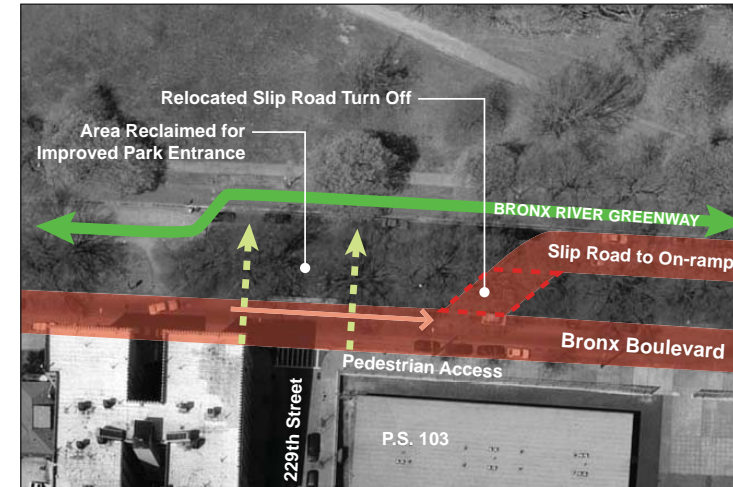


Figure 2: Proposed relocation of slip road turn off at 229th Street



A. Existing conditions at slip road turn off



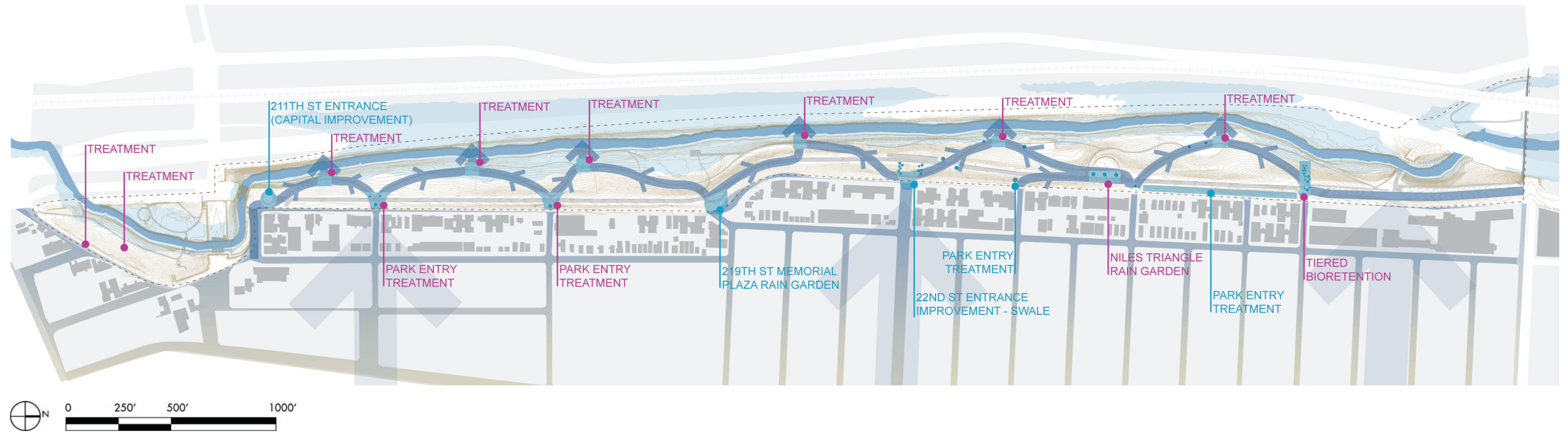
Figure 3: Existing conditions at Bronx River Parkway on-ramp south of 233rd Street



Figure 4: Proposed normalization of on-ramp intersection



B. Existing conditions at on-ramp crossing



## Stormwater Runoff

### Legend

- Bronx River
- Floodplain
- BMP Projects - Underway
- BMP Projects - Proposed
- ➔ Proposed Stormwater Conveyance
- ➔ Runoff

## Overview

Improvements in stormwater management in Shoelace Park are drastically needed to create a healthy, sustainable landscape. Refer to the Existing Conditions section of the master plan for more detailed information on the adverse stormwater conditions in the park today. Specific improvements are targeted in areas above the reach of the 100-year floodplain (60% of the park) and a separate set of recommendations is made for the floodplain landscapes (40% of the park.) By considering these two distinct zones, the master plan considers stormwater and floodplain resource management strategies within the design of Shoelace Park, providing a holistic, structural framework for all aspects of site design.

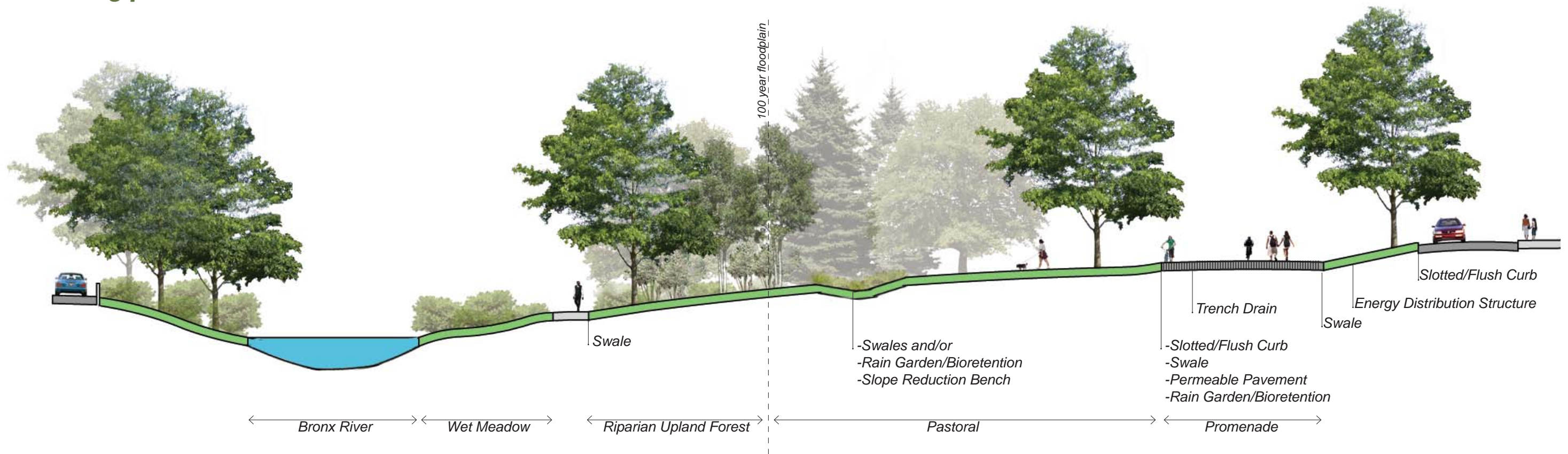
## Stormwater Management

Integrate stormwater best management practices (BMPs) into park design. Stormwater BMPs are techniques, processes, activities or structures that improve stormwater quality and reduce stormwater quantity. The implementation of BMPs is most effective when they are used together in a system for a specific goal for a specific location. The BMPs that are appropriate for Shoelace Park pertain to the capture, conveyance and infiltration of stormwater.

The overarching goals of the stormwater management strategy are to capture, redirect, and integrate stormwater in the park design:

- Redirect surface runoff from catch basin inlets along adjacent streets towards park BMPs. Future site specific designs in support of this goal will reduce the amount of stormwater entering the municipal sewer system that may contribute to combined sewer overflow events that adversely effect the water quality of the Bronx River.
- Convey stormwater within the park to minimize erosion and improve stormwater quality with the use of BMPs before it flows into the Bronx River. Current topographical conditions allow for water to flow in sheets over steep slopes, leading to erosion and the formation of gullies. New designs for Shoelace Park should work with the grading of the site in order to direct water in a way that minimizes erosion. The master plan dictates that stormwater flow along side the path system. In this way, it is visible to visitors to the park and it is concentrated in a way that minimizes erosion.
- Capture stormwater at upper slopes and reveal its movement as it flows downhill towards the Bronx River. Future site specific designs within the park should be developed to expose the both the movement and management (i.e., detention and treatment) of stormwater in a didactic way. The greater understanding there is of the importance of stormwater, the more it will be valued within the community. Designing structures that show the flow of water (or imply its movement during dry conditions) from the high elevations of the park to the river can demonstrate stormwater in action. Stormwater should, where possible, be brought the surface and highlighted within the design.

**Many opportunities exist to enhance stormwater management in Shoelace Park including reducing un-wanted flooding or ponding, reducing erosion, increasing opportunities for infiltration, detaining water where it can better support plants, and diverting pollution from the Bronx River.**



### Stormwater Management Strategies

An effective plan to manage stormwater includes source control strategies that are incorporated into stormwater BMPs. Source Control strategies recommended at Shoelace Park are:

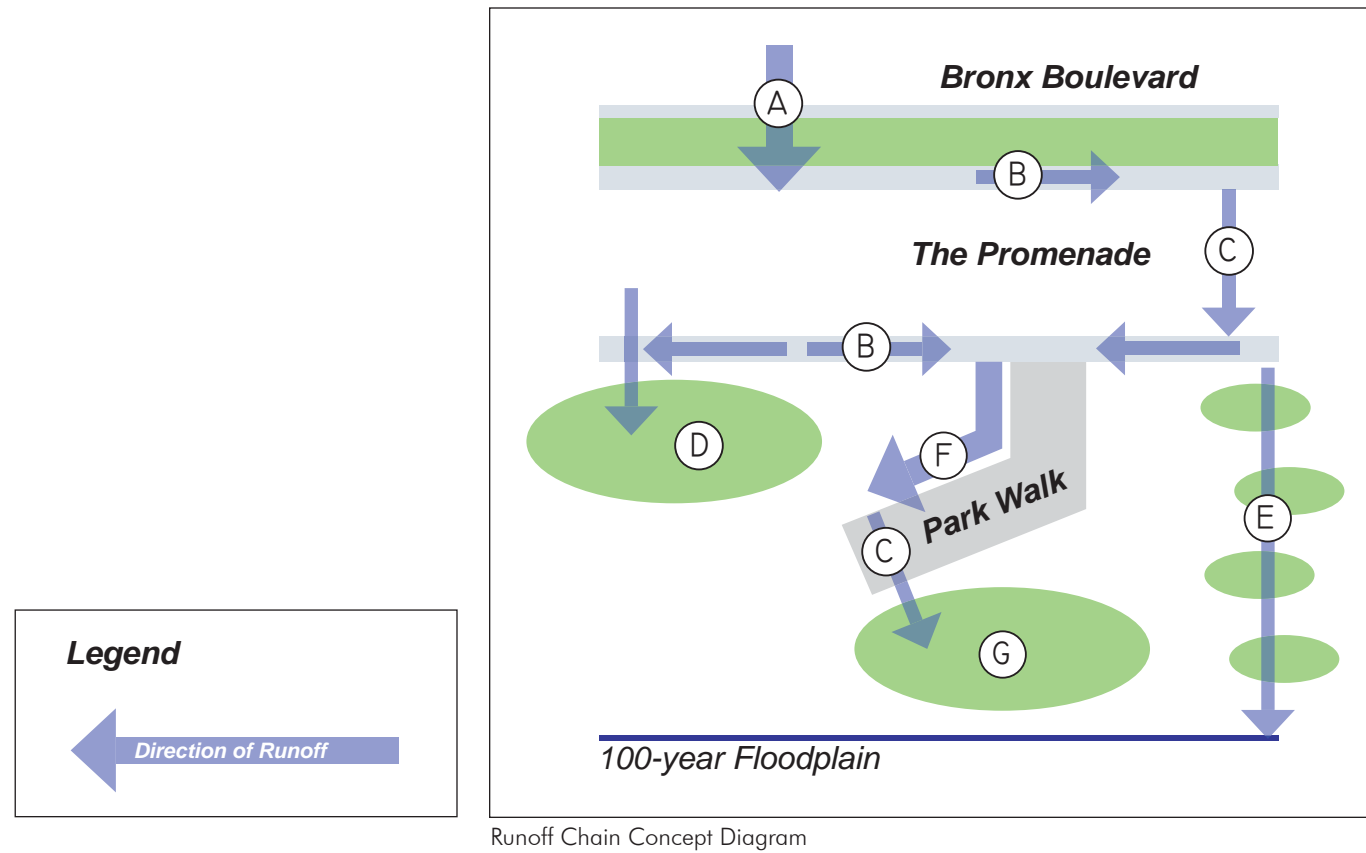
- direct stormwater runoff from impervious to pervious surfaces when not in areas with steep slopes;
- utilize permeable pavements;
- increase the amount of non-turf areas of groundcover vegetation and trees;
- extend stormwater runoff travel path to slow Time of Concentration; and
- reduce the total area of impervious surfaces wherever possible (especially within the floodplain).

In conjunction with these source control strategies, the master plan also recommends that future site designs incorporate the concept of a runoff chain, a sequence of structures and methods (BMPs) designed to holistically convey, treat, and infiltrate stormwater. Stormwater managements BMPs are most effective when used together. The goal for Shoelace Park is to have all runoff that enters Shoelace Park be captured, conveyed, detained, filtered by plants, infiltrated, and managed. Future designs should look to the site to see which BMPs are possible and most effective given site specific conditions.



## Stormwater Best Management Practices (BMPs)

The recommended stormwater BMPs can be broken down into two categories: Areas of Conveyance, linear techniques of moving runoff through the park and Areas of Treatment, techniques used in specific locations that allow runoff to be detained and/or infiltrated.



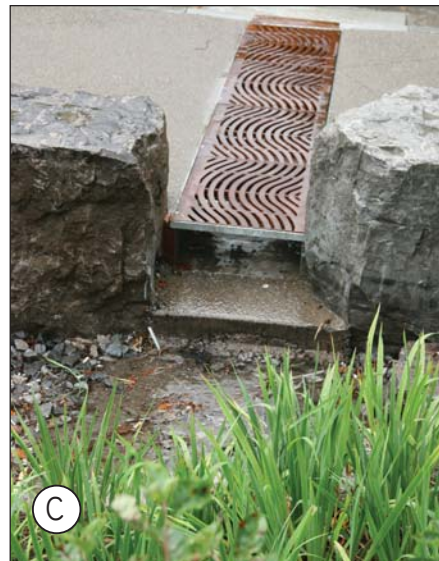
Runoff Chain Concept Diagram



A Slotted curb and flow spreader



B Armorized swale adjacent to pavement



C Trench drain



D Bioretention adjacent to paved area

## Conveyance Best Management Practices

Conveyance BMPs will guide stormwater to a catchment area or termination point and must be sensitive to the park's topography. Several BMPs will be used in a "chain" throughout the conveyance system. By coordinating the design of conveyance BMPs with proposed park improvements, the construction of a shared condition such as a new paved path will reduce operational expenses, including the increased longevity of pavements.

The design of conveyance BMPs must also consider the need to slow the velocity of runoff and control flow volumes entering treatment BMPs via inlet structures. Conveyance BMPs to be considered in Shoelace Park include:

- Custom check dams, weirs, and energy dissipation structures
- Open channel: vegetated and reinforced swale
- Infiltration trench (french drain)
- Trench drains (for use in areas where conveyance crosses areas of pavement) and pipes and drop structures that convey flow from catch basins to raingardens or other treatment BMPs in the park.
- Raised curbs and slotted curbs with flow spreaders (i.e. stone used for energy dissipation)

Working together, these practices illustrate a runoff chain and form comprehensive systems that will convey water through the site while allowing for greater infiltration, and protection of non-paved surfaces from erosion.

Additional information on existing site conditions is required to further develop site designs that support the recommended stormwater conveyance system. This information includes:

- Areas of contributing impervious catchments and periods of contribution (i.e. at all runoff events, or only when catch basins are filled or curbs overtopped)
- Spatial requirements necessary for volume of water to be treated
- Relationship to utility lines (where high flow management is required)
- Visual qualities
- Proximity to non-complementary programs
- Proximity to non-complementary vegetation (mature tree roots)
- General terrain and adjacent slope
- Proximity to treatment BMPs (for conveyance BMPs only)
- Relationship to floodplain delineation (limited BMP applications due to flooding)

Much of the information above can be provided in an updated topographic, tree and utility survey of the park. An updated survey is a recommendation of this master plan, as is a coordinated approach to all future stormwater management activities.

## Treatment Best Management Practices

The master plan analysis phase looked at park conditions and best available information on topography and circulation in order to make recommendations for stormwater catchment opportunity areas. Treatment BMPs typically require a greater amount of space than conventional stormwater conveyance techniques. The site analysis accounts for this greater need for space and stormwater goals are incorporated into the program development of the site. When the project moves past the Master Plan stage, calculations of the treatment-area-to-capture ratio will be necessary to quantify the amount of stormwater that the BMPs will be required to treat.

BMP treatment opportunity areas have been identified on the master plan drawing at higher elevations along both Bronx Boulevard and Duncomb Avenue, where high velocity runoff coming from the ultra-urban sub-watersheds can be slowed and collected soon after entering the park. Slowing and collecting water near the park entrances protects steep slopes downhill and reduces the need for conveyance BMPs.

Substantive areas of treatment will be located near park entrances and, pending the treatment-area-to-capture ratio, additional runoff will be conveyed to treatment BMPs in the *Parkland Terrace* where the sewer line is located. Stormwater management improvements in the *Promenade Terrace* will have the opportunity to incorporate overflow structures due to the elevational relationship to the main sewer line. BMPs located in Terrace areas below the sewer line elevation will require the design of inlet control devices to manage the treatment-area-to-capture ratio. Additionally, treatment at the park entrances makes stormwater management strategies visible to park visitors, reinforcing the connections between the recreational space and its ecological and hydrological functions as a place of habitat creation, stormwater filtration, conveyance and infiltration.

Because of the additional benefits of habitat enhancement and creation, treatment BMPs can create significant outdoor education opportunities. Therefore, siting the treatment BMPs in the landscape should be coordinated with program opportunity areas in the park. Areas designated to receive stormwater management improvement BMPs seek to capitalize upon the synergy of compatible adjacent uses. One example of this is the proposed display rain garden at Niles Triangle, which further enhances the historic plaza and redefines its relationship to the *Promenade*.

### Treatment BMP strategies that can be implemented in the park include:

- Biofiltration (vegetated depressions varying from higher maintenance, showcase “rain gardens” to more utilitarian, lower maintenance bioretention basins)
- Wet meadow
- Slope reduction benches (i.e., terracing)
- Subsurface detention basin with passive reuse for rain gardens and active reuse for grey water systems (i.e., irrigation)

## Monitoring and Maintenance of Best Management Practices

The incorporation of means of monitoring will be essential in determining the effectiveness of treatment BMPs once they are implemented. Monitoring will allow for adjustments to be made to future designs, throughout the phased implementation of stormwater management improvements. Likewise, the effectiveness of built BMPs will, in part, be contingent upon the implementation of an ongoing maintenance protocol, to be established upon completion of construction.

## Floodplain Resource Management and Ecological Enhancements

The master plan makes recommendations to improve the ecological functioning of floodplain resources, defined as the natural resources found in floodplains. Floodplains play an important role in interconnected ecosystems. In the case of Shoelace Park, this includes the Bronx River and the landscape eco-types that surround it: riparian and upland woodlands.

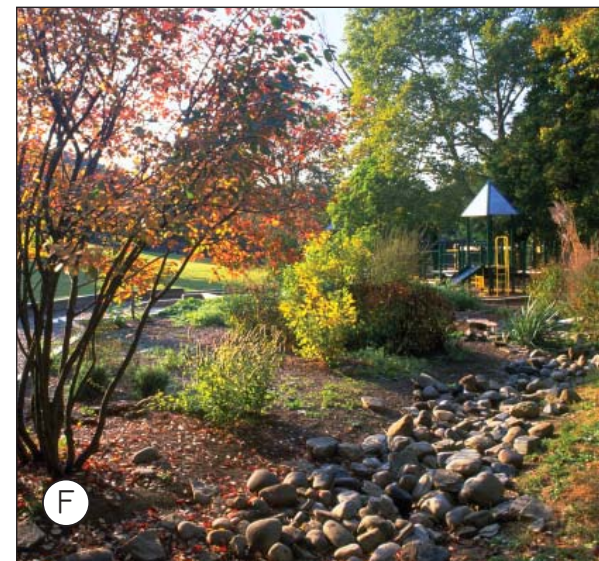
Over the long term, all built structures should be removed from the *Riverside Terrace* zone (except existing basketball courts) and areas designated as within the 100-year floodplain. These measures would promote opportunities for storage and conveyance of floodwaters while protecting capital investments.

Further recommendations include the reduction of impervious surfaces, achieved primarily through the removal of the existing asphalt park path along the river’s edge. Instituting stormwater BMPs in the upper and middle terraces and enacting source control strategies will significantly reduce the amount of sediment carried by runoff before it flows into the lower terrace zone and floodplain and filter nutrients and impurities. While specific amounts are not easily quantified, instituting stormwater BMPs will also allow for the promotion of infiltration with the potential to contribute to groundwater recharge.

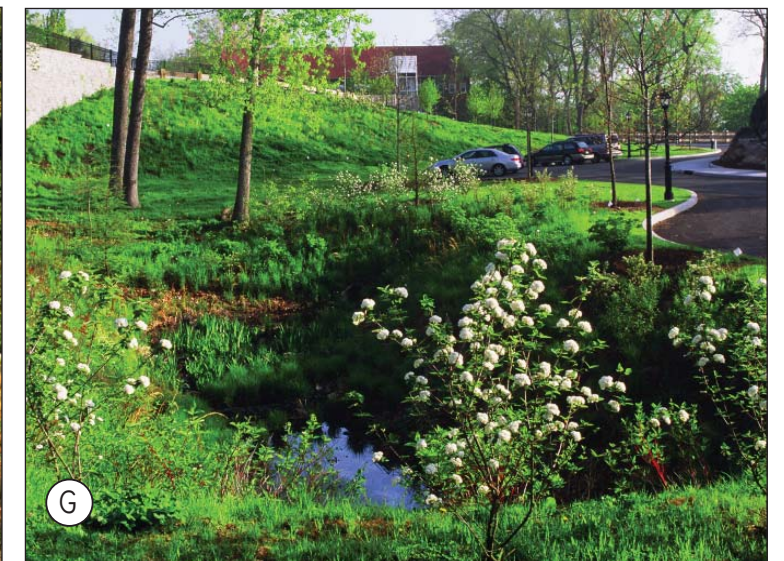
Stormwater BMPs implemented in the upland areas of the park will also assist in the enhancement of water quality and the reduction of pollutants carried during low flow storm events.



Custom check dams, weirs, energy dissipation structures



Armored swale adjacent to vegetated area



Bioretention basin, rain garden