HUDSON RIVER VALLEY GREENWAY LINK -- Preferred Routing

NYMTC NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

RBA

PB PARSONS BRINCKERHOFF

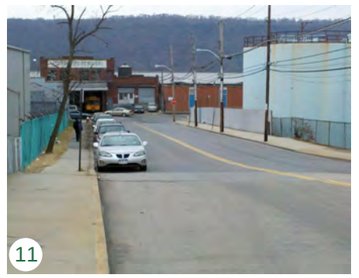
Eng-Wong, Taub & Associates

HOWARD STEIN-HUDSON ASSOCIATES

Interactive Elements Incorporated

Old Croton Aqueduct Trail
City of Yonkers, Westchester County

Manhattan Waterfront Greenway
New York City



Cover Picture Locations

1. Inwood Hill Park Waterfront Path - Manhattan
2. Henry Hudson Bridge and Inwood Hill Park - Manhattan
3. Hudson River Waterfront @ MNR Riverdale Station
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8. Spuyter Duyvil Amtrack Swing Bridge - Bronx-Manhattan
9. Yonkers Waterfront @ Main Street
10. Riverdale Park and Palisade Avenue - Bronx
11. Ludlow Street - Yonkers
12. Riverdale Waterfront and Track 6 at College Point - Bronx
13. Beczak Environmental Center - Yonkers

Acknowledgements

Funding Secured By:

Senator Charles Schumer

Funding Provided By:

Federal Highway Administration

Steering Committee

Amtrak, Capital Program Development

City Of New York Department of Parks & Recreation, Bronx Borough Commissioner

City of New York Department of Parks & Recreation, Northern Manhattan Parks

City of New York Department of Parks & Recreation, Planning

City of Yonkers Planning

MTA - Bridges and Tunnels

MTA - Metro North Railroad

New York State DOT-Regions 8 and 11

NYC Dept. of City Planning

NYC Dept. of City Planning, Transportation

NYC DOT

NYC DOT, Bicycle Program

NYC DOT, Manhattan Borough Commissioner

Westchester County Department of Parks

Westchester County Department of Planning

Westchester County Department of Public Works and Transportation (Planning)

Technical Advisory Committee

5BBC

Along the Hudson

American Sugar Refining

Beczak Environmental Education Center

Bronx Chamber of Commerce

Bronx Community Board 8

Bronx Council for Environmental Quality

Bronx Overall Economic Development Corporation

Century Road Club

City of Yonkers Department of Parks, Recreation, and Conservation

East Coast Greenway Alliance

Empire State Development Corporation

Environmental Defense Fund

Ferry Sloops Inc.

Fieldston Property Owners Association

Five Boro Bike Club

Friends of Fort Tyron Park Trust

Friends of Hudson River Park

Friends of Spuyten Duyvil

Friends of the Hudson River Greenway in the Bronx

Friends of the Old Croton Aqueduct

Gaia Institute

Greater Harlem Chamber of Commerce

Greater Riverdale Chamber of Commerce

Hudson Heights Owners Coalition, Community Board 12, Henry Hudson Scenic Byway

Hudson River Park Trust

Hudson River Valley Greenway

Hudson River Valley Greenway Communities Council

Interested Public

Inwood Livable Streets

Island Garden

Leake and Watts

Lower Washington Heights Neighborhood Association

Manhattan College

Manhattan Community Board 12

Metropolitan Waterfront Alliance

Mount Saint Vincent

Natural Resources Defense Council

New York City Audubon

New York Cycle Club

New York Department of State (Office of Coastal, Local Government and Community Sustainability)

New York New Jersey Trail Conference

New York State Department of Environmental Conservation

New York State Department of Parks, Recreation and Historic Preservation

New Yorkers for Parks

NY League of Conservation Voters

NYC RoadRunners Club

NYU - Wagner

Open Space Institute

Parks & Trails New York

Regional Plan Association

Riverdale Nature Preservancy

Riverdale Press

Riverdale Yacht Club

Rivers, Trails, & Conservation Assistance Program, National Park Service - New York City

Scenic Hudson

Shorewalkers

South Broadway BID

Transportation Alternatives

Tri-State Transportation Campaign

Trust for Public Land

Village of Ossining

Wave Hill

West Harlem Environmental Action

Westchester Cycle Club

Yonkers Chamber of Commerce

Yonkers Paddling & Rowing Club

Yuvan Planning & Development

A New Link in the Hudson River Valley Greenway Trail between Northern Manhattan and Westchester County

Joel P. Ettinger, Executive Director

The Manhattan Waterfront Greenway along the Hudson River from Battery Park in lower Manhattan to Dyckman Street in northern Manhattan is one of many projects that are shaping an interconnected network of multi-purpose greenway corridors in the Hudson River Valley Greenway, which includes the development of a trail or pathway system consistent with the greenway criteria connecting the city of New York to Saratoga County.

Building on previous work by community interests in Manhattan, the Bronx and the City of Yonkers, the New York Metropolitan Transportation Council has completed the Hudson River Valley Greenway Link Study to define a plan and conceptual designs for a pathway connecting the Manhattan Waterfront Greenway in northern Manhattan with the Old Croton Aqueduct Trail in Yonkers, via Riverdale in the northwest Bronx. In doing so, the study has laid the groundwork for the development of a critical missing link in the southernmost segment of the larger Hudson River Valley Greenway Trail.

The Greenway Link Study evaluated current conditions in its study area and formulated a phased plan for connecting the existing pathways. The study identified the preferred route for the Greenway Link as a multi-purpose waterfront trail close to the Hudson River shore which can be developed over time. Additionally, inland paths with visual access to the Hudson River are identified in areas where direct access to the shore is either not possible or can only be achieved in a medium-to-long-term time frame.

The Greenway Link plan and conceptual designs address several significant barriers and constraints in the study area, including:

- Crossing the Harlem River ship canal to connect Manhattan and the Bronx;
- Overcoming difficult topographical challenges to waterfront access in the Bronx; and
- Dealing with physical facilities along the waterfront in the Bronx and Yonkers.

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CHAPTER 1:

PROJECT OVERVIEW

HUDSON RIVER VALLEY GREENWAY LINK

History of the Project and Purpose of this Study

1. What is the Hudson River Valley Greenway?

"The Hudson River Trail will include existing scenic highways, urban cultural park trails and railroad beds together with property voluntarily included by localities and individuals to provide access to all New Yorkers to the magnificence of the Hudson River Valley."

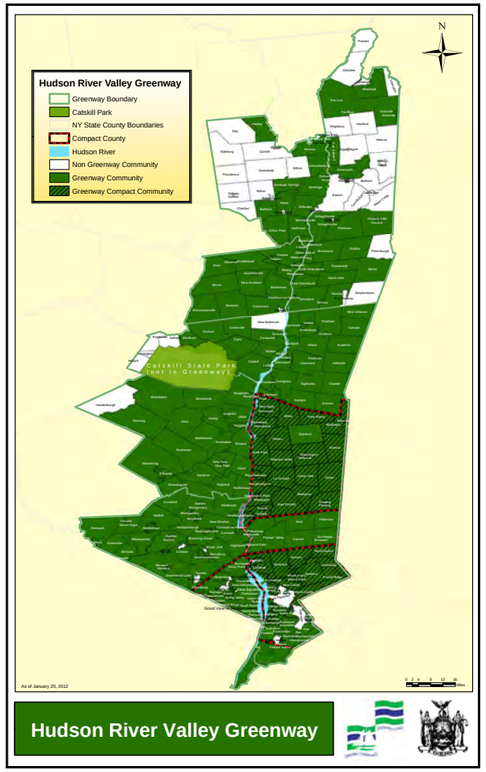
- Former New York State Governor, Mario Cuomo, 1991
  Governor's Message, McK. 1991 Session Laws, pp. 2234-35.

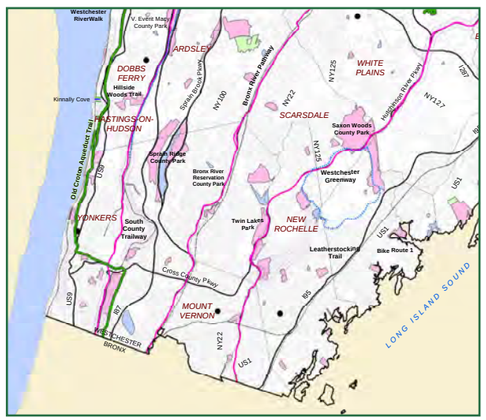
Greenway Mission: To continue and advance the state's commitment to the preservation, enhancement and development of the world-renowned scenic, natural, historic, cultural and recreational resources of the Hudson River Valley while continuing to emphasize economic development activities and remaining consistent with the tradition of municipal home rule.

The Hudson River Valley Greenway Act of 1991 (the "Greenway Act") created a process for voluntary regional cooperation among 264 communities within 13 counties that border the Hudson River. The Hudson River Valley Greenway (the "Greenway"), as established in the Greenway Act, is an innovative state sponsored program created to facilitate the development of a regional strategy for preserving scenic, natural, historic, cultural and recreational resources while encouraging compatible economic development and maintaining the tradition of home rule for land use decision-making. The Greenway Act created two organizations, within the executive department, to facilitate the Greenway process: **the Hudson River Valley Greenway Communities Council and the Greenway Conservancy for the Hudson River Valley, Inc.**

For more information about the Hudson River Valley Greenway, please visit:
http://www.hudsongreenway.ny.gov/home.aspx

The Hudson River Valley Greenway is conceived of by many, and is, for the purposes of this study, regarded as an off-road multi-use trail that connects the communities through which it passes to the River and to each other. The Greenway trail will serve as a transportation and recreation asset, facilitating both short and long-distance non-motorized commuter trips as well as serving as a tourism and recreational destination in its own right.





Hudson River. Today the Greenway is working to create a system of trails from the northern borders Saratoga and Washington counties to Manhattan. The Hudson River Greenway Trail System consists of two main components: a land trail and a water trail for paddling and boating.

The Hudson River Valley Greenway Land Trail in southern Westchester County, within the City of Yonkers in particular, is designated on the Old Croton Aqueduct Trail which turns East, away from the Hudson River in northern Yonkers and continues, with some missing sections, roughly along the alignment of the Old Croton Aqueduct as far south as the northern border of Van Cortland Park in the Bronx. This alignment is, however, well away from the Hudson River itself.

This study, therefore, concerns itself with establishing an alternative route for the official designated HRVG Land Trail from a logical connection point located on the OCA Trail in northern Yonkers and following a proposed alignment along and/or as close as possible to the Hudson River shoreline through the City of Yonkers, the Riverdale section of the Bronx and into northern Manhattan where it may connect seamlessly with New York City's Manhattan Waterfront Greenway in Inwood Hill Park. It is within this area that a critical missing gap exists between the Old Croton Aqueduct Trail in Yonkers and the Manhattan Waterfront Greenway in northern Manhattan. Project limits for this study are illustrated generally on the cover of this report and more clearly delineated on the Proposed Implementation plan in the Recommendations section of this report.

The purpose of this study is to map a route for the trail and identify specific physical improvements required to make the route safely navigable by pedestrians and cyclists. The goal is to identify a feasible route that remains as physically proximate to the river as possible. The proposed route is broken down into discreet segments. Some segments may be implemented at little cost in the near future, while others will require more time and money to build. Where critical route segments will take a very long time to realize, an alternative near-term route alternative is offered. Some portions of the route may need to exist as an on-street trail for many years to come, on which cyclists will be required to share the roadway with motor vehicles.

There are many planning and design issues to address when contemplating the construction of an off-road multi-use trail for non-motorized users in the urban environment. Design issues include: physical issues such as topography and geo-technical considerations; code compliance, regulatory compliance (including environmental) property ownership/ jurisdictional and political issues, even philosophical issues based on differing views of what it means to 'connect' communities. This study attempts to examine all of these critical planning and design constraints to realizing the trail objectives, segment by segment, and identify solutions in the form of recommended discreet capital improvements.

3. How did this study come about and how was it funded?

In 2006, The New York Metropolitan Transportation Council NYMTC, via its host, the New York State Department of Transportation released a Request For Proposals seeking professional consulting and planning services to develop and refine, through an iterative process, a plan to develop a conceptual design for a multiuser trail that would follow the eastern shore of the Hudson River Valley from the northern reaches of Manhattan to the City of Yonkers.

High Priority Funding via the FHWA was contained in the SAFETEA-LU federal transportation law that provided funds for this study, to continue and develop the work of previous efforts with an eye toward producing a conceptual design for more detailed development. Specifically, a Coalition of Environmental and Waterfront Revitalization organizations requested US Senator for New York, Chuck Shumer to support funding for the Hudson River Greenway Link project. The Senator was successful in securing $1.2 million in the Transportation Improvements section of the Legislation as Project 311 designating that the funds to be used for: "Planning and Interim Improvements for the Manhattan, Bronx, Yonkers Hudson River Greenway Link."

The role of NYMTC was to provide project management, and in concert with NYSDOT, to provide contract administration. NYMTC staff has worked with MPO members and interested parties to obtain input at each level of the study. NYMTC, as a regional organization, was in the unique position to work across jurisdictional boundaries and bring various and varying views together to conduct and finalize a successful study.

4. Completed Tasks and Deliverables

This Report is the culmination of several years of outreach, strategic planning and conceptual design work and represents the deliverable associated with Tasks 8 and 9 of the Project Scope of Work. The production of this report is the final task in a project that has already completed several major milestones. Following is a list of Study Tasks that were completed in advance of the production of this Final Report, with a link to each Task's corresponding deliverable report:

Scope of Work:
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/HRVGL%20Scope%2011.27.07.pdf

Study Timeline:
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/Handout_3_Study%20Timeline.pdf

Task 2 – Literature Review:
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/Tech%20Memo%20Task%202%20Literature%20Review%20Final.pdf

Task 3 – Gap Analysis
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/090220%20Task%203%20Gap%20Analysis%20Final.pdf

Task 4 – Research
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/TM_Task4.pdf

Task 6 – Data Collection Summary
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/100106Task%206Final.pdf

Task 6 – Alternate Design Solutions
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/Task6_DesignFinal_comp.pdf

Task 7 – Alternatives Analysis
http://www.nymtc.org/project/bike_walk/Greenways/Greenway_files/100917_Task7_TAC.pdf

All of the above reports may also be accessed via the Hudson River Valley Greenway Link Planning Study project page hosted on NYMTC's website:
http://www.nymtc.org/

The Project Team

1. Who is NYMTC?

The New York Metropolitan Transportation Council (NYMTC) is a regional council of governments and transportation providers which serves as the metropolitan planning organization for New York City, Long Island, and the lower Hudson Valley. NYMTC provides a collaborative planning forum to address transportation-related issues from a regional perspective and to plan for and make decisions on the use of Federal transportation funds. The Federal government requires metropolitan planning organizations in each urbanized region of the country to maintain a continuing, cooperative, and comprehensive transportation planning process in order to plan for and make decisions on the use of Federal transportation funding.

NYMTC's region is comprised of New York City and five suburban counties on Long Island and in the lower Hudson Valley. It encompasses an area of 2,440 square miles and a population of roughly 12.2 million, approximately 64 percent of New York State's population. The region has one of the most extensive transportation networks in the world with 477 route miles of commuter rail, 225 route miles of rail rapid transit, 22,870 centerline miles of roads, streets, and highways, as well as several commercial airports and maritime facilities for passengers and goods.

The member agencies of NYMTC are: the New York State Department of Transportation, the New York City Department of Transportation, the New York City Department of City Planning, the Metropolitan Transportation Authority, Nassau County, Suffolk County, Putnam County, Rockland County, and Westchester County. NYMTC's advisory members include the Federal Highway Administration, the Federal Transit Administration, the United States Environmental Protection Agency, the New York State Department of Environmental Conservation, the Port Authority of New York and New Jersey, the North Jersey Transportation Planning Authority, and NJ Transit.

2. Who are the Consultants?

Through an open competitive RFP process, NYMTC chose The RBA Group to lead a multi-disciplined team of consultants in the execution of the scope of work and preparation of this Final Report and prior deliverable documents.

The consultant team is comprised of the following firms:

- **The RBA Group** (Prime Consultant) – Overall Project Management, Community Outreach, Planning, Design and Engineering
- **Parsons Brinkerhoff** (Sub-Consultant) – Planning Design and Engineering Support and Community Outreach Support
- **Eng-Wong Taub and Associates** (Sub-Consultant) – Traffic Engineering Support
- **Howard Stein Hudson** (Sub-Consultant) – Community Outreach and Planning Support
- **Interactive Elements Incorporated** (Sub-Consultant) – Planning Support for Railroad Infrastructure

3. Who is the Project Steering Committee?

The Project Steering Committee is comprised of select NYMTC member agencies (see Who is NYMTC above for a complete list of member agencies), and other government agencies, without whose cooperation, the planning analysis that has led to this report, could not have been conducted. As such, steering Committee approval of all recommendations within this report was rigorously sought throughout the planning and design process.

The Steering Committee is comprised of the following agencies:

Amtrak (Hudson Line)
MTA – Metro North Railroad (Hudson Line)
MTA – Bridges and Tunnels (Henry Hudson Bridge)
New York State Department of Transportation (Henry Hudson Parkway – Regions 8 and 11)
Westchester County Department of Planning
Westchester County Department of Transportation
Westchester County Department of Parks and Recreation
New York City Department of City Planning
New York City Department of Transportation
New York City Department of Parks and Recreation
City of Yonkers Department of Planning

4. Who is the Technical Advisory Committee?

In addition to the Steering Committee, a Technical Advisory Committee (TAC) was formed to solicit input into the planning study and feedback in response to proposed solutions. The TAC was comprised of a collection of governmental, quasi-governmental and not for profit organizations. TAC participation was also solicited from among the many elected officials, at all levels of government, upon whose territories the project limits of the study did overlap. All TAC meetings were advertised publically and open to individual members of the public. In addition to regular recurring Steering Committee meetings and TAC meetings, open public meetings were held and presentations made, the most visible and well attended of which occurred in 2010, 2011 and 2012 at the Riverdale Riverfest and in 2012 at the Yonkers Riverfest.

Public Workshop #1 - Analyzing Route Alternatives

These photos were taken during the public presentation of the Preferred Alternative Route Alignment at the 2012 Riverdale Riverfest in the Bronx. The presentation took place on a barge moored in the Hudson River at College Point.

Environmental Review & Permitting

1. General Information

Under New York's State Environmental Quality Review Act (SEQR), state and local government agencies must consider the environmental impacts of discretionary actions. Alternatives for the Hudson River Valley Greenway Link may be required to have an Environmental Assessment Form (EAF) under SEQR. The EAF process would include coordination and/or correspondence with the several agencies for specific topics, such as the following: State Historic Preservation Office (SHPO) for information on historic resources; the New York State Department of Environmental Compliance (NYSDEC) Natural Heritage Program and the United States Fish & Wildlife Service for information on natural resources and wildlife; and the National Oceanic and Atmospheric Association (NOAA) Marine Fisheries Service for living marine resources. A completed EAF would be included in permit applications.

In addition to performing the environmental review, specific permits may be required; they will depend on the location and nature of the eventual alternative.

To build within the coastal zone of NYC, the applicant would have to consult with the NYC Department of City Planning and submit a consistency review per the policies of the New Waterfront Revitalization Program (the local WRP). Where project elements are outside of NYC, but within the State's coastal zone, an assessment would be completed and submitted to the New York State Department of State (NYSDOS) through its Coastal Zone Management Program (CZMP) for consistency certification.

NYSDEC regulates activities within 150 feet inland of the wetland boundary in New York City and 300 feet inland in the remainder of New York. Therefore, work activities not directly within the water can be subject to tidal wetlands permitting requirements under NYSDEC.

2. Waterfront Alternative: Permitting Issues

Given its proximity to the Hudson River, the Waterfront Alternative could require additional permitting and coordination. At this point, the exact design of the Waterfront Alternative is not determined, but construction could involve pile supported structures in the Hudson River as well as in-water excavation and fill activities. If construction activities include placement of fill in the Hudson River, the fill placement areas are likely to be discontinuous.

Waterfront construction activities generally require the following permits and approvals:

- US Army Corps of Engineers (USACE) Individual Section 10/404 Permit or Nationwide Permit (Individual Permits require preparation of an Essential Fish Habitat Assessment (EFH))

- New York State Department of Environmental Conservation (NYSDEC) Permit to include, as applicable, Section 401 Water Quality Certification (WQC); Tidal Wetlands; Excavation and Fill in Navigable Waters; Protection of Waters; Coastal Erosion Control

- New York State Department of State (NYSDOS) Coastal Consistency Determination and in New York City, New York City Waterfront Revitalization Program (NYCWRP) Coastal Consistency Determination

Construction activities also will require authorization under the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities. Authorization under this permit addresses stormwater management during construction.

In general, issues related to working in the Hudson River include temporary (i.e., construction-related) and permanent (due to excavation, driving piles, and placement of fill) impacts on water quality and aquatic ecology and the need for agency required mitigation. If disturbance of the river bottom would take place during construction, turbidity related impacts on aquatic ecology would be required to be minimized. The severity of impact related to potential excavation and fill activities would be related to the quality of the habitat being impacted, the area and volume of fill and or excavation proposed, whether the fill areas are continuous, and the duration of construction activities. The NYSDEC and the USACE likely would issue windows, i.e., time periods, during which particular construction activities could be conducted to minimize impacts on fish spawning, breeding or migrating periods.

The alternatives evaluation will need to show that that the selected alternative is the least damaging practicable alternative (LEDPA). The agencies will be looking to minimize excavation and fill to the extent practicable.

It is likely that the sediments in the proposed project area are contaminated. Therefore, minimizing turbidity will be especially important and construction and disposal costs could be costly depending on the construction activities proposed.

If the proposed alternative would result in permanent taking of marine habitat, the regulatory agencies could require mitigation. At this time it is not possible to determine whether mitigation would be required. The regulatory agencies can be inconsistent in the mitigation ratios they require for projects. In general, should mitigation be required, the agencies will ask for as close to "in kind" and "in place" as possible meaning the same type of habitat impacted should be created as close to the location of impact as possible. Often, the regulatory agency will not issue a permit until mitigation is agreed to.

The USACE and NYSDEC require only one application between them, the Joint Application for Permit, but also require an environmental questionnaire and the NYSDOS Federal Consistency Form. If no federal approval is required, then the NYSDOS State Consistency Form is required.

The actual applications and questionnaires for the DEC and USACE are very short. However, the DEC and the USACE require five sets each of maps, plans, photographs, as well as an environmental review (either the NYSDEC EAF or federal Environmental Impact Statement (EIS)).

Potential Funding Sources

The following is a compilation and brief description of sources of funding that have been, or could be used to fund pedestrian and bicycle improvements in New York. The list is not exhaustive, but it identifies funding sources that can be utilized to fund bicycle and pedestrian planning and project development activities, as well as construction. Some funding sources may also be used to fund programmatic activities.

Federal Funding Opportunities

Transportation Alternatives is the largest federal source for trail and greenway funding under MAP-21, the most recent federal transportation funding law. Transportation Alternatives is a combination of two core active transportation programs from SAFETEA-LU—Transportation Enhancements and Safe Routes to Schools (SRTS). While Transportation Alternatives projects are federally funded, the funds are administered by the New York Department of Transportation (NYSDOT) and the state's Metropolitan Planning Organizations (MPOs). Funding categories include:

- Bicycle & Pedestrian Facilities: Sidewalks, bike lane striping, wide paved shoulders, traffic calming, off road trails; bike and pedestrian bridges and underpasses; ADA compliance
- Safe Routes for Non-Drivers: Access and accommodation for children, older adults, and individuals with disabilities.
- Conversion of Railway Corridors for Trails: Planning, designing, constructing and reconstructing multi-use trails along a railroad R.O.W.; developing rail-with-trail projects; bike parking and bus rack, purchasing unused railroad property for reuse
- Scenic Turnouts, Overlooks and Viewing Areas
- Stormwater Management: Detention and sediment basins; stream channel stabilization; storm drain stenciling and river cleanups; water pollution studies
- Community improvement activities including vegetation management, historic preservation, archeological activities related to transportation projects, and boulevard construction

The federal funds are administered through reimbursement of up to 80 percent of a project's costs including Project sponsors are generally responsible for the remaining 20 percent of the project's cost. The project sponsor's matching share may include sponsor cash, donations of right-of-way integral to the project, in-kind contributions of labor or materials integral to the project, or other non-DOT state or federal funds. Under MAP-21, a portion of New York State's total allocation, or $25.8 million (2013), is available to the Transportation Alternatives Program; 50% of which is available for any area of the state. The remaining 50% will be sub-allocated throughout the state proportionately based on population. In 2013, more than $8 million will be sub-allocated to the New York-Newark metropolitan area.

The Highway Safety Improvement Program (HSIP) is administered by FHWA to fund any project on a public road, trail or path that is included in a state's Strategic Highway Safety Plan and corrects a safety problem such as an unsafe roadway element or fixes a hazardous location is eligible for HSIP funding. Eligible projects include, but are not limited to the following: intersection improvements, construction of shoulders, traffic calming, data collection, and improvements for bicyclists, pedestrians, and individuals with disabilities.

Congestion Mitigation and Air Quality Program (CMAQ) is jointly administered by FHWA and the Federal Transit Administration (FTA). Starting in FY 2013 all CMAQ projects will require a 20% local match, with the exception of carpool & vanpool projects, which will remain 100% Federal.

The Recreational Trails Program (RTP) is maintained as a distinct source of funding under MAP-21, although its funds are now drawn from the larger Transportation Alternatives funding pool.

Permissible uses include:

- Maintenance and restoration of existing recreational trails
- Development and rehabilitation of trailside and trailhead facilities and trail linkages for recreational trails
- Purchase and lease of recreational trail construction and maintenance equipment
- Construction of new recreational trails in existing parks or in new rights-of-way
- Planning studies, environmental assessments, engineering studies, and costs of permit applications are eligible expenses if they are part of a proposal that is primarily for trail construction or restoration, or development of trailside/trail head facilities. No more than 15% of the total project cost can be funded for planning and trail feasibility study expenses. Projects that include improvements to roads, road shoulders, or sidewalks however, are not eligible for funding.

Community Development Block Grants (CDBGs) are provided by the U.S. Housing and Urban Development (HUD) to communities for a wide range of community planning initiatives including neighborhood revitalization, economic development and improvement of community facilities and services, especially in low- and moderate-income areas. These grants require no match of funds or services from the community.

The Land & Water Conservation Fund (LWCF) provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources.

Environmental Contamination Cleanup Funding Sources. Many transportation corridors are contaminated from years of industrial use. To remediate this environmental pollution, there are many federal and state funding sources from which trails can benefit. The Environmental Protection Agency (EPA) has devoted a section of its website to funding and financing for brownfields, which are former industrial sites where contaminants or pollutants may be present. Many trails have taken advantage of brownfield funding, including Rhode Island's Woonasquatucket River Greenway Project, the Elkins Railyard redevelopment in West Virginia, and the Assabet River Rail Trail in Massachusetts.

Green Infrastructure and Stormwater Management Sources. Greenway trail corridors create the opportunity to address stormwater management and pollution by incorporating green infrastructure. As a strategy for compliance with the Federal Clean Water Act, green infrastructure, including such strategies as bioretention, vegetated buffers, and infiltration swales, and urban forestry can serve the environmental, social, and economic missions of a municipality with low lifecycle costs. By incorporating Stormwater Best Management Practices (BMP's) along the length of a greenway trail corridor, municipalities can create an engaging environment that provides measurable benefits in stormwater management and pollution reduction.

Funding for the improvement of water quality through the use of green infrastructure is available from several sources. The federal Environmental Protection Agency awards funding for green infrastructure through a number of programs, including Urban Waters, the EPA Clean Water Act Nonpoint Source Grant, the EPA Clean Water State Revolving Fund, and the EPA Community Action for a Renewed Environment Grant.

State and Local Funding Opportunities

Consolidated Local Street and Highway Improvement Program (CHIPS)

A New York State-funded program administered through the NYSDOT to assist localities in financing the construction, reconstruction or improvement of local highways, bridges, highway-railroad crossings and other local facilities. CHIPS eligible projects include bike Lanes, bike paths, sidewalks, shared use paths, traffic calming, curb reconstruction and wide curb lanes within a highway right-of-way.

Other Foundation and Company Grants. Many foundations and companies provide grants for trail and greenway projects, open space preservation, community development and community health. Below are a few examples of grants from private sources that can be used for trail and greenway building:

- The Bikes Belong coalition makes grants to bike advocacy and facility-building projects.
- The Conservation Fund's Kodak American Greenways Program provides grants for greenway planning and design.
- The American Hiking Society awards grants from its National Trails Fund for the establishment, protection and maintenance of trails in the United States.
- Outdoor goods store REI invites nonprofits nominated by its employees to submit proposals for funding. The company offers grants to support efforts "to care for public lands, natural areas, trails and waterways."
- The Conservation Alliance, a group of more than 180 outdoor businesses including REI, Patagonia, The North Face, Kelty and Burt's Bees, disbursed $1.3 million worth of grants in 2012, with a focus on habitat conservation and recreation.
- The Walmart Foundation provides grants to local communities and nonprofit organizations. These grants range from $250 to $5,000 and are awarded through each Walmart and Sam's Club store.

Other Potential Funding Sources
The following funding sources for greenways have been identified by Project for Public Spaces, Rails-to-Trails Conservancy and the National Trails Training Partnership.

Municipal Allocations. The most common sources of funding at the municipal and county level include allocations from a specific department, such as the park and recreation department, or a line item in a consolidated capital improvement program (CIP) budget. In some localities, a portion of an increase in the sales tax will be set aside for recreational trail or other conservation funding. Rarely, new taxes will be levied to exclusively support active transportation projects.

Impact Fees. Regulated by subdivision policies, impact fees require residential, industrial and commercial development project leaders to provide sites, improvements and/or funds to support public amenities such as open space and trails. Impact fees may be allocated to a particular trail or greenway from land development projects if the fund is a dedicated set-aside account established to help develop a county- or city-wide system of trail or greenway projects.

Bond Referendums for Greenways. Communities across the nation have successfully placed on local ballots propositions to support greenway development. The Charlotte-Mecklenburg County, NC area passed four consecutive referendums that generated more than $3 million for greenways. In Cheyenne, Wyoming, a greenway bond referendum was used to fund the first three miles of local greenways.

Local Private-Sector Funding. Local industries and private businesses may agree to provide support for greenway development through one or more of the following methods:

- Donations of cash to a specific greenway segment
- Donations of services by large corporations to reduce the cost of greenway implementation, including equipment and labor to construct and install elements of a specific greenway
- Reductions in the cost of materials purchased from local businesses that support greenway implementation and can supply essential products for facility development

Adopt-A-Trail Programs. These are typically small grant programs that fund new construction, repair/renovation, maps, trail brochures, facilities (bike racks, picnic areas, birding equipment).

Membership Campaigns. The return from this can be significant (The Pikes Peak Area Trails Coalition raises $18,000 per year), but your effort must be repeated every year.

CHAPTER 2:

IMPLEMENTATION APPROACH

HUDSON RIVER VALLEY GREENWAY LINK

Introduction

The Hudson River Valley Greenway Link Study began by looking at, and considering the feasibility of, establishing a greenway trail along many possible alignments that were spread across an expansive project Study Area. The western boundary of the Study Area is the Hudson River shoreline. In northern Manhattan the study area is bounded by Dyckman Street in the south and Broadway to the east. In the Bronx, the Study Area includes sections of Marble Hill and all of Riverdale (everything between and including the River and Broadway/Van Cortlandt Park). And in the City of Yonkers, the Study Area included all parts of the City west of Broadway. Throughout the Study Area, both on and off-road trail alignments and design solutions were considered.

Through a rigorous process of data collection, research, field investigations, community outreach, and with careful consideration of similar or related work completed as part of prior planning efforts, the study team eventually identified a 'preferred route' for this critical missing link in the Hudson River Valley Greenway Land Trail. Realizing that some specific 'links' within the chosen preferred route face significant engineering and funding constraints and could take a decade or more to realize, a number of more feasible alternate 'links' were also identified, for more near-term implementation, as an interim solution until such time as the complete 'preferred route' may be fully implemented. All of these links, 'preferred/long-term' and 'alternate/short-term' are identified and described on the maps and in the tables that comprise this chapter of the report.

The planning study has worked-through a number of sequential critical tasks to get us to this point. In succession, they were:

- Prior design reports and planning studies were reviewed under Task 2 – Literature Review.
- Data collection and field investigations were conducted under Task 4 - Research.
- Proposed alignment alternatives were identified and potential design solutions developed under Task 6 – Alternate Design Solutions.
- The alignment alternatives and proposed design solutions were analyzed, evaluated and ranked in Task 7 – Alternatives Analysis

In Tasks 8 and 9, for which this report is the final deliverable product, a preferred alternative route alignment for the proposed greenway trail was selected. The route selected is the route that was believed to best satisfy the Goals and Objectives set forth for the Study in Task 2. The preferred alternative route alignment was then divided into a number of separate individual links. Each link is envisioned as a separate proposed capital project, each with its own starting and ending point. The maps and tables that follow describe the scope and intent of each proposed project (link), providing key information about each in an easy to review tabular form. Information provided in the tables for each project includes: geographical project limits, design intent, critical design issues to be resolved, estimated cost[1], likely permits and approvals required, and agencies having jurisdiction, including identification of the agency most suitable to serve as the lead agency, or project sponsor.

In the following chapter of this report, a proposed conceptual design is presented for each of the proposed links that, taken together, make-up the preferred alternative route.

[1] Cost estimates are in 2012 dollars

These maps depict the level of analysis completed for over 40 individual route segments throughout the study

LEGEND

- Short-term off-Street Link
  Opportunity to create a Class 1 Physically Separated Greenway Path (3-5 years)
- Short-term on-street Link - On-street route alternatives requiring improved bicycle accommodation, sidewalk construction and/or repair, streetscape enhancements and pedestrian safety improvements at intersections (1-3 years)
- Medium-Term Link (5-10 years) - Capital Improvement Required
- Long-Term Link (10+ years) - Future Enhancement Project
- Study Area
- Existing Off-Street Multi-Use Trail (Manhattan Waterfront Greenway NYCDPR)

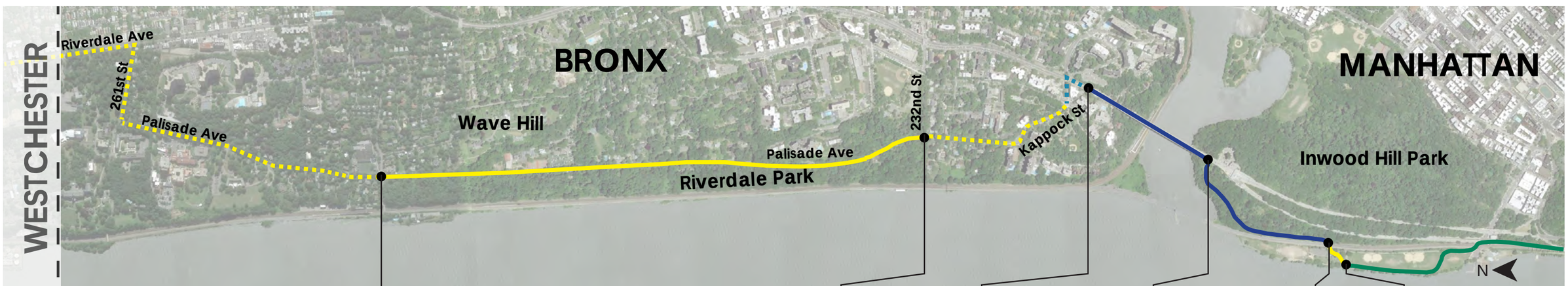
	Link Name	Begins	Ends	Approx. Length (LF)	Proposed Lead Agency	Approx. Cost (2012)	Explanation of Proposed Work	Critical Design Issues
1	Inwood Hill Park Stairs	N/A	N/A		**NYCDPR,** Amtrak	$2M	Construct new ramps on either side of existing bridge over the railroad in Inwood Hill Park.	Existing steel staircase may be too rotted to warrant keeping or repairing. Masonry step-ramp on East side of bridge may be deemed 'historic'
2	Henry Hudson Bridge Cantilevered Side Path and Bronx Approach Walkway	Henry Hudson Bridge Toll Plaza Lower Deck Inwood Hill Park	HHP Southbound Service Road	2,500	**To Be Determined**	1) $30M 2) $2.5M	1) Construct new cantilevered shared-use path across the Henry Hudson Bridge adjacent to west side of lower deck roadway. 2) Reconstruct approach walkway adjacent to southbound Henry Hudson Pkwy on Bronx approach and replace stairs with ramp.	Structurally loading the west side of the bridge requires similar loading on the east side as well. This proposal is cost prohibitive in the short-term. There will be physical impacts to Inwood Hill Park necesitating close coordination with NYCDPR. Widening of Bronx approach walkway impacts southbound Henry Hudson Parkway - requires coordination with NYSDOT Region 11.
3	HHP Southbound Svc Rd.; Kappock Street; Pailsade Ave	Henry Hudson Bridge Walkway @ Parkway Service Rd	232nd Street/ Palisade Ave	2,200	**NYCDOT**; NYCDPR (street trees)	1) $200,000 2) $1.5M	1) Install walk bike signage on service road and Class-2 on-street bicycle lanes on Kappock Street where street width permits, shared lanes elsewhere. 2) Reconstruct Palisade Avenue from Kappock Street to 232nd Street with new sidewalk, shoulder and shared lane markings.	Initial section of the service road is one-way southbound and has sidewalk on one side of street only. The grade of kappock street is steep. There is no mitigation for this. Bicycle 'lane' solution could impact availability of on-street parking. Palisade Avenue is narrow and private homes encroach on ROW.
4	Riverdale Park Waterfront Path and 232nd Street Connection	Palisade Ave/ 232nd Street to Riverdale Waterfront	Riverdale Waterfront at 254th Street	9,000	**NYCDPR**, NYCDEP, US Army Corps of Engineers, NYSDEC, NYSDOS, NYCDCP (WRP consistency review),	1) $15M 2) $15M	1) Waterfront path over rip-rap shoreline installed under a new NYMTC project. 2) A new bridge and ramp structure required to connect waterfornt path landward over the railroad tracks at either Riverdale Park, 232nd or 231st Streets.	Width of available land between railroad tracks and shoreline is constrained, especially adjacent to CP12, Substation 11, the Riverdale Yacht Club, and passing 254th Street bridge. There is no access to this waterfront path from Palisade Avenue south of 254th Street in the Bronx without going through Riverdale Park or across private property at 231st or 232nd Street and then constructing a new bridge over the railroad tracks.
5	Palisade Ave & Riverdale Park Pathway	232nd Street	254th Street	6,750	**NYCDPR**, NYCDOT, NYCDEP (if sewer reconstr. involved)	$4.3M	Construct physically separated side path on west side of Palisade Avenue Expand existing path edge of Riverdale Park to accommodate a shared use path from 232nd Street to Spaulding Lane. Construct new off-road shared-use path on existing right-of-way in Riverdale Park.	Community Outreach prior to implementation. There is a path within the park that connects the existing sections of Palisade Ave to the north and south of Riverdale Park. The path would require changes in order to accommodate bicycles, so it must be determined whether NYC DPR and NYC DOT are willing to use existing ROW for path
6	North Riverdale Waterfront	Palisade Ave - 254th Street	Waterfront and Bronx-Westchester County Border	4,700	**To Be Determined**	1) $2M 2) $20M	1) Improve connection to waterfront over existing bridge at the end of 254th Street including construction of a new ramp from bridge to waterfront. 2) Construct a new shared use path along waterfront on existing Metro North right-of-way. Includes widening existing path for approximately 1/4 mile north of 254th Street. Also requires relocation of track 6 and shoreline stabilization/ reconstruction throughout.	Costly relocation of track 6 and underground utilities is required. Possibility of landward connection at The Point to College of Mt. St. Vincent requires approval of and coordination with Sisters of Charity.
7	Palisade Ave, 261st Street and Riverdale Ave Connector	254th Street/ Palisade Ave and 261st Street	Riverdale Ave/ 261st Street and Valentine Lane	6,450	**NYCDOT:** City of Yonkers, Westchester City Planning and DOT (Westchester portion of Riverdale Ave)	1) $5M 2) $45,000	1) Reconstruct Palisade Avenue and 261st Street as 'slow-speed' complete streets. Install new sidewalks where missing, class 3 bicycle route signs and pavement markings and other miscelaneous pedestrian safety and traffic calming improvements. 2) Install Class 2 bicycle lanes and streetscape improvements as part of proposed 4-lane to 3-lane conversion on Riverdale Avenue (extends to Yonkers).	Palisade Avenue and 261st Street have steep grades and narrow lanes, no parking, limited visibity. There is no mitigation for this. Bicycle 'lane' solution could impact availability of on-street parking. This section of Riverdale Avenue is a busy retail corridor with limited on-street space. There is no mitigation for this. Bicycle 'lane' solution could impact availability of on-street parking.

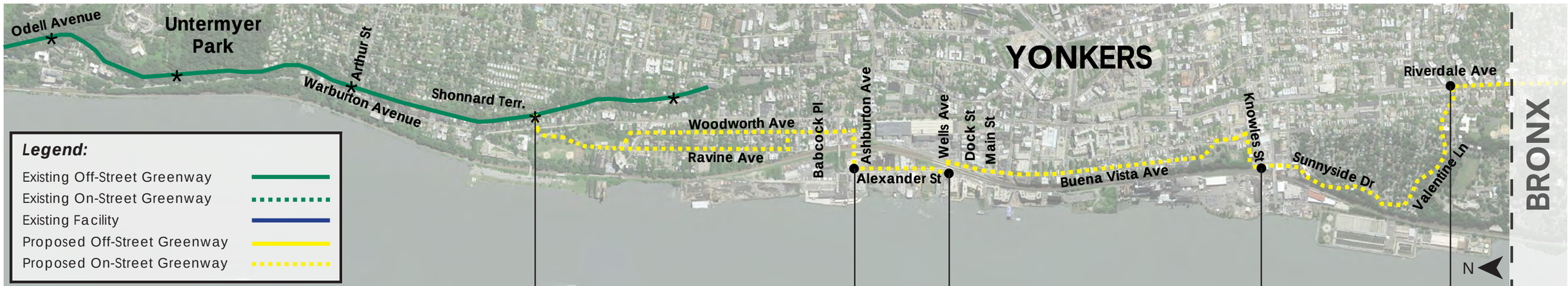
LEGEND

- Short-term off-Street Link
  Opportunity to create a Class 1 Physically Separated Greenway Path (3-5 years)
- Short-term on-street Link - On-street route alternatives requiring improved bicycle accommodation, sidewalk construction and/or repair, streetscape enhancements and pedestrian safety improvements at intersections (1-3 years)
- Medium-Term Link (5-10 years) - Capital Improvement Required
- Long-Term Link (10+ years) - Future Enhancement Project
- Study Area
- Existing Off-Street Multi-Use Trail Old Croton Aqueduct (OCA)
- ✻ Existing OCA Trail Access Points

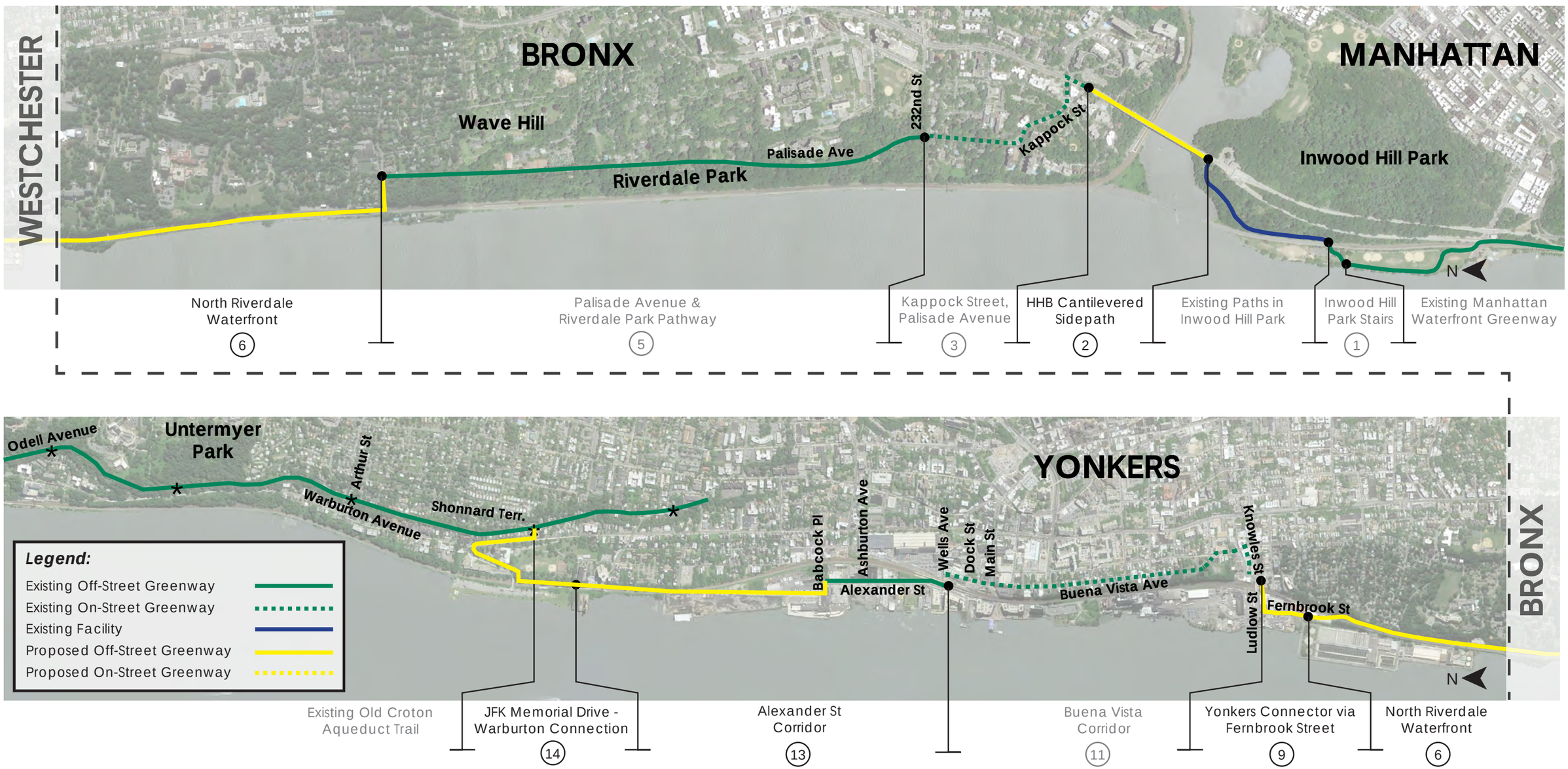
Link	Link Name	Begins	Ends	Approx. Length (LF)	Proposed Lead Agency	Approx. Cost (2012)	Explanation of Proposed Work	Critical Design Issues
8	Valentine Lane, Sunnyside Dr	Riverdale Ave	Bridge Street	4,200	**City of Yonkers**	$25,000	Install Class 3 shared lanes.	Community Outreach prior to implementation
9	Yonkers Connector via Fernbrook Street	Westchester wastewater sewage treatment plant north gate at dead-end of Fernbrook Street	Bridge Street/ Ludlow Street Intersection	3,800	**City of Yonkers**, Westchester County Dept of Env. Facilities (own Sewage Treatment Plant)	$1.7M	Install continuation of shared use path from Riverdale North Waterfront along west side of Fernbrook Street adjacent to waterfornt industrial properties (shared-use side-path). Trail continues 'on-street' on Ludlow Street and over the Ludlow Street bridge to Bridge Street.	Proposed trail must traverse northeast corner of sewage treatment plant property after leaving Metro-North RR property; may require relocation of Treatment Plant emergency access gate. Fernbrook Street shared-use side-path may require removal of parking and consolidation of waterfront access gates.Cyclists share road on Ludlow Street with heavy truck traffic bound for waterfront industrial parcels,
10	Riverdale Ave Urban Boulevard	Valentine Lane	Main Street	6,800	**City of Yonkers**; Westchester County Planning and DOT	$5M	Reconstruct Riverdale Ave as complete street urban boulevard with Class 1 physically separated Greenway path.	Yonkers Engineering, Westchester County DOT
11	Buena Vista Corridor	Bridge Street/ Ludlow Street Intersection	Buena Vista Avenue/ Wells Street Intersection	5,000	**City of Yonkers**	$1.5M	Route follows: Bridge Street, Knowles Street, Hawthorne Avenue, O'Boyle Park, Buena Vista Avenue Class 3 shared lanes, sidewalk repairs and new construction, street trees and plantings, intersection pedestrian safety improvements, corridor-wide traffic calming.	Area is run-down and remote, perceived by locals as 'dangerous'. Status of O'Boyle Park is uncertain - City may be considering selling it for development. Traffic volumes go up and traffic safety goes down as Buena Vista Avenue passes Main Street in the downtown area. Possibility to route pedestrians only via the Waterfront at Main Street.
12	Ashburton Ave, Woodworth Ave-Ravine Ave pair and Trevor Park Connection	Ashburton Street @ Alexander Street	OCA Trail access point @ Shonnard Terrace via Trevor Park	6,850	**City of Yonkers**	$1.4M	Implement Class 3 shared lane markings, sidewalk and streetscape improvements and traffic calming measures for enhanced pedestrian safety, on Ashburton Street and Woodworth-Ravine one way pair. Reconstruct existing ashalt path in poor condition in Trevor Park as a new shared use path. Install trail signage and markings throughout to direct trail users to OCA access on Shonnard Terrace via Trevor Park parking lot and Warbuton Ave.	To be coordinated with capital improvements planned for Trevor Park to be implemented by City of Yonkers and Hudson River Valley Museum.
13	Alexander Street Corridor	Buena Vista Avenue/ Wells Street Intersection	JFK Marina Park Bridge over the railroad tracks to JFK Memorial Drive	5,600	**Alexander Street Developers**, US Army Corps of Engineers, NYSDEC, NYSDOS, Westchester City (Riverwalk), **City of Yonkers**	$5M	Integrate greenway trail design into design and reconstruction of Alexander Street from Wells Street north as part of proposed new Alexander Street urban renewal and redevelopment project. Implementation of route requires close coordination with private developers and County's Riverwalk project.	Most recent plans available for Alexander St development indicate reconstruction of Alexander Street as a conventional street with basic pedestrian accommodation only. Pedestrians may be routed via Riverwalk at water's edge while cyclists are routed via new/reconstructed Alexander Street. Development plans also include construction of a new causeway at waters edge next to railroad tracks, to access JFK Marina Park to the north, separated greenway trail design would have to be integrated into causeway design.
14	JFK Memorial Drive -Warburton Connection	Glenwood MNR Railroad Station	OCA Trail access point at Shonnard Terrace via Warburton	1,300	**Westchester City Planning and DOT**; Yonkers DPRC, Hudson River Museum, NYSOPRHP (OCA- NYS State Historic Park), **City of Yonkers**	$130,000	Westchester County is implementing sidewalk improvements on JFK Memorial Drive and Warburton Avenue, and building a connecting path from the base of the JFK Marina Park Bridge over the railroad tracks to the Glenwood MNR Station.This project would add installation of Class 3 shared lane signs and markings to the path and the roadways to guide cyclists as well.	Cyclists making unprotected left turns from Warburton onto Shonnard Terrace and from Warburton onto JFK Memorial Drive.

Stage 1 (1-3 years)

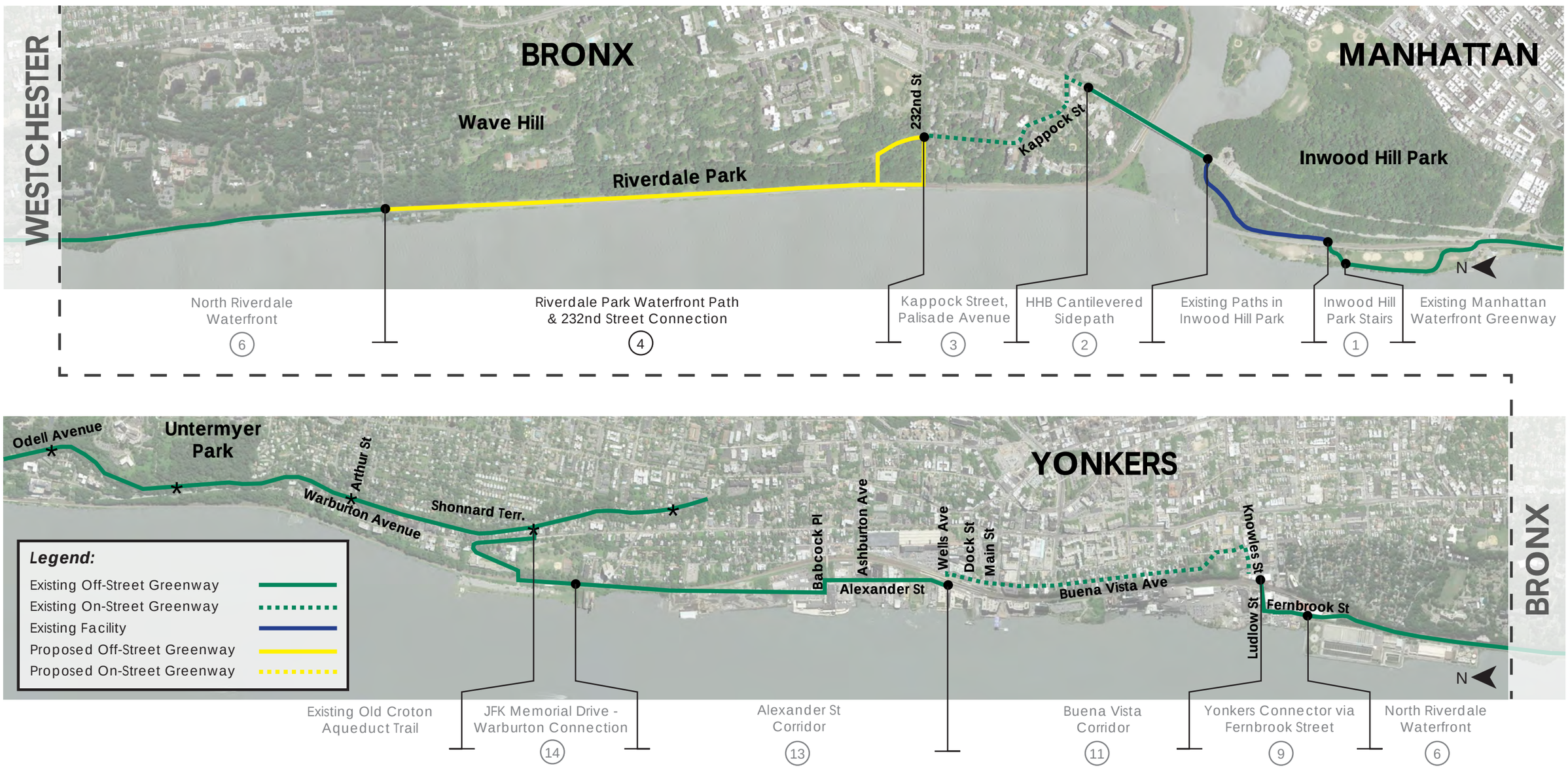




Stage 2 (3-10 years)



Stage 3 (10+ years)



CHAPTER 3:

CONCEPTUAL DESIGN OF PROPOSED CAPITAL PROJECTS FOR PREFERRED ROUTING

HUDSON RIVER VALLEY GREENWAY LINK

Introduction

Throughout the first seven Tasks of this planning study, many route alternatives were investigated and analyzed. The route that best met the goals and objectives of the project was the all-waterfront alignment. At Technical Advisory Committee (TAC) meetings, public workshops and public presentations, the message from participants was clear: they preferred a trail routed along the water to a trail that traveled inland, away from the water along small and busy streets. The whole purpose of the Hudson River Valley Greenway is, after all, to connect communities that border the river, to the river.

It is not surprising then that the Preferred Route, the one for which conceptual design was developed as part of this project, is an alignment that follows the river's edge as much as possible. The Preferred Route may be thought of as a single line on the map that traverses the entire study area, from North to South, connecting the Manhattan Waterfront and its Greenway in Inwood Hill Park to the Old Croton Aqueduct Trail in Northern Yonkers. That line was determined at the close of the Alternatives Analysis (Task 7). The project segments that make up the Preferred Route was divided into proposed discreet capital projects, and a proposed conceptual design for each of those projects is presented here, in Chapter 3 of this report.

However, in the Implementation Plan presented in Chapter 2, there are quite a few additional proposed 'links' shown on the maps and described in the tables in Chapter 2. This is because it is well recognized that some of the individual links that comprise the Preferred Route may take 5 or 10 or even more years to be built. It was believed prudent to identify alternate route links that stand a superior chance of being built in the foreseeable future (1-5 years).

The Preferred Route is one that can be built, though some parts of it may require large sums of money. A good example is the plan recommendation for the construction of a new cantilevered side path to be added to the Henry Hudson Bridge to replace (or compliment) the existing sub-standard pedestrian path. While structurally feasible, and in fact considered during the recent reconstruction of the bridge, the project will require significant funding in order to implement.

Although the goal, the Preferred Route cannot stay right on the waterfront all the way through the study area. Certain portions of the waterfront face challenges so great that it cannot be realistically hoped for that a path might be constructed there in the foreseeable future. A good example of this is the obvious omission of a pathway built on or adjacent to the Spuyten Duyvil Amtrak Railroad swing bridge. Through extensive communication with Amtrak it was determined that bridge simply could not support it and that the only chance of a trail along the water over the Spuyten Duyvil is when and if that bridge is entirely replaced as part of a much bigger project, perhaps the implementation of high-speed rail on the Hudson Line.

Another example of where constraints have eliminated the possibility of a strictly waterfront alignment is in Yonkers where the sugar refinery operates directly on the banks of the Hudson River. One of the precepts of this study was not to disturb operations of or displace jobs that are water dependent. The sugar refinery takes regular barge deliveries of raw sugar and provides valuable jobs to many Yonkers residents. A nearby low-volume roadway parallel to and with good views of the river, Buena Vista Avenue, offers an attractive and far easier to implement route alternative.

All in all the Preferred Route chosen, and presented here as discreet links, strikes an equitable balance between expensive but visionary projects that place trail users directly on the shoreline, and nearby on-street or through-park route alternatives. These links, while not located directly at the waters edge, still maintain a close visual connection with the river and may be designed to provide a safe, comfortable and convenient travel route for non-motorized users of the trail.

The Preferred Route is comprised of the following links;

Inwood Hill Park Stairs Replacement

Henry Hudson Bridge Cantilever Side Path and Bronx Approach Walkway Reconstruction

Riverdale Park Waterfront Path, 232nd Street to 254th Street

North Riverdale Waterfront Path, 254th Street to Fernbrook Street (Yonkers)

Yonkers Connector Via Fernbrook Street and Ludlow Street

Buena Vista Corridor Improvements

Alexander Street Corridor Improvements

JFK Memorial Drive Connector Improvements

① INWOOD HILL PARK STAIRS


HENRY HUDSON BRIDGE
INWOOD HILL PARK
(FOREVER WILD)
SPUYTEN DUYVIL
SWING BRIDGE
HHP NORTHBOUND
HHP SOUTHBOUND
AMTRAK
INWOOD HILL PARK
DYCKMAN STREET

Existing Conditions

Street Width: N/A

Travel Direction: North - South

Traffic Volumes: NA

Parking Regulations: N/A

Design Solution

Construct new ADA compliant ramps on either side of this existing pedestrian bridge across the railroad tracks. Resurface bridge deck. Sign ramps and bridge path for bicycle travel. Evaluate suitability of maintaining and refurbishing existing metal staircase on West side of railroad tracks. If staircase is structurally sound, refurbish it and design the new ramp on this side of the bridge to work with the existing staircase to remain. This will require structural modification of the parapet wall atop the bridge abutment to accommodate the new ramp. If the existing staircase is not structurally sound, replace it entirely with the proposed new ramp structure, utilizing the same location to attach the ramp where currently the staircase attaches to the abutment.

Construction Cost Estimate

Replacement of, or complementing, this metal stair, located on the west side of the bridge over the railroad tracks, and the step-ramp located on the east side of this same bridge, with new ADA compliant ramps, is required to facilitate bicycle access to the existing pedestrian path on the west side of the lower level of the Henry Hudson Bridge.

The pedestrian path on the HHB was reconstructed as part of a complete lower-deck roadway reconstruction project, on which work was completed in 2012. The southern access point to this pedestrian walkway is located inside the confines of Inwood Hill Park (NYCDPR) at the top of a large hill (Inwood Hill). This critical access point connects to the waterfront portion of Inwood Hill Park, located west of the railroad tracks, via a very steep pathway that traverses the hillside in a series of steep pitches, until it eventually reaches, and crosses, the steel bridge over the railroad tracks pictured at right. After crossing this bridge and descending the steel staircase located there, Dyckman Street is accessible via existing flat asphalt park paths that are in good condition. This route is a pedestrian only path and not currently designated as a bicycle route.

The New York City Parks Department (NYCDPR) completed construction of a DCP master plan for the Manhattan Waterfront Greenway in 2006. That project will bring a continuous multi-use trail up the Hudson River waterfront, adjacent to the southbound Henry Hudson Parkway, as far north as Dyckman Street.

A new NYCDPR Capital project, currently scheduled for completion in 2013 will improve and formalize the bicycle connection from the current northern limit of the MWG to and across this railroad bridge, and up the steep hill east of the bridge, to the HHB pedestrian path access point. This capital project will not, however, repair or replace the metal staircase on the west side of the bridge, or the masonry step-ramp on the east side of the bridge.

Replacement of or complementing existing metal stairs	$2,000,000
Total	$2,000,000

Steep paths inside Inwood Hill Park, paved with asphalt and in good condition, connect the steel bridge over the railroad tracks to the access point for the HHB pedestrian path

Inwood Hill Park Path where it connects to the Henry Hudson Bridge Pedestrian Bridge adjacent to the lower level Bridge toll plaza.

2 HENRY HUDSON BRIDGE CANTILEVERED SIDE PATH & BRONX APPROACH WALKWAY


RIVERDALE,
BRONX
REPLACE STAIRS
PROPOSED WALKWAY
RECONSTRUCTION
SPUYTEN DUYVIL SWING BRIDGE
SPUYTEN DUYVIL MNR
STATION
HENRY HUDSON BRIDGE
PROPOSED CANTILEVERED
SIDE PATH
INWOOD HILL PARK,
MANHATTAN
AMTRAK

The west facing side of the Henry Hudson Bridge as seen from above the Spuyten Duyvil MNR Station in Riverdale, Bronx.

Existing Conditions

Street Width: N/A

Travel Direction: North - South

Traffic Volumes: NA

Parking Regulations: N/A

Design Solution

Construct new cantilevered shared-use path structure adjacent to lower level roadway on West side of Bridge.

Widen existing at-grade pedestrian pathway adjacent to Henry Hudson Parkway Southbound roadway into the Parkway break-down lane.

Replace stairs located at north end of HHB pedestrian path access point in the Bronx (@ intersection with southbound Parkway service road) with a new ADA compliant ramp.

Construction Cost Estimate

The Henry Hudson Bridge was an early accomplishment of Robert Moses in 1936-7 and is currently used by cyclists and pedestrians and connects Inwood Hill Park at the northern most tip of Manhattan with the Riverdale section of the Bronx. The bridge affords magnificent views of the Hudson River and NJ Palisades beyond. There is an existing pedestrian path on the west side of the lower level roadway, but it is not ADA compliant. Cycling on the bridge is prohibited by MTA Bridges and Tunnels, the owner of the bridge. An original 10'-0" wide pedestrian promenade on the east side of the upper level roadway has been removed. Reaching the bridge on foot or by bike through Inwood Hill Park is a challenge due to the high elevation of the bridge and the very steep slope of the paths that connect to it. The existing lower level pedestrian path access point on the Manhattan side of the bridge is accessed via asphalt pathways that climb the very steep hillside from the banks of the Hudson River to the top of the west side of the ridge on which sits the Park. The pedestrian paths and associated drainage systems were fully reconstructed in 2006 and are in good condition. No signs currently mark the route to the bridge through the park, and at present these pathways are still designated as 'pedestrian-only', no bicycling allowed, however NYCDPR is currently carrying out a capital project (scheduled for completion Spring 2014) that will designate the pathways for cyclists as well.

Travelling north through the park toward the Bronx, once the bridge itself is gained, the existing pedestrian path on the south side of the lower level of the Henry Hudson Bridge is not adequate for a greenway route. It is 4 feet wide or less, and requires cyclists to dismount in order to cross the bridge. In order to provide a shared use path across the Henry Hudson Bridge it is proposed that a cantilevered side path be attached to the existing bridge structure.

There are two alternatives to be explored for improved pedestrian and bicycle accommodation on the bridge structure itself:

HHB Bridge Cantilever Alternative 1

A cantilevered side path could be retrofitted onto the bridge, maintaining all existing infrastructure. The pedestrian path sidewalk would become part of the roadway to provide additional width for the southbound moving lanes. The path would extend 10-12 feet from the fascia girder on the west side of the bridge, providing a bidirectional path for shared use by cyclists and pedestrians. See Figure 1: Henry Hudson Bridge cantilevered side path for a photo rendering of this recommendation. The feasibility of this solution has been confirmed by a bicycle and pedestrian access study conducted by MTA Bridges and Tunnels, although a source of funding to construct the path was never identified.

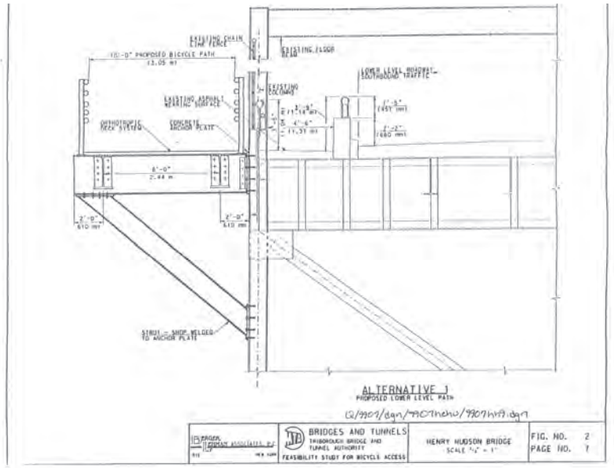
HHB Bridge Cantilever Alternative 2

The second alternative is still a new shared use path built on a cantilevered structure altered to the west side of the lower deck of the bridge. This alternative, however, entails removing the concrete wall and chain link fence on the west side of the bridge in order to include the existing pedestrian path as part of the new cantilevered shared use path. Therefore, pedestrians would have use of the existing space, with opportunities to pass or take in views of the Hudson River by crossing between the support beams of the bridge. If a capital project were to be undertaken to build this cantilevered path, consideration should be given to the feasibility of this option in order to provide the most robust greenway facility possible.

Cantilevered pathway on bridge	$30,000,000
Pathway widening adjacent to Parkway north of bridge	$2,000,000
Replace masonry stairs with new ramp structure at north end of pedestrian path	$500,000
Total	$32,500,000

Existing pedestrian only path on the west side of the lower deck roadway - recently reconstructed in 2008- 2010

This is the point at which cyclists and pedestrians accessing the path from Inwood Hill Park enter the pedestrian path shown at left.



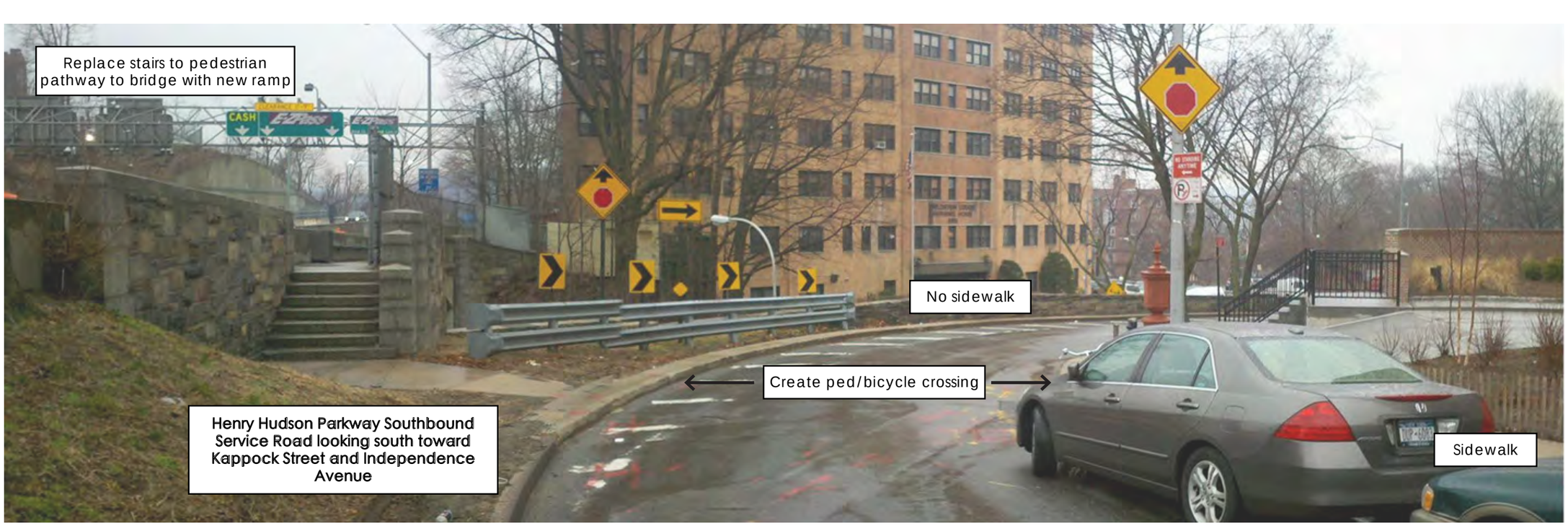
Schematic design of proposed cantilevered side path structure source:

Feasibility study for bicycle access at various Authority Facilities, MTA Bridges and Tunnels (TBTA), December 1999, prepared by Ammann & Whitney & Berger Lehman

Existing Henry Hudson lower level pedestrian path on west side of bridge. View looking south from Bronx side of the bridge.

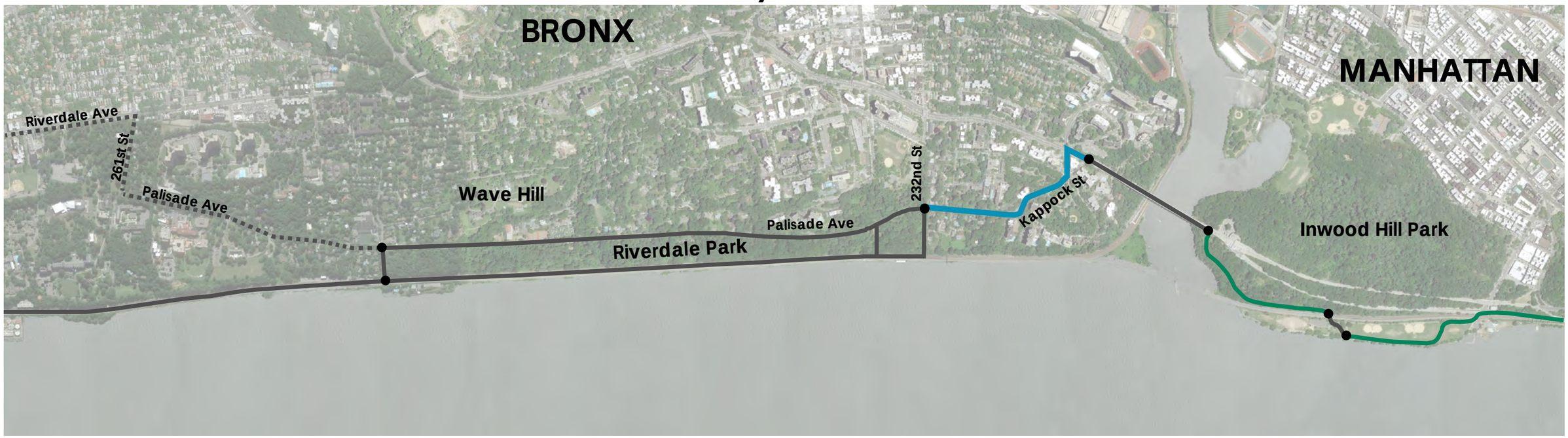
Proposed 10'-0" wide cantilevered side path without removing the existing concrete parapet wall and chain link fence.

Proposed 10'-0" cantilevered side path with existing concrete parapet wall and chain link fence removed.



Images on this page depict existing conditions in the Bronx at the location where the pedestrian path that goes to the Henry Hudson Bridge lower level walkway may be accessed from the Henry Hudson Parkway Southbound service road, just above Kappock Street.

3 HHP SOUTHBOUND SERVICE ROAD; KAPPOCK STREET; PALISADE AVENUE




SETON PARK
232nd STREET
231st STREET
PARKWAY SERVICE ROAD
HENRY HUDSON PARKWAY
INDEPENDENCE AVE
STREET
KAPPOCK
PALISADE AVENUE
PALISADE AVENUE

View looking down the hill on the southbound Henry Hudson Parkway service road. Independence Avenue intersection is visible in the background. Kappock Street is visible below and to the left.

Existing Conditions on Kappock Street

Existing Conditions on Palisade Avenue

Existing Conditions

Street Width: Kappock Street – 44'; Palisade Avenue – +/- 34'

Travel Direction: North - South

Traffic Volumes: Low

Parking Regulations: Alternate side parking on both sides of Kappock Street; informal parking along unpaved shoulder on North side of Palisade Avenue

Design Solution

The access point to and from the Henry Hudson Bridge pedestrian path is located on the east side of Henry Hudson Parkway Service Road which is one-way southbound. Because the Service Road is one-way, cyclists traveling south (from the Bronx to Manhattan) on the Greenway must walk their bicycles from Kappock Street/ Independence Avenue intersection up the hill to the Henry Hudson Bridge pedestrian path access point. When traveling north on the Greenway (from Manhattan to the Bronx), cyclists are able to ride down the hill with traffic along the service road in the direction of travel to Independence Avenue/ Kappock Street intersection and continue west and north on Kappock to Palisade Avenue.

Kappock Street provides the most direct connection from the end of the Henry Hudson Bridge pedestrian path to Palisade Avenue, the closest through-road parallel to the waterfront. It has large residential buildings set back from the street and low traffic volumes. A healthy tree canopy provides shade. A wide striped parking lane is recommended on the two-way section of Kappock Street between Independence Avenue and Palisades Avenue where street width permits.

Where Kappock Street ends and becomes Palisade Avenue, the roadway narrows and land use changes to a lower density with single family homes on larger lots and low traffic volumes. These conditions make shared lane markings a comfortable option for cyclists. To improve the pedestrian experience, it is recommended that shoulder parking be formalized on the east side of the street and a sidewalk built along the west side of the street. The Palisade Avenue roadway would need to extend eight feet to the west to accommodate the sidewalk. This stretch of Palisade Avenue from Kappock Street to 232nd Street should be designed as a slow-speed complete street with active traffic calming features such as speed humps and bicycle boulevard pavement markings.

<u>Accessing the waterfront</u>

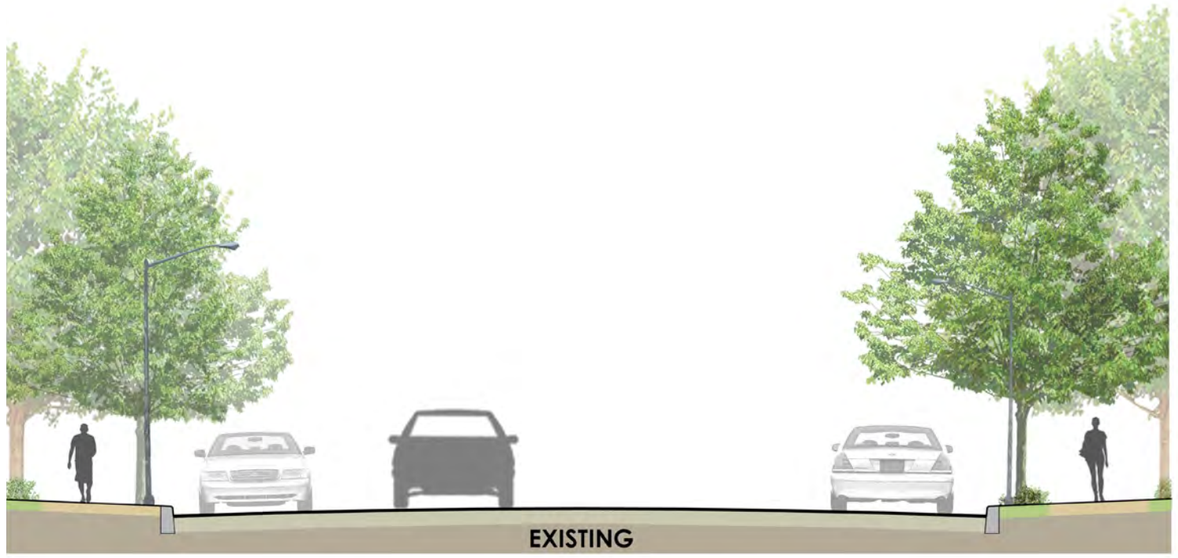
On the north end of this segment, the route could potentially connect to the waterfront via 231st or 232nd Street.

232nd Street: The 232nd Street right-of-way is the southern border of Riverdale Park and appears to end at the property line of a private residence. If waterfront access is not possible along the 232nd street right-of-way, the southern edge of Riverdale Park could be considered. Close coordination with NYC Parks would be required if a route through the park were to be considered.

These options will be studied further in the future.

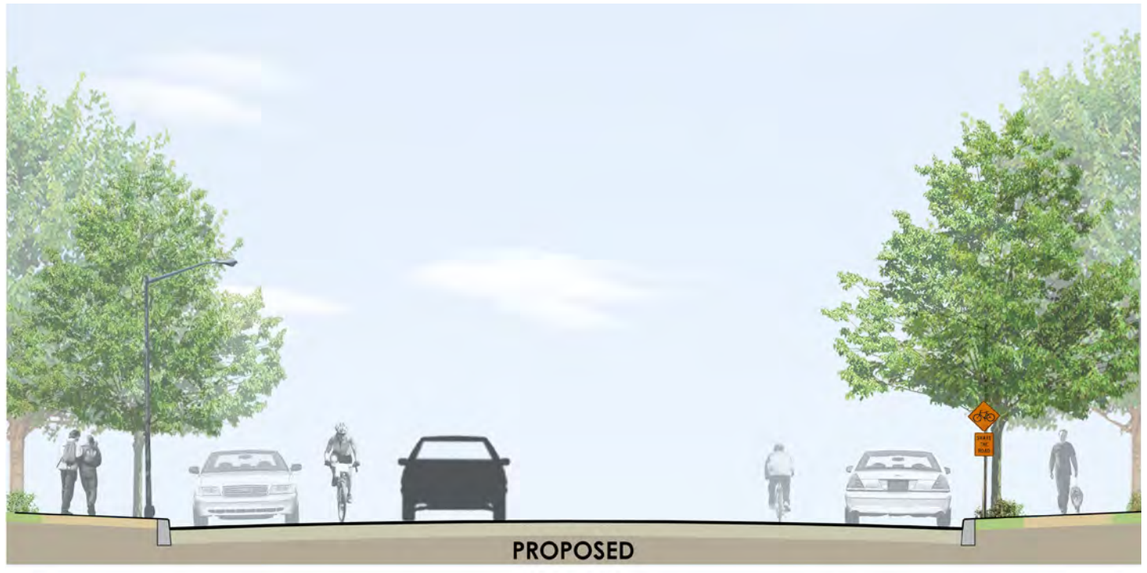
Construction Cost Estimate

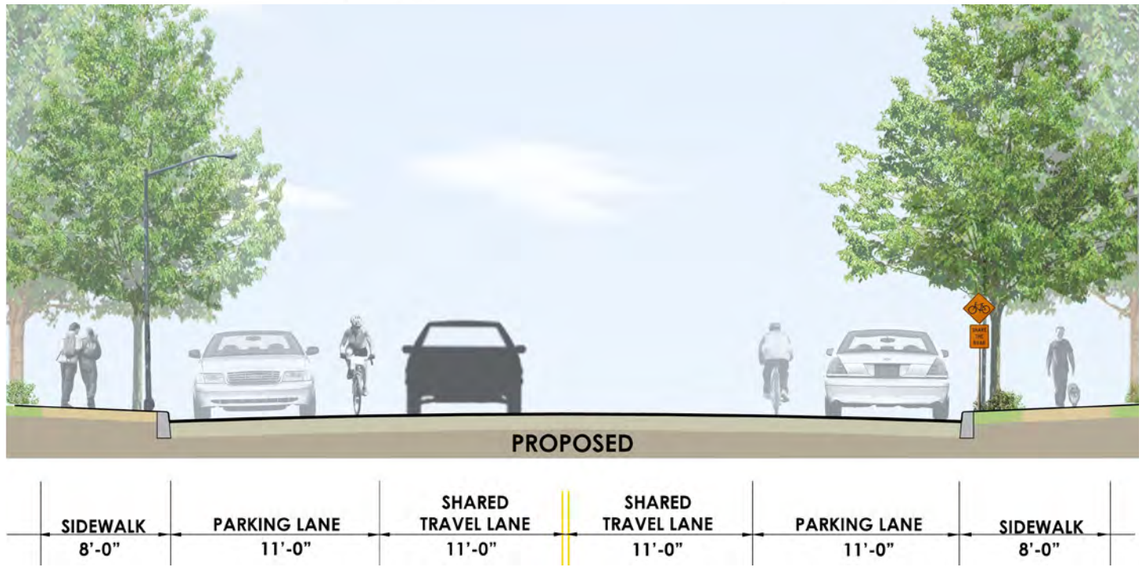
Kappock Street	$200,000
Palisade Avenue	$1,500,000
Total	$1,700,000



Existing Configuration of Kappock Street - Independence Avenue to Palisade Avenue

Existing Conditions on Kappock Street - view looking northwest towards Palisade Avenue from Independence Avenue





Proposed Configuration of Kappock Street - Independence Avenue to Palisade Avenue - Wide Parking Lane Alternative

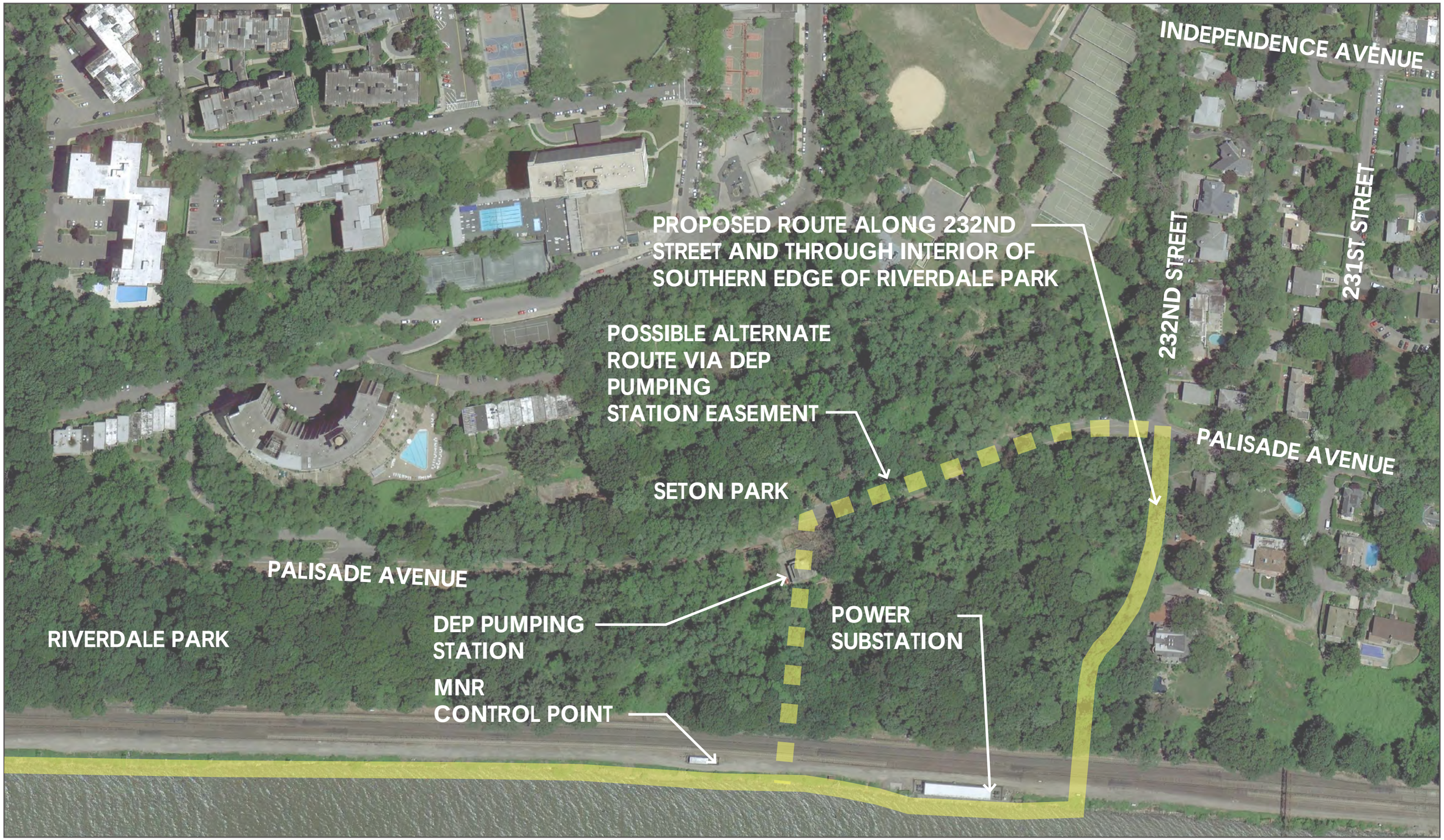
Example of Class III Bike Route - sharrows only

Existing Conditions on Palisade Avenue

Example of Wide Parking Lane

Proposed Conditions on Palisade Avenue

4 RIVERDALE PARK WATERFRONT PATH & 232ND STREET CONNECTION


INDEPENDENCE AVENUE
232ND STREET
231ST STREET
PROPOSED ROUTE ALONG 232ND STREET AND THROUGH INTERIOR OF SOUTHERN EDGE OF RIVERDALE PARK
POSSIBLE ALTERNATE ROUTE VIA DEP PUMPING STATION EASEMENT
PALISADE AVENUE
SETON PARK
PALISADE AVENUE
RIVERDALE PARK
DEP PUMPING STATION
POWER SUBSTATION
MNR CONTROL POINT

Looking North along the Riverfront with Riverdale Park to the right

Looking South along the Riverfront with CP12 at left and Substation 11 beyond

Existing Conditions

This alignment is off-road between the Hudson River shoreline and the Metro-North Railroad tracks from West 232nd Street to West 254th Street in the Bronx, with a connection on a bridge across the tracks to West 232nd Street. Metro-North's Track 6, an unelectrified service and freight track begins north of 232nd Street and continues north past 254th Street and Riverdale train station. From 232nd Street south a track leading to the Spuyten Duyvil railroad bridge used by Amtrak is also located between the four 'Main Line' tracks and the river's edge. Between the end of the Amtrak track and the beginning of Track 6 just north of West 232nd Street, are small buildings for Metro-North Substation 11 and Control Point 12 (CP12) for the operation of the track switches in that area.

A dirt and gravel service lane runs south from West 254th Street, past the substation and control point, to a point north of the Spuyten Duyvil Bridge. This lane occupies part of the space between the tracks and the shoreline. A line of metal towers between the service lane and the shore carry a power line from West 254th Street south to the substation. At the Riverdale Yacht Club, where the Metro-North right-of-way narrows, a design solution would need to be developed. Space is particularly constrained next to the substation and control point structures.

At the north end of the segment, the Riverdale Yacht Club occupies land that projects into the Hudson River. Next to the yacht club's fence, the service lane occupies all of the available space between the Yacht Club's fence and Track 6, which is located close to Track 4 throughout this section and therefore cannot be moved east as is possible in the section north of Riverdale Station.

At the north end of the segment a short roadway connects the Yacht Club and the Metro-North service road to the West 254th Street bridge. This segment of roadway, which turns south from the 254th Street Bridge, is owned by the Yacht Club.

Design Solution

A pedestrian bridge and ramp would be constructed to connect the riverfront path to Palisade Avenue at West 232nd Street. Options to connecting at West 232nd Street include connecting through part of Riverdale Park at the end of 232nd Street or at the DEP pumping station on Palisade Avenue. Due to the sensitive and unique historic forest conditions in Riverdale Park, the New York City Department of Parks & Recreation has given this area "Forever Wild status". In considering any plans for construction in a Forever Wild area, the proposal's impact to the flora and fauna, as well as the site's geological and hydrological conditions must be considered. A sensitively designed bike path may be constructed in Forever Wild areas, paved or unpaved, however it must be approved by the Natural Resources Group (NRG). In addition to the simple tree mitigation required in all city projects, NRG must be consulted to find a route that would minimize runoff and damage to habitat in the area. At the river's edge, the bridge over the MNR tracks could connect to the ground level by a switch-back ramp, a spiral ramp over the water, or a linear ramp, possibly with Metro-North facilities underneath the ramp.

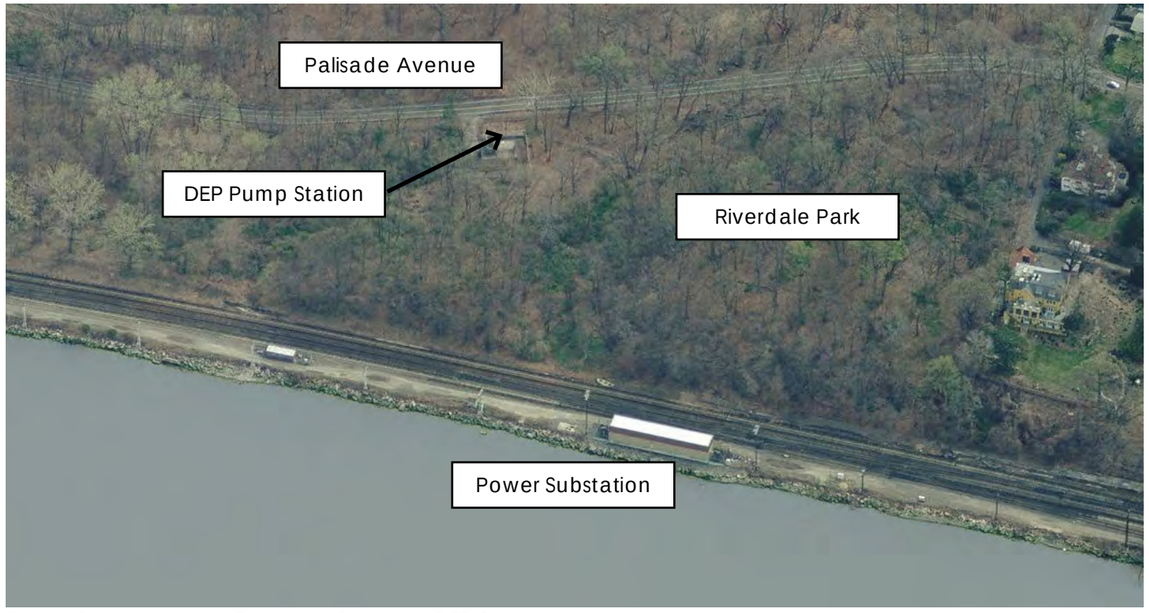
A paved or crushed stone multi-use path would be built along the river's edge with reconstruction and extension of the natural/ rip-rap shoreline by up to 10 feet in most areas. A fence would be constructed to separate the path from the Metro-North service road and the tracks. A design solution would be required to continue the path past the CP12 and Substation 11 structures. At the Riverdale Yacht Club, where the Metro-North right-of-way narrows, a design solution would need to be developed. This segment of the path would meet the Northern Riverdale Waterfront segment at the West 254th Street bridge.

A ramp would connect the path to the roadway at the west end of the 254th Street bridge over the MNR tracks. The ramp would be designed to meet ADA requirements for the disabled. The vertical climb at this location is about 20 feet, requiring a ramp about 300 feet in length, including short intermediate landings where the disabled could rest as required by ADA. Wider landings would be located at the top and bottom of the ramp to provide an area for people to rest or gather. Due to the slope and curvature of the existing roadway at the west end of the existing 254th Street bridge, some modification may be required in this area to provide a level connection between the roadway and the ramp. The ramp would be placed so that the multi-use path could continue south next to the ramp to pass under the West 254th Street bridge and continue south, if desired.

Construction Cost Estimate

Costs include construction of a pedestrian bridge, pathway, and fencing. Potential mitigations to address the substation and control point are such as a path built out over the water not known and require further development.

New pedestrian bridge access over railroad tracks	$15,000,000
New waterfront path and shoreline improvements	$15,000,000
Total	$30,000,000



Power Substation and Riverdale Park with DEP Station

Conceptual Plan for Multi-use Path at south end of Riverdale Yacht Club

Conceptual Plan for Multi-use Path at the north end of Riverdale Yacht Club

Conceptual Plan for Multi-use Path along Riverfront and Bridge to 232nd Street to be determined

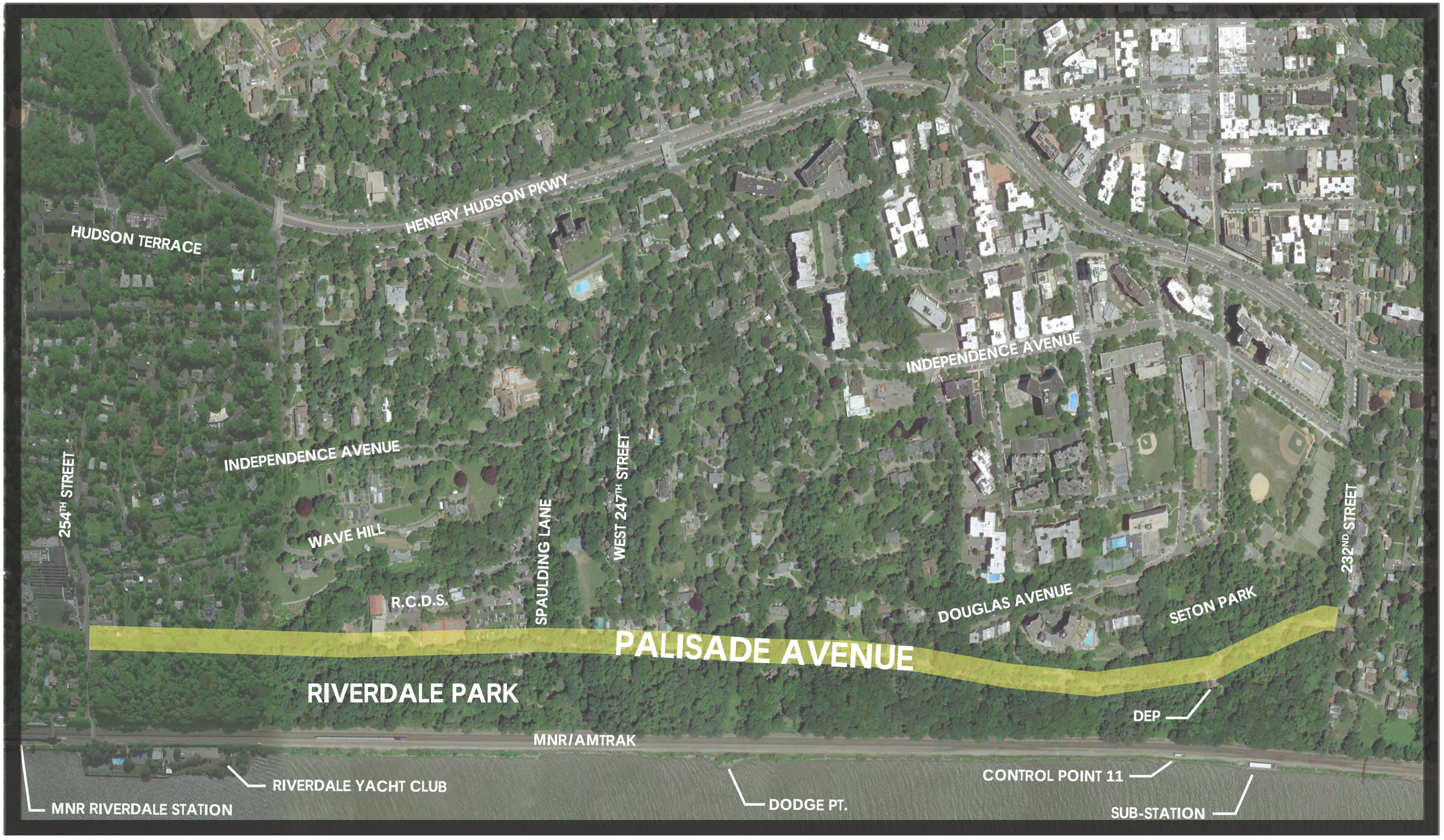
Eastbank Esplanade with Spiral Ramp

Floating Bikeway, Portland, OR

Pile supported pathway in Riverside Park, Manhattan

Fort Washington Park Link at water edge

5 PALISADE AVENUE & RIVERDALE PARK PATHWAY


HENERY HUDSON PKWY
HUDSON TERRACE
INDEPENDENCE AVENUE
254TH STREET
INDEPENDENCE AVENUE
WAVE HILL
SPAULDING LANE
WEST 247TH STREET
R.C.D.S.
DOUGLAS AVENUE
SETON PARK
232ND STREET
PALISADE AVENUE
RIVERDALE PARK
DEP
MNR/AMTRAK
RIVERDALE YACHT CLUB
CONTROL POINT 11
MNR RIVERDALE STATION
DODGE PT.
SUB-STATION

View looking north on Palisade Avenue Between Spaulding Lane & 232nd Street

Palisade Avenue R.O.W. Between Spaulding Lane & 254th Street

Existing Conditions

Street Width: 20' Roadway, 2-15' Side Path

Travel Direction: South - North

Traffic Volumes: Low

Palisade Avenue is a narrow, two-way residential street with direct views of the Hudson River waterfront at certain cross streets and New Jersey Palisades. From 232nd Street to Spaulding Lane, a 7-15' dirt path runs along the west side of the roadway. Official maps from the Bronx Borough President's Office show additional unused right-of-way under NYCDOT ownership that could possibly be used for a more robust greenway facility. Traffic volumes range between approximately 50 and 150 vehicles per hour (vph) per direction during the AM and PM peak hours. North of 231st Street, no parking is allowed on either side of the roadway. Land use is predominately single family residential to the east. Riverdale Park is to the west from 232nd Street to 254th Street.

Riverdale Park has been designated "Forever Wild" by NYCDPR. This designation has strong community support and presents a challenge to any new development that may be proposed on park property. However, the dirt path along the edge of the park is generally free of trees, and therefor improvements to the path would have minimal impact on Riverdale Park's natural environment. Impacts to trees are being studied. Because of its steep slope Spawling Lane is not recommended for a bicycle route. The intersection of Palisade Avenue and Spaulding Lane requires careful planning to guide motorists, pedestrians and cyclists around this right-angle turn in the road. Spaulding Lane has rough paving and climbs steeply away from Palisade Avenue, creating a need for significant traffic calming to address these conditions as well as visibility between modes.

Design Solution

Palisade Ave from 232nd Street to Spaulding Lane

Option A: The roadway consists of one 10' travel lane in each direction with minimal shoulder, no curbs and no parking. Pedestrians currently use a 7-15' dirt path on the west side of the roadway. This path should be upgraded to ensure pedestrian safety and comply with ADA guidelines. Shared-lane markings are proposed on this portion of the roadway for cyclists.

Option B: Title and grade maps from the Bronx Borough President's Office indicate an 80'-120' right-of-way exists on this portion of Palisade Avenue. A physically separated shared multi-use path, with a two-way bicycle path and walkway is proposed to upgrade the existing path on the west side of Palisade Avenue. One travel lane is maintained in each direction at the existing lane widths.

Spaulding Lane to 254th Street

Palisade Avenue right-of-way continues north of Spaulding Lane as a dirt path. It is proposed that this path could be improved to allow cycling, as a continuation of the side path proposed south of Spaulding Lane.

Construction Cost Estimate

Palisade Avenue from 232nd Street to Spalding Avenue	$1,000,000
Palisade Avenue from Spalding Avenue to 254th Street	$2,400,000
254th Street Connector	$900,000
Total	$4,300,000

Existing Conditions: Palisade Avenue R.O.W. - Spaulding Lane to 254th Street

Case Study Example: Tallman Mountain State Park - Rockland City, NY

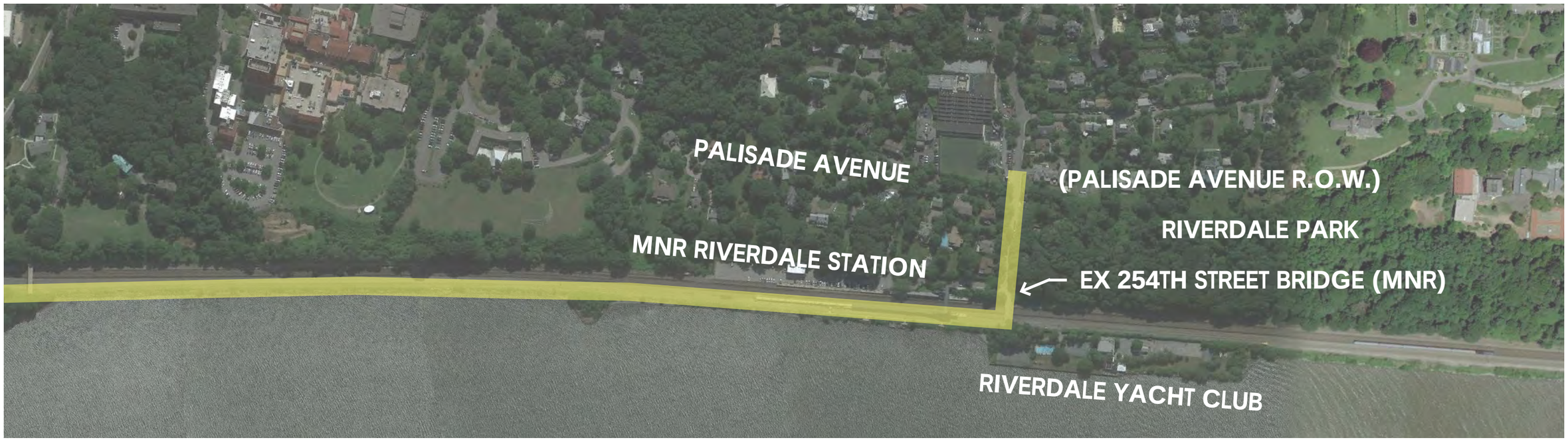
Case Study Example: The OCA Trail in Yonkers

Existing Photo Palisade Avenue - BEFORE

Rendering of potential multi-use path along Palisade Avenue - AFTER

Existing Conditions: Palisade Avenue Between Spaulding Lane & 247th Street

6 NORTH RIVERDALE WATERFRONT


PALISADE AVENUE
MNR RIVERDALE STATION
(PALISADE AVENUE R.O.W.)
RIVERDALE PARK
EX 254TH STREET BRIDGE (MNR)
RIVERDALE YACHT CLUB


FERNBROOK STREET
WESTCHESTER SEWAGE
TREATMENT PLANT

View Looking South along Hudson River Shoreline from College Point Bridge

Rendering of Potential Multi-use Path and Reconstructed Shoreline Looking South from College Point Bridge

Existing Conditions

This alignment is off-road between the Hudson River shoreline and the Metro-North Railroad tracks from West 254th Street in the Bronx to the south end of Fernbrook Street in Yonkers. Metro-North's Track 6, an unelectrified service and freight track parallels this entire section. Metro-North's Riverdale station is located at the southern end of this segment and, along with adjacent Track 6, limits available land next to the shoreline in that portion.

West 254th Street crosses the Metro-North tracks on a bridge just south of the Riverdale Station. At the west end of the bridge a short roadway turns south and descends to the level of the tracks, providing access to both the Riverdale Yacht Club and to an unpaved Metro–North service road that extends to the south. The paved roadway is the property of the Riverdale Yacht Club.

About midway through the segment, the shoreline extends out into the river, creating College Point, a piece of land on the west side of the railroad right-of-way which is owned by the College of Mount St. Vincent and is connected to the college by a foot bridge.

At the northern end of the segment, the Westchester County Wastewater Treatment Plant extends out into the Hudson River so the alignment runs between the Treatment plant and the railroad. Also in this section is an additional short track siding that runs parallel to Track 6.

Also throughout the segment, the shoreline undulates so that the space available between the railroad tracks and the shoreline varies. However, throughout most of the segment there is enough space to provide a multi-use path and maintain Track 6. The shoreline comprised primarily of unconsolidated fill material, edge is however, badly eroded and continually washing away into the river.

Design Solution

The proposed design in this segment consists of a paved or unpaved multi-use path along the waterfront between the shoreline and the railroad. Through most of the segment Track 6 would be shifted east to be closer to Track 4, which would free sufficient land for the path though most areas. Where the available space is too narrow for a path, primarily next to Riverdale station, a limited addition of rip rap, stone, and fill would be required to provide sufficient space for the path and to protect the river's edge and path from erosion. A continuous fence must separate the multi-use path from the Metro-North tracks.

At the north end of the segment, the short track siding next to the Westchester County Sewage Treatment Plant would have to be removed to make room for the multi-use path. The path would continue within the Metro-North right-of way behind the treatment plant to reach the southern end of Fernbrook Street. At the south end of Fernbrook Street, a new gate would be constructed for the emergency access road to the treatment plant in order to allow the multi-use path to connect to the street without passing through the adjacent private property.

Construction Cost Estimate

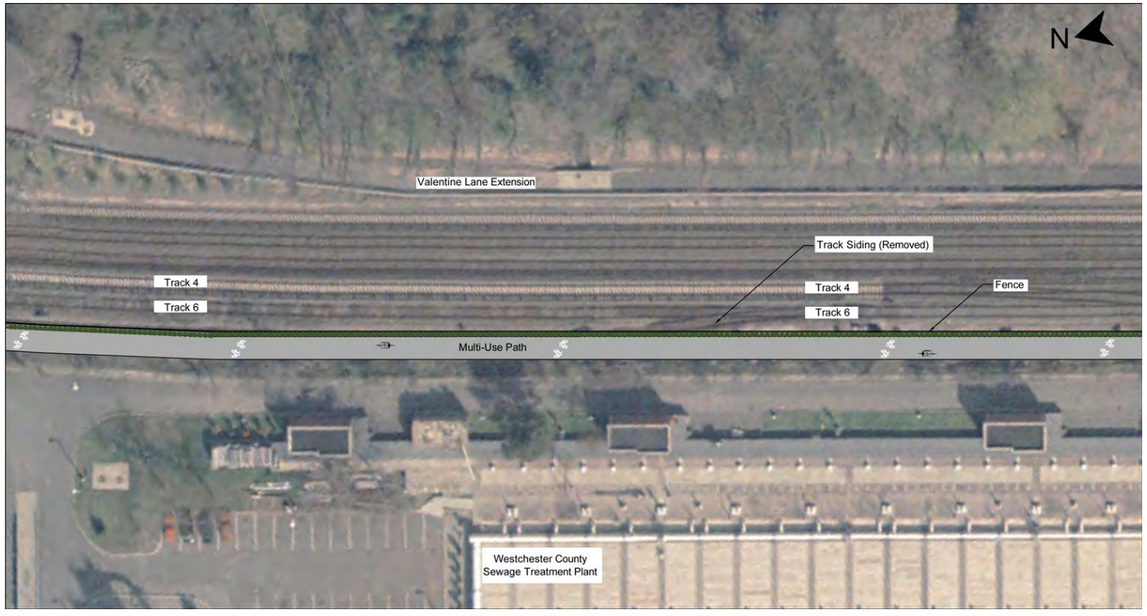
Costs would include construction of shared use path along waterfront on existing Metro North right-of-way or rip rap. Includes widening and other improvements to existing path for approximately 1/4 mile north of 254th Street. Explore relocation of track 6 north of Riverdale station. The order of magnitude cost estimate for the 254th Street Ramp is $1.0 to $1.1 million and includes a contingency factor.

New ramp from south end of path up to 254th Street bridge	$2,000,000
Relocation of Track 6 and associated underground utility and power	$15,000,000
Path Construction	$5,000,000
Total	$22,000,000

Conceptual Plan for Multi-use Path next to Riverdale Station

Conceptual Plan for Multi-use Path at Riverdale Yacht Club and 254th Street

Conceptual Plan for Multi-use Path next to the Westchester Sewage Treatment Plant - Part 1 South



Conceptual Plan for Multi-Use Path Next to the Westchester Sewage Treatment Plant – Part 2 Mid-South

North Riverdale Waterfront @ College Point (approximately 261st Street)

Conceptual Plan for Multi-Use Path Next to the Westchester Sewage Treatment Plant –Part 4 North. Proposed path exits MNR R.O.W. and cuts corner of Sewage Treatment Plant property to reach Fernbrook Street.

Existing Condition: Eroded Shoreline north of Riverdale MNR Train Station

Hudson River Shoreline, west bank, Nyack Beach State Park, Rockland County NY

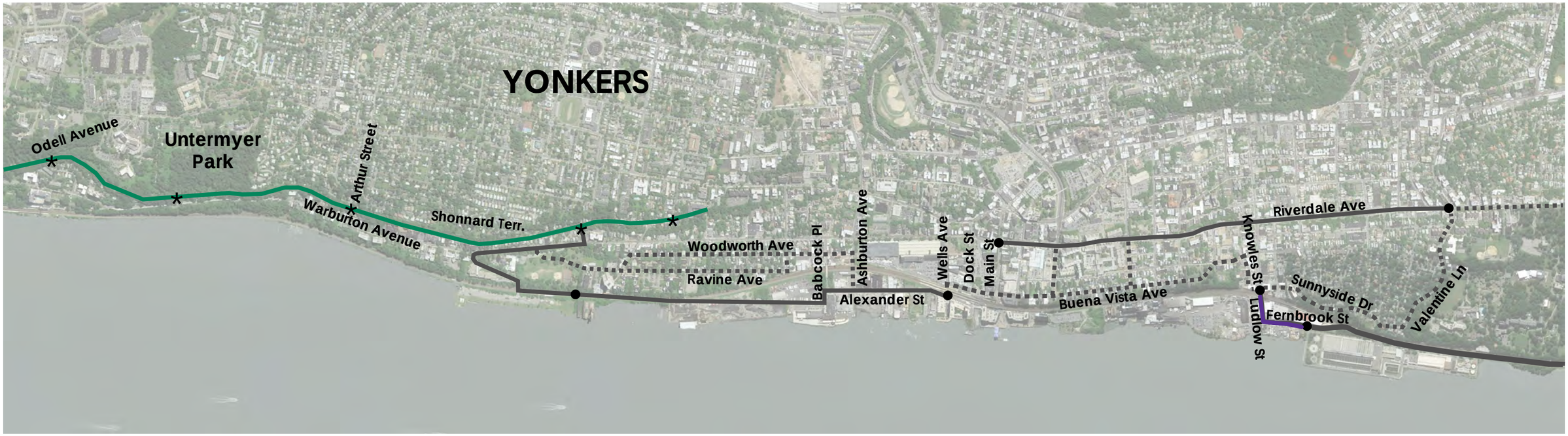
Existing Condition: Shoreline in vicinity of College Point

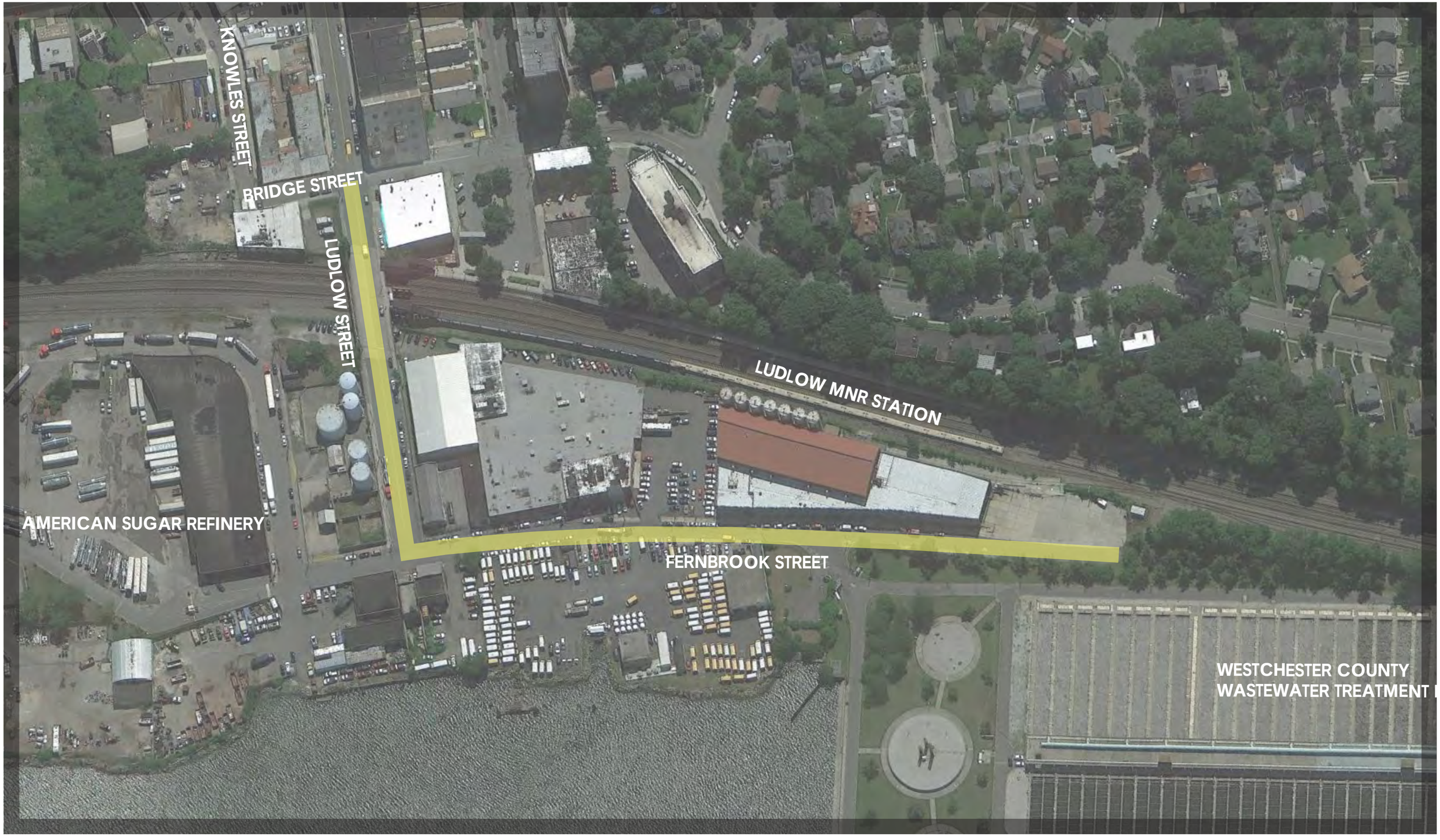
Tidal pools at the edge of Harlem River Park

Hudson River Shoreline, Riverside Park/ Cherry Walk, NY NY

9

YONKERS CONNECTION VIA FERNBROOK STREET




KNOWLES STREET
BRIDGE STREET
LUDLOW STREET
LUDLOW MNR STATION
AMERICAN SUGAR REFINERY
FERNBROOK STREET
WESTCHESTER COUNTY
WASTEWATER TREATMENT

Existing Conditions

Street Width: Fernbrook Street – varies 40 to 50 feet; Ludlow Street - 55 feet

Travel Direction: Two-way. Fernbrook Street dead-ends just past entrance to Westchester County Wastewater Treatment Plant.

Traffic Volumes: Low on weekdays, very low on weekends.

Parking Regulations: parking officially allowed on east side of Fernbrook Street only. Extensive informal parking also occurs on discontinuous sidewalk and unpaved curbless spaces along west side of Fernbrook Street. Parking is permitted on south side of Ludlow Street only between Fernbrook and the bridge over the Railroad tracks. No parking is allowed at all on Ludlow Street on the bridge structure itself.

Fernbrook Street along the east side of the street is lined with buildings that house a number of businesses including the relatively recent addition of a thriving set design business that has taken over a vacated warehouse. The majority of the waterfront along the west side of Fernbrook Street, between just south of Ludlow Street and the entrance to the sewage treatment plant, is a large open-air parking lot for a private bus company. While the edge of the roadway along the east side of the street is well defined by a curb and sidewalk in relatively good condition, the west side of the roadway, in many places, lacks physical definition, with no curb or pavement present, only a chain link fence separating the street from the bus parking lot. The lack of physical definition and signage along the west side of the street, results in this area being parked on in an ad-hoc, haphazard way. The large bus parking lot, that takes up almost the entire waterfront along the west side of Fernbrook, has only one entry/exit point.

Design Solution

Fernbrook Street - Short-Term: In the near-term, it is recommended that 'sharrow' pavement markings and shared lane signs be placed to guide cyclists along Fernbrook Street. They will also serve to alert truck drivers and other motorists that they are, or will be, sharing the roadway with cyclists. If parking restrictions along the west side of the street are ever enforced, then striping class 2 bike lanes along the street may be considered. Under the present circumstance, with cars lining both sides of the street, there isn't room for striped bicycle lanes. Pedestrians will use the existing sidewalk on the East side of the street. Streetscape improvements such as street trees, banners and other graphics blazing the greenway trail route, and hi-visibility decorative crosswalks at intersections can also be contemplated for the pedestrian route along the existing sidewalk.

Fernbrook Street - Long-Term: The off-road multi-use trail coming off of the railroad right-of way to the south, from behind the sewage treatment plant should continue all the way along the west side of Fernbrook Street as far as Ludlow Street, at which point, cyclists will begin riding in the street with traffic. This will require the permanent removal of the cars that park along this stretch of Fernbrook currently. This is feasible solution from an off-road trail design perspective because there is only the one location (the entry/exit to the bus parking lot) where vehicles will need to cross the trail. City owned right-of-way width must be confirmed to test engineering feasibility.

Ludlow Street – Short Term: Striped bicycle lanes are proposed as the 'cyclist' accommodation on Ludlow Street to Bridge Street. Streetscape improvements are proposed for the sidewalks though it must be noted that street trees cannot be planted on the bridge.

Ludlow Street – Long Term: Widen the sidewalk on the north side of the street and across the bridge to continue the proposed Urban Side Path (shared-use sidewalk) that is proposed for the west side of Fernbrook, all the way to Bridge Street. The current lack of parking and wide travel lane justifies testing the engineering feasibility of this recommendation.

View looking south on Fernbrook Street toward the sewage treatment plant. Unconsolidated parking at fence line is visible on right (west side of street). Recommend replacement of parking with new shared-use side-path.

Construction Cost Estimate

Short-Term solution

The construction in this area would include repair to curbs and sidewalks and striping for bike lanes or pavement markings (sharrows) and signage for shared-use of the two roadways.

Long-Term solution

Construction of an Urban Side Path (aka shared use sidewalk) on the west side of Fernbrook and the north side of Ludlow.

Short-Term solution	$175,000
Long-Term solution - separated path	$1,500,000
Total	$1,675,000

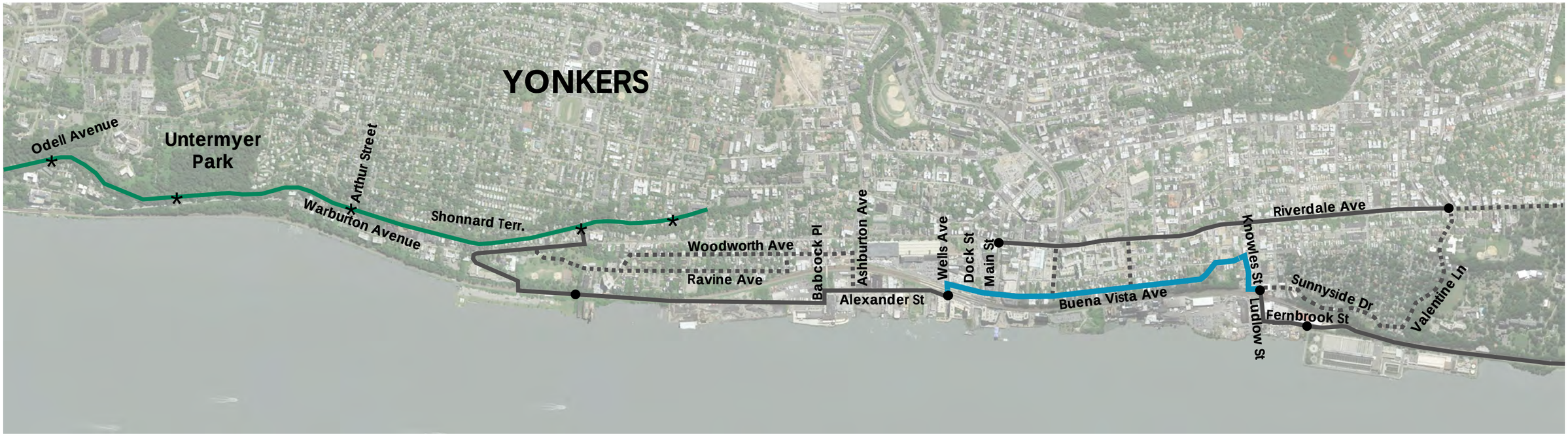
View looking west on Ludlow Street toward Fernbrook Street, from atop the railroad bridge. Hudson River is visible in the background.

View looking north on Fernbrook Street. Illegal unconsolidated parking along west side of Fernbrook Street is visible left side of photo. Recommend construction of a shared-use side-path here.

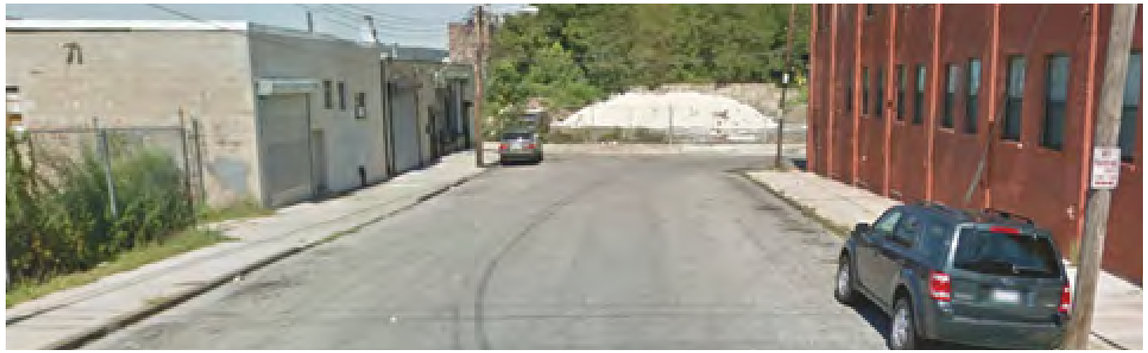
View looking east on Ludlow Street toward Bridge Street from atop the railroad bridge. Metro North Ludlow Station access stair is visible on the right.

Rendering of proposed shared-use sidewald on Fernbrook Street

11 BUENA VISTA CORRIDOR




HAWTHORN AVENUE
BUENA VISTA AVENUE
O'BOYLE PARK
DOWNING ST
KNOWLES STREET
LUDLOW STREET
BRIDGE STREET
LUDLOW STREET
MNR STATION
FERNBROOK STREET
DOMINO SUGAR



Existing Condition: View looking north on Bridge Street from Ludlow Street

Existing Condition: View looking east on Knowles Street from Bridge Street

Existing Conditions

Street Width: Bridge Street +/- 30' (curb to curb)
Travel Direction: North - South
Traffic Volumes: Traffic volumes and speeds are Low.
Parking Regulations: Alternate side parking on both sides.

Street Width: Knowles Street +/- 30' (curb to curb)
Travel Direction: East - West
Traffic Volumes: Traffic volumes and speeds are Low.
Parking Regulations: Alternate side parking on both sides

Street Width: Hawthorne Avenue +/- 36' (curb to curb)
Travel Direction: North - South
Traffic Volumes: Traffic volumes and speeds are lower along this corridor than on Riverdale Avenue, the parallel route alternative.
Parking Regulations: Alternate side parking on both sides

Street Width: Buena Vista Avenue – 36' (curb to curb)
Travel Direction: North - South
Traffic Volumes: Traffic volumes and speeds are lower along this corridor than on Riverdale Avenue, the parallel route alternative.
Parking Regulations: Alternate side parking on both sides with metered parking on the north end approaching the downtown area.

Shared Lane Markings on Fifth Avenue, Brooklyn

Design Solution

This link in the Preferred Route is an on-street route for cyclists and includes connections to and from Buena Vista Avenue via the Ludlow Street bridge over the MNR tracks, Bridge Street, Knowles Street, Hawthorne Avenue and O'Boyle Park. The streets are bordered by a mix of residential homes and industrial buildings. While this link is not directly on the waterfront, it runs along the top of a bluff overlooking the Hudson River and Hudson River Palisades, with good views of the river at each cross street and at vacant lots.

All streets are two-way with on-street parallel parking against the curb on both sides of the street except Hawthorne Avenue, which has on-street parking against the east curb only. Sidewalks generally are in disrepair and need repair. All streets are to be redesigned as 'complete streets'. As such, the following elements are to be integrated into the design of all streets:

- Streets are not wide enough for Class 2 (striped) bicycle lanes. Class 3 shared lane markings are, therefore, recommended.
- Sidewalks are to be repaired and/or constructed where missing.
- Sidewalks are to be 'greened' with the planting of street trees in planted tree pits. The possibility of planting new street trees in 'storm-water' tree pits that harvest storm water sustainably should be considered.
- Traffic calming measures are to be installed including intersection neck-downs with hi-visibility crosswalk markings and mid-block speed humps. The City of Yonkers should consider reducing posted vehicular speed limit along this route to 20 MPH.

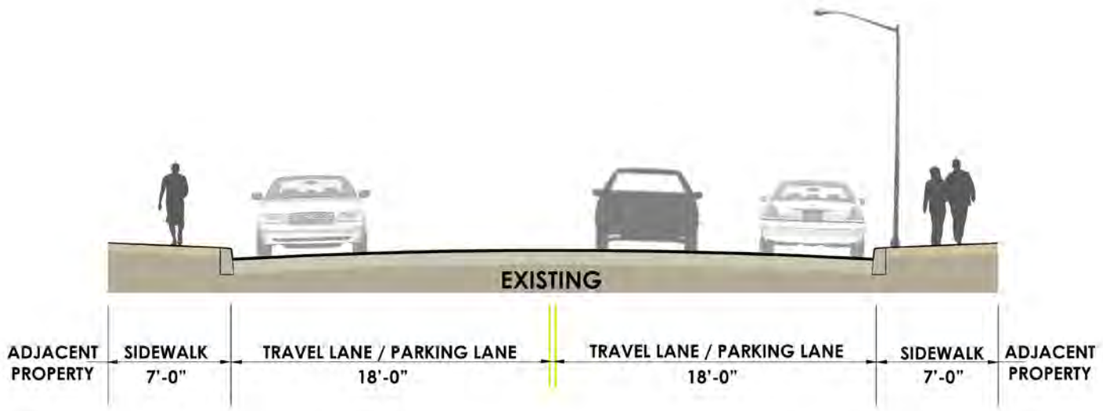
Construction Cost Estimate

Shared Lane Markings: Thermoplastic paint & signs	$15,000
Bicycle Lane: Thermoplastic paint & signs	$17,000
Sidewalk repair	$800,000
Sustainable Stormwater Plantings	$600,000
Total	$1,432,000

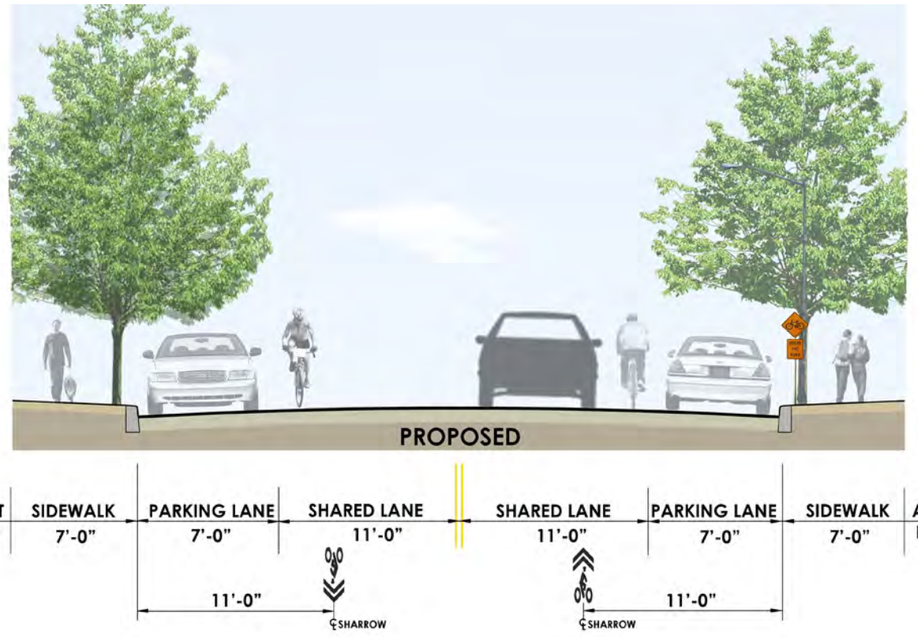
Existing Condition: View looking north on Hawthorne Avenue adjacent to O'Boyle Park. Preferred Route crosses O'Boyle Park to reach Buena Vista Avenue

Existing Condition: Buena Vista Avenue at approximately Hudson Street looking north

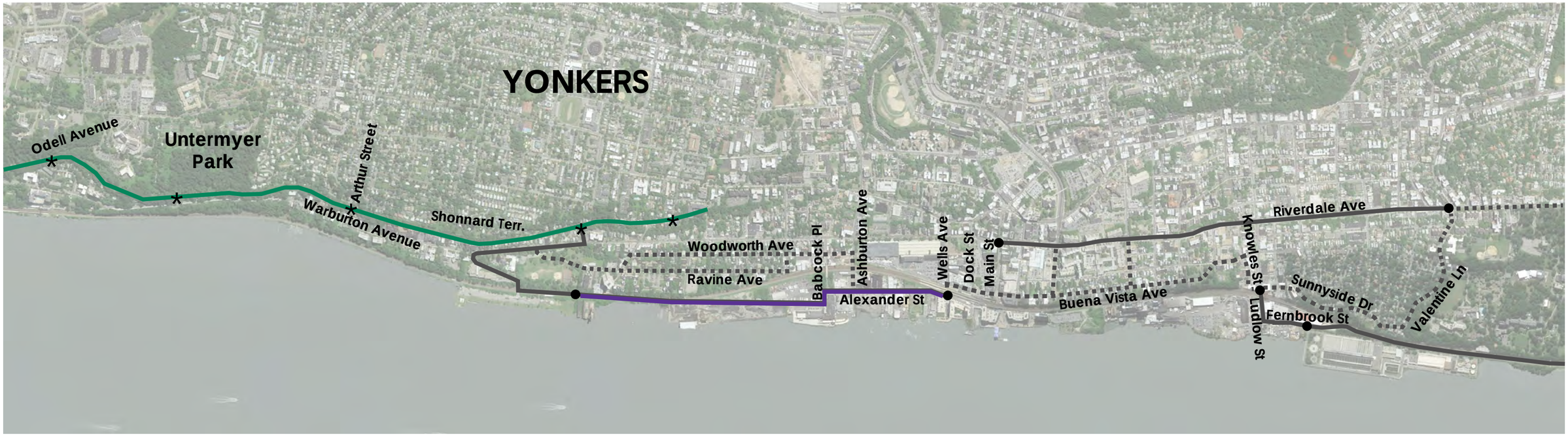
Existing Condition: River Street between Larkin Plaza and Wells Avenue



Buena Vista Avenue between Prospect Street & Vark Street



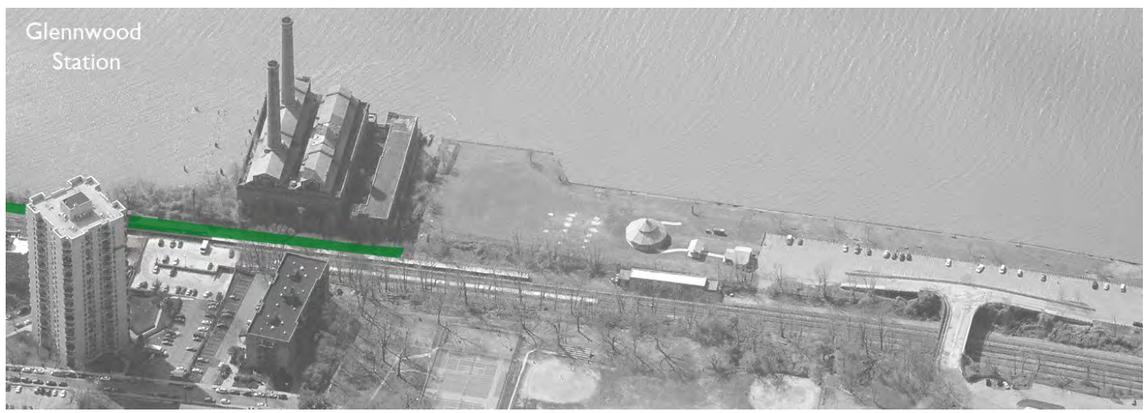
13 ALEXANDER STREET CORRIDOR




WARBURTON AVENUE
WOODWORTH AVENUE
RAVINE AVENUE
GLENWOOD AVENUE
BABCOCK PLACE
ASHBURTON AVENUE
WELLS AVENUE
ALEXANDER STREET

Proposed Alexander Street north of Babcock Place


Proposed Alexander Street south of Glennwood Station



Proposed Alexander Street north of Glenwood Station

Existing Conditions

Street Width: 30' where roadway currently exists

Travel Direction: North - South

Traffic Volumes: Low – Traffic volumes are 50 to 150 vehicles per hour per direction during peak hours. Under the Alexander Street Master Plan EIS, traffic volumes on Alexander Street at Ashburton Avenue are projected to increase from 450 to 550 vph per hour per direction during peak hours.

Parking Regulations: Parking on the east side only; no parking between Wells and Ashburton

Design Solution

The Alexander Street link begins at Wells Avenue after the Buena Vista crosses under the railroad tracks, and continues north to the Glenwood Metro North station. Metro-North needs to retain a maintenance road in the vicinity of the Glenwood station in the Alexander Street corridor.

Alexander Street runs along the waterfront west of the railroad right-of-way and has an industrial character as far north as Bobcock Place. The narrow width of the roadway on this portion of the street limits the possibility of striped bicycle lanes, so shared-lane markings are proposed in both directions. Although Alexander Street has limited traffic volumes, the presence of trucks and construction vehicles necessitates at least 11' wide shared travel lanes. Street trees with sustainable plantings are recommended to provide traffic calming and improve the sidewalks that are located on both sides of the roadway.

The Alexander Street Master Plan, which sets a framework for mixed-use redevelopment of waterfront parcels between Wells Avenue and Babcock Place, was approved. A guiding principle of the master plan is to increase public access to the waterfront. North of Babcock Place Alexander Street is largely characterized by vacant, derelict land. There is a paved right-of-way running north where Alexander Street will run when constructed as a proper roadway, with future development parcels currently fenced off. These parcels should be integrated into the development and construction of the Hudson River Valley Greenway in this area.

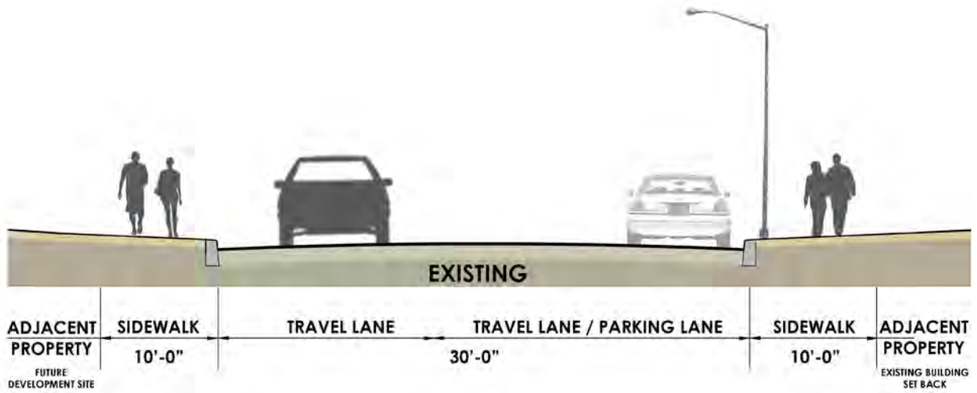
The Alexander Street Master Plan also includes a proposal for an Alexander Street Causeway to directly connect Alexander Street to JFK Marina Park. The roadway would consist of one 11' travel lane in each direction with no parking. As part of the master plan, Alexander Street would also be reconstructed. Alexander Street would be widened to contain one 11' travel lane in each direction, a landscaped center median and a parking lane on each side.

Implementation of this route requires close coordination with private Alexander Street development and City of Yonkers Riverwalk. As the area north of Ashburton Avenue is developed, there may be opportunities to build on the existing recommendations in order to provide a more comfortable greenway facility. In particular, there may be an option for a separated path on Alexander Street north of Point Street, where development plans have called for a new section of roadway to be built on the waterfront side of the Glenwood Metro North station. Current plans show only enough room for a sidewalk of minimally required width and standard moving lanes. Prior to design and construction of this path, which would only allow for a shared lane markings as the only option in this portion of Alexander Street, further analysis is recommended to better accommodate cyclists and pedestrians.

Construction Cost Estimate

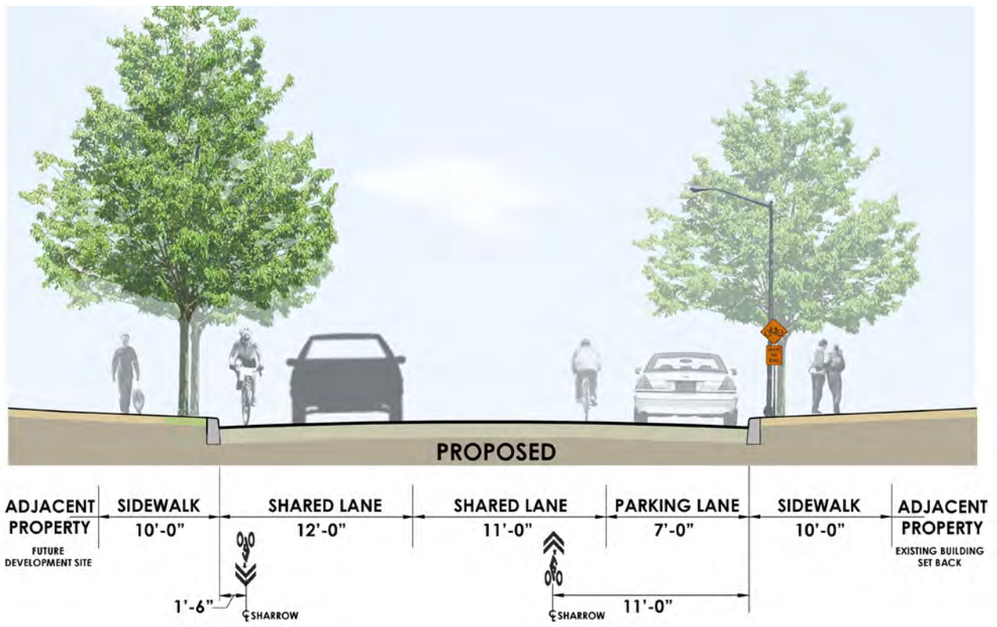
Shared lane markings on Alexander St from Wells Ave to Babcock St: Thermoplastic paint & signs	$13,000
New Separated path north of Babcock Street to JFK Marina	$5,000,000
Total	$5,013,000

Looking northwest from Alexander Street right-of-way within future development parcels

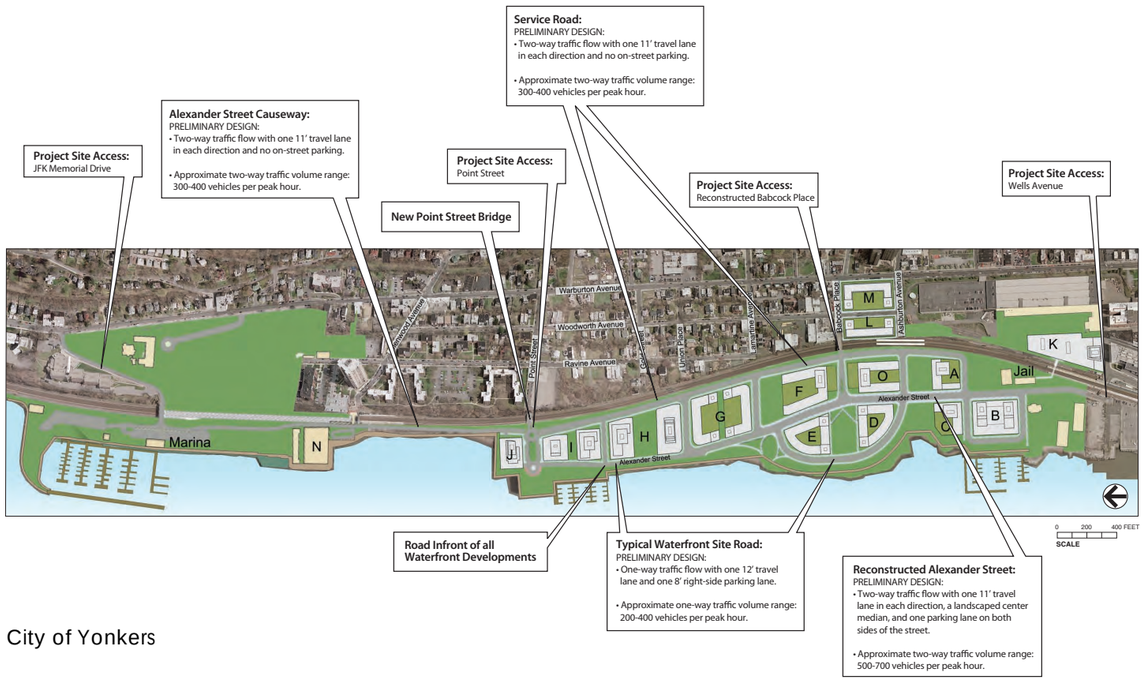


Alexander Street between Ashburton Avenue & Wells Street

Looking northeast from Alexander Street right-of-way within future development parcels

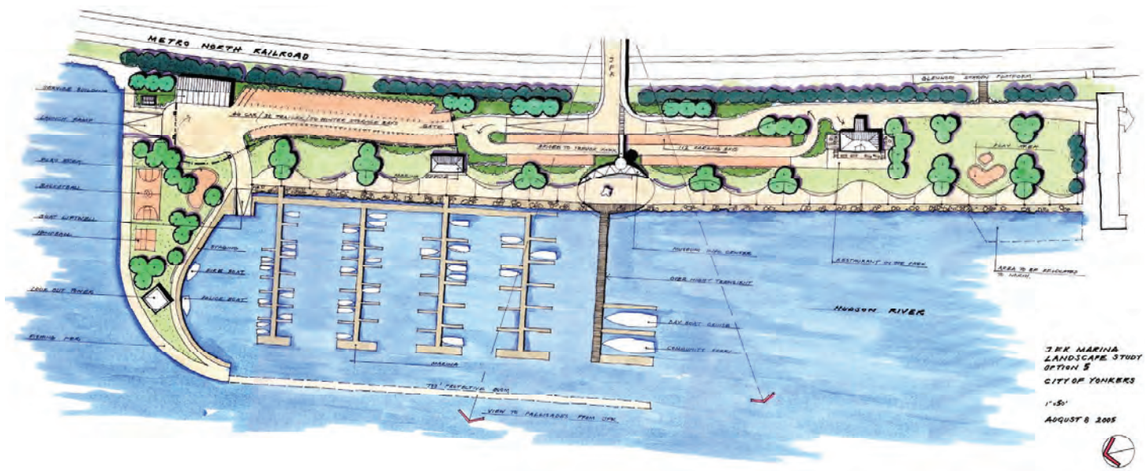


Master Plan Area Roadway Improvements



City of Yonkers

JFK Marina Park Landscape Plan



City of Yonkers

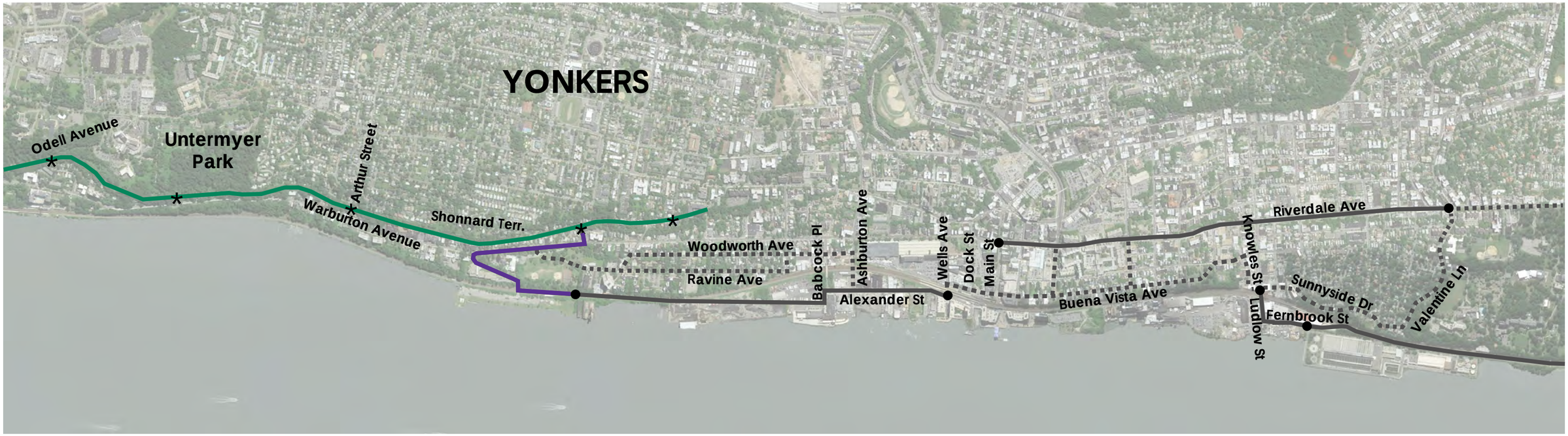
Alexander Street Waterfront - Plan Detail

City of Yonkers

Alexander Street Master Plan

The Alexander Street Master Plan covers the area that extends along the waterfront from Wells Avenue up to and including JFK Marina Park and Trevor Park. The plan calls for the existing street grid to the east to be extended, a public plaza, parks, green spaces and a waterfront esplanade. In the new parcels, residential buildings in a number of configurations including towers, mid-rise buildings and low-rise/townhouses, with ground floor retail, and a waterfront esplanade are proposed throughout the length of the site. Opportunities will be explored to align the greenway west of the rail line through the Alexander Street development site. The plan shows a service road and an improved Alexander Street as north-south corridors that would provide a connection to the JFK Marina.

14 JFK MEMORIAL DRIVE - WARBURTON CONNECTION




OLD CROTON AQUEDUCT TRAIL
WARBURTON AVENUE
JFK MEMORIAL DRIVE
TREVOR PARK
RAVINE AVENUE
JFK MARINA PARK
GLENWOOD MNR STATION

Trevor Park Connection from parking lot to JFK Marina Drive

Connection to Glenwood MNR Station

View looking north on Warburton Avenue from just north of Shonnard Terrace

Existing Conditions

Street Width: Bridge to marina – 35', JFK Memorial Drive – 46', Wharburton Avenue – 60', Shonnard Terrace – 30'

Travel Direction: East - West

Traffic Volumes: Low – Traffic volumes on JFK Marina Drive are limited to vehicles accessing marina parking lot, high school, firestation #8 and park. Traffic volumes and speeds on Wharburton Avenue are moderately high. Volumes and speeds on Shonnard Terrace are low due to quiet residential nature of the street.

Parking Regulations: Parking on east side of JFK Marina Drive only.

Design Solution

This route uses the existing bridge to provide access from the marina parking lot, which provides access across the railroad tracks without significant capital investment on new infrastructure. This bridge connects to JFK Marina Drive from the parking lot.

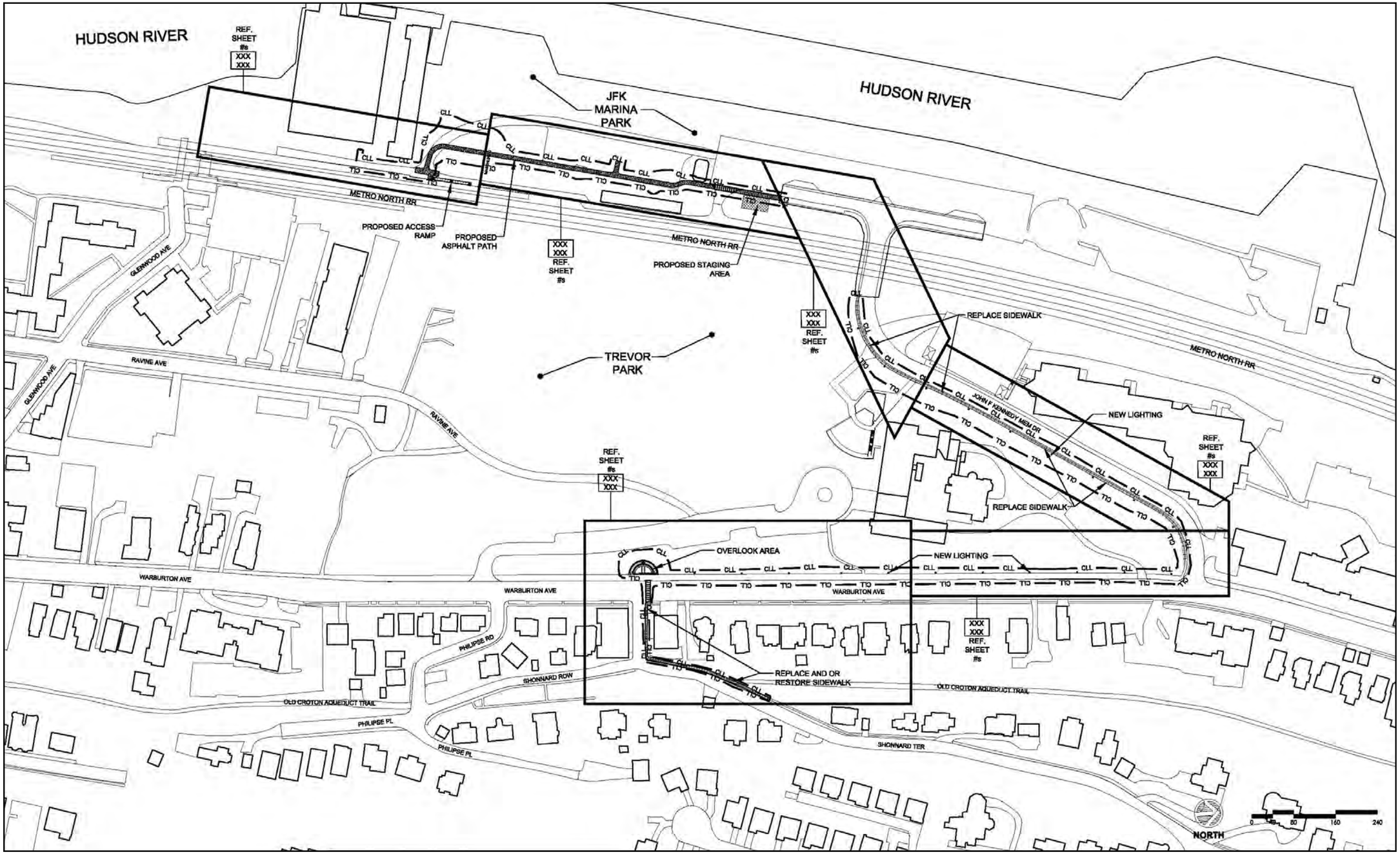
On JFK Marina Drive, Warburton Avenue and Shonnard Terrace, sidewalk improvements would include new pavement, lighting and plantings. Improvements to JFK Memorial Drive are already designed and founded for construction by Westchester County Department of Public Works and Transportation as part of the County's on-going 'Riverwalk' Project. The selection of this route for the Hudson River Valley Greenway Link trail builds on the work being done by Westchester County.

Shared lane markings are recommended on the bridge, JFK Marina Drive, Warburton Avenue and Shonnard Terrace to provide accommodations for cyclists.

This link connects the proposed trail at the water's edge to the Old Croton Aqueduct (OCA) Trail at Shonnard Terrace, via JFK Marina Drive and Wharburton Avenue. This cross-cutting switchback on-street route provides a manageable way to navigate the significant grade difference between the waterfront and the OCA Trail. Other OCA Trail Access Points to the North and South would require that the trail scale much steeper slopes.

Construction Cost Estimate

Shared lane markings on JFK Memorial Dr, Warburton Ave & Shonnard Terrace: Thermoplastic paint & signs	$15,000
Sidewalk Improvements	$115,000
Total	$130,000



Westchester County Riverwalk plan overview for Trevor Park Connection link