

BROOKLYN WATERFRONT GREENWAY IMPLEMENTATION PLAN



RBA





ACKNOWLEDGEMENTS

This Plan is the culmination of years of work by a wide array of organizations and would not have been possible without their input.

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Community Board 1 - Greenpoint-Williamsburg

Community Board 2 - Downtown Brooklyn

Community Board 6 - Red Hook

Community Board 7 - Sunset Park

Photo cover: Todd Landry Photography

Implementation Plan prepared by The RBA Group

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INTRODUCTION

BROOKLYN WATERFRONT GREENWAY

Introduction

New York City Department of Transportation (NYCDOT) is committed to providing walking and bicycling facilities throughout New York City that are safe and efficient, as well as accessible and appealing to a broad segment of the population. The agency is dedicated to making sure that all New Yorkers, regardless of age or cycling experience, feel that the option to travel by bike is available to them.

New York City has a long history of designated recreational pathways along public street right-of-ways. Frederick Law Olmsted, landscape architect of Central and Prospect Parks, designed Ocean Parkway in Brooklyn, which was completed in 1880. The design included a grassy median with a pedestrian path, which was divided in 1894 to provide a dedicated space for cyclists, creating the first bike path in the United States. Today, the multi-use pathway, coupled with Eastern Parkway, makes up a large part of the Brooklyn-Queens Greenway, providing a link between Coney Island and Long Island Sound. The Brooklyn Waterfront Greenway will be the City's next great greenway in the tradition of Olmsted's original plan for Eastern and Ocean Parkways and following the recent success seen on the Manhattan Waterfront.

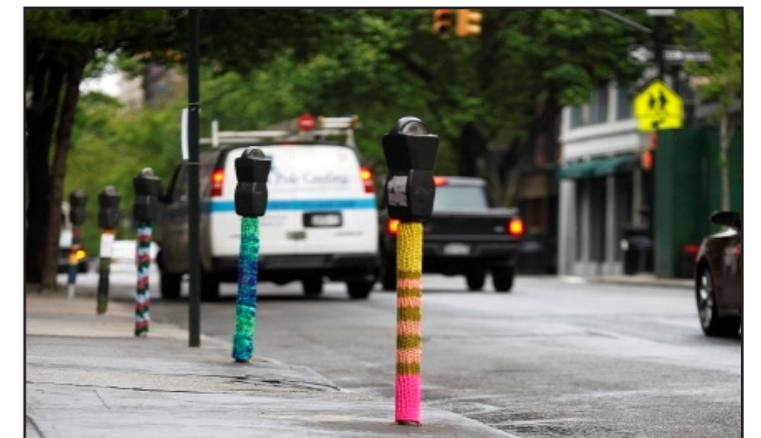
With the Brooklyn Waterfront Greenway (Greenway), NYCDOT seeks to combine the tradition of Olmsted's vision of leafy green tree-lined boulevards with the new paradigm of on-street bicycle and pedestrian paths. The route will pass through a variety of urban landscapes from historic neighborhoods to working industrial areas to dynamic new waterfront parks.

New York City Department of Parks and Recreation (DPR) defines a greenway as "...a linear open space, such as a path or trail, which links parks and communities around the city, providing public access to green spaces and the waterfront. Greenways expand recreational opportunities for walking, jogging, biking, and in-line skating." When completed, the Greenway, will consist of 14 miles of designated off-street pathways, enhanced sidewalks, and some on-street bike lanes, connecting the waterfront neighborhoods of Greenpoint, Williamsburg, the Brooklyn Navy Yard, Vinegar Hill, DUMBO, Downtown Brooklyn, Red Hook and Sunset Park.

The designated paths for bicycles and pedestrians will allow cyclists and walkers to commute, exercise, explore, and relax along the Brooklyn waterfront from Newtown Creek to the Shore Parkway.

Project Intent

- **Develop the route alignment for the 14-mile Brooklyn Waterfront Greenway.**
- **Identify a series of capital projects along the route for implementation.**
- **Act as a guide for the scoping, design and construction of capital projects.**
- **Develop Preliminary Design Plans for approximately three miles of the proposed route. The three miles will be comprised of several discrete segments.**



0.1 Project Goals and Objectives

The goal of this plan and for the Greenway is to encourage a healthy lifestyle and promote a higher quality of urban life by providing a safe, convenient and enjoyable venue for active recreation and the use of non-motorized forms of transportation.

Objectives for design of the Greenway include:

- **The Greenway will be physically separated from traffic when possible. It is recognized, however, that portions of the route may require that Greenway users share the road with motor vehicles. In these cases, a ‘complete streets’ approach to street design is to be taken to ensure the safety, convenience and comfort of non-motorized users of the Greenway.**
- **The route will be located as close as possible - and facilitate direct access - to the water.**
- **The route shall connect as many points of trip origin and destination as possible.**
- **The route will incorporate community input gathered from a series of community workshops (described in *Project Coordination and Community Outreach*) and previous studies.**
- **Frequent, safe and convenient access and egress points to/from the Greenway will be provided.**
- **Construction materials and street furnishings will be durable, low maintenance, and of high quality and distinctive character.**
- **Standard features will conform to the NYCDOT Street Design Manual and with other NYC Agency typical construction details.**
- **The design will be sensitive to the surrounding context.**
- **The design will also utilize/incorporate sustainable (or ‘green’) construction techniques, materials and technologies.**

This plan will lay out and describe the details of a continuous route that may be feasibly constructed. The route is divided into discrete segments for phased implementation and an estimated cost of construction will be provided for each segment.

It is anticipated that the vast majority of the Greenway will be constructed on land owned and maintained by New York City—most, if not all of it, on public right-of-way. Other portions may be proposed on land under other agencies’ jurisdictions. These agencies have been brought into this planning process and this plan will act as a guide for future design considerations. Portions of the Greenway, described in the Plan as “Future Enhancement Projects”, are long-term projects that may require additional land acquisition or formation of public/private partnerships in the future.

Planning and design of the Greenway has been a joint effort between community groups and City, State and Federal agencies. Open communication with these community groups and agencies continues to be an integral part of the Greenway development process.

Upon completion of the Implementation Plan for the Greenway, discrete segments of the Plan will be advanced to the preliminary design stage. For each segment advanced to preliminary design, a schematic geometric design, preliminary engineering estimate and traffic study will be completed.

It is important to note that Preliminary and/or Final Engineering design for two discrete segments of the proposed route are being progressed simultaneously to, but separately from this effort under parallel, individual work orders. They are:

1. West Street from Eagle Street to Quay Street in Greenpoint.
2. Flushing Avenue from the intersection of Williamsburg Street West to Navy Street

0.2 Summary of the Implementation Plan Process

Preparation of a Project Base Map

The base map was created to illustrate the project limits, alternative routes under consideration and the final preferred alternative route.

Literature Review

A review of previous plans for a greenway along this corridor was conducted and key conclusions and recommendations from each of the studies were distilled into a Literature Review. These previous efforts revealed important engineering, design, jurisdictional, and political challenges to implementation.

Gap Analysis

Findings from the Literature Review were compiled and distilled onto neighborhood maps. The objective was to identify route alignment alternatives that may have been inadequately explored or possibly overlooked altogether in previous planning efforts.

Route Planning

The route planning portion of this plan was completed in the following steps:

- Site reconnaissance and photo documentation of the route study area
- Development of preliminary route alternatives in portions of the route study area where a route alignment had not been designated
- Field investigations and analysis of traffic operations, roadway geometry, utility impacts, land use and right of way, environmental impacts, and historical and/or cultural resources
- Selection of the preferred route

Project Phasing and Implementation Plan

A table that identifies and describes the proposed discrete capital improvement projects for a planned multi-year phased implementation was prepared. Proposed capital projects are located on accompanying maps.

Design Guidelines

The purpose of the Design Guidelines is to ensure a uniform yet contextual design in the materials and furnishings used throughout future construction phases of the Greenway.

Project Coordination and Community Outreach

Workshops were held in each of the four Community Districts in which the Greenway route is located—Community Districts 1, 2, 6 and 7—to solicit feedback from project stakeholders and the public on proposed route alternatives and the preferred alternative.

The first series of meetings described the project goals and objectives and presented studies that had previously been conducted. A preliminary discussion of route alternatives also took place.

The second series of meetings began with route alternatives that were developed from previous public input. Participants were asked to identify specific opportunities and constraints inherent in the route alternatives being considered.

The third and final series of meetings involved a presentation of the preferred route. Input was solicited to understand how local conditions would affect operations for each route segment and community members were asked to prioritize the route implementation preferences.

Agency coordination meetings were also held with representatives of relevant governmental agencies, as required, including various divisions within New York City Department of Design and Construction (NYCDDC), DPR, New York City Department of Environmental Protection (NYCDEP) and New York City Economic Development Corporation (NYCEDC), to coordinate planning activities with other relevant ongoing planning and design efforts.

chapter

To begin the master planning effort, relevant planning studies and capital projects at the community, district, municipal, regional and state levels were compiled and reviewed. Stock was taken of initial Greenway planning studies in order to distill key conclusions and recommendations, as well as to highlight important engineering, design, jurisdictional, and political challenges anticipated for the project.

A Literature Review fully summarizing existing data sources relevant to the project was created and is included in the Appendix. The findings of the Literature Review were used to identify gaps in previous planning efforts relative to the goals of this study, and to identify route alignment alternatives that may not have been explored in previous studies.

The process of mapping previously studied routes also revealed gaps or areas where more study was necessary. A series of Gap Analysis Maps were produced that are found in this chapter. The maps are meant to graphically illustrate those constraints discussed in the Literature Review.

Literature Review summary

Several primary studies, which have direct application to planning a greenway route within the study area, were reviewed. Key findings and conclusions from the following studies are outlined in this chapter:

Primary studies

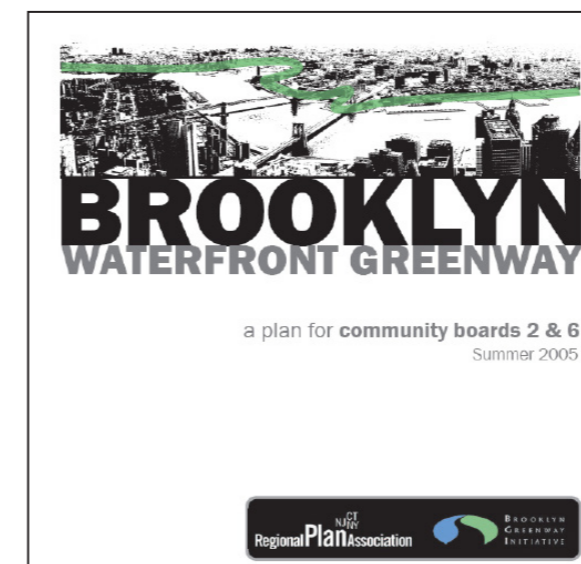
- Brooklyn Waterfront Greenway—A Concept Plan for Community Board 1
- Greenpoint—Williamsburg Open Space Master Plan
- Greenpoint—Williamsburg Waterfront Access Plan
- Dupont Street Site Plan
- 2011 NYC Cycling Map
- NYC Bicycle Master Plan
- Brooklyn Waterfront Greenway—A Concept Plan for Community Boards 2 & 6
- Brooklyn Waterfront Trail
- Conceptual Plan for a Sunset Park Greenway
- Brooklyn Waterfront Greenway—Design Principles
- Brooklyn Waterfront Greenway—Plan for Stewardship & Maintenance
- Sunset Park Waterfront Vision Plan



Summaries of the following secondary studies and development plans and maps, which provided valuable context to the planning effort, are included in the complete Literature Review, located in the Appendix:

Secondary studies

- Greenpoint 197—A Plan, CB 1
- Williamsburg Waterfront 197—A Plan, CB 1
- Vinegar Hill Zoning Study
- Red Hook: A Plan for Community Regeneration, CB 6
- Red Hook Truck Study
- New Connections/New Opportunities—Sunset Park 197-A Plan Brooklyn
- NYC Comprehensive Waterfront Plan—Reclaiming the City's Edge
- A Planning Primer: Greenways—Ideas for Making Greenways Valuable Neighborhood Enhancements
- New Amsterdam Waterfront Exchange Summary Report
- The New Waterfront Revitalization Program

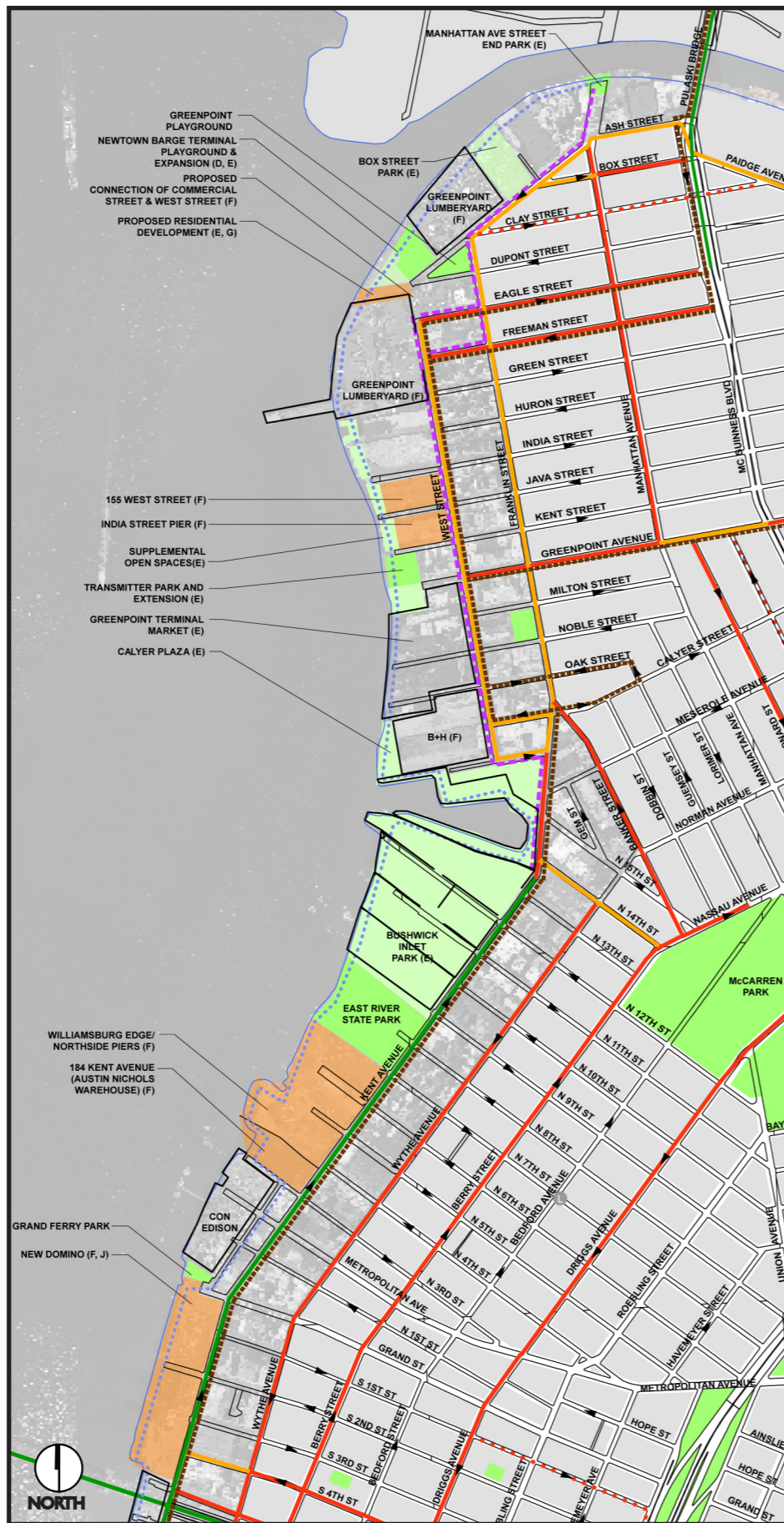


Additionally, several development plans and maps were reviewed that directly impact the study area including the following:

Development plans and maps

- Waterfront Developments for CB2 and CB6
- Transmitter Park Redevelopment Environmental Assessment Statement
- Domino Sugar Rezoning Draft Environmental Impact Statement
- Rose Plaza on the River Environmental Assessment Statement
- Request for Proposals for Developer of Admiral's Row
- Brooklyn Bridge Park Construction Documents
- Port Authority of New York and New Jersey Map of Piers 7-12





EXISTING BIKEWAYS (C) :

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

POTENTIAL BIKEWAY IN NYC BIKE MAP (C) :

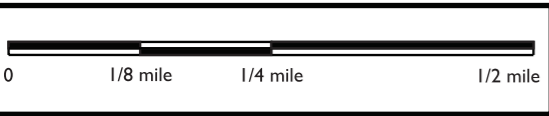
- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE OR SHARED LANE

SOURCES:

- (A) 1997 NYC BICYCLE MASTER PLAN (DOT + DCP)
- (B) A USER'S GUIDE TO THE BROOKLYN WATERFRONT GREENWAY 2009-2010 (BGI)
- (C) NYC FREE CYCLING MAP 2011 (NYC + DOT + DCP + DPR)
- (D) BROOKLYN WATERFRONT DEVELOPMENTS DOCUMENT (DCP)
- (E) GREENPOINT-WILLIAMSBURG OPEN SPACE MASTER PLAN
- (F) GREENPOINT-WILLIAMSBURG EAST RIVER WATERFRONT PARCEL AND PROJECT LIST
- (G) GREENPOINT-WILLIAMSBURG ACCESS PLAN
- (H) DUPONT STREET SITE PLAN
- (I) TRANSMITTER PARK REDEVELOPMENT ENVIRONMENTAL ASSESSMENT STATEMENT
- (J) DOMINO SUGAR REZONING DRAFT ENVIRONMENTAL IMPACT STATEMENT
- (K) ROSE PLAZA ON THE RIVER ENVIRONMENTAL ASSESSMENT STATEMENT
- (L) REQUEST FOR PROPOSALS FOR DEVELOPER OF ADMIRAL'S ROW (BNYDC)
- (M) BROOKLYN BRIDGE PARK CONSTRUCTION DOCUMENTS (DPR)
- (N) PORT AUTHORITY OF NEW YORK AND NEW JERSEY MAP OF PIERS 7-12 (PANYNJ/NYCDOT)

OTHER :

- PROPOSED GREENWAY BY BGI (B)
- PLANNED BIKEWAY ALONG KENT AVENUE (DPR) (M)
- 1997 BICYCLE MASTER PLAN ROUTE (A)
- PROPOSED PEDESTRIAN ONLY ROUTE (BGI) (B)
- EXISTING PEDESTRIAN ONLY ROUTE
- PROPOSED DEVELOPMENT
- PUBLIC HOUSING
- EXISTING PARK
- PROPOSED PARK



Brooklyn Waterfront Greenway—A Concept Plan for Community Board 1

2008, Brooklyn Greenway Initiative and Regional Plan Association
 Sponsor: Brooklyn Borough President's Office

This plan identifies the publicly endorsed route through Community Board 1 and details the steps and partnerships necessary to ensure the route's implementation. Developed with local communities and through consultation with technical and policy experts, the Concept Plan is one of a number of publications that outline the conceptual planning principles of the Greenway.

Greenpoint - Williamsburg Open Space Master Plan

2007, NYC Department of Parks and Recreation (DPR) in conjunction with the Office of the Mayor, the NYC Department of City Planning (DCP), and the NYC Economic Development Corporation (EDC).

This document guides the open space development along a two-mile stretch of the East River from Manhattan Avenue and North 3rd Street to West Street and Kent Avenue. This plan is built upon the Greenpoint and Williamsburg 197-A plans and the 2005 rezoning recommendations, as well as two community based plans: the Vision Plan for Brooklyn's Green Crescent, March 2006, and the Greenpoint/Williamsburg Open Space Plan, November 2004.

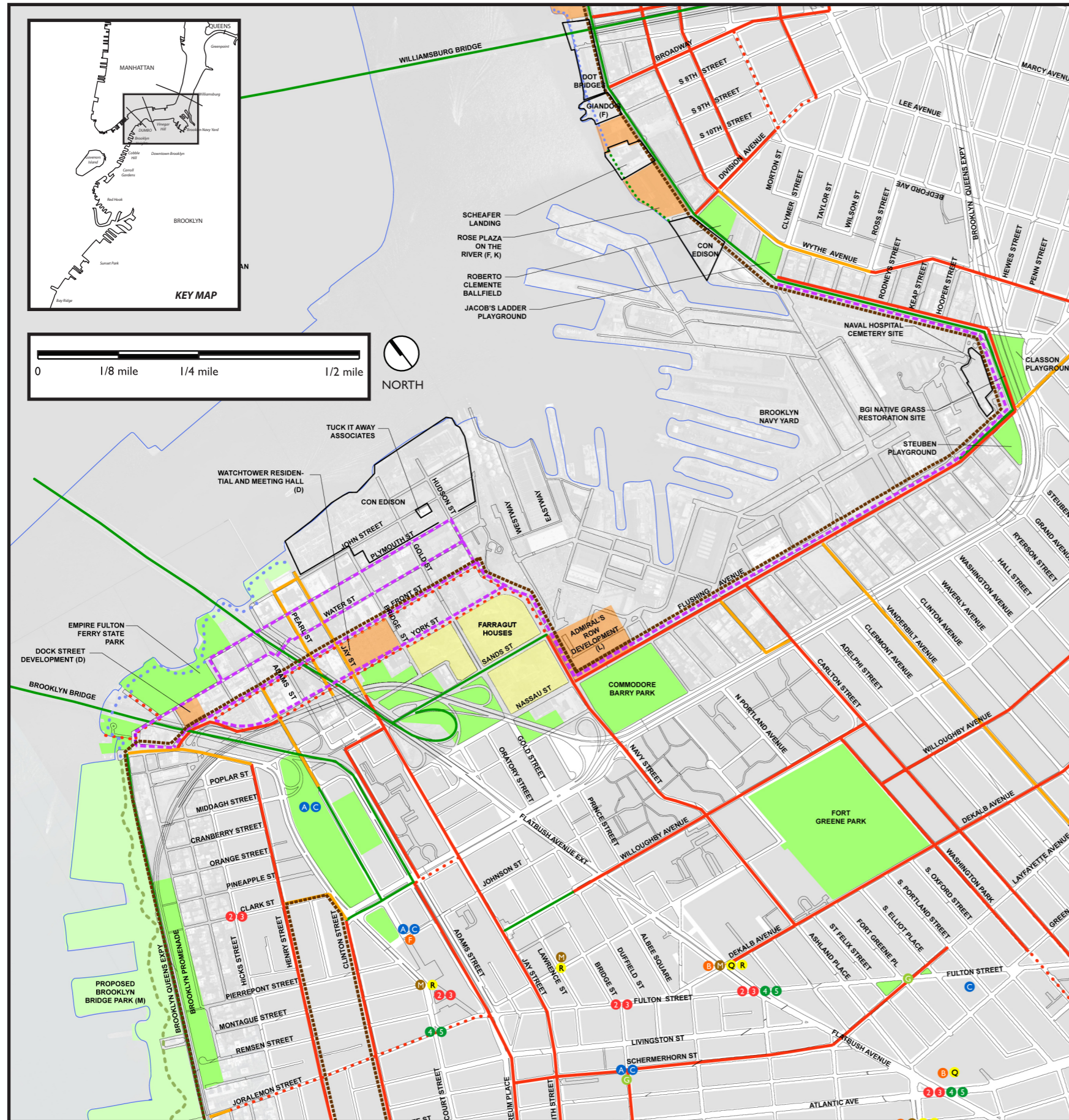
The Master Plan provides plans and conceptual designs for waterfront access in the form of 45 acres of public parks and 2.5 miles of shore public walkway built by a combination of public agencies and private developers.

Greenpoint - Williamsburg Waterfront Access Plan

2004, NYC Department of City Planning
 This plan illustrates proposed locations for a shore public walkway, supplemental public access areas, public parks, and future open space along the waterfront from Newtown Creek in Greenpoint to North 3rd Street in Williamsburg.

Dupont Street Site Plan

This technical site plan depicts an expansion of public open space from the Newtown Barge Terminal Playground to the waterfront, and the addition of a narrow strip of green space along the waterfront between the development and the East River. The plan also shows a proposed residential development on the property bordered by the East River and West Street, between Dupont Street and Eagle Street in Greenpoint.



Brooklyn Waterfront Greenway—A Concept Plan for Community Boards 2 & 6

2005, Brooklyn Greenway Initiative and Regional Plan Association
 Sponsor: Brooklyn Borough President’s Office

This plan proposes planning principles, design objectives, and a conceptual route for the Greenway in Community Boards 2 and 6, covering the waterfront from Division Avenue in South Williamsburg to the Hamilton Avenue Bridge over the Gowanus Canal. The plan also identifies many public and private partnerships that will be needed for the Greenway to be realized.

Brooklyn Waterfront Trail

1998, NYC Department of City Planning

This document outlines the plans for a 5-mile pedestrian and bike path paralleling the Brooklyn waterfront between Brooklyn Bridge and the Erie Basin, as proposed in the NYC Department of City Planning’s Greenway Plan for New York City in 1993. The identified route was considered to offer the best balance of safety, proximity to the waterfront, connections to commuter and recreational destinations, and potential for landscaped greenway paths. The recommendations include a combination of shared-use paths and on-street bike lanes on Furman Street, Columbia Street, Van Brunt Street, Imlay Street, Ferris Street, Beard Street, Bay Street and West 9th Street, with segments of pedestrian routes included.

The study recommends continuing the Greenway north of Brooklyn Bridge Park and southeast of Red Hook to 9th Street and the Gowanus Canal. It also recommends that future planning for maritime industries should encourage more integration with the upland neighborhood where feasible, and develop public viewing opportunities.

NYC Bicycle Master Plan

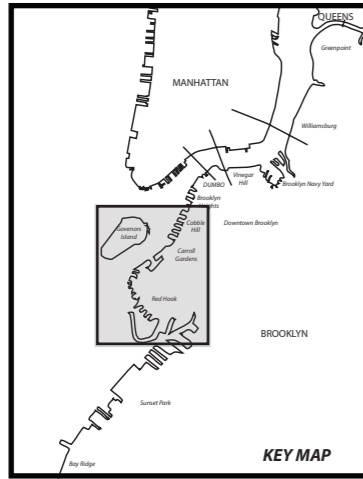
1997, NYC Department of City Planning and NYC Department of Transportation

The NYC Bicycle Master Plan was the final report of the first phase of the Bicycle Network Development Project, a joint project between the NYC Department of City Planning and the NYC Department of Transportation. The goal of this project is to increase bicycle ridership in New York City. The Brooklyn Bicycle Network map included with this plan proposes bicycle routes for the whole borough. Several of these routes are proposed within the Greenway study area. The routes on the map are represented by varying line types which depict proposed routes, proposed priority routes, and proposed routes requiring capital investment. The plan considers the Brooklyn Waterfront Trail plan and the Red Hook 197-A Plan.

2011 NYC Cycling Map

2011, NYC Department of Transportation, Department of City Planning, Department of Parks & Recreation

This cycling map is updated each year to document existing and potential bike routes, lanes and paths throughout New York City. It was used when considering connections to and from the Greenway and to other existing and potential bicycle facilities.



EXISTING BIKEWAYS (C) :

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

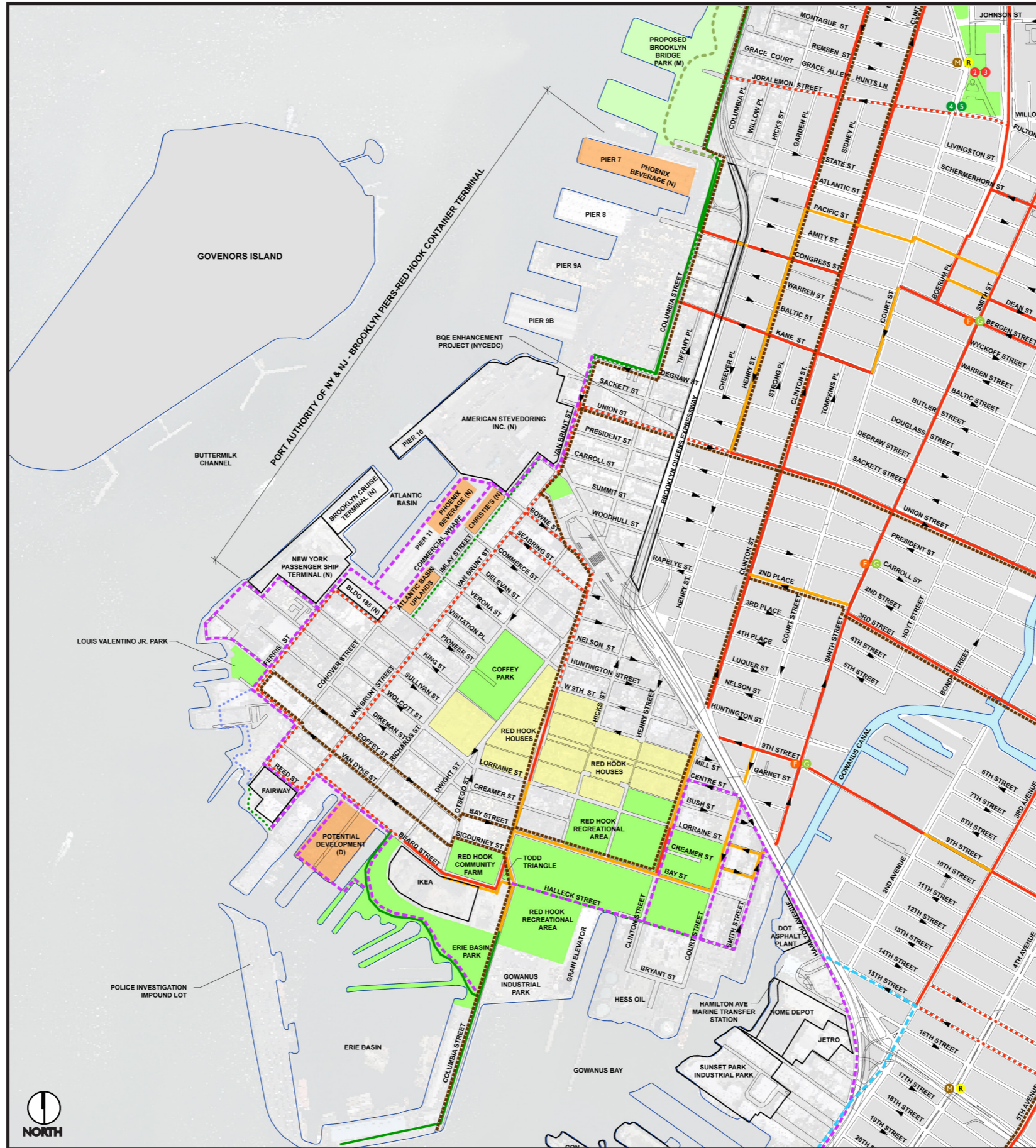
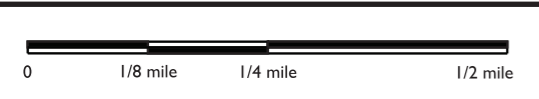
POTENTIAL BIKEWAY IN NYC BIKE MAP (C) :

- - - PROTECTED BICYCLE PATH
- - - STRIPED BIKE LANE OR SHARED LANE

SOURCES:
 (A) 1997 NYC BICYCLE MASTER PLAN (DOT + DCP)
 (B) A USER'S GUIDE TO THE BROOKLYN WATERFRONT GREENWAY 2009-2010 (BGI)
 (C) NYC FREE CYCLING MAP 2011 (NYC + DOT + DCP + DPR)
 (D) BROOKLYN WATERFRONT DEVELOPMENTS DOCUMENT (DCP)
 (M) BROOKLYN BRIDGE PARK CONSTRUCTION DOCUMENTS (DPR)
 (N) PORT AUTHORITY OF NEW YORK AND NEW JERSEY MAP OF PIERS 7-12 (PANYNJ/DOT)
 (O) INDUSTRY CITY PARKING ENVIRONMENTAL ASSESSMENT STATEMENT
 (P) REQUEST FOR PROPOSALS FOR FEDERAL BUILDING #2 REDEVELOPMENT
 (Q) BUSH TERMINAL PIERS OPEN SPACE, PAVEMENT STRIPING AND SIGNAGE PLANS (EDC + DPR)
 (R) SUNSET PARK WATERFRONT VISION PLAN (EDC)
 (S) CONCEPTUAL PLAN FOR SUNSET PARK GREENWAY (UPROSE + PRATT)
 (T) NEW CONNECTIONS/NEW OPPORTUNITIES: SUNSET PARK 197-A PLAN (CB7)
 (U) MARINE CARGO SYSTEM PLAN FOR THE CITY OF NEW YORK (EDC)

OTHER :

- - - PROPOSED GREENWAY BY BGI (B)
- - - PROPOSED PEDESTRIAN ONLY ROUTE BY BGI (B)
- - - EXISTING PEDESTRIAN ONLY ROUTE
- - - PROPOSED GREENWAY BY UPROSE + PRATT (T)
- - - UPLAND CONNECTORS BY UPROSE + PRATT (T)
- - - PEDESTRIAN FRIENDLY STREETScape BY EDC (S)
- - - PLANNED BIKEWAY WITHIN BROOKLYN BRIDGE PARK (M)
- - - 1997 BICYCLE MASTER PLAN ROUTE (A)
- PROPOSED DEVELOPMENT
- PUBLIC HOUSING
- EXISTING PARK
- PROPOSED PARK



Brooklyn Waterfront Greenway-Design Principles

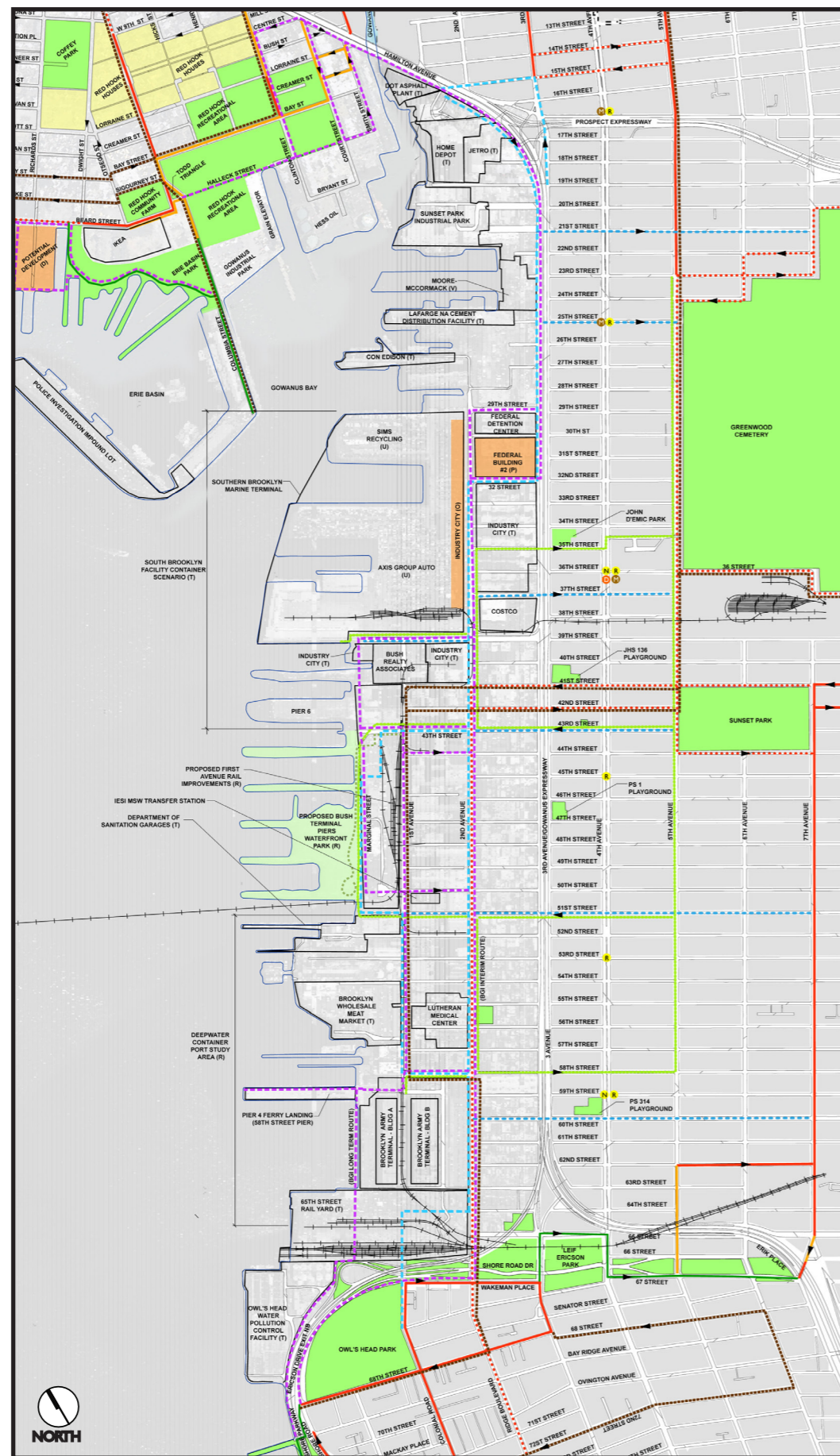
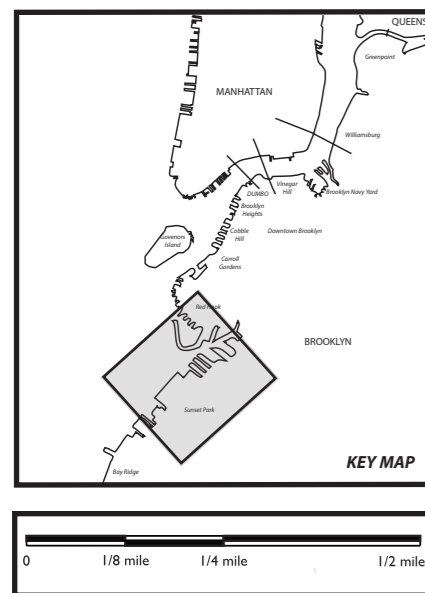
2008, Brooklyn Greenway Initiative and Regional Plan Association
 Sponsor: Office of the Brooklyn Borough President

The Design Principles identify reoccurring elements that will signify to users along the path that it is the Brooklyn Waterfront Greenway. The plan lists various greenway elements with descriptions and responsible parties, as well as common greenway challenges and possible design solutions. Elements include signage, standard City path markings, lighting standards, and associated structures and furnishings.

Port Authority of New York and New Jersey Map of Piers 7-12

Port Authority of New York and New Jersey

This map identifies the existing and proposed developments from Pier 7 to Pier 12 in the Red Hook Waterfront area.



Brooklyn Waterfront Greenway—Plan for Stewardship & Maintenance

2008, Brooklyn Greenway Initiative and Regional Plan Association

This plan recognizes the unique challenges that result from the Greenway right-of-way comprising property that is under the jurisdiction of up to eight public agencies. Maintenance services, demand, and responsibility are identified. A provision of maintenance is outlined for various segments, as well as a table highlighting the maintenance costs of existing parks and greenways and a maintenance cost estimate for the proposed Greenway from Greenpoint to Red Hook.

Sunset Park Waterfront Vision Plan

Summer 2009, NYC Economic Development Corporation

This plan states that creating safe public access to the waterfront while maximizing the area's utility for industry is a critical issue to address in order to ensure the long-term success of the Sunset Park waterfront.

The plan highlights the City's investment in rail upgrades along First Avenue to increase its functionality for freight transportation, giving businesses along the Sunset Park industrial waterfront a more efficient link to regional rail networks via the Bay Ridge line at 65th Street, and points west via the cross-harbor rail barge floats at 65th and 51st Streets.

The plan recommends activation of the rail and marine transfer hub at the 65th Street yard, which sits at a critical juncture between the harbor, the Bay Ridge regional rail line, and the First Avenue rail line.

Also addressed in the plan are the vehicular, pedestrian, and bicycle circulation improvements catalyzed by the construction of Bush Terminal Piers Park. These circulation improvements will not only separate industrial traffic at the Bush Terminal Campus from the Park users, but will serve as a model for future improvements in the rest of the industrial waterfront district.

Conceptual Plan for a Sunset Park Greenway

2008, United Puerto Rican Organization of Sunset Park (UPROSE) and Pratt Center for Community Development Sponsor: Brooklyn Borough President and the New York State Department of State

This conceptual plan emphasizes the importance of having a recreational waterfront that is connected to the adjacent inland community along streets that are designed for bicycling and walking. General traffic calming measures are recommended along the Greenway route and inland connectors to create safe pedestrian/bicycle accommodation.

The plan acknowledges that the waterfront is home to active industrial uses, and that it is important to provide public space on the waterfront for the surrounding community and for those that work there. It also recommends that signage and public art be reflective of common values.

CHAPTER 2:
ROUTE PLANNING AND DESIGN
BROOKLYN WATERFRONT GREENWAY

chapter 2

This chapter documents existing conditions and analyzes potential route alignments. It defines a preferred route that incorporates and connects existing paths and destinations along the waterfront, establishing a 14-mile waterfront Greenway route.

Route alternatives were developed and evaluated by examining previous studies, observing conditions in the field, and gathering public input at community workshops. A proposed typical cross-section was developed for each segment of the preferred route. This schematic design is meant to:

- Provide the framework for further analysis and design
- Define the parameters of design to facilitate development of a preliminary cost estimate

The 14-mile route is broken up into four distinct geographical study areas:

2.1. Greenpoint and Williamsburg Waterfront – Pulaski Bridge to the intersection of Kent Avenue and Clymer Street.

2.2. Downtown Brooklyn Waterfront – Kent Avenue and Clymer Street to Atlantic Avenue and Columbia Street.

2.3. Red Hook Waterfront – Atlantic Avenue and Columbia Street to the Hamilton Avenue Bridge.

2.4. Sunset Park Waterfront – Hamilton Avenue Bridge over the Gowanus Canal to Owl’s Head Park.

This chapter describes the existing conditions for each of these study areas. Each study area is then further broken down into smaller segments. Route alternatives are analyzed for each segment. In cases where the Greenway is already in place, current upgrade projects and planned upgrades are also outlined.

Preferred Route

For each set of route alternatives, the Preferred Route is that which has been determined to be most viable, considering suitability as a greenway facility and feasibility with regard to timing and financial limitations.

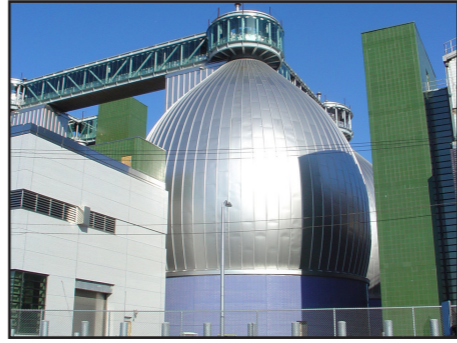
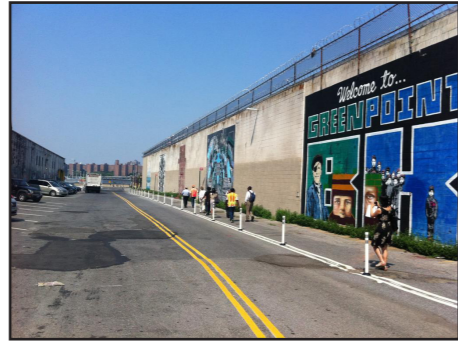
Future Enhancement Projects

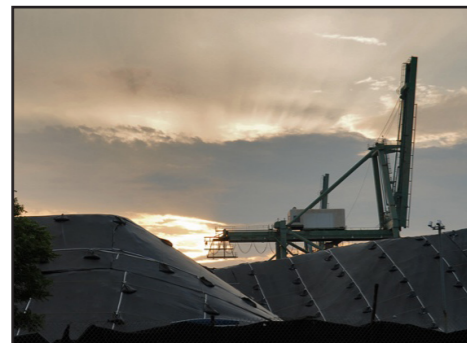
Future Enhancement Projects are route alternatives that would greatly enhance the Greenway, but would be difficult to implement because they require excessive capital commitment or have significant environmental impacts. These should be pursued as long-term goals for the Greenway.

Inland Connectors

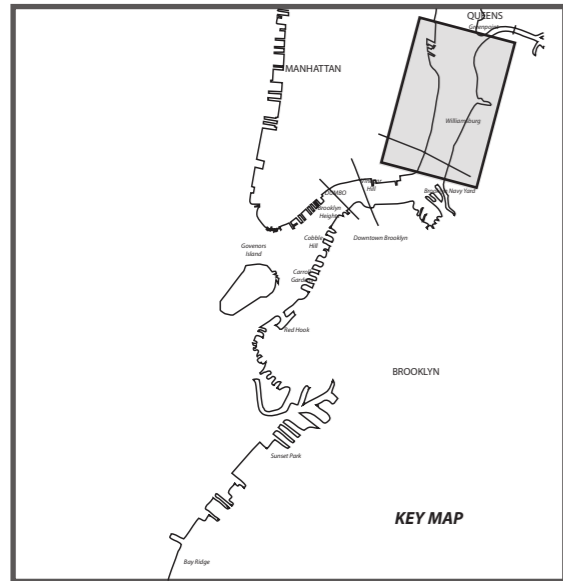
Inland Connectors serve as principal corridors for people travelling to and from the Greenway. All of the proposed Inland Connectors have sidewalks and some have bicycle facilities. In addition to providing basic accommodations for pedestrians and cyclists, it is recommended that amenities described in Chapter 4, Design Guidelines, be considered along these routes.







GREENPOINT-WILLIAMSBURG ROUTE ALTERNATIVE MAP



EXISTING BIKEWAYS:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

POTENTIAL BIKEWAYS IN NYC BIKE MAP:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE OR SHARED LANE

PROPOSED ROUTE AND ROUTE ALTERNATIVES:

- EXISTING ROUTE
- PLANNED ROUTE
- ROUTE ALTERNATIVE A
- ROUTE ALTERNATIVE B
- ROUTE ALTERNATIVE C

ROUTE ALTERNATIVE LABEL WITH BIKEWAY DIRECTION

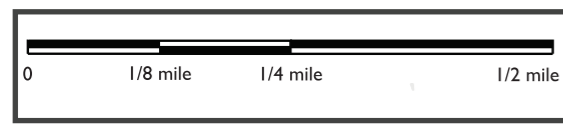
BEGINNING / END OF ROUTE ALTERNATIVES

KEY BIKE / PEDESTRIAN ACCESS POINTS TO WATERFRONT - PROPOSED SAFETY IMPROVEMENTS

PROPOSED PEDESTRIAN ESPLANADE

- PROPOSED DEVELOPMENT
- PUBLIC HOUSING
- EXISTING PARK
- PROPOSED PARK

NORTH



2.1.1 EXISTING CONDITIONS

Neighborhood Boundaries

This study area includes the Greenpoint and Williamsburg neighborhoods. It is bounded by Newtown Creek to the north, the East River to the west, and the Williamsburg Bridge to the south, and extends approximately one-quarter mile inland.

Neighborhood Waterfront Amenities-Land Use

The study area is characterized by a mix of light industrial, commercial and residential properties. Historically, maritime uses such as ship building, manufacturing and shipping of commercial goods dominated the East River shores of these neighborhoods. Over the past 10-15 years, these two neighborhoods have seen demographic and land-use changes as waterfront related industrial uses are being replaced by new land uses, mainly residential.

In 2005, the New York City Department of City Planning (DCP) instituted a rezoning to address the major changes in land use and density. This rezoning allows for additional housing and open spaces, while maintaining existing light industrial and commercial uses.

Existing and Planned Pedestrian and Bike Infrastructure

The existing bike infrastructure comprises predominantly north-south bike lanes and shared lanes. Kent Avenue between North 14th Street and Clymer Street has a two-way on-street bicycle path separated from northbound traffic by striping and parking. Eagle and Freeman Streets have shared lane markings, as do Franklin, Quay and Calyer Streets. NYCDOT will be redesigning and rebuilding West Street in coming years and the redesign will incorporate the Greenway.

The Shore Public Walkway is a result of City's 2005 Greenpoint-Williamsburg rezoning. The rezoning text includes a requirement to provide public open space in the form of new parks and pedestrian esplanades along the entire waterfront. This will take place as development continues along the waterfront.

Greenway Destinations

- Newtown Creek Nature Walk
- Greenpoint & Newtown Creek Terminal Playgrounds
- Box Street Park
- Transmitter Park
- East River State Park
- Planned Bushwick Inlet Park

Community Outreach

Community Workshops were held on April 22, 2010, October 21, 2010 and October 25, 2011. Existing conditions throughout the study area were described and discussed at the first workshop. Route options and possible design concepts were presented and discussed at the second workshop. The Recommended Route and associated design concepts were presented and discussed at the third workshop.

Key points addressed in the workshops include:

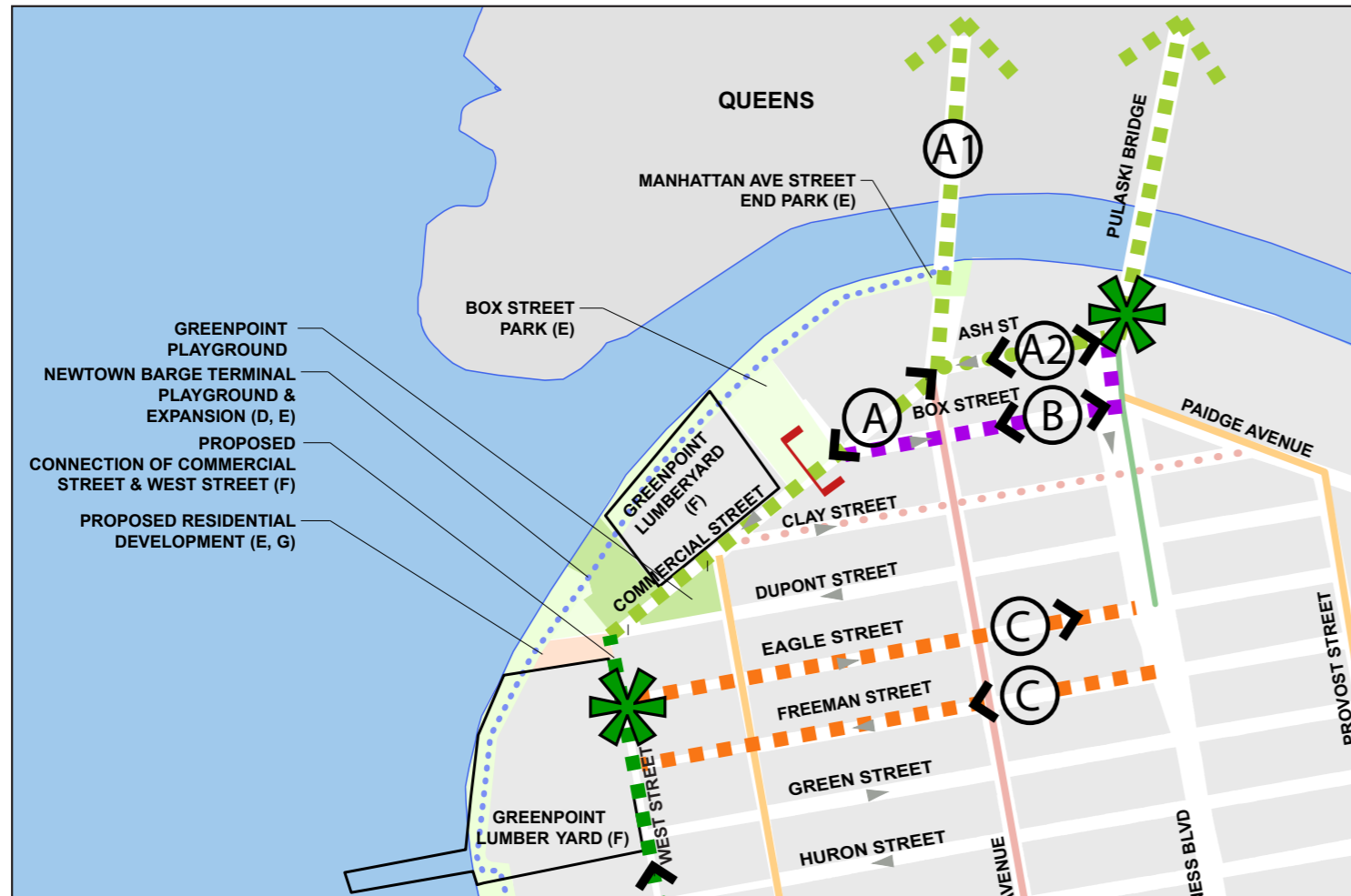
- Near-term vs. long-term capital projects
- Options for crossing Newtown Creek
- Building on success of Kent Avenue facility
- Key locations for waterfront access and inland connections
- Discussion of design possibilities



New York Harbor from Greenpoint waterfront



Nature Walk at the Newtown Creek Sewage Treatment Plant



Plan Enlargement 1: Pulaski Bridge over Newtown Creek to West Street route alternative

2.1.2 ROUTE ANALYSIS

In Greenpoint and Williamsburg several segments of the Greenway are already in place. In the future, a waterfront esplanade will provide direct pedestrian access along the East River. This section describes a current project to upgrade the existing shared lane facility on West Street and a planned project to upgrade the existing facility on Kent Avenue. It also analyzes route alternatives for two segments. Moving north to south, these segments include:

- Pulaski Bridge over Newtown Creek to West Street
- West Street to Kent Avenue

Pulaski Bridge over Newtown Creek to West Street (Plan Enlargement 1)

Bicycle and pedestrian traffic currently uses the Pulaski Bridge shared-use path to cross the Newtown Creek between Queens and Brooklyn. Eagle and Freeman Streets form a one-way pair of bicycle lanes that feed cyclists to the bicycle lanes along Manhattan Avenue and the shared lanes along Franklin Street. As part of the route analysis process, three potential route alternatives were explored for a Greenway connection between the Pulaski Bridge and West Street. These alternatives take into account the City’s goal of connecting West Street to Commercial Street when the parcel between DuPont Street and Eagle Street is developed.

Route A1 is the *Newtown Creek Bicycle and Pedestrian Bridge Future Enhancement Project*.

This Future Enhancement Project could be pursued when funds are available.

As illustrated in the Enlargement Map, the plan calls for a new pedestrian and bicycle bridge over the creek at the Manhattan Avenue Street End Park. Newtown Creek is a navigable waterway so any new bridge design must not interfere with the passing of barge or other boat traffic. This option has major cost and environmental constraints associated with it.

Route A2–Retrofit Ramp from Pulaski Bridge to Ash Street

Route A2 is not a practical option because of the cost associated with a new ramp structure and the impacts such a structure would have on the existing right-of-way and land uses.

Also considered was Route A2, which runs along Ash Street to the Pulaski Bridge where a new ADA compliant ramp could be constructed to provide pedestrian and bicycle access from the street up to the existing Pulaski Bridge path. Ash Street is currently one-way westbound with shared lane markings. It is also a truck route. Implementation of a two-way shared-use path would require removal of parking along the street and could interfere with access to loading and unloading areas.

The photo of the bike ramp on the Manhattan Bridge below shows an example of one possible design for this type of ramp structure.



Newtown Creek facing north towards Queens (existing)



Ash Street facing west from the Pulaski Bridge (existing)



Pedestrian and bicycle path on west side of Pulaski Bridge (existing)



Retrofit bike ramp to Manhattan Bridge (precedent)

Route A–Commercial Street

Route A offers direct access to Newtown Creek, the Nature Walk at the Newtown Creek Sewage Treatment Plant and runs close to the waterfront. Route A is the preferred route.

Commercial Street is a 41'-wide, two-way street with parking on both sides. The roadbed could be narrowed in order to provide a separated bicycle path. This Greenway segment will create connections between Greenpoint Playground, Newtown Barge Terminal Playground, the Manhattan Avenue Street End Park and the Nature Walk at the Newtown Creek Sewage Treatment Plant. Future plans by the City to create a link from West Street to Commercial Street, between Dupont Street and Eagle Street, could spur development along Commercial Street. This segment will also provide a link to the proposed bridge between Manhattan Avenue Street End Park and Queens. It should be noted that implementation of this option would likely result in a net loss of parking along the street.



Commercial Street between Clay Street and Box Street (existing)

Route B–Box Street

Route B would require the removal of parking and would not connect directly to an existing or proposed crossing over the Newtown Creek, making it an undesirable route.

As an alternative to routing the westbound Greenway along Ash Street, Route B utilizes Box Street to connect the Pulaski Bridge and Commercial Street. Box Street is a mixed residential and commercial street. Instead of ending at Manhattan Avenue Street End Park, Route B would utilize Box Street to access a new ramp up to the existing pedestrian and bicycle path on the west side of the Pulaski Bridge. Currently, Box Street is two-way from Commercial Street to Manhattan Avenue with shared lane markings in the eastbound direction only. From Manhattan Avenue to McGuinness Boulevard, Box Street becomes one-way eastbound and has a striped bicycle lane. Ash Street and Box Street currently serve as a one-way pair bicycle route between Commercial Street and the Pulaski Bridge. Placing a new two-way protected bicycle path on Box Street would require removal of some on-street parking.



Box Street at the Pulaski Bridge (existing)

COMMERCIAL STREET CROSS-SECTIONS (ROUTE A)

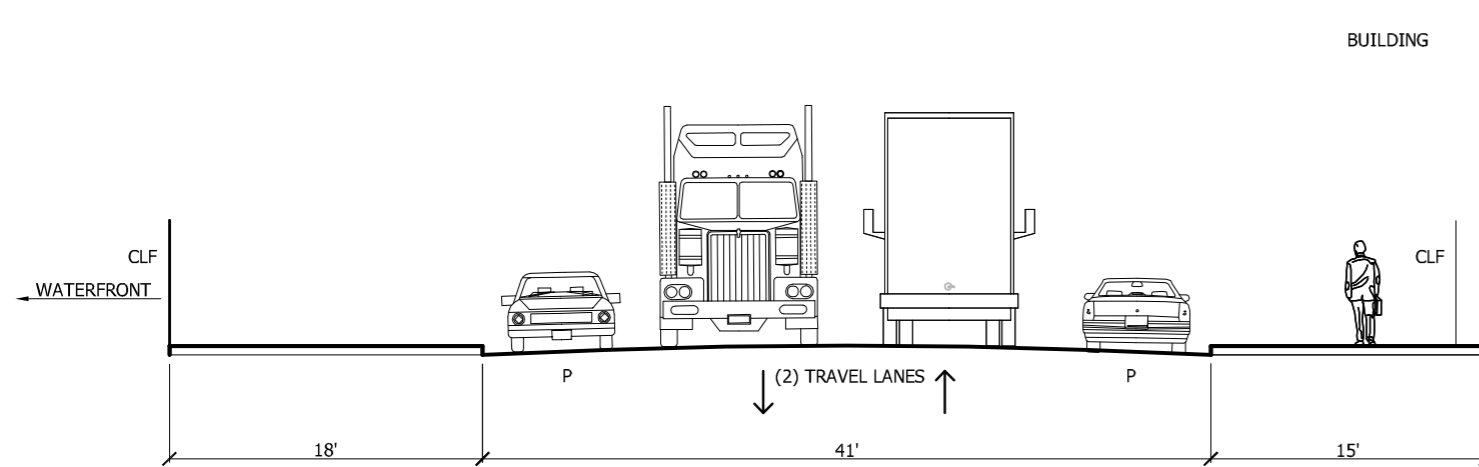


Fig. 1: Current Configuration on Commercial Street

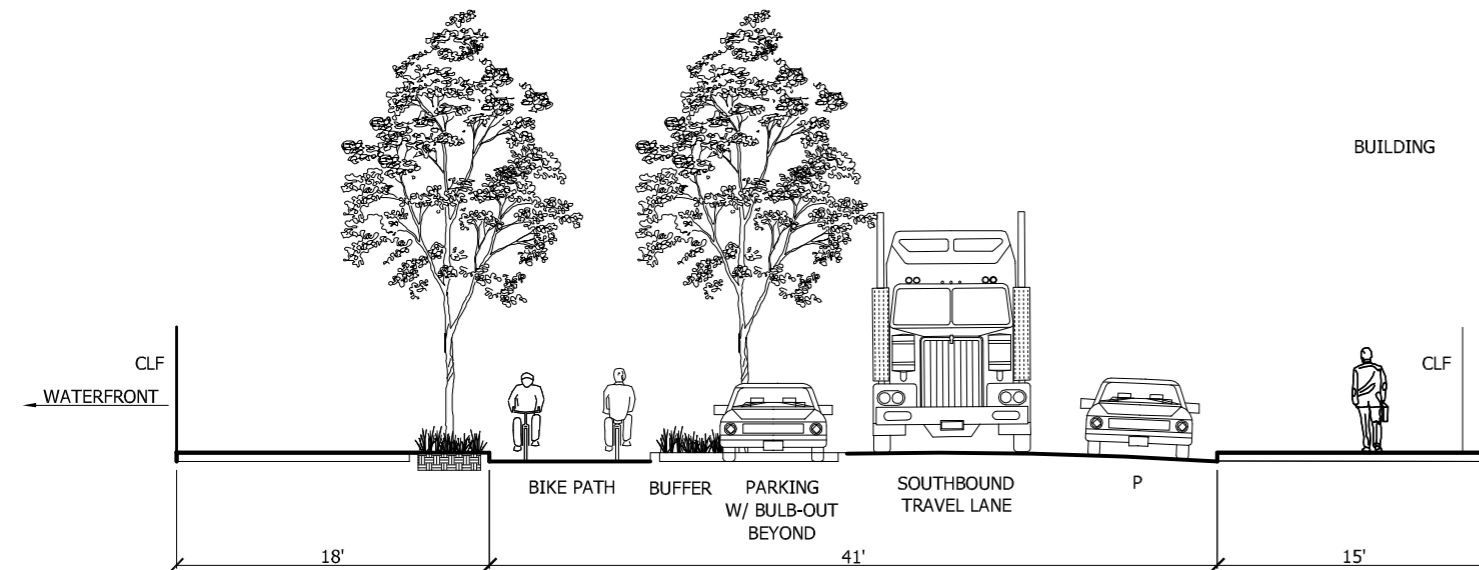


Fig. 2: Possible Reconfiguration for Commercial Street

Route C–Eagle and Freeman Street

Route C does not provide an adequate Greenway experience to serve as a final route.

The bicycle facility that comprises Route C is already in place. Both Eagle Street and Freeman Street already have bicycle lanes, which become shared lane markings as they approach the Pulaski Bridge. Due to the narrow width of these streets it would be difficult to improve the existing facilities beyond the current design. In order to make room for a protected bicycle path, some or all of the existing on-street parallel parking would have to be removed. These are residential streets and the loss of parking would likely be opposed by the local community. The existing one-way pair of bike lanes function well as connections to the Pulaski Bridge, but are not ideal for potential Greenway users. Route C is not the preferred alternative for this segment.



Eagle Street from West Street (existing)

RECOMMENDATION:

From **Pulaski Bridge to West Street** the Preferred Route Recommendation is:

Route A–Commercial Street with Ash/Box Street as a One-Way Pair, based on

- Convenient access to Pulaski Bridge
- Proximity to the waterfront
- Feasibility of implementing waterfront path
- Enhanced connection to Newtown Creek Nature Walk and open space along Newtown Creek waterfront

Future Enhancement Project

Newtown Creek Bicycle and Pedestrian Bridge (Route A1), based on

- Need for safe, convenient protected bicycle and pedestrian connection between Brooklyn and Queens

Current Project–West Street from Eagle Street to Quay Street

West Street provides access to waterfront parcels and street-end view corridors of the East River and the Manhattan skyline. The location of West Street makes it a calm street, ideal for the Greenway.

West Street runs parallel to the waterfront from Eagle Street to Quay Street. As currently configured, the street does not meet NYCDOT lane width standards. The 31'-wide two-way roadway has on-street parking on both sides.

Several industrial properties have loading docks and driveways along the street. The west side of the street is also characterized by irregular curb lines and discontinuous sidewalks. The east side of the street has wide sidewalks with varying conditions. The narrow street width coupled with on-street parking and two-way truck traffic often compromises local traffic circulation. Bicycle access on West Street is currently provided as a shared route. An on-going capital project is examining possible reconfigurations to accommodate the Greenway while preserving current uses.

In the proposed scheme there is a single northbound traffic lane, on-street parking on the east side of the street, and a grade-separated, two-way bicycle path on the west side of the street. The edge of the path is a mountable curb, allowing for vehicular encroachment and easy bike access. A planted buffer will separate the sidewalk from the bike path. NYCDOT will continue to work with Department of Design and Construction (DDC) and the community to meet the needs of all roadway users on West Street.



West Street at Eagle Street looking north (existing)



West Street at Freeman Street looking south (existing)



Columbia Street Two-Way Separated Path (precedent)

WEST STREET CROSS-SECTIONS

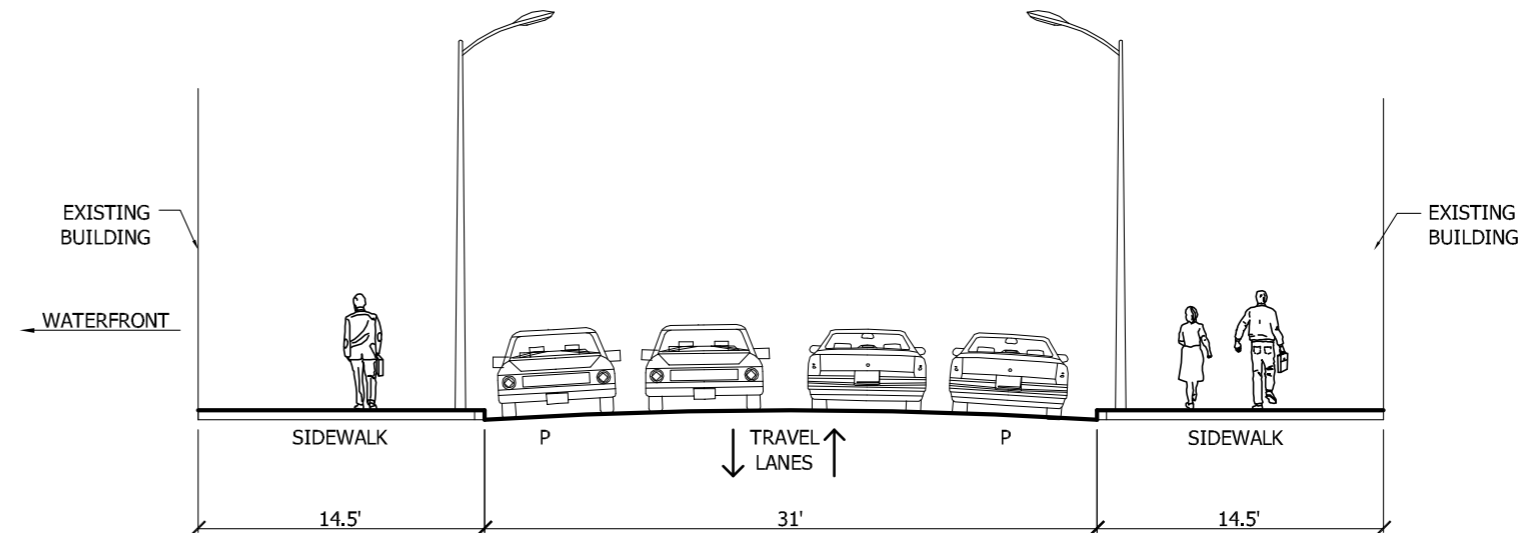


Fig. 3: Existing configuration on West Street

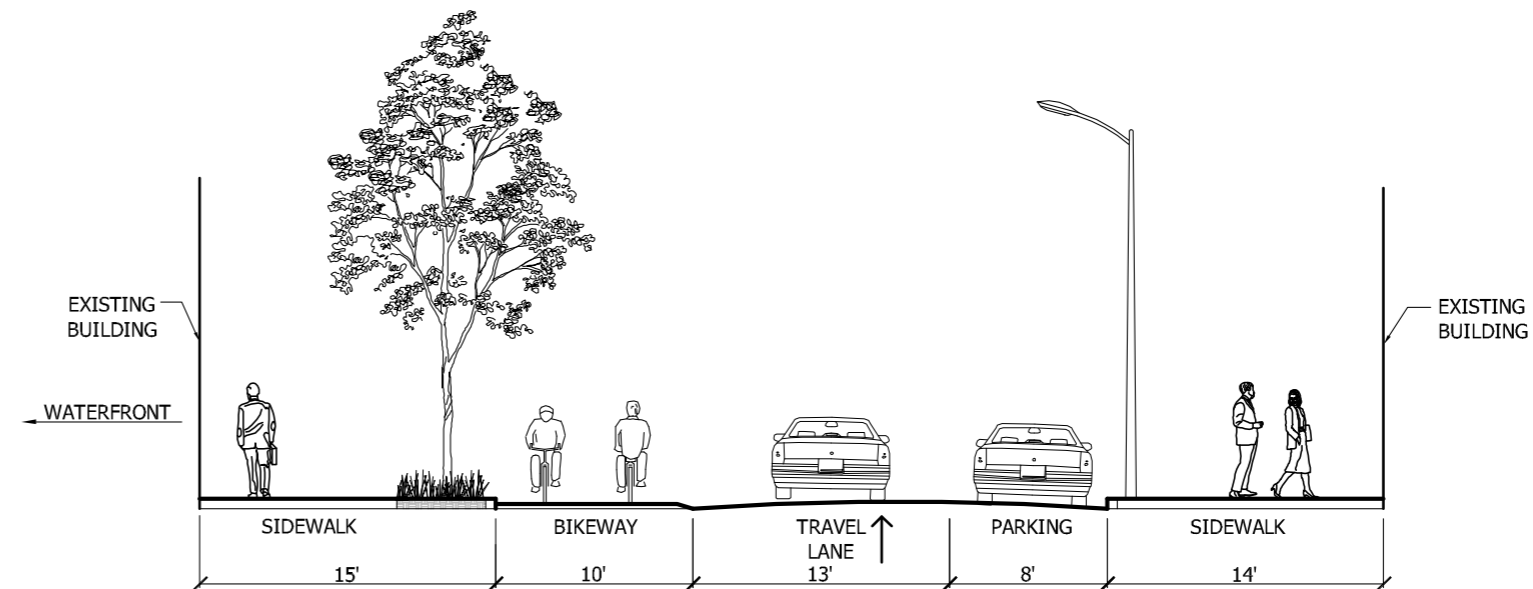


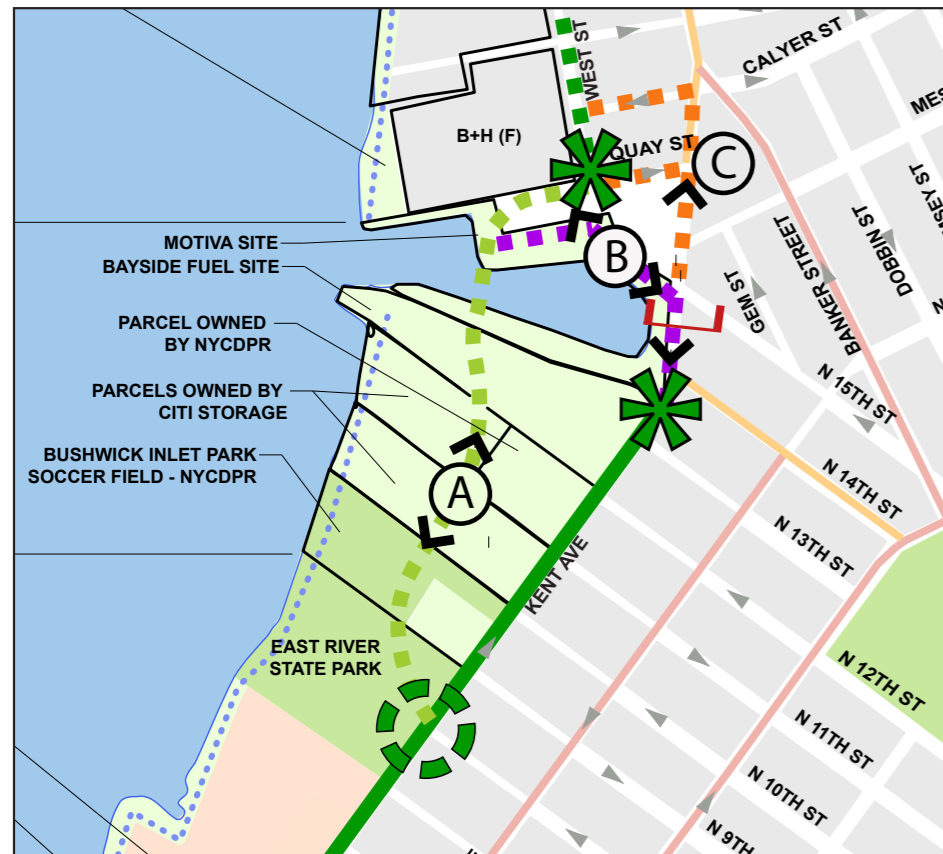
Fig. 4: Possible configuration for West Street



Existing conditions on West Street



Possible reconfiguration of West Street



Plan Enlargement 2: West Street to Kent Avenue

West Street to Kent Avenue (Plan Enlargement 2)

The connection between West Street and Kent Avenue is one of the only locations in Greenpoint-Williamsburg with the possibility of direct waterfront access for cyclists.

Route A—Path through Bushwick Inlet Park

Route A proposes a new bridge which requires the development of the proposed Bushwick Inlet Park and the acquisition of the parcels between it and East River State Park.

This route would include a bridge over the inlet, connecting the Quay Street right-of-way west of West Street to the future park south of the inlet. From the park the path could connect to Kent Avenue at approximately North 8th Street. A new bridge would be expensive and require extensive environmental permits.



Inlet bridging at Riverside South, Manhattan (precedent)



Bushwick Inlet (existing)



Bushwick Inlet and future park land (existing) Photo: Bing

Route B is the Bushwick Inlet Park Future Enhancement Project.

Route B also requires property acquisition and development as a park. At the northern edge of Bushwick Inlet Park, the route hugs the periphery of the park, creating a direct connection to West Street, running through the center of the development parcel south of Calyer Street. While this land is currently vacant, acquisition and potential environmental permitting make this a Future Enhancement Project.

Route B includes the extension of the West Street right of way south of Calyer Street and into the park. Regardless of ownership, this space should be retained as an important access point to the park and visual connection to West Street and the Greenpoint street grid. From there, the path would follow the inlet, connecting with the Kent Avenue bicycle lane at North 14th Street.

Both Routes A and B are dependent on the development of Bushwick Inlet Park, which has been cited as planned open space in both the DCP Greenpoint-Williamsburg Waterfront Access Plan and the DPR Greenpoint-Williamsburg Waterfront Open Space Master Plan.

FRANKLIN STREET CROSS-SECTIONS (ROUTES B & C)

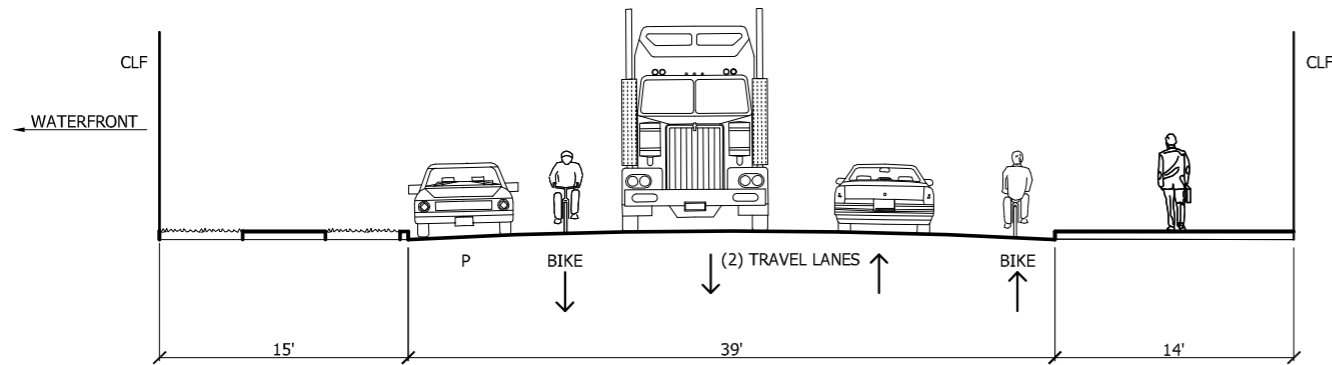


Figure 5: Existing configuration on Franklin Street from Quay Street to North 14th Street along east side of Bushwick Inlet Park

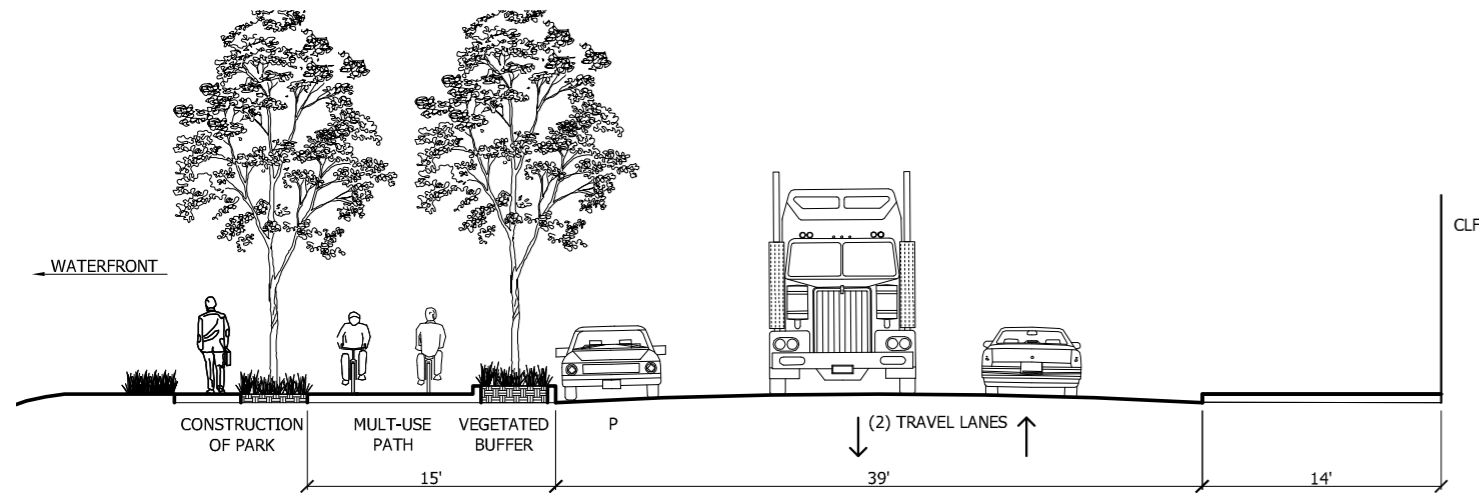


Figure 6: Possible configuration for Franklin Street from Quay Street to North 14th Street along east side of Bushwick Inlet Park

Route C—Quay Street and Calyer Street to Franklin Street

Route C is the only viable near-term option along this section, thus it is the preferred route.

Route C is the existing on-street route, which connects West Street to Kent Avenue via shared lanes on Cayler Street and Quay Street, and a mix of shared lanes and bicycle lanes on Franklin Street.

In order to provide a more robust facility in the long-term, Routes A and B have been considered.

Planned Upgrade—Kent Avenue

Kent Avenue is the designated Greenway route from North 14th Street to Clymer Street. The Greenpoint-Williamsburg Community Board requested a shared-use path along Kent Avenue and in response, NYCDOT installed the bicycle path that is there today.

The Kent Avenue bicycle path is a two-way, parking-protected bicycle path. The typical cross-section from west to east consists of an 8' two-way bicycle path (4' lanes in each direction); a buffered area separating cyclists from the 8' parking lane; an 11' northbound moving lane; and an 8' loading/parking lane against the east curb.

This plan proposes an upgraded facility including planted pedestrian refuge islands at intersections, providing more physical separation between travel modes and more greenery.

RECOMMENDATION:

From West Street to Kent Avenue the Preferred Route Recommendation is

Route C—Quay Street and Calyer Street to Franklin Street, based on

- Existing shared lanes
- Proximity to the waterfront
- Difficulty to implement waterfront path

Future Enhancement Project

Route B—Quay Street to north side of Bushwick Inlet Park, based on

- Access to waterfront
- Ability to be constructed with minimal land assembly
- Connections to existing Greenway routes



Franklin Street at Quay Street looking north (existing)



Franklin Street at 14th Street looking north (existing)



Route 9A Bikeway, Manhattan (precedent)



Kent Avenue bicycle path (existing)

2.1.3 GREENPOINT-WILLIAMSBURG RECOMMENDED ROUTE

Greenpoint - Williamsburg Waterfront Recommendation Summary/Discrete Capital Projects

- 1 **Box Street/Ash Street One-Way Pair and Commercial Street**
 Ash/Box Street one-way pair, between McGuinness Boulevard and Manhattan Avenue/Commercial Street – Class 2/3 – Refresh bicycle lane and shared lane markings
 Commercial Street between Manhattan Avenue and Dupont Street – Class 1 – Two-way bicycle path on west side of the street
- 1a **Future Enhancement Project–Newtown Creek Bicycle and Pedestrian Bridge**
- 2 **West Street**
 West Street between Eagle Street and Quay Street – Class 1 – Widen west sidewalk to include two-way bicycle path
- 3 **Franklin Street**
 Franklin Street between North 14th Street and Calyer Street – Class 2/3 – Existing striped bicycle lanes and shared lane markings
 Calyer Street between Franklin Street and West Street – Class 3 – Shared lane markings
 Quay Street between West Street and Franklin Street – Class 3 – Shared lane markings
- 3a **Future Enhancement Project–Bushwick Inlet Park**
- 4 **Kent Avenue Greenway Upgrade**
 Kent Avenue between North 14th Street and Clymer Street – Class 1 – Upgrade existing bicycle path with curb separation and planted pedestrian islands

GREENPOINT-WILLIAMSBURG RECOMMENDED ROUTE MAP

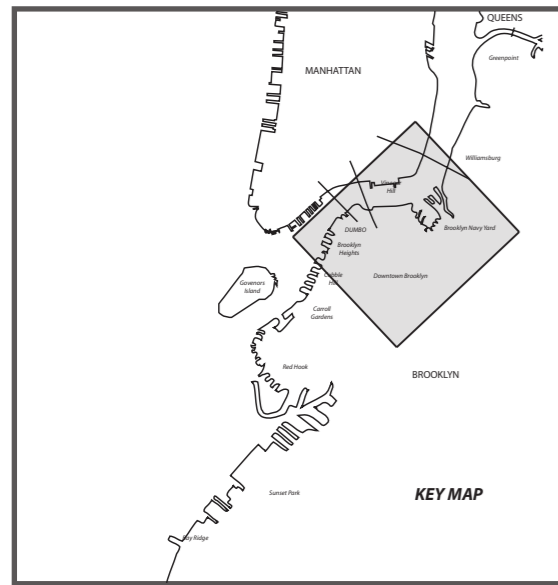


2.1.4 GREENPOINT-WILLIAMSBURG INLAND CONNECTORS

Inland Connectors ←-----→

- Eagle Street and Freeman Street:** Existing bicycle lanes; Connects to Pulaski Bridge and Northern Greenpoint
- Greenpoint Avenue:** Existing bicycle lanes and major pedestrian connection; Connects to Greenpoint neighborhood/retail and Transmitter Park
- North 8th & North 9th Streets:** Bicycle facility to be determined; Connects to Williamsburg neighborhood/retail and East River State Park
- South 4th & South 5th Streets:** Existing bicycle lanes; Connects to Williamsburg Bridge
- Division Avenue:** Existing shared lane markings/bicycle lanes and major pedestrian connection; Connects to South Williamsburg neighborhood/retail

DOWNTOWN BROOKLYN ROUTE ALTERNATIVE MAP



EXISTING BIKEWAYS:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

POTENTIAL BIKEWAYS IN NYC BIKE MAP:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE OR SHARED LANE

PROPOSED ROUTE AND ROUTE ALTERNATIVES:

- EXISTING ROUTE
- PLANNED ROUTE
- ROUTE ALTERNATIVE A
- ROUTE ALTERNATIVE B
- ROUTE ALTERNATIVE C

ROUTE ALTERNATIVE LABEL WITH BIKEWAY DIRECTION

BEGINNING / END OF ROUTE ALTERNATIVES

KEY BIKE / PEDESTRIAN ACCESS POINTS TO WATERFRONT - PROPOSED SAFETY IMPROVEMENTS

PROPOSED PEDESTRIAN ESPLANADE

PROPOSED DEVELOPMENT

PUBLIC HOUSING

EXISTING PARK

PROPOSED PARK

NORTH



2.2.1 EXISTING CONDITIONS

Neighborhood Boundaries

The Downtown Brooklyn waterfront study area includes the Brooklyn Navy Yard, Vinegar Hill, DUMBO and Brooklyn Bridge Park. The northern boundary is the intersection of Kent Avenue and Clymer Street. The southern limit is Pier 6 in Brooklyn Bridge Park and Atlantic Avenue. The inland boundary roughly follows the Brooklyn Queens Expressway.

Neighborhood Waterfront Amenities-Land Use

The study area comprises a mix of land uses, from residential towers to industrial supply manufacturers. There are still water-dependent businesses inside the Brooklyn Navy Yard, which is operated by the Brooklyn Navy Yard Development Corporation (BNYDC) and is closed to the public.

West of the Brooklyn Navy Yard the shoreline is occupied by the Con Edison power generation plant, one privately owned industrial building and Brooklyn Bridge Park.

Existing and Planned Pedestrian and Bicycle Network

Along Kent Avenue between Clymer Street and Williamsburg Street West, the western sidewalk is designated for use by pedestrians and northbound cyclists. There is an on-street bicycle lane for southbound cyclists. Williamsburg Street West from Flushing Avenue to Kent Avenue, and Flushing Avenue from Williamsburg Street West to Washington Avenue have a two-way path protected with a concrete barrier on the west and north sides of the streets, respectively. There is currently a westbound curbside buffered bicycle lane and eastbound conventional bicycle lane on Flushing Avenue from Washington Avenue to Navy Street. DDC is currently working with NYCDOT and the community to build a continuous separated path on Flushing Avenue from Williamsburg Street West to Navy Street.

There is a grade-separated buffered bicycle path against the center median of Sands Street between Navy Street and Gold Street. This facility transitions into a two-way, physically separated bicycle path in the middle of Sands Street from Gold Street to Jay Street that brings cyclists to the Manhattan Bridge bicycle ramp. Jay Street has a curbside bicycle lane for its entire length south of Sands Street.

Greenway Destinations

- Brooklyn Bridge Park
- Fulton Ferry Landing
- Vinegar Hill (neighborhood)
- DUMBO (neighborhood)
- The Brooklyn Navy Yard

Community Outreach

Community Workshops were held on March 25, 2010, September 30, 2010 and November 2, 2011. Existing conditions throughout the study area were described and discussed at the first workshop. Route options and possible design concepts were presented and discussed at the second workshop. The Recommended Route and associated design concepts were presented and discussed at the third workshop.

Key points presented in the workshops include:

- Possible routes through Vinegar Hill and DUMBO
- Providing access to waterfront along John Street
- Preservation of historic character of Hudson Ave
- Treatment options for cobblestone streets
- Discussion of design possibilities

2.2.2 ROUTE ANALYSIS

Much of the Greenway in Downtown Brooklyn already exists in various forms. This section describes current projects to upgrade the existing facility on Flushing Avenue, to establish a southbound bicycle route on Anchorage Place and through the Pearl Street Triangle, and to construct the path through Brooklyn Bridge Park. It also outlines planned upgrades for Kent Avenue south of Clymer Street, Williamsburg Street West.

Since so much of the Greenway route through Downtown Brooklyn has already been determined, route alternatives are only analyzed for one segment:

- Navy Street to Brooklyn Bridge Park

Planned Upgrade–Kent Avenue South of Clymer Street

The existing shared-use path on the sidewalk of the southbound side of Kent Avenue, adjacent to the Brooklyn Navy Yard, has been implemented in order to provide an important connection around the Navy Yard. The long-term vision is a reconfiguration of this segment of Kent Avenue in which the southbound parking lane is relocated to the northbound side of the center median, allowing this space to be utilized as a northbound bicycle path, protected by a striped buffer and flexible plastic bollards. This reconfiguration would also provide for greening with a landscaped median between the north and southbound bicycle lanes.



Kent Avenue South adjacent to the Navy Yard (existing)

Planned Upgrade–Williamsburg Street West

From the southern end of Kent Avenue, the Greenway route travels down Williamsburg Street West. The existing two-way bicycle path is between the sidewalk and moving lane, separated from traffic with a jersey barrier. The long-term upgrade to the existing facility would provide a multi-use path where the sidewalk is currently located, separated from traffic by a landscaped buffer. The path would include separated lanes for pedestrians and two-way bicycle traffic.



Williamsburg Street West (existing)

KENT AVENUE SOUTH CROSS-SECTIONS

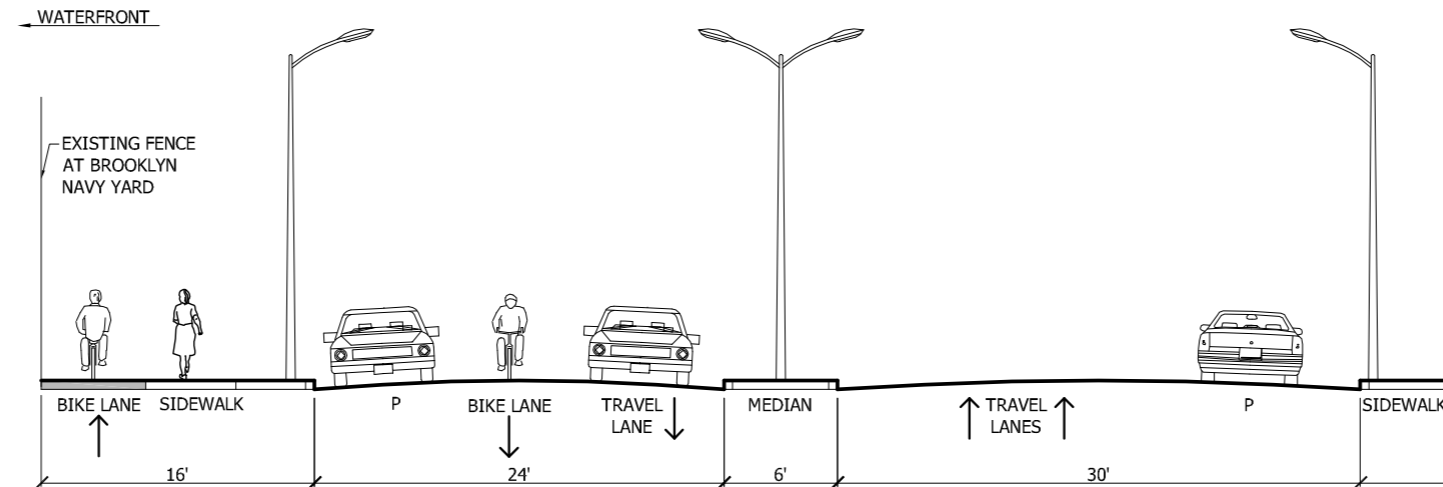


Fig. 7: Existing configuration on Kent Avenue South at Navy Yard

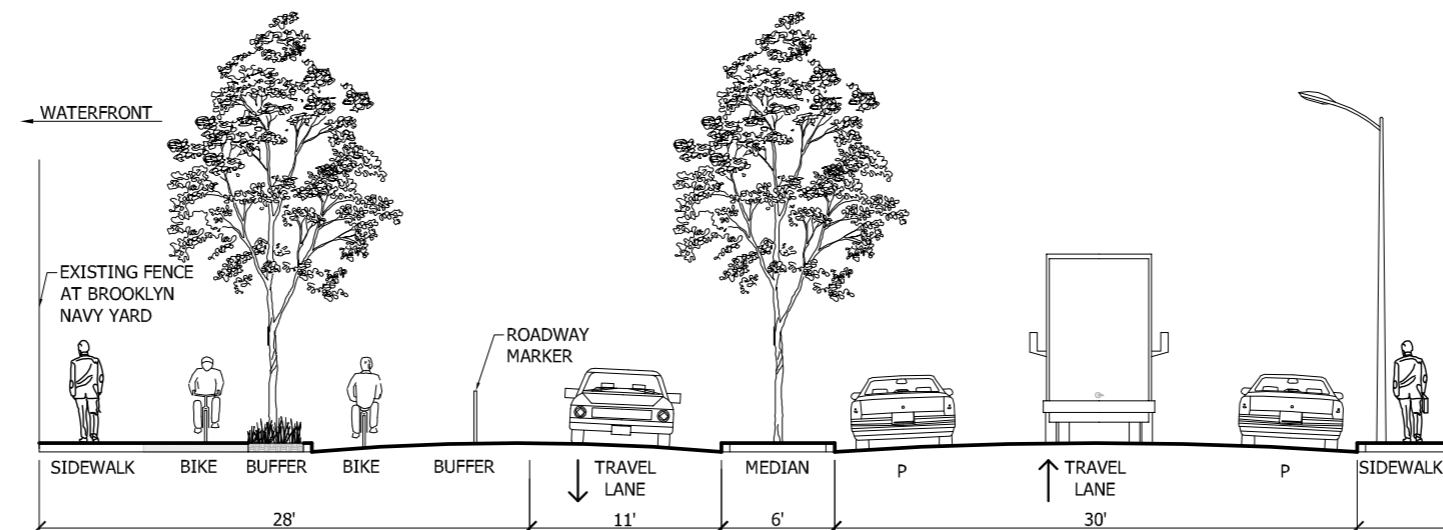


Fig. 8: Possible configuration for Kent Avenue South at Navy Yard - Reprogram Parking Space as Bike Lane

Current Project–Flushing Avenue

Flushing Avenue from Navy Street to Washington Avenue currently has striped bicycle lanes on both sides of the street. East of Washington there is a two-way curbside bicycle path separated from traffic by a jersey barrier. This facility is a highly trafficked route for commuter cyclists accessing the Manhattan Bridge and Downtown Brooklyn. In order to enhance this facility, an off-street path is planned for this stretch of Flushing Avenue. The design calls for a bicycle path with 4' lanes in both directions, a sidewalk for pedestrians and landscaping. DDC and NYCDOT are currently working with the community to implement this upgrade.

The Admiral's Row Development being built on the southwest corner of the Navy Yard will bring land use changes along Flushing Avenue. This project is still under development, but the final design will accommodate the Greenway.



Flushing Avenue at Brooklyn Navy Yard entrance (existing)

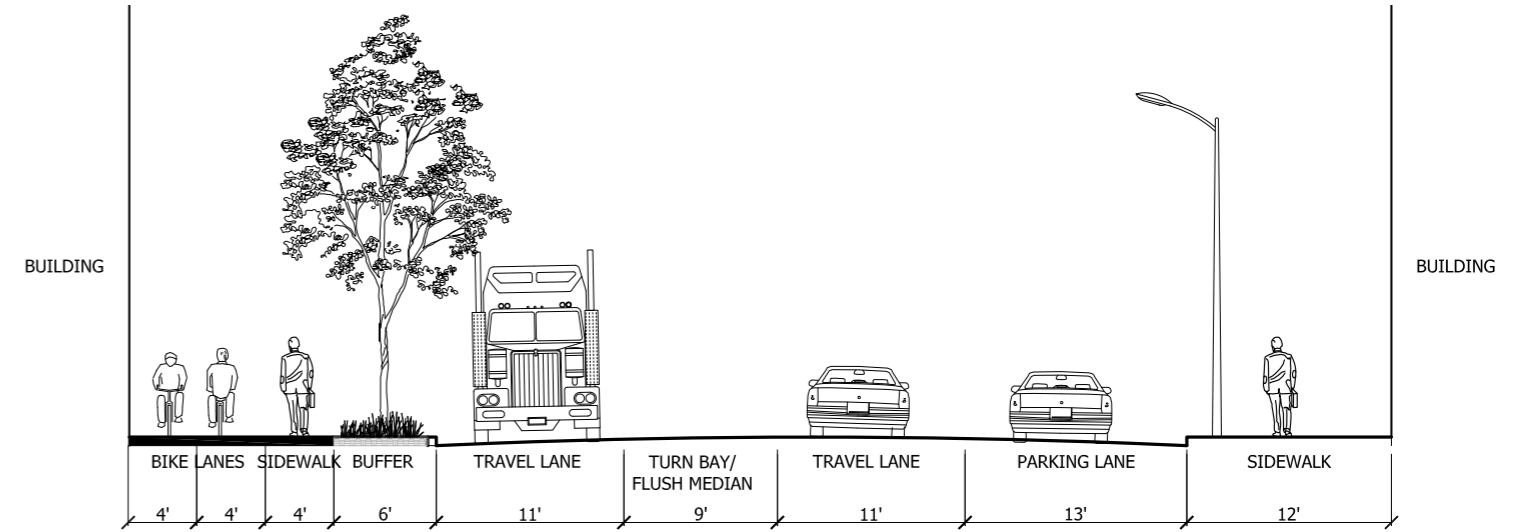
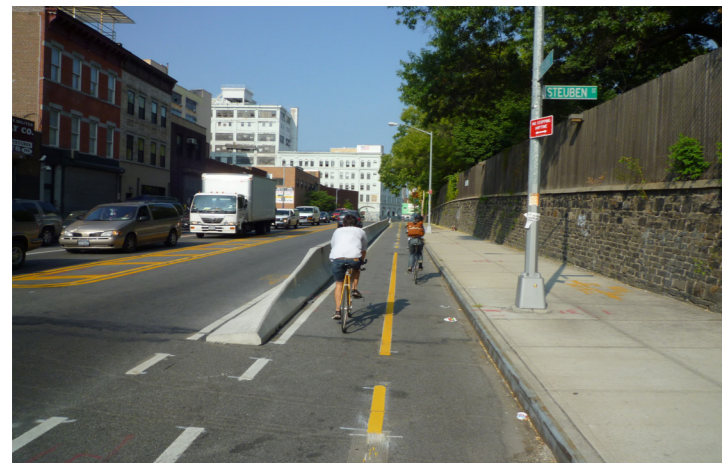


Fig. 9: Possible configuration for Flushing Avenue



Flushing Avenue at Clinton Avenue facing east (existing)



Flushing Avenue at Steuben Street facing west (existing)



Possible configuration for Flushing Avenue

Planned Upgrade–Navy Street

Navy Street from Flushing Avenue to Sands Street is a two-way, north-south street with one moving lane, one bicycle lane in each direction, a center turn lane and parking on both sides of the street. The Admiral’s Row Development is being built on the southwest corner of the Navy Yard at the northeast corner of Navy Street and Flushing Avenue. This retail development will accommodate the Greenway. The design of the Greenway on Navy Street has not been decided, but ample space between the path and land uses will be provided and turning movements will be safely controlled along this stretch of roadway. Bike parking will also be provided. This Greenway facility and its high volume of daily users will likely contribute to the new development’s success.

It is proposed that the physically separated, shared-use Greenway path proposed as part of the Flushing Avenue upgrade project be carried around the corner from the north side of Flushing Avenue onto the east side of Navy Street and maintained as far north as York street adjacent to the Brooklyn Navy Yard.



View looking east down Flushing Avenue from Navy Street (existing)



View north on Navy Street looking towards Sands Street (existing)

NAVY STREET CROSS-SECTIONS

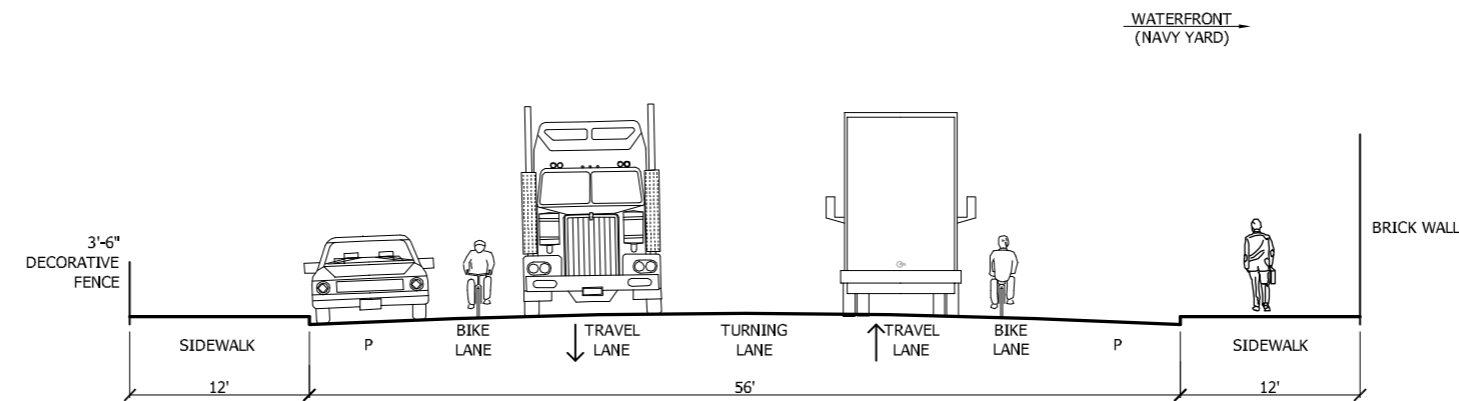


Fig. 10: Existing configuration on Navy Street

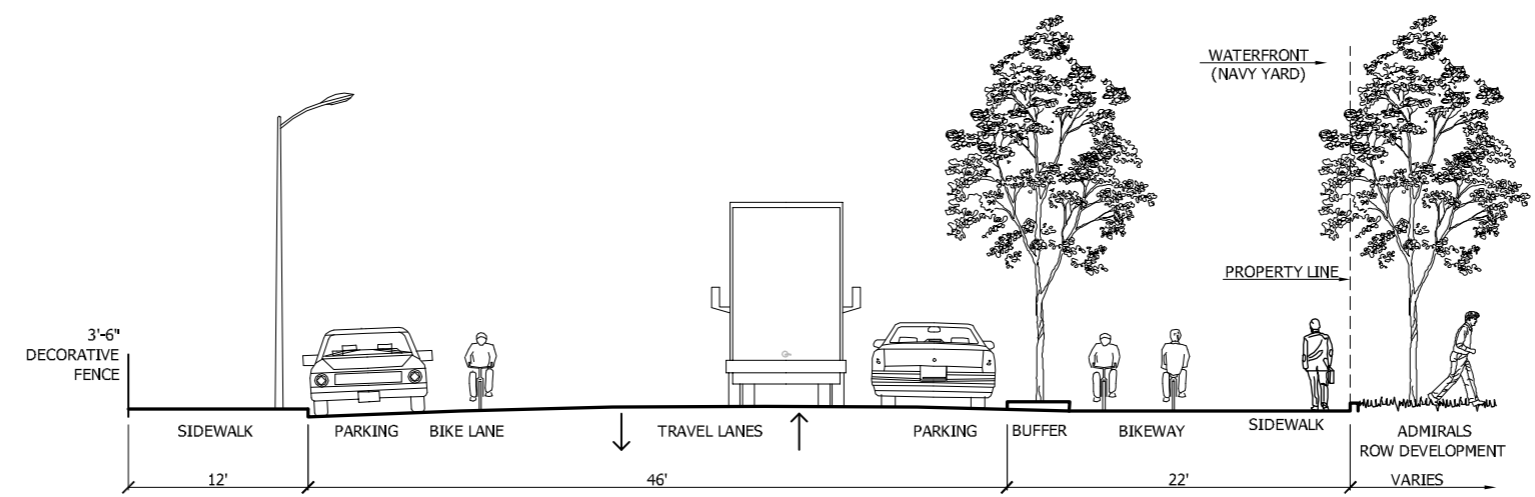


Fig. 11: Possible configuration for Navy Street



Plan Enlargement 3: Navy Street to Brooklyn Bridge Park

Navy Street to Brooklyn Bridge Park (Plan Enlargement 3)

Route A—Hudson Avenue and John Street

Route A includes historic streets in Vinegar Hill and DUMBO. This proposal brings the route as close as possible to the waterfront. The portion of Route A on Hudson Avenue between York Street and Plymouth Street is part of the preferred route.

Route A begins at the intersection of York Street and Navy Street, and travels on Hudson Avenue to John Street. Hudson Avenue is a narrow two-way street with parking on the west side. The street is paved with older cobblestones, creating a unique roadbed with different sizes and colors of cobbles. The sidewalks are of varying materials, including slate and concrete. This portion of Hudson Avenue is within the Vinegar Hill Historic District.

Routing the Greenway on Hudson Avenue allows users to travel through the heart of Vinegar Hill, visit shops and restaurants, and engage with a well-preserved portion of the historic Brooklyn waterfront. The cobblestones are currently not ideal for cyclists. Given the unique historic character of this street, any future design should integrate the existing cobblestones into a smooth surface that accommodates cyclists. This design challenge will likely add costs to the project. As an alternative, cyclists may use the separated path along Sands Street between Navy and Jay/Pearl Streets (see Route C). Meanwhile, pedestrians following the Greenway can use Hudson Avenue.

From Hudson Avenue, Route A turns onto John Street, which is the street that runs closest to the waterfront. John Street is two-way from Hudson Avenue to Gold Street with parking on the south side of the street. Between Gold Street and Bridge Street, access to John Street is restricted by Con Edison property. NYCDOT will

continue to work with Con Edison to reopen John Street. Until that time, the preferred route is on other streets (see Route B).

John Street is two-way between Bridge and Jay Streets. The north sidewalk is lined with jersey barriers at the curb.

John Street between Jay Street and Adams Street is one-way westbound. There are no sidewalks from Jay Street to Pearl Street, which allows vehicles to park on the east side of the street, against the face of the building and often blocking pedestrian access. Limited right-of-way makes it difficult to implement a protected path along both Hudson Avenue and John Street.

John Street east of Jay Street has ample roadbed and sidewalk space to warrant the consideration of routing a Greenway along this waterfront street in the future.

Route A1 is the *John Street Waterfront Connector Future Enhancement Project*.

Route A1 is a long-term plan that calls for waterfront access from Jay Street to Brooklyn Bridge Park. This Future Enhancement Project should be pursued when land uses change, ConEdison reconsiders the closing of John Street and funds are made available.

The long-term plan should consider providing access to the waterfront at Jay Street and explore the development of a shared-use esplanade along waterfront parcels, offering direct access to Brooklyn Bridge Park. In addition, Brooklyn Bridge Park could potentially be expanded in the waterfront parcel west of Jay Street and north of John Street.

HUDSON AVENUE SOUTH CROSS-SECTIONS (ROUTE A)

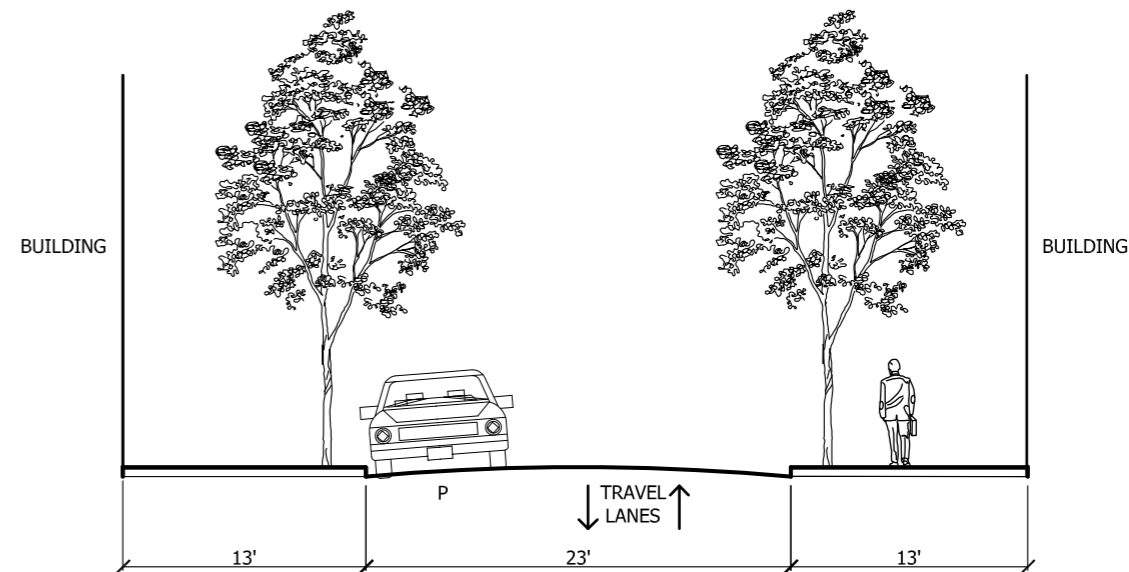


Fig. 12: Existing configuration on Hudson Avenue



Existing cobbles will remain to the extent possible



Future design should take into account all users, including cyclists



Hudson Avenue (existing)



John Street east of Jay Street (existing)



John Street west of Jay Street (existing)



Degraw Street, Brooklyn (precedent)



Madrid, Spain (precedent)



JOHN STREET CROSS-SECTIONS (ROUTE A)

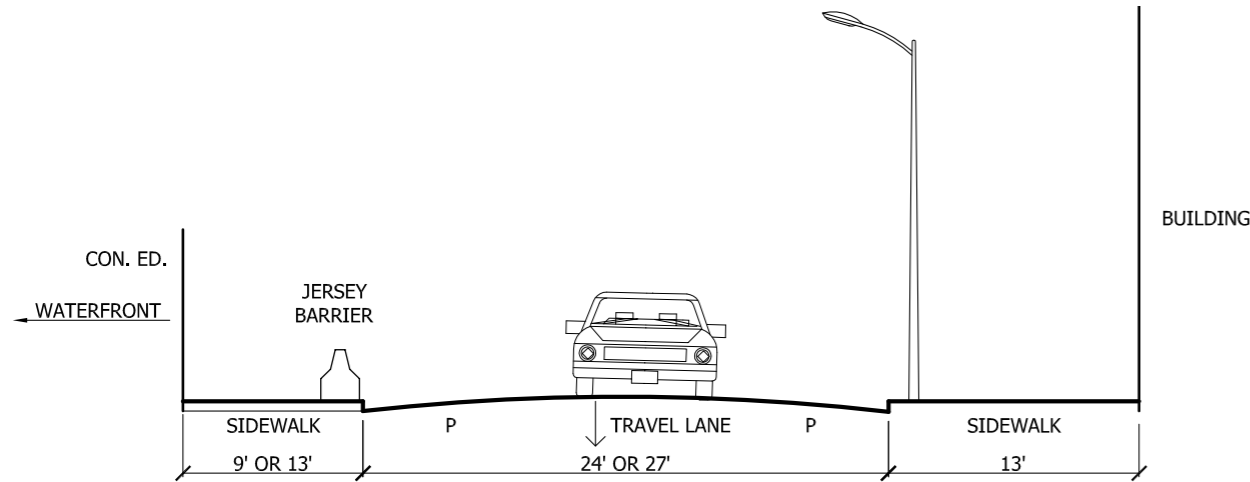


Fig. 13: Existing configuration on John Street east of Jay Street

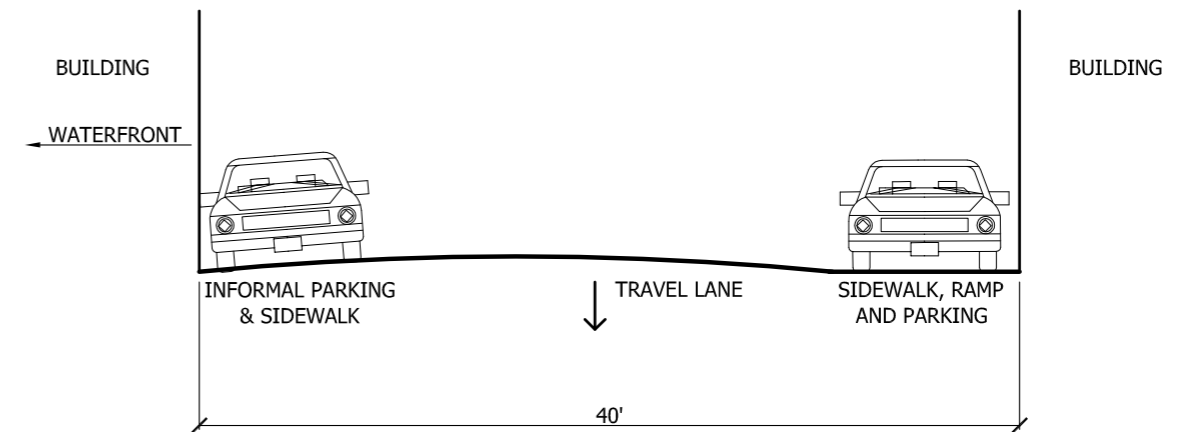


Fig. 15: Existing configuration on John Street west of Jay Street

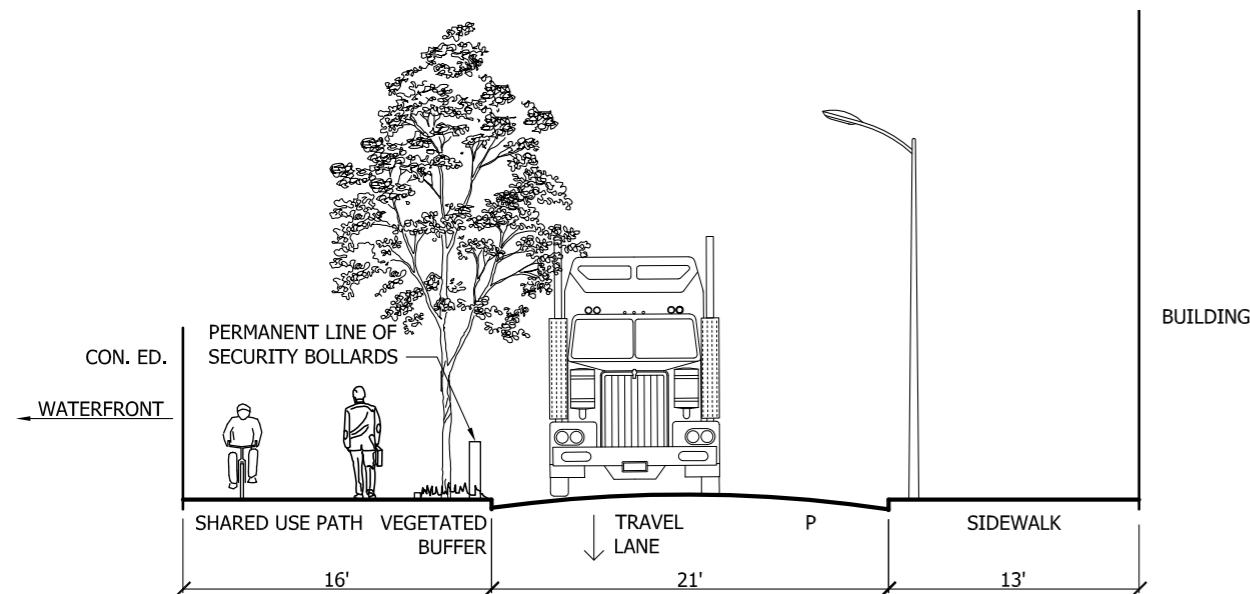


Fig. 14: Possible configuration for John Street east of Jay Street

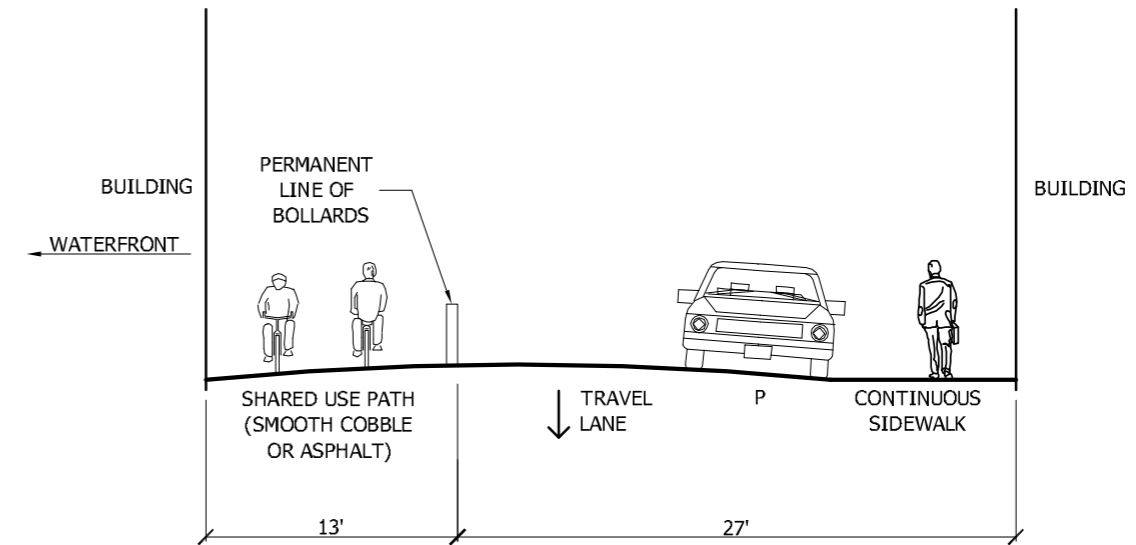


Fig. 16: Possible configuration for John Street west of Jay Street

Route B–York Street, Plymouth Street and Water Street

Route B consists of a series of one-way pairs, each turning twice to avoid Brooklyn-Queens Expressway exit ramps, making this an indirect route. The one-way pair parallel to the waterfront on Plymouth and Water Streets, however, connects Brooklyn Bridge Park to Hudson Avenue, making it part of the preferred route.

From Navy Street, Route B travels west on York Street, turning north on Bridge Street and west on Water Street to reach Brooklyn Bridge Park. In the opposite direction, Plymouth Street and Gold Street are used to make the connection.

Cobblestones will have to be smooth to accommodate cyclists. A capital project that is underway will enhance Pearl Street Plaza and Water Street. The Greenway will be incorporated into and improved through this project.



York Street looking west from Gold Street (existing)



Plymouth Street looking west from Jay Street (existing)



Water Street looking west from Jay Street (existing)



Gold Street looking north from Front Street (existing)



Water Street going under the Manhattan Bridge (existing)

Route C–Sands Street to Jay and Pearl Streets to John Street

Route C offers direct access to the Manhattan Bridge and the Brooklyn Bridge, but circumvents the waterfront and the historic waterfront neighborhoods of Vinegar Hill and DUMBO. Although this route works as a through-route, it is not the preferred route for the Greenway because it does not provide access to the waterfront.

Route C is an inland route which does not provide a strong connection to the waterfront, but utilizes the separated path on Sands Street. From the intersection of Sands Street and Navy Street, the route travels west to Jay Street and the Manhattan Bridge entrance, at which point it connects to existing striped bicycle lanes on Jay Street, Pearl Street and Prospect Street, streets used by vehicles accessing the Brooklyn and Manhattan Bridges and the Brooklyn Queens Expressway.

Jay Street and Pearl Street serve as a one-way, north-south pair, bringing Greenway users directly to and from the waterfront. Jay Street ends at the waterfront, offering views across the East River and potential for a street end park.



Grade-separated bicycle lane on Sand Street (existing)



Sands Street east of Jay Street (existing)



Pearl Street looking north from Front Street (existing)

RECOMMENDATION:

From **Navy Street to Brooklyn Bridge Park** the Preferred Route Recommendation is:

Route A–Hudson Avenue from York Street to Plymouth Street based on

- Direct connection between Navy Yard and the Waterfront
- Incorporation of the historic waterfront district into the Greenway route

Route B–Plymouth Street and Water Street from Hudson Avenue to Main Street, based on

- Existing through connections to street grid
- Difficulty implementing waterfront path

Future Enhancement Project

John Street Waterfront Connector, based on

- Access to waterfront
- Connection to existing waterfront open space

Vinegar Hill Preferred Route Vision

The preferred route through Vinegar Hill combines parts of Route A and Route B. This route was selected in part due to the quiet nature of these streets resulting from their relatively remote location and consequently low traffic volumes, and from the cobblestones that slow vehicular traffic. For pedestrians especially, the route along Hudson Avenue is pleasant, possessing an historic character that is aesthetically pleasing and lends itself to the calm atmosphere that is characteristic of a greenway. Note that, in its current form, this route requires cyclists to ride on rough cobblestones or walk their bicycles.

In order to improve this route, the following design recommendations should be considered in the long-term:

Hudson Avenue (Vinegar Hill Connector)

The Hudson Avenue segment between Front Street and Plymouth Street is lined with historic buildings and sidewalks and has a cobblestone roadbed. The shared nature of this street should be enhanced. A portion of the roadway adjacent to the curb should be reconstructed using smooth cobblestones to accommodate cyclists.

Any future capital project will include outreach to the community. The final design will respect the historic designation of the neighborhood and include the existing cobblestones. Sands Street between Navy Street and Pearl/Jay Streets can be used as an alternative bicycle path.

Plymouth/Water Street Pair

Plymouth Street and Water Street through Vinegar Hill and DUMBO could have a similar treatment to that described for Hudson Avenue, except that Plymouth and Water Streets comprise a one-way pair so there would not be two-way traffic as found on Hudson Avenue. The eastbound route would follow Plymouth Street from Main Street to Hudson Avenue. The westbound route would follow Water Street from Hudson Avenue to Anchorage Place, where it would turn north along Anchorage Place to the easternmost entrance to Brooklyn Bridge Park under the Manhattan Bridge.



Plymouth Street at Jay Street (existing)



Smoothed cobblestone treatment on Washington Street, DUMBO (precedent for Plymouth/Water Street and Hudson Avenue)

PLYMOUTH STREET CROSS-SECTION (ROUTE B)

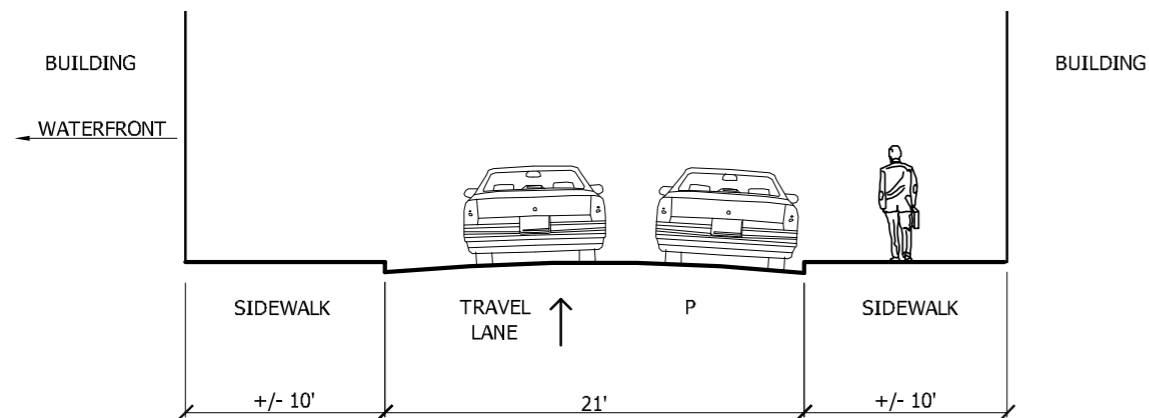


Fig. 17: Existing configuration on Plymouth Street looking west from Jay Street

WATER STREET CROSS-SECTION (ROUTE B)

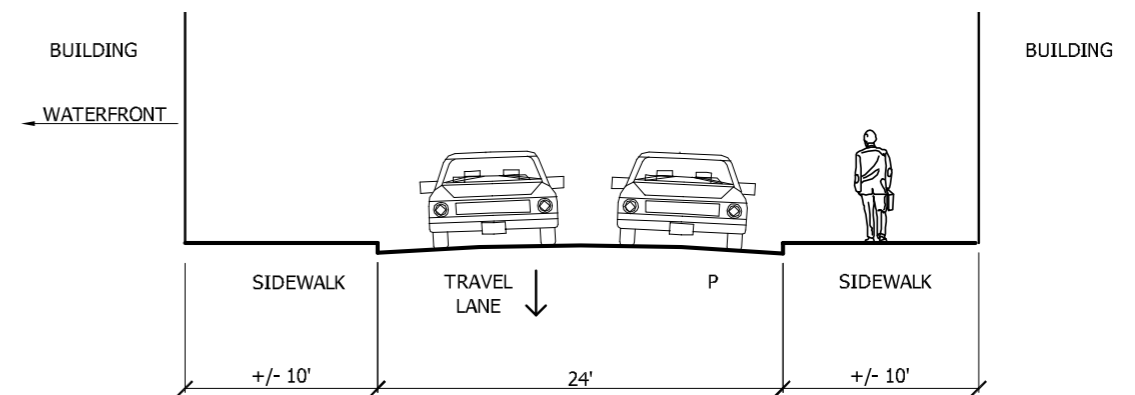


Fig. 19: Existing configuration on Water Street looking west from Jay Street

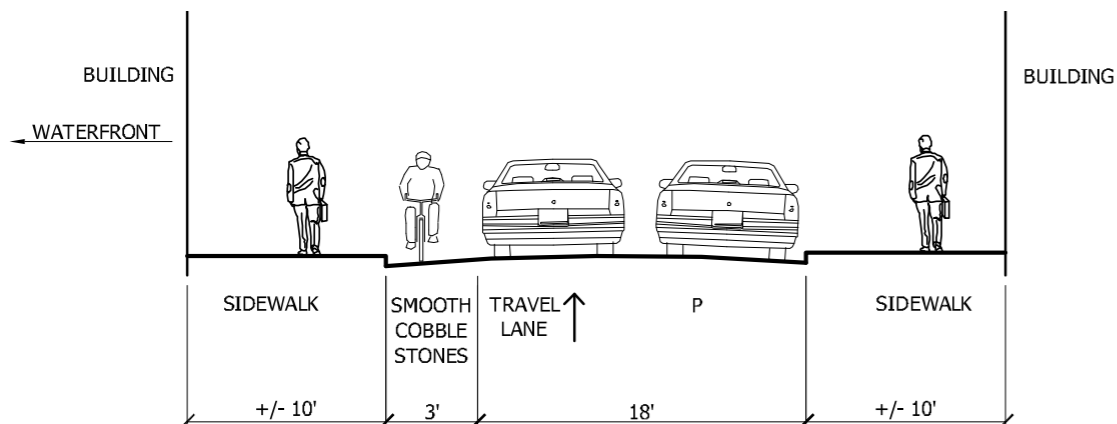


Fig. 18: Possible configuration for Plymouth Street looking west from Jay Street

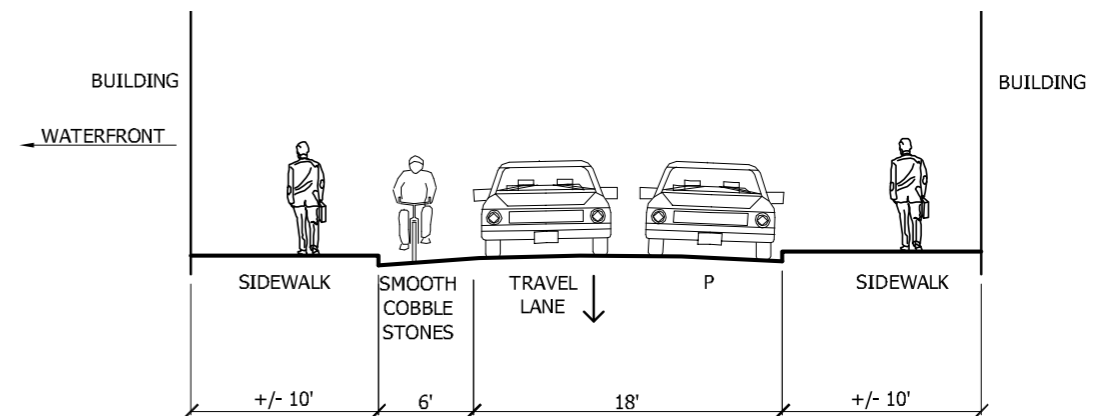


Fig. 20: Possible configuration for Water Street looking west from Jay Street

Anchorage Place

The Pearl Street Triangle is currently being built out with curbs and permanent features as part of the final construction of Brooklyn Bridge Park. The Greenway will take advantage of this defining open space in the heart of DUMBO. The westbound route will enter the plaza at Water Street, turn right on Anchorage Place and enter Brooklyn Bridge Park at John Street. This route will be incorporated into the on-going capital project to redesign the plaza and the surrounding streets. The eastbound route will exit Brooklyn Bridge Park at Main Street and continue east to Hudson Avenue on Plymouth Street.

NYCDOT and Brooklyn Bridge Park will continue to work together to increase bicycle and pedestrian access to the Park and provide safe, separated paths within the Park that are well-signed and integrated into the overall Greenway.

Brooklyn Bridge Park

As construction of Brooklyn Bridge Park progresses, a permanent shared-use path will be constructed through the park. Currently, there is an interim multi-use path which runs from Pier 2 south to Pier 5. The final path will span from Pier 1 to Pier 6, as shown below in the Phasing Plan for Brooklyn Bridge Park.

At Atlantic Avenue, there is a two-way separated bicycle path adjacent to the sidewalk to connect the southern end of the park to the Columbia Street shared-use path.



Temporary shared-use path in Brooklyn Bridge Park (existing)



Recent improvements on Atlantic Avenue connection between Columbia Street Greenway and Pier 6



Anchorage Place at Front Street facing north (existing)



Northern End of Brooklyn Bridge Park between Manhattan Bridge and Brooklyn Bridge (existing)



Shared-use Path in Brooklyn Bridge Park at Pier 6

2.2.3 DOWNTOWN BROOKLYN RECOMMENDED ROUTE

Downtown Brooklyn Waterfront Recommendation Summary/Discrete Capital Projects

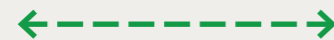
- 5 **Kent Avenue South**
Kent Avenue between Clymer Street and Williamsburg Street West – Class 1 – Reconfigure traffic and parking to accommodate new Greenway design
- 6 **Williamsburg Street West Greenway Upgrade**
Williamsburg Street West from between Kent Avenue and Flushing Avenue – Class 1 – Expand existing sidewalk to improve existing Greenway
- 7 **Navy Yard Greenway Upgrade**
Flushing Avenue between Williamsburg Street West and Navy Street – Class 1 – Expand existing sidewalk to accommodate grade-separated path
Navy Street between Flushing Avenue and York Street – Class 1 – Two-way bicycle path on east side of the street
- 8 **Vinegar Hill Connector**
Hudson Avenue between York Street and Front Street – Class 3 – Curbside bicycle route with shared lane markings
Hudson Avenue between Front Street and Plymouth Street – Class 2 (modified) – On-street two-way smooth cobble bicycle lane
- 9 **Plymouth/Water Street Pair**
Plymouth Street between Washington Street and Hudson Avenue – Class 2 (modified) – On-Street curb-side smooth cobble bicycle lane
Water Street between Hudson Avenue and Anchorage Place – Class 2 (modified) – On-Street curb-side smooth cobble bicycle lane
Anchorage Place between Water Street and Brooklyn Bridge Park – Class 1 – Off-street path to be included in final construction of Brooklyn Bridge Park
- 9a **Future Enhancement Project–John Street Waterfront Connector**
- 10 **Brooklyn Bridge Park**
Brooklyn Bridge Park from Main Street to Atlantic Avenue – Class 1 – Off-street path to be included in final construction of Brooklyn Bridge Park

DOWNTOWN BROOKLYN RECOMMENDED ROUTE MAP



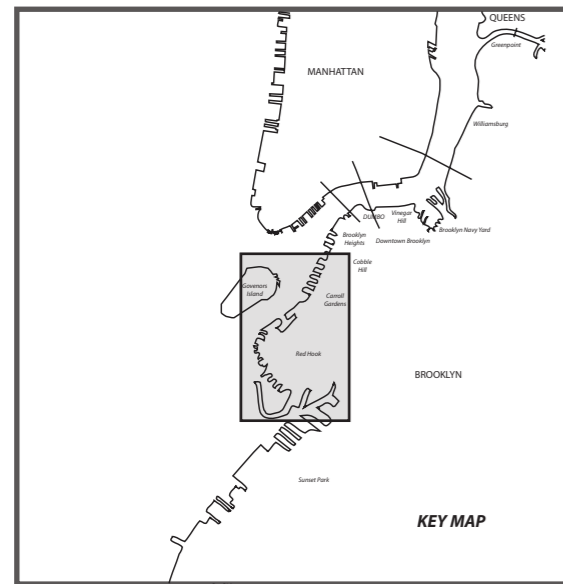
2.2.4 DOWNTOWN BROOKLYN INLAND CONNECTORS

Inland Connectors



- Vanderbilt Avenue:** Existing shared lane markings; Connects to Fort Greene/Clinton Hill, pedestrian connection to Myrtle Avenue
- Carlton Avenue & Cumberland Street:** Existing bicycle lane & shared lane markings (respectively); Connects to Fort Greene neighborhood/retail and Fort Greene Park
- Navy Street:** Existing bicycle lane; Connects to Fort Greene neighborhood/retail
- Sands Street:** Existing grade-separated bicycle path; Connects pedestrians to Manhattan Bridge and Downtown Brooklyn
- Jay & Pearl Streets:** Existing shared lane markings; Connects pedestrians to Manhattan Bridge and Downtown Brooklyn
- Cadman Plaza West:** Existing shared lane markings; Connects pedestrians to Fulton Ferry Landing and Brooklyn Bridge Park

RED HOOK
ROUTE ALTERNATIVE MAP



EXISTING BIKEWAYS:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

POTENTIAL BIKEWAYS IN NYC BIKE MAP:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE OR SHARED LANE

PROPOSED ROUTE AND ROUTE ALTERNATIVES

- EXISTING ROUTE
- PLANNED ROUTE
- ROUTE ALTERNATIVE A
- ROUTE ALTERNATIVE B
- ROUTE ALTERNATIVE C

ROUTE ALTERNATIVE LABEL WITH BIKEWAY DIRECTION

BEGINNING / END OF ROUTE ALTERNATIVES

KEY BIKE / PEDESTRIAN ACCESS POINTS TO WATERFRONT - PROPOSED SAFETY IMPROVEMENTS

PROPOSED PEDESTRIAN ESPLANADE

- PROPOSED DEVELOPMENT
- PUBLIC HOUSING EXISTING PARK
- PROPOSED PARK

NORTH

0 1/8 mile 1/4 mile 1/2 mile



2.3.1 EXISTING CONDITIONS

Neighborhood Boundaries

The Red Hook Waterfront study area is bounded by Atlantic Avenue to the north, the Gowanus Canal to the south, the Brooklyn Queens Expressway and Hamilton Avenue to the east and the waterfront to the west.

Neighborhood Waterfront Amenities-Land Use

Land use in the area is diverse, consisting of maritime-related industry, warehouses and manufacturing, low-, medium- and high-density residential development, neighborhood-scale and regional big-box retail, and parks and recreational facilities.

Pier 10 is an active container port and Atlantic Basin (Piers 11 and 12) is where the Brooklyn Cruise Ship Terminal is located. Although the terminal itself is closed to non-cruise related visitors, other areas of Atlantic Basin are open from dawn to dusk.

The Red Hook waterfront south of Atlantic Basin comprises several businesses and cultural attractions, including galleries, waterfront museums and public open spaces.

Away from the waterfront, cobblestone streets and historic warehouse architecture define a mixed industrial, residential and commercial neighborhood. Red Hook Houses (New York City Housing Authority), row houses and several new housing developments define a strong residential core. Van Brunt Street and Columbia Street are important commercial corridors. On-street parking is well used on residential and commercial blocks.

Cycling in parts of the study area is a challenge due to the narrow rights-of-way on some of the streets and irregular cobblestone surfaces. In other parts of the study area, commercial activity generates high truck volumes. Design of new bicycle and pedestrian facilities must address these constraints.

Existing and Planned Pedestrian and Bicycle Network

A two-way shared-use path exists on the west side of Columbia Street between Atlantic Avenue and Degraw Street and on the north side of Degraw Street to Van Brunt Street. The DDC is currently working with NYCDOT to continue the Columbia Street and Degraw Street paths south along Van Brunt Street to Hamilton Avenue.

There is also an existing shared-use path and promenade in Erie Basin Park connecting to the Columbia Street Pier. There are striped north-south bicycle lanes and shared lane markings on Columbia Street, Bay Street, Clinton Street and Court Street.

Greenway Destinations

- Louis Valentino, Jr. Park
- Coffey Park
- Red Hook Pool and Recreational Area
- Pedestrian path and seating area at Fairway Market
- Van Brunt Street and Columbia Street retail corridors
- Erie Basin Park
- Columbia Street Pier Promenade
- Red Hook Community Farm

Community Outreach

Community Workshops were held on April 13, 2010, October 14, 2010 and October 12, 2011. Existing conditions throughout the study area were described and discussed at the first workshop. Route options and possible design concepts were presented and discussed at the second workshop. The Recommended Route and associated design concepts were presented and discussed at the third workshop.

Key points addressed in the workshops include:

- On- and off-street route alternatives as documented in previous studies
- Connections to existing community facilities, open space and waterfront
- Consideration of vehicular mix
- Treatment options for cobblestone streets
- Discussion of design possibilities



Plan Enlargement 4: Hamilton Avenue and Van Brunt Street to Beard Street and Conover Street

2.3.2 ROUTE ANALYSIS

In Red Hook, three important segments of the Greenway exist: Columbia Street, Erie Basin Park, and the Columbia Street Pier. This section describes planned upgrades to each of these segments and a current project to establish the Greenway on Van Brunt Street. It also analyzes route alternatives for the following three segments:

- Hamilton Avenue and Van Brunt Street to Beard Street and Conover Street
- Beard Street and Conover Street to Erie Basin Park
- Erie Basin Park to Hamilton Avenue Bridge

Planned Upgrade—Columbia Street

From the southern end of Brooklyn Bridge Park at Atlantic Avenue, there is a jersey-barrier protected bicycle path to Congress Street, where an off-street path continues to Degraw Street. In the future, this existing section of Greenway could be upgraded with additional landscaping and amenities.

Current Project—Van Brunt Street

The DDC is currently working with NYCDOT to extend the existing path on Degraw Street to Van Brunt Street and establish a bicycle facility along Van Brunt Street to Hamilton Avenue. This segment of the Greenway will be built as part of the on-going reconstruction of Van Brunt Street.

Summit Street and Van Brunt Street to Beard Street and Conover Street (Plan Enlargement 4)

Route A-Waterfront Route

Route A from Pioneer Street and Conover Street is the Buttermilk Channel Waterfront Future Enhancement Project.

Route A takes advantage of the space and waterfront access available at Atlantic Basin. The section that runs along Summit Street and Imlay Street from Hamilton Avenue to the Bowne Street gate to the Basin is part of the preferred route. Alternatively, based on continued discussions with the Port Authority of New York and New Jersey (PANYNJ) and EDC, the route may continue down Imlay Street and enter the Basin at Verona Street. The Basin and the Cruise Ship Terminal are changing landscapes and the route will have to be flexible as implementation moves forward.

Route A travels along Van Brunt Street to Summit Street and onto Imlay Street. On Summit Street the roadway is very wide and a two-way path could be accommodated. On Imlay Street, the west sidewalk abuts a fence but could be extended to create a 16' wide multi-use path that complements the truck route by separating bicycles and pedestrians from traffic. Converting Imlay Street and Summit Street to one-way streets should also be explored as a means of simplifying truck movements and providing more space for the Greenway.

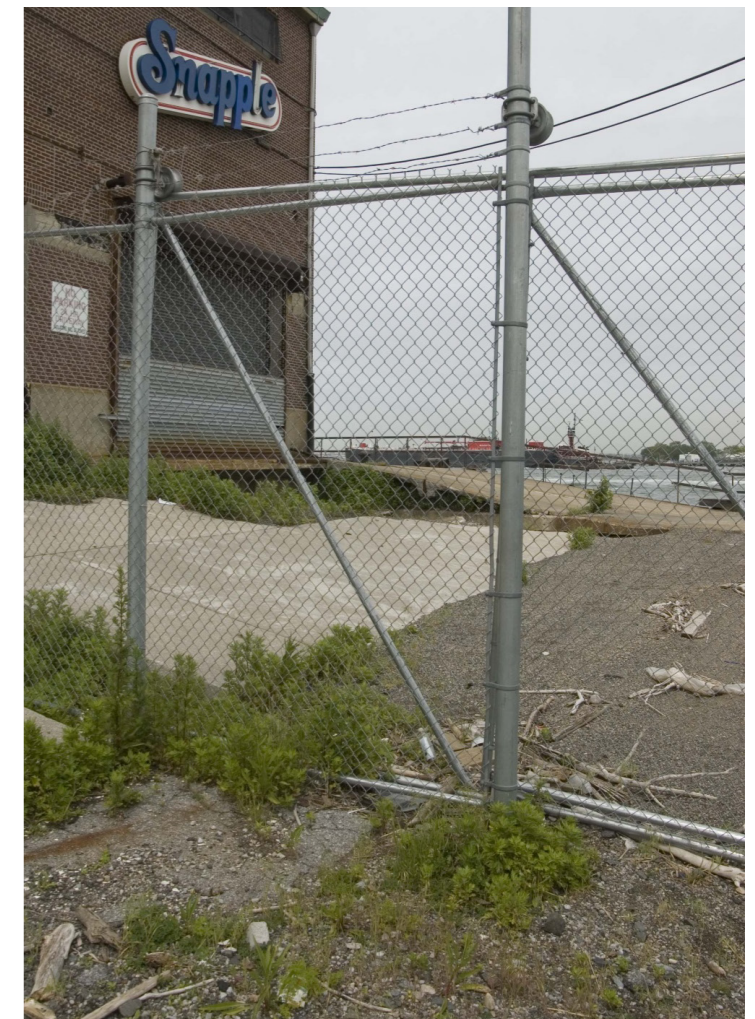
Route A continues through the gate at Bowne Street and Imlay Street and into Atlantic Basin on a PANYNJ controlled roadbed. Commercial Wharf, the street within the Basin, has ample space for pedestrians and bicycles. The Bowne Street gate is narrow and is the primary vehicular egress to the Basin for the Cruise Ship Terminal and Phoenix Beverage. Alternatively, the Greenway could continue on Imlay Street to Verona Street and Commercial Wharf. NYCDOT will work with PANYNJ and EDC to implement a safe bicycle facility within the Basin that does not interfere with traffic operations on cruise days.

Commercial Wharf becomes Conover Street at the intersection of Pioneer Street, where Route A diverts from Route B. Route A turns west towards the waterfront, along the periphery of the New York Passenger Ship Terminal parking lot and then continues along the waterfront edge of several privately-owned waterfront properties. Though property owners have expressed interest in a public esplanade, construction will require expensive bulkhead repair.

The route follows the waterfront and connects to Conover Street via Louis Valentino, Jr. Park and Van Dyke Street. This route offers Brooklyn's closest views of the Statue of Liberty and Governor's Island. Route A was preferred by most participants at the second community workshop, due to its proximity to the waterfront. Due to the high construction cost and access to private property required, this portion of the route is a long-term option.



Cruise Ship Terminal to Valentino Jr. Park (existing). Photo: Bing



Waterfront lot at west end of Wolcott Street (existing)



Imlay Street north of Bowne Street (existing)



Columbia Street (precedent)



Pier 11 at Commercial Wharf (existing)



Valentino Pier Park (existing)

IMLAY STREET CROSS-SECTIONS (ROUTE A)

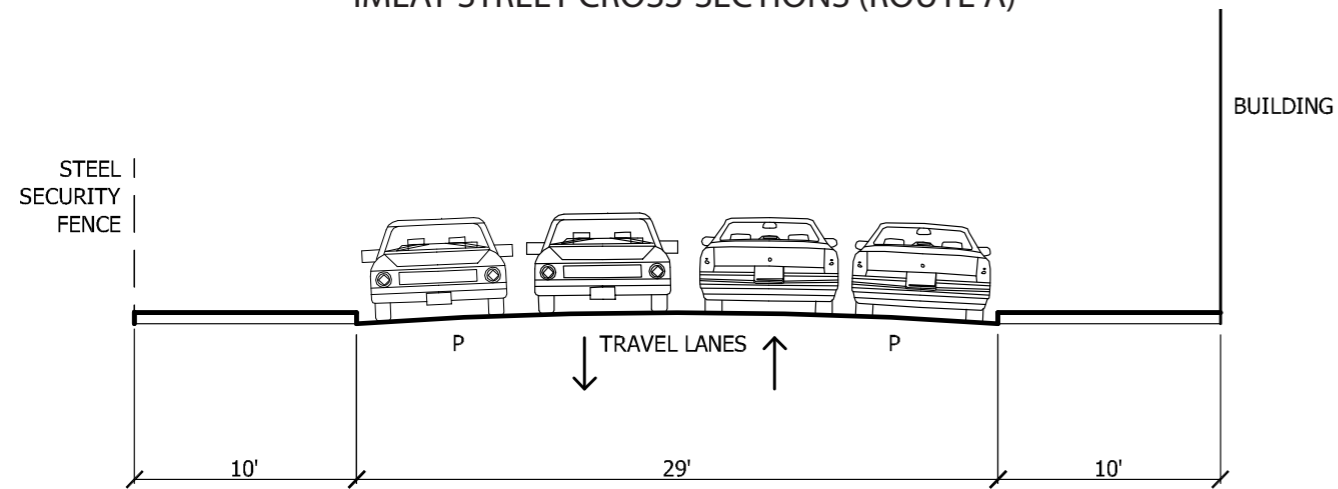


Fig. 21: Existing configuration of Imlay Street north of Bowne Street

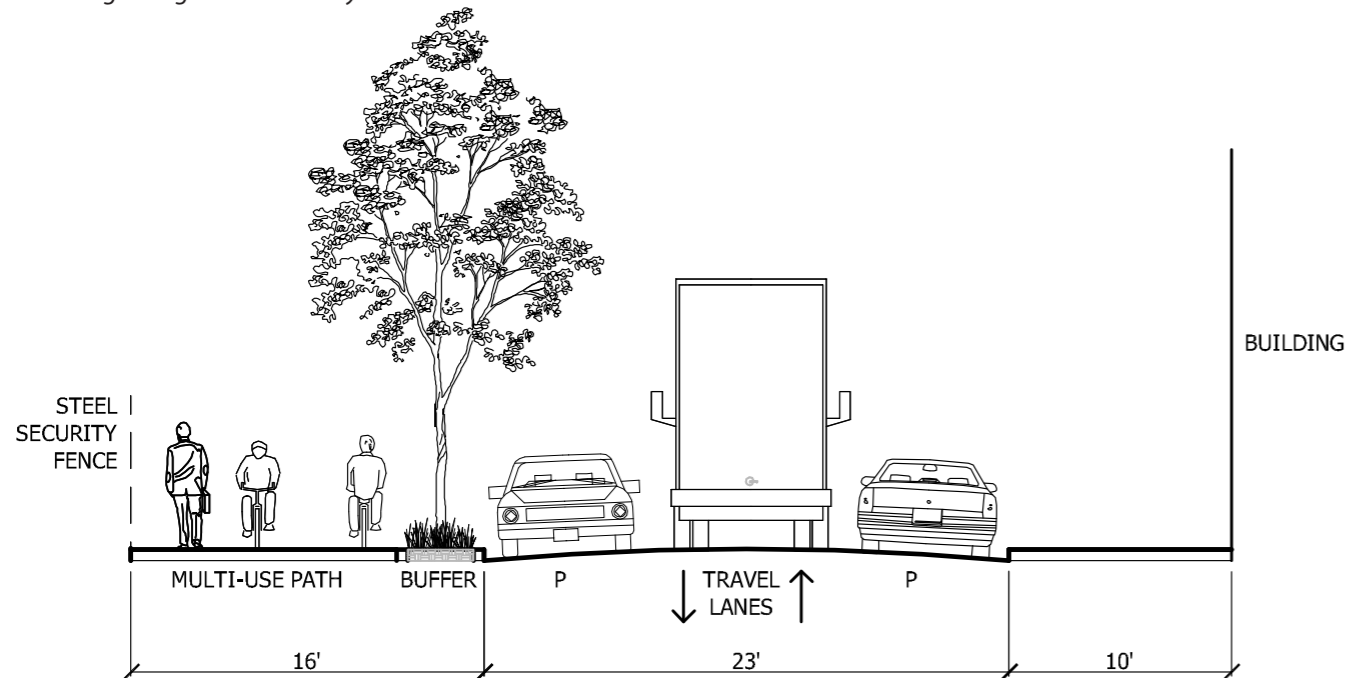


Fig. 22: Possible configuration for Imlay Street north of Bowne Street

COMMERCIAL WHARF CROSS-SECTIONS (ROUTES A)

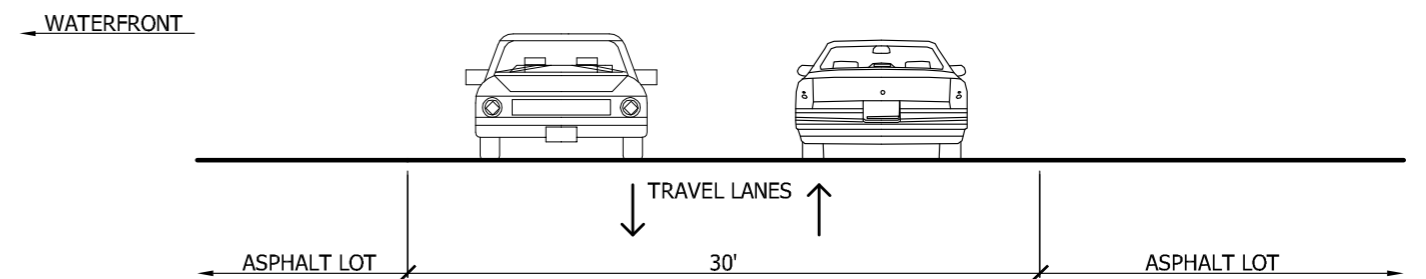


Fig. 23: Existing configuration on Pier 11 at Commercial Wharf

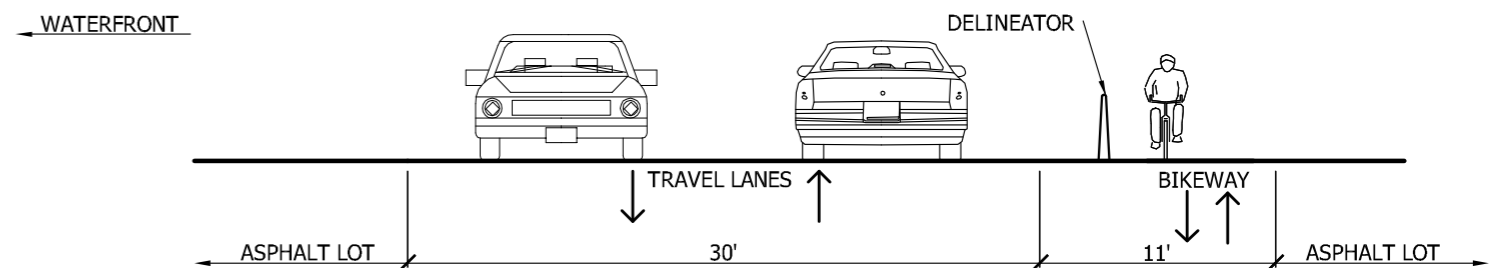


Fig. 24: Possible configuration for Pier 11 at Commercial Wharf

Route B–Conover Street

Route B splits from Route A south of Atlantic Basin at the intersection of Conover Street and Pioneer Street. It is the preferred route as it will be easier to implement than Route A, but still offers direct access to Atlantic Basin.

Conover Street has a 30' cobblestone roadbed and accommodates two-way traffic and parking on both sides. Smooth cobble bicycle lanes could be constructed adjacent to the parking lanes, leaving a strip of rough cobblestone paving in the center of the street to calm traffic south of Dikeman Street. Shared lane markings may not be ideal for a greenway facility, but given the challenges of implementing the long-term waterfront option (see Route A) and low traffic volumes on this street, it is considered the best option at this time. Other traffic calming and streetscape enhancements should be explored as this capital project is developed.



Conover Street north of Beard Street (existing)



Bike lanes and cobblestones, Long Island City and Berlin (existing)



Bike lanes and cobblestones (precedent)

CONOVER STREET CROSS-SECTIONS (ROUTE B)

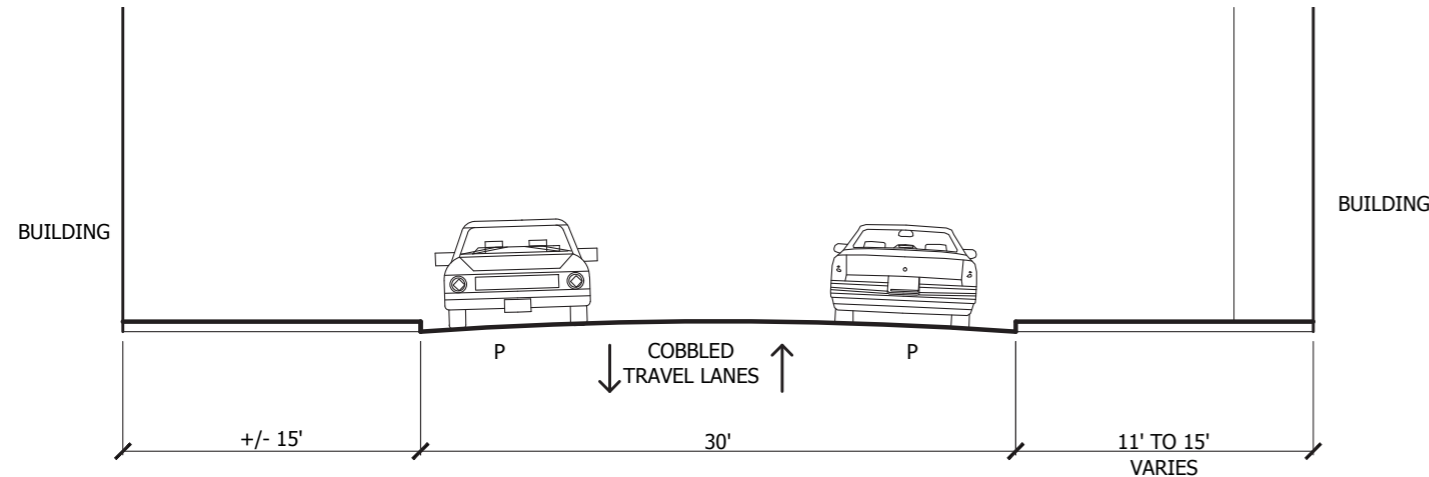


Fig. 25: Existing configuration on Conover Street north of Beard Street

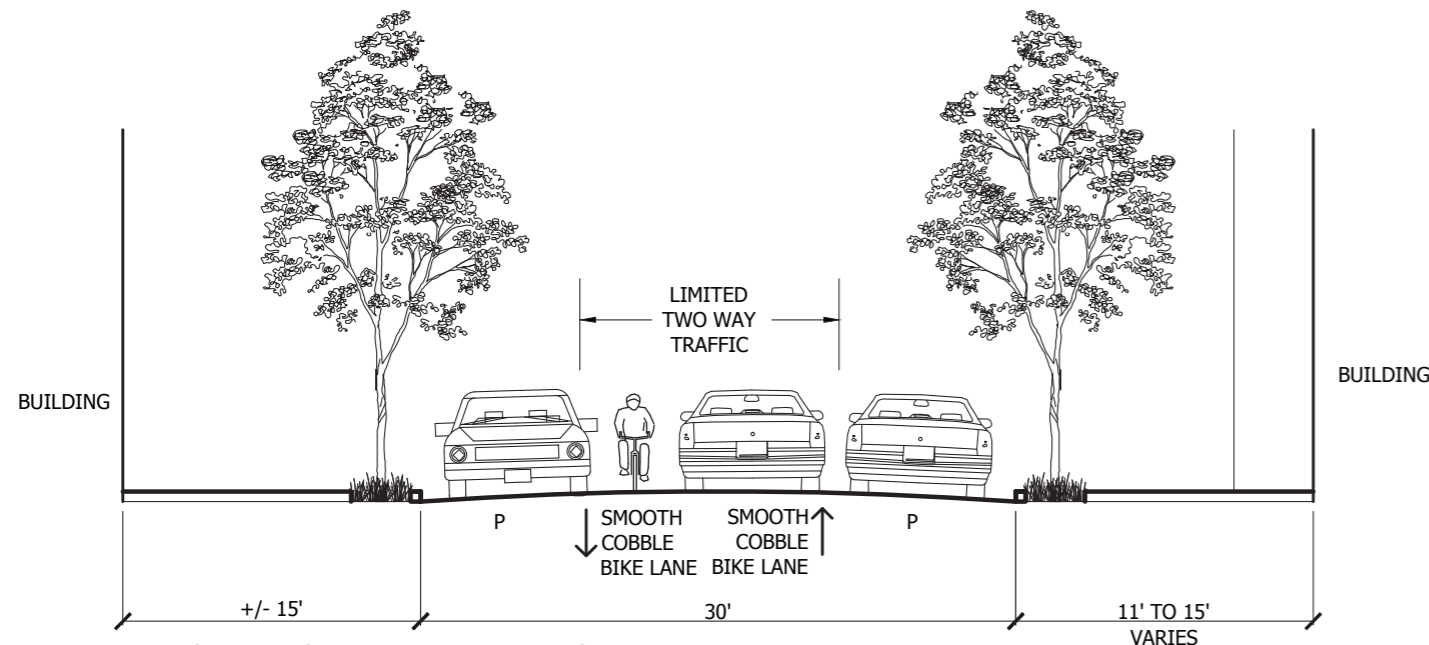


Fig 26: Possible configuration for Conover Street north of Beard Street

Ferris Street is a potential north-south alternative to Conover Street because it offers direct access to Louis Valentino, Jr. Park, but access at the Ferris Street Gate at Atlantic Basin is currently restricted. NYCDOT will continue to discuss routing the Greenway through Atlantic Basin and via Ferris Street with the PANYNJ and EDC.

Route C–Van Brunt Street

Although Route C would offer direct access to retail along Van Brunt Street, the street's narrow width and relatively high traffic volumes make this a very difficult route to implement. It also lacks a strong connection to the waterfront. It is not the preferred route.

Route C would be the most direct route from the intersection of Hamilton Avenue and Van Brunt Street, but it would bypass the western shoreline of Red Hook. Van Brunt Street has high traffic volumes, and is a truck and bus route. This narrow roadway has few traffic signals. A bicycle facility on Van Brunt Street would consist of either shared lane markings or the removal of parking on at least one side to accommodate bicycle lanes, which would impact local businesses.



Van Brunt Street north of Summit Street (existing)

RECOMMENDATION:

From **Summit Street and Van Brunt Street to Beard Street and Conover Street** the Preferred Route Recommendation is:

Route A–Hamilton Avenue and Van Brunt Street to Conover Street and Pioneer Street, based on

- Waterfront access at Atlantic Basin
- Low traffic volumes on Summit Street & Imlay Street
- Potential for future extension along waterfront

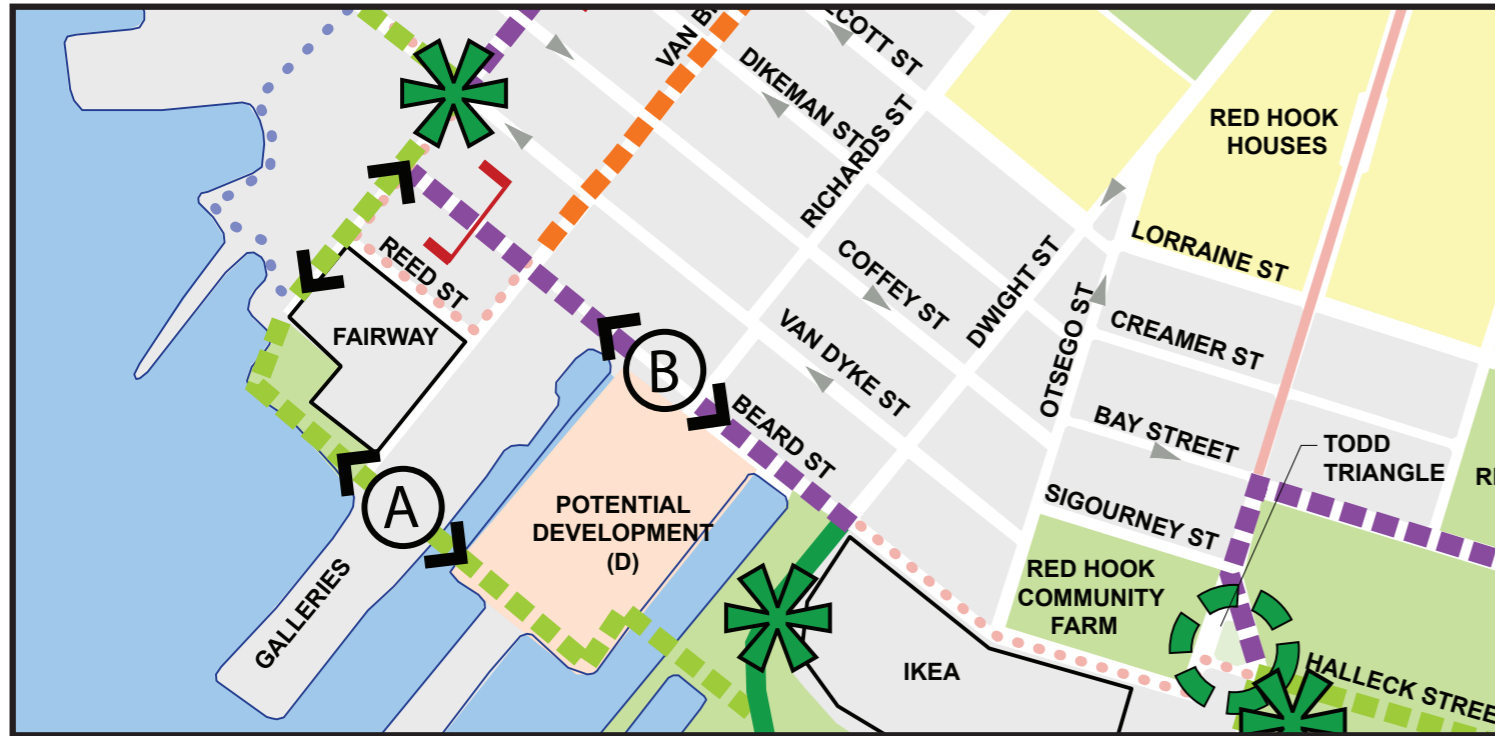
Route B–Conover Street and Pioneer Street to Beard Street and Conover Street, based on

- Low traffic volumes on Conover Street
- Direct access between Atlantic Basin and Fairway Market and its Esplanade

Future Enhancement Project

Buttermilk Channel Waterfront

- Waterfront Access
- Connection to Louis Valentino, Jr. Park and Pier



Plan Enlargement 5: Beard Street and Conover Street to Erie Basin Park

Beard Street and Conover Street to Erie Basin Park (Plan Enlargement 5)

Route A–Fairway and Erie Basin

Route A offers direct access to the shops, galleries and esplanade along the waterfront, but this privately owned waterfront would require substantial investment in improved bicycling and walking infrastructure to comfortably accommodate a public Greenway.

Route A is the Fairway and Erie Basin Future Enhancement Project.

Route A continues on Conover Street until meeting the water’s edge on the southwest corner of the Fairway Market property. This route overlaps with an existing pedestrian path behind Fairway, which would require widening in order to function as a shared-use path. Route A continues southeast onto a pier with various gallery spaces. The inlet between the piers would then have to be crossed with a new bridge.

The large waterfront parcel to the east of Fairway and the Galleries is a development site. Should this parcel be developed in the future, implementation of a public esplanade along the edge could be explored, creating a seamless link between the Van Brunt Street Pier and Erie Basin Park (Ikea). Because of the costs involved, especially the construction of at least one, and perhaps two, new bridges and significant investment to stabilize the bulkheads, Route B is the preferred alternative.

Planned Upgrade: Erie Basin Park and Columbia Street Pier

Paths already exist through Erie Basin Park and along the Columbia Street Pier. In the future, these routes could be upgraded to provide an improved experience for Greenway users, by widening the paths and providing additional amenities, such as landscaping.

Route B–Beard Street

Route B can be implemented within the public right-of-way and with considerably less new infrastructure than Route A. Route B is the preferred route.

Route B consists of a connection along Beard Street from Conover Street to Erie Basin Park. Beard Street has cobblestones with asphalt patches and will need to be resurfaced in the future. The road should be repaved without cobblestones, or smooth cobblestones should be laid in moving lanes, delineating the roadbed as a shared space for cyclists and warning cars of their presence.

RECOMMENDATION:

From **Beard Street and Conover Street to Erie Basin Park (Ikea)** the Preferred Route Recommendations:

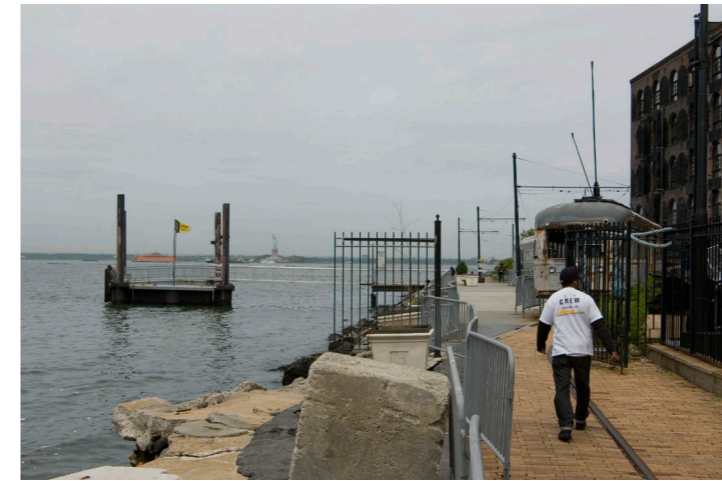
Route B–Beard Street, based on

- Slow moving traffic along Beard Street
- Proximity to the waterfront
- Difficulty to implement waterfront path
- Direct connection to Louis Valentino, Jr. Park and Pier

Future Enhancement Project

Fairway and Erie Basin

- Access to the waterfront
- Off-street path connecting to Erie Basin Park



Fairway to Ikea via the waterfront (existing)



Beard Street between Conover Street and Erie Basin Park (existing)

BEARD STREET CROSS-SECTIONS (ROUTE B)

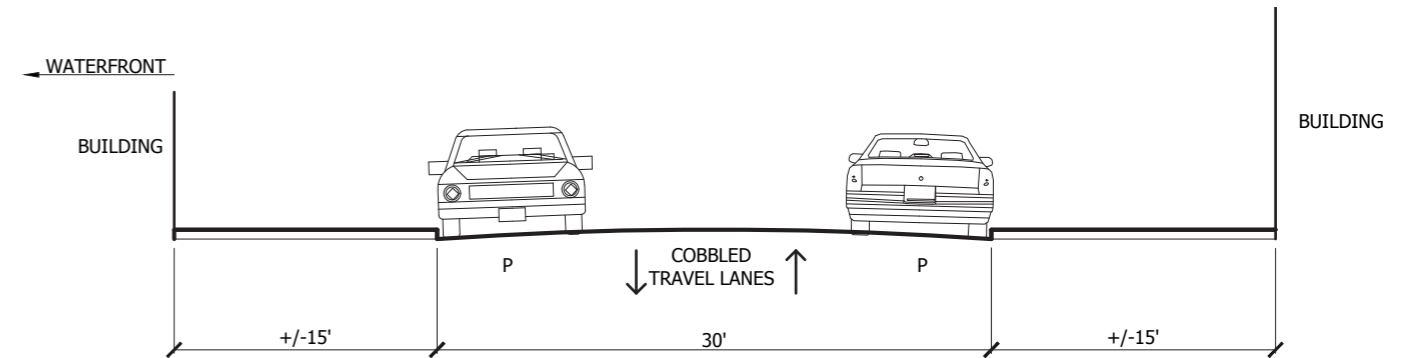


Fig. 27: Existing configuration on Beard Street between Conover Street and Erie Basin Park

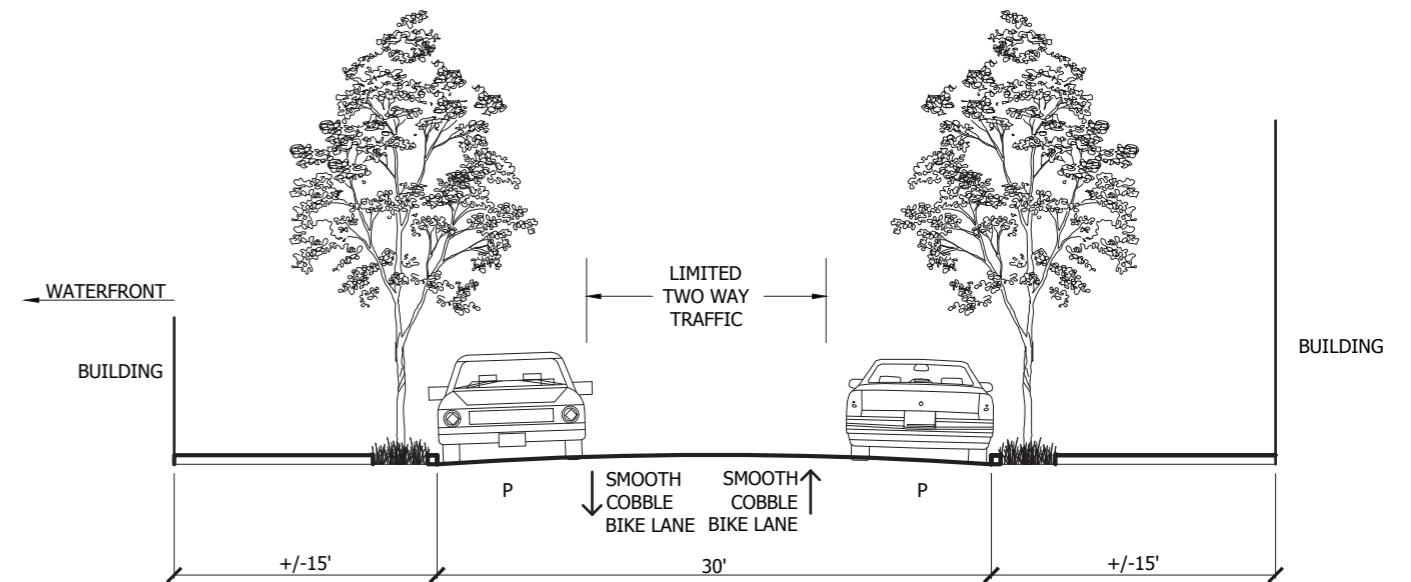
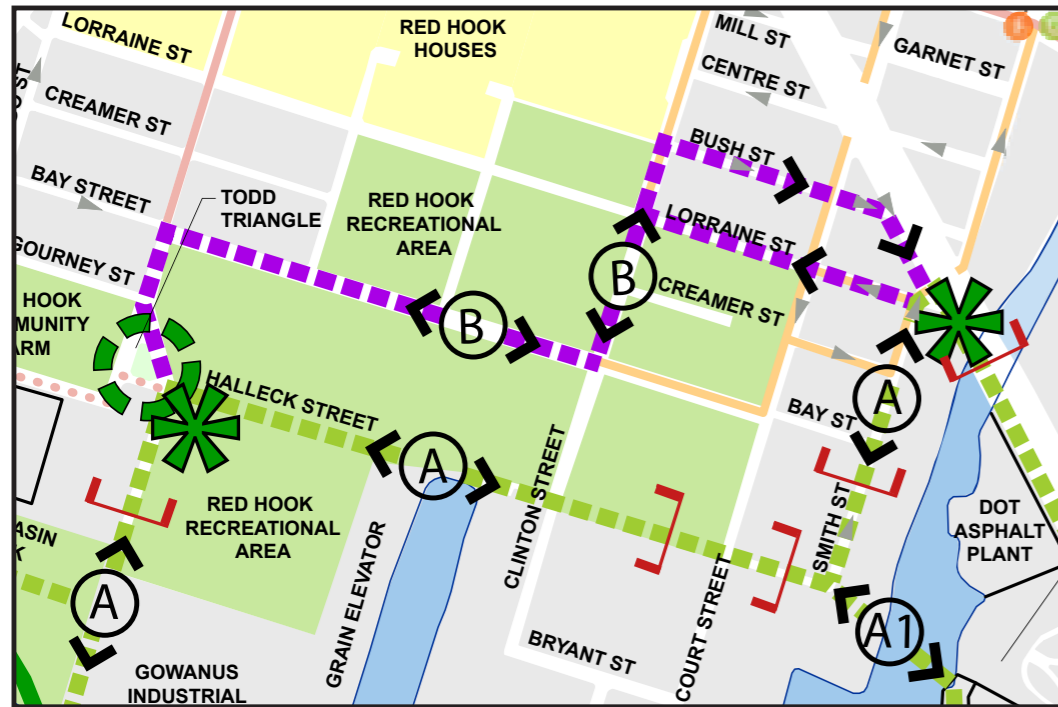


Fig. 28: Possible configuration for Beard Street between Conover Street and Erie Basin Park



Plan Enlargement 6: Erie Basin Park to Hamilton Avenue Bridge

Erie Basin Park to Hamilton Avenue Bridge (Plan Enlargement 6)

Route A—Columbia, Halleck and Smith Streets

Route A is the most direct route and is closest to the waterfront. It directly connects Erie Basin Park (Ikea) to the Red Hook Recreational Area and offers the possibility of connecting to the Gowanus Canal waterfront. Route A is the preferred route.

Route A crosses the east side of Red Hook primarily on off-street paths that are close to the waterfront. Along Halleck Street the design of the Greenway would not have to account for the presence of vehicular traffic, except crossing Clinton Street.

The path will exit Erie Basin Park onto Columbia Street at the foot of the Columbia Street Pier and head north on the sidewalk on the east side of Columbia Street to Halleck Street where it will turn east and enter Red Hook Recreation Area. A new mid-block road crossing will be needed on Columbia Street where the path exits Erie Basin Park. Upon reaching the East side of Columbia Street and turning to head north, path users will first pass truck parking for the Gowanus Industrial Park. The iconic grain elevator building is visible in the background. The sidewalk in front of Gowanus Industrial Park is 12' wide and will need to be widened to accommodate the path design as proposed. Where Gowanus Industrial Park ends, natural turf baseball fields begin. The route will continue on the existing sidewalk past the baseball fields until reaching Halleck Street. The sidewalk in front of the baseball fields is 20'-wide, has existing street trees and does not need to be widened to accommodate the path.

At the intersection of Columbia Street and Halleck Street, a small traffic island with a NYCDOT public art project connects the

Greenway to the Columbia Street Pier. Improvements to this traffic island will be explored to create a gateway to the Greenway and the Columbia Street Pier from the Columbia Street bicycle lanes. From here, Route A enters the Red Hook Recreational Area and travels along the south side of the sports fields, with expansive views of Erie Basin. Existing park pedestrian paths are narrow, but could be widened for shared use.

Past the small inlet and grain elevators, Route A continues on the Halleck Street right-of-way all the way to Clinton Street. West of Clinton Street, the right-of-way is used by the adjacent property owner. Between Clinton Street and Court Street, Halleck Street is covered with debris and is reportedly contaminated with PCBs. Although these constraints are a barrier to immediate development, this section of the Greenway could be built on existing right-of-way.

Route A continues on Halleck Street from Court Street to Smith Street where it once again becomes a typical roadway in public use. The route then turns north on Smith Street to Hamilton Avenue, the most direct means of continuing south to Sunset Park. Smith Street between Halleck Street and Lorraine Street is a truck route. Many of the buildings on the east side of the street are currently vacant and for sale, as they all back-up onto the Gowanus Canal—a designated Federal Superfund site. As such, these buildings may remain underutilized for the foreseeable future. It is recommended that the sidewalk on the east side of the street be reconstructed as a shared-use path.



Columbia Street opposite Erie Basin Park (seen at left), view looking north (existing)



Columbia Street at baseball fields, immediately south of Halleck Street ROW, view looking north (existing)

COLUMBIA STREET CROSS-SECTIONS (ROUTES A & B)

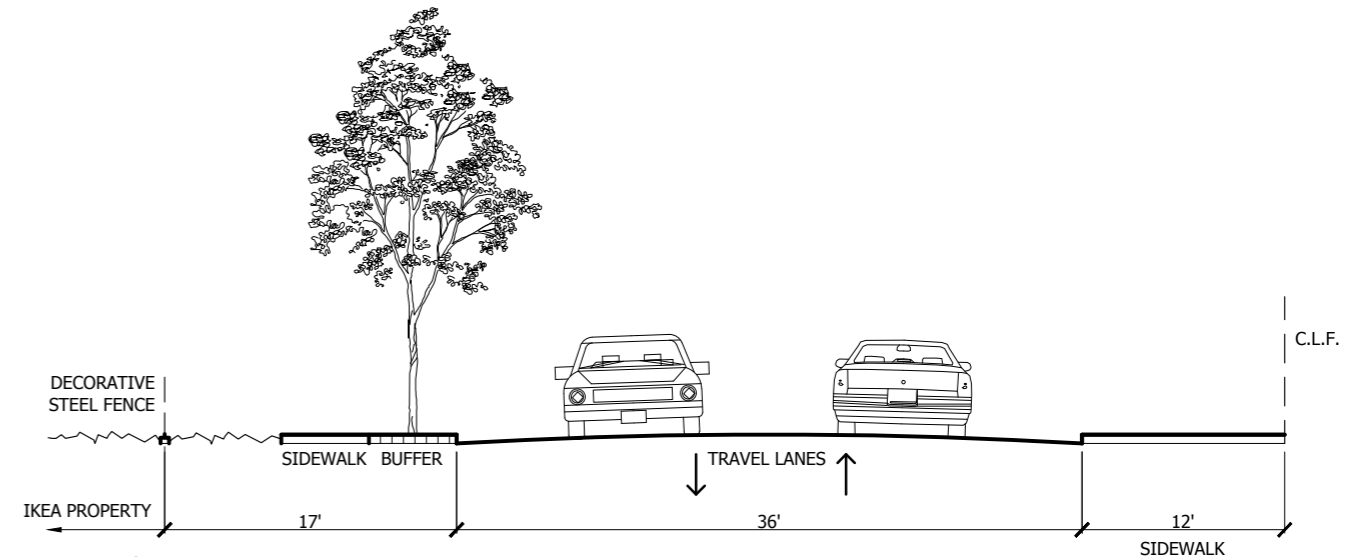


Fig. 29: Existing configuration on Columbia Street opposite Erie Basin Park and adjacent to Gowanus Industrial Park

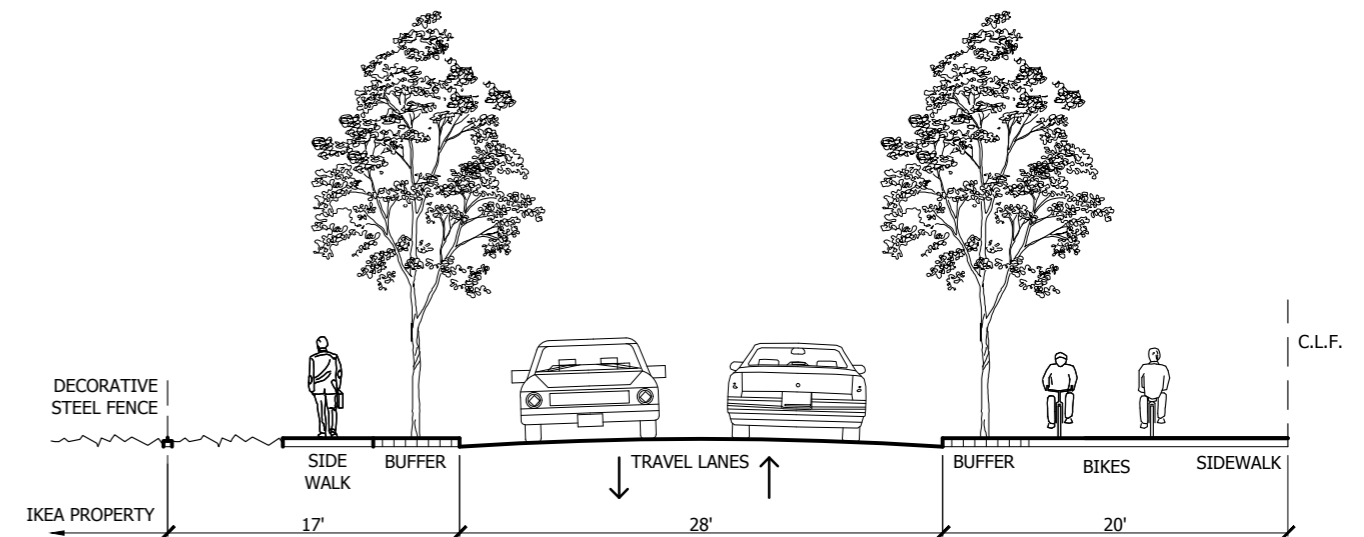


Fig. 30: Possible configuration for Columbia Street opposite Erie Basin Park and adjacent to Gowanus Industrial Park



Waterfront at Red Hook Recreational Area (existing)



Halleck Street at Red Hook Recreational Area (existing)

HALLECK STREET AT PARK (ROUTE A)

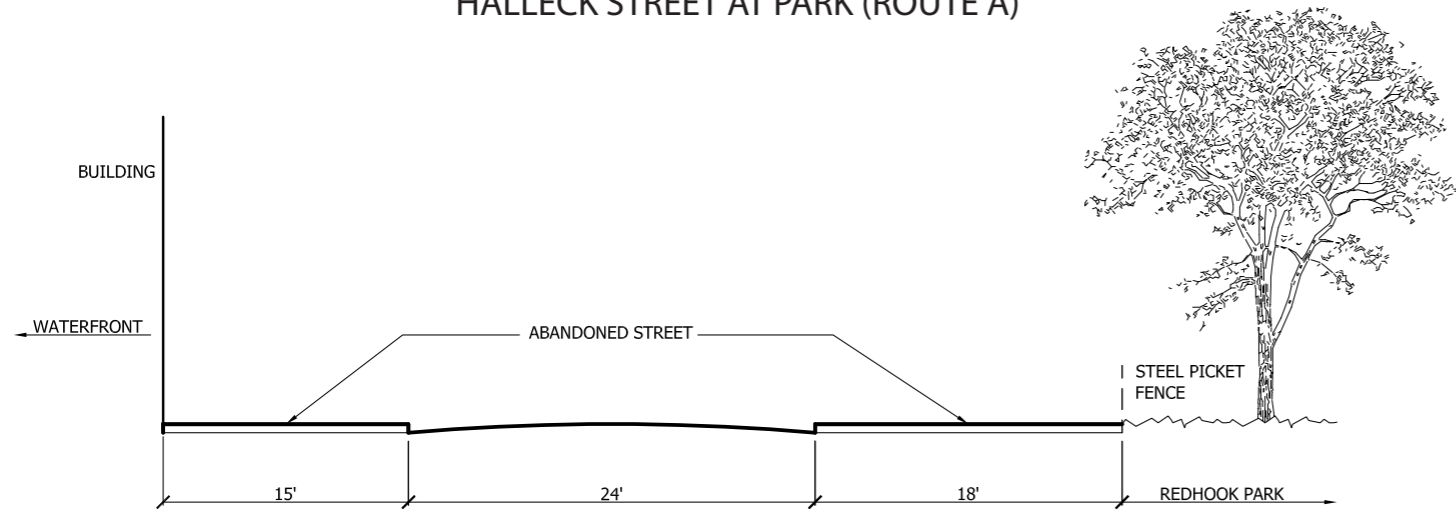


Fig. 31: Existing configuration on Halleck Street between Court Street and Clinton Street

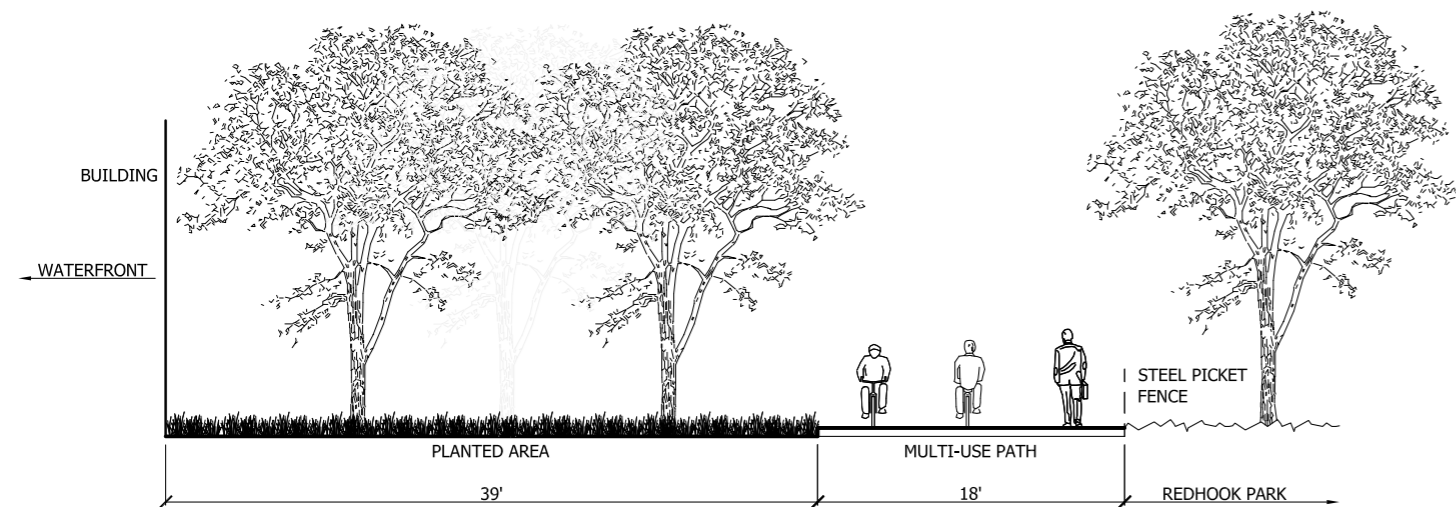


Fig. 32: Possible configuration for Halleck Street between Court Street and Clinton Street



Proposed Configuration for Halleck Street at Red Hook Recreational Area



Halleck Street between Court and Smith Streets (existing)



Columbia Street, Brooklyn (precedent)

Route A1 is the *Proposed Bridge over the Gowanus Canal Future Enhancement Project*.

As the Greenway develops in Red Hook and Sunset Park, it is proposed that a new bicycle and pedestrian bridge across the Gowanus Canal be constructed as an alternative to the Hamilton Avenue Bridge route. (The Hamilton Avenue Bridge route alternative is discussed in the Sunset Park section of this chapter). If this new bridge were to be built, the Greenway route would connect to Sunset Park from Halleck Street and Smith Street, rather than continuing north on Smith Street (as described in Route A above).

On the western side of the Gowanus Canal, Percival Street east of Smith Street is mapped as City right-of-way. However, it appears to be used by adjacent property owners, so acquisition would

have to be explored if the bridge were to be constructed here. On the eastern side of the canal, there is a City-owned property between the bulkhead line and Home Depot where the bridge could potentially land. This property offers potential waterfront access and connects directly to 19th Street, providing a better link to Sunset Park. The Gowanus Canal is a navigable waterway, so a new bridge would have to be built to permit boats to pass.

Given the high cost of altering the Hamilton Avenue Bridge, community concerns about routing cyclists through industrial areas, and the potential to create new open spaces and view corridors at the entrance to the canal, the construction of a new bridge in this location is proposed as an alternative to retrofitting the Hamilton Avenue Bridge. There are major cost and environmental constraints associated with this project.

HALLECK STREET CROSS-SECTIONS (ROUTE A)

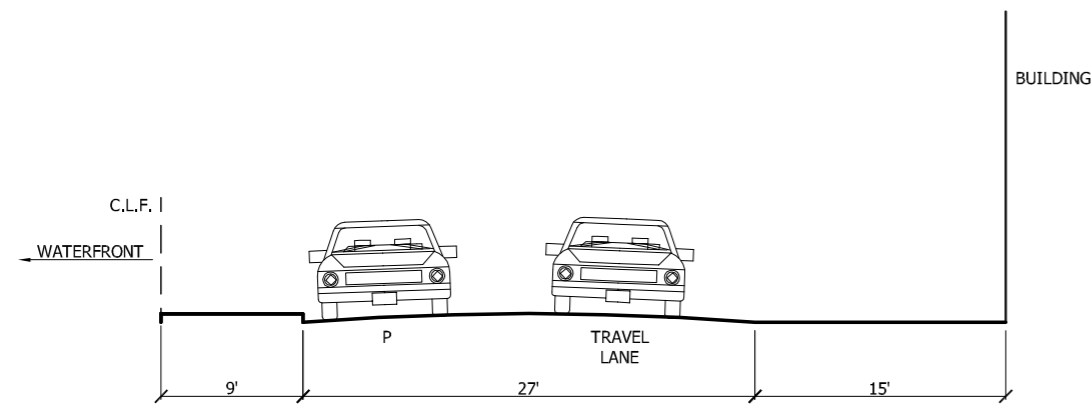


Fig. 33: Existing configuration on Halleck Street between Court Street and Smith Street

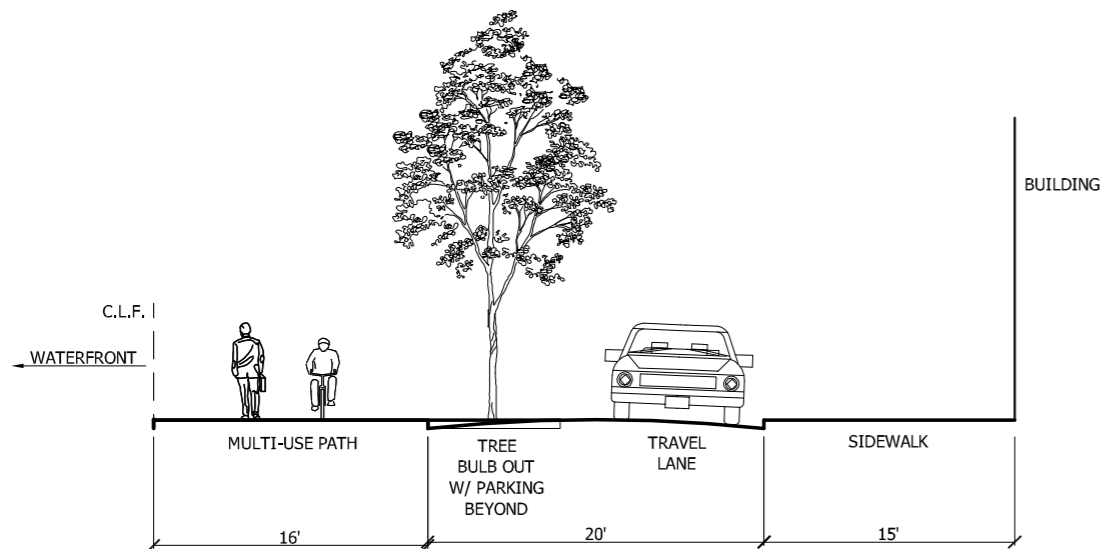


Fig. 34: Possible configuration for Halleck Street between Court Street and Smith Street



Concept for proposed bridge over the Gowanus Canal Future Enhancement Project. Photo: Bing



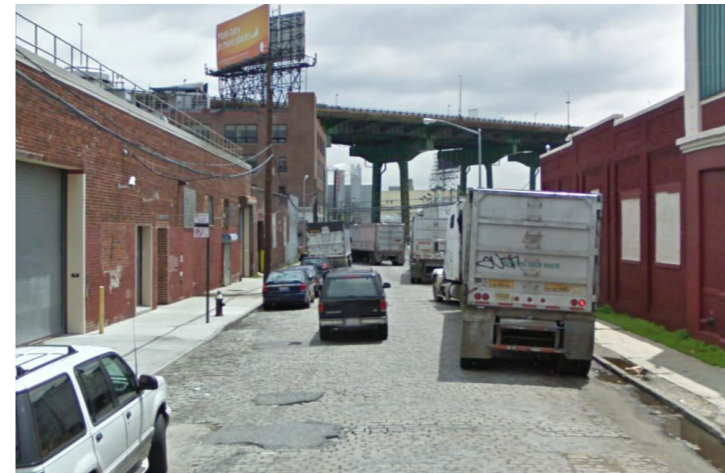
Small-scale operable pedestrian bridge; closed and open, UK (precedent)



Smith Street between Sigourney Street and Bay Streets (existing)



Kent Avenue, Brooklyn (precedent)



Bush Street between Clinton and Court Street looking east (existing)



Lorraine Street between Clinton and Court Streets looking east (existing)

SMITH STREET CROSS-SECTIONS (ROUTE A)

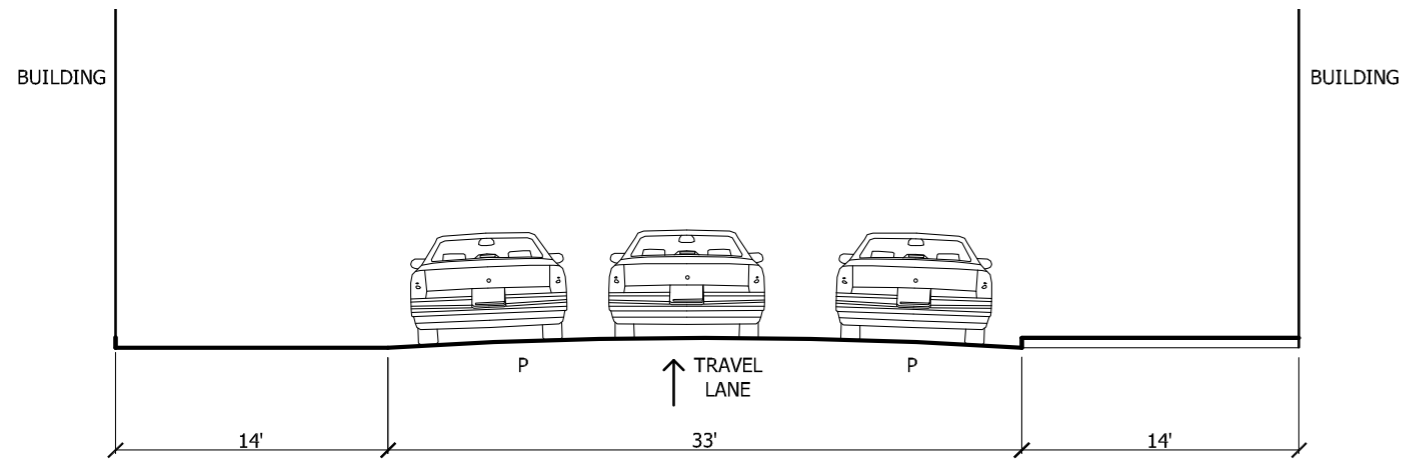


Fig. 35: Existing configuration on Smith Street between Sigourney Street and Bay Street

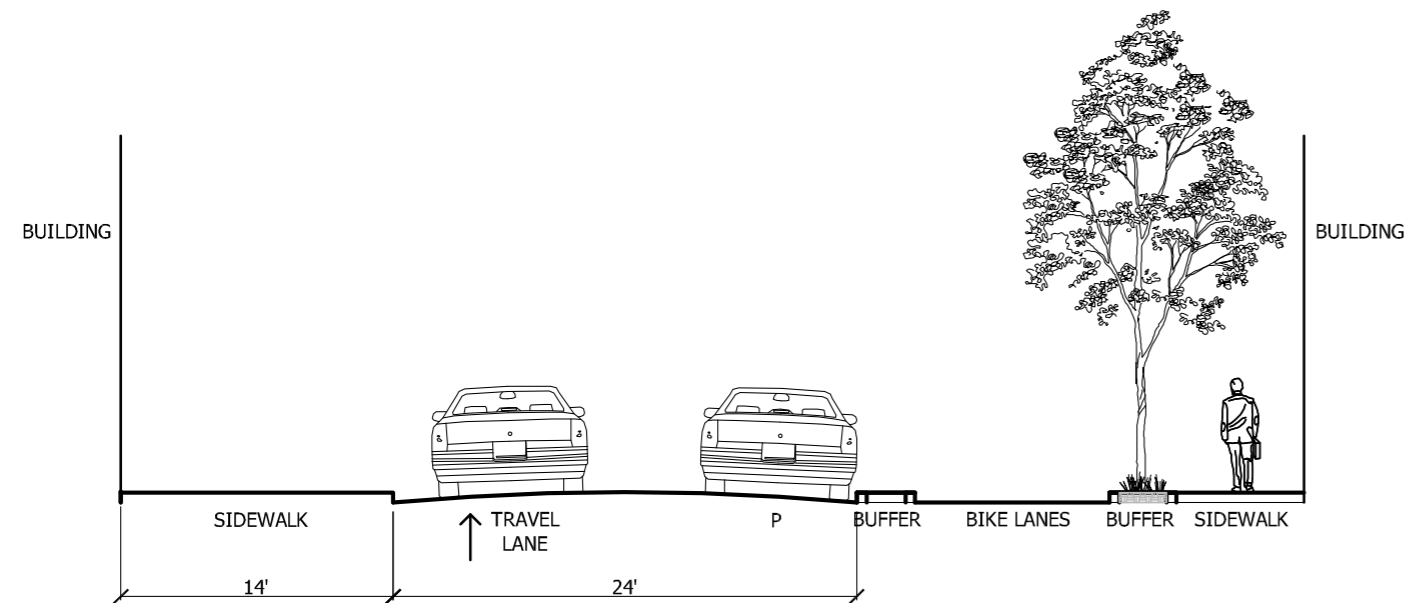


Fig. 36: Possible configuration for Smith Street between Sigourney Street and Bay Street



Clinton Street at Creamer Street looking north (existing)



Bay Street looking east from Columbia Street (existing)

Route B—Columbia, Bay, Clinton, Lorraine and Bush Streets

Route B would not provide protected paths and would not provide waterfront views or access. It is not the preferred route.

Route B overlaps with Route A between Erie Basin Park and the intersection of Columbia Street and Halleck Street. From there, Route B continues two additional blocks north on Columbia Street to Bay Street, at which point Route B turns east on Bay Street to Clinton Street. Shared lane markings are the only bicycle facility that could be implemented in the existing right-of-way without removal of the on-street parking that serves businesses in the area.

At the intersection of Bay Street and Clinton Street, Route B turns up Clinton Street, avoiding the heavy industrial uses along Smith Street. Within two to three blocks, the Greenway route would connect to the east via a one-way pair of streets on Lorraine Street and Bush Street, which connects to Hamilton Avenue to cross the Gowanus Canal. The routes along these streets would be a mixture of on-street bicycle lanes and shared lane markings. These streets are farther from the waterfront and also have a high percentage of truck traffic.

RECOMMENDATION:

From **Erie Basin Park to Hamilton Avenue Bridge** the Preferred Route Recommendations:

Route A—Columbia, Halleck and Smith Streets, based on

- Waterfront views and access
- Incorporation of Red Hook Recreational Area
- Underutilized right-of-way between Clinton Street and Court Street

Future Enhancement Project

Proposed Bridge over the Gowanus Canal

- Provides alternative to Hamilton Avenue Bridge
- Circumvents portion of Hamilton Avenue and Third Avenue

2.3.3 RED HOOK RECOMMENDED ROUTE

Red Hook Waterfront Recommendation Summary/Discrete Capital Projects

- 11 **Columbia Street Greenway Upgrade**
Columbia Street between Atlantic Avenue and Degraw Street – Class 1 – Landscape existing sidewalk path
Degraw Street between Columbia Street and Van Brunt Street – Class 1 – Widen, landscape and extend existing path to Van Brunt Street
- 12 **Atlantic Basin Connector**
Van Brunt Street between Degraw Street and Hamilton Avenue – Class 1 – New two-way shared-use path
Summit Street between Van Brunt Street and Imlay Street – Class 1 – New two-way shared-use path
Imlay Street between Hamilton Avenue and Bowne Street – Class 1 – New two-way shared-use path
- 13 **Atlantic Basin**
Bowne Street from Imlay Street to Commerical Wharf – Class 3 – Designated bicycle route with shared lane markings, or Alternative: Imlay Street between Bowne Street and Verona Street – Class 1 – New two-way multi-use path
Commercial Wharf from Bowne Street to Pioneer Street – Class 1 – New two-way shared-use side path
- 14 **Valentino Pier Connector**
Conover Street between Pioneer Street and Beard Street – Class 3 – Designated bicycle route with shared lane markings, or Alternative: Ferris Street between Pioneer Street and Valentino Pier– Class 3 – Designated bicycle route with shared lane markings
Beard Street between Conover Street and Dwight Street – Class 3 – Designated bicycle route with shared lane markings
- 14a **Future Enhancement Project–Buttermilk Channel Waterfront and Fairway Erie Basin Waterfront**
- 15 **Erie Basin Park Greenway Upgrade**
Erie Basin Park (Continuous Park Property) between Dwight Street and Gowanus Industrial Park – Class 1 - Upgrade of existing facilities
- 16 **Columbia Street Extension (Next to Ikea)**
Columbia Street between Ikea Path and Halleck Street – Class 1 – New two-way shared-use side path with landscape
- 17 **Red Hook Recreation Area**
Halleck Street between Columbia Street and Court Street – Class 1 – Upgrade existing and create new off-street two-way shared-use paths
- 18 **Smith Street Connector**
Halleck Street between Court Street and Smith Street – Class 1 – New two-way shared-use side path
Smith Street between Halleck Street & Gowanus Expressway – Class 1 – New two-way shared-use side path

2.3.4 RED HOOK INLAND CONNECTORS

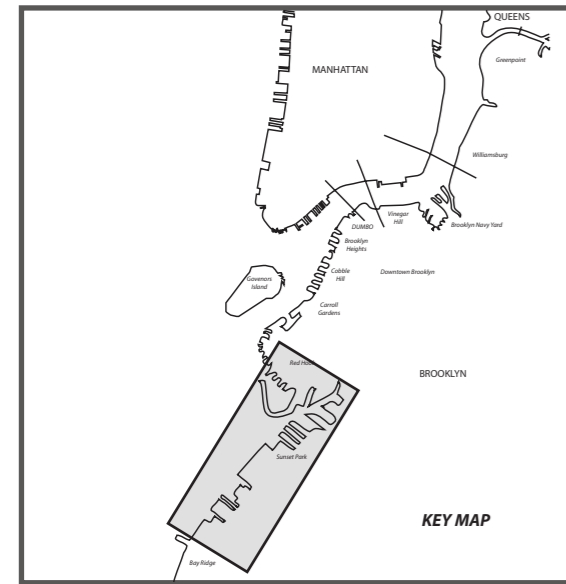
Inland Connectors ←-----→

- Kane & Congress Streets:** Existing bicycle lanes; Connects to Cobble Hill and Carroll Gardens neighborhoods/retail
- Van Brunt Street:** Vibrant commercial street and pedestrian crossing ; Connects to Red Hook neighborhood/retail
- Court & Smith Streets:** Existing shared lane markings; Connects to Red Hook Recreational Area

RED HOOK RECOMMENDED ROUTE MAP



SUNSET PARK ROUTE ALTERNATIVE MAP



EXISTING BIKEWAYS:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE
- SHARED LANE

POTENTIAL BIKEWAYS IN NYC BIKE MAP:

- PROTECTED BICYCLE PATH
- STRIPED BICYCLE LANE OR SHARED LANE

PROPOSED ROUTE AND ROUTE ALTERNATIVES

- EXISTING ROUTE
- PLANNED ROUTE
- ROUTE ALTERNATIVE A
- ROUTE ALTERNATIVE B
- ROUTE ALTERNATIVE C

ROUTE ALTERNATIVE LABEL WITH BIKEWAY DIRECTION

BEGINNING / END OF ROUTE ALTERNATIVES

KEY BIKE / PEDESTRIAN ACCESS POINTS TO WATERFRONT - PROPOSED SAFETY IMPROVEMENTS

PROPOSED PEDESTRIAN ESPLANADE

- PROPOSED DEVELOPMENT
- PUBLIC HOUSING
- EXISTING PARK
- PROPOSED PARK

NORTH

0 1/8 mile 1/4 mile 1/2 mile



2.4.1 EXISTING CONDITIONS

Neighborhood Boundaries

The Sunset Park study area is bounded by the Hamilton Avenue Bridge to the north (located where Hamilton Avenue crosses over the Gowanus Canal), the intersection of Shore Road and 69th Street where pedestrians and cyclists access the Veteran's Memorial Pier and the Shore Parkway Bicycle Path to the south, New York Harbor shoreline to the west and Third Avenue to the east.

Neighborhood Waterfront Amenities-Land Use

Sunset Park is a strong center of manufacturing and industry. The City has invested heavily in industrial infrastructure along the waterfront. There are two recently rebuilt railroad "float-bridges" operated by PANYNJ, one at 51st Street and the other at the south end of the Brooklyn Army Terminal (BAT). EDC is currently upgrading in-street heavy-rail infrastructure to ensure continued and improved future connectivity between the two float-bridge operations and surrounding industrial property.

Bush Terminal is an enclosed industrial park located between the waterfront and First Avenue, from 43rd Street to 51st Street. The South Brooklyn Marine Terminal (SBMT) is another large industrial facility along the waterfront, located between the waterfront and Second Avenue, from 28th Street to 39th Street.

Aside from these two large industrial parks on the waterfront, there are several large industrial properties in the area, such as Sunset Industrial Park at the north end of the study area, accessible from Third Avenue via 20th Street and 21st Street, and Industry City, a 90-acre, 8-square block industrial complex located between 29th Street and 37th Street and Second Avenue and Third Avenue.

Besides manufacturing and industry, the Sunset Park waterfront is home to a number of critical municipal services including two power generation stations, two waste-transfer stations, a municipal asphalt production plant and a NYC Department of Sanitation (DOS) garbage truck depot located at 51st Street and First Avenue. At Second Avenue and 56th Street sits Lutheran Medical Center, a full city block (and growing) of interconnected buildings and home to one of the busiest and most highly-rated trauma centers in all of New York City.

All of these land uses provide valuable jobs to the local community and New York City. While typical residential-oriented retail activity can be found consistently along Fourth and Fifth Avenues, isolated pockets can also be found on both Second Avenue in the vicinity of Lutheran Hospital and along Third Avenue.

Existing and Planned Pedestrian and Bicycle Network

The only two bicycle facilities in the Sunset Park study area are in the southern end. There is a one-way eastbound bicycle lane on Wakeman Place between Colonial Road and Third Avenue, and an existing two-way bicycle path in Owl's Head Park.

Second Avenue south of 41st Street as well as 41st Street and 42nd Street east of Second Avenue are represented in the NYC

Cycling Map as potential bicycle routes.

Greenway Destinations

Aside from a playground on Second Avenue between 55th Street and 56th Street there are no public parks or recreational facilities within the Sunset Park study area. Public access to the waterfront includes:

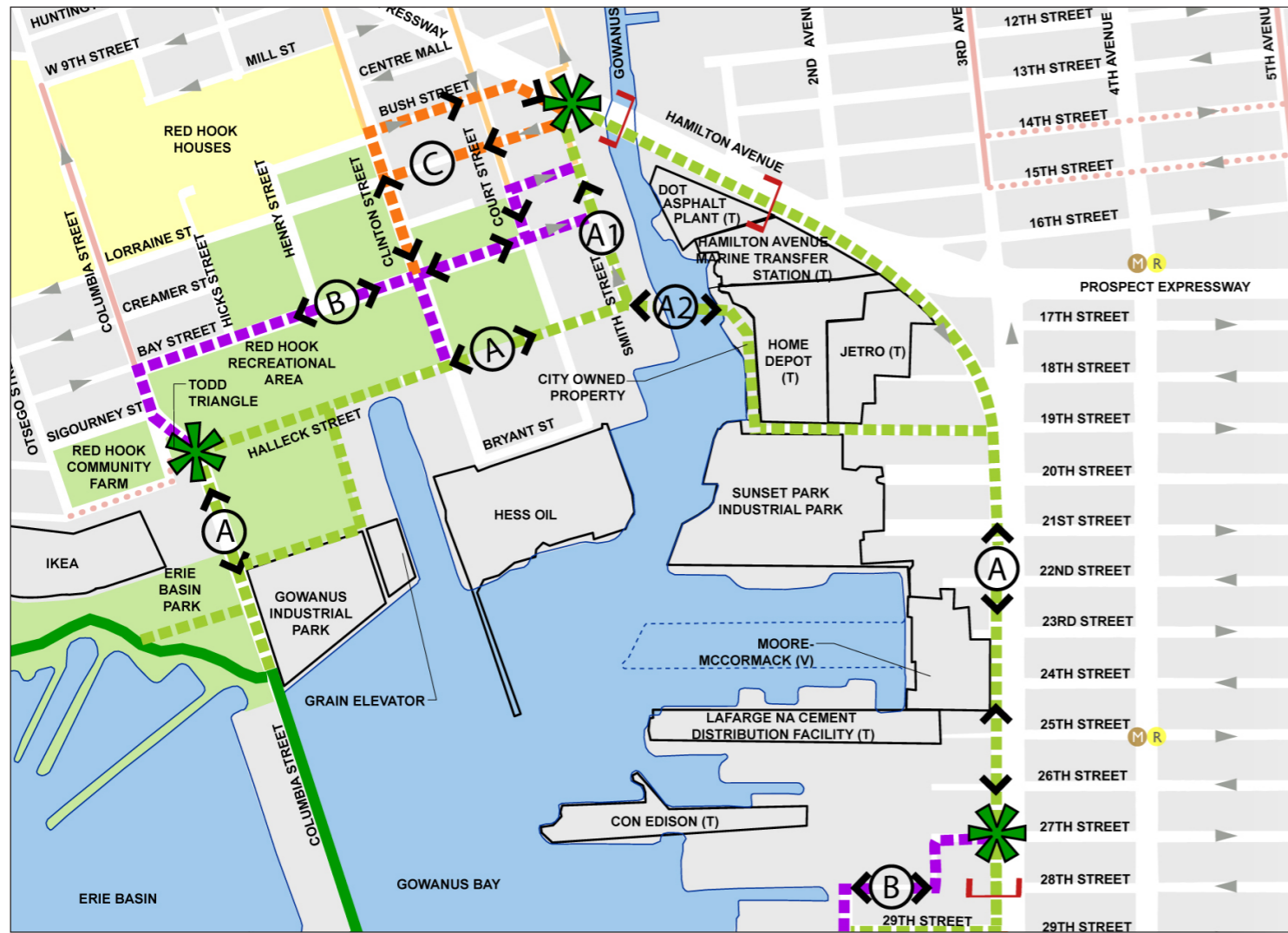
- Pier 4, also known as the 58th Street Pier (daytime use only)
- Owl's Head Park
- Shore Park and Shore Parkway Waterfront Esplanade begins at 69th Street
- Veterans Memorial Pier at the end of 69th Street
- Planned: Bush Terminal Piers Waterfront Park – along the waterfront between 43rd Street and 51st Street

Community Outreach

Community workshops were held on April 8, 2010, October 7, 2010 and October 18, 2011. Existing conditions throughout the study area were described and discussed at the first workshop. Route options and possible design concepts were presented and discussed at the second workshop. The Recommended Route and associated design concepts were presented and discussed at the third workshop.

Key points addressed in the workshops include:

- Industrial retention and continued economic growth to provide jobs for the local community
- Importance of walking to waterfront jobs
- Accessible waterfront with high-quality public open spaces
- Connections from the community to public open spaces and the waterfront
- Vehicular mix (i.e., pedestrians and cyclists mixing with large trucks) and the design of complete streets that are safe, functional and attractive for all users
- The role of bicycle and pedestrian facilities to connect local industrial workers to their jobs
- Wayfinding and access to the planned Bush Terminal Piers Park
- Discussion of design possibilities



Plan Enlargement 7: Hamilton Avenue at Smith Street to Third Avenue at 27th Street

2.4.2 ROUTE ANALYSIS

The Sunset Park Waterfront study area was broken down into the following five segments, moving north to south:

- Hamilton Avenue at Smith Street over the Gowanus Canal to Third Avenue and 27th Street
- Third Avenue and 27th Street to Second Avenue and 32nd Street
- Second Avenue from either 29th or 32nd Street to Second Avenue and 39th Street
- Second Avenue and 39th Street to Second Avenue and 58th Street
- 58th Street to Shore Parkway Greenway

Hamilton Avenue at Smith Street over the Gowanus Canal to Third Avenue at 27th Street (Plan Enlargement 7)

Route A—Hamilton Avenue at Smith Street to Third Avenue at 27th Street

Due to the physical barriers presented by the Gowanus Expressway, the Gowanus Canal and Hamilton Avenue, Route A along Hamilton Avenue and Third Avenue is the only currently feasible route alternative and is, therefore, the preferred route.

Route A on Hamilton Avenue departs from Smith Street and travels southeast, passing over the Gowanus Canal on the Hamilton Avenue Bridge. At the approach to 17th Street there are four moving lanes. Two left turn lanes allow vehicles to exit

this southbound section of Hamilton Avenue to reach points to the north and east. The innermost turn lane is dropped at this location, as is the outermost through-lane, which reduces the roadway to two moving lanes between 17th Street and 19th Street. The route then bends to the south and merges with Third Avenue at 19th Street, and continues on the west side of Third Avenue to 29th Street.

In order to create the space needed to accommodate the Greenway from Smith Street to 21st Street, it is proposed that the curbside travel lane closest to the waterfront be eliminated, reducing the number of moving lanes from four lanes to three lanes. The additional space would be used to create a two-way bicycle path at grade with the existing sidewalk (which would remain for pedestrians). A traffic study will be performed to confirm that the westernmost travel lane may be removed without adversely impacting the vehicular level of service in the southbound direction on Hamilton Avenue. South of 21st Street it is proposed that the existing three travel lanes and curbside parking lane be preserved but that the travel lanes each be narrowed to 11' to allow for widening of the sidewalk to accommodate the bicycle path.

Traveling south from Smith Street, the Greenway will cross over the Gowanus Canal on the Hamilton Avenue Bridge, which is a moveable bridge. Therefore, it is not recommended that the bridge deck be reconstructed. Pedestrians will continue to use the existing sidewalk and cyclists would be accommodated in the roadway directly adjacent to the existing curb, pending removal of one travel lane as described above. It is recommended that the bicycle path on the operable portion of the bridge be separated from adjacent vehicular traffic with flexible plastic bollards similar to a treatment found on Tillary Street. Due to the necessary costs and the limitations of a moveable bridge, it is not recommended that the sidewalk be widened or heavy concrete barriers be placed on the bridge deck.

A short-term solution for the bicycle path on Hamilton Avenue south of the Hamilton Avenue Bridge to 21st Street is to place the bicycle path in the roadway, adjacent to the existing curb, in place of the existing travel lane. The bicycle path would be separated from vehicular traffic by a fixed concrete barrier and fence similar to the treatment in place on Flushing Avenue. This treatment is proposed as a short-term solution as far south as 21st Street, where curbside parking begins. See Route A from 21st Street to 29th Street for details of the proposed design south of 21st Street.

The long-term solution for this segment is to permanently reconstruct and widen the sidewalk closest to the waterfront to accommodate the bicycle path and a buffer of trees at the same elevation as the sidewalk. This long-term option would likely require reconstructing the entire roadway, narrowing the moving lanes from their current widths and relocating existing utilities.



Hamilton Avenue at Home Depot entrance/exit facing east (existing)



Hamilton Avenue at 17th Street facing west (existing)



Hamilton Avenue Bridge over Gowanus Canal facing west (existing)

HAMILTON AVENUE CROSS-SECTIONS (ROUTE A)

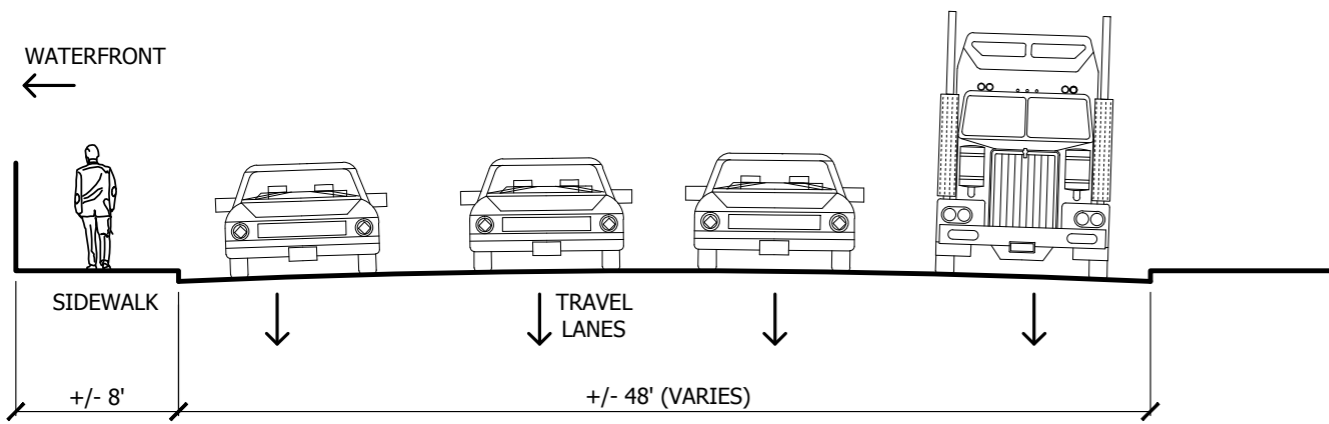


Fig. 37: Existing configuration on Hamilton Avenue from Smith Street to 21st Street

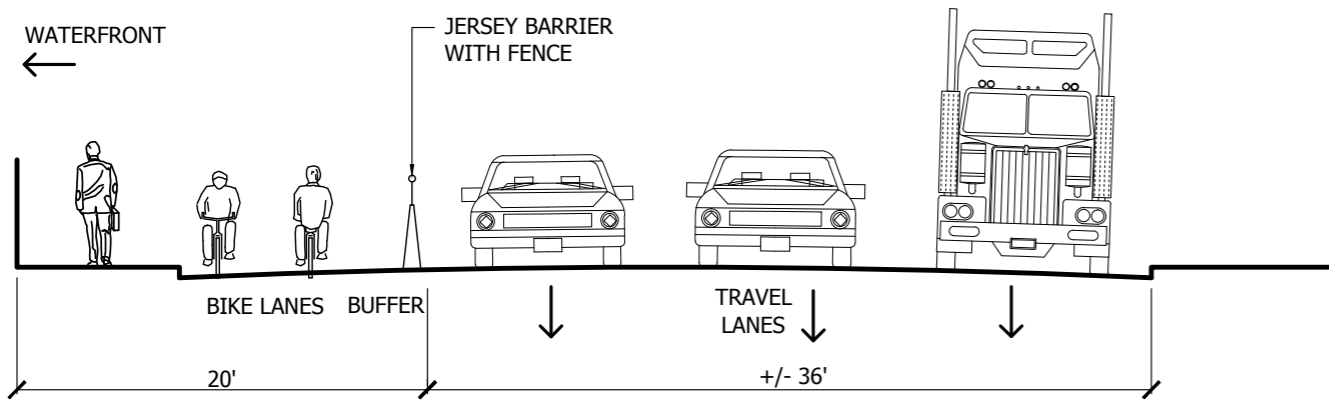


Fig. 38: Possible Short-Term Configuration for Hamilton Avenue from Hamilton Avenue Bridge to 21st Street

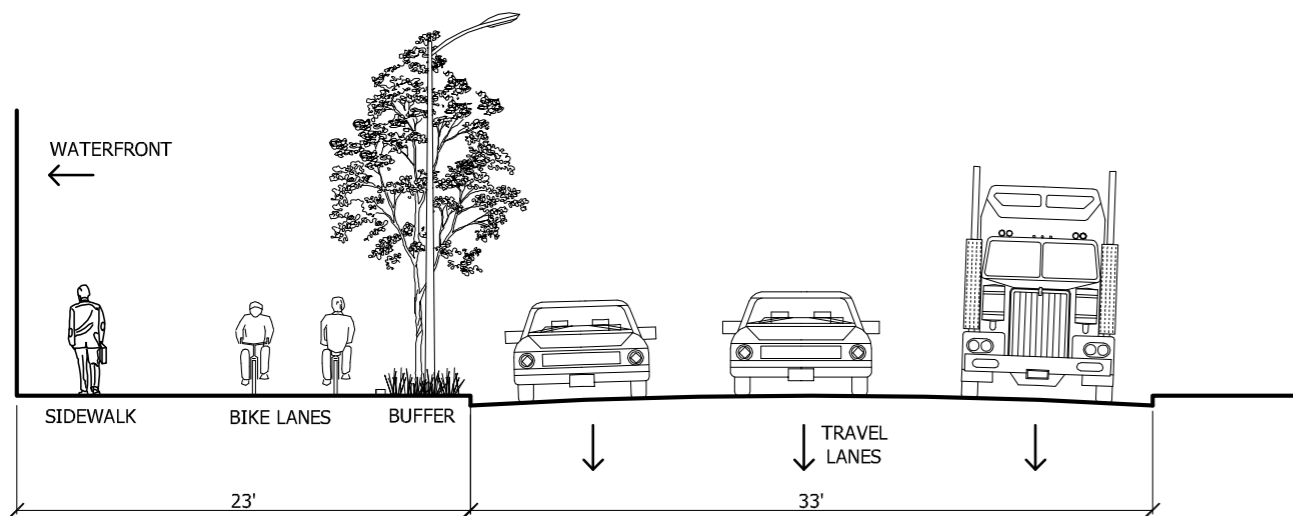


Fig. 39: Possible Long-Term Configuration for Hamilton Avenue from Hamilton Avenue Bridge to 21st Street



Kent Avenue Bicycle Path with turn bays (precedent)



Columbia Street with jersey barrier (short-term precedent)



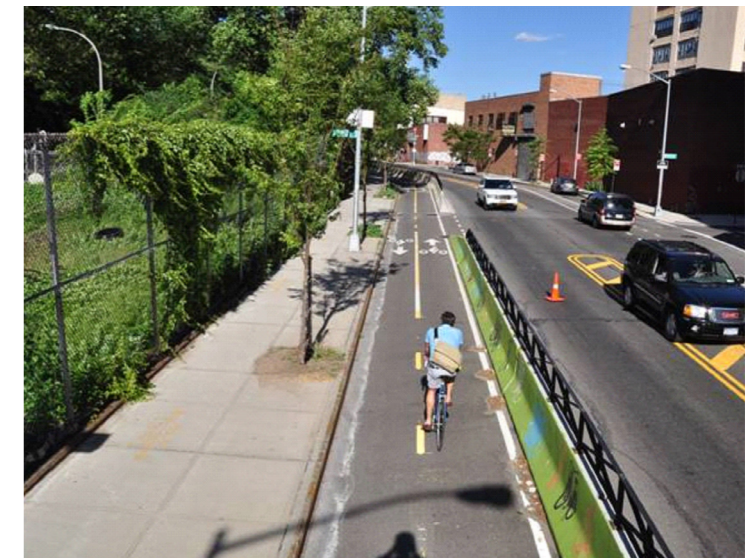
Hamilton Avenue Bridge looking west (existing)



Tillary Street Bicycle Path with flexible bollards (short-term precedent)



Hamilton Avenue looking west from Department of Sanitation Marine Transfer Station (existing)



Flushing Avenue with jersey barrier (short-term precedent)

Route A (continued) from 21st Street to 27th Street

Southbound Hamilton Avenue becomes Third Avenue at 18th Street. The Existing configuration changes at 21st Street from four moving lanes without parking to three moving lanes with on-street parking on the west curb. It is proposed that the travel lanes on Third Avenue between 21st Street and 27th Street be narrowed to provide space for the sidewalk on the west side of Third Avenue to be widened for a two-way shared path.

The path would be separated from the parked cars with a narrow buffer for trees and lighting. This would entail reconstructing the curb and sidewalk and most of the roadway, requiring relocation of drainage and other utilities. Parking may need to be removed in advance of certain key intersections to provide a dedicated right-turn lane in order to maintain vehicular level of service.



Third Avenue from 18th Street to 27th Street (existing)

THIRD AVENUE CROSS-SECTIONS (ROUTE A)

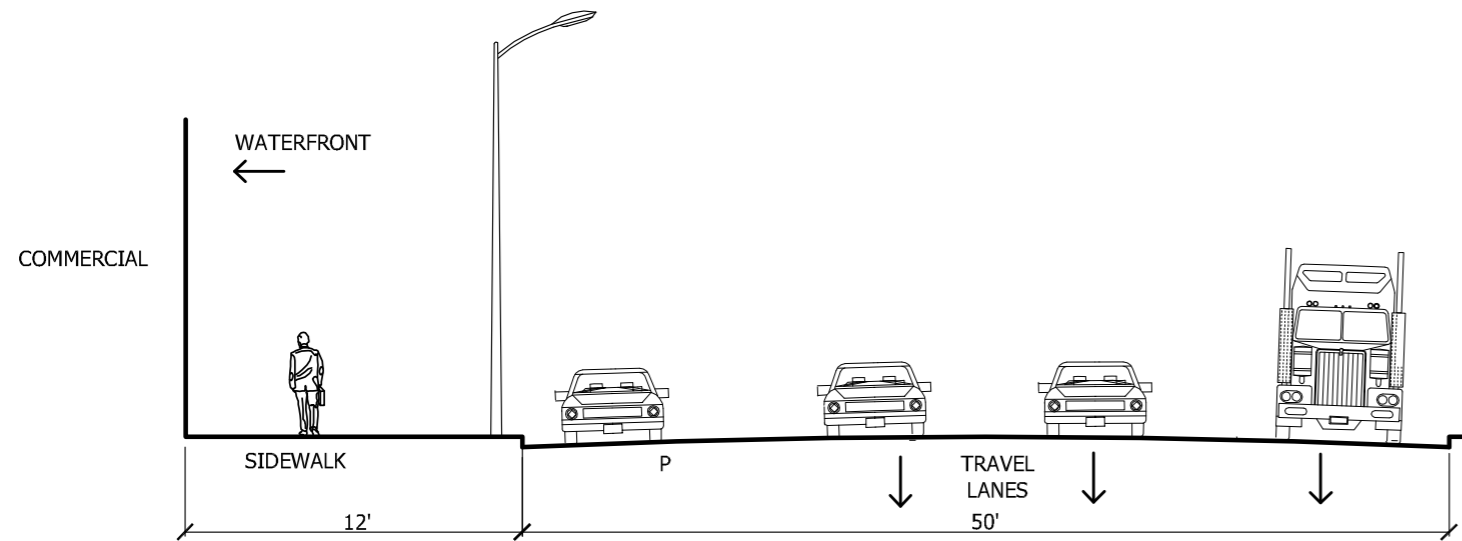


Fig. 40: Existing configuration on Third Avenue between 21st Street and 27th Street

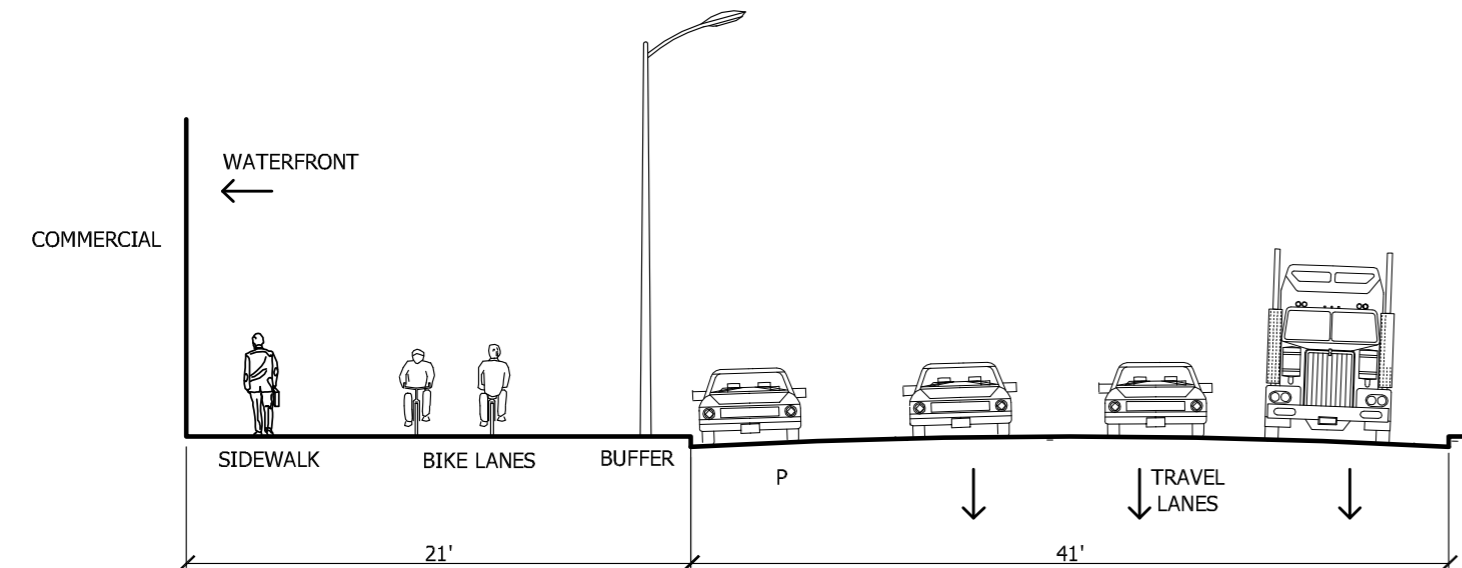
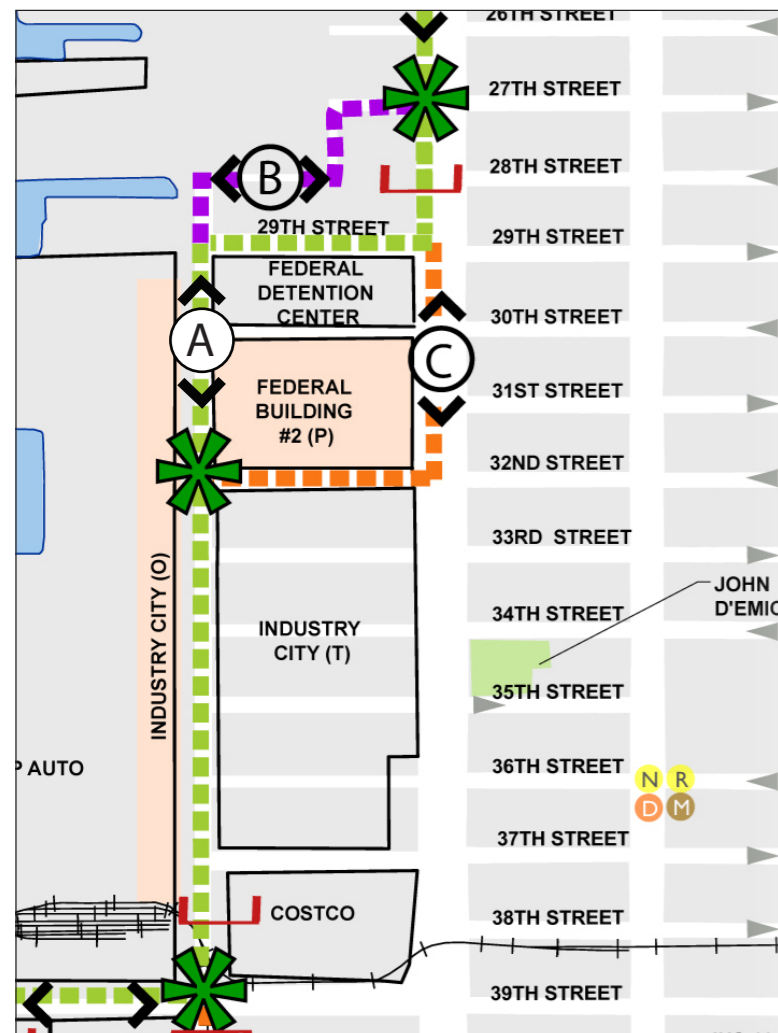


Fig. 41: Possible Configuration for Third Avenue between 21st Street and 27th Street



Computer enhanced image of a shared-use sidewalk, Germany (precedent)



Plan Enlargement 8: Third Avenue and 27th Street to Second Avenue and 32nd Street

Third Avenue & 27th Street to Second Avenue & 32nd Street (Plan Enlargement 8)

Route A–29th Street Connector

Route A continues the Greenway treatment proposed for Third Avenue north of 27th Street to 29th Street and then to Second Avenue. 29th Street is extremely wide and closed to traffic. Route A is the preferred route.

Route A takes advantage of the northernmost existing pedestrian connection to Second Avenue which is 29th Street. 29th Street is closed to through traffic due to the Federal prison that is located between Third and Second Avenues. The primary pedestrian entrance to the Federal Detention Center is located along 29th Street, so a route along this section requires coordination with the Federal government.

Two possible Greenway route configurations are possible on 29th Street. Option 1 involves building a physically separated pathway down the middle of the street (shown in figure 42). Option 2 would use the extremely wide sidewalk on the north side of 29th Street instead.



29th Street looking west from Third Avenue (existing)

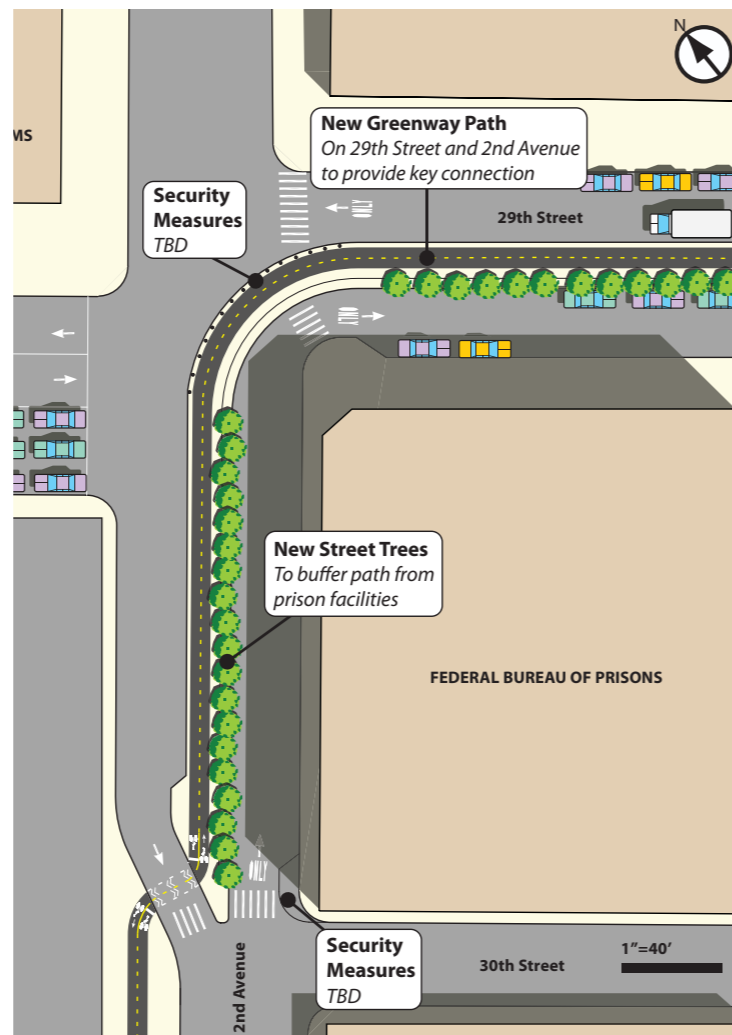


Fig 42: Possible configuration of 29th Street and Second Avenue connection in front of the Federal Bureau of Prisons

Route B–27th and 28th Street Connector

Route B brings the Greenway from Third Avenue to Second Avenue at the first possible opportunity via an off-street connection. Route B runs adjacent to an active Con Edison sub-station and involves land not within NYCDOT jurisdiction. It is also visually removed from the street grid which presents safety issues. Thus, Route B is not a desirable route.

Route B heads towards the waterfront at 27th Street. 27th Street terminates approximately 250 feet west of Third Avenue, where a paved roadway forms a north-south connection to 28th Street. This north-south roadway is an unmapped street but it runs parallel to the street grid and connects to 28th Street. From there, Route B turns onto Second Avenue.

At the time of this report, Con Edison was not in favor of opening this space to the Greenway. Instead they offered to support the Greenway along 29th Street where they will work with NYCDOT to meet the needs of the Greenway along the south side of their property (north side of 29th Street).



27th Street between Second Avenue and Third Avenue looking south (existing)

Route C–32nd Street Connector

Route C remains on Third Avenue to 32nd Street to avoid the prison because access to 30th and 31st Streets are controlled by gates and security guards, so these streets should be avoided. 32nd Street is in poor condition and has many cobblestones. Due to traffic considerations on Third Avenue and the high cost of construction, this is not the preferred route.

A Federal Detention Center occupies the block between 29th and 30th Street and a building listed as Federal Building Number 2 occupies the block between 30th and 31st Streets. The block between 31st Street and 32nd Street is vacant. The public is not admitted to 30th and 31st Streets currently with access controlled by gates and security guards. After 29th Street, 32nd Street is the next available opportunity to travel from Third Avenue to Second Avenue. South of 32nd Street to 38th Street there is no access to Second Avenue through Industry City.

32nd Street is wide and has views to the waterfront, but would require a full reconstruction. There are no sidewalks and the street is paved with very rough cobblestones. This route is considered an alternative in the event that an agreement cannot be reached with the Federal Detention Center about the use of 29th Street.



30th Street looking west from Third Avenue (existing)

RECOMMENDATION:

From **Third Avenue & 27th Street to Second Avenue & 32nd Street** the Preferred Route Recommendations:

Route A–29th Street Connector, based on:

- Low traffic volumes
- Street width/available right-of-way
- First east-west connection from Third Avenue

Second Avenue from 29th Street to 39th Street

No viable alternative exists; this is the preferred route.

Second Avenue is in poor condition. In most places, original Belgian blocks remain as do some of the original trolley and railroad tracks. The sidewalk is not continuous on the west side. The street width varies and pavement is in poor condition.

The proposed design widens the existing sidewalk to create a two-way bicycle path along the curb maintaining the sidewalk along the fence line. A landscaped buffer would separate the path from the moving lanes. In order to realize this vision, the entire roadway would likely need to be fully reconstructed.

Industry City, the primary land owner east of this section of Second Avenue, has supported the Greenway and expressed a desire for improvements along this stretch of roadway. This segment could become a major access point for cyclists and pedestrians to reach the planned Bush Terminal Piers Park as well as a popular commuter route for local workers.



Looking west down 32nd Street from Third Avenue (existing)



Industry City, Second Avenue at 33rd Street (existing)

SECOND AVENUE CROSS-SECTIONS (ROUTE A)

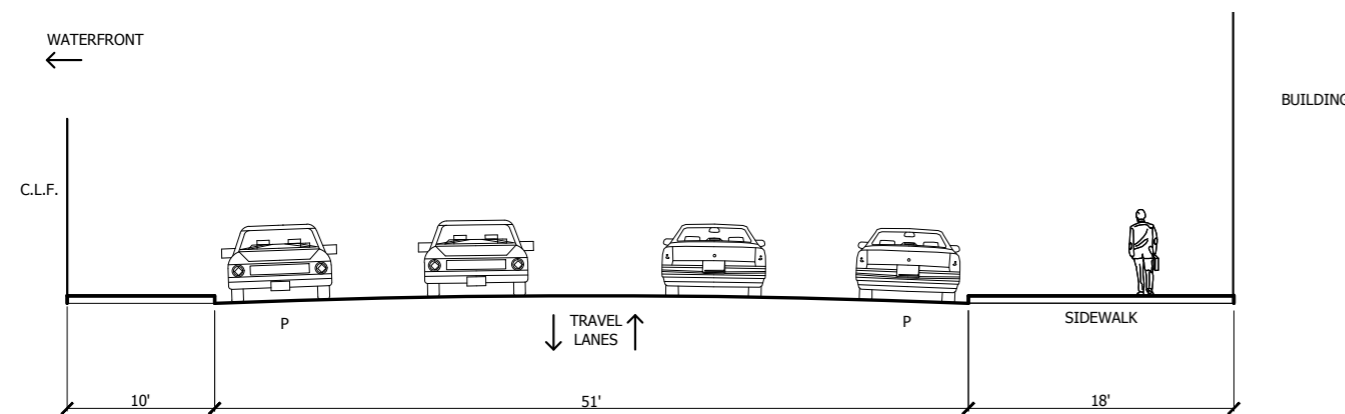


Fig. 43: Existing configuration on Second Avenue 27th Street to 39th Street

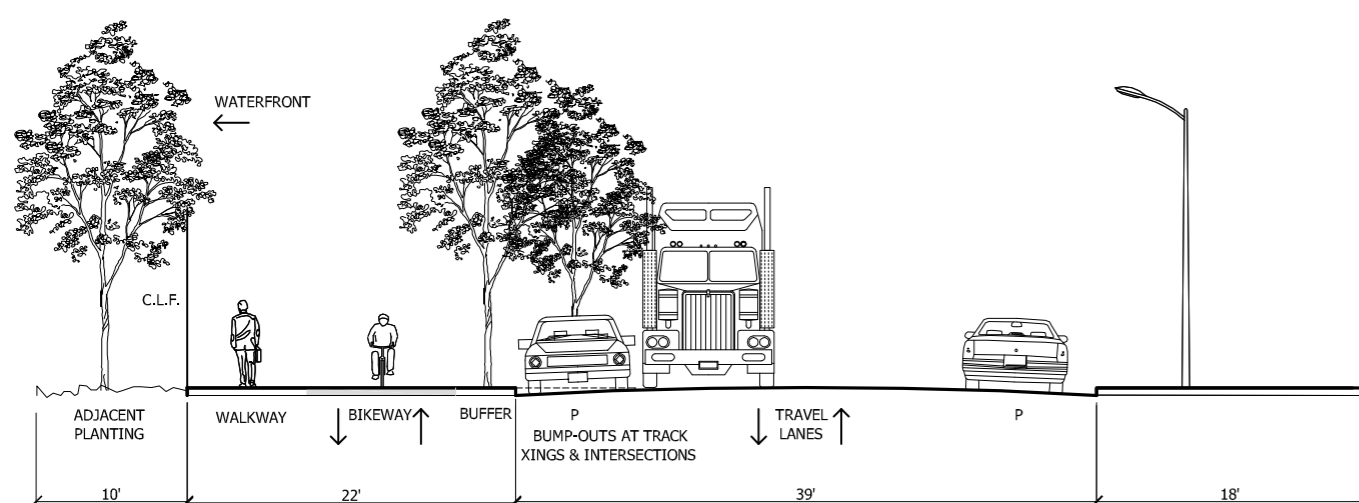
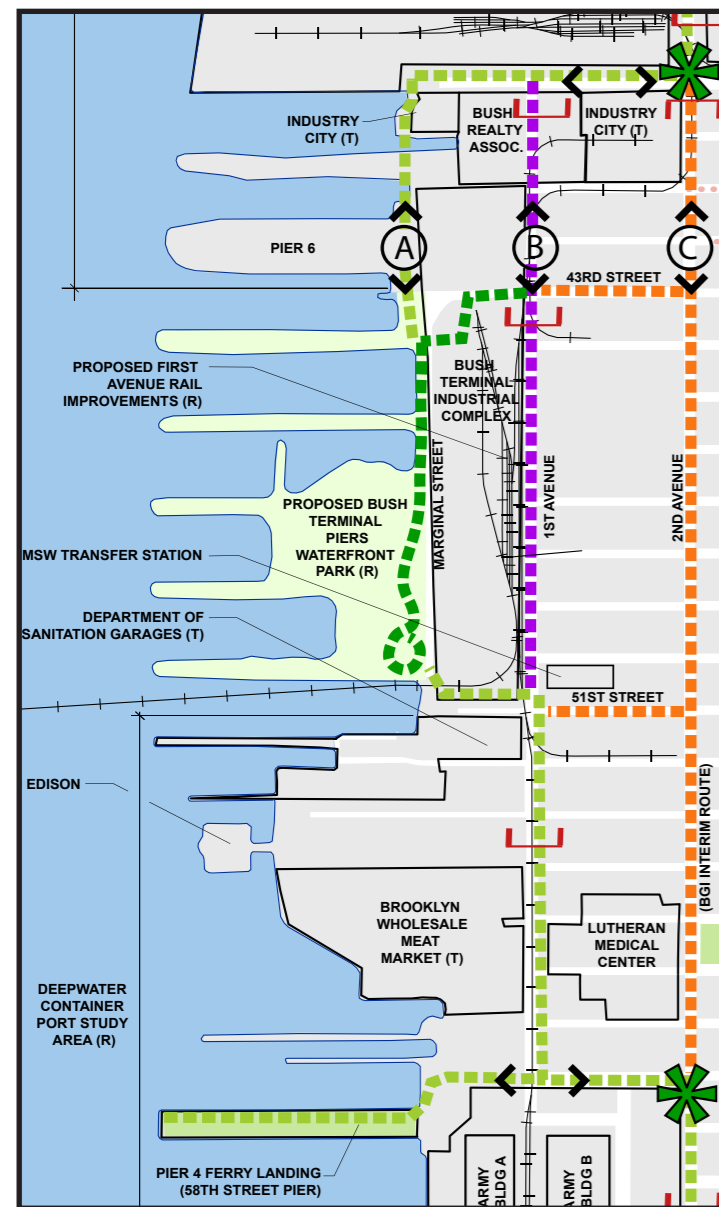


Fig. 44: Possible Configuration for Second Avenue 27th Street to 39th Street



Possible configuration for Second Avenue from 29th Street to 39th Street opposite Industry City



Plan Enlargement 9: 39th Street to 58th Street

39th Street to 58th Street (Plan Enlargement 9)

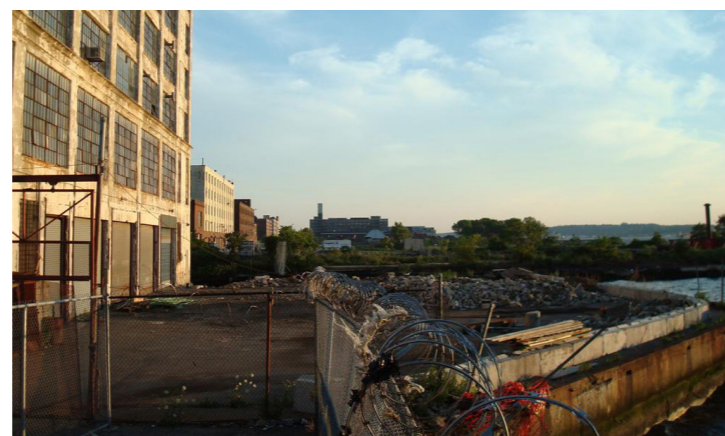
On-going City and State improvements to rail and road infrastructure along the Sunset Park waterfront are an important part of this section. EDC is currently installing new railroad track on First Avenue between 43rd Street and 39th Street. With this in mind, any future reconfiguration of First Avenue must be approved by the EDC, NYSDOT and PANYNJ to ensure that it does not impede freight movement. Furthermore, any design of the Greenway through this section of Sunset Park must be reviewed by adjacent businesses to ensure the project does not impact circulation, parking and access to loading areas.

Route A—39th Street, Marginal Street, the planned Bush Terminal Piers Park, 51st Street, First Avenue and 58th Street

Construction of the waterfront portion of Route A (39th Street to 51st Street) requires significant reconstruction of shoreline structures along Marginal Street from 39th Street to 43rd Street as well as construction of the planned Bush Terminal Piers Park from 43rd Street to 51st Street. Implementation of the waterfront portion of Route A needs to be closely coordinated with industrial use of the waterfront, making it a Future Enhancement Project.

The sections of Route A along 39th Street from Second Avenue to First Avenue, along First Avenue from 51st Street to 58th Street and along 58th Street from First Avenue to Second Avenue are part of the preferred route.

39th Street from Second Avenue to First Avenue is a wide two-way cobblestone street. On the north side of the street is the SBMT. The south side of the street is lined with large industrial buildings with numerous loading docks on the ground floor facing the street. It is proposed that the Greenway along this stretch continue the same design proposed for Second Avenue (from 29th Street to 39th Street), a two-way, shared-use path built on the north side of the street, adjacent to the SBMT property line. This will require widening the sidewalk, with special care taken when in close proximity to active rail tracks, specifically when entering the SBMT.



Marginal Street facing south from 39th Street (existing)



39th Street facing west from Second Avenue (existing)

Marginal Street from 39th Street to 43rd Street is the first of two segments that comprise the planned Marginal Street/Bush Terminal Piers Park Future Enhancement Project. Marginal Street provides direct access to the waterfront using unmapped right-of-way along the waterfront from 39th Street to 43rd Street. The route would pass on the west side of a property owned by Industry City located along the waterfront bulkhead, past Pier 6, to meet up with the planned Bush Terminal Piers Park at approximately 43rd Street. As Bush Terminal properties are developed, the possibility of a public/private partnership to build a continuous esplanade from 39th Street to Bush Terminal Piers Park could be explored.

Although this path would offer direct access to the waterfront and provide an off-street bicycle and pedestrian alternative to First Avenue and Second Avenue, it should be considered a long-term project because it will require costly demolition and reconstruction of deteriorating waterfront infrastructure. Construction of this segment will require extensive environmental review and permitting as well as coordination with adjacent property owners. Marginal Street between 39th Street and 43rd Street is currently utilized by adjacent industrial businesses and is not open for public use. Significant capital investment would be needed to open up this section and ensure that 43rd Street and 51st Street can be used as park/waterfront access points. Due

to these constraints, it is unlikely that a waterfront route in this section will be open in the near future.

Bush Terminal Piers Park is part of the Marginal Street/Bush Terminal Piers Park Future Enhancement Project. This planned new public park would be built on the waterfront behind Bush Terminal, from approximately 43rd Street to 51st Street. A design for the park exists, but the final design has not been completed.



Float bridge operations at 51st Street (existing). Photo: Bing



Proposed Plan for Bush Terminal Piers Park. Image: EDC



First Avenue facing south from 43rd Street (existing)



58th Street Pier view looking east with BAT in background (existing)



58th Street at Second Avenue looking west (existing)



Columbia Street (precedent)

A pedestrian and bicycle path connection to the park at 51st Street must be designed in a way that accommodates crossing of active freight rail movement between the float bridge connection point at the water's edge and First Avenue. A large DOS maintenance facility is located on the south side of 51st Street. NYCDOT will have to coordinate with EDC and PANYNJ to implement the southern connection to the park.

Routing of the Greenway along First Avenue from 51st Street to 58th Street will also need to consider the presence of increased rail traffic along the corridor. On this segment of First Avenue, active rail is in the middle of the roadway with one travel lane in each direction and parking on both sides of the street. Trucks make up a high percentage of the vehicular mix. The proposed design leaves the railroad tracks in their existing location but calls for reconstruction of the roadway by widening the sidewalk on the west side of the street to accommodate a two-way shared-use path with a landscaped buffer. Any design will have to be finalized with community input and discussions with EDC and PANYNJ.

58th Street from First Avenue to Second Avenue is a wide two-way street, with parking on both sides of the street. A short-term treatment for this block would be to move the parked cars on the south side of the street approximately 14' off the curb and utilize markings and pavement color to create a parking-protected two-way curbside bicycle path in the roadway, similar to Kent Avenue in Williamsburg. A long-term solution would be to narrow the travel lanes and widen the sidewalk on the south side of the street to build a physically separated two-way shared-use path with a landscaped buffer, similar to the path on Columbia Street south of Atlantic Avenue. The design of the Greenway at First Avenue and 58th Street, where it turns the corner towards Second Avenue, will need to accommodate vehicular access to the BAT and public access to the 58th Street Pier.

FIRST AVENUE CROSS-SECTIONS (ROUTE A)

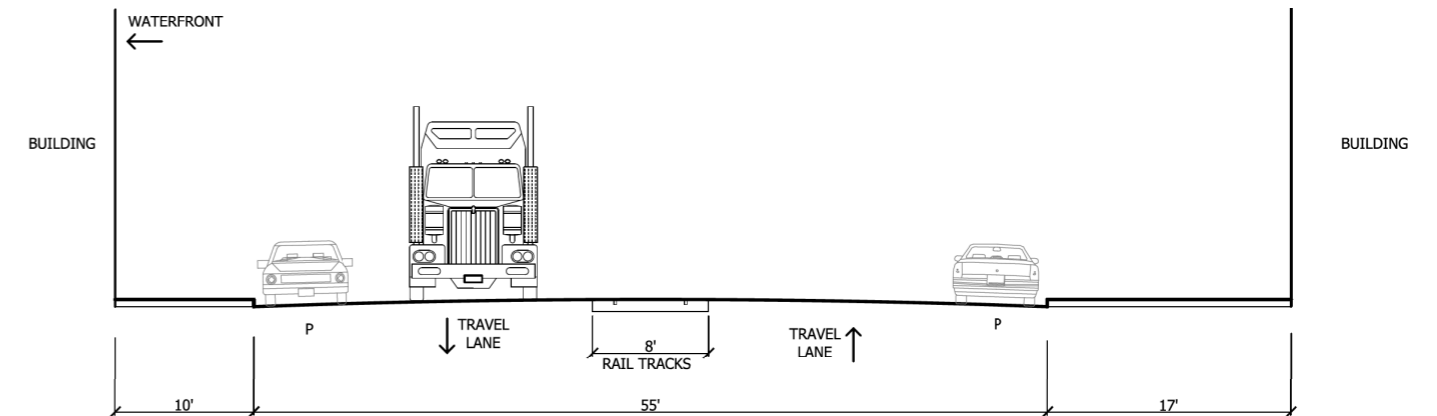


Fig. 45: Existing configuration on First Avenue between 51st and 58th Streets

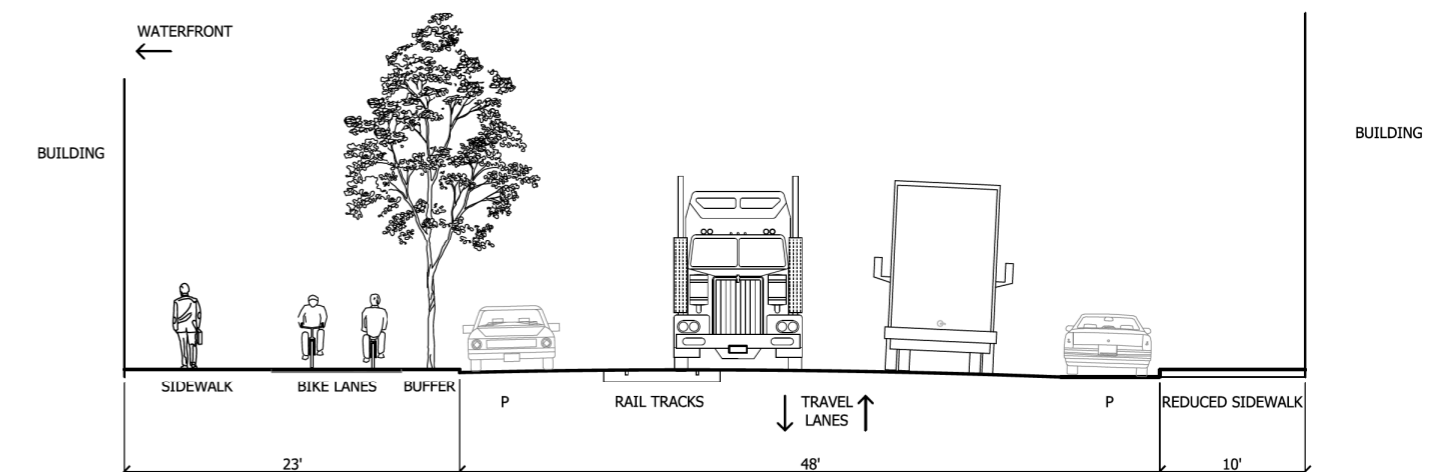


Fig. 46: Possible configuration for First Avenue between 51st and 58th Streets



51st Street facing west from First Avenue (existing)



First Avenue facing north from 52nd Street (existing)

Route B—First Avenue from 39th Street to 51st Street

Route B offers an alternative to the northern section of waterfront route (Route A) by using First Avenue. Freight rail improvements are currently being constructed on First Avenue connecting Bush Terminal at 43rd Street and to the SBMT at 39th Street. Route B is the preferred route from 39th Street to 51st Street.

Route B runs along First Avenue from 39th Street to 51st Street. Rail operations are active, and new rail road tracks are currently being built in the center of First Avenue between 39th Street and 43rd Street and connecting north into the SBMT. Efforts are on going to attract new industrial tenants to the Bush Terminal Industrial Complex. Rail and truck traffic along this stretch of First Avenue is predicted to increase.

First Avenue lacks sidewalks between 39th and 41st Street on the east side and between 39th and 42nd Street on the west side. Active loading docks, loading bays, garage doors and driveways line both sides of First Avenue between 39th Street and 42nd Street. Furthermore, a one story brick warehouse on the east side narrows the width of First Avenue between 40th Street and 41st Street.

The proposed Greenway design includes a new shared-use path to be built along the east side of the street to avoid conflict with loading zones on the west side. It is proposed that First Avenue be kept one-way southbound from 39th Street to 41st Street after construction in order to accommodate implementation of the proposed Greenway path on the east side of the new tracks.

At 43rd Street, the Greenway will need to cross to the west side of First Avenue to make use of the sidewalk along the periphery of Bush Terminal. The west side is an ideal greenway location due to the edge condition with no turning movement conflicts across the path. It is recommended that the sidewalk and curb be fully reconstructed, widened, planted with street trees and designated as a shared-use path, similar to the proposal along Second Avenue from 29th Street to 39th Street.

FIRST AVENUE CROSS-SECTIONS (ROUTE B)

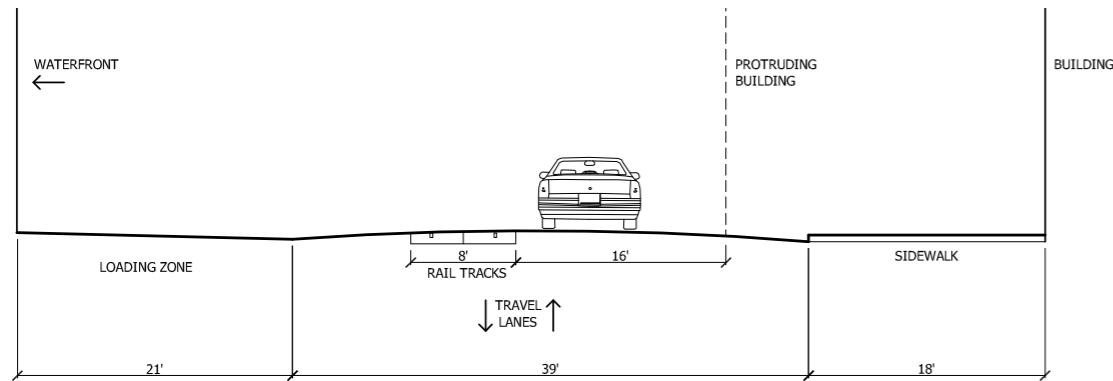


Fig. 47: Existing configuration on First Avenue between 39th and 44th Streets

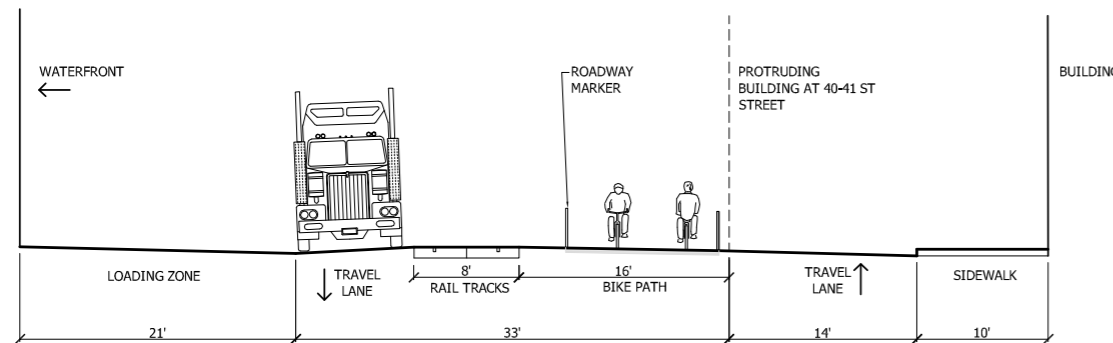


Fig. 48: Possible configuration on First Avenue between 39th and 44th Streets

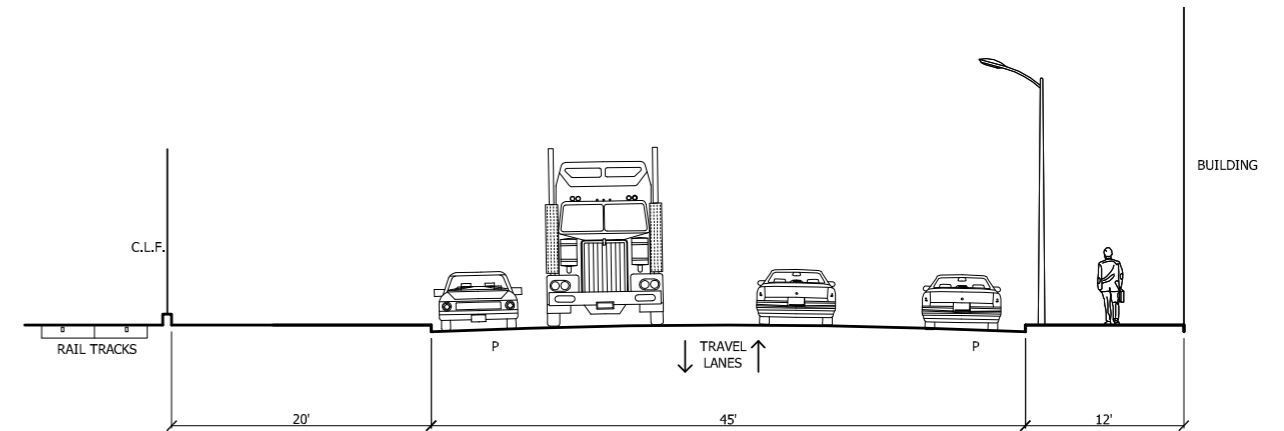


Fig. 49: Existing configuration on First Avenue between 44th and 51st Streets

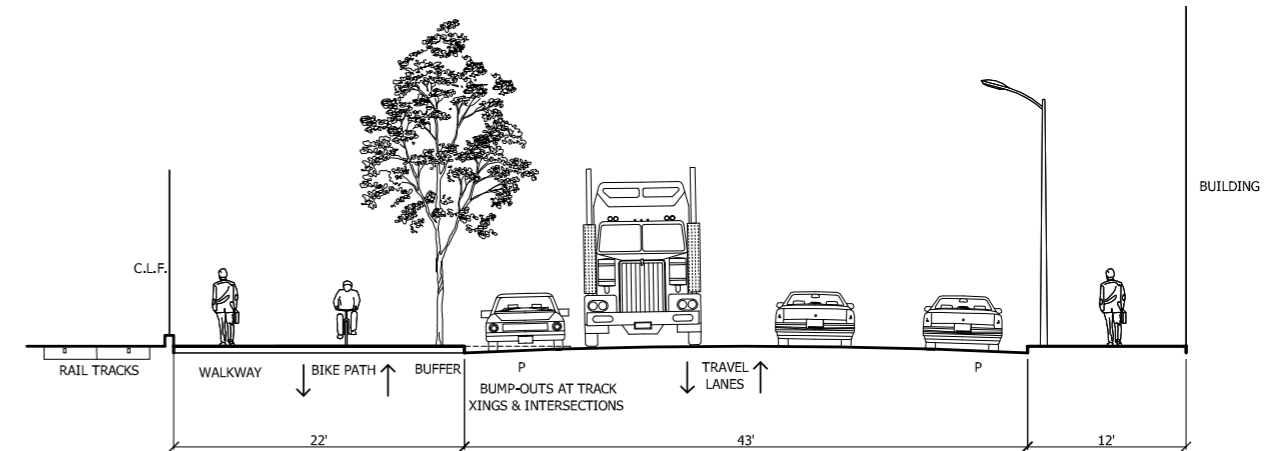


Fig. 50: Possible configuration on First Avenue between 44th and 51st Streets



First Avenue facing north from 43rd Street (existing)

Route C—Second Avenue from 39th Street to 44th Street

Route C is not recommended because it does not provide direct access to, or views of, the waterfront, or an adequate greenway facility suitable for use by all ages of cyclists.

This option calls for the installation of shared lane markings in the roadway for cyclists. Parking would be maintained on both sides of the street. Route C would connect to the Bush Terminal Piers Park via existing sidewalks and new shared lane markings on 43rd Street and/or 51st Street. Route C would be far less expensive, but it would not create the desired greenway experience. Existing land uses would also impact the Greenway: as retail activity and traffic generated by Lutheran Medical Center create higher volumes, there will be more on-street parking demand and double parking.



Second Avenue at 52nd Street looking north (existing)

SECOND AVENUE CROSS-SECTIONS (ROUTE C)

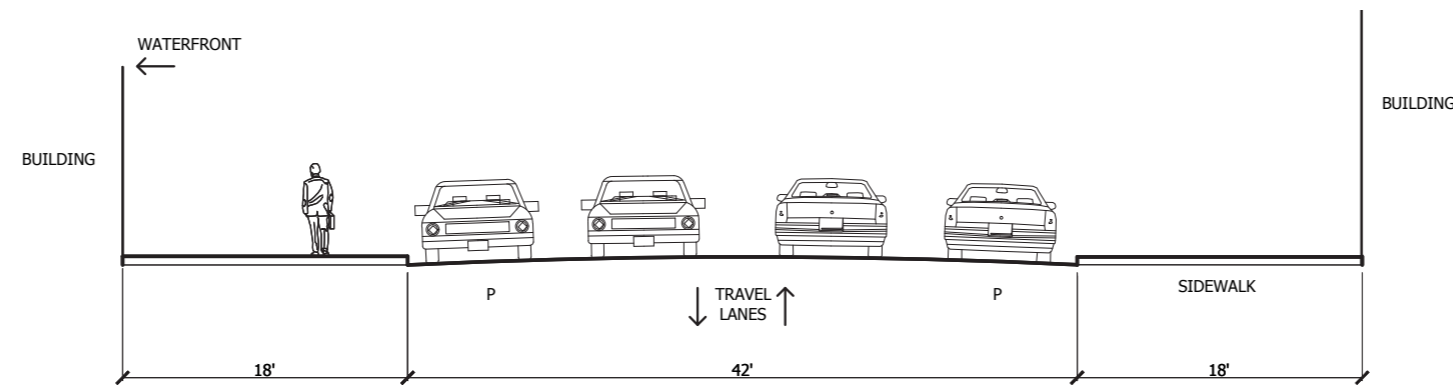


Fig. 51: Existing configuration on Second Avenue between 39th and 44th Streets



First Avenue facing north from 42nd Street (existing)

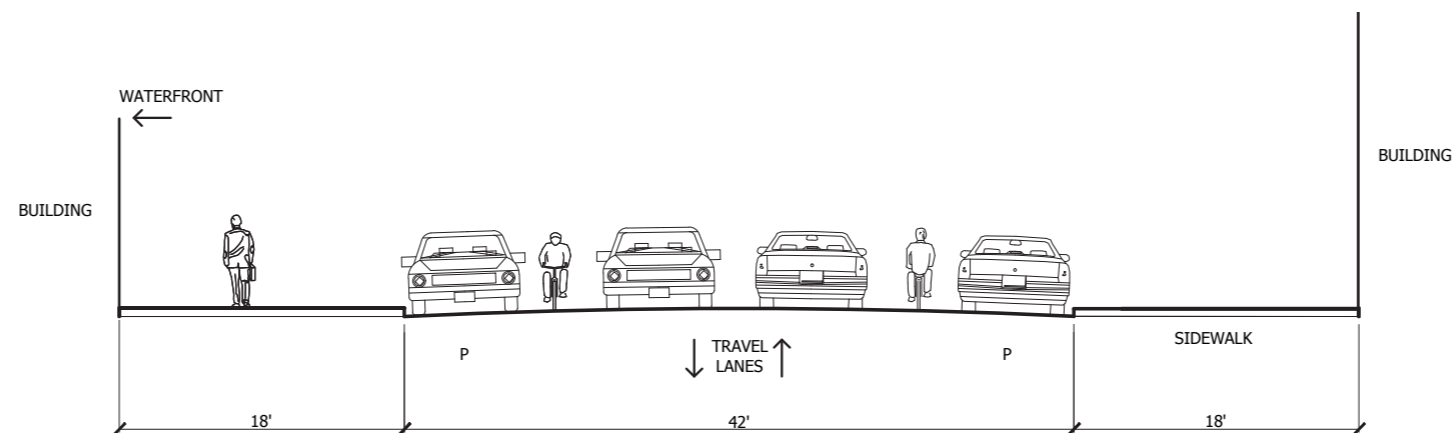


Fig. 52: Possible configuration on Second Avenue between 39th and 44th Streets

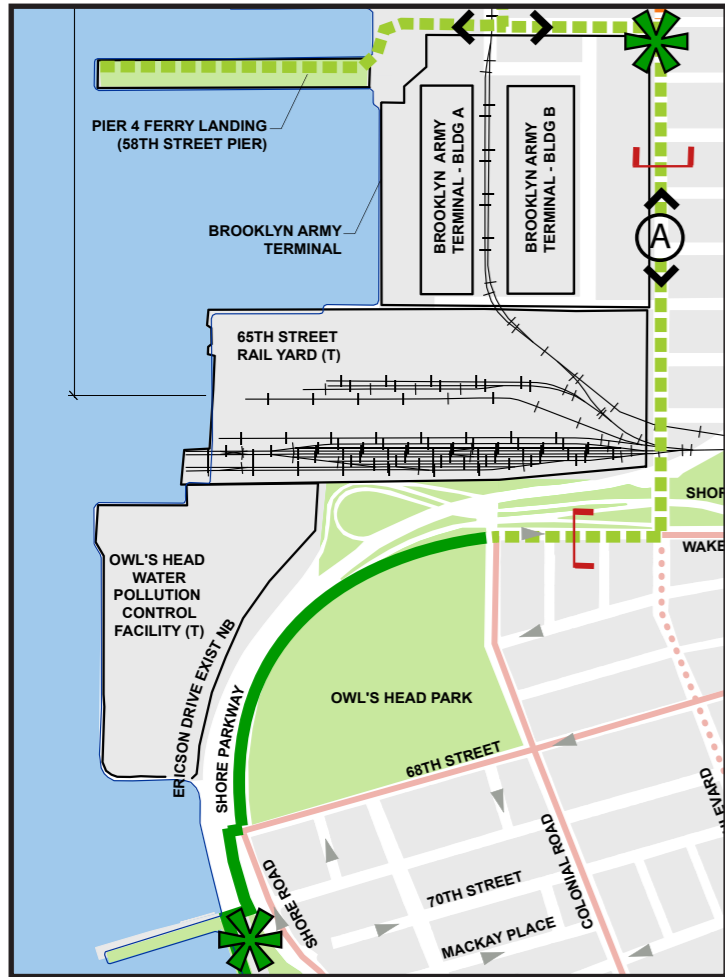


First Avenue facing north from 44th Street (existing)

RECOMMENDATION:

From **39th Street to 58th Street** the Preferred Route Recommendations are:

- Route A—39th Street** from Second Avenue to First Avenue, based on
 - Seamless connections from Second Avenue path to First Avenue path.
- Route B—First Avenue** from 39th Street to 51st Street, based on
 - Direct connection to Bush Terminal Piers Park at 43rd Street and 51st Street
 - Continuous route the length of First Avenue
- Route A—First Avenue** from 51st Street to 58th Street, based on
 - Proximity to waterfront
 - Direct connection to 58th Street Pier and BAT
 - Continuous route the length of First Avenue
- Route A—58th Street** from First Avenue to Second Avenue, based on
 - Wide right-of-way
 - Connection to 58th Street Pier and BAT



Plan Enlargement 10: 58th Street to Shore Parkway

Second Avenue and 58th Street to Owl's Head Park (Plan Enlargement 10)

Route A—Owl's Head Park Connection

No alternative exists; this is the preferred route.

The existing sidewalk on the west side of Second Avenue from 58th Street to Wakeman Place is wide and could be used as a shared-use path. Some portions of the sidewalk need to be repaired, but overall, this route functions well because of the generous width and minimum number of curb cuts that interrupt the path. As funding is pursued, widening the sidewalk should be explored to allow for more landscaping and a more comfortable design for bicycles and pedestrians.

Wakeman Place from Second Avenue to Colonial Road, around Owl's Head Park and to the Shore Parkway Esplanade at 69th Street is a relatively quiet one-way eastbound residential street with parking on both sides of the street and a 4' bicycle lane. There is an existing sidewalk on the north side of the street that is used primarily by pedestrians accessing parked vehicles. It is recommended that the northern curb be extended 5' to the south. The fence line along this sidewalk could potentially be shifted further towards Shore Parkway to better accommodate a shared-use path.



Second Avenue facing west from 58th Street (existing)



Columbia Street, Brooklyn (existing)

SECOND AVENUE CROSS-SECTIONS (ROUTE A)

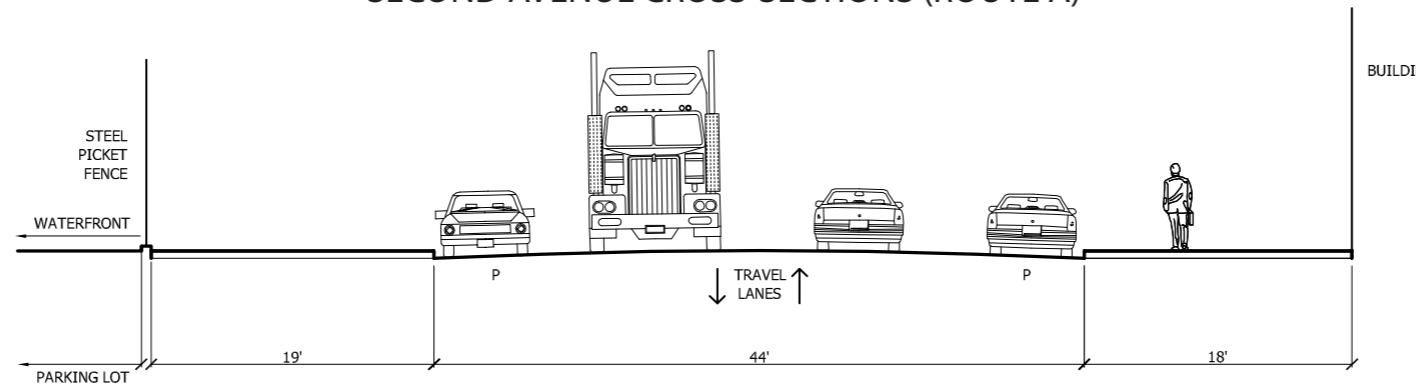


Fig. 53: Existing configuration on Second Avenue between 58th Street and Wakeman Place

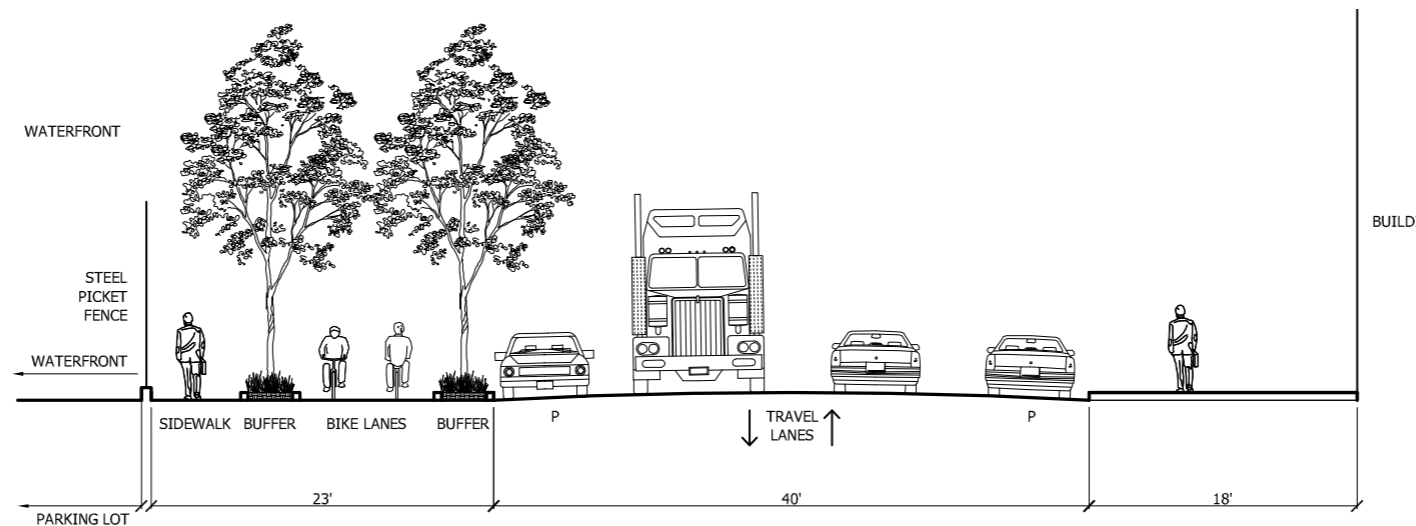


Fig. 54: Possible configuration for Second Avenue between 58th Street and Wakeman Place



Wakeman Place between Sedgwick Place and Bergen Place (existing)



Degraw Street, Brooklyn (precedent)

WAKEMAN PLACE CROSS-SECTIONS (ROUTE A)

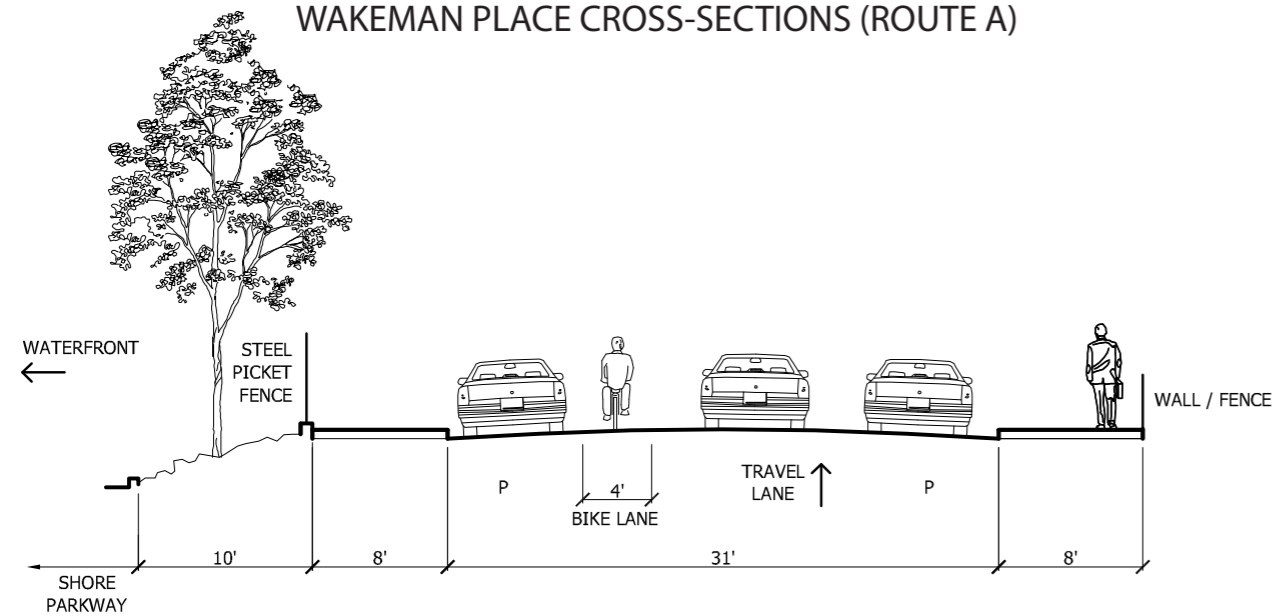


Fig. 55: Existing configuration on Wakeman Place between Sedgwick Place and Bergen Place

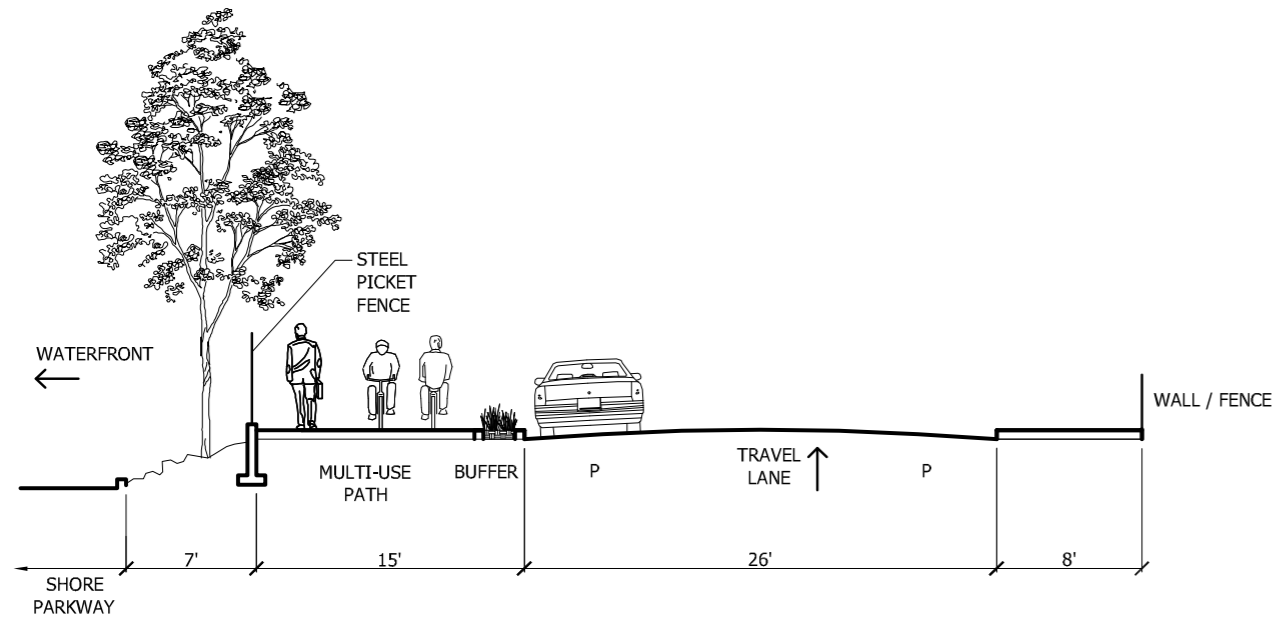


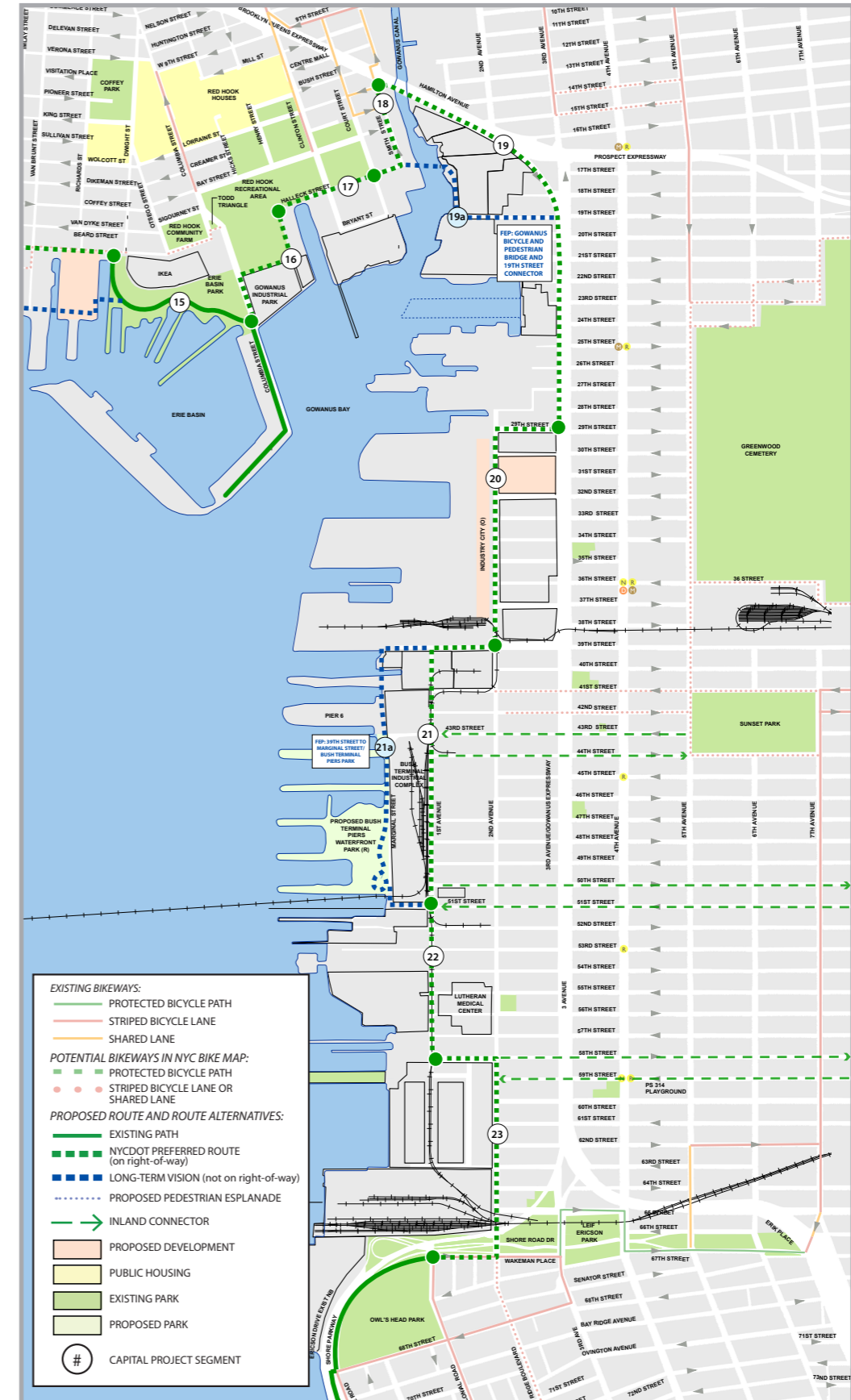
Fig. 56: Possible configuration for Wakeman Place between Sedgwick Place and Bergen Place

2.4.3 SUNSET PARK RECOMMENDED ROUTE

Sunset Park Waterfront Recommendation Summary/Discrete Capital Projects

- 19 **Gowanus Connector / Hamilton Avenue**
Hamilton Avenue between Smith Street and 18th Street – Class 1 – Off-street, two-way shared-use bicycle path
Third Avenue between 18th Street and 29th Street – Class 1 – Off-street, two-way shared-use sidewalk path
- 19a **Future Enhancement Project–Gowanus Bicycle and Pedestrian Bridge and 19th Street Connector**
- 20 **Sunset Park North**
29th Street between Second Avenue and Third Avenue – Class 1 – Off-street, two-way shared-use path
Second Avenue from 29th Street to 39th Street – Class 1 – Off-street, two-way shared-use path
- 21 **Bush Terminal Connector**
39th Street between Second Avenue and First Avenue – Class 1 – Off-street, two-way shared-use path
First Avenue between 39th Street and 43rd Street – Class 1 – On-street, two-way bicycle path separated with roadway markers
First Avenue between 43rd Street and 51st Street – Class 1 – Off-street, two-way shared-use path
- 21a **Future Enhancement Project–Marginal Street/Bush Terminal Piers Park**
- 22 **Sunset Park South**
First Avenue between 51st Street and 58th Street – Class 1 – Off-street, two-way shared-use path
- 23 **Owl’s Head Connector**
58th Street between First Avenue and Second Avenue – Class 1 – Parking-protected, two-way bicycle path
Second Avenue between First Avenue and Wakeman Place – Class 1 – Off-street, two-way shared-use path
Wakeman Place between Second Avenue and Colonial Road – Class 1 – Off-street, two-way shared-use path

SUNSET PARK RECOMMENDED ROUTE MAP



2.4.4 SUNSET PARK INLAND CONNECTORS

Inland Connectors ←-----→

- 43rd & 44th Streets–Pedestrian connection/amenities;** Bicycle and pedestrian facilities to be enhanced; Connecting future Bush Terminal Piers Waterfront Park
- 50th & 51st Streets:** Bicycle and pedestrian facilities to be enhanced; Connecting Sunset Park neighborhood/retail to future Bush Terminal Piers Waterfront Park
- 57th & 58th Streets:** Bicycle and pedestrian facilities to be enhanced; Connecting Sunset Park neighborhood/retail to 58th Street Pier

CHAPTER 3:
PHASING AND IMPLEMENTATION PLAN
BROOKLYN WATERFRONT GREENWAY

chapter 3

The previous chapter describes the proposed route of the 14-mile Greenway and offers suggestions for how the path may be built. This chapter breaks the 14-mile route down into a series of Discrete Capital Projects for phased implementation by NYCDOT, as funding becomes available. Future Enhancement Projects (FEPs) are long-term projects, typically located directly on the waterfront, on land not under the jurisdiction of NYCDOT.

A total of 23 Discrete Capital Projects and 6 Future Enhancement Projects (FEPs) have been identified. Each is listed in the table and shown on the maps on the following pages. Projects were defined based on a number of factors including:

- Individual neighborhood needs and constraints
- Political and agency jurisdiction
- Street geometry, grid orientation and physical barriers to development
- Realistic roadway reconstruction expectations
- The presence of other recently completed projects and proposed new capital projects on or adjacent to the route

For each capital project, physical project limits, including start and end points, and the approximate length of affected streets are specified. NYCDOT reserves the right to change proposed project limits and route. To assist in phasing the implementation of these capital projects over time, the table also includes the following information for each project:

- “Order-of-Magnitude” Estimated Construction Cost (ECC)
- A summary of the unique permits, approvals and special agency reviews required
- A description of the work proposed
- A listing of other recent and/or proposed capital projects within or adjacent to the project limits

The ECC is based on standard costs per linear foot of typical roadway reconstruction. These costs are based on existing pay items as defined by the Bidscope Item Price List set by the New York City Department of Design and Construction (DDC). This linear foot cost has been applied to each discrete capital project and adjusted to account for unique components and geometry within the limits.

The linear foot cost does not include replacement of sewers, water mains or relocation of power and telephone services that may otherwise be considered part of a typical roadway reconstruction, because it is unclear whether such utility work will be necessary when the project is undertaken. If utility work is required, it is assumed that there will be a separate budget for the utility operator’s share of the capital cost.

With the exception of designated NYC Historic Districts, for which a cost escalation factor for premium materials has been applied, costs exclude special materials such as granite, pavers, etc. Also excluded are costs for landscaping (other than standard street trees), benches, bike racks and other street furniture. These costs will likely be added when each capital project is developed and the design is finalized.

The final cost is expressed in the table as an order-of-magnitude cost. Technical assumptions are described in the column labeled Description of Work. The table lists special approvals and agency reviews required for each Discrete Capital Project. Below is a list of abbreviations used:

ACE	Army Corp of Engineers
BAT	Brooklyn Army Terminal
BBPC	Brooklyn Bridge Park Corporation
BNYDC	Brooklyn Navy Yard Development Corporation
DEC	New York State Department of Environmental Conservation
DEP	NYC Department of Environmental Protection
DOS	NYC Department of Sanitation
DOT Bridges	NYCDOT Bridges
DPR	NYC Department of Parks and Recreation
EDC	NYC Economic Development Corporation
EPA	US Environmental Protection Agency
LPC	Landmarks Preservation Commission
NYCDOT	NYC Department of Transportation
NYSDOT	New York State Department of Transportation
PANYNJ	Port Authority of New York and New Jersey
PST	Passenger Ship Terminal
SBIC	Southwest Brooklyn Industrial Corporation
SBMT	South Brooklyn Marine Terminal
USCG	US Coast Guard

In addition to special approvals and agency reviews, the following standard NYC agency reviews will be required for all projects:

- **New York City Department of Transportation (NYCDOT):** In-house development and review of each project will be conducted by appropriate divisions.
- **New York City Department of Design and Construction (DDC):** Preliminary and final design and administration of the construction of the capital projects identified, for which individual scopes of work have been developed by NYCDOT.
- **New York City Department of Parks and Recreation (DPR):** Review and approval of all proposed changes to and/or impacts to existing street trees and Greenstreet plantings as well as review and approval of all proposed new street trees and Greenstreet plantings for which DPR will assume maintenance responsibility.
- **New York City Department of Environmental Protection (DEP):** Review and approval of all proposed Greenway designs that may affect existing drainage structures and/or existing storm water flow rates and/or proposed new storm water drainage facilities relating to the Greenways, water main, and related work.
- **Public Design Commission (PDC) and/or Landmarks Preservation Commission (LPC):** Review requirements for non-standard items, features or amenities. LPC has jurisdiction over PDC inside designated Historic Districts and pertaining to Individual Historic Landmarks.
- **Community Board:** Review and comment on proposed Greenway designs within each Community District prior to seeking PDC or LPC approval.
- **Private Utility Companies:** Review and approval of Greenway design impacts on:
 - Cable, telephone, fiber-optic and other data services
 - Above- and below-ground electrical services
 - Gas and steam lines

*Included in the Appendix is the Leventhol Memorandum, which summarizes maintenance responsibilities for greenways in NYC.

1 Ash/Box Street and Commercial Street

Locations

- Ash/Box St between McGuinness Boulevard & Manhattan Ave/Commercial St
- Commercial St between Manhattan Ave & Dupont St

1a Future Enhancement Project: Newtown Creek Bicycle & Pedestrian Bridge

3 Franklin Street

Locations

- Franklin St between N 14th St & Calyer St
- Calyer St between West St & Franklin St
- Quay St between West St & Franklin St

3a Future Enhancement Project: Bushwick Inlet Park

5 Kent Avenue South

Locations

- Kent Ave between Clymer St & Williamsburg St West

7 Navy Yard Greenway Upgrade

Locations

- Flushing Ave between Williamsburg St West & Navy St
- Navy St between Flushing Ave & York St

9 Plymouth/Water Street Pair

Locations

- Plymouth St between Hudson Ave & Main St
- Water St between Hudson Ave & Anchorage Pl
- Anchorage Pl between Water St & Brooklyn Bridge Park

9a Future Enhancement Project: John Street Waterfront Connector

11 Columbia Street Greenway Upgrade

Locations

- Atlantic Ave between Brooklyn Bridge Park & Columbia St
- Columbia St between Atlantic Ave & Degraw St
- Degraw St between Columbia St & Van Brunt St



2 West Street

Locations

- West St between Eagle St & Quay St

4 Kent Avenue Greenway Upgrade

Locations

- Kent Ave between N 14th St & Clymer St

6 Williamsburg Street West Greenway Upgrade

Locations

- Williamsburg St West between Kent Ave & Flushing Ave

8 Vinegar Hill Connector

Locations

- Hudson Ave between York St & Plymouth St

10 Brooklyn Bridge Park

Locations

- Brooklyn Bridge Park between Anchorage Pl & Atlantic Ave

12 Atlantic Basin Connector

Locations

- Van Brunt St between Degraw St & Hamilton Ave
- Summit St between Hamilton Ave & Imlay St
- Imlay St between Summit St & Bowne St

13 Atlantic Basin

Locations

- Bowne St between Imlay St & Commercial Wharf
- Alternative: Imlay St between Bowne St & Verona St
- Commercial Wharf between Verona St & Pioneer St

15 Erie Basin Park Greenway Upgrade

Locations

- Erie Basin Park between Dwight St & Columbia St

17 Red Hook Recreation Area

Locations

- Halleck St extended between Columbia St & Court St

19 Gowanus Connector/ Hamilton Avenue

Locations

- Hamilton Ave between Smith St & 18th St
- Third Ave between 18th St & 29th St

19a Future Enhancement Project: Gowanus Bicycle & Pedestrian Bridge & 19th Street Connector

21 Bush Terminal Connector

Locations

- 39th St between Second Ave & First Ave
- First Ave between 39th St & 51st St

21a Future Enhancement Project: Marginal Street/Bush Terminal Piers Park

23 Owl's Head Connector

Locations

- 58th St between First Ave & Second Ave
- Second Ave between 58th St & Wakeman Place
- Wakeman Place between Second Ave & Colonial Rd/Owls Head Park



Photo: Bing

14 Valentino Pier Connector

Locations

- Conover St between Pioneer St & Beard St
- Alternative: Ferris St between Pioneer St & Valentino Pier
- Beard St between Conover St & Dwight St

14a Future Enhancement Project: Buttermilk Channel Waterfront & Fairway & Erie Basin Waterfront

16 Columbia Street Extension

Locations

- Columbia St between Gowanus Industrial Park/Erie Basin Park entrance & Halleck St

18 Smith Street

Locations

- Halleck St between Court St & Smith St
- Smith St between Halleck St & Hamilton Ave

20 Sunset Park North

Locations

- 29th St between Second Ave & Third Ave
- Second Ave between 29th St & 39th St

22 Sunset Park South

Locations

- First Ave between 51st St & 58th St

Legend

- Discrete Capital Project Divisions
- Existing Route
- ⋯ Planned Route
- ⋯ Alternative Planned Route
- ⋯ Future Enhancement Project
- ← - - - - - → Inland Connectors

3.1 GREENPOINT - WILLIAMSBURG DISCRETE CAPITAL PROJECTS

ID	PROJECT	LOCATION	PROJECT BEGINS	PROJECT ENDS	OVERVIEW OF WORK	SPECIAL PERMITS, APPROVALS & AGENCY REVIEW	APPROX. LENGTH (LF)	ESTIMATED CONSTRUCTION COST (ECC)	DESCRIPTION OF WORK	RECENTLY COMPLETED AND/OR PROPOSED CAPITAL PROJECTS
GREENPOINT-WILLIAMSBURG										
1	Ash/Box Street and Commercial Street	Ash/Box Street	McGuinness Boulevard	Manhattan Avenue (Ash Street) and Commercial Street (Box Street)	Class 2/3 – Refresh bicycle lane and shared lane markings		600	\$250,000 ¹	Repair sidewalks, plant trees and refresh the existing bicycle lane and shared lane markings on Box and Ash Streets, respectively. Examine the feasibility of upgrading Ash Street to a Class 2 bicycle lane.	HWK701A - Ash Street & Manhattan Avenue (2008 & 2011) - Manhattan Ave Park from Ash Street to Bulkhead at Newtown Creek including New Park; Kent Ave from North 14th St to the Brooklyn Queens Expressway (BQE); Franklin St from North 14th St to Commercial St; HWK693W - Commercial Street & Franklin Avenue (2008) - Kent Ave from North 14th St to the Brooklyn Queens Expressway (BQE); Franklin St from North 14th St to Commercial St
		Commercial Street	Manhattan Avenue	Dupont Street	Class 1 – Two-way bicycle path on west side of the street		1,600	\$4.25 Million ²	Reconstruct/widen sidewalk to accommodate a two-way side-path on the west side of the street with planted buffer. Continue Greenway through DEP property from Dupont Street to Eagle Street to connect to West Street.	
1a	(FEP) Newtown Creek Bicycle and Pedestrian Bridge	Across Newtown Creek	Manhattan Avenue northern terminus (Brooklyn)	Vernon Boulevard southern terminus (Queens)	Class 1 – New operable bicycle-pedestrian bridge across Newtown Creek at Manhattan Avenue	Newtown Creek is a navigable waterway with existing water-dependant industrial uses. ACE, USCG, DCP (CEQR), DEC (SEQR)	250-300	\$5-10 Million	Construct a new operable bicycle/pedestrian-only bridge across the Newtown Creek on axis with Manhattan Avenue in Brooklyn.	
2	West Street	West Street	Eagle Street	Quay Street	Class 1 – Widen west sidewalk to include two-way bicycle path		3,150	\$8.5 Million	Existing NYCDOT/DDC Capital Project that will fully reconstruct the roadway to accommodate a physically separated two-way multi-use side path along the west side of the street.	HWK1048A - West Street between Eagle Street & Quay Street (2011) - West Street from Eagle Street to Quay Street - Phase 1 of the Brooklyn Waterfront Greenway
3	Franklin Street	Franklin Street	North 14th Street	Calyer Street	Class 2/3 – Existing bicycle lanes and shared lane markings		1,100	Existing	Pedestrians use existing sidewalks and cyclists use existing bicycle lanes and shared lane markings. Implement new shared lane markings on Quay and Calyer Streets between Franklin and West Streets. Planting of additional street trees should be coordinated with DPR.	HWK693W - Franklin Street between Calyer Street & N. 14th Street (2008) - Kent Ave from North 14th St to the Brooklyn Queens Expressway (BQE); Franklin St from North 14th St to Commercial St
		Calyer Street	Franklin Street	West Street	Class 3 – Shared lane markings		450	\$125,000 ¹		
		Quay Street	West Street	Franklin Street	Class 3 – Shared lane markings		350	\$100,000 ¹		
3a	(FEP) Bushwick Inlet Park	Bushwick Inlet Park	West/Quay Street	Kent Avenue/N. 14th Street	Class 1 – New off-street path	DPR	400	N/A	Construct a two-way shared-use path through the planned Bushwick Inlet Park. This project will be implemented by DPR.	
4	Kent Avenue Greenway Upgrade	Kent Avenue	North 14th Street	Clymer Street	Class 1 – Upgrade existing parking-protected two-way bicycle lanes		8,300	\$4.5 Million	Construct permanent raised pedestrian refuge islands with trees at either end of each 'floating' parking bay. Construct raised planted median where currently there is a striped thermoplastic buffer area between the parking bay and the bicycle lanes. Pedestrian improvements such as curb extensions will be investigated.	HWK693W - Kent Avenue between N. 14th Street & Clymer Street (2008) - Kent Ave from North 14th St to the Brooklyn Queens Expressway (BQE); Franklin St from North 14th St to Commercial St; NWBURGFL - Kent Avenue between N. 8th Street & N. 7th Street (2011) - North Williamsburg Ferry Landing; SCHAFAER - Kent Avenue between S. 7th Street & S. 8th Street (2011) - Schafer Brewing Co site
¹ To be constructed with NYCDOT (or other City agency) in-house resources ² Cost Estimate based on full-depth roadway reconstruction ³ Cost Estimate includes a factor of 1.3 to account for materials required within a Historic District										

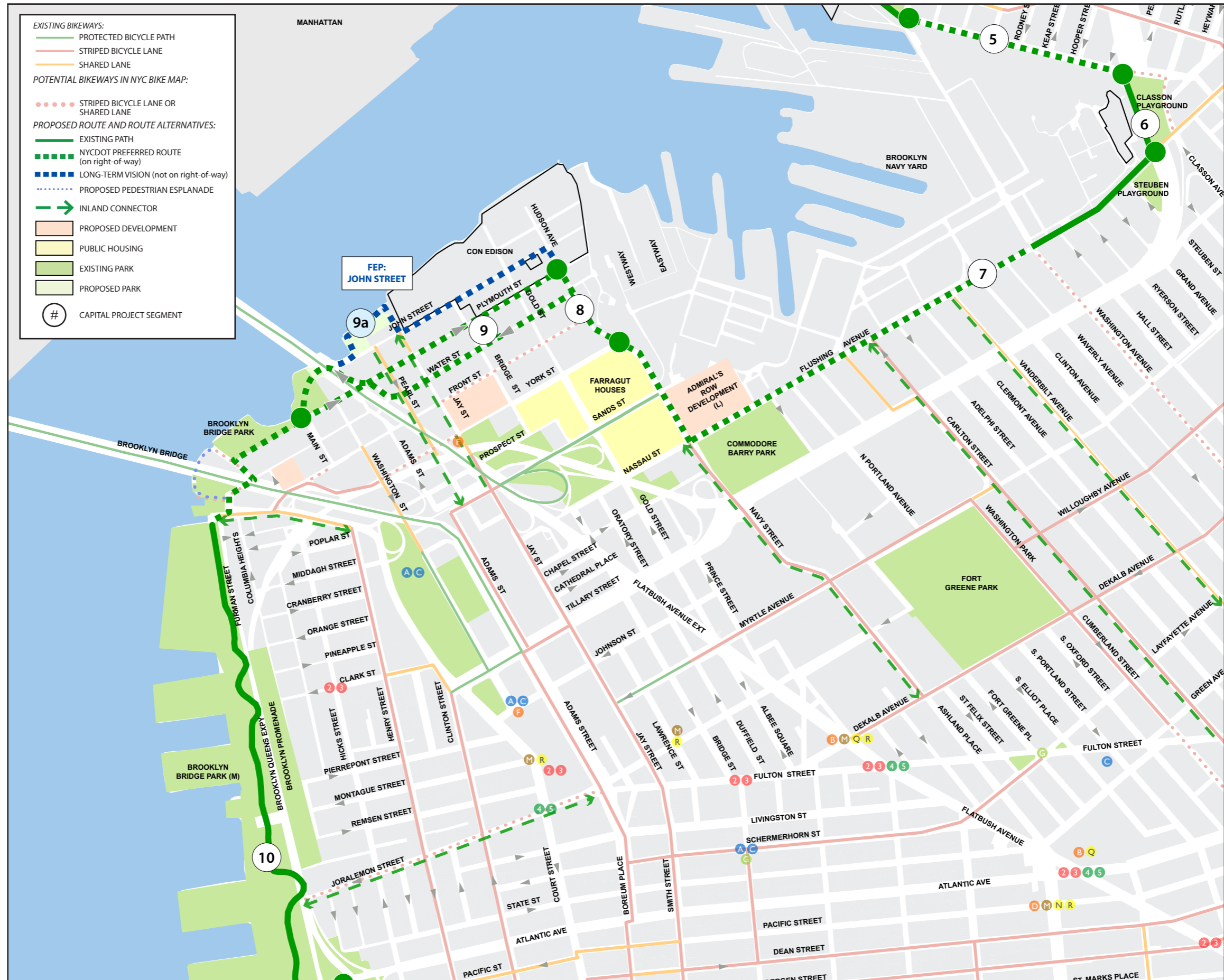
3.2 DOWNTOWN BROOKLYN DISCRETE CAPITAL PROJECTS

ID	PROJECT	LOCATION	PROJECT BEGINS	PROJECT ENDS	OVERVIEW OF WORK	SPECIAL PERMITS, APPROVALS & AGENCY REVIEW	APPROX. LENGTH (LF)	ESTIMATED CONSTRUCTION COST (ECC)	DESCRIPTION OF WORK	RECENTLY COMPLETED AND/OR PROPOSED CAPITAL PROJECTS
DOWNTOWN BROOKLYN										
5	Kent Avenue South	Kent Avenue	Clymer Street	Williamsburg Street West	Class 1 – Reconfigure traffic and parking to accommodate new design	BNYDC	2,000	\$2.4 Million ¹	Remove one travel lane in the northbound direction. Relocate south parking lane to the north side of the street. All existing curb lines and drainage structures remain. Add new street trees to existing sidewalks and roadway medians. Build new contra-flow northbound bicycle lane next to the south curb separated from traffic by striping and flexible plastic bollards.	HWK693W - Kent Avenue between Clymer Street & Williamsburg Street West/BQE (2008) - Kent Ave from North 14th St to the Brooklyn Queens Expressway (BQE); Franklin St from North 14th St to Commercial St
6	Williamsburg Street West Greenway Upgrade	Williamsburg Street West	Kent Avenue	Flushing Avenue	Class 1 – Upgrade existing path	BNYDC	900	\$4 Million ²	Reconstruct the western half of the roadway, including the sidewalk, to place the bicycle path at grade with the sidewalk and construct a permanent decorative barrier curb between the bicycle path and moving lane. Reconstructed sidewalk to include a continuous tree pit/amenity strip with porous pavers to help promote tree health.	HWK472A - Williamsburg Street West/BQE & Flushing Avenue (2008)
7	Navy Yard Greenway Upgrade	Flushing Avenue	Williamsburg Street West	Navy Street	Class 1 – New two-way shared-use path on north side of the street	BNYDC for design at entrances	4,900	\$7.5 Million ²	Reconstruct north half of Flushing Avenue to accommodate two-way physically separated multi-use path.	HWK472W - Flushing Avenue between Williamsburg Street West/BQE & Washington Avenue - Reconstruction of Flushing Avenue between Cypress Avenue and Flatbush Avenue; HWK472W - Flushing Avenue between Washington Avenue & Navy Street (2011) Extension
		Navy Street	Flushing Avenue	York Street	Class 1 – New two-way shared-use path on east side of the street	BNYDC for design at entrances	1,100	\$3.5 Million ²	Reconstruct east half of Navy Street to accommodate two-way physically separated multi-use path. Resurface/restripe balance of street, as required.	HWK472A - Navy Street & Sands Street (2011)
8	Vinegar Hill Connector	Hudson Avenue	York Street	Front Street	Class 3 – Curbside bicycle route with shared lane markings	LPC	420	\$150,000 ¹²	Install Class 3 bicycle route with shared lane markings placed next to the existing curbs.	HWD101K02 - Hudson Avenue between Front Street & John Street (2011) - Vinegar Hill Belgian Block Restoration grant received from NYC Council Member Letitia James.
		Hudson Avenue	Front Street	Plymouth Street	Class 2 (modified) – On-street two-way smooth cobble bicycle lane		480	\$1.5 Million ²³	Full roadway reconstruction as a shared-street or bicycle boulevard; cobblestones to remain.	
9	Plymouth/Water Street Pair	Plymouth Street	Hudson Avenue	Main Street	Class 2 (modified) – On-street curbside smooth cobble bicycle lane	LPC	2,670	\$6.7 Million ²³ (long-term)	Short-term – Reconstruct roadway to install on-street one-way smooth-cobble bicycle lanes adjacent to existing curb. Long term (estimated) – Investigate feasibility of eliminating curbs altogether and creating 'shared-street' experience by integrating/alternating street trees with car parking.	
		Water Street	Hudson Avenue	Anchorage Place			1,800	\$4.5 Million ²³ (long-term)		
		Anchorage Place	Water Street	Brooklyn Bridge Park			665	\$1.7 Million ²³ (long-term)		
9a	(FEP) John Street Waterfront Connector	John Street	Hudson Avenue	Jay Street	Class 1 – Widen existing north sidewalk to accommodate path	BBPDC, LPC, DEP/DEC for permit to build over East River at end of Jay Street, Con Edison, private property owner at northwest corner of John and Jay Streets	1,500	\$6 Million	Construct a physically separated, two-way shared-use path along the north side of John Street from Hudson Avenue to proposed new Brooklyn Bridge Park entrance at Jay Street (does not exist yet). Requires coordination with Con-Edison to open the one block section of John Street between Bridge and Gold Streets. NYCDOT will work with Brooklyn Bridge Park to continue the path through the park to connect with the existing route.	
		Jay Street	John Street	Brooklyn Bridge Park	Class 1 – Reconstruct street-end to create access to proposed park		50	\$500,000		
		Hudson Avenue	Plymouth Street	John Street	Class 2 (modified) – On-street center-aisle two-way smooth-cobble bicycle lane		260	\$650,000		
10	Brooklyn Bridge Park	Brooklyn Bridge Park	Anchorage Place	Atlantic Avenue	Class 1 – Off-street path to be included in final construction of Brooklyn Bridge Park	All work to be completed by BBPDC	--	--	When construction is completed, there will be a continuous shared-use path in Brooklyn Bridge Park from Jay Street to Atlantic Avenue.	

¹ To be constructed with NYCDOT (or other City agency) in-house resources

² Cost Estimate based on full-depth roadway reconstruction

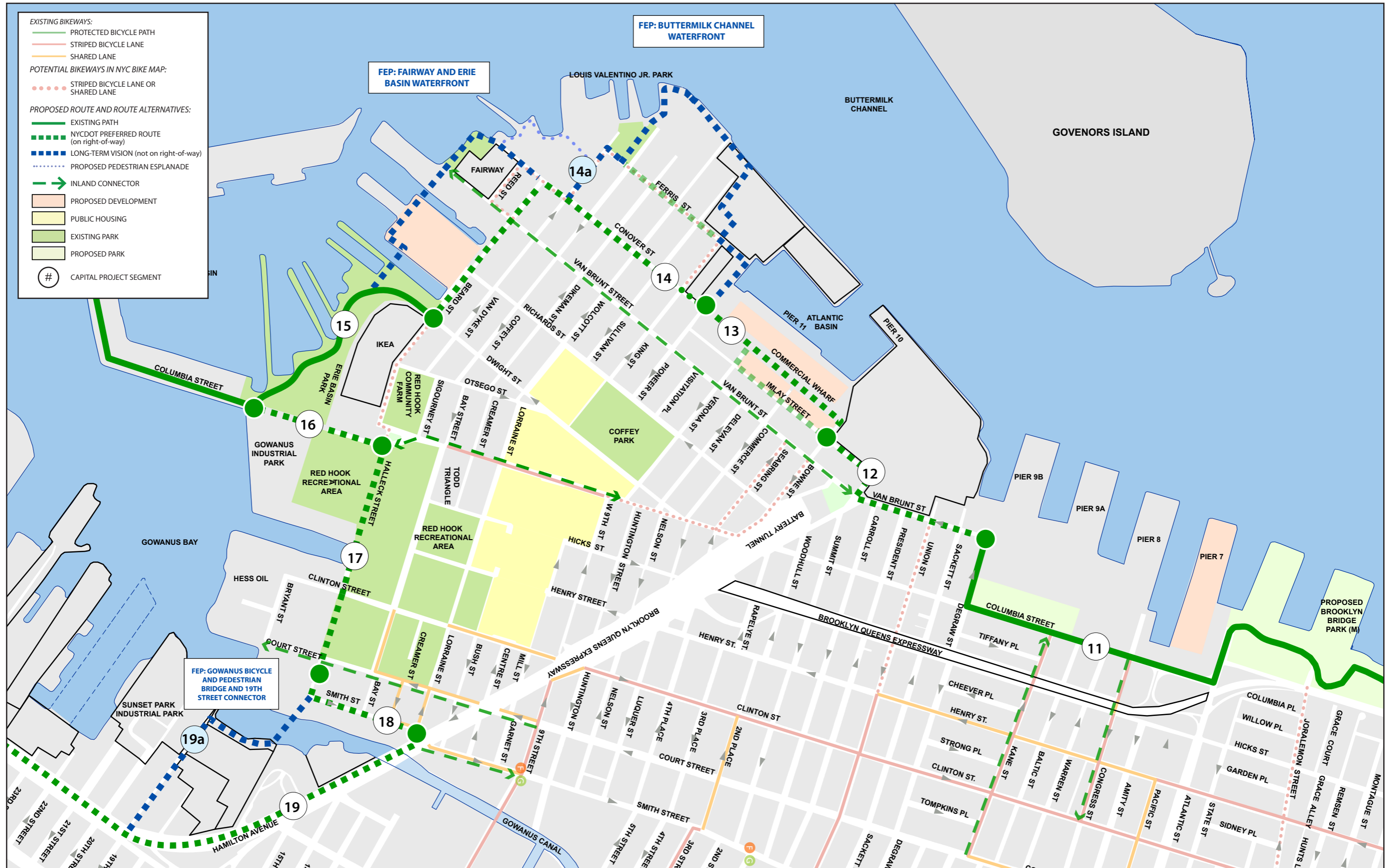
³ Cost Estimate includes a factor of 1.3 to account for materials required within a Historic District



BROOKLYN WATERFRONT GREENWAY

3.3 RED HOOK DISCRETE CAPITAL PROJECTS

ID	PROJECT	LOCATION	PROJECT BEGINS	PROJECT ENDS	OVERVIEW OF WORK	SPECIAL PERMITS, APPROVALS & AGENCY REVIEW	APPROX. LENGTH (LF)	ESTIMATED CONSTRUCTION COST (ECC)	DESCRIPTION OF WORK	RECENTLY COMPLETED AND/OR PROPOSED CAPITAL PROJECTS
RED HOOK										
11	Columbia Street Greenway Upgrade	Columbia Street	Atlantic Avenue	Degraw Street	Class 1 – Landscape existing two-way shared-use path	PANYNJ	2,300	\$1.5 Million	Construct planted buffer (width varies 5-20 feet) on container-port property (owned by PANYNJ) west of existing fence line (and move fence back).	
		Degraw Street	Columbia Street	Van Brunt Street	Class 1 – Upgrade and extend existing path to Van Brunt Street	PANYNJ	700	\$1 Million	Reconstruct the street to move the curb and widen the existing two-way shared-use asphalt pathway to create a tree-lined amenity strip between the path and the parked cars. Complete the path to Van Brunt Street.	HWK700A - Degraw Street between Columbia Street & Van Brunt Street (2008 & 2011) - Columbia Street Area, Columbia Street from Hamilton Avenue to Atlantic Avenue, DeGraw Street from Columbia Street to Van Brunt Street, Van Brunt Street from DeGraw Street to Hamilton Avenue
12	Atlantic Basin Connector	Van Brunt Street	Degraw Street	Hamilton Avenue/Summit Street	Class 1 – New two-way shared-use path with landscaped buffer	ASI, PANYNJ, EDC	1,050	\$3.6 Million ²	Reconstruct the streets to widen the existing sidewalk on the west/north sides of these streets to create a new tree-lined two-way, shared-use path. Requires one-way conversion of Summit and Imlay Streets.	HWK700A - Van Brunt Street between Degraw Street & Hamilton Avenue (2008 & 2011) - Columbia Street Area, Columbia Street from Hamilton Avenue to Atlantic Avenue, DeGraw Street from Columbia Street to Van Brunt Street, Van Brunt Street from DeGraw Street to Hamilton Avenue
		Summit Street	Van Brunt Street	Imlay Street			250	\$750,000 ²		
		Imlay Street	Hamilton Avenue	Bowne Street			520	\$1.15 Million ²		
13	Atlantic Basin	Bowne Street	Imlay Street	Commercial Wharf	Class 3 – Shared route	EDC, PANYNJ, PST	450	\$50,000 ¹	Construct physically separated (striped buffer and flexible plastic delineators) two-way shared-use path along the south side of the existing vehicle lanes on Commercial Wharf, entering at the Bowne Street gate and exiting onto Conover Street at a new gate to be constructed at Pioneer Street. As an alternative to entering Atlantic Basin at Bowne Street, the Greenway could continue on Imlay Street and enter at Verona Street. This alternative would require a one-way conversion of Imlay Street.	
		Imlay Street (Alternative Route)	Bowne Street	Verona Street	Class 1 – New two-way shared-use path		1,000	\$500,000 ²		
		Commercial Wharf	Verona Street	Pioneer Street			550	\$50,000 ¹		
14	Valentino Pier Connector	Conover Street	Pioneer Street	Beard Street	Class 3 – Designate (signed) bicycle route with smooth cobbles		1,600	\$1 Million ¹	Reconstruct Conover Street and Beard Street to include shared lane treatment.	
		Beard Street	Conover Street	Dwight Street			1,800	\$5.4 Million ²		
14a	Buttermilk Channel, Fairway and Erie Basin FEP's	Buttermilk Channel Waterfront, Valentino Park, Fairway Esplanade to Erie Basin Waterfront	Pier 11 PST @ Pioneer/Conover Streets	Erie Basin Park	Class 1 – New two-way shared-use path	EDC, PST, multiple private property owners, DPR (Valentino), DEC for reconstruction of marine structures, Fairway, Van Brunt Street Pier ownership, Ikea PANYNJ	--	\$10-20 Million	Long-term waterfront alternative involving construction of shared-use path to and along the water's edge. The route would require easements, bulkhead reconstruction and access to and reconstruction of existing waterfront esplanades that are currently 'pedestrian-only'. All improvements through the cruise ship terminal will have to be agreed to by PANYNJ.	
15	Erie Basin Park Greenway Upgrade	Erie Basin Park (Continuous Park Property)	Dwight Street	Gowanus Industrial Park	Class 1 – Upgrade existing path	Ikea, DPR	2,500	\$250,000	Install signage and pavement markings to create a visual connection to the neighborhood and to designate this waterfront promenade as part of the Greenway. A new curb cut onto Columbia Street would be required.	
16	Columbia Street Extension	Columbia Street	Gowanus Industrial Park/ Erie Basin Park entrance.	Halleck Street	Class 1 – New two-way shared-use path		1,300	\$3.6 Million ²	Widen the sidewalk (as necessary) on the east side of Columbia Street and construct a landscaped two-way shared-use path along the eastern edge of Columbia Street.	
17	Red Hook Recreation Area	Halleck Street	Columbia Street	Clinton Street	Class 1 – Upgrade existing and create new two-way shared-use path	DPR; DEP (Haz-Mat remediation in abandoned Halleck Street ROW)	1,600	\$2.1 Million ²	Widen existing pedestrian paths and install signage and pavement markings in Red Hook Recreational Area (DPR) between Columbia Street and Clinton Street.	
		Halleck Street	Clinton Street	Court Street			600	\$1.6 Million ²	Construct new two-way, shared-use path in abandoned Halleck Street right-of-way between Clinton and Court Streets, adjacent to Red Hook Recreational Area. Environmental remediation costs not included in ECC.	
18	Smith Street	Halleck Street	Court Street	Smith Street	Class 1 – New two-way shared-use path	DPR	400	\$1.25 Million ²	Narrow vehicular moving lane and widen southern sidewalk on Halleck and eastern sidewalk on Smith to accommodate construction of a new two-way, shared-use path.	HBKF2007 - Smith Street & Gowanus Expressway (2011) - Retrofit/upgrade of Asphalt Plant at Hamilton Avenue in Brooklyn. This is a design-build contract.
		Smith Street	Halleck Street	Hamilton Avenue			1,000	\$3 Million ²		
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BROOKLYN WATERFRONT GREENWAY

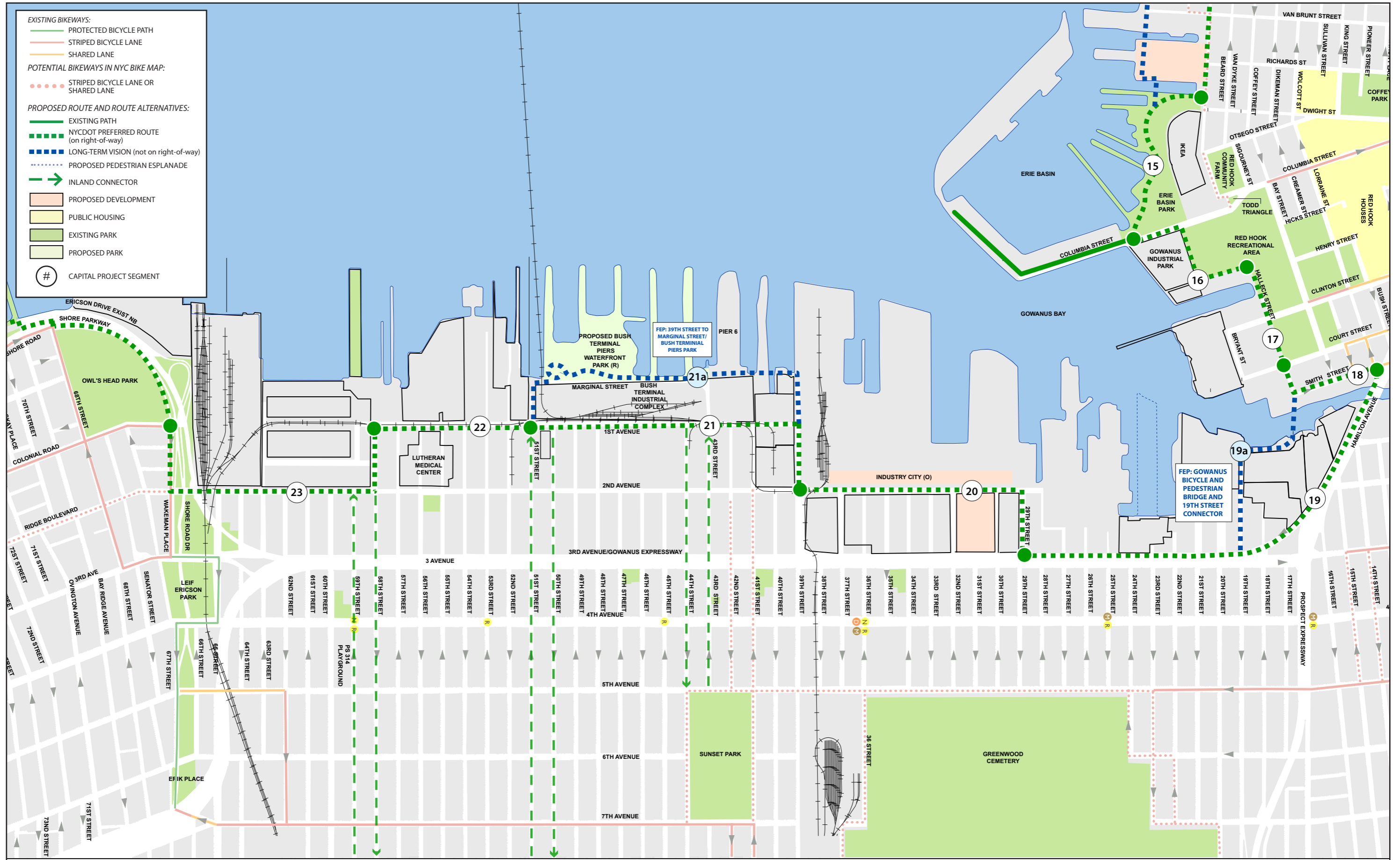
3.4 SUNSET PARK DISCRETE CAPITAL PROJECTS

ID	PROJECT	LOCATION	PROJECT BEGINS	PROJECT ENDS	OVERVIEW OF WORK	SPECIAL PERMITS, APPROVALS & AGENCY REVIEW	APPROX. LENGTH (LF)	ESTIMATED CONSTRUCTION COST (ECC)	DESCRIPTION OF WORK	RECENTLY COMPLETED AND/OR PROPOSED CAPITAL PROJECTS
SUNSET PARK										
19	Gowanus Connector/ Hamilton Avenue	Hamilton Avenue	Smith Street	18th Street	Class 1 – New two-way shared-use path	NYCDOT Bridges; DOS (waste transfer station), asphalt plant, SBIC	2,800	\$8.4 Million ² (long-term)	Short-term (in-house): Convert western-most curbside moving lane to a two-way bicycle path separated from moving lanes with jersey barrier and fence. Long-term (estimated): Reconstruct/widen western curb and sidewalk to permanently convert sidewalk and moving lane to physically separated, two-way, shared-use path with landscaping.	
		Third Avenue	18th Street	29th Street	Class 1 – New two-way shared-use path		2,700	\$7.5 Million ²	Narrow existing moving lanes and widen sidewalk to create an at-grade two-way bicycle path with tree-lined amenity strip between parking lane and sidewalk.	
19a	(FEP) Gowanus Bicycle and Pedestrian Bridge and 19th Street Connector	Mouth of the Gowanus Canal	Halleck Street/ Smith Street	Third Avenue/19th Street	Class 1 – Private parcel acquisition and redevelopment; construction of a new bridge over the Gowanus Canal	Private property owner; DOT Bridges; USCG, ACE (navigable waterway); DEP, DEC and EPA (superfund site); Home Depot	–	\$10-15 Million	Purchase the private waterfront parcel at the south end of Smith Street and convert it to a new City park (with public/private investment and concession opportunity). Construct a new operable pedestrian/bicycle only bridge across the canal to the public esplanade land along the water behind Home Depot and connect via a new esplanade to 19th Street. Install greenway path on 19th Street to Third Avenue.	HBK1140 - Gowanus Expressway & Lorraine Street (2011) - Hamilton Avenue/Gowanus Canal (Bin) 2-24023
20	Sunset Park North	29th Street	Second Avenue	Third Avenue	Class 1 – New two-way shared-use path	Federal Department of Corrections	800	\$1.2 Million ¹²	Construct a new two-way shared-use path with landscaping on the north sidewalk.	
		Second Avenue	29th Street	39th Street		EDC, SBMT, SBIC	2,600	\$10.25 Million ²	Reconstruct western half of Second Avenue to accommodate a new two-way shared-use path with landscaped buffer adjacent to SBMT property line. Work with EDC/SBMT to include landscaped buffer adjacent to path on SBMT property.	
21	Bush Terminal Connector	First Avenue	39th Street	51st Street	Class 1 – New two-way shared-use path	EDC, NYSDOT, PANYNJ, SBIC, Bush Terminal, Meat Market	3,100	\$12.2 Million ¹	Construct a new two-way shared-use path with landscaping on north side of 39th Street from Second Avenue to First Avenue, on east side of First Avenue from 39th Street to 43rd Street and on west side of First Avenue from 43rd Street to 51st Street.	
		39th Street	Second Avenue	First Avenue		EDC, SBMT, SBIC	700	\$2.75 Million		
21a	(FEP) Marginal Street/Bush Terminal Piers Park	39th Street	First Avenue	Marginal Street	Class 1 – New two-way shared-use path	EDC, SBMT	670	\$3.8 Million ²	Fully reconstruct the northern half of 39th Street adjacent to the SBMT to accommodate a tree-lined, off-street, two-way, shared-use path. Coordinate design of path with crossing railroad tracks.	
		Marginal Street	39th Street	43rd Street	Class 1 – New two-way shared-use path	Waterfront property owners, EDC, DEP (reconstruction of shoreline marine structures), Bush Terminal	1,000	\$10-20 Million ²	Fully reconstruct deteriorating bulkhead and upland areas behind the mostly empty buildings to accommodate new public waterfront esplanade for pedestrians and cyclists to connect directly to the planned Bush Terminal Piers Waterfront Park.	
		Waterfront	43rd Street	51st Street	Class 1 – New two-way shared-use path	EDC, NYSDOT, PANYNJ (51st Street float-bridge operation), DOS (51st St M&O yard)	2,500	N/A - to be paid for by EDC	Park design already includes waterfront route from 43rd Street to 51st Street.	
		51st Street	Waterfront	First Avenue	Class 1 – Path on 51st Street		400	\$1.2 Million	Construct a physical connection from the waterfront to First Avenue via 51st Street. Reconstruct southern edge of the park and/or 51st Street to accommodate the Greenway path; Coordinate design with PANYNJ at railroad crossing.	
22	Sunset Park South	First Avenue	51st Street	58th Street	Class 1 – New two-way shared-use path	EDC, BAT, Bush Terminal, Meat Market, NYSDOT, PANYNJ, DOS, DEP, SBIC	1,900	\$7.75 Million ²	Fully reconstruct the entire roadway to narrow the eastern sidewalk and widen the western sidewalk to accommodate construction of a tree-lined, off-street two-way, shared-use path on the west side of the street.	
23	Owl's Head Connector	58th Street	First Avenue	Second Avenue	Class 1 – New two-way shared-use path	BAT	800	\$2.25 Million ¹ (long-term)	Long-term: Narrow travel lanes and move parking lane on south side of street to accommodate installation of an off-street, two-way, shared use path on widened sidewalk.	
		Second Avenue	58th Street	Wakeman Place	Class 1 – New two-way shared-use path	EDC, NYSDOT, NYCDOT Bridges DPR, DEP	2,400	\$6 Million ² (long-term)	Long-term: Widen west sidewalk on Second Avenue to accommodate construction of an off-street, two-way, shared-use path with landscaping. Includes sidewalk widening across two bridges and across the mouth of a parkway exit ramp.	
		Wakeman Place	Second Avenue	Colonial Road	Class 1 – New two-way shared-use path	NYSDOT	800	\$2.25 Million ²	Widen north sidewalk into roadway and construct off-street, two-way, shared-use path.	
		Intersections	Wakeman Place @ Colonial Road	68th Street @ Shore Road	Spot safety improvements at dangerous intersections	NYCDOT, NYSDOT, DPR	200	\$100,000 ¹	Implement traffic calming at uncontrolled Shore Parkway entrances.	

¹ To be constructed with NYCDOT (or other City agency) in-house resources

² Cost Estimate based on full-depth roadway reconstruction

³ Cost Estimate includes a factor of 1.3 to account for materials required within a Historic District



CHAPTER 4:

DESIGN GUIDELINES

BROOKLYN WATERFRONT GREENWAY

chapter 4

The goal of this chapter is to identify and recommend construction materials, site furnishings and design treatments that may be considered in final design and construction documents for future Greenway projects. The underlying design intent is to construct a facility that is safe to use, ecologically sustainable, attractive, and contextually harmonious with the surrounding environment.

The Brooklyn waterfront is a dynamic urban landscape. Each design should respond to the unique urban fabric along the Greenway route, meeting the needs of the rapidly changing waterfront and addressing the environmental challenges of each location. Creativity is to be encouraged when designing projects along the Greenway. At the same time, design components should be cost-effective, durable, require minimal maintenance and be responsive to the City's sustainability goals.

Design materials have been categorized as "historic" or "contemporary" as well as "standard" or "non-standard".

Style–Historic vs. Contemporary

The history of this stretch of Brooklyn's waterfront is that of a densely developed, working waterfront. Some areas have remained industrial, like parts of Red Hook and Sunset Park, while other sections have seen dramatic changes in land use, like parts of DUMBO and Williamsburg. Stylistically, this has led to varying types of architecture; modern residential and office buildings coexist with older warehouses and industrial facilities.

These guidelines contain examples of both historic and contemporary site furnishings and materials.

Standard vs. Non-standard

The majority of the preferred route is on New York City streets with a few smaller segments in New York City Parks. It is expected that the majority of the Greenway will be constructed with standard, or "typical" building materials (pavements, curbs, etc.). At certain locations, however, a design may call for a non-standard, or "customized" design treatment.

Standard: Items referred to herein as "standard" are those which one or more City agency has the ability to install and maintain using in-house and/or regularly contracted maintenance and operations resources.

Non-standard: Items referred to herein as "non-standard" are those whose use is contingent on receipt of special permission from the owner of the Greenway right-of-way (such as installation and maintenance of a cobblestone roadway or an historic light fixture on a NYCDOT street). In the case of non-standard items, a maintenance entity must be identified (such as a Business Improvement District, Merchant's Association, private business or individual).

The significance of the standard vs. non-standard distinction pertains largely to the issue of maintenance cost. These guidelines recommend the use of applicable standard NYCDOT, Department of Parks and Recreation (DPR) and Department of Environmental Protection (DEP) items as well as non-standard items. Non-standard materials and design treatments are presented for use at specific locations or in specific areas where one or both of the following are true:

- The specific location or portion of the route possesses a unique character that warrants the additional expense. For example, designated historic districts like Vinegar Hill in Downtown Brooklyn.
- The specific location or portion of the route has a responsible partner who has requested such items and has agreed to accept maintenance responsibility.

Design Guideline Categories:

- Streetscape Elements
- Pedestrian Accommodations
- Bicycle Accommodations
- Traffic Calming
- Sustainable Storm Water Management Techniques

On the following pages, the Greenway route is broken down into three waterfront urban design character classifications; Transitional, Working Industrial and Park/Open Space. This map is meant to initiate a discourse when using these guidelines. There are many different styles of streets, land uses and building types along the waterfront. The Greenway will be built in stages as a series of discreet capital projects. As each project is undertaken, designers will need to reference the unique context of the immediate surroundings, while at the same time creating a route that is visually cohesive end to end, across all neighborhoods. The Greenway will become a bridge between neighborhoods, not only connecting people, but mimicking styles and creating an eclectic space that represents the diverse and dynamic Brooklyn waterfront.



Transitional Waterfront

The style of streetscape elements in Transitional Waterfront sections of the Greenway route should remain reflective of the history and the context of the industrial architecture while responding to the contemporary style of new developments. The stylistic appeal of contemporary design is explored in these areas, often borrowing materials and styles from modern and post-modern architecture.



Modern residential development (left) across From 19th century brick factory (right) in Greenpoint, Brooklyn

Working Industrial Waterfront

The Working Industrial Waterfront includes portions of the Greenway route directly adjacent to active industrial land uses that are expected to remain, as well as portions of the waterfront where expansion of port related industrial activity is planned.

The aesthetic character of the Working Industrial Waterfront segments of the Greenway should be functional and utilitarian, with an industrial style. Elements taken directly from surrounding sites, such as nautical elements, machine parts and/or train architecture, can reference the historic industrial character. Historic design may be warranted when the Greenway passes areas with historic structures.



Photo: Bing

Park/Open Space Waterfront

Portions of the Greenway will travel through or alongside waterfront parks and esplanades. The nature of park design allows for a flexible approach to design of the Greenway.

Design of the Greenway in the Park/Open Space Waterfront areas may incorporate historic or contemporary design elements depending on the desired aesthetic. For instance, a waterfront open space that has a rich industrial history may be designed with materials reminiscent of that neighborhood's past. Conversely, when the Greenway path passes alongside or through a newly constructed contemporary park such as Brooklyn Bridge Park, a clean and modern design aesthetic may be adopted.



Active industrial area on 39th Street in Sunset Park, Brooklyn



Brooklyn Bridge Park, Downtown Brooklyn

4.1 Streetscape Elements

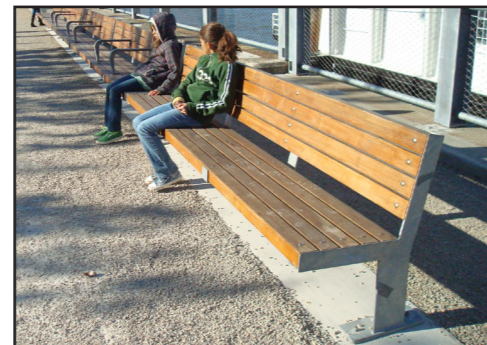
The Greenway will be a linear public space. When the route is located on a street, the Greenway should “feel” different than a typical city street. Streetscape elements that give the Greenway a sense of place and an identity as a public space should be used. The streetscape elements that follow will enhance comfort, safety and aesthetic appeal along the Greenway.



Movable tables and chairs, Brooklyn Bridge Park

4.1.1 Street Furniture

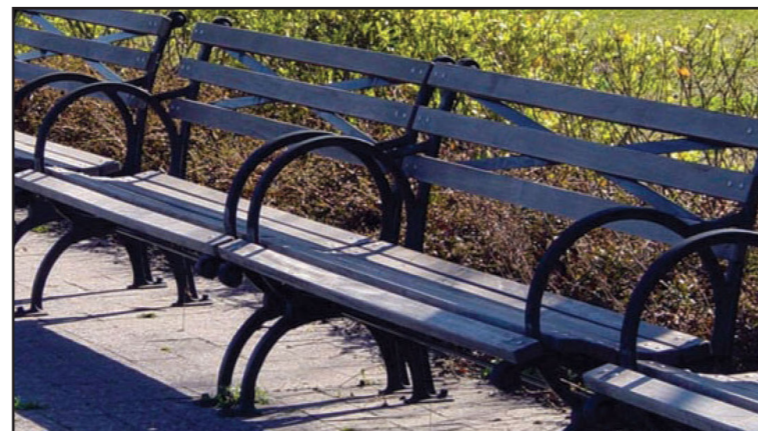
Benches create successful sitting environments; they allow people to gather, rest and take-in their surroundings. Benches should be placed in areas of heavy pedestrian traffic, areas of special interest and along view corridors. The placement of benches should be convenient but should not impede travel. The design and materials used should depend on the surrounding land uses, landscape, and users. A variety of seating should be offered including seats with backs and without, and moveable and fixed chairs. Both formal (proper benches and chairs) and informal (seat walls and steps) seating options should be provided.



Non-Standard contemporary bench design, Brooklyn Bridge Park



DPR standard historic Hoof Bench



DPR standard historic 1939 World’s Fair Bench



Example of formal seating



Example of informal seating

Trash receptacles should be placed on each street corner in high-traffic pedestrian areas. The installation of recycling containers and self-compacting trash receptacles should be considered.

Contemporary



Non-Standard waste receptacle that conform to department of sanitation requirements

Historic



Functional



Standard wire mesh trash receptacle



Solar powered self-compacting trash receptacle



Cleat bench, Brooklyn



Standard recycling receptacle



Standard paper recycling receptacle



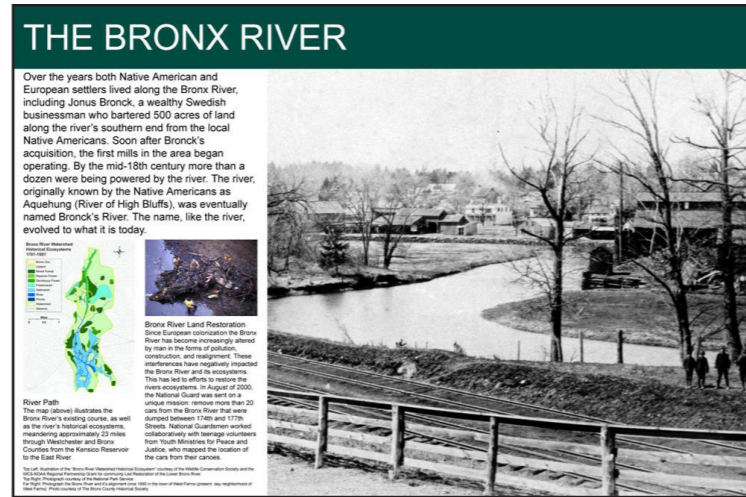
Example of non-standard, artistic, integrated street furniture design–Subway Grate/Bike Rack/Bench, Manhattan



Large stone blocks serve as barriers and Seating

4.1.2 Wayfinding Signs and Kiosks

Wayfinding signs/maps and information kiosks provide useful information about nearby destinations and public places including parks, historic, and cultural sites. Interpretive signs can help enliven a place by educating visitors about local history and ecology. When designed with engaging content and located correctly, they can help encourage people to stop and linger a little longer than usual in a particular place. Special care should be taken when designing wayfinding and interpretive signs to ensure that they are attractive, legible, pedestrian-scale and blend well with the overall streetscape character.



Proposed interpretive/informational sign, Bronx River Greenway, Bronx



Inlaid interpretive/informational historic marker, Fulton Landing, Brooklyn



Manhattan Waterfront Greenway informational sign and kiosk



DPR Standard Greenway wayfinding signage



NYCDOT Standard Greenway wayfinding signage, Brooklyn Bridge Park

4.1.3 Public Art

Public art should be considered to both anchor and highlight important nodes within public open spaces. Public art can include traditional sculpture or more playful designs. Attention should be paid to the use of art to enliven long stretches of the Greenway, using linear elements such as decorative fences, light pole banners and wall murals. When designed and installed by local talent, public art is also a good mechanism for engaging the immediate community and encouraging a sense of ownership of a particular segment of the route. Proposals should be reviewed and approved by an arts committee in accordance with existing Department of Cultural Affairs (DCLA) artist selection guidelines. Art will also need to be reviewed and approved by the Public Design Commission.



NYCDOT urban art installation, Bronx



Public art can appeal to children



NYCDOT urban art installation within seating and planting area, Brooklyn



NYCDOT urban art installation—Andy Warhol Statue, Manhattan

4.1.4 Street Trees

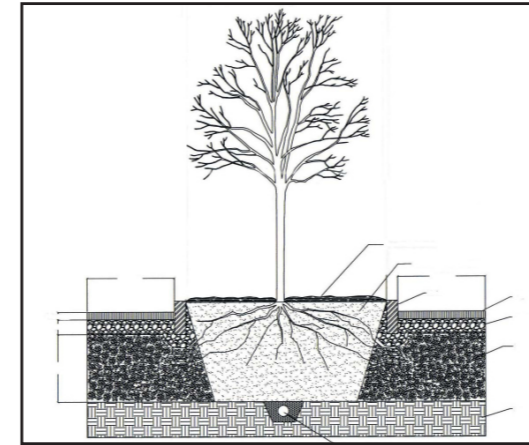
Street trees should be planted along the Greenway route at regular intervals in medians and on sidewalks.

Trees create a link to the natural environment, provide shade for Greenway users and reduce the urban heat island effect. They also function as a traffic calming measure by visually narrowing the roadway and provide a buffer between vehicular and pedestrian traffic. Tree canopies should be dense and continuous.

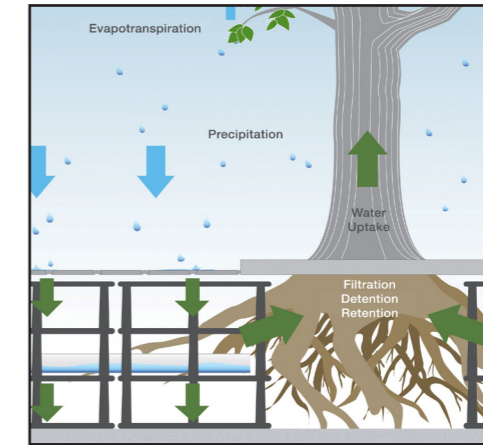
Trees can be planted at-grade in individual or connected tree pits, with or without pavers and grates, or they can be planted in raised planters.



Root barriers prevent the roots from lifting the sidewalk but curtail growth



Bare root tree



Silva Cells can greatly improve root growth



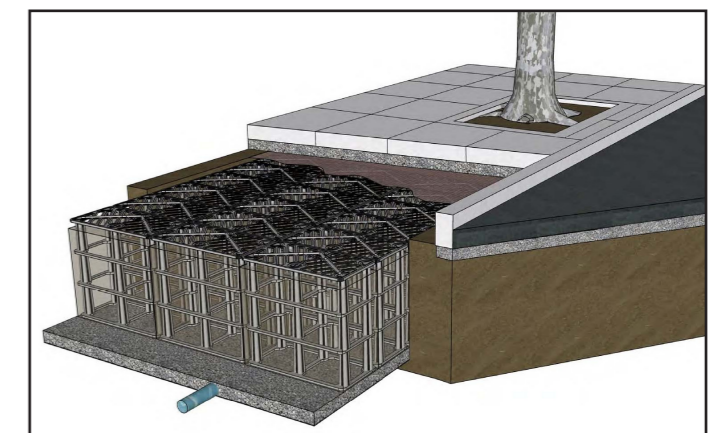
Paver grate suspension system with pavers installed, Battery Place, Manhattan



Paver grate suspension system without pavers installed, Battery Place, Manhattan



Structural soil



Silva Cells support the surface above while leaving space for root growth and water infiltration in the root zone

4.1.5 Tree Pit Design

Urban trees are subjected to great stress and few reach maturity due to a variety of factors including soil compaction, lack of air, water and nutrients and exposure to polluted air, noise and salt splash. The scarcity of high quality soil and soil compaction impede drainage and inhibit access to nutrients and oxygen.

There are many ways to allow more water and air to reach roots including using porous pavers over root zones and expanding the size of the tree pit by using structural soil (mix of load-bearing rock and organic soil) under the pavement between tree pits. Connected tree pits give roots more space and should be used wherever possible to improve tree health and longevity. In areas with heavy pedestrian volumes, the trench of connected tree pits can be bridged by sidewalk slabs supported either by structural soil or a subsurface frame system. Grates should be used only where sidewalk width is limited and pedestrian traffic is high, such as at building entrances and in outdoor dining areas.



Non-standard tree grate, Union Square, Manhattan



Standard tree pit with wicket fence and flowers, 9th Street, Brooklyn



Continuous tree canopy planted in Silva Cells, Lincoln Center, Manhattan

4.1.6 Planted Islands and Moveable Planters

Plant material should be incorporated into street design as much as possible to infuse color and texture into the urban landscape. Landscaping can be used to separate pedestrians from vehicles and to decorate and enhance the appearance of neighborhood gateways. Hanging planters, planting beds, and large containers can be used to display flowers and shrubs. Plant material also attenuates noise and absorbs air pollution.

Similar to street trees, planted islands and moveable planters can reduce the urban heat island effect and function as a traffic calming measure.



Planted median provides enough soil depth above-grade to support large root structures, Adams Street, Brooklyn



NYCDOT standard pedestrian plaza, Schermerhorn Street, Brooklyn



Landscaped buffer separating bicycle path from moving lanes, Route 9A, Manhattan



DPR Greenstreets program installation, Fulton Landing, Brooklyn



Planted roadway medians, Route 9A, Manhattan



Pre-fabricated panelized plant container, Park Avenue South, Manhattan

4.1.7 Street Lighting

Street lighting should be provided to illuminate the road for vehicular travel and to brighten and define paths for pedestrians and cyclists. Lighting, along with landscaping, can be used to define travel corridors intended for different travel modes, distinguishing cartways designated for use by vehicles from those designated for pedestrians and cyclists.

Pedestrian-scale light sources should be positioned 15-20 feet above sidewalks and should be designed in context with surrounding land uses. Light-emitting diode (LED) bulbs or solar powered lights can be used for energy conservation. Both street and pedestrian lighting can be solar powered. Lighting along the Greenway should provide a minimum 0.5 footcandle per square foot level of illumination, depending on surrounding uses and security concerns.



Reflective lighting , Queens West



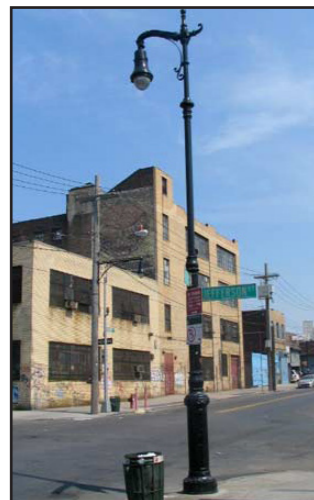
NYCDOT historic bishops crook



NYCDOT typical historic Type M with pedestrian-scale light head, Route 9A Bikeway, Manhattan



Solar powered LED plaza lighting, Spain



NYCDOT standard historic Type F street light pole



Vehicular- and pedestrian-scale lighting, Manhattan



NYCDOT standard cobra



DPR/NYCDOT standard historic Type B pedestrian scale light pole- used for park paths



Day and night shots of the wind/solar powered street lights installed recently at the Brooklyn Navy Yard

4.1.8 Barriers and Bollards

Barriers and bollards can function as important separators between different modes along the Greenway, protecting cyclists and pedestrians from motor vehicle traffic and enhancing the comfort level of Greenway users. They can also be used as decorative informal seating elements.

Barrier and bollard applications can range from low-cost, improvements to costly capital projects. Use of these features should fit the need for safety and aesthetic enhancements.

Some existing bicycle facilities in New York City and along the Greenway are separated by a 'barrier-curb' to provide a substantial and permanent treatment. Many have railings mounted to provide the 42-inch height recommended by the American Association of State Highway and Transportation Officials (AASHTO) for separation of bikeways from traffic on grade changes.



Granite blocks used as bollards, Madison Square, Manhattan



Combination bollard and railing, Manhattan Bridge Approach, Manhattan



Reinforced concrete divider with railing, Sands Street, Brooklyn



Reinforced concrete divider with railing, Manhattan Bridge Approach, Brooklyn



Pedestrian refuge with cast Iron bollards, Route 9A, Manhattan



Movable planters as bollards



Nautical cleats used as bollards, Brooklyn Waterfront



Bollards, New York Stock Exchange/Wall Street, Manhattan

4.1.9 Non-Standard Distinctive Pavements

Sidewalks should be constructed with a firm and durable surface such as concrete or pavers. Dark gray tinted concrete is preferred in commercial areas and in historic districts.

Tinted concrete sidewalks can be surfaced with colored pebble-sized aggregate to create a textured surface. High-albedo (light-colored) exposed-aggregate surfaces help reduce the urban heat island effect by increasing reflectivity. Poured concrete pavement can also be surfaced with silicon carbide to add sparkle and increase slip resistance.

Excessive texturing such as deep imprinting to simulate unit pavers can be problematic and may impede ADA compliance.

Authentic slabs of bluestone or granite should be preserved where possible, particularly when in designated historic districts.

For details on distinctive paving for bicycle facilities, see Section 4.3.7.



Granite and cobblestone crosswalk, DUMBO, Brooklyn



Decorative brick paved intersection at transit mall, Portland, Oregon



Red, white and gray colored concrete pavement on widened sidewalk on Greenwich Street, Manhattan



Decorative pavement materials (bluestone paving and square asphalt pavers on the sidewalk, extra wide granite curb and granite block in the road bed), Union Square West, Manhattan



Decorative brick plaza pavement, Bard College, Manhattan



Detail of exposed aggregate concrete pavement

4.2 Pedestrian Accommodations

The pedestrian component of the Greenway must be safe and comfortable to function well as an important public space. At a minimum, sidewalks along the Greenway route should be in good repair and provide at least 7 feet of unobstructed pedestrian space.

When possible, distinctive treatments should be considered in order to provide enhanced visibility and priority to pedestrians alongside bicycle facilities, vehicular thoroughfares and industrial areas.

4.2.1 Crosswalks

Crosswalks make pedestrian actions more predictable for motorists by indicating accepted crossing locations. The design of crosswalks should be consistent throughout an area. Non-standard crosswalks should utilize materials, textures and colors that are compatible with the materials and furnishings included in the overall streetscape design.



NYCDOT standard pedestrian crosswalk, Manhattan



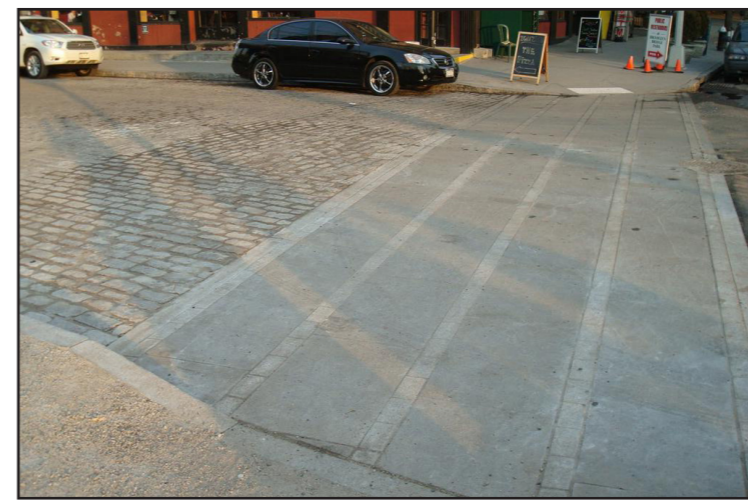
NYCDOT high-visibility crosswalk—used only in areas with heavy pedestrian and vehicular volumes, Manhattan



NYCDOT school safety (ladder style) crosswalk—used only along designated walk to school routes, Manhattan



Granite block crosswalk, Stone Street, Manhattan



Granite slab crosswalk, DUMBO, Brooklyn



Mix of unit paver types defining a crosswalk, Barcelona, Spain

4.2.2 Pedestrian Islands

Pedestrian islands may be applicable on roads wider than 55 feet. They provide a safe place for pedestrians to wait while crossing so that the entire intersection does not have to be crossed in one signal cycle.

In some locations, the plans for the Greenway may include medians, particularly on wider roads. Curb ramps or cut-throughs must be provided for ADA compliance.



Pedestrian island with bollards, Brooklyn



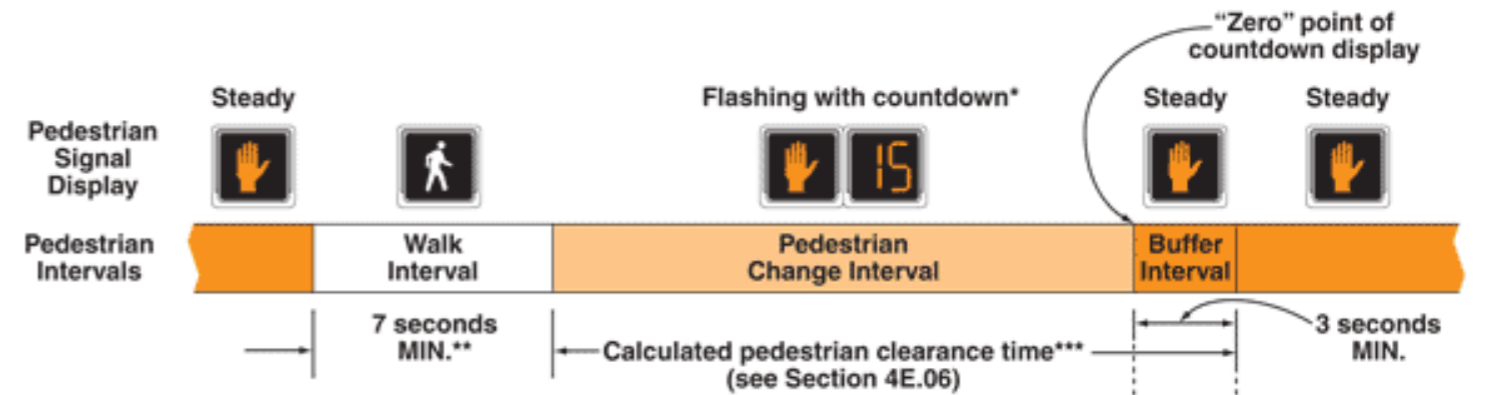
Pedestrian island with planting and flexible bollards, Manhattan

4.2.3 Pedestrian Countdown Signals

Pedestrian countdown signals should be installed at certain signalized intersections to notify pedestrians when it is safe to cross and how much time remains in the pedestrian phase. It is recommended that pedestrian countdown signals be used where there are high vehicular and/or high pedestrian volumes.



Standard pedestrian countdown signal



Relationship to associated vehicular phase intervals:

Yellow Change Interval = Buffer Interval	G	Y	Red
Yellow Change Interval + Red Clearance Interval = Buffer Interval	G	Y R	Red
Part of Yellow Change Interval + Red Clearance Interval = Buffer Interval	G	Y R	Red
Red Clearance Interval = Buffer Interval	G	Y R	Red
Associated Green Interval extends beyond end of Buffer Interval	G	Y R	Red

Legend

- G = Green Interval
- Y = Yellow Change Interval (of at least 3 seconds)
- R = Red Clearance Interval
- Red = Red because conflicting traffic has been released

- * The countdown display is optional for Pedestrian Change Intervals of 7 seconds or less.
- ** The Walk Interval may be reduced under some conditions (see Section 4E.06).
- *** The Buffer Interval, which shall always be provided and displayed, may be used to help satisfy the calculated pedestrian clearance time, or may begin after the calculated pedestrian clearance time has ended.

4.2.4 H.A.W.K Pedestrian Signals

The HAWK (High-intensity Activated Crosswalk) signal is a combination of a flashing beacon and traffic signal used at marked crosswalks. Unless activated, the HAWK signal remains dark. When pedestrians wish to cross, they push a button, and a traffic signal for motorists flashes yellow, then solid yellow, then red. Pedestrians then receive a "Walk" signal, followed by a "Don't Walk" signal with a countdown. The motorist signal switches to flashing red, which requires a stop but allows motorists to proceed when pedestrians have cleared the crosswalk. This signal should only be installed at marked crosswalks with applicable warning signs. It should not be used at crosswalks controlled by YIELD signs, STOP signs, or existing traffic control signals. This signal can be helpful in areas of frequent pedestrian crashes or where pedestrians have difficulty obtaining a gap in continually flowing traffic.



HAWK signal, Phoenix, Arizona, Photo: PBIC



Pedestrian actuated signal, Calgary, Canada, Photo: PBIC

4.3 Bicycle Accommodations

The Greenway's bicycle facilities should be suitable for users of all ages and experience levels. When designing on-street bicycle accommodations, protected facilities should be considered when the right-of-way is available. Protected facilities are those with physical separation such as parked cars, jersey barriers, striped buffers with flexible bollards, and landscaped areas.

High-visibility markings should be used on bicycle facilities when crossing pedestrian paths, driveways and intersections. Better visibility between modes provides a safer and more comfortable experience for Greenway users.

Bicycle parking should be provided at key destinations and waterfront or open space access points.

4.3.1 Physically Separated On-Street Bicycle Paths (Class I)

Physically separated on-street bicycle facilities provide a dedicated space for cyclists within the street cross-section, and can carry one-way or two-way bicycle traffic. Throughout New York City, parking-protected bicycle paths provide a low-cost means of separating cyclists from moving vehicles without major infrastructure improvements. Alternately at some locations where roadway width is limited, barrier curbs can be placed between the bicycle path and vehicular traffic.

A major design consideration for these facilities is the treatment of intersections which, like all bicycle facilities, must be designed with turning conflicts in mind. However, because physical separation also visually distances cyclists from drivers, the provision of a mixing zone at intersection approaches should be considered. Reducing the separation between vehicles and cyclists increases visibility and reduces the potential for conflict. Alternatively, separate signal phases for bicycles and turning vehicles may be used.

Many existing physically separated facilities also include pedestrian islands, high-visibility markings through intersections and signage alerting turning vehicles to the presence of cyclists.

4.3.2 On-Street Bicycle Lanes (Class II)

On-street bicycle lanes are a portion of a roadway that is designated by pavement striping, logos and signs. Bicycle lanes are typically provided for each direction of travel, either one on each side of a two-way street or as a one-way pair along two adjacent one-way streets.

4.3.3 On-Street Shared Lanes (Class III)

On-street shared lanes are shared by bicycles and motor vehicles. Shared lanes are typically identified through the placement of a shared lane marking, or 'sharrow'. These markings alert motorists that they are sharing the roadway and indicate to cyclists where they are expected to ride. Shared lane facilities can also include supplemental "Share the Lane" or "Bicyclist Allowed Full Use of Lane" signs.



Grade-separated bicycle lanes alongside a raised median, Sands Street, Brooklyn



Jersey barrier separated two-way path, Columbia Street, Brooklyn



Curbside Class II Bike Lane (color), 9th Street, Brooklyn



Two-way parking protected bike path on a one-way street, Prospect Park West, Brooklyn



Striped bicycle lane (no color), Bedford Avenue, Brooklyn



Shared lane pavement markings, Brooklyn

4.3.4 Off-Street Paths (Class I)

Off-street paths located away from the street grid, primarily along the waterfront and within parks, have few intersections and as a result, are safer for bicyclists and pedestrians than bicycle and pedestrian facilities located alongside or on roadways.

Special attention must be paid, however, to accommodating both pedestrians and bikes when they share the same space on two-way paths. Locations where pedestrians must cross dedicated bike paths to reach pedestrian only paths or sidewalks should be well marked. Adequate buffer space between modes should be provided, where possible, to increase visibility and channelize conflicting or opposing streams of traffic. Also, pavement markings and signs should be clear, making use of accepted symbology and designed in accordance with recognized standards.



Pedestrian crosswalk across route 9A bikeway, Manhattan



Off-street multi-use pathway with separation between bikes and pedestrians, Route 9A Bikeway/Walkway, Manhattan



Off-Street bike path, Brooklyn Bridge Park, Brooklyn



Manhattan Waterfront Greenway underneath the FDR Drive South, Manhattan



Pedestrian crosswalk across Route 9A Bikeway, Manhattan



Floating bikeway on the Willamette River, Portland, Oregon



Multi-use path connection built on a pile-supported structure over the open water in Riverside Park, Manhattan



Riverside Park, Manhattan

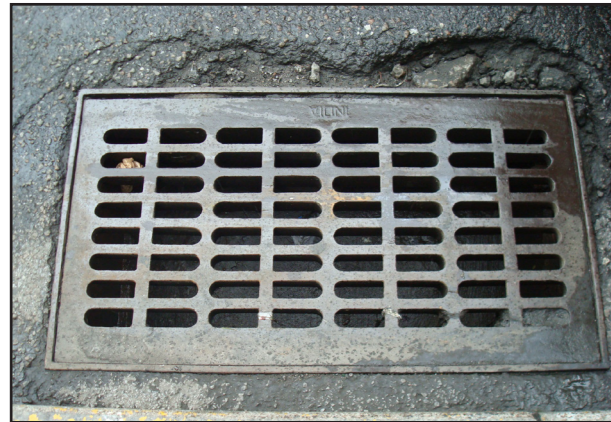
4.3.5 Drainage Grates

Drainage grates with long and wide openings running parallel to the curb can catch or deflect narrow bicycle wheels causing safety issues. Care must be taken to ensure drainage grates are safe with openings small enough to prevent a bicycle wheel from falling into the slots of the grate. Another way to avoid drainage grate problems is to eliminate them entirely with the use of inlets in the curb face. This may require more inlets per mile to handle bypass flow.

4.3.6 Bicycle Parking

Providing safe and secure bicycle parking can help encourage cycling. NYCDOT currently has two standard bicycle rack designs, the “hoop” design and the “meter rack,” designed to turn existing non-used parking meter poles into bike racks.

Other examples of bicycle parking include sheltered racks that have been installed throughout New York City. Private property owners may also provide non-standard racks.



Bicycle-safe drainage grate



Drainage grate with large openings are unsafe for cyclists



NYC bus shelter with bicycle parking



Standard NYC Cityracks new “hoop” design



Standard NYC parking meter conversion to bike rack



NYC Cityracks original design (standard until 2009)



Non-Standard stainless steel racks (catalogue)

4.3.7 Bicycle Lanes on Rough Stone Streets

Cobblestone and other rough stone streets provide many aesthetic and traffic calming benefits, but they make cycling difficult. When the Greenway route runs along streets paved with rough stone, a strip of smooth stone blocks or another smooth surface should be installed to create a “lane within a lane” for cyclists to ride on. In historic districts, this provides an ideal way to preserve stone streets, while providing bicycle access.

A bicycle logo may be inlaid or applied on the smooth surface with thermoplastic paint, and signage can be added to highlight the bicycle route.



Stone Street with smooth paved surface for bicycle lane, Amsterdam



Stone and Belgium block patterns provide smooth surface for cyclists, Queens West



Belgium block street with stone slabs for cyclists with metal bicycle logo inlaid, Stockholm



Shared lane treatment with smooth cobbles in the middle of the street and rough cobbles in the parking lanes, DUMBO, Brooklyn

4.3.8 Rail with Trail

When designed properly, the linear nature of rail corridors can work well with bicycle and pedestrian facilities. When siting trails in the vicinity of railways, the preferred design will depend on operational considerations. Barriers may or may not be used depending on the volume of both rail and trail users as well as the speed of rail cars. Over 240 miles of successful rail with trail paths exist across the United States, many in urban areas.



Alaskan Way Trail, Seattle, WA



Rail with trail, Seattle, WA



Rail with trail, Portland, OR

4.4 Traffic Calming

The Greenway traverses varying roadway and land use conditions; traffic calming measures may be needed at certain locations. As the Greenway is built out, special attention will be paid to calming traffic at key intersections and potential points of conflict. Traffic calming may also be beneficial along the inland connectors, identified in Chapter 2, to enhance access to the Greenway from nearby communities.

4.4.1 Curb Extensions

Curb extensions refer to an extension of the sidewalk into the street in order to enhance pedestrian safety. They are also sometimes referred to as neck-downs or bulb-outs. The benefits of curb extensions include narrower pedestrian crossings, reduced motor vehicle speeds, added space for sidewalk furniture and improved visibility between pedestrians and drivers. Special attention should be paid to placement along bike routes to avoid narrowing the width of the roadway and forcing bicycles and vehicles into an unnecessary shared lane configuration.

Pedestrian crossing distances can be shortened quickly and inexpensively by implementing curb extensions at intersections. A less permanent option is to use colored epoxy gravel, thermoplastic line striping and flexible plastic bollards to create extended pedestrian areas, which should also have reduced curb radii to calm traffic.



Curb extension implemented in conjunction with school crosswalks, Manhattan



Curb extension implemented in epoxy gravel with flexible bollards, Manhattan

4.4.2 Curb Radius Reduction

Reducing curb radii slows down turning vehicles and shortens pedestrian crossing distances. During design, curb radii should be tested by designers to provide the tightest possible radius at each intersection. Standard unit vehicle specifications should be tested to ensure that emergency vehicles and other vehicles with limited maneuverability can make all allowable turning movements through each intersection. On truck routes, reduction of curb radii may not be feasible due to the need to accommodate larger vehicles.



Street corner with reduced curb radius, Union Square West, Manhattan

4.4.3 Narrow Travel Lanes

Narrow travel lanes slow operational speeds. By constraining lane width visually or physically, drivers intuitively slow down to safely navigate the road.



Mid-block narrowing, 94th Street, Manhattan

4.4.4 On-Street Parking

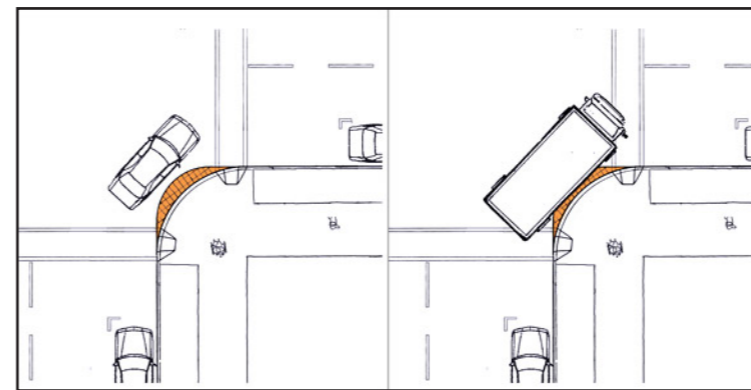
On-street parking slows traffic speed and reduces the severity of crashes. Cars parked on the street act as a buffer between vehicular traffic and pedestrians. Parking can also be used to separate vehicular traffic from a bicycle path, but this requires sufficient width that cyclists can maneuver around open car doors and the path can be cleaned with a mechanical sweeper.



Parking along Kent Avenue slows traffic and protects cyclists, Brooklyn



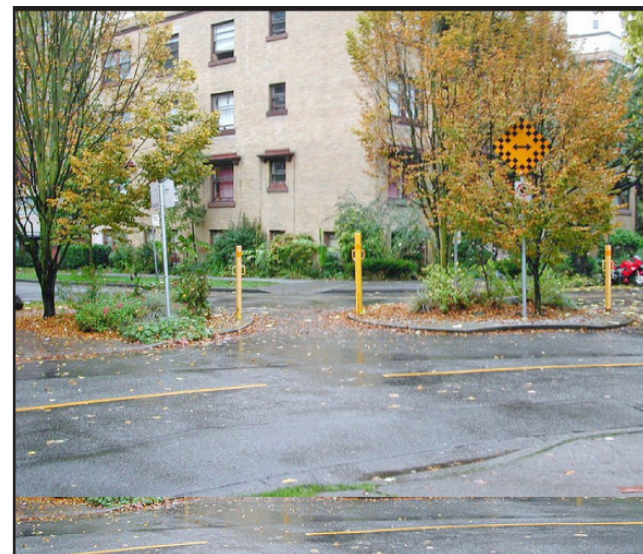
Sidewalk extension implemented in conjunction with high-visibility crosswalk striping, Union Square, Manhattan



At-grade reduced turn radius at street corner, San Francisco, Image Credit: City of San Francisco

4.4.5 Forced Turn Islands

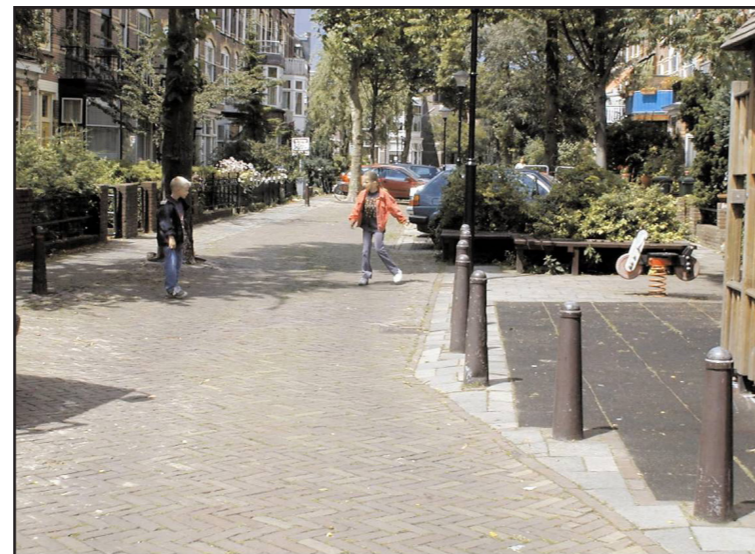
Forced turn islands act to divert through traffic using street geometry to force motorists to make a turn at an intersection. Traffic volumes and speeds can be reduced, however this treatment should be reserved for residential or local streets. Diagonal diverters force turns on both approaches to intersections. These treatments should allow an opening for cyclists to pass through, and sidewalks should be provided.



Diagonal diverter

4.4.6 Shared Streets (Woonerf)

A Woonerf (Dutch for 'Living Street') is a street where the conveyance of motor vehicles is secondary in importance to pedestrians and cyclists. The concepts of shared spaces, traffic calming and low speed limits are enforced to improve pedestrian, bicycle, and automobile safety. Design characteristics of a Woonerf often include: decorative pavement, street trees and landscaping, limited parking clustered along the street, low vehicular speeds and other traffic calming measures to prioritize the safety and comfort of pedestrians over the importance of accommodating high travel speed. Design speeds of 5-10 miles per hour can be achieved by introducing textured paving surfaces, roadway geometry that causes lateral or vertical shifts, lane surroundings and other high visibility traffic calming measures.



Woonerf, Amsterdam



Shared street with bicycle parking, Copenhagen



Shared street along retail corridor, Copenhagen

4.4.7 Temporary Street Closures

To create a temporary community space, street closures can be considered. Examples of street closures in New York City include Summer Streets, during which streets are closed for several hours on weekends in the summer and Play Streets, which closes streets on weekdays to provide a public place for children to play. Car-free events can also be held citywide, closing streets to provide entire communities with a temporary public space.

By closing sections of streets for regular hours on a daily or weekly basis, area residents are given the opportunity to enjoy public space in communities that are often underserved with open space.



Car free 78th Street temporary closure, Jackson Heights, Queens



Car free 78th Street, Jackson Heights, Queens

4.5 Sustainable Stormwater Management

Conventional urban infrastructure routes stormwater through catch basins and pipes to a treatment facility, where particulate matter and toxins are removed before it is released back into natural water bodies. Sustainable stormwater management relies on natural absorption and filtration systems (vegetation, soil, and rock) to absorb and filter stormwater before it enters the sewage system, so that it does not need to be piped to treatment facilities.

In New York City, sustainable stormwater management is especially important because stormwater runoff currently mixes with sanitary sewage in a combined sewer system. During heavy rain events, wastewater treatment plants become overwhelmed, causing untreated stormwater to flow directly into the City's rivers and harbor, carrying raw sewage with it. Sustainable stormwater management reduces the burden on the City's treatment plants during storm events and can therefore help improve water quality in local water bodies.

The DEP, in partnership with the rest of the City's Mayoral Agencies (NYCDOT, DPR, Department of Design and Construction (DDC), etc.) has begun implementing an aggressive plan to reduce the rate and quantity of stormwater runoff that enters the sewer system during storm events through the introduction of sustainable stormwater management interventions. Many of these interventions are aimed at the redesign of the City's 40,000 miles of roadways. The replacement of impervious pavement with vegetation and/or porous pavement will allow more water to percolate into the ground and recharge the aquifer instead of flowing to storm drains. The City's goal is to redesign and rebuild urban infrastructure such that the first inch of rain in a two-hour storm event is retained instead of entering the sewer system.

Given its proximity to the waterfront, inclusion of sustainable stormwater management techniques in the design of the Greenway is a primary goal of the project. Development of the Greenway offers many opportunities to integrate sustainable stormwater interventions into the redesign of the 14 miles of City streets and paths that comprise the route. Implementation of these interventions has the potential to positively impact water quality in the East River, Newtown Creek, Gowanus Canal, and New York Harbor, especially since areas adjacent to water bodies are typically low-lying and close to the water table, which allows stormwater to quickly return to the ecosystem. Advances in the design of rain gardens and bioswales enable the capture and infiltration of large quantities of water in very small spaces.

4.5.1 Rain Gardens and Bioswales

Through design of the Greenway, opportunities should be sought to include large tree pits, amenity strips and planted buffer areas adjacent to the path. Locations where roadway geometry results in excess capacity should be documented and plans developed to convert this space, currently paved with asphalt and concrete, to large planting areas.

Rain gardens and bioswales are not the same as conventional planted areas. A cross-section through a properly designed rain garden or bioswale shows a deep section filled with layers of sand and gravel and soil. This composition resists compaction and thus allows water to percolate easily. The spaces in the sand and gravel allow for retention of high volumes of water and the various densities of the different layers are extremely effective at filtering the water as it percolates to the aquifer below. Proper planning

and design of rain gardens and bioswales dictates that soil borings must be taken to analyze existing soil composition and determine depth to ground water and/or bedrock. Species of vegetation planted in a rain garden or bioswale must be moisture tolerant, adaptable to the soil type used and resilient in the New York City environment.



Slotted curb for natural percolation, Bronx River Greenway



Slotted curb allows stormwater capture, Portland, OR



Stormwater tree pit with slotted curb, Portland, OR



Storm drain outfall to rain garden, Portland, OR



Slotted curb rain garden, Portland, OR



NYCDEP rain garden tree pit, Brooklyn

4.5.2 Porous Surfaces

When possible, porous surfaces should replace impervious surfaces to minimize stormwater runoff, there by increasing groundwater recharge and lessoning the burden of stormwater on the sewage system. Porous pavement may be used on sidewalks and bicycle paths, low-volume travel lanes, parking areas, and other low-traffic areas.

Porous surfaces can be pavers, cement, or structural soil designed to allow water to infiltrate through the hard surface. Under the paving material, a stone base holds water during rain events, gradually allowing it to seep into the ground below and ultimately circulate back into the groundwater system without entering the combined sewer system.



Porous pavers in amenity strip



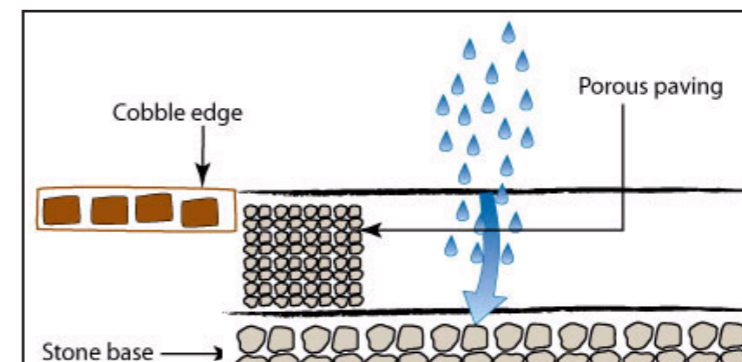
Porous pavers in parking lane



Porous pavers in parking lot, Brooklyn Navy Yard, Brooklyn



Cobblestone pavement with porous sand joints, Columbia Street, Brooklyn



Graphic depicting how porous paving works



Newtown Creek taken from Pulaski Bridge

