

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.

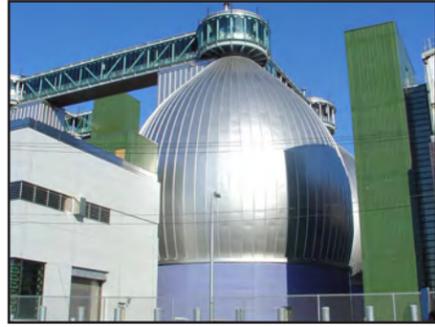
Future Enhancement Projects

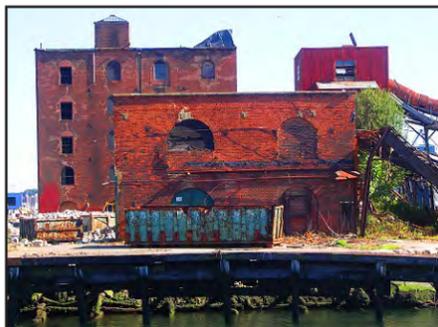
Future Enhancement Projects are route alternatives that would greatly enhance the Greenway, but would be difficult to implement because they require excessive capital commitment or have significant environmental impacts. These should be pursued as long-term goals for the Greenway.

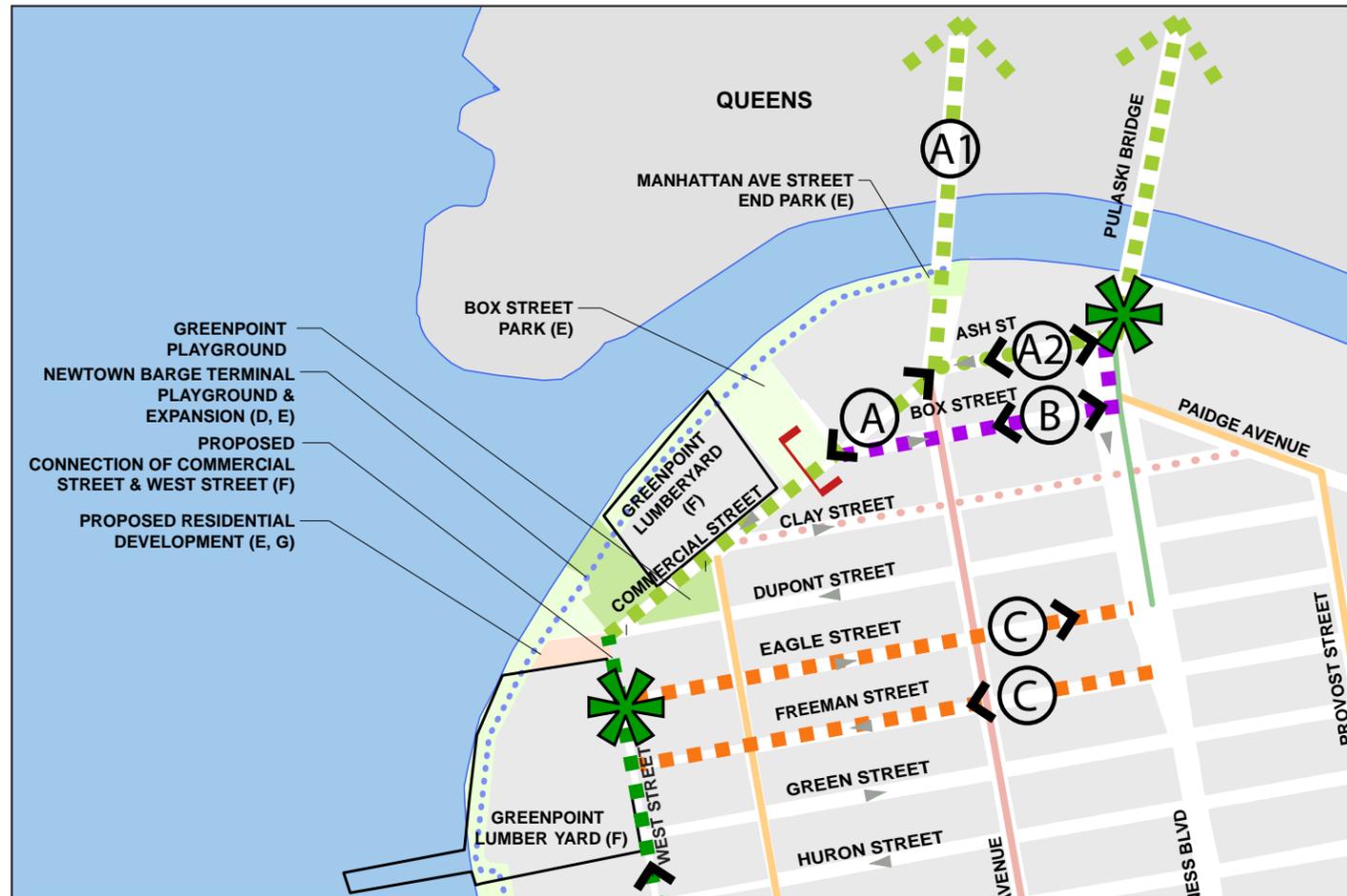
Inland Connectors

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.









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.



Newtown Creek facing north towards Queens (existing)

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.



Ash Street facing west from the Pulaski Bridge (existing)

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



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)

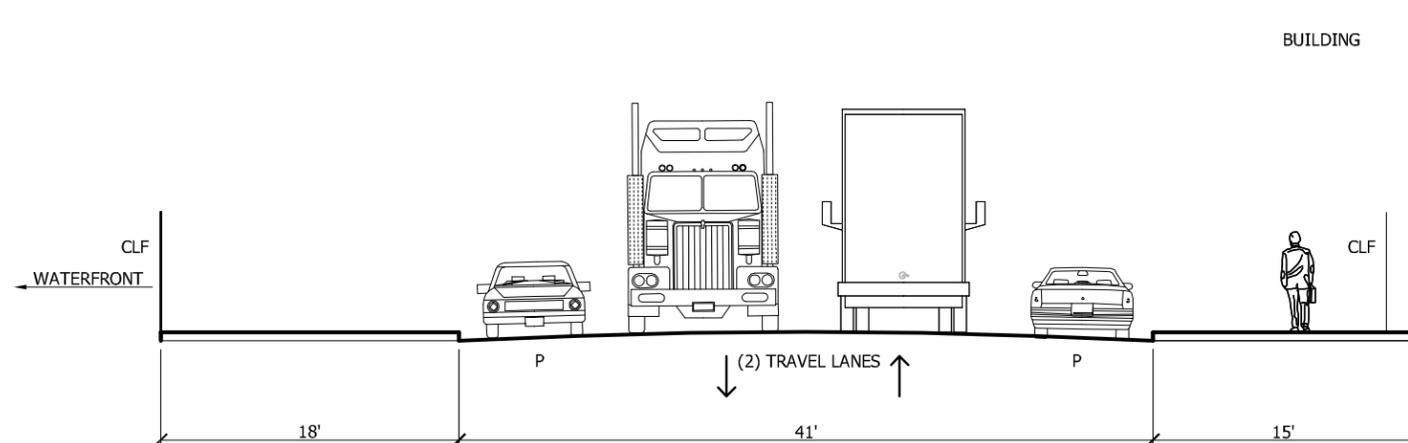


Fig. 1: Current Configuration on Commercial Street

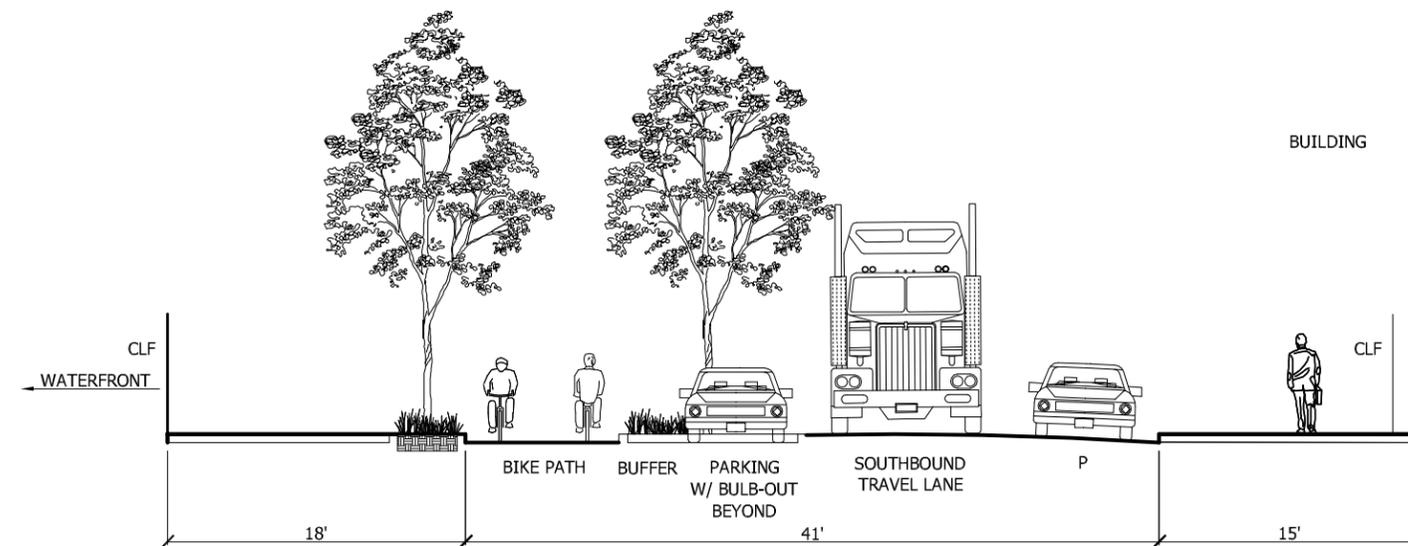


Fig. 2: Possible Reconfiguration for Commercial Street

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

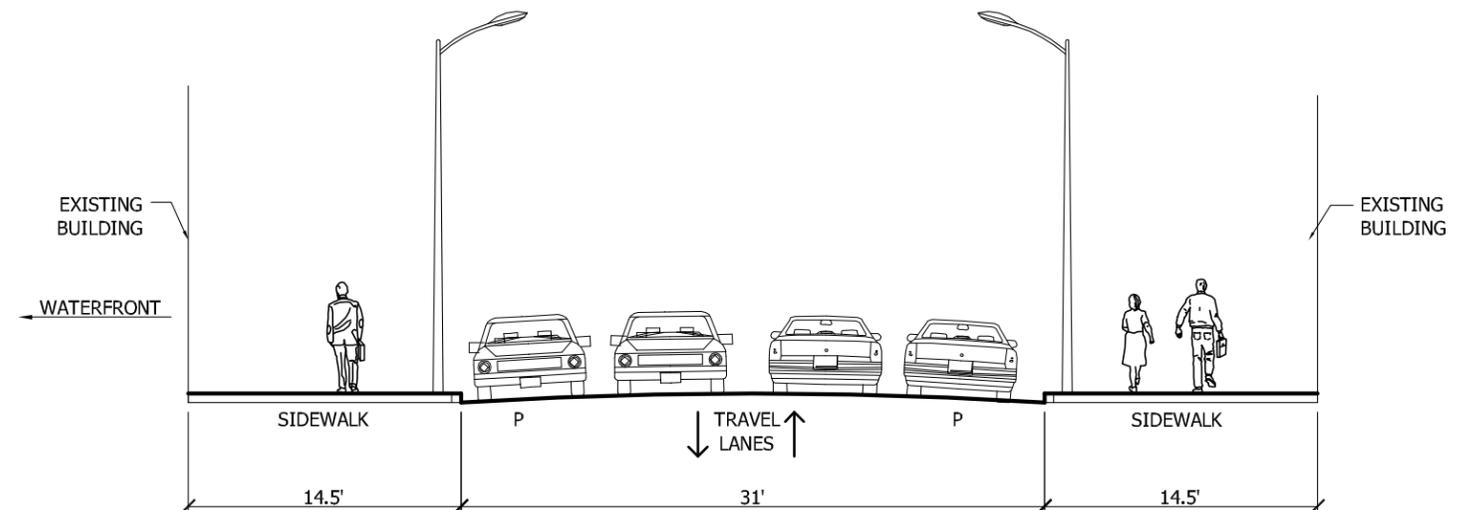


Fig. 3: Existing configuration on West Street

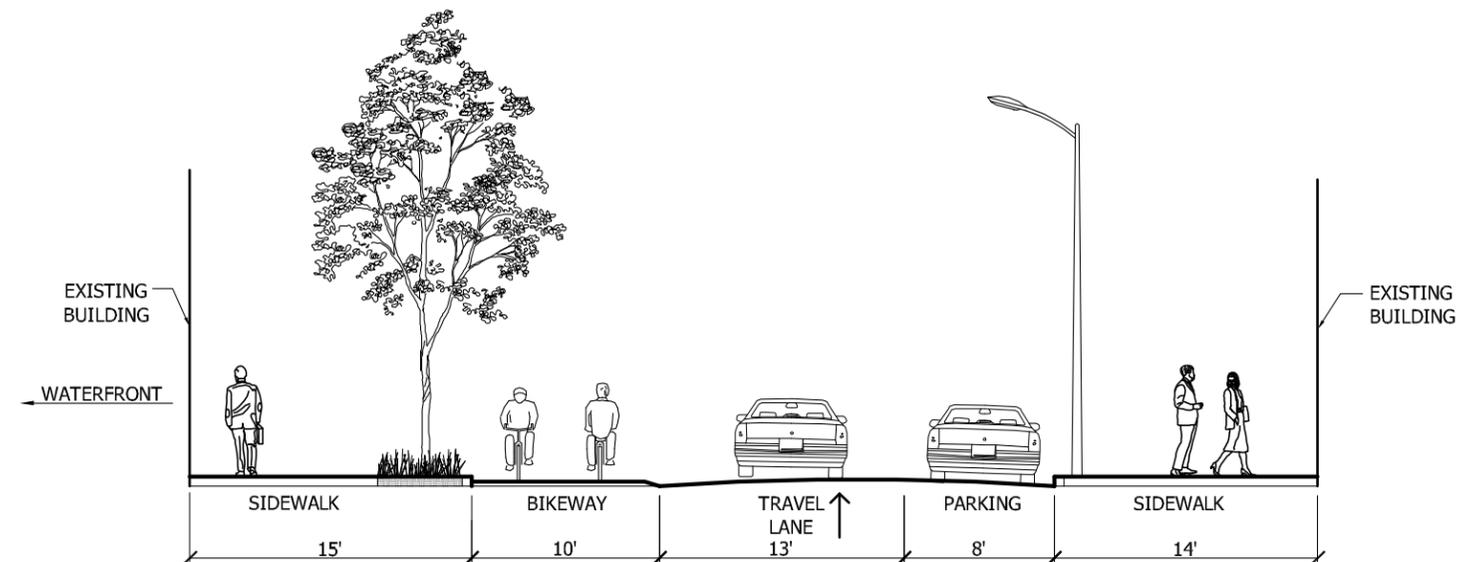


Fig. 4: Possible configuration for West Street



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)

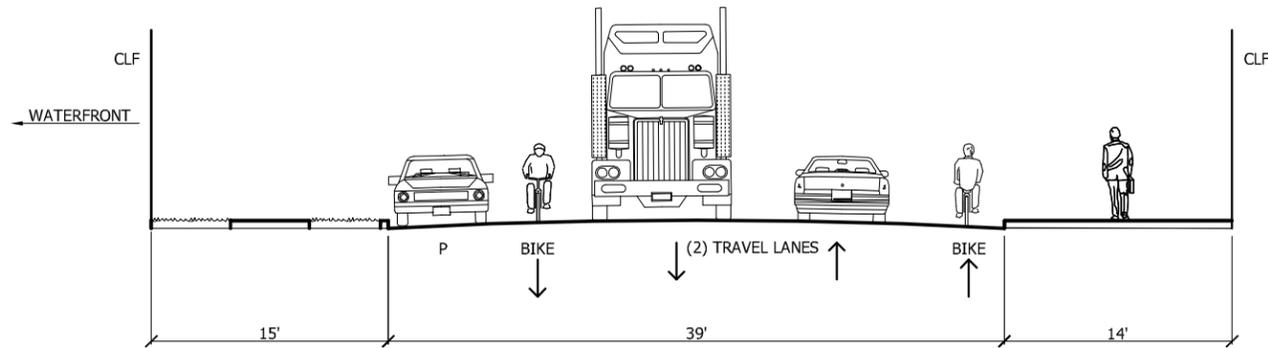


Figure 5: Existing configuration on Franklin Street from Quay Street to North 14th Street along east side of Bushwick Inlet Park

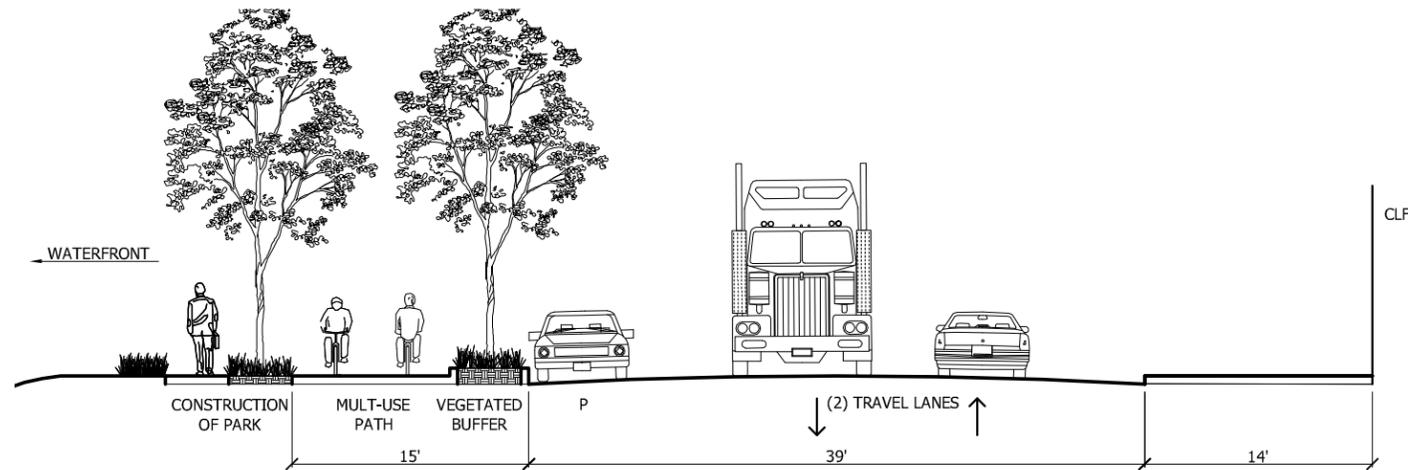


Figure 6: Possible configuration for Franklin Street from Quay Street to North 14th Street along east side of Bushwick Inlet Park

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)



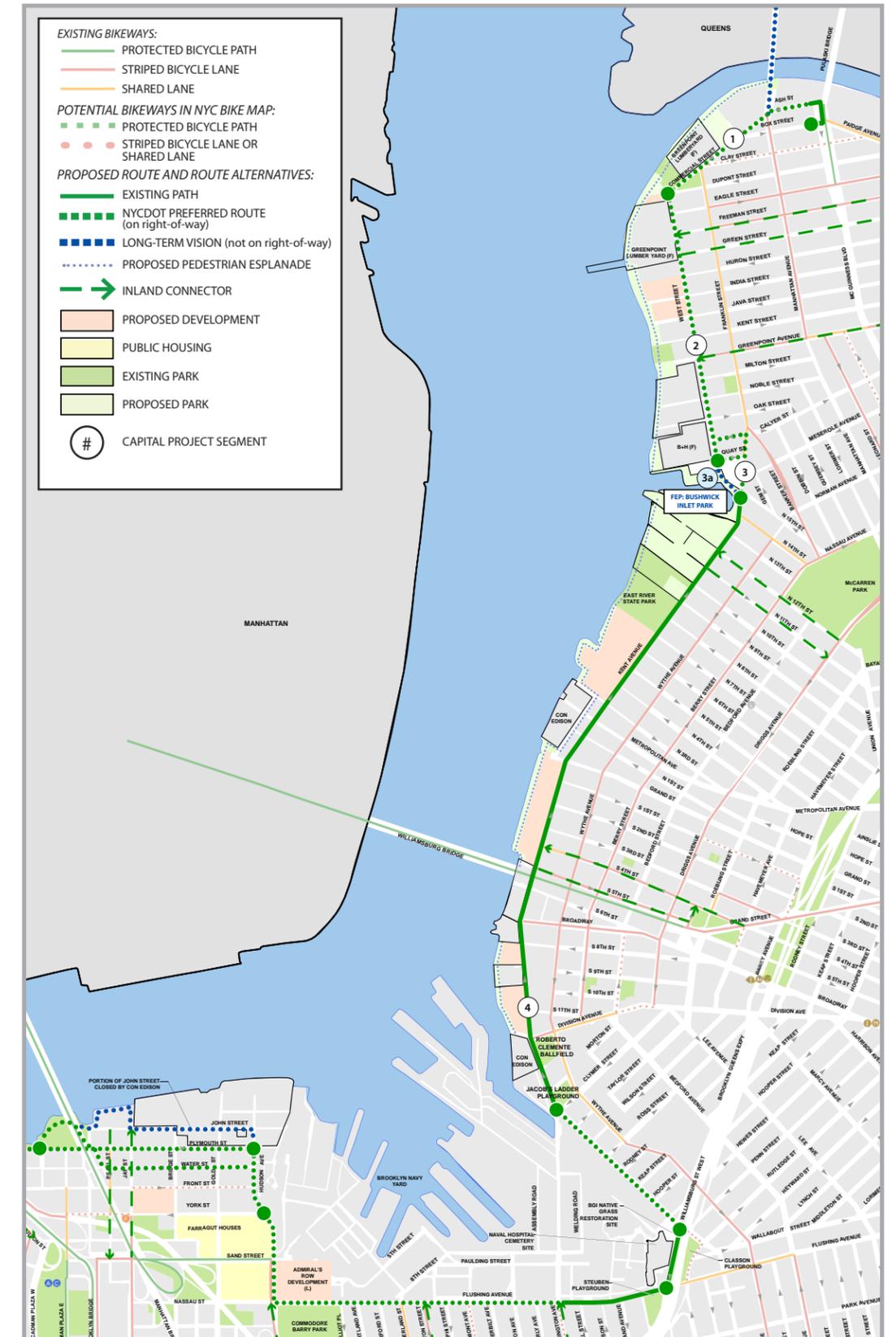
Kent Avenue bicycle path (existing)

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

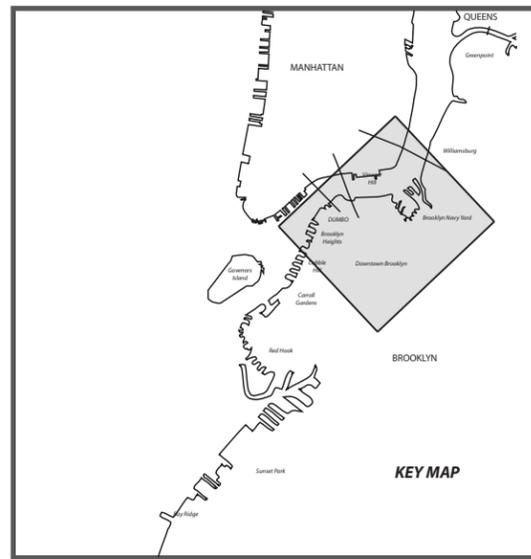


2.1.4 GREENPOINT-WILLIAMSBURG INLAND CONNECTORS

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



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

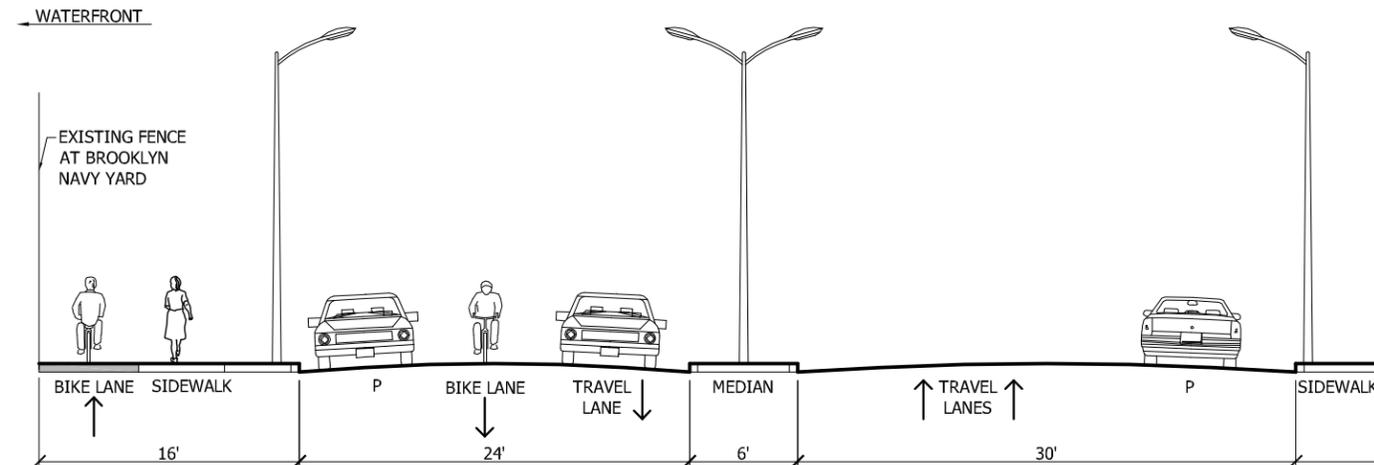


Fig. 7: Existing configuration on Kent Avenue South at Navy Yard

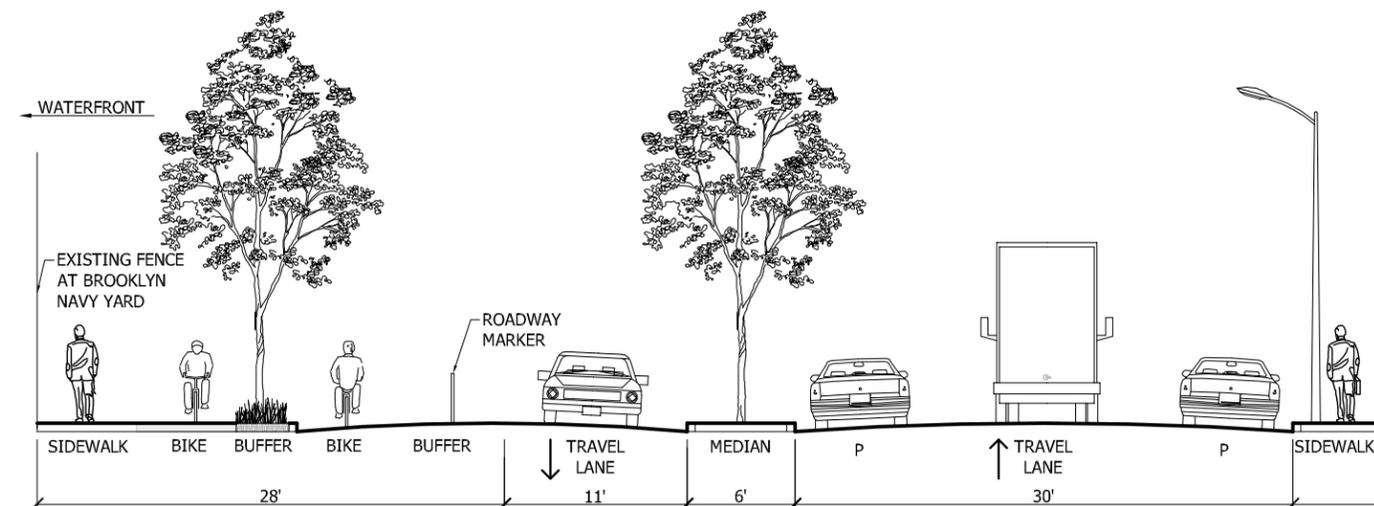
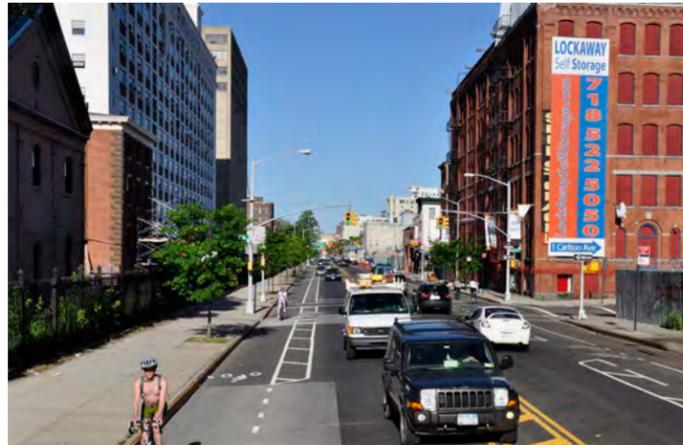


Fig. 8: Possible configuration for Kent Avenue South at Navy Yard - Reprogram Parking Space as Bike Lane

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)

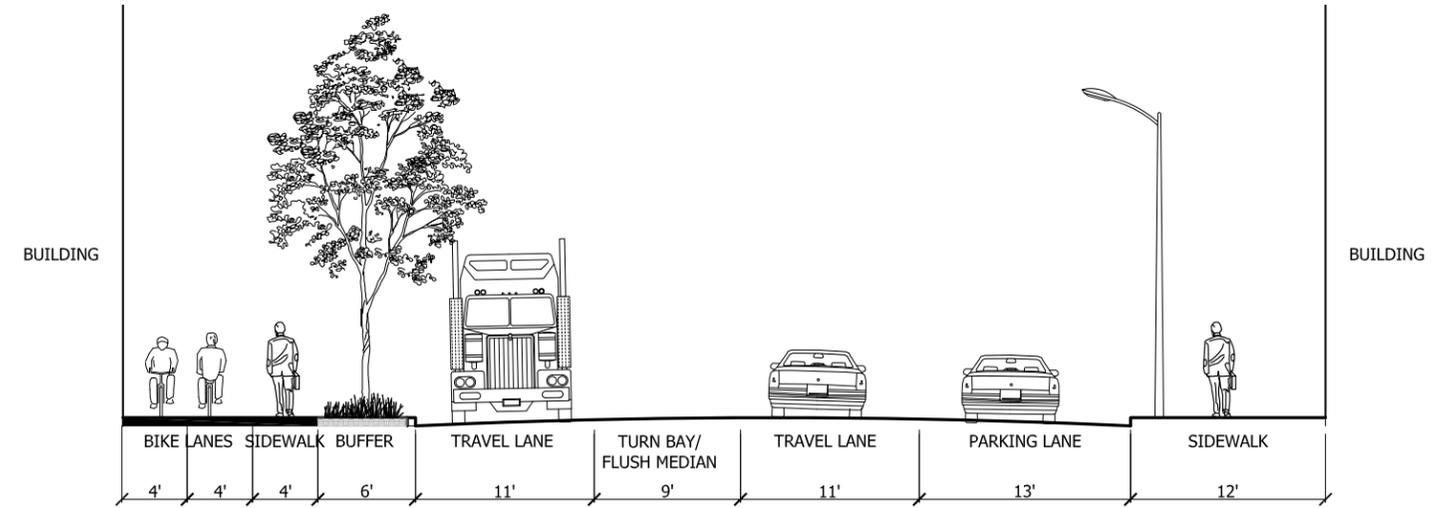
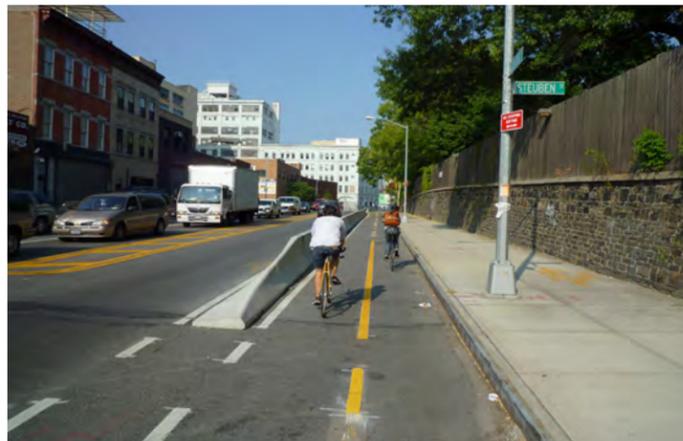


Fig. 9: Possible configuration for Flushing Avenue



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

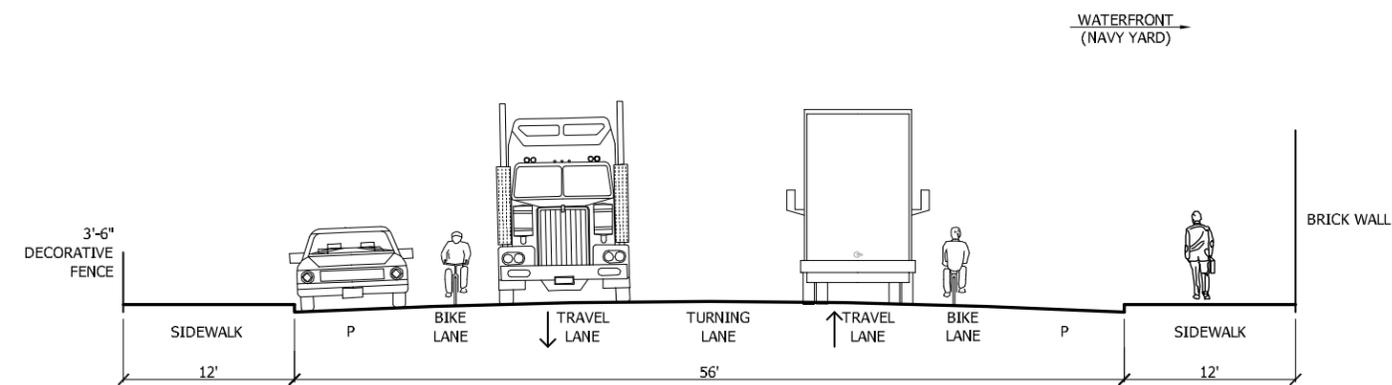


Fig. 10: Existing configuration on Navy Street

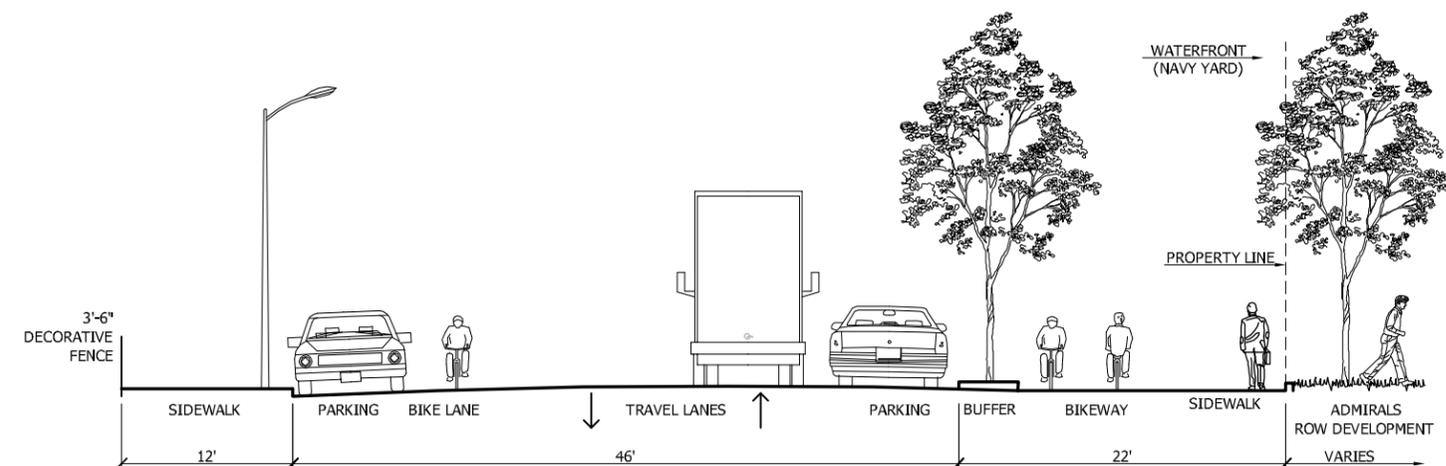


Fig. 11: Possible configuration for Navy Street



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)

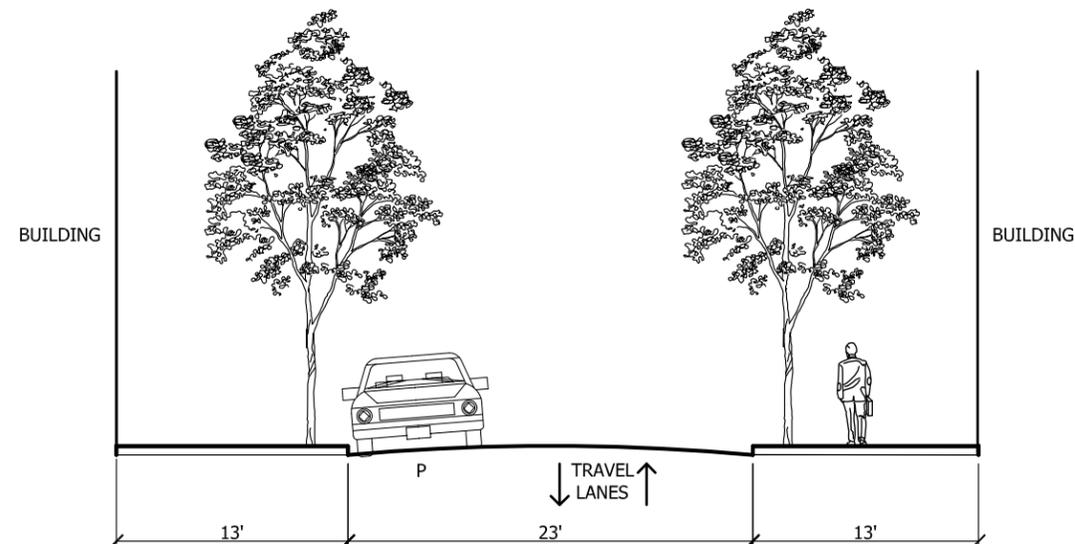


Fig. 12: Existing configuration on Hudson Avenue



Existing cobbles will remain to the extent possible



Future design should take into account all users, including cyclists



Hudson Avenue (existing)



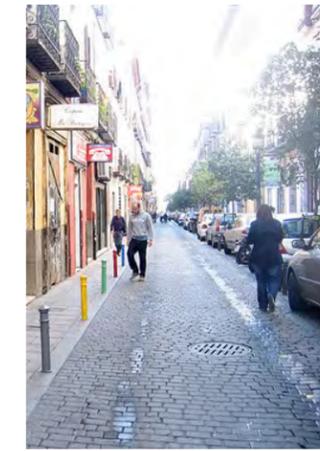
John Street east of Jay Street (existing)



John Street west of Jay Street (existing)



Degraw Street, Brooklyn (precedent)



Madrid, Spain (precedent)



JOHN STREET CROSS-SECTIONS (ROUTE A)

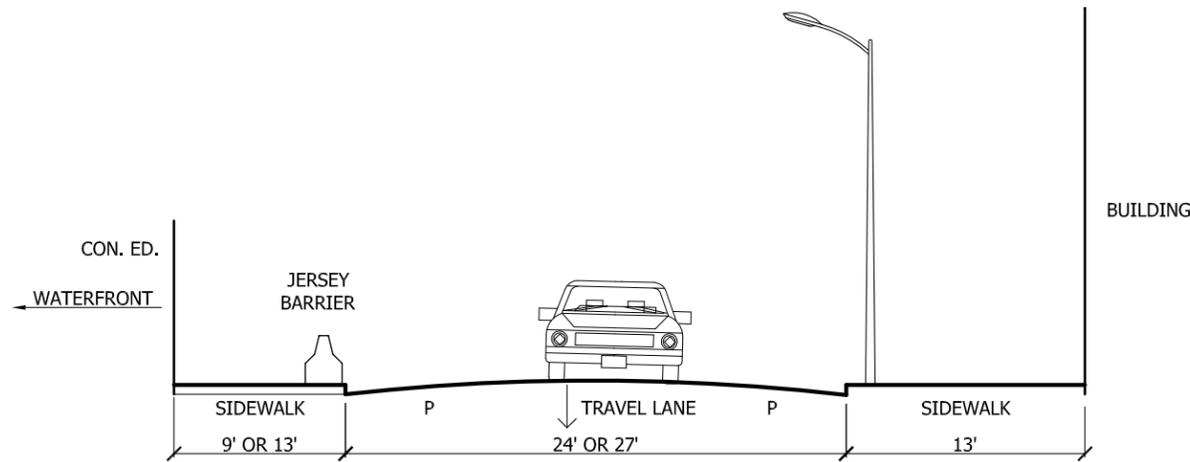


Fig. 13: Existing configuration on John Street east of Jay Street

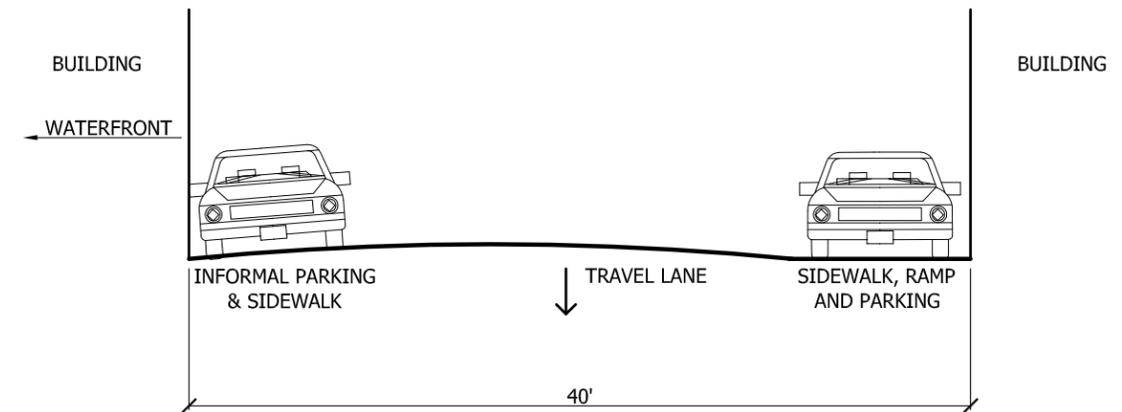


Fig. 15: Existing configuration on John Street west of Jay Street

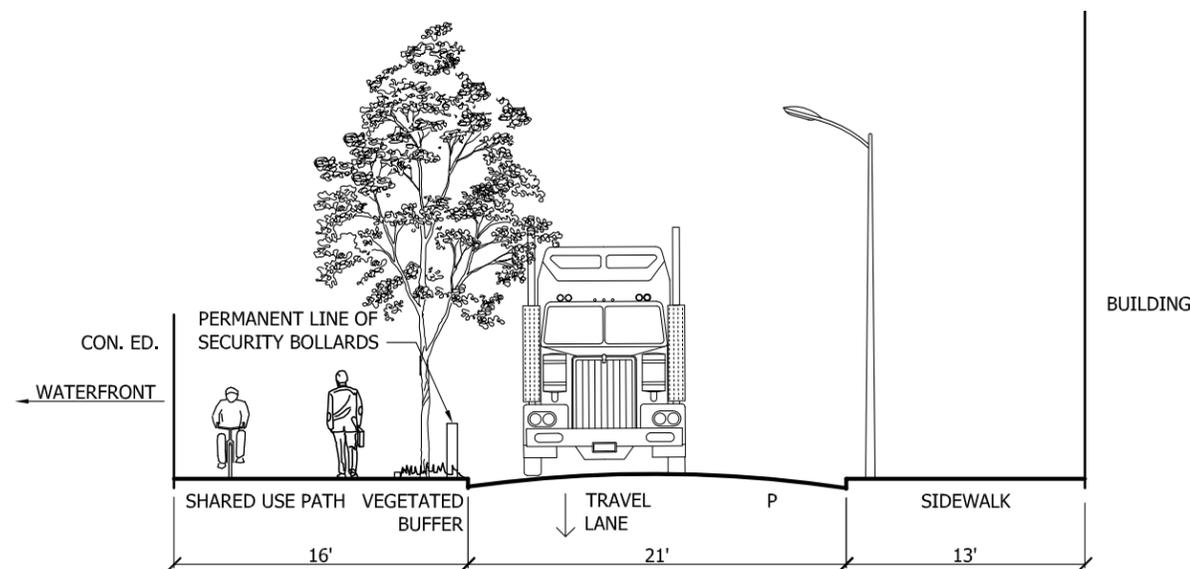


Fig. 14: Possible configuration for John Street east of Jay Street

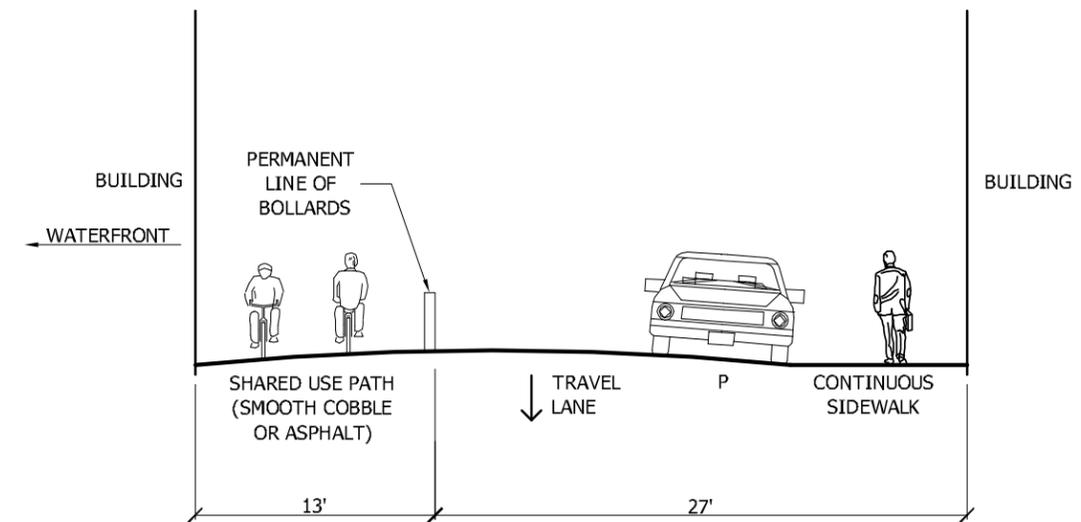


Fig. 16: Possible configuration for John Street west of Jay Street

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)



Gold Street looking north from Front Street (existing)



Water Street looking west from Jay 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)

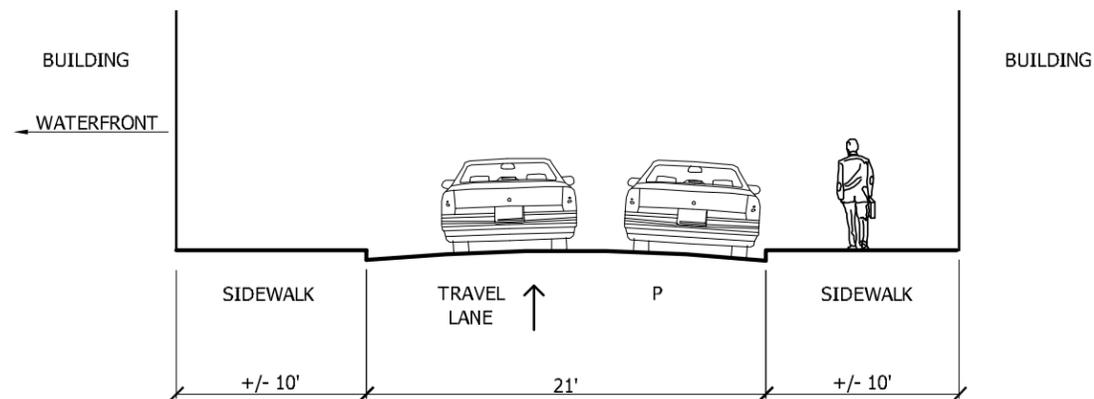


Fig. 17: Existing configuration on Plymouth Street looking west from Jay Street

WATER STREET CROSS-SECTION (ROUTE B)

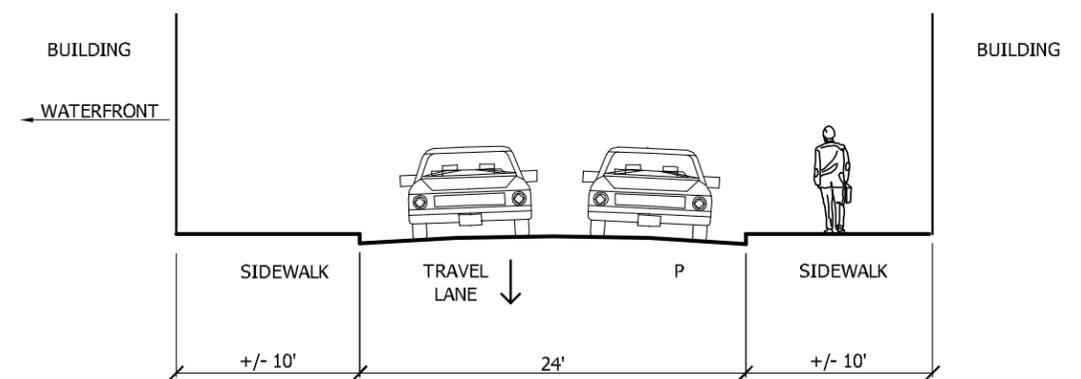


Fig. 19: Existing configuration on Water Street looking west from Jay Street

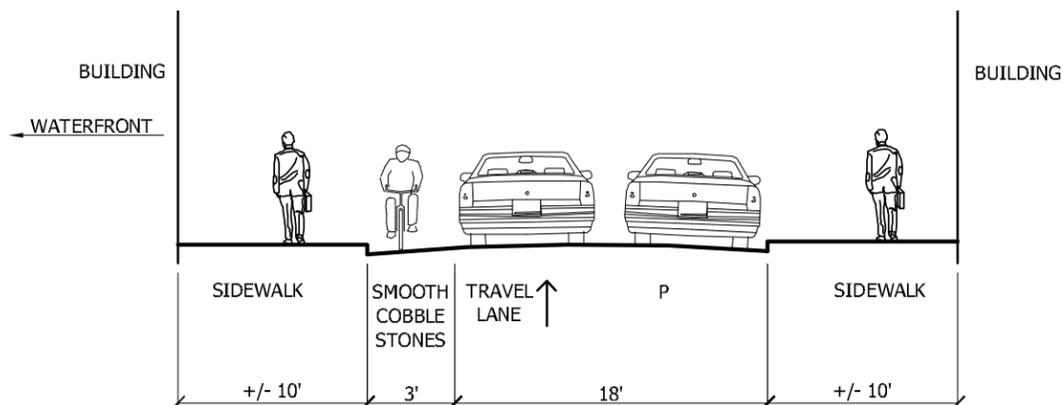


Fig. 18: Possible configuration for Plymouth Street looking west from Jay Street

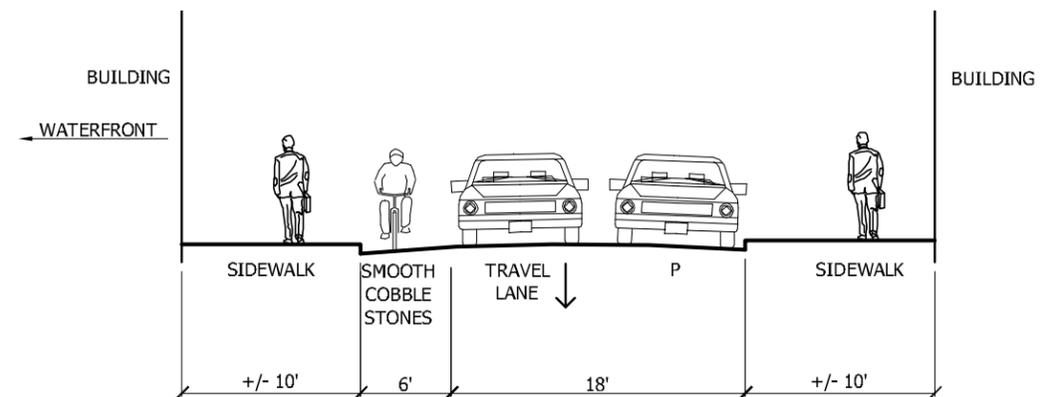


Fig. 20: Possible configuration for Water Street looking west from Jay Street

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)



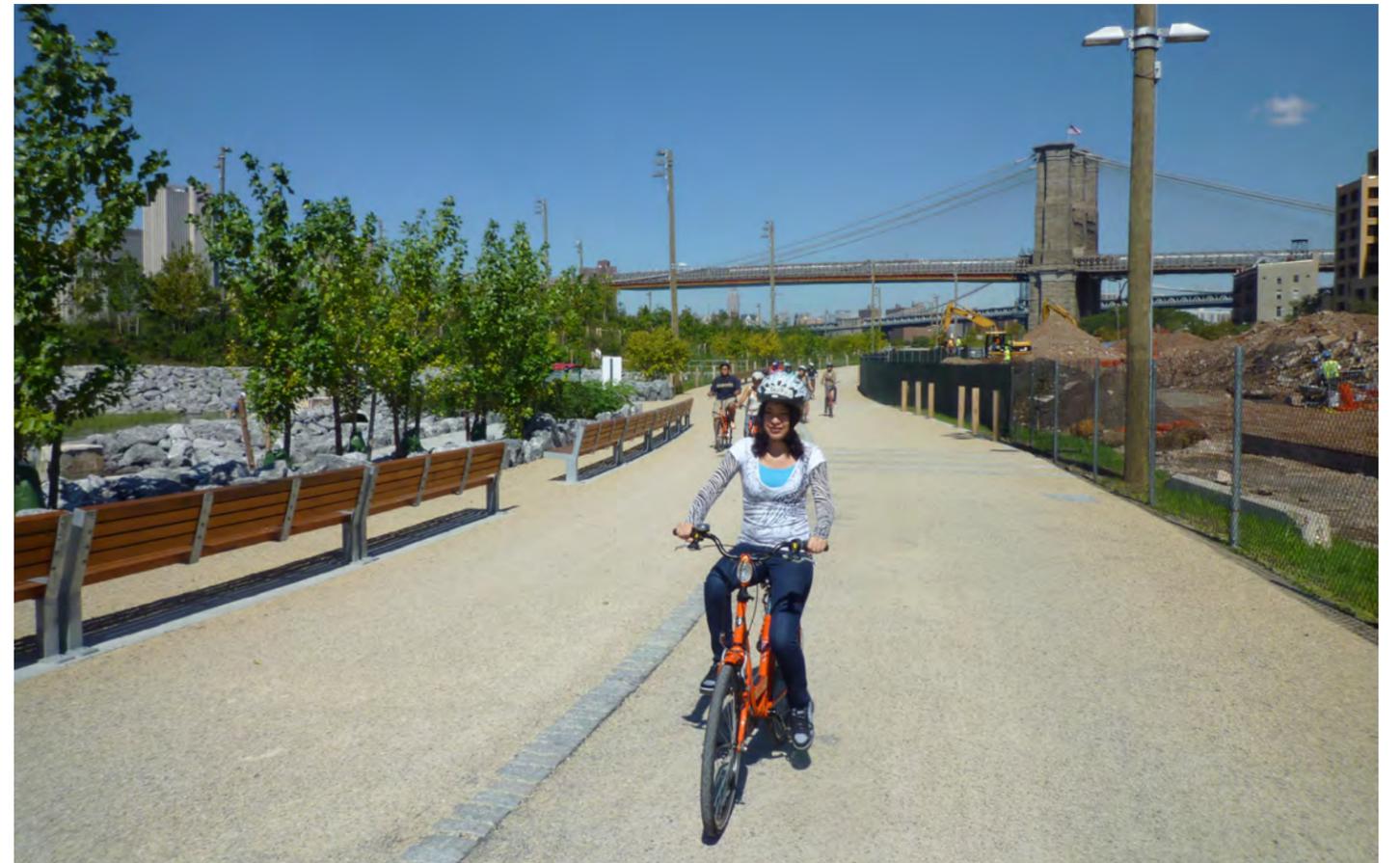
Recent improvements on Atlantic Avenue connection between Columbia Street Greenway and Pier 6



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



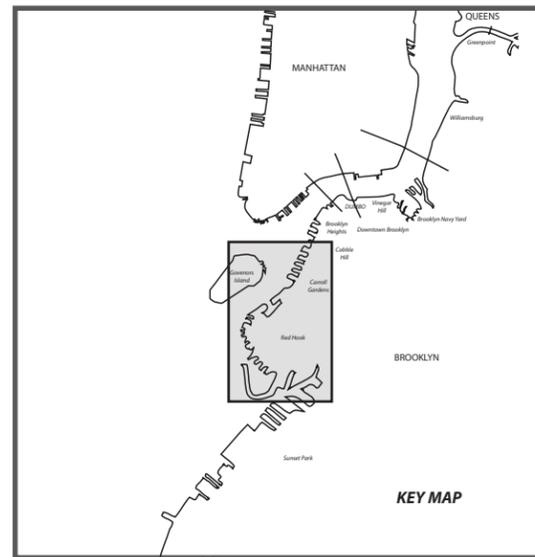
2.2.4 DOWNTOWN BROOKLYN INLAND CONNECTORS

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