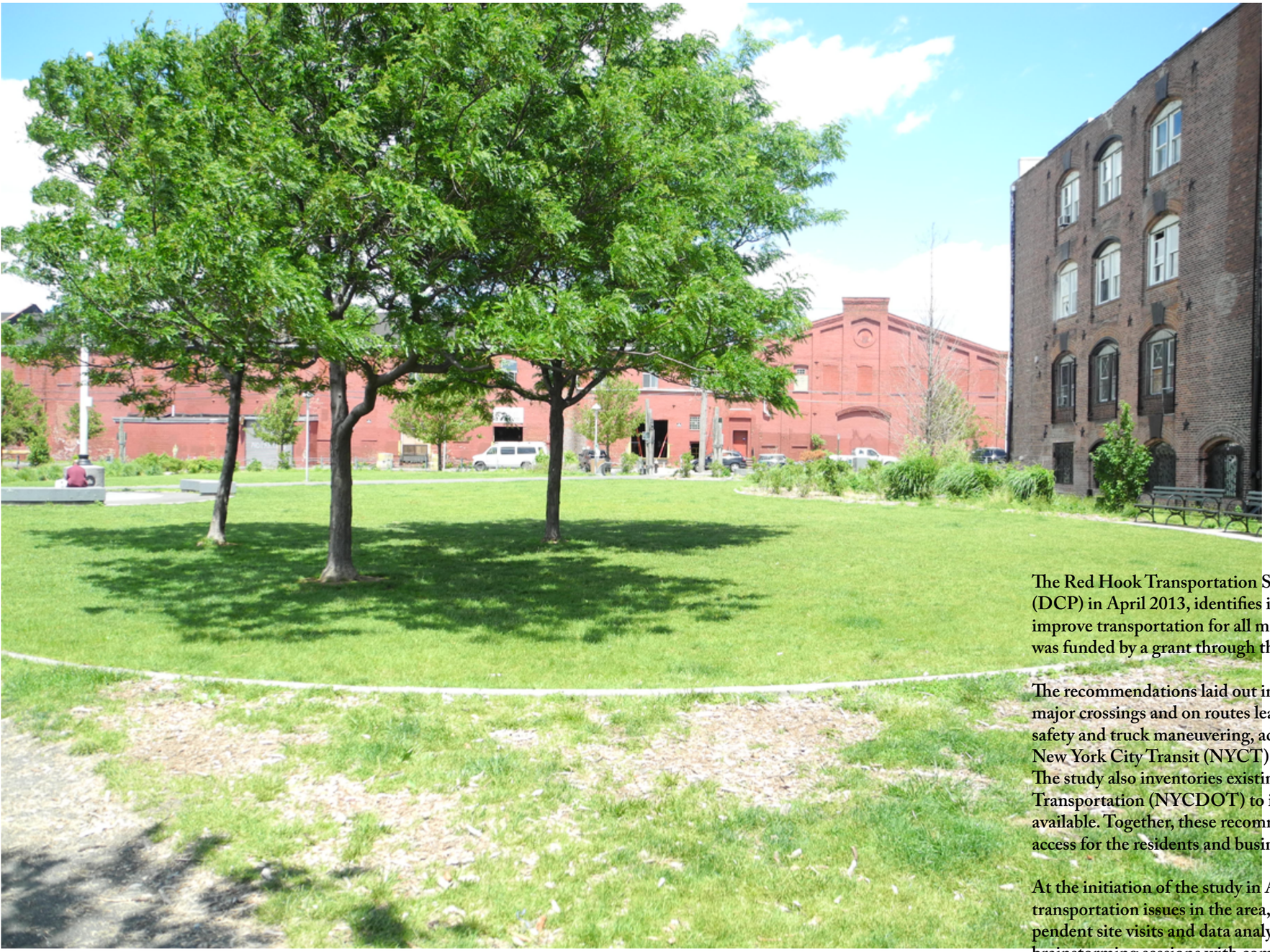
RED HOOK TRANSPORTATION STUDY

NEW YORK CITY DEPARTMENT OF CITY PLANNING

November 2014

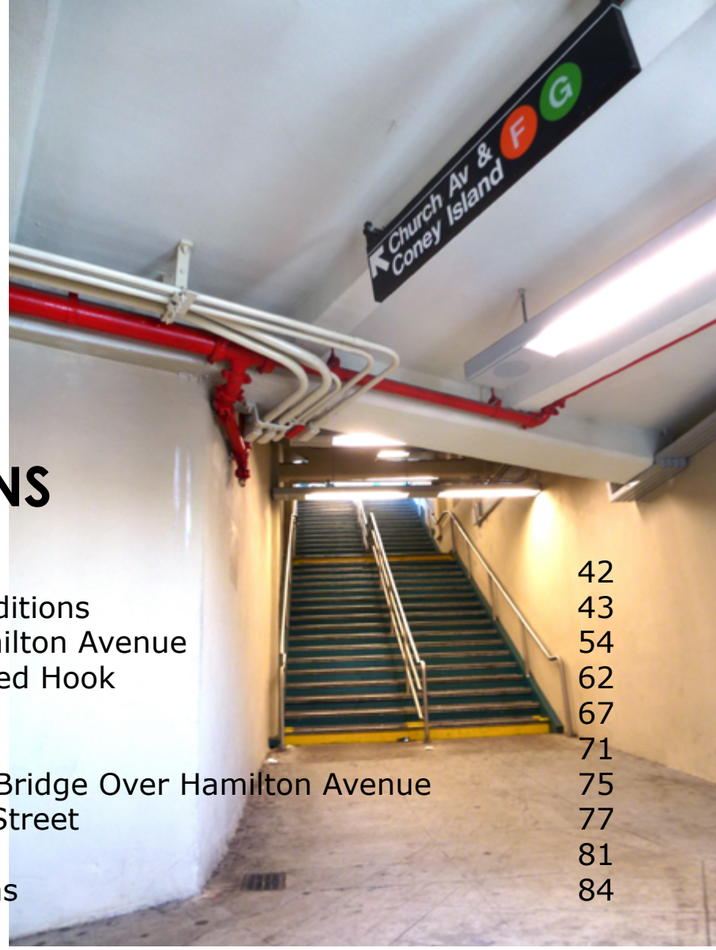


The Red Hook Transportation Study, launched by the New York City Department of City Planning (DCP) in April 2013, identifies incremental improvements that can be made by the City and MTA to improve transportation for all modes and users in the community of Red Hook, Brooklyn. This study was funded by a grant through the New York Metropolitan Transportation Council (NYMTC).

The recommendations laid out in this report include improvements to enhance pedestrian safety at major crossings and on routes leading to transit, changes to curbside regulations to improve traffic safety and truck maneuvering, additions and improvements to Red Hook's bicycle network, and MTA New York City Transit (NYCT) exploration of new or enhanced bus service to Lower Manhattan. The study also inventories existing roadways in disrepair to enable the New York City Department of Transportation (NYCDOT) to incorporate them into repairs or capital projects as funding becomes available. Together, these recommendations can contribute to improving the safety and transportation access for the residents and businesses of Red Hook.

At the initiation of the study in April 2013, DCP engaged with other agencies to identify the major transportation issues in the area, as well as current and pending projects. DCP also conducted independent site visits and data analysis. Based on this understanding of the study area, DCP held public brainstorming sessions with community members to solicit ideas from Red Hook residents, workers and business owners about their priorities for transportation issues and potential strategies to address them. The outreach process, and details about related studies can be found in Appendices I and II, respectively. Findings from this research were used to establish recommendations for improving transportation in Red Hook that are presented in this report.

TABLE OF CONTENTS



Executive Summary

EXECUTIVE SUMMARY

Existing Conditions

Red Hook in Context
The neighborhood of Red Hook is located on a peninsula in the south of Brooklyn along the western waterfront with views of Governor's Island, Lower Manhattan and the Statue of Liberty. It is relatively isolated from the City's transportation network. The Gowanus Expressway cuts the neighborhood off from Brooklyn, there are no subway stations within its boundaries and bus service is limited. The primary study area for this project was the Red Hook peninsula southwest of the Gowanus Expressway. The secondary study area included parts of Carroll Gardens and the Columbia Street Waterfront District. After a period of decline in the second half of the 20th century, Red Hook has recently revived, attracting new investment and interest.
As demonstrated during Hurricane Sandy in October 2012, Red Hook is vulnerable to storm-related flooding, which can affect the structural and mechanical systems of residential, commercial and manufacturing buildings.

Figure 1-1: Red Hook primary and secondary study areas.

Zoning and Land Use
Zoning in Red Hook consists of manufacturing districts along an active working waterfront and residential districts in the interior, interspersed with smaller manufacturing districts. There are commercial overlays and parks in each of the three residential districts. A special mixed-use district is located on the southwestern waterfront containing a Fairway supermarket which opened in 2006. The manufacturing districts around the waterfront are characterized largely by industrial and transportation uses. An IKEA furniture store, which opened in 2008, is located on the south shore in an M1 district. The R6 district and the eastern R5 district contain the New York City Housing Authority (NYCHA) development, Red Hook Houses, and the western R5 district includes residential and commercial uses along the Van Brunt Street corridor.
The Southwest Brooklyn Industrial Business Zone was designated by the administration of Mayor Michael Bloomberg in 2005. This IBZ runs along the waterfront from the Columbia Street Waterfront District, through Red Hook and Gowanus and down through Sunset Park. It creates favorable conditions for the operation and growth of industrial businesses. There are a number of notable parks in Red Hook including Coffey Park and the large Red Hook Recreation Area, which includes a swimming pool and multiple soccer fields and baseball diamonds.

Socioeconomic and Demographic Data
While Red Hook's population experienced a substantial decline from 1950 to 2000, it remained stable through 2010 when it was 10,227, 68 percent of which was located in Red Hook Houses. The neighborhood is largely black and Hispanic, but from 2000 to 2010 the white population increased from 8 percent to 18 percent while the black population decreased from 43 percent to 34 percent and the Hispanic population decreased from 47 percent to 43 percent. From 2000 to 2010, median household income increased significantly in locations along the waterfront and around Van Brunt Street while it remained below $30,000 per year in Red Hook Houses.

Transportation Data
The residential population of Red Hook largely relies on public transportation to get to work (61 percent). Residents have long commutes to work and households have a low rate of vehicles available at 25 percent compared to the rest of the city at 45 percent. Workers commuting to Red Hook largely drive to work and have shorter commutes than residents. However, from 2000 to 2010, the data suggests that Red Hook workers have replaced autos, to some degree, with public transportation. This could be related to jobs generated by IKEA, Fairway and related services.

Transportation Networks
The Gowanus Expressway is the only limited access highway in Red Hook. Major roadways in Red Hook consist of Hamilton Avenue and Van Brunt, Clinton, West 9th, Smith and Court streets. Significant local roadways in Red Hook include Bay, Beard, Lorraine and Columbia streets.

Red Hook contains a number of local truck routes which largely run around the exterior of the neighborhood, on Hamilton Avenue and through the current and former industrial areas. On-street parking regulations in Red Hook are similar to those in other mixed-use neighborhoods in the city with daylighting (prohibiting parking at certain corners to increase visibility and facilitate wide turns) playing a significant role in Red Hook. The neighborhood is also characterized by dozens of off-street parking facilities including several bus depots.

Major pedestrian thoroughfares include Van Brunt, Richards, Columbia, Clinton, Bay, Lorraine, Wolcott and Centre streets and Centre Mall. Local streets around IKEA and Fairway also see a significant amount of pedestrian traffic as do the streets between Red Hook Houses and Hamilton Avenue. While the New York City Department of Transportation (NYCDOT) is currently installing a segment of the Brooklyn Waterfront Greenway around the edge of Red Hook, the existing bicycle network is somewhat limited, with some routes in the eastern section.

From 2009 to 2011, a significant number of crashes involving autos, bicyclists or pedestrians occurred along Hamilton Avenue, while several other locations have seen moderate concentrations of crashes.

The project team worked with a consultant to conduct traffic counts at eleven key intersections in Red Hook. For each intersection, a level of service (LOS) analysis was performed. For results of the LOS analysis, see Appendix III.

Public Transportation and Ferries
The New York City Transit (NYCT) operated F and G trains make two stops close to Red Hook: Carroll Street and Smith-9th Streets. Both require traveling significant distances for many Red Hook residents. In addition, the neighborhood is served by the NYCT-operated B57 and B61 buses. New York City Water Taxi also operates a ferry from Manhattan to IKEA and IKEA operates a shuttle bus between its store and local subway stations.

Recommendations for Improving Transportation

The project team undertook a comprehensive survey of all street and pedestrian conditions in the primary study area. The goal of the survey was to understand and assess the street environment and to make a series of recommendations that focus on improving safety, access, mobility and livability for residents and workers in Red Hook. Data was collected on issues related to pedestrian facilities such as missing or damaged sidewalks, missing street signage, damaged roadway surfaces and missing striping, public transportation infrastructure and scheduling, safety issues such as conflict points between transportation modes, unmaintained areas with overgrown plants and vegetation and street design.

Many of the recommendations in this report need to be undertaken by implementing government agencies such as NYCDOT and NYCT. While the availability of funds is limited, this report can be used for guidance and for establishing priorities when funding does become available. The information gathered from the comprehensive street survey was sent to NYCDOT so that it could be incorporated into their regular maintenance schedule which will enable them to coordinate repairs and improvements.

Improvement of Pedestrian Conditions
Poor pedestrian conditions exist throughout Red Hook. The goal of the pedestrian conditions section is to highlight all locations that need improved pedestrian facilities and to explain why they need improvement, so as to provide the community with the basis to advocate for improvements and other changes to the streetscape.

Data gathered on pedestrian conditions was recorded in five maps for use by the community. Each map shows a different subsection of the primary study area, contexualizing the pedestrian environment in each. Poor pedestrian conditions included sidewalks that were absent or in disrepair, vehicles blocking sidewalks, vegetation issues and other areas of concern. Emphasis was placed on describing how each area is used by pedestrians and, on that basis, what kinds of fixes are important and why. This section provides the community with an overview on each area that can guide improvements.

Pedestrian Improvements to Hamilton Avenue
Hamilton Avenue—with the elevated Gowanus Expressway above and connections to the Hugh L. Carey Tunnel, the Brooklyn-Queens Expressway and the Red Hook industrial waterfront—is an important major roadway that not only connects Red Hook with adjacent neighborhoods, but also separates it. Hamilton Avenue is dominated by vehicles and trucks passing through the area, which makes the

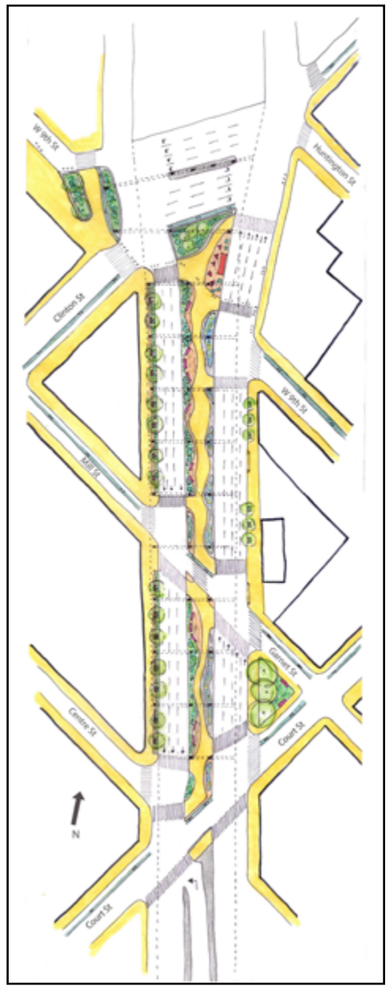


Figure 1-2: Proposed redesign of Hamilton Avenue.

pedestrian environment unpleasant and potentially unsafe to use. The project team found inadequate pedestrian crossings, pedestrian facilities in disrepair and insufficient lighting underneath the Gowanus. In order to enhance the pedestrian environment on Hamilton Avenue, this report recommends the following five treatments:

- Create a buffer between pedestrians and vehicles in the right-hand lane on the southeast-bound side of Hamilton Avenue between Clinton Street and Centre Street.
- Implement traffic calming measures at the intersection of Hamilton Avenue and West 9th Street.
- Redesign the median under the Gowanus Expressway to be more accessible and hospitable for pedestrians. This report offers a preliminary design, which was completed in collaboration with the Design Trust for Public Space and includes a pedestrian walkway with green plantings and vegetation, seating areas and improved drainage.
- Property owners should repair damaged pedestrian infrastructure adjacent to their properties.
- The feasibility of installing additional pedestrian crossings across Hamilton should be studied at these locations:
  - West 9th Street
  - Mill Street
  - Centre Street
  - Court Street

Changes to the Bus Network in Red Hook

Red Hook has inadequate access to public transit. During outreach meetings for this project, there was widespread community support for a direct bus connection from Red Hook to Lower Manhattan. DCP's analysis of available ridership data suggests such a bus connection would significantly improve transit options for people inside and outside of Red Hook. This report recommends the following:

- New York City Transit should study the feasibility of extending an existing bus route between Lower Manhattan and Red Hook via the Hugh L. Carey Tunnel. DCP's preliminary analysis indicates that the M22 would be a viable option.
- The bus study should include an analysis of running a shuttle bus during peak travel periods as an alternative option. While this is not DCP's preferred option, it may be more feasible from a cost perspective.
- Add seating and shelters at selected bus stops in the area.

While there is currently no funding available for such a route extension, these recommendations were included in this report in order to provide the Red Hook community with the basis to advocate for these changes as funding becomes available.

Roadway Improvements

Many streets throughout Red Hook are in need of design and maintenance improvements to enhance safety, accessibility, and mobility for all users. Many of the streets also sustained damage from

Hurricane Sandy flooding. One of the unique characteristics of the neighborhood is the several cobblestone streets. While these historic streets preserve the neighborhood character, they also create hazards if they are not properly maintained. This section provides a map of significant roadway issues as well as a series of treatments to improve specific streets.

The sections of Lorraine and Bay streets between Columbia and Clinton streets where no pedestrian crossings exist were analyzed. This report makes the following recommendations:

- An evaluation should be done of installing traffic signals at Hicks and Henry Streets.
- Curb extensions and bulb-outs should be installed at selected intersections.
- Areas with faded markings should be restriped.

On Richards Street, this report recommends the following:

- Restripe faded street markings and bring street pavement to a state of good repair.
- Conduct further evaluation to determine the feasibility and potential location of additional pedestrian crossings.
- Install traffic calming measures.

On Ferris Street, which is used heavily by trucks, this report recommends improved maintenance.

The report lays out several options for the community to consider in dealing with damaged cobblestone streets. They are as follows:

- Identify streets to use expense funding for repairs and upgrades.
- Create paved crosswalks on cobblestone streets where necessary for pedestrian safety.
- Pave over cobblestones with asphalt to even out streets and reduce wear on vehicles.
- Repurpose the cobblestones for other uses.
- Preserve the cobblestones for future use.

Improving the Bicycle Network

The New York City bicycle network of connected lanes and paths provides limited access in and to Red Hook. The Brooklyn Waterfront Greenway, which will eventually connect the entire Brooklyn waterfront, is currently being installed. While this will be a significant and remarkable addition to the bike network in the area, additional access points to the greenway as well as east-west connections are needed in the neighborhood. This report makes the following recommendations:

- A shared lane should be installed on Wolcott Street extending to the western

waterfront.
- The existing route on Bay Street should be restriped.
- The West 9th Street bike route in Carroll Gardens should be extended southwest across Hamilton Avenue to connect with the Columbia Street route.
- The community should work with NYCDOT to identify appropriate sites to install additional bike racks. This report identifies some potential locations.
- Additional daylighting should be installed at the intersection of Van Brunt Street and Sullivan Street in order to mitigate the high number of bicycle crashes at this location.

Improvements to the Pedestrian Bridge Over Hamilton Avenue
There is a pedestrian bridge over Hamilton Avenue between Luquer and Nelson streets connecting the northeastern and southwestern sides of Hamilton Avenue. This bridge is in a state of disrepair, lacks lighting and is unwelcoming. This report recommends the following steps:
- Additional lighting should be installed, an initiative NYCDOT is already examining.
- Pedestrian amenities like handrails and trash cans should be provided.
- Existing fencing should be fixed or transparent fencing should be installed to improve visibility on the bridge.
- An approach should be developed to improve the pedestrian experience of the bridge with an art installation, a mural depicting the history or uniqueness of Red Hook or a sound installation to mask noise from the expressway.

Mitigating Conflicts on Woodhull Street
Woodhull Street is a wide two-lane road that passes over the Hugh L. Carey Tunnel portal and provides a 180 degree, one-way, U-turn at the northwestern edge of Hamilton Avenue. This street is characterized by conflicts between motorists, bicyclists and pedestrians. This creates potentially unsafe conditions and the potential for crashes. This report recommends the following treatments to mitigate these conflicts:
- Signage should be improved to direct cyclists to Summit and Bowne streets as well as the Brooklyn Waterfront Greenway, streets which are more suitable for cyclists.
- Further evaluation should be done on whether to install a new signal at the intersection of Woodhull Street and northbound Hamilton Avenue.
- The pedestrian area on the north side of the intersection should be expanded and used for additional green space.
- Further evaluation should be done on adding pedestrian crossings across Bowne Street and southbound Hamilton Avenue.
- Bollards should be installed in the striped triangle between Hamilton Avenue and Bowne Street.

Improvements to Truck Routes
Red Hook's truck routes are important to the businesses that operate in the neighborhood. The streets these routes run on, however, are often congested. Two significant problems along the truck routes are the inability of large trucks to make turns onto small local streets and the congestion caused by double-parked trucks during loading periods on Van Brunt Street. This study recommends the following:

- Daylighting should be installed or existing daylighting should be reinforced at several key intersections where this problem was observed.
- Local businesses should work with NYCDOT to establish areas for loading zones along Van Brunt Street between Pioneer and Coffey streets.

Other Mass Transportation Options
Red Hook generally lacks mass transportation options. This report's recommendation for NYCT to conduct a study on extending a bus route from Manhattan to Red Hook would greatly improve public transportation into the central business district in Manhattan. Red Hook community members have also expressed sentiment in favor of increased ferry service and creating a streetcar network in Red Hook. The *Comprehensive Citywide Ferry Study* was conducted in 2011 by NYHarborWay and the New York City Economic Development Corporation (EDC) with assistance from NYCDOT, and it found that increased ferry service was not currently feasible. This study is being updated and the preliminary report indicates that Red Hook is still being considered as an option for increased ferry service. Also in 2011, NYCDOT conducted the Brooklyn Streetcar Feasibility Study, which concluded that a streetcar in Red Hook was not feasible. The study indicates that evaluation of Red Hook for a potential streetcar system should be revisited when residential developments and employment densities increase in the neighborhood.

Next Steps
Many of the recommendations in this report can be undertaken by implementing government agencies such as NYCDOT and NYCT. This report can be used for guidance and for establishing priorities. Red Hook community groups can play a vital role in ensuring that improvements are made in the way that best benefits the people who live and work in Red Hook. DCP will continue to serve as a liaison in ongoing coordination efforts with relevant community groups and operational agencies to prioritize and implement the study's recommendations.

EXISTING CONDITIONS

Red Hook in Context

Red Hook Study Area Regional Context
Located in southwestern Brooklyn, the neighborhood of Red Hook occupies a peninsula linked to land only along its eastern edge. Although Red Hook is geographically part of Brooklyn, the Gowanus Expressway, a limited access highway, largely cuts the area off from the rest of the borough. Subway lines do not enter Red Hook and the nearest stations are located across Hamilton Avenue, a major thoroughfare that runs underneath the Gowanus Expressway, and that can be hazardous for pedestrians to cross. Throughout the twentieth century, these geographic and transportation-related factors have combined to isolate Red Hook from the rest of New York City. Yet in the past ten years, Red Hook has seen greater investment, bringing new businesses, residents and commerce.

For the purposes of this report, the study area is divided into two sections. The primary study area, the heart of Red Hook, is located to the southwest of the Gowanus Expressway and Hugh L. Carey Tunnel. It is bounded to the south by Gowanus Bay, to the west by Upper New York Bay, and to the northwest by Buttermilk Channel. The secondary study area contains a corridor that extends north through the Columbia Street Waterfront District to Atlantic Avenue and is bounded to the east by the Brooklyn-Queens Expressway and to the west by the Hudson River. This secondary area also includes the southern portion of Carroll Gardens and the western portion of Gowanus bounded to the north by Degraw Street and to the west by Smith Street. While this study focuses on the primary study area, the secondary area is

Figure 2-1: Red Hook study area in geographic context.

included because these neighborhoods were historically connected before the building of the Gowanus Expressway and the Hugh L. Carey Tunnel. The secondary study area also contains key transportation corridors that extend beyond Red Hook, for example, to the subway stations along Smith Street.

Only a third of a mile to the west of Red Hook is Governor's Island, a former military base that is becoming a New York City recreation

Figure 2-2: Red Hook primary and secondary study area

attraction and destination for New Yorkers and tourists. Additionally, Lower Manhattan is located a mile to the north across the East River, and is connected to Red Hook by ferries and the tunnel. The most significant transportation infrastructure surrounding the study area includes the Gowanus Expressway, which borders the primary study area and links the Hugh L. Carey Tunnel to Manhattan; the Culver Viaduct, which carries the F and G trains over the Gowanus Canal; and the Brooklyn-Queens Expressway (the larger citywide highway that includes the Gowanus Expressway) which connects Brooklyn with Queens.

In recent years there have been notable additions to the Red Hook area that serve as destinations for residents from within and outside the city. These include the Brooklyn Cruise Terminal, opened in 2006; a Fairway food store which also opened in 2006; and

IKEA, the Swedish furniture store, which opened in 2008. The opening of both Fairway and IKEA have drawn many visitors to Red Hook. Both quickly became commercial anchors, drawing in shoppers from other parts of the City, especially on weekends, and small businesses operating near Fairway cater to the shoppers that the store draws into Red Hook.

Study Area History

Beginning in the 1850s, Red Hook became one of the busiest shipping centers in the United States. To house the large number of workers in the area, Red Hook East Houses was built in 1939, containing 2,528 apartments, and Red Hook West Houses was built in 1955 with 345 apartments. Currently, Red Hook Houses is the largest New York City Housing Authority (NYCHA) development in Brooklyn and is where the majority of the neighborhood's residents live.

In 1946, construction of the Gowanus Expressway, along with the Brooklyn-Battery Tunnel (now the Hugh L. Carey Tunnel), separated Red Hook from Carroll Gardens and the rest of the city. Due to technological advances in shipping during the 1960s, many shipping and manufacturing companies left Red Hook, ending the neighborhood's era as a major port and maritime center. The loss of jobs and economic vibrancy during the 1970s and '80s caused conditions in Red Hook to deteriorate, with many streets becoming desolate and dangerous.

In recent years Red Hook has become a more attractive and safer neighborhood, due in large part to dedicated community groups, residents, and property/business owners. There is now increased demand for its older townhouses and warehouses, along with retail and unused industrial spaces, located mostly along the waterfront. The vibrant location, with commanding views of Lower Manhattan, the Statue of Liberty and the Verrazano-Narrows Bridge, is now home to a variety of businesses, artisans and artists. Two hotels and many non-profit organizations also serve a variety of needs for both visitors and residents.

Red Hook and Hurricane Sandy

Red Hook is vulnerable to weather-related events, because much of the neighborhood rests on low-lying former marshland, leaving it flood-prone and vulnerable to industrial spills, storm surge, electrical outages, and other flood-related hazards. During Hurricane Sandy in October 2012, storm-related flooding damaged the mechanical systems of buildings, residential units, personal possessions, the inventory of retailers and the heavy equipment and products of industrial businesses. Luckily, very little major structural damage occurred. During Sandy, low-lying Red Hook was overwhelmed by flooding which inundated basements and ground floors with over six feet of water in some places. This flooding affected most of the primary study area including Red Hook Houses where heat, water and electricity were lost for weeks. The secondary study area, including the Columbia Street Waterfront District and Carroll Gardens (adjacent to the Gowanus Canal), also experienced significant flooding during Sandy.

In the future, Red Hook and most other waterfront neighborhoods are faced with challenges as sea levels rise due to climate change. The most significant risks for these areas are storm surge and flooding from coastal storms as well as sea level rise itself, which could lead to significant damage and sewer flooding in communities such as Red Hook by the 2050s.

In 2013, the Mayor's office released the report *A Stronger More Resilient New York*[1] in response to Hurricane Sandy. The report includes recommendations on increasing Red Hook's resilience in future decades. In addition, the Governor's office established the New York Rising Community Reconstruction Program[2] (a community-based planning effort for resiliency), also in response to severe weather that has impacted the region in recent years. The Red Hook community very actively participated in this program.

[1] See http://www.nyc.gov/html/sirr/html/report/report.shtm and Appendix II.
[2] See Appendix II.

Figure 2-3: Destinations in the study area

Existing Conditions

Land Use and Zoning

Citywide Regulations
New York City is divided into three basic zoning districts: residential (R), commercial (C) and manufacturing (M). The three basic districts are further divided into ten residential, eight commercial and three manufacturing zoning districts of varying densities and regulations. Any of these districts may be overlaid by special zoning districts tailored to the unique characteristics of certain neighborhoods, such as a commercial overlay on some blockfronts in residential districts. These overlay districts modify and supplement the controls of the underlying zoning districts.

Red Hook contains a mixture of several residential and manufacturing districts as well as some commercial overlays and a Special Mixed Use District. The residential districts include extensive low-rise and some high-rise NYCHA properties as well as smaller walk-up buildings. The manufacturing districts mostly contain warehouses, a few large loft buildings and some small walk-up residential buildings. There are also transportation facilities and some heavier industry in these districts as well. Commercial overlays are located in three of the residential districts at important thoroughfares. In the sections that follow, we describe some of the key zoning districts in Red Hook.
The Southwest Brooklyn Industrial Business Zone (IBZ) was designated by the administration of Mayor Michael Bloomberg in 2005. This IBZ runs along the waterfront from the Columbia Street Waterfront District, through Red Hook and Gowanus and down through Sunset Park. It creates favorable conditions for the operation and growth of industrial businesses.

M2-1 District
The large strip along Red Hook's western coastline is the only M2-1 district mapped within the study area. It stretches over the Hugh L. Carey Tunnel portal and extends north to the Brooklyn Bridge. Two large transportation/utility developments—Red Hook Container Terminal and Brooklyn Cruise Terminal—are located just north of King Street. The Red Hook Container Terminal is the only terminal in New York east of the Hudson River. The Brooklyn Cruise Terminal, built in 2006, has state-of-art facilities and a large parking lot on its south end. At the southern part of this district, most land is occupied by industrial/manufacturing uses. In addition, two parks—Louis Valentino Jr. Park and Pier 44 Waterfront Garden—are located in this area. They provide the neighborhood with access to the waterfront and a view of the Statue of Liberty.

M3-1 District
Two M3-1 districts are mapped within the study area. One M3-1 district is located at the south end of the study area along the southern coastline of Red Hook. At the western end of this district, there are Civil War-era warehouses which now host the Brooklyn Waterfront Artists Coalition (BWAC). This extension of land is used as a dock to store New York Water Taxi ferries. There is also a cement plant on a vacant lot located between IKEA and Columbia Street. The rest of this district contains industrial/manufacturing uses. The end of the pier that begins on Columbia Street and loops around to the West and North forming the Erie Basin contains an NYPD auto pound and serves as a barge port.

The other M3-1 district is located in the southeast corner of the study area. It stretches far south beyond the study area boundary. The part within the study area contains primarily warehouses, but also has a concrete facility and a Hess tank farm whose fuel tanks lie along the waterfront.

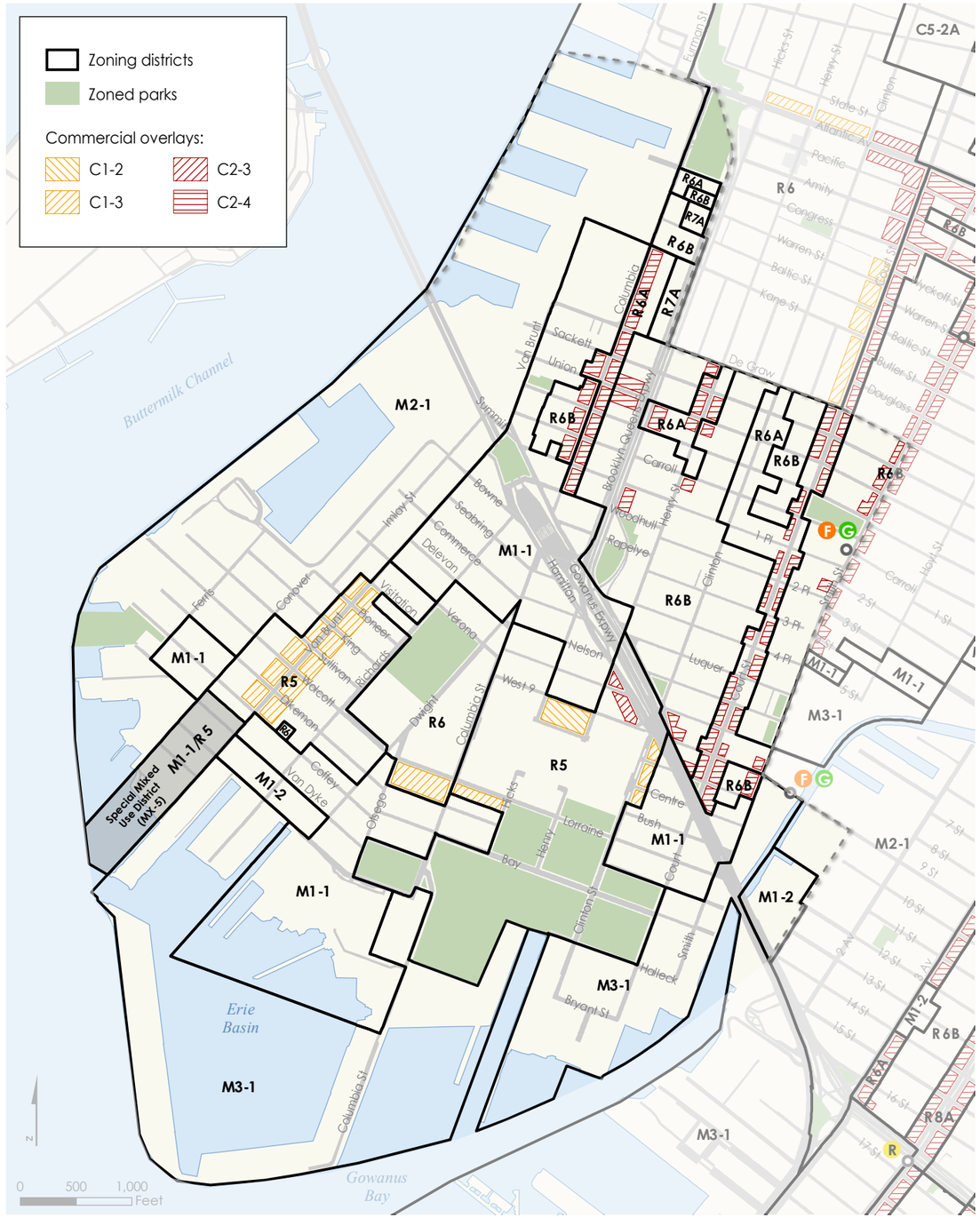


Figure 2-4: Zoning districts in the study area.

R5 and R6 Districts
There are two R5 districts mapped within the study area. The first R5 district is located along Van Brunt Street. Diverse land uses are located in this district, although residential uses predominate. Mixed commercial/residential buildings are prevalent along Van Brunt Street, where a C1-3 commercial overlay is located. This overlay includes galleries, grocery stores, restaurants, pharmacies, hair salons and specialty stores. Two schools are located in this district: P.S. 15 Patrick F. Daly elementary school and South Brooklyn Community High School. A branch of the Brooklyn Public Library is located at the eastern end of the district. In addition, there are some industrial/ manufacturing buildings in the center of the district and public facilities at the northern end.

The other R5 district is situated north of Red Hook Recreation Area, which is the largest public space within the study area. Red Hook East Houses, a cluster of six-story apartment buildings, makes up the bulk of this district. The northern part of this district contains a mix of land uses, including small-scale industrial/manufacturing buildings, residential buildings and a school building on the north side of Huntington Street shared by Summit Academy Charter School and P.S. 676. Red Hook Recreation Area includes baseball fields, basketball courts, a pool, soccer fields, running tracks and playgrounds. Along this district's eastern edge on Clinton Street is a C1-3 commercial overlay which contains a grocery store, a church and a post office. A block along Lorraine Street also contains a C1-3 overlay which extends into the adjacent R6 district. It hosts a grocery store, a pharmacy, a laundromat, a bank, and a now-closed supermarket.

Adjacent to this R5 district, on its western side, is an R6 district. Much of this R6 district is made up of Red Hook West Houses which contains both six-story apartment buildings and a high-rise apartment building. The northern part of this district contains industrial/ manufacturing uses and vacant land. A major park in this area, Coffey Park, is situated in the center. It has basketball courts, handball courts, playgrounds and barbecuing areas.

Special Mixed Use District (MX)
Special Mixed Use Districts permit residential, commercial and light industrial uses to be located side-by-side or in the same buildings. The MX district was developed in 1997 to add vibrancy to existing mixed-use neighborhoods and to encourage the creation of new ones. The MX-5 mixed use district is located in the southwestern part of Red Hook, in an area that includes Fairway and the retail establishments, along with several residential and industrial buildings.

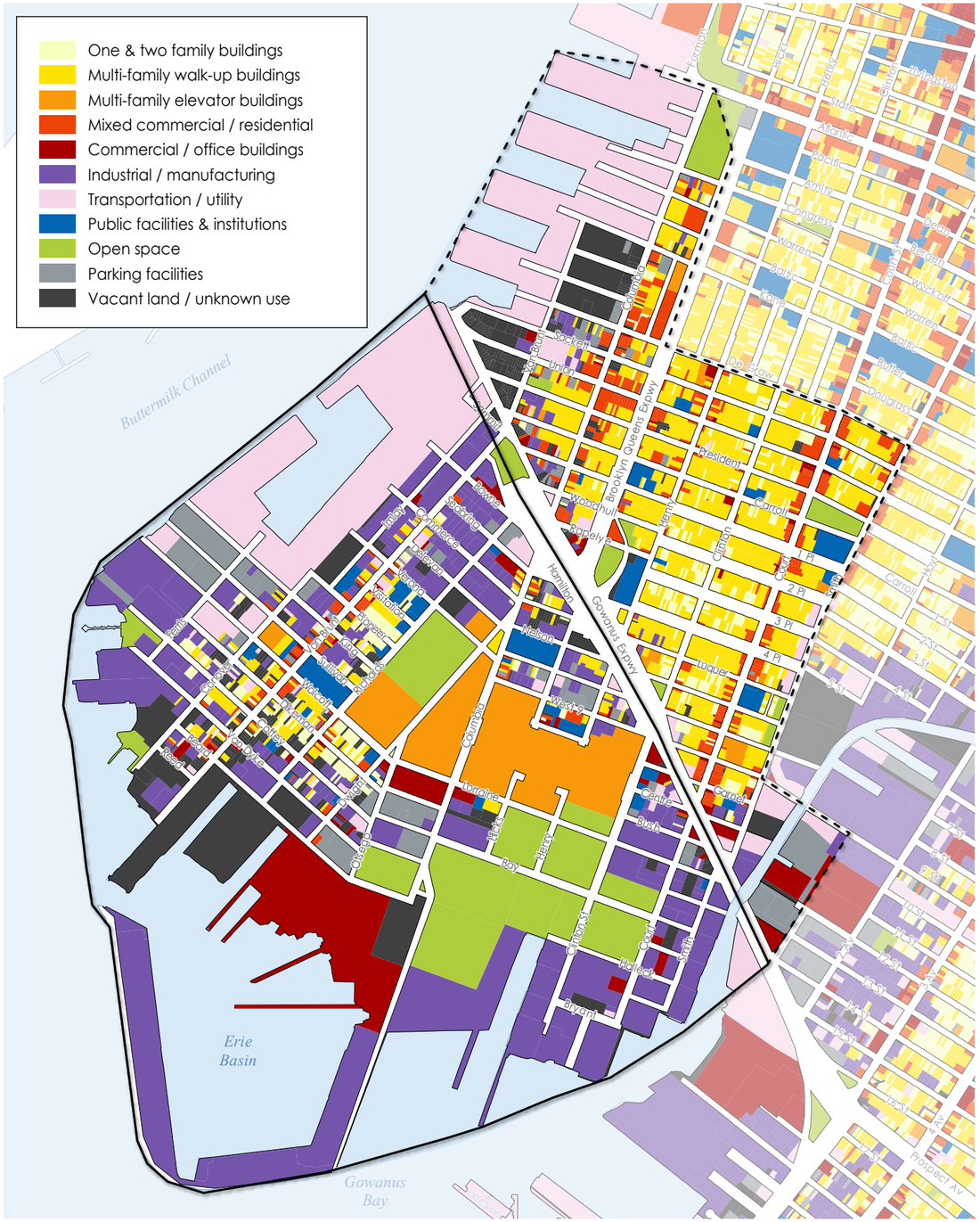


Figure 2-5: Land use in the study area.

Socioeconomic and Demographic Data

In the following sections we present several key statistics on the Red Hook study area using data from the Decennial Census (2000 and 2010), and the American Community Survey (ACS) which is administered every year.

Population
The population of Red Hook (currently Census tracts 53, 59 and 85) went through an extended decline from 1950 with approximately 21,000 residents, to 2000 with 10,215 residents. In recent years, the population has held steady and was measured at 10,227 in the 2010 census. From 2000 to 2010, while the distribution of the population has generally remained stable, there has been a shift of population away from the western waterfront and toward the southern waterfront. The study area's population is mainly clustered in Red Hook Houses where 6,948 residents lived in 2010. The remaining population is in the southwest of the neighborhood by the waterfront, with pockets of population density around Van Brunt Street and north of Red Hook Houses. The southeastern and northwestern areas of the neighborhood generally do not contain many residents as these areas are mainly dedicated to recreational, industrial and transportation uses.

Race
In 2000, the population of Red Hook was made up mostly of black and Hispanic people—43 percent and 47 percent respectively—most

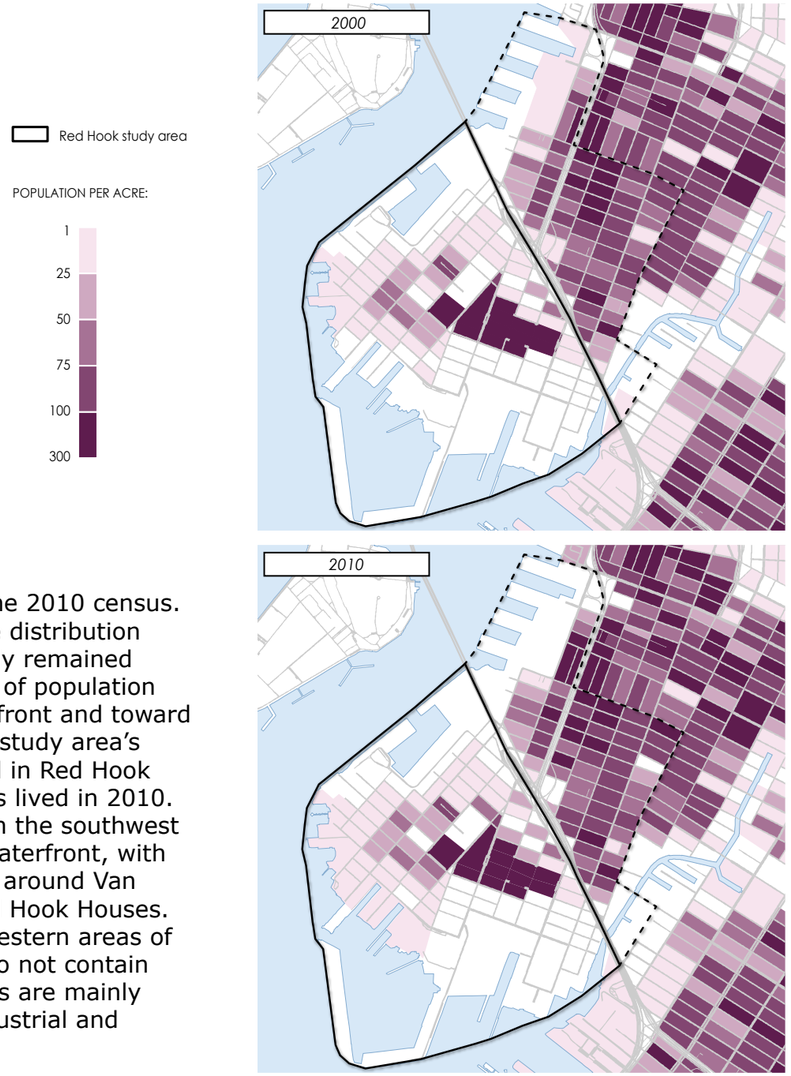


Figure 2-6: 2000 and 2010 Red Hook population density by census block.


Red Hook Houses

A Note About Census Data

The 2010 Census is different from previous censuses in several ways and changes the way we can extrapolate information from data. One of the reasons for this was the decision to remove the Long Form from the Census after 2000 and create a separate survey called the American Community Survey (ACS). The driver behind this choice was the difficulty in following rapidly changing trends using 10-year snapshots of the population. The ACS is mailed out continuously and provides yearly, three-year and five-year estimates of the survey. However, the sample size is significantly smaller than that previously used by the Long Form. The problem faced in this study is reliability, especially at smaller levels of geography where margins of error are significant. With that reliability issue in mind, the Census Bureau releases ACS data with the margins of error, which indicates the level of reliability of the given data. Since census data is released at a local level (e.g. census tracts and blocks) and at a larger level (e.g. PUMAs and counties) there was a need to find a geographic level that was somewhere between the county level and the 5-block area of a typical census tract. Our staff in the Transportation Division, with help and guidance from DCP's Population Division, have created estimates for some of Red Hook's 2010 ACS data by aggregating all of the census tracts within the boundary of our study area. This process allows us to better understand trends in the study area and compare them with the rest of the city.

Existing Conditions

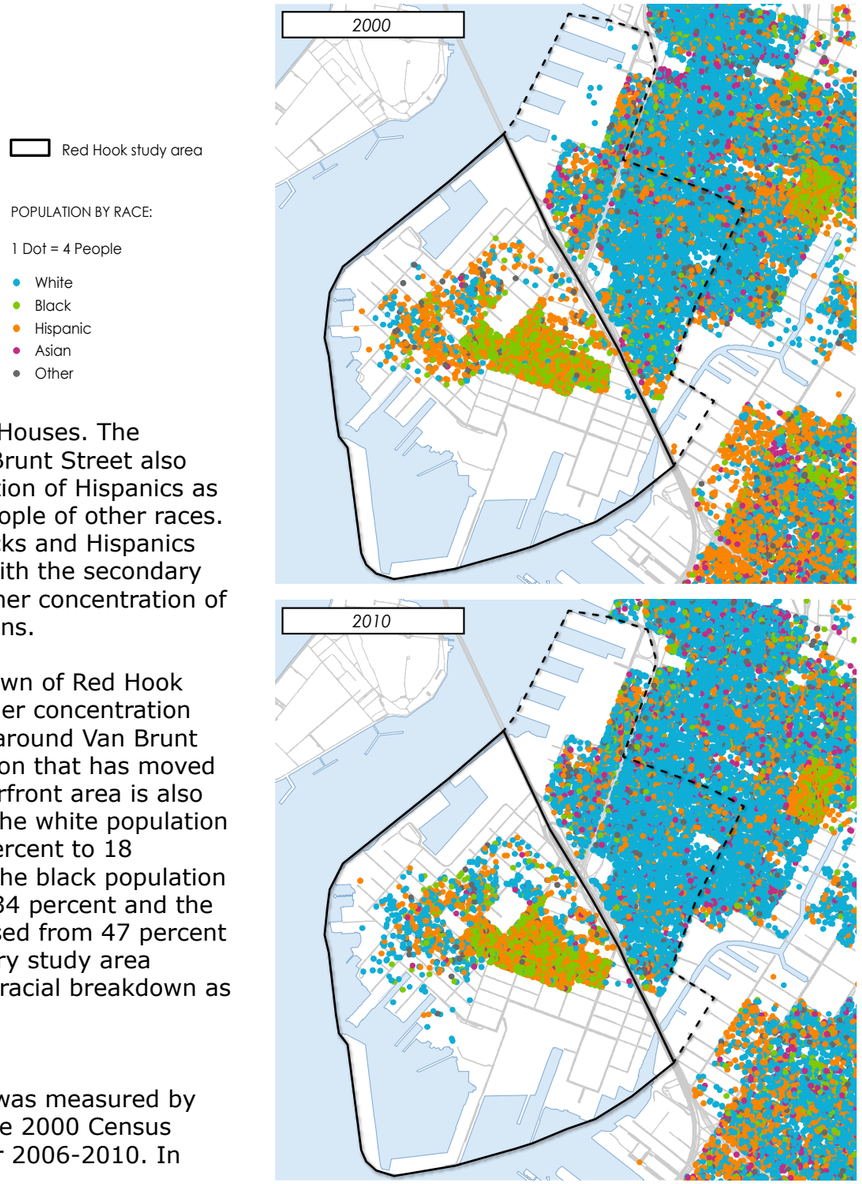


Figure 2-7: 2000 and 2010 racial breakdown of Red Hook population.

Figure 2-8: 2000 and 2010 household income in Red Hook by census tract.

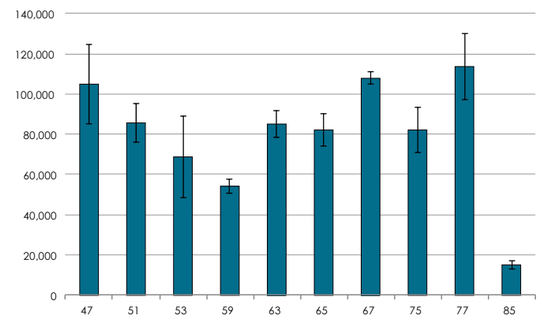


Figure 2-9: Margins of error for 2010 household median income in dollars by census tract.

of whom lived in Red Hook Houses. The area around southern Van Brunt Street also contained a high concentration of Hispanics as well as some whites and people of other races. The high percentage of blacks and Hispanics was a significant contrast with the secondary study area which had a higher concentration of whites as well as some Asians.

By 2010, the racial breakdown of Red Hook was characterized by a higher concentration of white people, especially around Van Brunt Street. Most of the population that has moved closer to the southern waterfront area is also white. From 2000 to 2010 the white population in Red Hook grew from 8 percent to 18 percent. At the same time the black population shrank from 43 percent to 34 percent and the Hispanic population decreased from 47 percent to 43 percent. The secondary study area continues to have a similar racial breakdown as in 2000.

Income

Median Household Income was measured by the Census Bureau using the 2000 Census and the subsequent ACS for 2006-2010. In 2000, the study area included two census tracts with median household income below $30,000: census tract 85, which consists of Red Hook Houses, and census tract 59 which includes some intensively clustered housing and many industrial properties. The other two tracts in the study area located along the waterfront and along Van Brunt Street, census tracts 55 and 57, had a median household income of between $30,000 and $60,000.

By 2010, household income figures increased significantly. While household income in Red Hook Houses remained below $30,000 per year, median household income in census tract 59 increased to between $30,000 and $60,000. Furthermore, census tract 53, which includes southern Van Brunt Street and the waterfront, had a median household income of between $60,000 and $90,000. Parts of the secondary study area had incomes of over $90,000.

Existing Conditions

Transportation Data

Means to Work
Means to Work by Residence is a measure of how people who live in Red Hook get to their workplaces. In 2000, approximately half of residents in three of four study area census tracts used public transportation as a means to work, while approximately three-quarters used public transit in census tract 55. In all four tracts, approximately a quarter used a car, truck or van as a means to work. In census tract 57, which included most of the southern portion of Van Brunt Street, approximately 13 percent of residents rode their bicycles to work.

Means to Work by Workplace is a measure of how people who work in Red Hook get to their workplaces. In 2000, in census tract 85, almost half of all workers used public transportation, the largest share in Red Hook. About a quarter of residents in this tract used a car, truck or van and just over a quarter walked to work. The other three census tracts in the study area had a different makeup, all with approximately a quarter of workers using public transportation and well over half of workers using a car, truck or van as a means to work.

As shown in Figure 2-11, figures for 2010 for workers living in Red Hook show that public transportation was still the most common means to work, and the share for this mode likely increased between 2000 and 2010 more

Transportation data in this section is displayed in map and chart form. It is also available in table form and can be requested from DCP's Transportation Division.

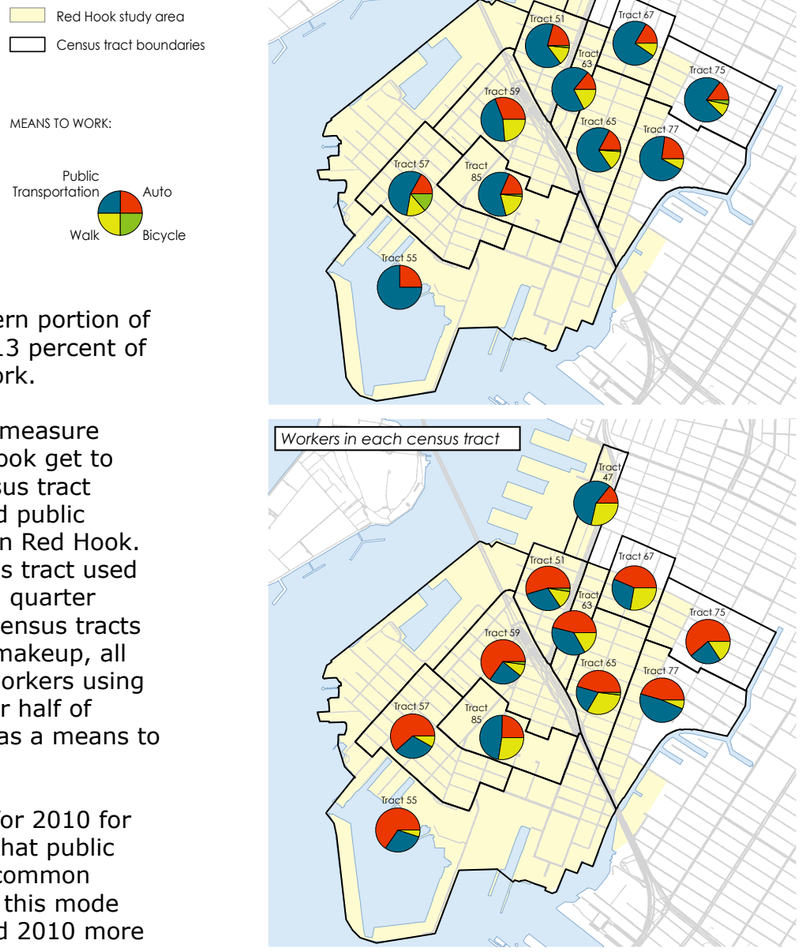


Figure 2-10: Means to work by residence and workplace in Red Hook in 2000

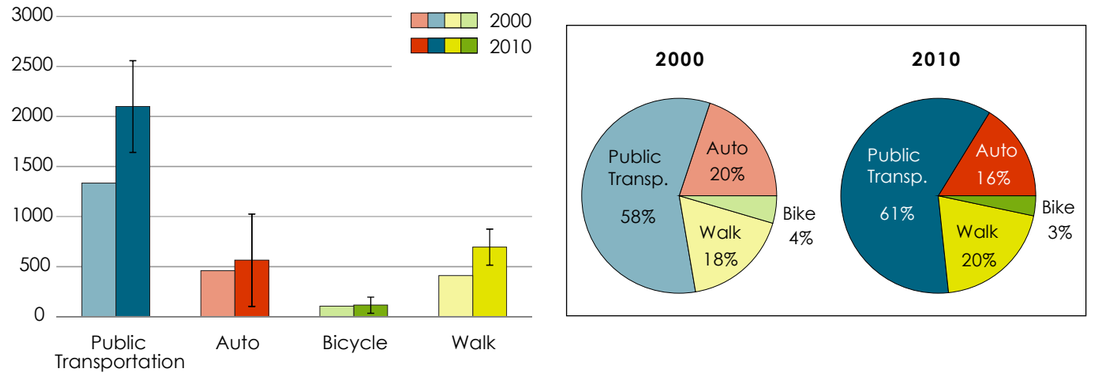


Figure 2-11: Means to Work by Residence in Red Hook

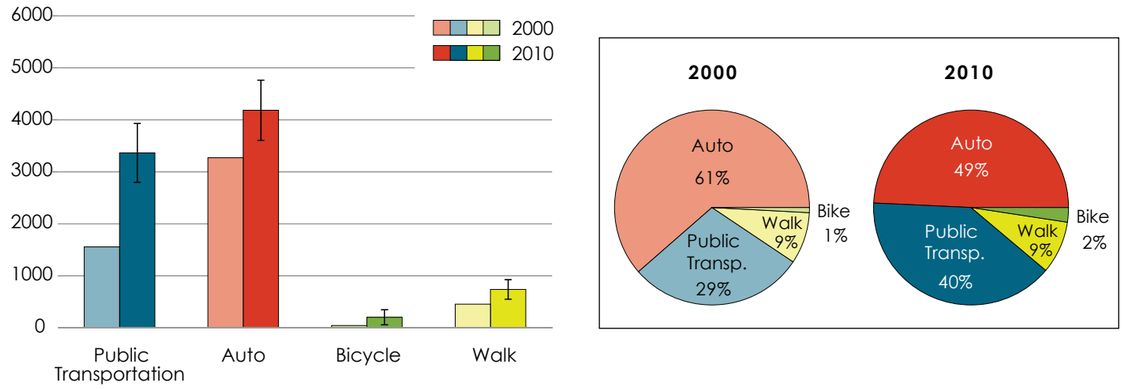


Figure 2-12: Means to Work by Workplace in Red Hook

than any other mode. As shown in Figure 2-12, for people traveling to work in Red Hook, ACS estimates suggest that public transportation as a means to work also increased significantly, replacing to a degree commuting by car, truck or van. (Please note the significant margins of error for Red Hook in 2010.) This shift could be a reflection of jobs generated by IKEA and Fairway, which were both added to the neighborhood between 2000 and 2010. These new workers may increasingly use public transportation to get to work.

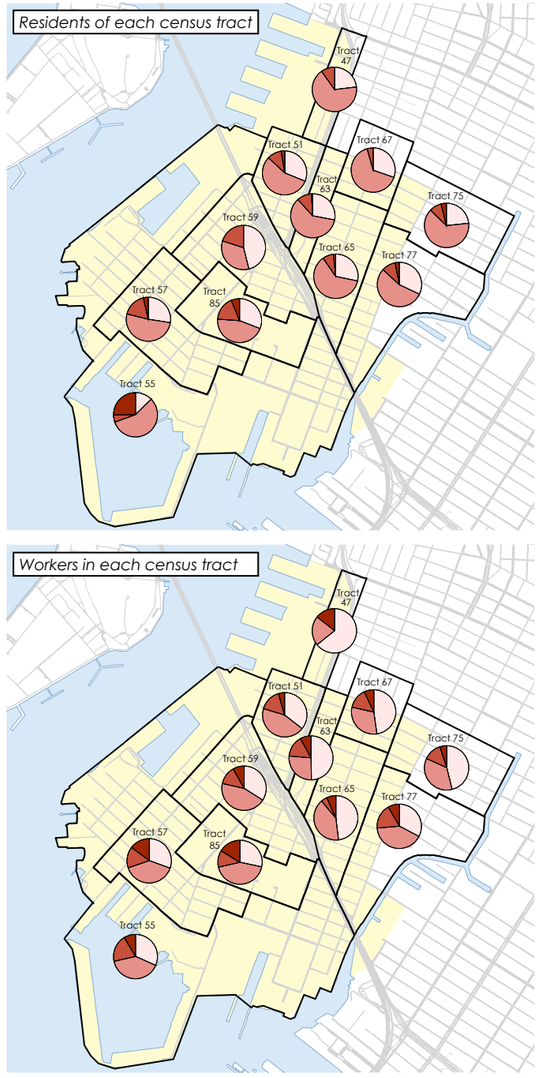


Figure 2-13: Travel Time to Work by Residence and Workplace in Red Hook in 2000

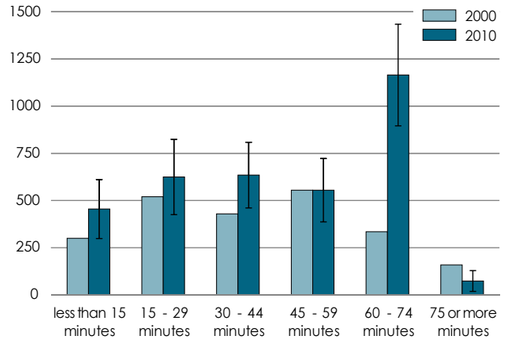


Figure 2-14: Travel Time to work by residence in Red Hook

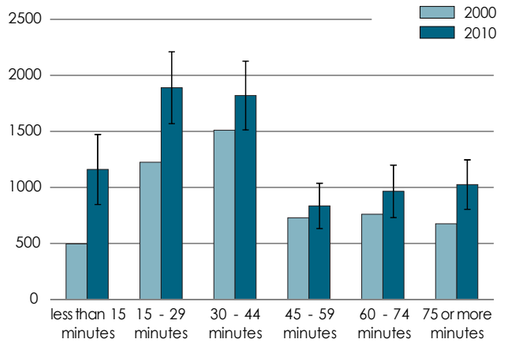
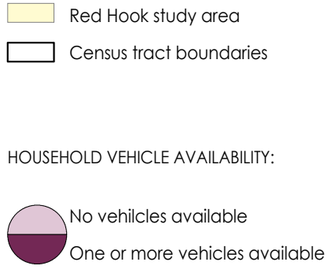


Figure 2-15: Travel Time to work by workplace in Red Hook

Travel Time to Work

Travel Time to Work by Residence in Red Hook measures the commute time for residents from Red Hook to their places of work. In 2000, most residents of Red Hook had commutes of less than an hour. In tract 55, around one quarter of residents commuted 90 minutes or more. In tracts 55, 57 and 85, around half of residents had commutes between 30 and 59 minutes. Between 2000 and 2010, residents with commutes of 60 to 74 minutes increased dramatically. (Please note the significant margins of error for 2010 data.)

Travel Time to Work by Workplace in Red Hook measures the commute times for people traveling into Red Hook for their work. In 2000, these figures were very similar to travel time for residents, but a higher proportion of Red Hook workers had commutes of over an hour.



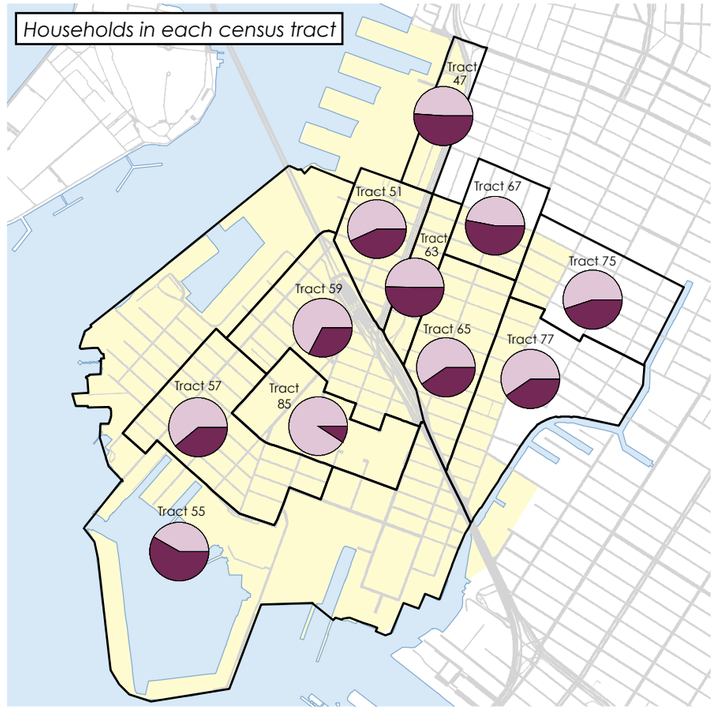


Figure 2-16: Vehicles Available by Residence in Red Hook in 2000

Still, unlike the secondary study area where most workers commute less than half an hour, in the primary study area, most workers had commutes of 30 to 59 minutes.

Vehicles Available

Vehicles Available in Red Hook measures the number of households that have access to a motorized vehicle. In 2000, over 90 percent of households in the census tract containing Red Hook Houses had no car available. This underscores that the bulk of the population, which was located in Red Hook Houses, relied on means other than their own cars (e.g. public transportation and walking) to get around. While the majority of people who live in census tracts 57 and 59 in the interior of Red Hook had no vehicles available, a majority of those in census tract 55 had one or more vehicles available. From 2000 to 2010, vehicles available data for Red Hook in general was little changed. As a whole, 25 percent of households in Red Hook in 2010 had at least one vehicle available as compared with 45 percent for New York City.

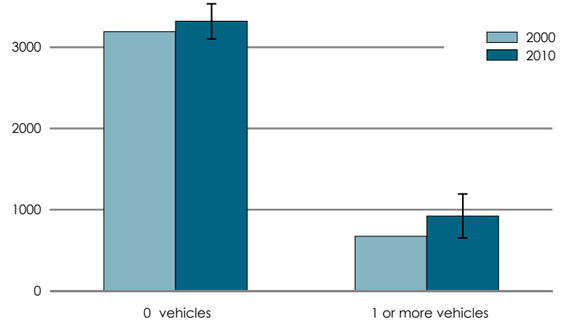


Figure 2-17: Vehicles Available for households in Red Hook

Transportation Networks

Roadways and Street Networks
The New York City street network is comprised of three types of roadways: limited access highways that join local communities with the metropolitan region, major roadways that connect local communities with adjacent local communities and local roadways that provide access to businesses and residences within local communities. A significant number of roadways in Red Hook including Conover and Beard streets are paved with cobblestones. Some of the cobblestone streets in Red Hook are in a good state of repair, while others are not.

Limited Access Expressway
Limited access highways connect the boroughs of New York City to each other, often via the region's major bridges and tunnels. The only limited access highway in the Red Hook study area is the Gowanus Expressway (I-478) which leads to the Hugh L. Carey Tunnel to Manhattan. This highway contains four lanes in each direction and provides links to Queens and the Bronx to the north, and to Staten Island via the Verrazano-Narrows Bridge to the south.

Major Roadways
Major roadways tend to have commercial activities, offices and public institutions. Many of these streets contain one or more bus routes. Hamilton Avenue, the northeastern boundary of the study area, is a major roadway that has a significant influence on Red Hook transportation infrastructure. This roadway, located below the elevated Gowanus Expressway, carries high traffic volumes and varies from one to four lanes in each direction along the study area boundary where it contains some commercial uses including a McDonald's restaurant and a gas station. When Hamilton Avenue crosses the Gowanus Canal on the southeastern edge of the study area, it spans the recently renovated Hamilton Avenue Bridge which, when occasionally raised, disrupts traffic flow to allow boats through the canal.

Van Brunt Street is a major north-south corridor, extending from Red Hook's waterfront to Hamilton Avenue and then connecting Red Hook to the Columbia Street Waterfront District. There is one moving and parking lane in each direction. Van Brunt Street is a retail destination both for the neighborhood and for visitors, with shops dominating the southern end and terminating at the Fairway grocery store. Further north along Van Brunt Street, the land uses become more industrial.
Clinton Street is a major north-south corridor that connects Red Hook to Downtown Brooklyn. It has one moving and parking lane in each direction and a planted center median between Bush Street and Hamilton Avenue. From the north, Clinton passes along the eastern edge of Red Hook Houses and travels through some local commercial, industrial and community facilities before going through Red Hook Recreation Area and ending near the Hess terminal at Bryant Street.

Other major roadways include West 9th, Smith and Court streets. All are one-way as they cross Hamilton Avenue.

Local Roadways
Bay Street is a local roadway that serves as an east-west connector on the eastern end of the neighborhood and runs mostly through Red Hook Recreation Area. It runs east from Otsego Street, starting off as a one-lane one-way street with a parking lane on each side, and at Columbia Street it becomes two-way with one lane in each direction and parking lanes on both sides.

Figure 2-18: Roadways in Red Hook study area.

Beard Street is a two-way street that runs along the southern edge of Red Hook on the neighborhood's western side between Otsego and Conover streets and contains parking lanes on both sides for part of its extent. The eastern end of Beard Street is partially paved with cobblestones and partially with asphalt.

Lorraine Street provides access from Hamilton Avenue into Red Hook and runs along the southern edge of Red Hook Houses and the northern edge of Red Hook Recreation Area. It is a one-way westbound street from Hamilton Avenue to Court Street and then it continues two-way to Otsego Street. It has one lane in each direction and parking lanes along most of its length, and contains local retail uses including grocery stores.

Columbia Street extends from Red Hook to the Columbia Street Waterfront District, interrupted by the approach to the Hugh L. Carey Tunnel as it connects these two neighborhoods. It contains one moving and parking lane in each direction. Toward the center of the study area, it runs though the middle of Red Hook Houses and terminates on the pier that forms the Erie Basin. At the north end of Columbia Street in Red Hook, some pre-existing non-conforming commercial and residential uses exist among some larger industrial uses. North of Hamilton Avenue, Columbia Street is the local commercial corridor for the Columbia Street Waterfront District, with restaurants, retail and residential land uses.

Truck Routes

The New York City Truck Route Network is comprised of Local Truck Routes and Through Truck Routes. Through Truck Routes include mainly major urban arterials and highways and are used by trucks that do not have an origin or destination within a local area or borough. The only Through Truck Route near Red Hook is the Gowanus Expressway. Local Truck Routes are designated for trucks with an origin and/or a destination within a local area or borough. This includes trucks that are traveling to make a delivery or for loading or servicing. Trucks are advised to only use non-designated routes in order to travel between their origin or destination and a truck route.

The Local Truck Route in Red Hook runs around the exterior of the neighborhood, largely following the industrial and formerly industrial areas. The truck route runs down Van Brunt Street, serving the industrial uses on the northern end of street and on its western side. It also serves many of the local retail and leisure businesses on Van Brunt. The route continues down Delevan Street, serving the industrial businesses in the northern section of the neighborhood. In the southern section of the study area, the designated local truck route crosses the neighborhood on Beard and Bay streets serving Fairway and IKEA and connecting to Smith and Court streets to serve industrial businesses near the Gowanus Canal.

On-Street Parking Regulations

The on-street parking regulations within Red Hook are comparable to those found within similar mixed-use neighborhoods in New York City. While there are differences in day and night regulations, the most commonly found regulations are for New York City Department of Sanitation street cleaning, curb use, metered parking and bus stops. In general, on-street parking is governed by parking signs that regulate parking either during a specific time of day or on a specific day of the week. These regulations usually correspond to street-cleaning periods. Curbside regulations also include "No Parking Anytime" and "No Standing" signs, pertaining to a specific use such as a school or a church.

Daylighting is a street design practice that prohibits parking near corners in order to increase visibility for drivers and pedestrians and allow for an easier execution of wide right turns, especially for large vehicles. Red

Figure 2-19: Local and Through Truck Routes in the study area.

Hook's long industrial history, and intensively clustered housing, has generated a consistently high volume of large trucks, school buses and NYCT buses. Daylighting is practiced using "No Standing Anytime" signs, located near many corners throughout the study area.

Off-Street Parking

There are many properties in Red Hook that are used for off-street parking. The vast majority of these properties are used as accessory parking lots, commercial vehicle parking, taxi yards and trailer storage areas. According to field observations, there are no accessory off-street parking locations in Red Hook Houses or the adjacent park properties. In addition to the above-mentioned uses of off-street parking, there are several other uses in the study area including:

- Five junkyards along the waterfront, with three on the western side and two on the eastern side.
- Eight yards filled with abandoned vehicles, clustered along the western side of the study area on the streets off of Van Brunt and Conover streets.
- Several large school bus depots near the western waterfront.
- A large number of bus depots spread throughout the study area, with no particular areas of concentration.
- A large site used for maintenance and storage of prop vehicles for renting to films in the northern portion of the neighborhood.

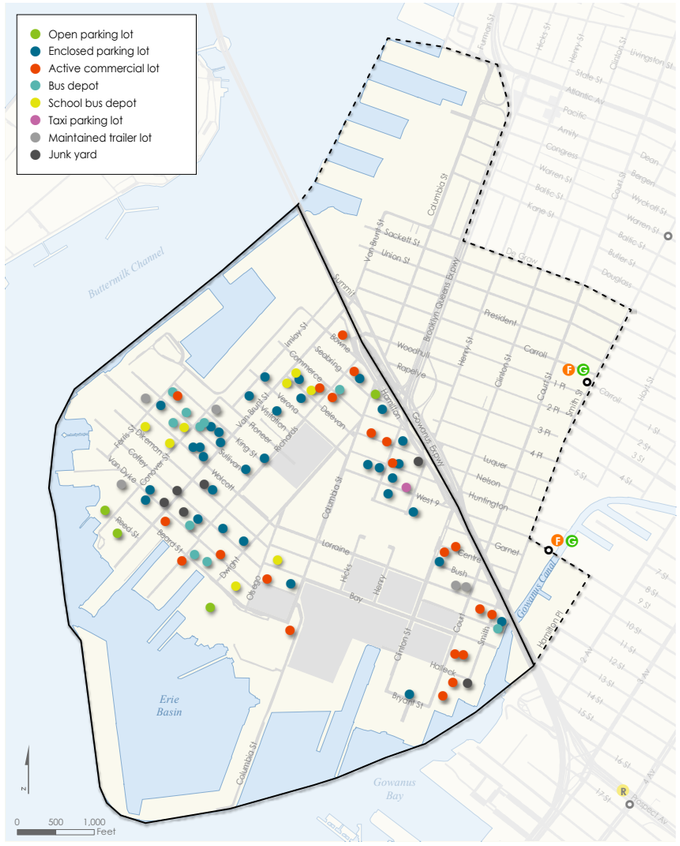


Figure 2-20: Off-street parking in the study area.

Pedestrian Conditions

As described above, Red Hook contains several north-south and east-west pedestrian thoroughfares. There are also some small clusters of streets around major destinations throughout the neighborhood that are heavily used by pedestrians.

Major north-south pedestrian thoroughfares include Van Brunt, Richards, Columbia and Clinton streets. Van Brunt Street is a popular destination from both within Red Hook and from other parts of the city because of the small shops, restaurants and art galleries located along its southern extent. Similar businesses on neighboring streets, including Conover Street, benefit from Van Brunt Street foot traffic and stops made by the B61 bus, which runs most of its length. Along Richards Street, there is a public school, a church, Coffey Park, and the western edge of Red Hook West Houses. Columbia Street, which runs through Red Hook Houses, is an important corridor for pedestrians who commute between Red Hook Houses and Lorraine Street as well as those crossing between Red Hook East and West Houses. Clinton Street is used by pedestrians commuting between Red Hook Houses and locations across Hamilton Avenue, including subway stations and retail destinations.


Lorraine Street

There are three major east-west pedestrian connectors: Bay, Lorraine, Wolcott and Centre streets, and Centre Mall. Bay Street runs along the southern portion of Red Hook through the collection of blocks that form Red Hook Recreation Area, providing access to its ball fields, pool and running track. Lorraine Street, which runs the length of the eastern portion of the study area, also provides access to Red Hook Recreation Area, and contains a number of key retail destinations for residents of Red Hook Houses, including small grocery stores. Pedestrian traffic is also generated by the B57 and B61 buses which run along Lorraine. In the western portion of Red Hook, Lorraine turns into Wolcott Street, which connects Red Hook Houses to Van Brunt Street and provides access to Patrick F. Daly school and the Red Hook Senior Center. Wolcott Street also serves as a connection from the western waterfront and nearby Valentino Pier to the rest of the neighborhood. Centre Mall, which runs through Red Hook East Houses, is a pedestrian-only street with a grassy median in the center and grass and trees on the sides. This street allows residents to access Centre Street which crosses Hamilton Avenue in the East and Columbia Street and Red Hook West Houses to the west.

The area north of Red Hook East Houses and south of Hamilton Avenue contains several streets that are heavily used by pedestrians commuting from Red Hook Houses to destinations across Hamilton Avenue. These include Mill, West 9th, Hicks and Huntington streets. There is also a pedestrian bridge between Hicks and Nelson streets that crosses Hamilton Avenue and the Gowanus Expressway, connecting the neighborhood of Carroll Gardens with Red Hook. There is a school on each side of this bridge.

Fairway and IKEA are major regional retail destinations that bring pedestrians into Red Hook. Fairway is located at the southern end of Van Brunt Street, and serves as an anchor for nearby retail, art galleries, and entertainment destinations. It also is the site of the Water Taxi dock that was used during the summer of 2013 and has a waterfront open space that is open to the public. Van Dyke and Beard streets are used heavily by pedestrians in this area due to the access to the B57 and B61 buses and the ferry service at IKEA. The Waterfront Public Access Area (Erie Basin Park) located just south of IKEA is an important pedestrian destination that is served by Columbia and Beard streets.

Bicycle Routes
The New York City, the bicycle network is comprised of three basic types of bicycle paths: Protected Bicycle Paths, Bicycle Lanes and Shared Lanes. Protected Bicycle Paths include greenways with exclusive rights-of-way, bike lanes located between curbs and parked cars and bike lanes separated from the rest of the street by physical barriers. The greenway is a particular kind of protected bicycle path which is found in parks and along the waterfront. Bicycle Lanes are delineated by painted lines in the street located between vehicle lanes and parking lanes or adjacent to the curb when parking is not permitted. Shared Lanes are bike routes that share the same space with cars and are marked either with signage indicating the presence of a bicycle route or with "sharrows" which are chevrons painted on the street.

In Red Hook, the bike network is continuously being expanded with new designated bike routes. Currently, Court, Smith and Clinton streets have bike routes (a combination of dedicated and shared lanes) leading into and out of Red Hook on the neighborhood's eastern side. Bay Street contains a shared lane connecting eastern Red Hook with Columbia Street. The Brooklyn Waterfront Greenway, which extends south through the Columbia Street Waterfront District, enters Red Hook on Van Brunt Street. Limited sections of this greenway have been built so far. Columbia Street contains a bike lane and a shared lane running from West 9th Street down to the Columbia Street Esplanade. This Brooklyn Waterfront Greenway extension connects to the Greenway in Erie Basin Park, next to IKEA, which runs to Beard Street. The Bay Street shared bike lane extends partially down Beard Street ending at the cobblestone portion of the roadway.

The New York City Department of Transportation (DOT) plans to extend the Brooklyn Waterfront Greenway through portions of Red Hook. The plan is described in more detail in Appendix II.

Crash Data
A crash analysis was performed on Red Hook to determine if there are high-crash locations that need to be addressed. The results were divided into two categories: total crashes and bicycle and pedestrian crashes. The crash data presented here is cumulative from 2009 to 2011. The results of the analysis indicate that the parts of Red Hook along the waterfront did not have high numbers of crashes over the three year period studied. A likely explanation is that the traffic volumes in these areas are low. Most of the intersections within the study area that do have significant numbers of crashes, especially for bicycles and pedestrians, are clustered along Hamilton Avenue and near Red Hook Houses and P.S. 15 which is located on Van Brunt and Sullivan streets.

The location with the highest number of crashes is the intersection of three streets: Clinton Street, West 9th Street and Hamilton Avenue. From 2009 to 2011, this location saw 31 crashes, including one bicycle and three pedestrian crashes. Hamilton Avenue,

Figure 2-21: Red Hook bicycle network.

a major regional corridor, carries significant vehicular volumes and several minor arterials terminate at Hamilton with irregular geometry, thereby providing conditions for vehicular conflicts. High volumes of pedestrians use this intersection to walk to and from the Smith-9th Streets train station on the opposite side of Hamilton Avenue. The intersection of Lorraine and Smith streets at Hamilton Avenue was the site of 20 crashes, with three involving cyclists or pedestrians between 2009 and 2011. This intersection is characterized by irregular street geometry, long crossing distances and high volumes of turning vehicles. It also provides access to the Smith-9th Streets train station. Other high crash intersections along Hamilton Avenue include Centre and Court streets (15 crashes) and Huntington Street (18 crashes). The intersection of Hamilton Avenue and Centre Street was the location with the most crashes involving pedestrians, with five such crashes.

Several high-crash intersections are also located around Red Hook Houses which generates high volumes of pedestrians. The intersections near Red Hook Houses including Clinton and West 9th streets, and Mill and Centre streets, all had bicycle or pedestrian crashes from 2009-2011. Lorraine and Bay streets between Clinton and Columbia streets had several moderate crash intersections with a high proportion involving bicycles or pedestrians. Along this corridor, Red Hook Houses, the Red Hook Recreation Area and local retail establishments generate high pedestrian volumes.

The intersection of Sullivan and Van Brunt streets is also a site of high crash frequencies and the site of five bicycle crashes, the most in the study area. It is located on a neighborhood commercial corridor and is near P.S. 15, the Patrick F. Daly School.

Hamilton Avenue at West 9th and Clinton Streets

A Note on Crash Data

The crash data is recorded by the New York Police Department (NYPD) and sent to the New York State Department of Motor Vehicles (DMV). The DMV sends the crash data to the New York State Department of Transportation (NYSDOT), which records it in its ALIS (Accident Location Information System) database. ALIS is a web-based system that visually displays a crash data query in a geographic information system format. The New York City Department of Transportation has geocoded the crash data provided by NYSDOT. To perform the analysis for this project, DCP used NYCDOT's database of geocoded crash locations.

Figure 2-22: Total crashes in Red Hook from 2009 to 2011.

Public Transportation and Ferries

Subways
Red Hook is only peripherally served by the New York City subway system. The Metropolitan Transportation Authority, New York City Transit (NYCT) F and G subway routes hug the eastern edge of the secondary study area along Smith and 9th streets, with two stops near Hamilton Avenue: Carroll Street in Carroll Gardens and Smith-9th Streets in Gowanus. An extensive rehabilitation of the elevated Culver Viaduct that carries these two subway routes across the Gowanus Canal was recently completed. This work entailed the Smith-9th Streets Station being rehabilitated for the first time since it opened in 1933. As a result, the station was closed for two years and reopened in the spring of 2013. According to a press release on the MTA's website, "At nearly 88 feet, Smith-9th Streets is the highest subway station in the world."[3] Below are descriptions of the F and G subway lines.

train service runs between Stillwell Avenue-Coney Island, Brooklyn and 179th Street, Jamaica, Queens. (On weekdays, some trains terminate at Kings Highway.) F service, which runs express along the Queens Boulevard Line and local in Manhattan and Brooklyn, operates at all times. F trains are scheduled to run every 4 to 7 minutes in both directions during AM peak hours and at 4-to 6-minute intervals during the PM peak hours. Weekday midday service is generally scheduled at 6- to 9-minute intervals, and Saturday midday service is scheduled at 10-minute intervals.

train service runs from Court Square, Queens to Church Avenue. The service operates at all times. Brooklyn-bound G trains are scheduled at 6- to 9-minute intervals during the AM peak and 8- to 11-minute intervals during the PM peak. Manhattan-bound G trains are scheduled at 5- to 10-minute intervals during the AM peak and 7- to 10-minute intervals during the PM peak. Weekday midday service runs at 6- to 12-minute intervals. Saturday midday service is scheduled for 10-minute intervals.

Buses
Prior to 2009 the broader Red Hook study area was served by at least five routes (B37, B61, B71, B75, B77), but due to budget cutbacks, service in the area was reduced. Currently, two NYCT bus routes serve the primary study area: the B57 and B61. The B63 bus route terminates at the northern edge of the secondary study area, along Atlantic Avenue, but does not run within the study area boundaries. Below are descriptions of the two bus routes serving the Red Hook Study Area.

B57
This route runs between the IKEA at Beard and Otsego streets in Red Hook, and Flushing Avenue and 61st Street in Maspeth Queens, via Downtown Brooklyn and Flushing Avenue. This route was extended in January of 2013 to run within the primary study area due to local demand. Within the study area, the extended B57 route primarily runs along Lorraine Street. In January of 2014, the northbound B57, along with the eastbound B61, were rerouted in Red Hook. While both buses previously turned right where Lorraine Street meets Court Street and turned back up Smith Street to exit Red Hook, the new route has buses

[3] Metropolitan Transportation Authority. "Brooklyn's Smith-9th Streets F/G Station Returns to Service," April 26, 2013. http://new.mta.info/press-release/nyc-transit/brooklyn%E2%80%99s-smith-9th-streets-fg-station-returns-service

Figure 2-23: Bus network in and around the study area.

turn left where Lorraine Street meets Clinton Street and exit Red Hook at the recently built Mill Street crossing at Hamilton Avenue. This new streamlined route now provides faster connections to the Smith-9th Streets train station from Red Hook.

The B57 schedule generally adheres to 15-minute headways in both directions, but has 12- to 18-minute headways Queens-bound during the AM peak. Weekday midday service operates at 15- to 20-minute intervals, and evening service runs at 27- to 34-minute intervals in both directions. Saturday midday service operates at 19- to 21-minute intervals. As of August 2013, five buses are scheduled Red Hook-bound during its peak service hour of 7:00am to 8:00am weekdays. There is no identifiable peak hour Queens-bound; service runs at three to four buses per hour throughout most of the day. Within the study area, B57 service does not run between approximately 1:45am and 4:45am weekdays, 1:15am and 5:00am Saturdays, and 1:30am and 5:00am Sundays.

B61
The B61 runs between 20th Street and Prospect Park West in Windsor Terrace and Smith and Livingston streets in Downtown Brooklyn. Within the Red Hook study area, B61 service primarily operates along Lorraine, Van Brunt, Beard and Van Dyke streets. The B61 now has MTA Bus Time, a real-time bus tracking service that lets riders know where the buses are along their route and can be accessed via the internet or mobile devices. Downtown Brooklyn-bound B61 buses are scheduled for 7- to 12-minute headways during AM peak hours and for 8- to 12-minute intervals during PM peak hours. Windsor Terrace-bound buses are scheduled for 8- to 12-minute headways during both AM and PM peak hours. Weekday midday service runs at 10- to 12-minute intervals in both directions. Downtown Brooklyn-bound evening service is scheduled for 14- to 27-minute headways; Windsor Terrace-bound buses are scheduled for more frequent 14- to 18-minute headways. Saturday midday service is scheduled for every 12 to 16 minutes Downtown Brooklyn-bound and for every 11 to 15 minutes Windsor Terrace-bound. As of August 2013, eight Downtown Brooklyn-bound buses were scheduled within the study area during its peak service hour of 7:00am to 8:00am, and eight Windsor Terrace-bound buses were scheduled during the peak service hour of 5:00pm to 6:00pm. B61 service runs at all times.
B63

The northernmost portion of the secondary study area is also served by the B63 which runs between Brooklyn Bridge Park and Bay Ridge via Atlantic and 5th Avenues. Transfers are possible between the B63 and the B57 and B61 routes along Atlantic Avenue. The B63 operates at all times.

IKEA Shuttle Bus
IKEA operates a free shuttle bus that runs between the store on Beard and Otsego streets and three NYCT subway stations. The Smith/9th Shuttle Route runs from IKEA to the Smith-9th Streets station and the 4th Avenue station in Park Slope. The Borough Hall Shuttle Route runs from IKEA to the Borough Hall station in downtown Brooklyn. The bus runs daily every half hour from 11am to 10:10pm

Express bus routes
Nine express bus routes – the BM1, BM2, BM3, BM4, X17, X27, X28, X37 and X38 – run to and from Lower and Midtown Manhattan via the Gowanus Expressway and Hugh L. Carey Tunnel but make no stops within the Red Hook study area. These nine routes fan out across much of southern and southeastern Brooklyn.

IKEA Express Shuttle

Ferries
Red Hook is currently served by the New York Water Taxi-operated IKEA Express Shuttle. During the summer of 2013 a second New York Water Taxi ferry stop was available on weekends at Fairway's pier.

The IKEA Express Shuttle runs between Pier 11 near Wall Street in Manhattan and IKEA Dock near the store on the southern shoreline of Red Hook. It runs every 40 minutes from 2pm to 8pm on weekdays and costs $5 each way. If a rider spends $10 or more at IKEA and shows his or her New York Water Taxi ticket, he or she will receive a $5 credit on an IKEA purchase. On the weekend, this service runs every 40 minutes from 11:20am to 9:20pm and is free of charge. Children under 12 years of age ride the shuttle for free.

The second ferry from Lower Manhattan to the Red Hook waterfront began operating on May 25, 2013 and ran through Labor Day, September 2, 2013. This ferry ran from Pier 11 at Wall Street, to the ferry dock just outside Fairway at the southern tip of Van Brunt Street and then on to IKEA. It ran every 25 minutes only on weekends from 10am to 9pm and the service was free of charge.

RECOMMENDATIONS

The results of community outreach, data analysis and field research show that Red Hook is a neighborhood that in general does not have good connections with most modes of transportation and that its residents urgently want improvements to this condition.

Analysis of the available data on the populations that live and work in Red Hook shows that travel times to work are generally high, much of the residential population has no access to a motor vehicle and much of the residential population relies heavily on public transportation to commute. Compounding this is the fact that many households in Red Hook live at incomes below the poverty level, which accentuates the effects of the neighborhood's transportation isolation because of the need for its population to access social services and possibly commute to multiple jobs.

As Red Hook is a neighborhood with a significant number of residents who either walk to work or school or walk long distances to public transit, the widespread poor conditions of the pedestrian infrastructure, especially along Hamilton Avenue, are a serious concern. Furthermore, the high crash rates at certain locations in the neighborhood indicates the presence of potentially unsafe conditions for roadway users.

These existing conditions point to the general need for improved transportation infrastructure—largely for pedestrians—as well as the need for additional transportation options to make commuting to the rest of the city easier and more efficient for the local population. DCP can provide its partners at NYCDOT with information necessary to improve pedestrian and bicycle infrastructure and roadway conditions. The widespread community sentiment in favor of a direct bus connection to Manhattan via the Hugh L. Carey Tunnel is an important place to start when considering options for greater transit access into and out of Red Hook. In the recommendations sections that follow, we outline our basic proposals for making these improvements.

Figure 3-1: Meetings with various community stakeholder groups helped direct the focus of the recommendations. (See Appendix I.)

Improvements to Pedestrian Conditions

In order to fully understand the pedestrian environment in Red Hook, we undertook a comprehensive survey of all pedestrian facilities in the primary study area. During this effort, we collected data on all safety issues, damaged pedestrian facilities, areas of poor maintenance and unpleasant streetscapes. This data was recorded on maps for use by the community. In the course of our research we found that different areas of Red Hook are used by pedestrians in different ways. Accordingly, we divided the area up by regions: north, southern Van Brunt Street, western waterfront, northern Van Brunt Street, Southwest, South and East. In the sections that follow, we contextualized the pedestrian environments in each of these regions in order to create a basis for the community to advocate for improvements and other changes to the streetscape.

Beard Street

The New York City Department of Transportation's pedestrian infrastructure inspections are complaint-based. If an inspection reveals damage to pedestrian infrastructure, NYCDOT issues the owner of the property at the location a "Notice of Violation," which gives the owner 45 days to make repairs. This is not a fine. If a repair is made, the owner can request a dismissal and the violation will be removed. If the owner prefers, he or she can defer to a city contractor to make the repairs. The contractor will then bill the owner. If an emergency condition exists such as an impassable or collapsed sidewalk, the city allows ten days instead of 45.

Figure 3-2: North pedestrian section of Red Hook.

North Pedestrian Section

The north-central part of Red Hook, shown in Figure 3-2, is an important area for pedestrians who commute from Red Hook Houses to destinations across Hamilton Avenue and to destinations on these streets themselves. The pedestrian bridge between Luquer and Nelson streets is one of the few crossings over Hamilton in this area (see chapter X, Pedestrian Bridge). On Hicks and Huntington streets is P.S. 676 and Summit Academy Charter School in the same building. In addition to Red Hook Houses, there are several residential buildings in this area interspersed with warehouses, garages and other industrial uses as well as small grocery stores and a supermarket on Mill Street just north of Red Hook East Houses. As these are important local destinations, sidewalks and pedestrian crossings in this area are used extensively. It is essential that the streets in this area as well as the pedestrian bridge over the highway be safe and usable by students and their parents as well as other commuters in the area. When observing these streets, we found a number of impediments to pedestrians such as broken pavement, excessive trash, dirty sidewalk surfaces, lack of street lighting, overgrown weeds and cars and trucks parked on sidewalks. The prevalence of these issues reflects a generally neglected streetscape that, at best is unpleasant and at worst, is dangerous.

One example is Hicks Street between Huntington and West 9th streets. The northern half of the western sidewalk is located next to an unlicensed parking lot whose overgrown weeds invade the sidewalk. Trash covers the entirety of this area including the grass-filled parking strips next to the parking lot. The southern half of the sidewalk is generally barren, bordering a garage and cars and pick-up trucks can be found parked on the sidewalk. The northern half of the eastern sidewalk borders an auto-repair shop and cars often take up the entirety of the space on this side, forcing pedestrians to use the western sidewalk or the street. The southern half of this sidewalk is occupied by the Red Hook Initiative community center that is heavily used by neighborhood children for activities and tutoring.

Another problematic area for pedestrians is the collection of sidewalks next to the pedestrian bridge. The bridge itself empties onto Hamilton Avenue in back of a nearly empty triangular lot owned by the Departments of Environmental Protection (DEP) and Parks and Recreation (DPR) and dedicated to a water tunnel. Pedestrians who want to access the schools or other uses on Hicks Street must walk north or south on Hamilton Avenue to get around this lot. This triangle is a fairly barren area and, while it is used heavily, pedestrians usually come across alone or in small groups which can leave them vulnerable to crime. The wide sidewalks bordering the triangle area are also nearly bereft of trees and vegetation except for the weeds growing out of the lot.

The frequently-used streets adjacent to the north side of Red Hook East Houses, 9th and Mill streets, have similar problems including dirty sidewalks with cracked pavement and weeds. The north side of 9th Street lacks trees and other vegetation. Mill Street, between Hicks and Henry streets, has smooth, clean pavement and several trees outside PAVE Academy Charter School on the eastern half, but, in stark contrast, the western half of Mill Street outside the supermarket and deli is dirty and treeless.

Figure 3-3: Southern Van Brunt Street pedestrian section of Red Hook.

Southern Van Brunt Street

The southern portion of Van Brunt Street, shown in Figure 3-3, is a compact residential area with a vibrant commercial strip. Since Van Brunt Street is a major north-south thoroughfare with a bus route and is bounded on both sides by residential streets, this commercial corridor sees significant volumes of pedestrian traffic at all hours. Many restaurants, grocery stores, pharmacies as well as the Fairway supermarket are located along this corridor, and pedestrian accommodations need improvement throughout. There are no traffic control devices, including stop signs and traffic lights, making street crossings difficult for children, pedestrians with mobility and visual impairments, the elderly and those with difficulty judging both vehicle speed and distance.

Vegetation control is a widespread issue along this corridor, with brush and other vegetative growth in the sidewalk right-of-way near many vacant and underutilized properties. In some locations the growth is limited to small numbers of weeds growing in sidewalk cracks while in other locations, much more significant growth prevents safe passage for people with mobility issues. A sample location with overgrowth on a high-volume pedestrian corridor is the southwest corner of Van Dyke and Van Brunt streets.

Damaged, missing and substandard sidewalk conditions can be found along Van Brunt Street and within the general area of this corridor. For example, Beard Street from Van Brunt Street to IKEA is in extremely poor condition, with acceptable portions giving way to missing sections, damaged areas, gravel, haphazardly placed concrete planters and portions of the sidewalk closed due to extreme damage.

Figure 3-4: Western Waterfront pedestrian section of Red Hook.

Western Waterfront Area

The western waterfront area, shown in Figure 3-4, generally serves the businesses located near the waterfront. While most of these are warehouses, parking lots and small workshops, there are also small residential properties sprinkled throughout. Valentino Park, an important destination for pedestrians, cyclists and drivers, lies to the southwest of this area. Aside from the park, the area does not see a significant amount of pedestrian activity and its sidewalks are in very poor condition. In order to increase access to the waterfront, this area would need to see significant pedestrian improvements.

Ferris Street is an important north-south connector in this section of Red Hook and several of its blocks are missing sidewalks altogether. Weeds have taken over previously existing sidewalks, which have completely turned to gravel making them virtually impassable. Several of the east-west streets have this problem as well. These east-west –streets tend to end in dead-ends at the waterfront, which are generally derelict and uninviting. Wolcott Street is an important example of this situation with a barbed-wire fence blocking access to the waterfront and trash and weeds dominating the street. There is also a dearth of street trees in this area which may be convenient for the industrial businesses that use the sidewalks to park trucks and other work vehicles, but is not conducive to pedestrian use. Another factor that makes this an uninviting environment for pedestrians is the lack of pedestrian crossings. Trucks dominate the road here in order to access the warehouses spread throughout, so greater pedestrian access would require the introduction of safety measures including stop signs, traffic lights and crosswalks.

Figure 3-5: Northern Van Brunt Street pedestrian section of Red Hook.

Northern Van Brunt Street

The northern Van Brunt Street area, shown in Figure 3-5, contains several large industrial buildings occupied by active manufacturing and industrial uses (including large bus repair shops, furniture and food manufacturers) and warehouses for food, construction, and other materials. In spite of the large industrial buildings that dominate portions of the area, it is mixed-use in nature, containing some offices, community facilities and residential buildings, and therefore generates significant pedestrian volume. Also adding to pedestrian volumes at the northern edge of this area are Red Hook's two hotels.

The main pedestrian node of the area is Coffey Park, which is located near Red Hook Houses and row houses on Pioneer Street and Visitation Place. Centrally located in the neighborhood and near Visitation Church, this park is frequently used for community events and gatherings. A secondary pedestrian node is Harold Ickes Playground, located at the intersection of Van Brunt Street and Hamilton Avenue, on top of the Hugh L. Carey Tunnel entrance. The park is used by dog walkers, exercisers and workers taking lunch breaks on the benches. As evidenced by tire tracks, the portion of the park to the south is apparently also used as illegal parking or for vehicle turnarounds. This southern portion of the park, although it has benches, is not well used by park visitors.

Van Brunt Street is the main commercial corridor in this section of Red Hook, with the northern end of Columbia Street also contributing to some local retail uses. Along Van Brunt Street, at the northern end of Columbia Street, there are a number of small mixed-use 2- to 4-story buildings typical of older Brooklyn neighborhoods. Pedestrian traffic on Van Brunt Street appears to diminish as the street becomes more industrial in character as ones moves north. Columbia Street has fewer pedestrians and it becomes more residential as one moves south. There is no direct connection from Columbia Street south of Hamilton to Columbia Street north of Hamilton Avenue, but one can imagine that prior to the expressways' construction the more robust commercial strip to the north would have continued seamlessly to meet the southern portion, continuing until it met the smattering of industrial uses, Monarch Luggage Co. Building (residential loft conversion), Coffey Park, and Red Hook Houses south of Delevan.

One of the two large New York Dock Company loft buildings on Imlay recently received approval from the Board of Standards and Appeals to convert to a residential building with a conforming M2-1 use (industrial or commercial) on the ground floor. This project could potentially produce and draw more foot traffic to Imlay Street. Around the corner to the west on Pioneer Street is Pioneer works, an art center and gallery that draws in visitors and artists with events and classes.

Transportation safety concerns were not significant in this area, but like the rest of Red Hook, the sidewalk conditions seem to reflect the activity of the uses. Notably the sidewalk on the north side of Verona (across from Coffey Park) is in need of repair, and the fence around the adjacent vacant lot is falling down. The bus stops along Van Brunt Street are in good condition, often with shelters. The streets to the north that are more industrial and commercial in nature (Delevan, Commerce, Seabring, Bowne) have fairly good sidewalks compared to the rest of the study area, but lack shade and bike racks. In particular the Monarch building had a few bikes locked to scaffolding. Additional pedestrian amenities such as street trees and bike racks would be an asset to this area.

Figure 3-6: Eastern pedestrian section of Red Hook.

Eastern Area

The eastern end of Red Hook, as shown in Figure 3-6, is an important gateway for pedestrians into and out of the neighborhood. The Smith-9th Streets station for the F and G trains is just a two to three blocks to the northeast of Hamilton Avenue. The heavily used Red Hook Park extends into the center of this area, an important regional destination. Other destinations include industrial uses throughout this area as well as some community facilities.

However, like most of the sidewalks in Red Hook, there is a mix of well-kept, accessible sidewalks and patches or large stretches where the sidewalk is broken, un-built or overgrown, usually on a lot by lot basis. More active uses generally have better sidewalks, with vacant or low traffic lots having less well-maintained sidewalks. Unlike the more interior portions of Red Hook, there is not much shade nor are there many street trees in this area, the exception being most notably along the Red Hook Park and Red Hook Houses blocks where there are numerous trees on and near the properties. Similar to other industrial blocks in the neighborhood, trucks and cars utilize the sidewalks for parking, loading and other operations, particularly at the northeastern edge of the area on Smith Street, forcing pedestrians to walk in the streets.

While keeping this area in a state of good repair is important to support existing pedestrian flows, a more significant challenge is pedestrian access to the waterfront. The southern portion of this area is dominated by the Hess tanks and related facilities as well as other industrial buildings and warehouses. Physical and visual access to the waterways can only be achieved from the tip of the Henry Street Basin in Red Hook Park (which has benches and is quite pleasant) and at the draw bridge on Hamilton Avenue (which has no benches and is less pleasant due to the traffic and noise of the expressway).

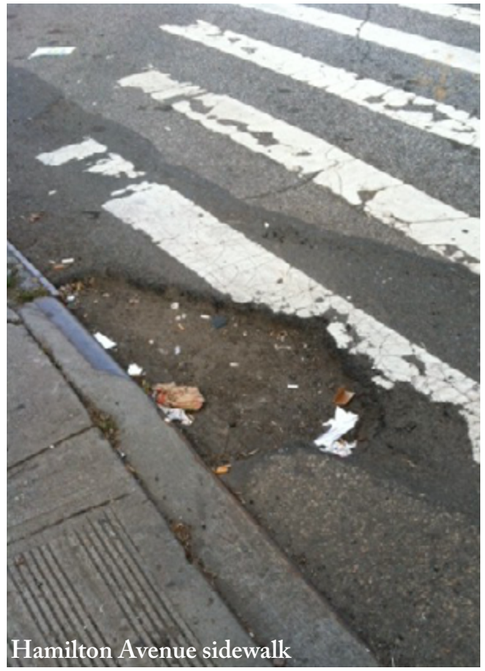
Pedestrian Improvements to Hamilton Avenue

Hamilton Avenue is characterized by traffic that flows at high speeds, a significant portion of which is trucks. This street also experiences high pedestrian volumes, as many pedestrians use West 9th Street or Mill and Garnet streets to cross Hamilton and access the Smith-9th Streets train station. This is the main pedestrian gateway into Red Hook, but it is not inviting due to several key issues including poorly maintained sidewalks, a lack of pedestrian crossings and amenities and potentially unsafe conditions caused by the speed of the traffic and a lack of lighting under the Gowanus Expressway. Several accidents involving pedestrians have occurred at the Clinton, Court and Centre street crossings (see crash map on page X). While an efficient traffic flow along this route is a high priority, this should not come at the expense of the pedestrian experience. Improving conditions on Hamilton Avenue to create a safe and aesthetically pleasing pedestrian gateway into Red Hook is a high priority.


Hamilton Avenue sidewalk

Sidewalks
The sidewalks along Hamilton are wide, but are not well-maintained, limiting usable pedestrian space. In most sections, the sidewalk is between 12 and 18 feet wide. In some places, a wide sidewalk would be an amenity, but along Hamilton Avenue the wide sidewalk contributes to the feeling of a barren landscape. There are issues of gravel, debris and overgrowth in several places, particularly between Coles and Luquer streets, and between Nelson and West 9th streets. Especially for children and seniors, uneven sidewalks covered with garbage and gravel create serious barriers to mobility. The street trees in the area contribute to this as well; garbage tends to accumulate in the tree pits, and tree roots can disrupt the sidewalk, for example, between Coles and Luquer streets.

The industrial and automotive uses that front Hamilton Avenue such as gas stations and auto body shops require curb cuts for vehicles to enter and exit, and there is little incentive to keep the sidewalks in good repair. The pavement is broken in sections, with trash collecting at the curb and buildings, and poor drainage after it rains. Particularly at Centre, Huntington, Henry, and Luquer streets, there is degraded pavement that cause potentially unsafe conditions for pedestrians.


Hamilton Avenue sidewalk

Pedestrian Crossings
Residents have indicated that they are very concerned about the safety of crossing Hamilton Avenue at this end of the neighborhood. Several intersections along Hamilton Avenue do not have marked crosswalks on both sides of the intersection, even though they have curb cuts. West 9th Street has no marked pedestrian crossings on the Red Hook side of Hamilton Avenue, even though it is a signalized intersection with curb cuts. The Miccio Community Center is located where West 9th Street meets Hamilton Avenue. Seniors and children using the Miccio have no marked crossing on the north side of the intersection, but people still cross here, leaving them to make a potentially dangerous crossing on the northeast side of Hamilton Avenue. Users of the Miccio also face a potentially unsafe situation when crossing West 9th Street west of Hamilton Avenue as cars make a sharp, blind turn from Hamilton Avenue onto West 9th Street. As they cross Hamilton, Centre and Court streets have crossings on their north sides, but not their south sides. However, we observed many pedestrians crossing at these locations regardless of signalization. Pedestrians also cross Hamilton between Court and Smith streets (near the McDonald's restaurant) without using the pedestrian crossing at Smith Street. This matched residents' concerns.
In addition a lack of adequate locations to cross, the dedicated timing for pedestrian crossings does not permit pedestrians to cross the entirety of Hamilton Avenue in one interval.

During our visits, we also observed many pedestrians crossing at the marked crosswalks, but against the signal. Particularly at the Clinton Street intersection, vehicles are making left turns onto southeast-bound Hamilton Avenue; pedestrians crossing against the light may not be able to see these oncoming vehicles which create potentially dangerous conflicts.

Recently, NYCDOT completed the Mill Street Connector project, which opened Mill across Hamilton for vehicles to route buses, cyclists and traffic more efficiently. The project also added a crosswalk on the southern side of the new signalized intersection to create safer conditions for pedestrians. Following the completion of the NYSDOT reconstruction project on the Gowanus Expressway, additional crossings will be marked on the northern side of the intersection.


Southbound Hamilton Avenue right lane

General Pedestrian Environment
Between Clinton and Centre streets, the wide right lane creates an unclear roadway. Without any kind of barrier, pedestrians are exposed to high-speed traffic and may not feel safe walking along Hamilton Avenue. The land uses that front Hamilton Avenue also create an uninviting pedestrian environment. The auto body shops and industrial businesses along Hamilton Avenue generally have blank brick street facades, and boarded up windows with deteriorating walls in some sections.


Mill Street crossing

The NYSDOT reconstruction project on the Gowanus Expressway, which began in mid-2013, will replace over 50,000 square feet of bridge deck and repair deteriorated structural steel on the Gowanus Expressway at the segment near the Hugh L. Carey Tunnel.

The Gowanus Expressway itself is also a dominating presence for pedestrians. The concrete barriers that support the elevated structure provide some buffer between pedestrians and traffic, but can inhibit both the pedestrian's view of oncoming traffic and the driver's view of pedestrian presence. The area beneath the structure is dark at night, creating potentially dangerous conditions for pedestrians traveling at night. For the duration of the Gowanus reconstruction project, much of the median below the expressway will be used as a staging area for this construction. Due to this project, a previously planned NYCDOT Urban Art Project involving a light installation at the West 9th Street crossing will no longer be implemented here. Currently, the center median is inaccessible to pedestrians from West 9th Street to Mill Street because of the construction.

The area that is currently accessible to pedestrians has a host of other issues. The deteriorated pavement and cobblestones create barriers to access. Like other sidewalks in the area, debris and garbage pile up around the edges of the median and the concrete supports. The median has no amenities to soften the hard street edge, and the existing lighting is scaled for vehicles using Hamilton Avenue, but not pedestrians crossing under the Expressway.

The Brooklyn Greenway Initiative's preferred route for the greenway through Red Hook involves a section on Hamilton from Smith Street eastward to 3rd Avenue. The proposed configuration from NYCDOT involves creating a two-way protected bike path on the south side of Hamilton Avenue, and reducing travel lanes from four to three. This improvement would calm traffic over the Hamilton Avenue Bridge and create safe bike and pedestrian conditions.

Recommendations
In order to create a safer and more inviting pedestrian environment on Hamilton Avenue, we recommend several treatments to improve conditions on the sidewalk and center median. The treatments focus on Hamilton between West 9th and Smith streets, the segment containing the potentially most dangerous pedestrian conditions and the greatest opportunity for improvement.

Clarifying and making sense of the overly wide roadway would improve conditions for both drivers and pedestrians on Hamilton Avenue. Narrowing the right lane on southbound Hamilton and creating parking or loading zones would provide visual cues to alert motorists to other users of the road and help control speed on this corridor. Alternatively, constructing bulb-outs in the extra roadbed with native plants would provide an opportunity for green infrastructure to soften the street edge. At the corners, right-turn lanes or curb extensions should be installed at Centre and Mill streets respectively, to organize traffic and create shorter crossing

distances. More analysis should be done to assess the effect of this treatment on vehicular level of service.

Street trees, planted bollards (seen on Court Street shown below) or concrete blocks on the sidewalk would create a more inviting streetscape, and buffer pedestrians from traffic. Special attention should be paid to integrating local maritime history and the industrial character of the neighborhood into the street furniture to retain a sense of neighborhood identity. To improve physical mobility along Hamilton much of the infrastructure needs to be repaired, sidewalks repaved and fading crosswalks restriped. More analysis should be done to assess the viability of adding pedestrian crosswalks to both sides of the intersections at West 9th, Mill, Centre and Court streets. To improve safety at several other key locations, we recommend installing curb extensions to calm traffic and provide more space for pedestrians. Southbound traffic often makes a sharp right-hand turn onto a blind curve at West 9th Street. This could be made safer by adding a sidewalk extension, a speed bump or traffic mirrors to create a more direct line of sight for westbound vehicles. Where Smith and Lorraine streets intersect Hamilton Avenue, the unused roadway at this potentially dangerous intersection could be converted to a planted concrete triangle to create a pedestrian refuge island and shorten a long crossing distance.

The center median between West 9th and Court streets is the first entrance into Red Hook for most pedestrians walking from the subway. This expanse of open space beneath the elevated structure could better provide public space and a gateway to Red Hook with some design improvements. Pedestrian scale lighting should be implemented along all

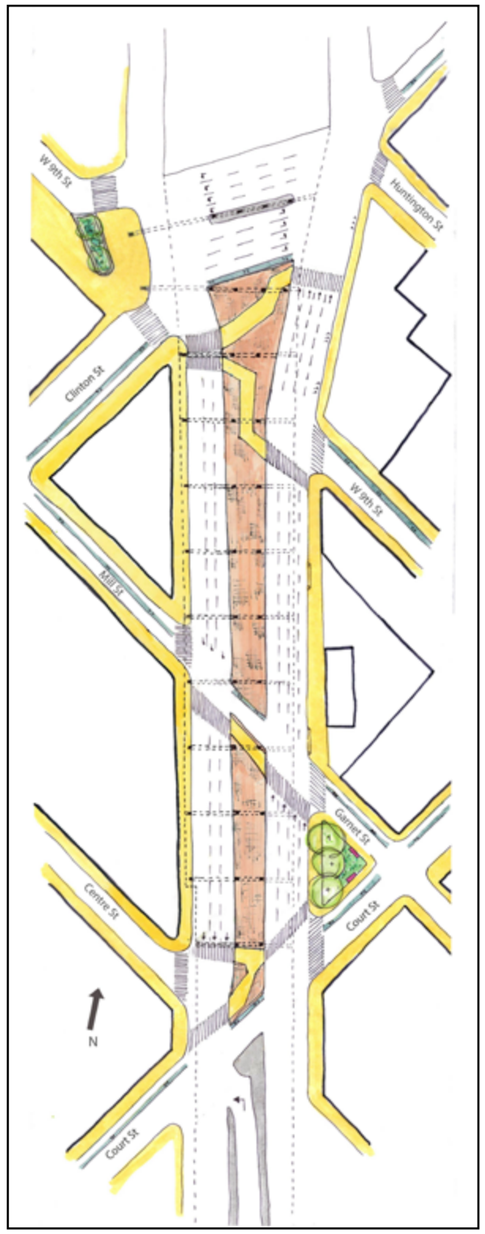


Figure 3-7: Existing conditions on Hamilton Avenue.

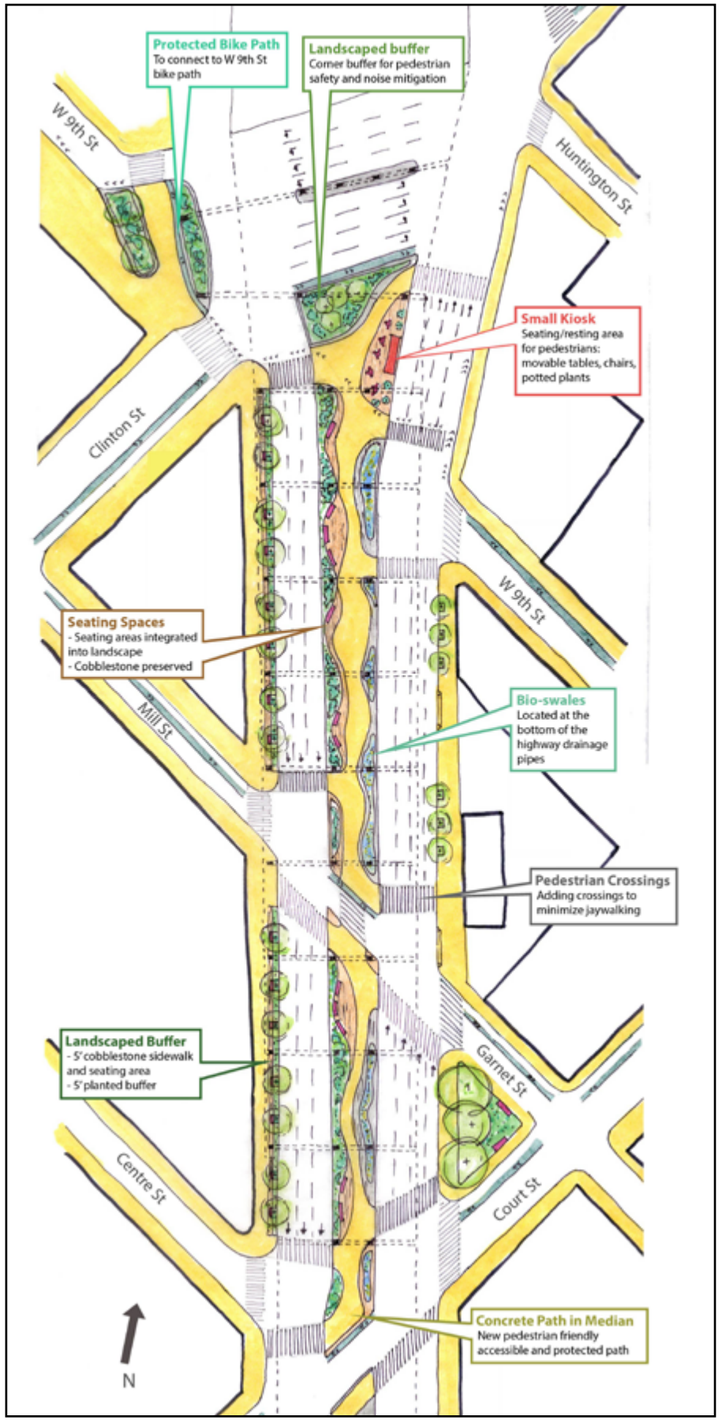


Figure 3-8: Pedestrian safety improvements to Hamilton Avenue.

sections of the median. Innovative lighting methods such as color, art and reflective surfaces could bring more visual interest and make the enclosed median feel safer for pedestrians. As discussed in the bicycle section, the bike lane on West 9th Street should continue through the median with pavement and markings to connect with West 9th Street on the Red Hook side. Additional design improvements to the median such as repaving and providing benches and planted barriers from Mill to Court streets would create a continuous design standard and encourage people to use the median as a pedestrian path. Instead of feeling the need to cross against the light, this could provide pedestrians with an incentive to wait and possibly walk along the median to cross at a different street. Again, using materials that reflect the character of Red Hook would highlight the history of the neighborhood and is desired by the local community. Providing a safe and enjoyable median would help define Red Hook and highlight this area specifically as more pedestrian-oriented.

Figure 3-10 shows potential design treatments for the space under the Gowanus Expressway between West 9th and Court Streets. A paved path with a planted buffer would create a more hospitable place for pedestrians to walk and discourage jaywalking. Several seating areas on a cobblestone strip would also create a place that feels safer for pedestrians to stop and rest and provide an opportunity to extend Red Hook's identity into the space. On the east side of Hamilton Avenue, storm water and runoff from the expressway can be treated through green infrastructure and bioswales along the edge of the median. The potentially dangerous

Figure 3-9: Existing conditions under Gowanus Expressway

Figure 3-10: Potential pedestrian safety improvements to Hamilton Avenue.

intersection at West 9th and Clinton Streets could be buffered from pedestrians with a large planted area and larger seating area with potential for flexible uses such as a food vendor as the community sees fit. Repurposing the extra roadway on the southbound side of Hamilton Avenue would create space for additional street trees and a cobblestone strip with seating.

Figure 3-11: Existing pedestrian conditions along Hamilton Avenue

Figure 3-12: Potential pedestrian safety improvements to Hamilton Avenue.

As DCP was conducting this study, the Design Trust for Public Space, a local non-profit organization, was working on a study in partnership with NYCDOT called *Under the Elevated: Reclaiming Space, Connecting Communities* which seeks alternative community-oriented uses for the public space beneath the nearly 700 miles of elevated transportation infrastructure throughout the five boroughs. Their study will develop design, policy and programmatic guidelines for how local community groups can work with city agencies to repurpose these spaces. The median along Hamilton Avenue presents an example of space under the elevated Gowanus Expressway that could be repurposed as a vibrant public space. The project team worked in collaboration with the fellows and staff from the Design Trust's project team to ensure that the recommendations from this Red Hook study align with the broader goals of Under the Elevated. The site-specific design treatments presented here will also inform the context-sensitive approach for the Design Trust's final recommendations.

Recommendations

Changes to the Bus Network in Red Hook

A central issue that was raised repeatedly in our meetings with the Red Hook community was access to transit. The closest subway stations to the neighborhood are Carroll Street and Smith-9th Streets which both require a long commute for many residents. The B61 and B57 buses are available as well, but these buses experience significant delays, and for commuters who travel to and from Manhattan, they are helpful but insufficient. Furthermore, the newly renovated Smith-9th Streets F and G train station is not accessible to people with disabilities, which forces commuters with accessibility issues to find other means of transportation.

This study examined options to remedy this transit issue. One such option would be to run a bus route through the Hugh L. Carey Tunnel from Red Hook to Lower Manhattan, providing a short and easy way for Red Hook residents to commute to Manhattan. Feasibility concerns, such as cost and the ability of the street network to handle certain route changes, were raised at preliminary meetings from NYCT, leaving the following three basic recommendations:

- A detailed study by NYCT of establishing a bus connection from Manhattan to Red Hook. This report's initial analysis pointed to the M22 bus as a prime candidate for such a study.
- A detailed study by NYCT of running a shuttle through the tunnel that would make one stop each in Brooklyn and Manhattan during peak periods. While this is not DCP's preferred option, it may be more feasible from a cost perspective.
- Improvements to existing bus infrastructure.

M22 Extension Study

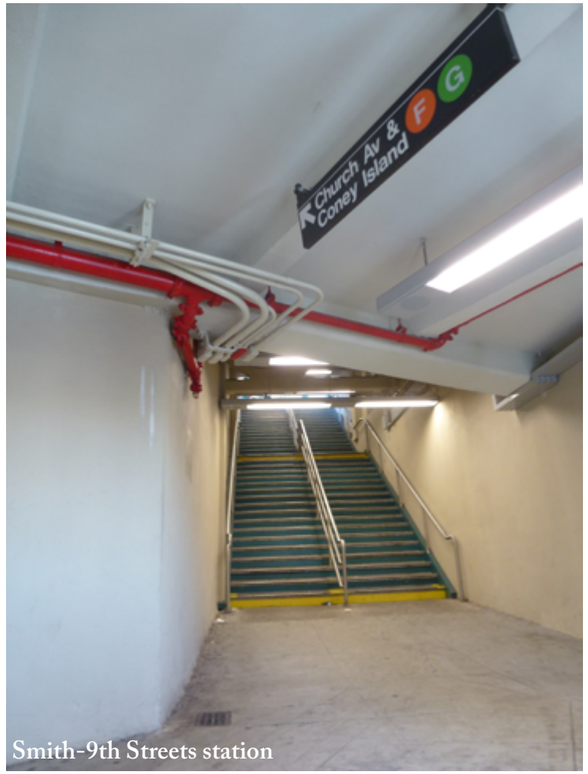
At the kick-off meeting for the Red Hook Study and at meetings with Red Hook East Houses and Red Hook West Houses, we received strong sentiment in favor of a bus route that would run directly to Manhattan. This indicates the existence of a need that would be well served by such a bus route. We have also received numerous complaints about delays and crowding on the two bus routes which now serve Red Hook, the B57 and B61. In addition, as the Environmental Protection Agency (EPA) begins its remediation of the Gowanus Canal superfund, these buses which go over the Canal's drawbridges may begin to see additional delays due to increased barge traffic and drawbridge operation. This report recommends NYCT study the feasibility of a Manhattan to Red Hook bus connection based on a thorough consideration of the most viable existing routes. However, the project team began an analysis of which routes might be the best candidates for such a study.

These two existing bus routes do not lend themselves to extension into Manhattan. The B57 is already a long route, running from Red Hook to Maspeth, Queens. Schedule reliability would be compromised by making it longer. Running the B61 into Manhattan via the tunnel would divert it from Atlantic Avenue and Downtown Brooklyn, increasing commute times to Downtown Brooklyn which is not a viable option.

Figure 3-13: Proposed Red Hook-Lower Manhattan M22 extension study.

This study also considered the possibility of extending a Manhattan bus route into Red Hook. Five routes serve lower Manhattan: the M5, M9, M15, M20, M22 and M103. The M5 can be ruled out right away because it runs from South Ferry to the George Washington Bridge Bus Station at West 179th Street. Similarly, the M15 and M15 SBS run up to East 126th Street, the M20 runs up to Lincoln Center and the M103 runs to East Harlem. These are all lengthy routes which are already subject to widespread schedule disruptions. The M9 would appear to be a viable candidate, since it only travels to East 29th Street, but NYCT has informed us that that route already has reliability issues.

The other option is running the M22—a relatively short crosstown route, running between Battery Park City and the Lower East Side—into Brooklyn through the Hugh L. Carey Tunnel. Ridership for this route is not particularly robust, especially at its western end: fewer than 500 passengers per day are on these buses in each direction west of Broadway.[4] Instead of running to Battery Park City, this route could be routed down Broadway to the tunnel and up Trinity Place and Church Street from the tunnel. Meanwhile, the B61 accumulates and disperses 2,100 to 2,200 passengers at its Downtown Brooklyn terminus of Smith and Livingston streets, close to the Jay Street-MetroTech (A, C, F, R), Hoyt-Schermerhorn Streets (A, C, G), and Hoyt Street (2, 3) subway stations. In other words, most of its passenger load arrives or leaves in Downtown Brooklyn, and presumably a significant fraction of these passengers continue their trip via subway into Manhattan. Importantly, 2,452 passengers enter northbound B61 buses in the Red Hook study area, and 2,523 passengers exit southbound B61 buses in the study area. Therefore even if only 30 percent of these B61 passengers disembarking at Smith and Livingston streets are heading to Manhattan, that justifies extending M22 service through the tunnel and into Red Hook.



Smith-9th Streets station

These ridership numbers point to a strong possibility that an M22 extension through the tunnel would meet a significant demand for commuters from Red Hook to access Manhattan. A further study by NYCT of this possible route extension could be justified by the numbers. MetroCard data analyzing subway ridership patterns of B61 riders should be generated, including the return trip swipe locations of these B61 passengers as they come back to Red Hook. Different routings in Manhattan and Red Hook need to be analyzed, and replacement service to Battery Park City (probably by adding service to the M9) should be studied.

While there is a significant possibility that this route extension would serve an important need for Red Hook residents, discussions with NYCT revealed that the cost of making such an extension at this point in time would be prohibitively high. This is largely due to the fact that the extension would be long and there would be few places to pick up passengers and that re-routing the M22 in Manhattan would be a challenge. Despite these concerns, we have included this recommendation in case funding becomes available in the future.

[4] For ridership data captured on a January 2012 weekday, see Appendix IV.

Shuttle Bus Through the Tunnel
A similar but less expensive option to the M22 route extension would be to run a shuttle bus through the Hugh L. Carey Tunnel during peak periods. This option would still be expensive, but would be significantly less so than the M22 option. The drawback of this option is that, while demand is likely high for trips into Manhattan during the morning peak period and into Brooklyn during the evening peak period, shuttles may have to make the return trips at a lower capacity. However, this cannot be conclusively stated until a study determines the actual demand for such a route.

Improved Bus Infrastructure
As the most accessible means of public transportation in Red Hook, the B57 and B61 buses are used heavily. It is therefore important that commuters who use these buses on a regular basis have appropriate accommodations while waiting. Two bus stops that get a significant amount of traffic are the eastbound and westbound stops at Lorraine and Otsego streets, but these stops do not have shelters or seating. The need is even more apparent in that riders have created makeshift seating at the westbound stop. We recommend that shelters with seating be installed at both of these stops. Another stop that could also use this treatment is the westbound stop at Lorraine and Court streets. There is ample sidewalk space at this location for a shelter and seating. Adequate lighting should also be installed here because it is an industrial area with low pedestrian activity.

Accessible Transit Service
The elevated Smith-9th Streets train station recently underwent major renovations and re-opened in April, 2013 after being closed for nearly two years. This station provides transit access to many Red Hook residents who had previously had to make other accommodations during the renovation period. However, while the station is located 88 feet above ground level, it is not accessible to riders with disabilities: there is no elevator and the escalators only run part of the way to the platform, leaving riders to climb stairs near the top. Furthermore, this station is not part of NYCT's Key Stations Program which has been making 100 train stations across the city accessible. Many individuals in Red Hook with disabilities will therefore have to continue to make accommodations to get to their destinations.

Lorraine Street bus stop

To this end, New York City buses are all accessible to customers with disabilities. Extension of bus service through the Hugh L. Carey Tunnel would provide a significant improvement in transit access for those with mobility issues. New York City Transit also administers Access-a-Ride, the city's paratransit bus service for disabled and elderly individuals.

Access-a-Ride provides door-to-door service which can be arranged by calling NYCT's toll free number, 877-337-2017, or visiting the MTA's website, www.mta.info, and choosing the "Accessibility" option.

Figure 3-14: Roadway problems in Red Hook.

Roadway Improvements

As with pedestrian infrastructure, we conducted a detailed survey of existing roadways to catalogue all significant issues from potholes to missing signage. This data is displayed in Figure 3-14 for each location according to the type of issue found. Details about location-specific issues and solutions are described below.

Traffic Calming Corridors & Intersection Safety

Lorraine and Bay streets have been identified as locations where traffic calming and intersection safety measures should be considered. These streets act as routes for through traffic, but also have significant pedestrian activity.

Lorraine Street borders the south of Red Hook Houses and has several commercial uses, which generate significant pedestrian traffic. The street has bus stops for the B57 and B61 at all intersections and several existing curb extensions. As is, traffic moves quickly on Lorraine Street. Between Clinton and Columbia streets, there are no stop signs or signals and motorists must constantly be alert to pedestrians crossing the street at uncontrolled locations. This study recommends marking all parking lanes and center lines to better define the roadway. Curb extensions installed on Henry and Columbia streets would visually and physically narrow the roadway in this high-pedestrian traffic area. Finally, a warrant analysis should be conducted to determine if a traffic signal is appropriate at both Henry and Hicks streets. If warranted, these controlled intersections should also have pedestrian countdown clocks and high visibility crosswalks. Creating dedicated crossings

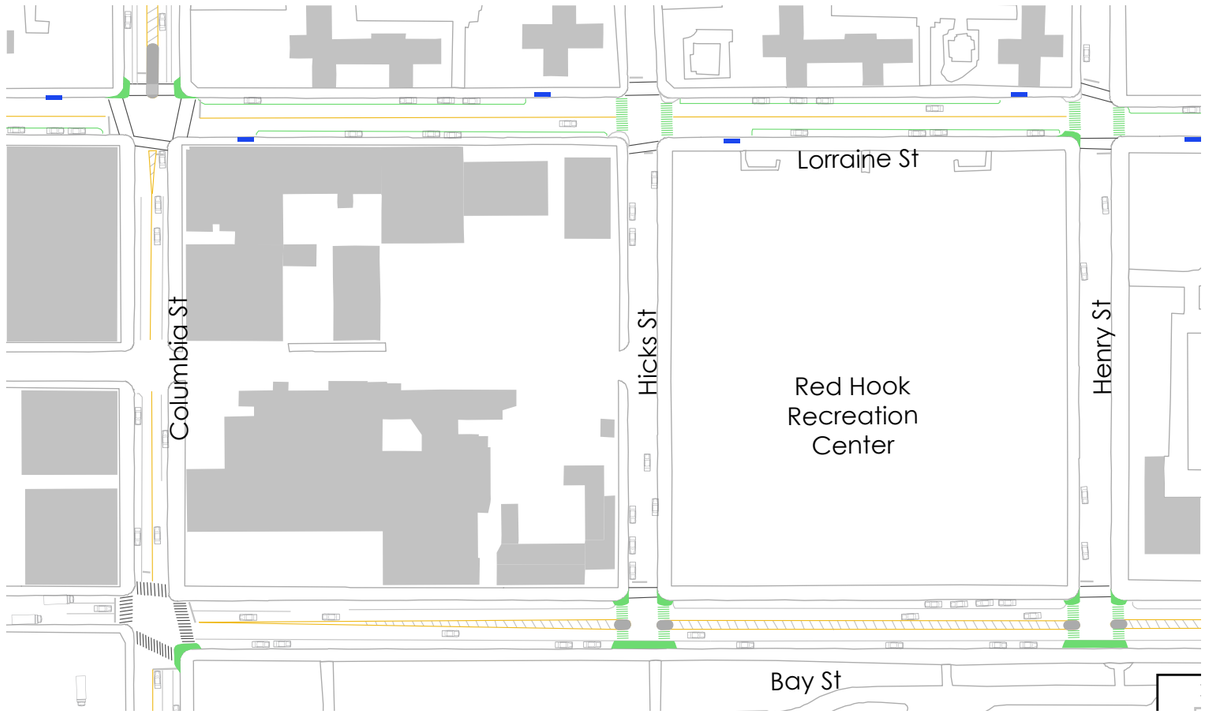


Figure 3-15: Recommendations for improving Lorraine and Bay streets; crosswalks, striping parking and travel lanes, installing bulb-outs and green infrastrucutre i.e. bioswales

would provide pedestrians with a safer place to cross the street, and create conditions to slow vehicular traffic.

On Bay Street much of the striped median and parking lanes have faded, and the roadway is now unclear. There are also concrete pedestrian refuge islands at the Henry and Hicks street intersections, but without marked crossings, which creates mixed messages for pedestrians and drivers. Restriping the parking line, center line, and bike sharrows would clarify the roadway to create safer driving conditions. This study also recommends adding a curb extension at Columbia Street and on the north side of Bay at both Hicks and Henry streets. At these two locations, bulb-outs along the park would also allow for greater pedestrian visibility and opportunities for green infrastructure. These two intersections on Bay Street are also prime candidates for pedestrian yield signs with crosswalks. Signal warrant analysis should be conducted at these intersections as well.


Bay Street

Signage

Within the Red Hook study area, there are opportunities for improvement to informational and directional signage. When drivers, cyclists and pedestrians focus their attention on navigation, they risk becoming distracted from the immediate surroundings creating unsafe conditions for themselves and others. Roadway signage helps them determine where they are, where they need to go and how to get there. Well-placed and appropriate roadway signage can improve safety while encouraging efficient pedestrian and vehicular movements. Several intersections within the study area have too few street signs or no street signage whatsoever. For the heavy industrial and low-traffic areas, drivers and pedestrians may be very familiar with the streets and not need signage to navigate to their destination. However, for the commercial corridors, routes to the waterfront and other destinations where users may not be familiar with the area, signage is more integral to safe and efficient circulation.

Street Pavement and Markings

Many of the roadways in the study area are in disrepair which creates unpleasant driving conditions. Heavy truck traffic in the study area, especially on the local truck routes, has degraded the pavement and lane markings. There are potholes, areas of sunken and broken pavement, as well as faded crosswalks, center lines and lane striping.

Richards Street, north of Verona Street is characterized by industrial uses and therefore experiences heavy truck traffic along this segment. The pavement has been broken and the curbs have been eroded, creating poor driving conditions. The roadway is relatively wide between Verona and Lorraine streets with only two lanes of moving traffic and no street markings. As a result, the roadway is potentially confusing and unclear to motorists. Since the street is adjacent to a park and several schools and cultural uses in this section, there are long, potentially dangerous crossings for pedestrians and conflicts with vehicles. In addition to restriping the lane markings, additional analysis should be conducted to determine the feasibility of speed bumps or stop signs. Richards Street is not a truck or bus route, and adding speed controls would create a safer pedestrian and roadway conditions.


Beard Street cobblestones

Ferris Street near the waterfront in the western part of the study area is an industrial and manufacturing street, and are therefore used by heavy truck traffic which has fractured the pavement in many sections, creating potholes. Maintaining this street and others with heavy industrial uses can create better driving conditions and support the industrial uses.

Damaged Cobblestones

In Red Hook, there are a substantial number of streets that are paved with cobblestones, most of which are located in the southwestern section of the neighborhood. While some of this pavement is in good condition, there are many locations where cobblestones are damaged are uneven, with missing stones and potholes that are sometimes paved over with asphalt. These damaged cobblestone streets are potentially unsafe for pedestrians, especially those with mobility issues; are uncomfortable for cyclists to ride on; and create wear and tear on all vehicles. Upgrading the streets in Red Hook is important for the safety of pedestrians and cyclists, and it is necessary in order to bring the streets into compliance with accessibility standards set by the American Disabilities Act (ADA). The ADA requires cobblestones to be uniform in height within a quarter of an inch on sidewalks and in crosswalks.

At the same time, cobblestone streets preserve the unique character of the

neighborhood and calm traffic in a natural way. The Street Design Manual published by NYCDOT includes within its Goals and Principles section these design elements: design for safety, design to balance access and mobility, and design for context. Under Design for Context it states the following: "Streets help define the character of neighborhoods. Except for standard furniture, materials, and lighting, a street's design should interact with the surrounding context, including its history, land uses, and nearby landmarks."[5] Street design should preserve the unique character of neighborhoods and maintain aesthetic consistency within neighborhoods and corridors.

Because of these conflicting concerns, dealing with damaged cobblestone streets is a particular challenge for improving transportation in Red Hook. Potential solutions include:

- Identify streets to use expense funding for repairs and upgrades. This is essentially the status quo: NYCDOT has made repairs to cobblestone streets on an ad hoc basis. While this helps keep the damage under control, it is not a long-term solution.
- Create paved crosswalks on cobblestone streets where necessary for pedestrian safety. This would mitigate pedestrian safety concerns, one of the more serious problems associated with uneven cobblestones
- Pave over cobblestones with asphalt to even out streets and reduce wear on vehicles. This would solve all of the problems associated with damaged cobblestones, but would not preserve this unique element of the historic character of Red Hook.
- Repurpose the cobblestones for other uses. One example of this treatment is the way in which IKEA repurposed cobblestones from the streets near its store into its parking lot as strips in the roadway. Similar options could be applied to other cobblestone streets in Red Hook.
- Preserve and mine the cobblestones for future use. Similar to the repurposing option, this would allow the community time to decide on an appropriate option on how to re-use the cobblestones for one or multiple uses

[5] http://www.nyc.gov/html/dot/html/pedestrians/streetdesignmanual.shtml, p. 20.

Improving the Bicycle Network

The New York City bicycle network provides limited access to Red Hook, and an incomplete network of routes within the study area. This condition will improve in months and years to come as NYCDOT continues to install the Brooklyn Waterfront Greenway, and continues to expand the bicycle network within the study area. The Greenway has already been built on a

section of Imlay and Conover streets and will continue south and then east along the waterfront in Red Hook, exiting the neighborhood at Smith Street and Hamilton Avenue. There also are other bicycle routes and planned improvements throughout the neighborhood. In this report we focus on improving access to the greenway, east-west connections to improve the network and additional bicycle infrastructure in Red Hook. Community members expressed a general need to expand infrastructure for the everyday cyclist who uses the bicycle network to commute to work, school and leisure activities.

Currently, there is no complete east-west bicycle route in Red Hook. When the greenway is built, it will run along Beard Street, through Red Hook Park and along Halleck street, providing east-west connectivity. However, an additional east-west connection is important for those cyclists who want a choice as to how to get across Red Hook and where they can access the greenway. Bay Street is an existing two-way shared lane that runs from Smith Street, where it will eventually connect with the greenway, to the two-way bike lane on Columbia Street. West of Columbia, however, there are no bike routes for cyclists to use to get to the western waterfront. Our recommended connection is Wolcott Street. If a route is installed here, cyclists could use routes running from Bay Street to Columbia Street to Lorraine Street, which turns into Wolcott Street, to efficiently cross Red Hook from east to west. This route would have three advantages for cyclists. First, as mentioned above, it would connect the heart of Red Hook with the greenway. Second, Wolcott runs all the way to the waterfront, thus increasing access for the neighborhood. Third, it would provide an efficient way for commuting cyclists to get across Red Hook instead of taking the relatively scenic greenway route. The specific improvements this would require include the following:

- Restriping Bay Street, where the sharrows have faded.
- Installing a westbound signed route on Lorraine Street between Columbia and Otsego streets.
- Installing a shared lane on Wolcott Street from Otsego Street to the waterfront.

The measurement of Wolcott Street at Otsego Street is 30 feet, too narrow for a bike lane, but large enough for sharrows. Wolcott Street is not heavily traveled and it does not have any cobblestones.

In the secondary study area, West 9th Street is a one way westbound street with parking on one side and a painted bike lane on the

Figure 3-16: Recommendations for additional bike routes in Red Hook.

north side of the street. The existing bike lane ends at Hamilton Avenue and does not proceed into Red Hook. Our proposal is to extend the 9th Street lane across Hamilton and to add sharrows to 9th Street on the Red Hook side of Hamilton, leading all the way to Columbia Street. It will be necessary to add paved space to the median on Hamilton next to the 9th Street pedestrian crossing for the 9th Street bike lane to cross the street. Sharrows should then be drawn next to the crosswalk leading to the south side of Clinton and next to the crosswalk leading to the north side of Clinton. Signage should then direct cyclists along the northeastern edge of the sidewalk to the 9th Street route. A 9th Street route would then lead cyclists to the two-way bike route on Columbia Street where they would have the option of going south to the Columbia Street Esplanade or the proposed westbound route on Wolcott.

While there are westbound streets, such as West 9th and Wolcott streets, where cyclists can be routed from east to west, there is a lack of obvious eastbound streets to pair with our westbound proposals. Coffey Street is an eastbound street that connects with Bay Street, but it is paved with cobblestones, which makes it challenging to install a bicycle route here. The Mill Street sharrows and bike lane provide limited eastbound connectivity, routing cyclists from Clinton Street to the Smith and 9th Streets train station, but this route does not go west past Clinton Street. Further study should be done on how to add additional bicycle routing from west to east.

There were 25 bicycle crashes and injuries reported to the 76th precinct in 2012, which includes Red Hook.[6] One location that has a high bicycle crash rate is the intersection of Van Brunt and Sullivan streets. Responding to community concerns and a traffic analysis, NYCDOT installed a traffic signal in 2007 on the basis of a successful warrant study. However, there has still been a relatively high number of crashes (see Figure 2-22), especially those involving bicycles. From 2009 to 2011, the last three years for which data is available, five of seven crashes at this location involved cyclists. The majority of these collisions involved vehicles travelling southbound on Van Brunt Street and eastbound on Sullivan Street. This study recommends re-enforcing existing


Van Brunt Street

[6] NYCDOT, "Bicycle Crash Data – 2012," http://www.nyc.gov/html/dot/downloads/pdf/2012-bi-cycle-crash-data-report.pdf.

daylighting at this corner by creating curb extensions or striped areas and installing additional daylighting. Both corners of Van Brunt on the north side of the street are currently "No Standing" zones; these should be reinforced with striping or curb extensions. In addition, both corners of Sullivan Street on the west side of Van Brunt Street should be made "No Standing" zones. These treatments would further increase the visibility for roadway users at this intersection. Signage should also be installed alerting drivers to the presence of cyclists and warning cyclists that they must stop at red lights.

Along Van Brunt Street, and elsewhere in the study area there are also opportunities to install self-service bike repair stations, a project which could be initiated by local business and property owners reaching out to NYCDOT. In addition to allowing cyclists to repair simple damage to their bikes, repair stations create a bicycle friendly community by providing a feeling of safety and security. At a minimum, these facilities would include an electric or hand bike pump and a set of tools such as a track wheel wrench, bike levers and Allen wrenches. We recommend placements of repair stations along all routes, particularly at these locations:

- On the planned greenway at
  - Ferris and Van Dyke streets,
  - Beard and Conover streets and
  - Halleck and Smith streets
  - Bay and Smith streets
- On the planned bike routes at
  - Van Brunt and Bowne streets and
  - Columbia and Seabring streets

While the area around Van Brunt Street has a significant number of bike racks, the area around Red Hook Park and the planned eastern portion of the greenway does not. The community should work with NYCDOT to identify appropriate sites to install additional bike racks. Locations along the greenway, the Columbia Street bike route and on Bay Street should be prioritized. Another location where additional bike racks should be added is on Delavan Street between Dwight and Richards Streets. Cyclists use existing infrastructure that is not meant for bicycles to lock their bikes on this street. Similarly to repair stations, bike racks can provide conditions that enhance the general cycling environment.

Improvements to the Pedestrian Bridge over Hamilton Avenue

The Hamilton Avenue pedestrian bridge connects the northeastern and southwestern sides of Hamilton Avenue. It extends from Coles and Henry streets in the northeast to Hamilton Avenue between Luquer and Nelson streets in the southwest. Many students use this bridge daily to travel to and from the schools on either side of Hamilton – the Brooklyn New School and Brooklyn School for Collaborative Studies on the northeast side and P.S. 676 and Summit Academy Charter School on the southwest side. It is also a valuable connection between the neighborhoods of Carroll Gardens and Red Hook that is protected from vehicular traffic and within walking distance to both the Carroll Street and Smith-9th Streets train stations.

Currently the bridge has an outer railing and an inner chain link fence, with pedestrian scale lighting on the southern side of the bridge. The path, which is 8-10 feet wide, includes a ramp from Coles Street in Carroll Gardens and a switchback ramp on the Red Hook side. In 2011, the New York State Department of Transportation completed a $1 million renovation to improve the concrete deck and steel structures of the pedestrian bridge. The bridge was in need of immediate repair, and was completed sooner than its slated reconstruction in 2014. However, this renovation project did not address previous safety concerns identified by the community such as maintenance issues (e.g. graffiti and garbage), and public safety concerns (i.e. the isolated location makes bridge users feel vulnerable to muggings).

Issues

We recognized similar issues during our site visits to the Hamilton Avenue pedestrian bridge. The chain link fence was added to increase safety, but does not enhance the pedestrian's perception of safety while crossing the bridge. The tight chain links limit visibility at certain angles, especially at the corners, and one cannot see oncoming pedestrians. The bridge is relatively narrow, so only three people can comfortably walk along the bridge side by side. Air and noise pollution are also

Hamilton Avenue pedestrian bridge

potential issues due to the close proximity the expressways that carry high vehicle volumes including heavy truck traffic. Garbage accumulates at the entrances and along the path of the bridge, and the concrete structure is covered in graffiti.

The existing lighting also contributes to potentially unsafe pedestrian conditions. Currently, the lights located along the bridge provide some pedestrian scale lighting, but are limited and do not illuminate the whole path. The elevation of the bridge creates issues as well. To pass under both the eastbound and westbound overpasses to the BQE, the footbridge dips and rises again to provide clearance for the roads below. The low clearance from the ramp, combined with the low elevation compared to the rest of the bridge creates dark, low visibility segments.

Recommendations
Recommendations for the pedestrian bridge include installing additional lighting, providing pedestrian amenities like handrails and trash cans, improving visibility on the bridge, and creating safer and more attractive landings.

Installing additional pedestrian lighting would better illuminate the bridge and make pedestrians feel safer. NYCDOT is already examining this issue, and we encourage generous lighting of the bridge. Another solution to the lack of lighting on the bridge and particularly under the overpasses would be to install an urban art project that incorporates illumination at these segments. Similar to NYCDOT's canceled project for the West 9th Street crossing under the Gowanus Expressway further southeast on Hamilton, this would be a strong candidate to enhance a pedestrian space through lighting and an art installation.

Additional features would enhance the pedestrian experience along the bridge. An illuminated handrail could be added to the bridge, which would bring the dual benefit of lighting and assistance for young children and elderly people crossing the bridge. Garbage cans should be provided at both entrances to the pedestrian bridge to deter people from littering on the bridge. An art installation that creates ambient noise for passing pedestrians could mitigate loud and unpleasant noise levels from the highway that runs above and below the bridge. Because of the various fences used on the bridge, it can be difficult for pedestrians to see each other. Replacing the overlapping fencing with a single wide-link fence or providing transparent fencing could create a safer and more attractive bridge without sacrificing the quality of the structure.

The entrances to the bridge on both landings could also be enhanced to improve the safety and functioning of the bridge. Wayfinding signage at the base of each ramp should indicate the pedestrian path from the sidewalk on Hamilton Avenue and maps could describe destinations (such as the schools) on either side. Students from local schools could paint murals on the blank façades of the ramp on the Red Hook side depicting the history or uniqueness of Red Hook. Bringing in color and visual interest, while creating a sense of ownership from the students, would make for a more aesthetically pleasing bridge entrance, while also deterring graffiti on the bridge. A similar project was completed in Red Hook, a few blocks down on Hicks Street through Groundswell, a non-profit organization that coordinates public art with local community based organizations. The blank façade on the landing to the bridge is an ideal candidate for this type of treatment.

Mitigating Conflicts on Woodhull Street

One particular location that creates conflicts between pedestrians, cyclists and vehicles is the intersection of Woodhull Street and Hamilton Avenue near the toll facility at the entrance to the Hugh L. Carey Tunnel in the northern part of the study area. Woodhull Street is a one-way street that extends from the northbound side of Hamilton Avenue in a U shape, merging onto Hamilton Avenue southbound at Bowne Street. This is an area of concern because it is the only opportunity for pedestrians to cross Hamilton Avenue in the northern section, it is a natural connection for cyclists, and there are several potential vehicular, bicycle and pedestrian conflicts.

Vehicular Issues
Many local trucks use Woodhull Street to connect to the industrial businesses throughout the northwestern and northern sections of the study area. This route does have heavy truck traffic, so a wide turning radius on Woodhull Street is necessary for trucks to maneuver. One issue creating potential vehicle conflicts is the lack of intersection controls on Woodhull Street. On the northbound Hamilton Avenue side, vehicles on Woodhull Street have a stop sign, but must cross three lanes of oncoming traffic on Hamilton Avenue with no signal and low visibility of cars moving north on Hamilton Avenue. It is difficult for motorists to anticipate the movements of other drivers, which creates potentially unsafe conditions for all users of the roadway. Although Woodhull Street is a two-lane street, the unclear and faded lane markings cause confusion for motorists. Low traffic volumes, wide truck turns and faded lane striping lead many drivers to simply drive in the middle and use Woodhull Street as a one-lane street. Vehicles must then merge with Hamilton Avenue and Bowne Street without any controls, causing vehicles to


Woodhull Street

slow down and impede the flow of traffic. We also observed vehicles making an illegal right turn from Woodhull Street onto southbound Richards Street, driving over the striped road area. With uncontrolled merging traffic from Hamilton Avenue and Bowne Street, this turn creates additional conflicts that merging vehicles might not be anticipating. In addition to moving vehicles, parked vehicles also cause issues; trucks and other cars often park in the striped areas of roadway, obstructing sight lines for motorists.

Bicycle Issues
Cyclists on this section of Woodhull Street also create potentially dangerous conditions. The Greenway along Imlay Street at the waterfront serves cyclists who want to travel along the western edge of the study area. However, for cyclists who want to travel to the middle section of Red Hook, there are few routes to guide cyclists around the Hugh L. Carey Tunnel from the north and the south. Woodhull Street is a natural connection for cyclists using the bike lane on Columbia Street through Red Hook to the bicycle network to the north. During our site visits, we observed many cyclists already making this connection. Much

Figure 3-17: Roadway issues identified at Woodhull Street and Hamilton Avenue.

of the bicycle traffic along this road segment was counterflow, which means cyclists were riding against the direction of vehicular traffic. This creates even more potentially dangerous conditions for both cyclists and motorists.

Pedestrian Issues

Pedestrians also use this route to cross Hamilton Avenue at the tunnel approach since the next crossing opportunity is the pedestrian bridge between Luquer and Nelson streets. There are no marked crossings at Bowne Street or Hamilton Avenue as they merge with Woodhull Street, and yet we observed many pedestrians crossing. Pedestrians must cross one lane on Bowne Street, one lane on southbound Hamilton Avenue, and two lanes on northbound Hamilton Avenue. Or pedestrians can risk crossing three travel lanes on both northbound and southbound Hamilton Avenue if they use the inner sidewalk that extends from the plaza space. Vehicles parked in the striped roadway areas may obstruct sightlines for drivers and pedestrians, creating even more potentially dangerous crossing conditions. Beyond the tunnel ventilation building just north of Woodhull is the Harold Ickes Playground, and children attempting these unprotected crossings could be exposed to danger.

Recommendations

Several key recommendations for Woodhull Street would mitigate many conflicts described above. We recommend further evaluation for installing a new traffic signal at the intersection of Woodhull and northbound Hamilton Avenue, improving signage for preferred bicycle routes, and improving pedestrian and public space at this intersection. While no serious crashes have taken place at this location in the last several years, clarifying the right-of-way of the roadway will enhance safety for all users and improve the functioning of the intersection. There are very few signals on Hamilton Avenue to the north of the Hugh L. Carey Tunnel exits. The intersection at Woodhull Street provides an opportunity to add a signal that would not significantly affect the flow of traffic in this section, and will improve conditions for motorists and pedestrians. NYCDOT could study this intersection to determine if a signal is warranted. If warranted, a signal and left-turn lane from Hamilton Avenue would provide clear vehicular movements onto Woodhull Street. Adding a crosswalk would provide a safe pedestrian crossing. Along Woodhull Street, the lane markings should also be re-striped to indicate that this section is a two-lane street, which would create calmer traffic conditions.

While cyclists are travelling on Woodhull Street, they may not be aware that just one block to the west, the Atlantic Basin Connector has recently been implemented by NYCDOT. This section of the Brooklyn Waterfront Greenway includes a two-way protected bike lane that follows the waterfront along Imlay, Summit and Van Brunt streets. To facilitate connections between the inland routes like Columbia Street and the greenway, signage should be added to direct cyclists to each of these facilities. Signage can direct cyclists heading northbound on Columbia Street that Seabring Street is the preferred westbound route to connect to Van Brunt Street and the greenway; while signage on the Greenway can indicate that Bowne Street is the preferred eastbound route to connect to inland areas of Red Hook. During the interim, before cycling facilities are added to these streets, signage is an important feature to encourage cyclists to take safer routes than the counterflow movement on Woodhull.

Extending and enhancing Harold Ickes Park with plantings and benches would create a more pleasant and usable pedestrian environment. Converting the extra roadway space on the northern side of Woodhull Street to a sidewalk extension with low plantings could improve public space and create a buffer

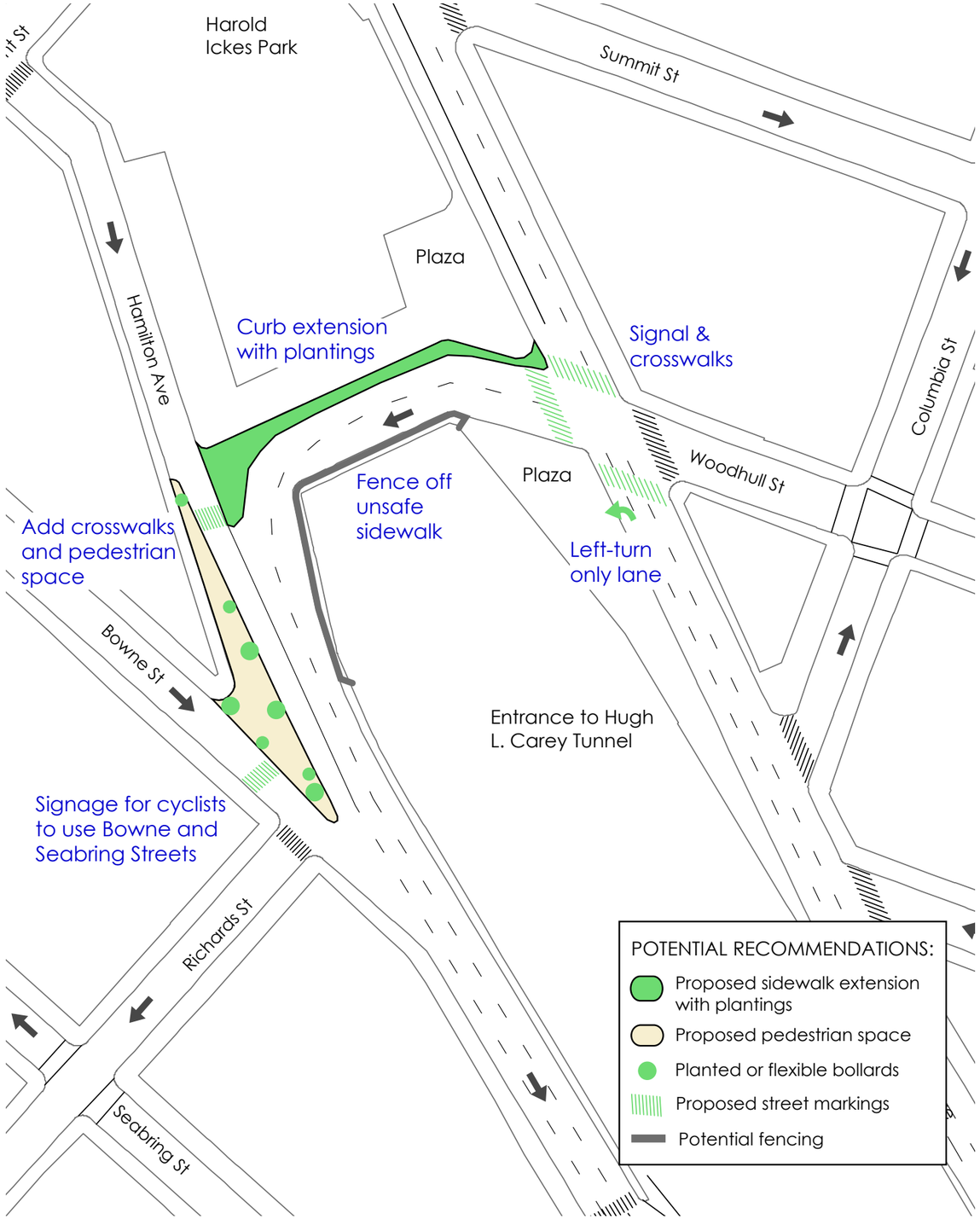


Figure 3-18: Recommendations identified for roadway issues at Woodhull Street.

between pedestrians and vehicles. This would also provide an opportunity to install green infrastructure in the form of bioswales. Fencing off a the southern sidewalk on Woodhull Street would discourage pedestrians from continuing on a route from which there are no safe crossings until Hamilton Avenue and Columbia Street, two long blocks away.

The large striped area where Bowne Street and Hamilton Avenue merge could be converted to a pedestrian space with the use of paint and planted or flexible bollards to prevent vehicles from using the area for turning and parking. Pedestrians often use Woodhull Street to cross Hamilton Avenue because there are no pedestrian crossings on Hamilton between Van Brunt Street and the Hamilton Avenue pedestrian bridge. Repurposing the extra roadway from vehicle space to pedestrian space would allow safer places to cross. High visibility crosswalks could be crossing Bowne Street and southbound Hamilton Avenue (shown in Figure 3-18). These crossings could improve pedestrian safety and provide visual cues for drivers to yield to pedestrians.

Improvements to Truck Routes

As mentioned earlier, several local truck routes run through Red Hook along heavily trafficked streets. The presence of trucks, buses, cars and cyclists leads to congestion on some of these streets, particularly Van Brunt Street. Congestion is often exacerbated during loading periods when trucks are sometimes forced to double park to make deliveries. In addition, trucks often have to turn off local truck routes onto other

Truck turning off Van Brunt Street

streets in order to reach their destinations. Several of these turns are challenging or impossible for large trucks to make and ultimately add to congestion.

Daylighting
Several of the side streets that branch off of Van Brunt Street are narrow with one travel lane in each direction and parking on both sides. When vehicles are parked near the edge of the intersection, wide turns can be extremely difficult and potentially dangerous. During one site visit, our team observed a truck that got stuck making a right turn from Van Brunt onto Dikeman Street because of cars parked at the corner. While trying to maneuver out of the situation, the truck was blocking both travel lanes on Van Brunt, including several cars, buses and other trucks. We have heard stories from residents of cars being crushed by trucks turning off Van Brunt. Difficult turning maneuvers are potentially dangerous and can impede the roadway and prevent the flow of traffic for all users.

Figure 3-19: Recommended changes to local truck routes in Red Hook.

In order to mitigate these turning problems, we recommend installing daylighting at several intersections in Red Hook. We also recommend re-enforcing existing daylighting. Drivers often park or stand illegally in "No Standing Anytime" or "No Parking Anytime" zones in Red Hook. Recommended treatments are as follows:

- At the top of the T intersection at Van Brunt and Delavan streets change the currently marked "No Parking Anytime" zone to "No Standing Anytime." Reinforce the daylighting by installing zebra striping or a curb extension.
- At the intersection of Van Brunt and Wolcott streets change the existing street cleaning regulations on the north side of Van Brunt near the corner to "No Standing Anytime" or "No Stopping Anytime." Reinforce this daylighting appropriately.
- At the intersection of Van Brunt and Van Dyke streets install daylighting on the eastern corner of Van Brunt on the north side of Van Dyke. This will also allow buses greater room to make the turn onto Van Brunt.
- At the intersection of Reed and Van Brunt streets install daylighting on the northwest corner of Van Brunt and reinforce the prohibition on parking in the driveways on the east side of Van Brunt. Some truck drivers who we spoke to in this area specifically requested reinforcement of daylighting. This intersection sees heavy truck traffic.
- At the intersection of Bay and Court streets, change the existing street cleaning regulations on the northeast corner of Court to "No Stopping Anytime." This change would mirror the existing conditions at Bay and Clinton streets. Both Clinton and Court streets are designated local truck routes and lead towards Hamilton Avenue and the highway network.
- At the intersections of Reed and Conover streets, Dikeman and Richards streets and Coffey and Richards streets, conduct further study to determine if daylighting is appropriate.

Loading/Unloading Zones

Another issue along Van Brunt Street is double parked commercial vehicles loading and unloading which causes congestion and potentially unsafe traffic conditions for other roadway users. We recommend that local businesses work with NYCDOT to identify additional needed loading zones on Van Brunt between Pioneer and Coffey streets where the volume of retail establishments is high. These areas would take the form of "No Standing Except Commercial Vehicle Loading/Unloading" zones. The establishment of these zones can help reduce the number of double-parked commercial vehicles and decrease congestion.

Enforcement

No matter what changes are made, the cooperation of the local police precinct and the traffic enforcement bureau is necessary. It is also the responsibility of motor vehicle operators to obey the regulatory signage and operate in a safe manner.

Other Transportation Options

As stated above, Red Hook is secluded from the rest of New York City and the neighborhood's mass transit options are limited. One common request by the Red Hook community has been for the improvement of public transportation service and the provision of additional transit options to, from and within the neighborhood. Our recommendation for NYCT to study the feasibility of extending bus service through the Hugh L. Carey Tunnel would go a long way to meeting these needs.

Increased Ferry Service
Increased ferry service would allow Red Hook residents to take advantage of the proximity of the neighborhood to the city's central business district and could serve to promote the neighborhood's economic development. Many people, including tourists, would likely be attracted to the boat ride itself and would enjoy the added benefit of spending time in Red Hook.

Research has been done on the possibility of introducing more regular ferry service to Red Hook. In March of 2011, the New York State Department of State published the *Comprehensive Citywide Ferry Study*,[7] an in-depth look at the feasibility of increased ferry service in New York City. The study analyzed over 40 potential ferry sites throughout the city from the standpoint of potential ridership and cost. The study was a collaboration between the NYHarborWay, the New York City Economic Development Corporation (EDC) and NYCDOT.

While the study advocated and was generally hopeful for an expansion of ferry service citywide, it concluded that Red Hook was not a high priority because the data did not support increased service in the near future. While the results of this study indicate that daily commuter ferry service is not cost effective at this point, the New York State Department of State is continuing to study the potential of various ferry routes. The popularity of the IKEA Express Shuttle as well as the temporary New York City Water Taxi ferry that ran during the summer of 2013 indicates that potential does exist. Future studies should take into account not only current ridership potential but also the possibility that ferries may be increasingly seen as an attractive transportation option.

The document *Citywide Ferry Study 2013*[8] was released last year as a preliminary report on the updated ferry study to be released later in 2014. This study indicates that, in addition to Van Brunt Street, a new possible site for ferry service that is being analyzed is Valentino Pier. New modeling for ferry routes includes additional fare options such as $2.50 and $2.75 per ride, but it appears that per passenger subsidies would still be very high, indicating that increased ferry service for Red Hook would be expensive.

[7] See http://www.nycedc.com/resource/comprehensive-citywide-ferry-study-2011.
[8] See http://www.nycedc.com/resource/citywide-ferry-study-2013.

A Trolley or Light Rail Option
As described above, another possibility that has been raised is a streetcar system running from Red Hook to Downtown Brooklyn. The latest study published in September 2011 by NYCDOT, *Brooklyn Streetcar Feasibility Study*,[9] was prepared in close consultation with a community advisory committee that included residents, community advocates, neighborhood associations, business owners, elected officials and city and state agencies.

After careful consideration of alignment options, streetcar feasibility capital and operating costs, public support, zoning and land use policies and expected benefits, NYCDOT found that a streetcar system would be better suited in a neighborhood with fewer physical constraints and potential conflicts. This conclusion was reached after a full consideration of many factors, including the significant construction and operating costs required, the relatively low expected transit ridership increase, narrow streets that hinder streetcar motions in certain segments, and city land use and zoning policy in the neighborhood which precludes the higher mixed-use development and neighborhood master planning that has been key to successful streetcar projects around the country.
The study contains a wealth of information about the feasibility of the streetcar mode in a New York City environment and provides a valuable resource for potential future efforts to revive this mode. The study indicates evaluation of Red Hook for a potential streetcar system should be revisited if residential developments and employment densities increase in Red Hook.

Next Steps

This report identifies transportation issues that affect Red Hook community members on a daily basis, and presents a framework for addressing these issues. Implementing the study's recommendations would require participation from many different agencies and organizations, including Red Hook community groups, transportation agencies and DCP.

The Red Hook community groups, which include Community Board 6 and local elected officials, can play a vital role in ensuring that improvements are made in the way that best benefits the people who live and work in Red Hook. Among transportation agencies, NYCDOT can play the leading role in implementing changes to the physical design of streets and improving conditions for pedestrian and cyclists; and MTA can study and carry out changes to transit routes and infrastructure. In the coming months, DCP will continue to serve as a liaison in ongoing coordination efforts with relevant community groups and operational agencies to prioritize and implement the study's recommendations.

[9] See http://www.nyc.gov/html/dot/downloads/pdf/201108_redhook_sc_final_report.pdf.

APPENDIX I: PROCESS AND DATA COLLECTION

Outreach: City Agencies and Red Hook Community
The preliminary round of outreach involved several meetings. The first group of meetings during the spring and summer of 2013 was internal to DCP and with other city agencies. We then had three meetings with community members: one community brainstorming session for everyone who lives in and uses Red Hook as well as one meeting each for Red Hook West Houses and Red Hook East Houses. The brainstorming session held in September of 2013 was well attended with approximately 32 participants. For Red Hook Houses, we attended tenants association meetings in October with each section which garnered approximately 25 to 35 residents each. The meetings with city agencies were essential to orient ourselves to the neighborhood and begin to frame our research. The outreach meetings with the community were successful in complementing the fieldwork component of the project.

Our first set of meetings began with an internal DCP meeting between the two participating divisions, the Brooklyn Borough Office and the Transportation Division. We also met on an ongoing basis with staff from several divisions with DCP. We then met with other key transportation agencies: NYCDOT and NYCT. These latter meetings helped us coordinate to make sure our study would complement existing transportation projects in Red Hook. In the process, we got a sense of what kinds of solutions would be most easily implemented and which ones were longer-term priorities.

The outreach meetings to community members were designed to serve as participatory data-gathering sessions. We sought to involve the community in the framing of the project by helping them identify issues that they encounter on a daily basis. The initial community brainstorming session began with a brief presentation given by DCP which was followed by a small group exercise in which attendees indicated their transportation issues and potential remedies by drawing on large maps of the study area. Each group then presented its most important issues to the meeting. Afterwards, we studied these maps and found common themes in the data we received.

Since 68 percent of the neighborhood's population lives in Red Hook Houses, we made a special effort to seek out the input of these residents. At the tenants association meetings, we delivered our presentation and solicited feedback from the people who attended. We made sure to leave stacks of fliers with the contact information of the project managers in order to keep the line of communication open. After these meetings, we incorporated our notes into the data gathered from the community brainstorming session and looked for more common themes.

These three community outreach meetings, along with our fieldwork, served as the basis by which we identified the most important transportation-related issues in Red Hook and proposed remedies to mitigate those issues. Once we settled on a series of recommendations, we held another meeting with the community in February of 2014 where we presented our preliminary draft recommendations in order to solicit feedback. This meeting was well-attended and we had a lively discussion during which we gained greater insight into the community's needs. Over the next two months, we adjusted our recommendations accordingly and finalized the written report.

Research and Fieldwork
The study required extensive research and on-site fieldwork on an ongoing basis. Planners from the Brooklyn Office introduced the study area to those from the Transportation Division in an initial tour of Red Hook by car. After this, we researched the neighborhood thoroughly by consulting zoning and land use maps, obtaining Census data on the major characteristics of Red Hook, researching its history and context and finding out about past and ongoing projects in the area. Smaller teams continuously went out for day trips to gather more specific data.

In order to gather data on pedestrian conditions, we combed the neighborhood using the application Spotmarker for Android smart phones and Fulcrum for iPhones. These tools served as efficient data collection methods: we were able to walk to a particular spot, tap on a map on our phones to locate a point, take a picture of the site and type in notes. At the end of each day of fieldwork, we had a series of points on a map with data and geo-located pictures attached to them. The resulting files were then uploaded to Google Earth for reference when formulating ideas. This process was also used in approaching the roadways section.

For information on how we conducted traffic counts, see Appendix III.

APPENDIX II: OTHER RED HOOK STUDIES

Several significant studies involving a transportation component are being done or have been done in Red Hook in recent years. They include the NYCDOT steering committee, New York Rising's resiliency study, a bus study by local politicians in 2011 and a resiliency plan issued by the mayor's office after Hurricane Sandy. In addition, DCP conducted a New York State Brownfield Opportunity Area (BOA) Step 1 study that analyzed general background data and historic contamination in Red Hook.

NYCDOT Projects

One of the most significant projects currently being done by NYCDOT is the Brooklyn Waterfront Greenway. When completed this bike path will run along the waterfront from Greenpoint to Bay Ridge, including Red Hook, starting on Imlay street in the northwest and leaving Red Hook at Smith Street in the southeast. The Greenway has already been installed on Van Brunt Street south to Hamilton Avenue. In Red Hook, a section on Imlay Street from Summit Street to Verona Street has been installed as well as a brief stretch on Conover Street from Pioneer Street to King Street. Work is currently being done on the section on the Greenway that will run on Ferris Street. See Figure X for the projected path of the Greenway. Figure X also shows several other potential bicycle paths that NYCDOT has planned in Red Hook which will be implemented on an ongoing basis. Along with the Greenway, NYCDOT also made changes to street directions in order to free up road space for cyclists. Another component of the Greenway is the Columbia Street Connector which runs along the Columbia Street esplanade. Improvements for cyclists and pedestrians are planned for this area as well.

After NYCDOT's 2011 Brooklyn Streetcar Feasibility Study, this agency set up a steering committee to implement ad hoc improvements to transportation infrastructure in Red Hook. One significant improvement that was made was to open up Mill Street for pedestrians and autos as it crosses Hamilton Avenue. A traffic light was installed at this location and a bike lane was run through as well. In addition, NYCDOT worked with NYCT to reroute the B57 and B61 buses up Clinton street and out of Red Hook via Mill Street.

NYCDOT has implemented and is considering a number of other transportation improvements in Red Hook such as additional pedestrian amenities, street repavings and additional bike lanes.

Figure A2-1: Ongoing and completed NYCDOT projects in Red Hook.

New York Rising
The New York Rising Community Reconstruction Program was established by Governor Andrew M. Cuomo in the fall of 2013 in order to help rebuild and revitalize communities in New York State affected by Hurricanes Sandy and Irene and Tropical Storm Lee. Red Hook is included in this project and New York Rising has been working with the community to develop plans to improve resilience in the neighborhood. The project team has held a series of community meetings to assess the needs and goals of people and areas affected. Currently, they are identifying and prioritizing projects for funding. Initiatives included in the final report will cover many areas.

Next Bus Please
After significant service cuts to buses that served Red Hook in 2009, including the loss of four bus lines that served the neighborhood, the offices of Councilmember Brad Lander, Congresswoman Nydia Velázquez and Councilmember Sara M. González conducted a study of the B61 bus titled Next Bus Please: Improving the B61 Bus. The study found significant crowding and delays on the B61 and recommended increased service on this route, the introduction of limited stop buses, an extension of the B57 into Red Hook and equipping B61 buses with MTA Bus Time which would allow riders to track buses and get service alerts on their smart phones. Subsequent to this study in January of 2013, the B57 was extended into Red Hook to IKEA, the B61 was equipped with Bus Time and more buses were added to the B61 route.

BOA Study
The Southwest Brooklyn Industrial Development Corporation (SBIDC), a local community organization in Red Hook, has been awarded funds by the New York State Department of State Brownfields Opportunity Area (BOA) program. This program aims to empower communities that have been impacted by environmental contamination to develop a comprehensive strategy for economic development and environmental remediation. Under a contract awarded to the NYC Mayor's Office of Environmental Remediation by the New York State Department of State, the NYC Department of City Planning has completed a Step 1 study of Red Hook that includes an overview of current existing conditions and identifies strategic sites in the neighborhood. Moving forward, SBIDC will use this study to engage the community and apply for additional BOA funds that can support future planning efforts and environmental remediation of sites.

A Stronger, More Resilient New York
The Mayor's office released the report A Stronger, More Resilient New York, following the devastation of New York City neighborhoods from Hurricane Sandy in the fall of 2012. The report lays out three general strategies for dealing with the effects of storms on transportation infrastructure: protecting transportation assets in order to maintain system operations, preparing the system to restore service after extreme weather events and implementing expanded service to increase the flexibility and redundancy of the system. The report contains many smaller initiatives meant to improve the resilience of different aspects of the transportation system as well as some that deal specifically with Red Hook. Some of them have already identified funding sources. The major initiatives that apply to Red Hook and transportation are as follows:

- **Coastal Protection Initiative 23: Install integrated flood protection system in Red Hook.** This would include both permanent and temporary features as well as landscaping and drainage improvements, the goal being to protect the neighborhood while also not interfering with Red Hook's non-storm fabric.

- **Transportation Initiative 12: Plan for and install new pedestrian and bicycle facilities to improve connectivity to key transportation hubs**. One aspect of this is for NYCDOT to explore the possibility of expanding transportation options that do not rely on the electrical grid such as the city's bike share system, Citi Bike, into areas that are adjacent to those already served by the program such as Red Hook.

- **Brooklyn-Queens Waterfront Initiative 1: Work with the Port Authority to continue a study of innovative coastal protection measures using clean dredge material in Southwest Brooklyn.** These measures would include in-water tools that could decrease the impact of a storm surge during a weather event.

- **Brooklyn-Queens Waterfront Initiative 2: Call on and work with the U.S. Army Corps of Engineers (USACE) to develop an implementation plan and preliminary designs for a local storm surge barrier along the Gowanus Canal.** The area around the Gowanus Canal, which runs through the southeastern area of Red Hook, lies within the flood plain and flooded during Sandy. This measure would mitigate such flooding in the future.

- **Brooklyn-Queens Waterfront Initiative 7: Improve connections between Red Hook and the rest of Brooklyn.** This initiative includes some of NYCDOT's projects to improve pedestrian and bus crossing over Hamilton Avenue.

- **Brooklyn-Queens Waterfront Initiative 8: Call for the MTA to explore Red Hook-Lower Manhattan bus connections.** The New York City Economic Development Corporation (EDC) will call on the Metropolitan Transportation Authority (MTA) to study the potential for routing buses through the Hugh L. Carey Tunnel.

- **Brooklyn-Queens Waterfront Initiative 9: Implement expanded free summer weekend ferry from Manhattan to Red Hook in 2013.** This ferry ran from Manhattan and stopped at Van Brunt Street and IKEA. In addition, EDC will study the possibility of expanded ferry service citywide, including in Red Hook.

- **Brooklyn-Queens Waterfront Initiative 10: Create and implement a revitalization strategy for targeted retail and community spaces within Red Hook Houses.** This initiative will involve capital improvements to the area around Red Hook Houses to allow for retail and community organizations to utilize the spaces.

APPENDIX III: LEVEL OF SERVICE ANALYSIS

Vehicular Traffic

Level of Service Analysis and Methodology

The level of service of signalized and unsignalized intersections within the Red Hook study area was analyzed applying the methodologies presented in the 2000 Highway Capacity Manual (HCM2000). These procedures evaluate analyzed intersections for average delay per vehicle and level of service (LOS).

Signalized Intersections

The capacity analysis methodology separates an intersection approach into lane groups on the basis of the movements occurring during each signal phase. The lane groups are then analyzed to determine the specific vehicular capacity and LOS. This analysis requires the following input parameters: intersection geometry, lane utilization, number of travel lanes, width of travel lanes, on-street parking conditions, locations of bus stops, number of buses stopping per hour, vehicle turning movements, vehicle classification, conflicting pedestrian movements, traffic signal cycle length, and allocation of green time.

The operating characteristics of signalized intersections can be estimated and evaluated by analyzing capacity and performance. The capacity of an intersection represents the throughput of a facility (i.e., the maximum number of vehicles that can be served in one hour). Capacity analysis generally results in the volume-to-capacity ratio (v/c ratio) which presents the proportion of capacity (supply) utilized by the existing traffic volume (demand). High v/c ratios (>0.85) indicate some traffic congestion, and low v/c ratios (<0.60) indicate smooth traffic flow.

The performance of an intersection is based on the estimated average delay time (i.e., the average stopped time per vehicle) for each vehicle utilizing a roadway segment. Delay time is determined by the capacity of a lane group, the amount of green time allotted to a lane group, and the signal cycle length. Delay time is the factor which determines the LOS for a lane group.

Short delays receive a good LOS while long delays receive a poor LOS. For example, an average delay of up to ten seconds per vehicle corresponds to LOS A, while an average delay of 45 seconds corresponds to LOS D. The following Table describes the LOS definitions for signalized intersections.

Table A3-1
Level of Service Definitions for Signalized Intersections

Flow Quality	Description
Level A	Describes operation with very low delay, i.e., less than or equal to 10 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
Level B	Describes operation with delay in the range of >10-20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
Level C	Describes operation with delay in the range of >20-35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although some may still pass through the intersection without stopping.
Level D	Describes operation with delay in the range of >35-55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, longer cycle lengths, or high v/c ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
Level E	Describes operation with delay in the range of >55-80 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
Level F	Describes operation with delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: *Highway Capacity Manual,* Transportation Research Board, National Research Council, Washington, D.C., 2000

Unsignalized Intersections
Capacity analysis at unsignalized intersection depends on a clear description and understanding of the intersection of drivers on the minor or stop-controlled approach with drivers on the major street.

Level of service (LOS) for a stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS is not defined for the intersection as a whole. LOS criteria are presented in the following Table.

Table A3-2
Level of Service Criteria for Unsignalized Intersections

Level of Service	Control Delay (sec/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Intersection Analysis
A total of 11 intersections were selected for the level of service analysis, of which 7 are signalized and 4 are unsignalized. The following is a list of the signalized intersections:

1. Hamilton Avenue and Clinton Street/W 9th Street
2. Hamilton Avenue and Smith Street
3. Lorraine Street and Columbia Street
4. Bay Street and Columbia Street
5. Bay Street and Clinton Street
6. Beard Street and IKEA main entrance
7. Van Brunt Street and Wolcott Street

The unsignalized intersections are as follow:

1. Lorraine Street and Otsego Street /Dwight Street
2. Bay Street and Court Street
3. Beard Street and Van Brunt Street
4. Columbia Street and Nelson Street/Delevan Street

Existing Level of Service Conditions
The traffic analysis focused on the peak hour of traffic volume. The peak hour typically represents the most critical period of operation and has the highest capacity requirements.

Traffic volume, turning movement, and vehicle classification counts were performed during the weekday morning, midday, and evening peak hours, as well as during the midday Saturday.
The peak hours were identified for each intersection. They are varying from 7:15-8:00AM to 8:15-9:00AM for the morning period, from 12:00-1:00 PM to 1:00-2:00 PM for the midday period, from 4:15-5:15PM to 5:00-6:00PM for the evening period and 1:00-2:00 PM to 2:00-3:00 PM for Saturday.

The New York City Department of City Planning (NYCDCP), in conjunction with the consulting firm J. RAP & Associates, Inc., collected all necessary data for the study. Existing traffic volumes were based on weekday morning, midday, and evening peak hour, as well as Saturday midday peak hours. The data was collected in November 2013. For each signalized intersection, the signal timing, cycle length, and phasing were obtained from the New York City Department of Transportation (NYCDOT).

Automatic Traffic Recorders (ATR) were used to conduct automatic 24-hour traffic counts for seven consecutive days, during the same week as manual vehicular counts were collected, at the following three locations:

1. Beard Street
2. Columbia Street, and
3. Van Brunt Street

The HCM summary sheets, which document the existing signal timing and phasing, allowed traffic movements, traffic volumes, peak hour factors, percent of heavy vehicles, LOS by approach, and LOS for the entire intersection, are on file at NYCDCP.

The capacity analysis indicated that most intersection approaches operate at LOS D or better for all four peak periods. At one intersection of Hamilton Avenue and Smith Street, the eastbound left approach movement operates at LOS E during the morning peak period and LOS F during the midday, evening and Saturday peak hours.

Appendix

The tables below present the existing LOS conditions for the selected signalized and unsignalized intersections within the study area.

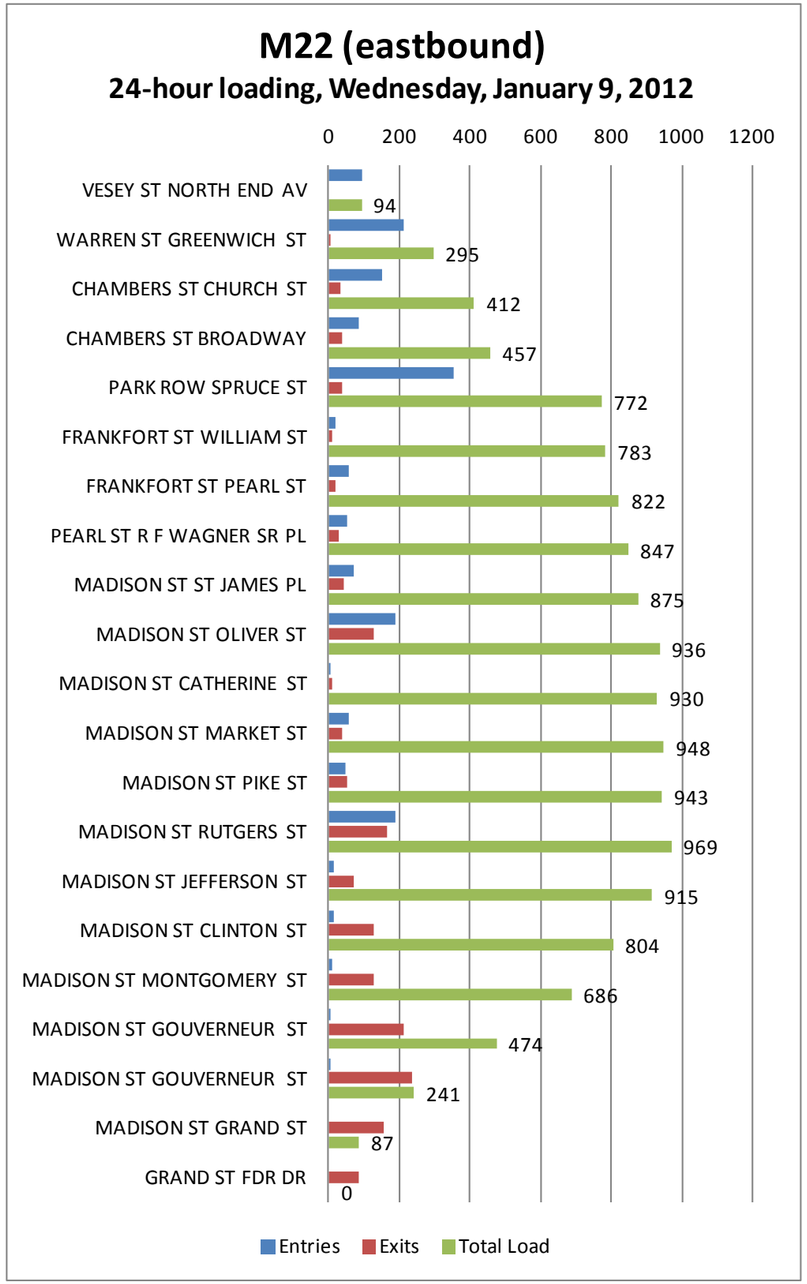
Signalized Intersections

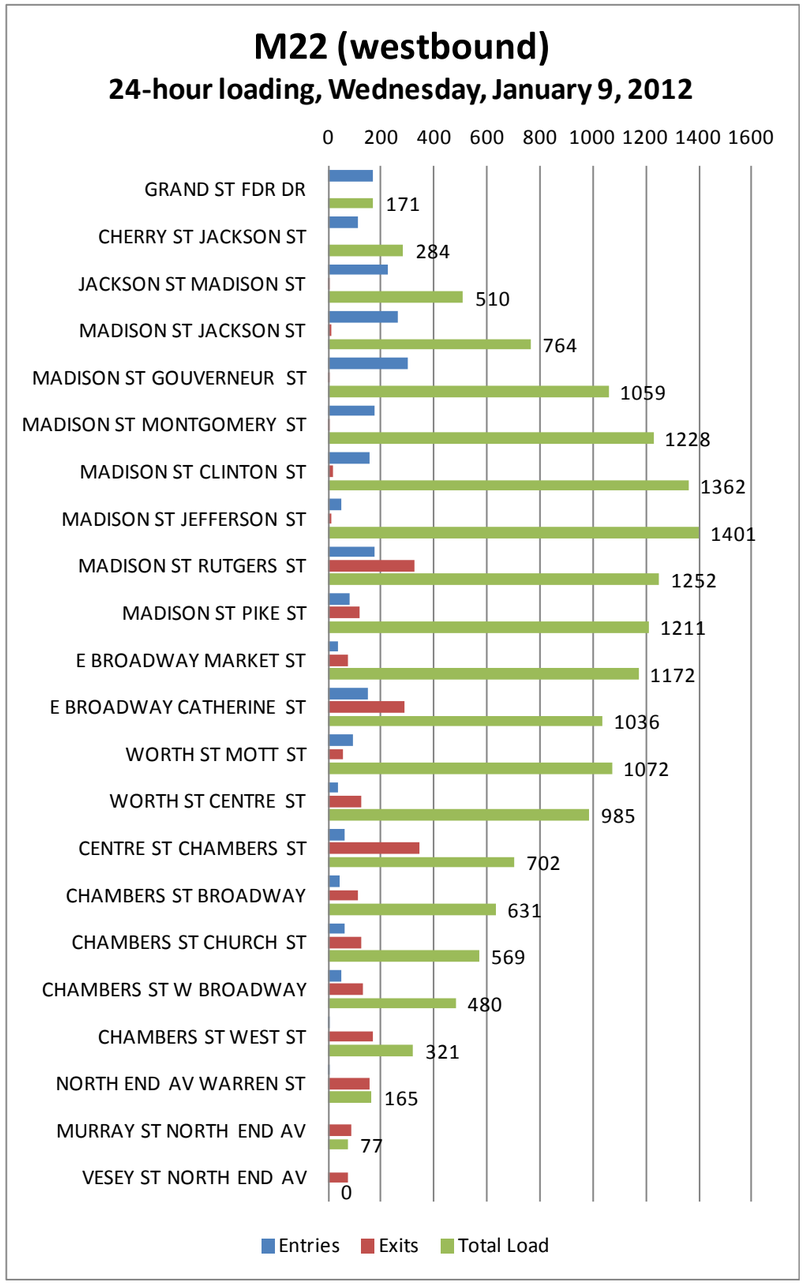
Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Clinton Street and Bay Street													
Eastbound	LTR	0.25	8.8	A	0.68	15.9	B	0.38	10-	A	0.37	10.1	B
Westbound	LTR	0.16	8.1	A	0.4	10.2	B	0.29	9.2	A	0.27	8.9	A
Northbound	LTR	0.1	14.9	B	0.13	15.2	B	0.08	14.7	B	0.09	14.7	B
Southbound	LTR	0.3	17.1	B	0.32	17.4	B	0.24	16.3	B	0.3	17	B
Intersection Delay			**11.4**	**B**		**14.3**	**B**		**11**	**B**		**11.4**	**B**
Bay Street and Columbia Street													
Eastbound	L	0.01	10.2	B	0.01	10.2	B	0.01	10.3	B	0.01	10.3	B
	TR	0.03	10.4	B	0.05	10.6	B	0.03	10.4	B	0.04	10.5	B
Westbound	L	0.24	12.4	B	0.7	21.9	C	0.45	15.4	B	0.42	14.6	B
	LR	0	10.2	B	0	10.2	B	0	10.2	B	0	10.2	B
	R	0.05	10.6	B	0.06	10.7	B	0.08	10.8	B	0.11	11	B
Northbound	TR	0.15	11.1	B	0.35	12.6	B	0.24	11.8	B	0.26	11.8	B
Southbound	LT	0.3	12.8	B	0.45	15	B	0.67	20.8	C	0.47	14.9	B
Intersection Delay			**11.9**	**B**		**15.8**	**B**		**15.7**	**B**		**13.3**	**B**
Lorraine Street and Columbia Street													
Eastbound	LTR	0.11	11.1	B	0.16	11.6	B	0.13	11.3	B	0.23	12.2	B
Westbound	LTR	0.33	13.2	B	0.29	12.8	B	0.54	16.6	B	0.29	12.8	B
Northbound	LTR	0.16	11.4	B	0.29	12.6	B	0.23	12	B	0.31	12.7	B
Southbound	LTR	0.31	12.9	B	0.48	15.3	B	0.37	13.6	B	0.61	17.7	B
Intersection Delay			**12.5**	**B**		**13.6**	**B**		**14.2**	**B**		**14.7**	**B**
Beard Street at IKEA Main Entrance													
Eastbound	TR	0.12	7.9	A	0.19	8.4	A	0.18	8.2	A	21	8.4	A
Westbound	LT	0.09	7.5	A	0.43	11	B	0.29	9.3	A	0.87	29.1	C
Northbound	LR	0.04	14.4	B	0.24	16.2	B	0.23	16.2	B	0.59	22.3	C
Southbound													
Intersection Delay			**8.7**	**A**		**11.5**	**B**		**10.8**	**B**		**23.4**	**C**
Van Brunt and Wolcott Street													
Eastbound													
Westbound	LTR	0.34	19.8	B	0.47	21.9	C	0.36	20.1	C	0.47	21.9	C
Northbound	LT	0.24	7.3	A	0.24	7.4	A	0.25	7.4	A	0.34	8.3	A
Southbound	TR	0.32	8.0	A	0.39	8.7	A	0.27	7.5	A	0.4	8.9	A
Intersection Delay			**11.0**	**B**		**12.5**	**B**		**11.3**	**B**		**12.4**	**B**
Hamilton, W9 Street and Clinton Street													
Eastbound	L	0.22	9.9	A	0.32	11	B	0.29	10.7	B	0.41	12.3	B
	LTR	0.41	11.6	B	0.33	10.7	B	0.54	13.3	B	0.31	10.5	B
	TR	0.56	14.0	B	0.42	11.9	B	0.74	18	B	0.4	11.7	B
Westbound	LT	0.71	16.2	B	0.42	11.6	B	0.54	13.2	B	0.46	12	B
	T	0.7	16	B	0.41	11.5	B	0.54	13.2	B	0.45	12	B
Northbound	L	0.21	38.1	D	0.32	39.5	D	0.26	38.7	D	0.36	40	D
	TR	0.3	40.3	D	0.4	42.3	D	0.43	42.9	D	0.58	47.6	D
Southbound	L	0.12	36.9	D	0.06	36.3	D	0.1	36.8	D	0.12	37	D
	T	0.21	38.3	D	0.14	37.3	D	0.14	37.3	D	0.12	37	D
	R	0.3	39.8	D	0.34	40.5	D	0.43	42.2	D	0.6	46	D
Intersection Delay			**18.4**	**B**		**18.2**	**B**		**19.3**	**B**		**18.6**	**B**
Hamilton and Smith Street													
Eastbound	L	0.65	74.8	E	0.97	120	F	0.87	98.3	F	0.99	121.1	F
	TR	0.24	9.5	A	0.24	9.4	A	0.46	11.6	B	0.25	9.5	A
Westbound	TR	0.95	39.8	D	0.83	30	C	0.9	34.3	C	0.68	24.7	C
	R	0.25	17.6	B	0.22	17.2	B	0.25	17.6	B	0.19	16.8	B
Northbound	L	0.04	36.9	D	0.02	36.6	D	0.04	36.8	D	0.04	36.9	D
	T	0.28	40.6	D	0.25	39.9	D	0.44	43.7	D	0.25	40	D
	R	0.3	41.5	D	0.29	41.1	D	0.43	45.5	D	0.37	42.7	D
Intersection Delay			**39.5**	**D**		**35.9**	**D**		**37.1**	**D**		**34.1**	**C**

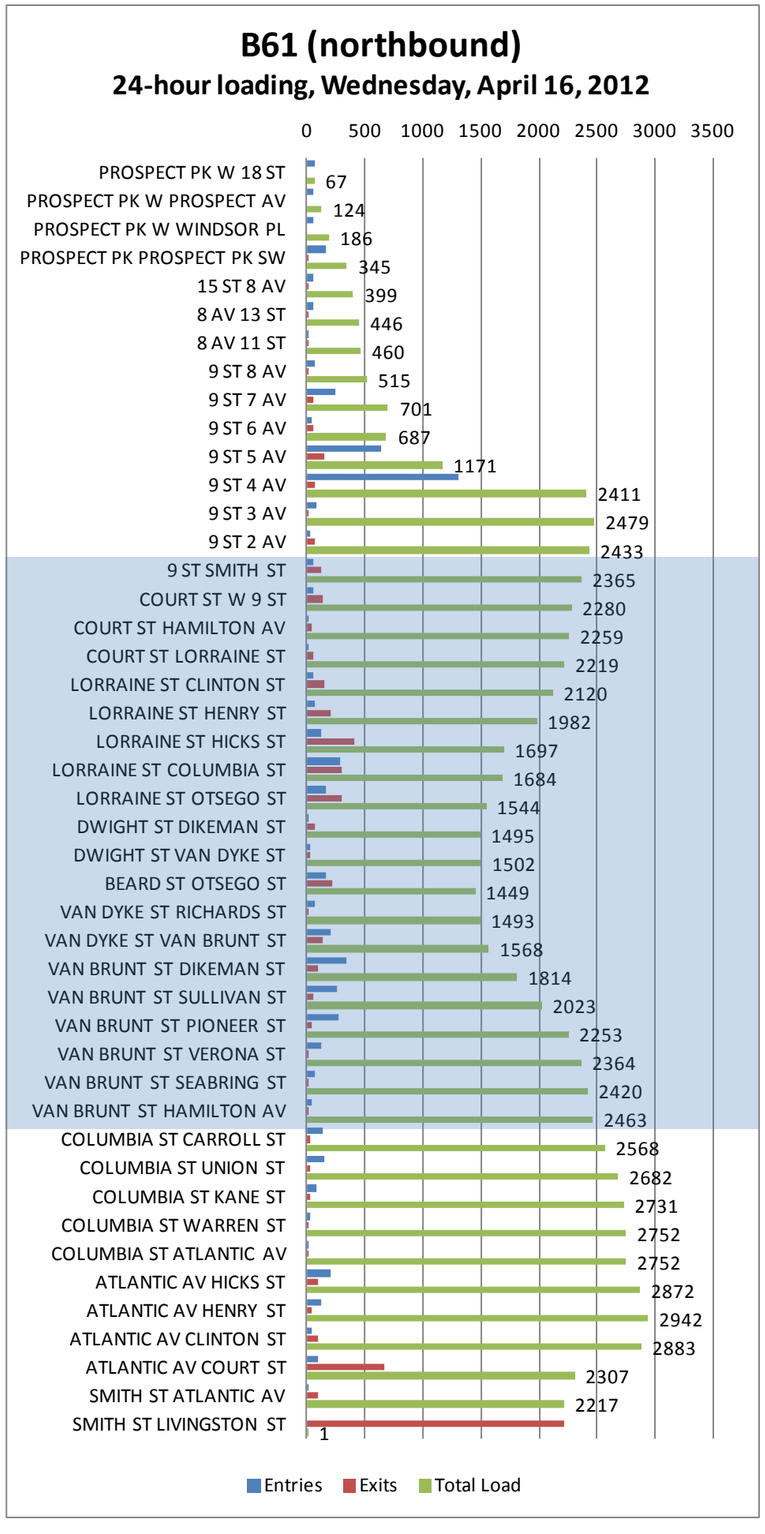
Unsignalized Intersections

Intersection	Appr.	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Court Street and Bay Street													
Eastbound	LTR	0.02	7.3	A	0.09	7.5	A	0.05	7.4	A	0.05	7.4	A
Westbound													
Northbound	LTR	0.06	10.2	B	0.53	29.6	D	0.09	12.6	B	0.1	11.3	B
Southbound	LTR	0.15	9.5	A	0.44	12.8	B	0.26	10.4	B	0.19	9.4	A
Nelson Street and Columbia Street													
Eastbound													
Westbound	LTR	0.07	10+	B	0.17	12.9	B	0.16	12.2	B	0.13	13.2	B
Northbound	LT	0.03	7.5	A	0.05	7.8	A	0.05	7.8	A	0.02	8.2	A
Southbound													
Lorraine Street and Ostego/Dwight Streets													
Eastbound													
Westbound	LTR	0.21	10.4	B	0.03	12.1	B	0.26	11.7	B	0.4	13.4	B
Northbound	LTR	0.01	7.4	A	0.03	7.5	A	0.02	7.5	A	0.02	7.5	A
Southbound													
Beard Street ana Van Brunt Street													
Eastbound													
Westbound	LTR	0.04	7.4	A	0.04	7.4	A	0.02	7.3	A	0.08	7.5	A
Northbound	LTR	0.22	11.3	B	0.21	11.3	B	0.22	10.8	B	0.47	15.7	C
Southbound	LTR	0.21	11.6	B	0.31	12.5	B	0.26	11.2	B	0.44	16.3	C

APPENDIX IV: BUS RIDERSHIP TABLES (JANUARY 2012)



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24-hour loading, Wednesday, April 16, 2012
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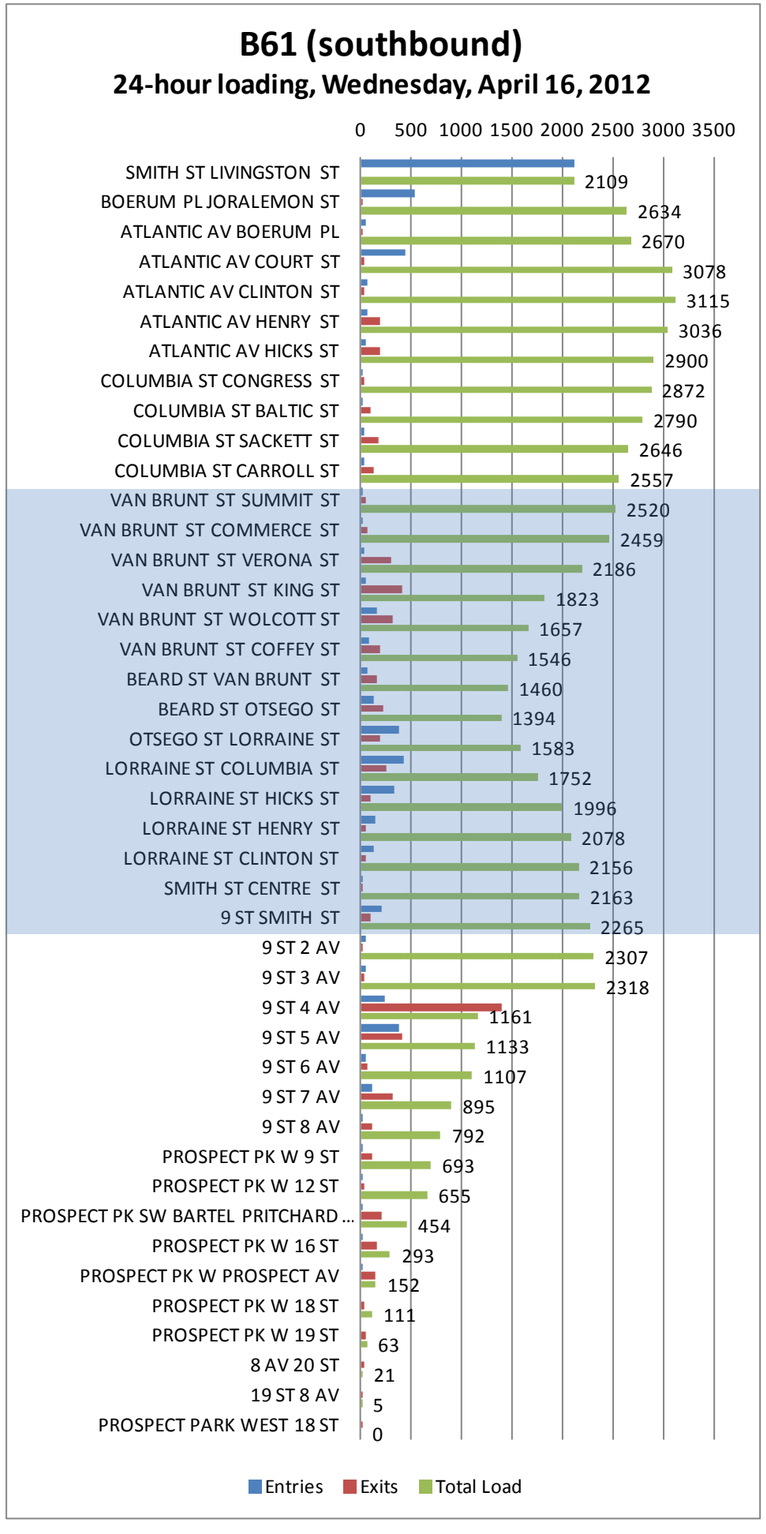
PROSPECT PK W 18 ST 67
PROSPECT PK W PROSPECT AV 124
PROSPECT PK W WINDSOR PL 186
PROSPECT PK PROSPECT PK SW 345
15 ST 8 AV 399
8 AV 13 ST 446
8 AV 11 ST 460
9 ST 8 AV 515
9 ST 7 AV 701
9 ST 6 AV 687
9 ST 5 AV 1171
9 ST 4 AV 2411
9 ST 3 AV 2479
9 ST 2 AV 2433
9 ST SMITH ST 2365
COURT ST W 9 ST 2280
COURT ST HAMILTON AV 2259
COURT ST LORRAINE ST 2219
LORRAINE ST CLINTON ST 2120
LORRAINE ST HENRY ST 1982
LORRAINE ST HICKS ST 1697
LORRAINE ST COLUMBIA ST 1684
LORRAINE ST OTSEGO ST 1544
DWIGHT ST DIKEMAN ST 1495
DWIGHT ST VAN DYKE ST 1502
BEARD ST OTSEGO ST 1449
VAN DYKE ST RICHARDS ST 1493
VAN DYKE ST VAN BRUNT ST 1568
VAN BRUNT ST DIKEMAN ST 1814
VAN BRUNT ST SULLIVAN ST 2023
VAN BRUNT ST PIONEER ST 2253
VAN BRUNT ST VERONA ST 2364
VAN BRUNT ST SEABRING ST 2420
VAN BRUNT ST HAMILTON AV 2463
COLUMBIA ST CARROLL ST 2568
COLUMBIA ST UNION ST 2682
COLUMBIA ST KANE ST 2731
COLUMBIA ST WARREN ST 2752
COLUMBIA ST ATLANTIC AV 2752
ATLANTIC AV HICKS ST 2872
ATLANTIC AV HENRY ST 2942
ATLANTIC AV CLINTON ST 2883
ATLANTIC AV COURT ST 2307
SMITH ST ATLANTIC AV 2217
SMITH ST LIVINGSTON ST 1
Entries
Exits
Total Load


B61 (southbound)
24-hour loading, Wednesday, April 16, 2012
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SMITH ST LIVINGSTON ST 2109
BOERUM PL JORALEMON ST 2634
ATLANTIC AV BOERUM PL 2670
ATLANTIC AV COURT ST 3078
ATLANTIC AV CLINTON ST 3115
ATLANTIC AV HENRY ST 3036
ATLANTIC AV HICKS ST 2900
COLUMBIA ST CONGRESS ST 2872
COLUMBIA ST BALTIC ST 2790
COLUMBIA ST SACKETT ST 2646
COLUMBIA ST CARROLL ST 2557
VAN BRUNT ST SUMMIT ST 2520
VAN BRUNT ST COMMERCE ST 2459
VAN BRUNT ST VERONA ST 2186
VAN BRUNT ST KING ST 1823
VAN BRUNT ST WOLCOTT ST 1657
VAN BRUNT ST COFFEY ST 1546
BEARD ST VAN BRUNT ST 1460
BEARD ST OTSEGO ST 1394
OTSEGO ST LORRAINE ST 1583
LORRAINE ST COLUMBIA ST 1752
LORRAINE ST HICKS ST 1996
LORRAINE ST HENRY ST 2078
LORRAINE ST CLINTON ST 2156
SMITH ST CENTRE ST 2163
9 ST SMITH ST 2265
9 ST 2 AV 2307
9 ST 3 AV 2318
9 ST 4 AV 1161
9 ST 5 AV 1133
9 ST 6 AV 1107
9 ST 7 AV 895
9 ST 8 AV 792
PROSPECT PK W 9 ST 693
PROSPECT PK W 12 ST 655
PROSPECT PK SW BARTEL PRITCHARD ... 454
PROSPECT PK W 16 ST 293
PROSPECT PK W PROSPECT AV 152
PROSPECT PK W 18 ST 111
PROSPECT PK W 19 ST 63
8 AV 20 ST 21
19 ST 8 AV 5
PROSPECT PARK WEST 18 ST 0
Entries
Exits
Total Load