WESTERN QUEENS TRANSPORTATION STUDY

NYC PLANNING

This study was funded by a grant through the New York Metropolitan Transportation Council (NYMTC).

Credits:

New York City Department of City Planning
Carl Weisbrod, Chairman
Purnima Kapur, Executive Director
Howard Slatkin, Deputy Executive Director for Strategic Planning

Transportation Division
Jack Schmidt, Director
Kevin Olinger, Deputy Director
Michael Klatsky, Project Manager
Stephanie Shellooe, Assistant Highway Transportation Specialist
Abraham Abreu, Assistant Highway Transportation Specialist
Karen Blatt, Former Project Manager

Queens Office
John Young, Director
Penny Lee, Lead Planner

Urban Design Division
Jeff Shumaker, Director
Sagi Golan, Associate Urban Designer
Skye Duncan, Former Urban Designer

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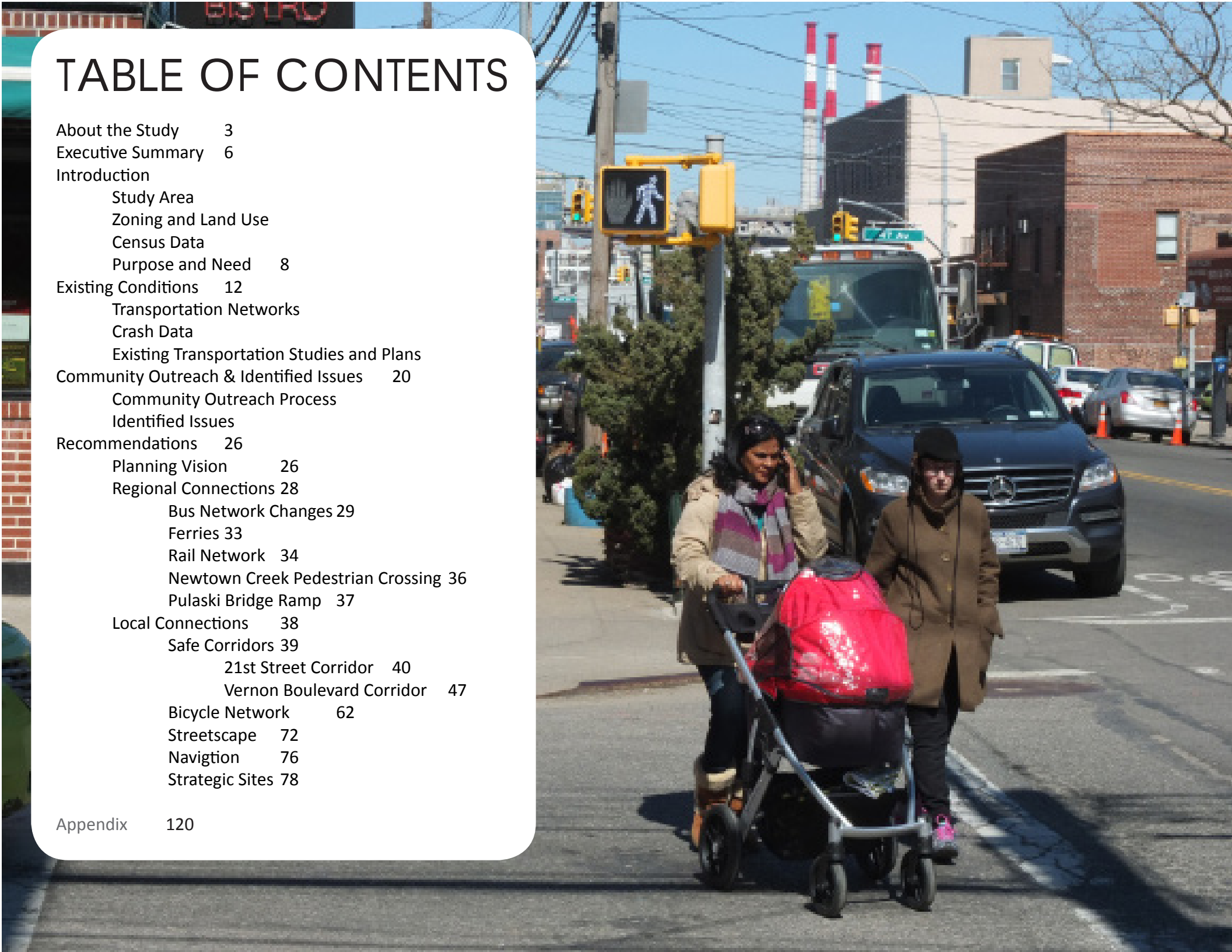


EXECUTIVE SUMMARY

The New York City Department of City Planning (DCP) has undertaken the Western Queens Transportation Study with the goal of improving mobility and enhancing connections both within Western Queens and between Western Queens and other areas of the city for pedestrians, bikes, mass transit users, and drivers.

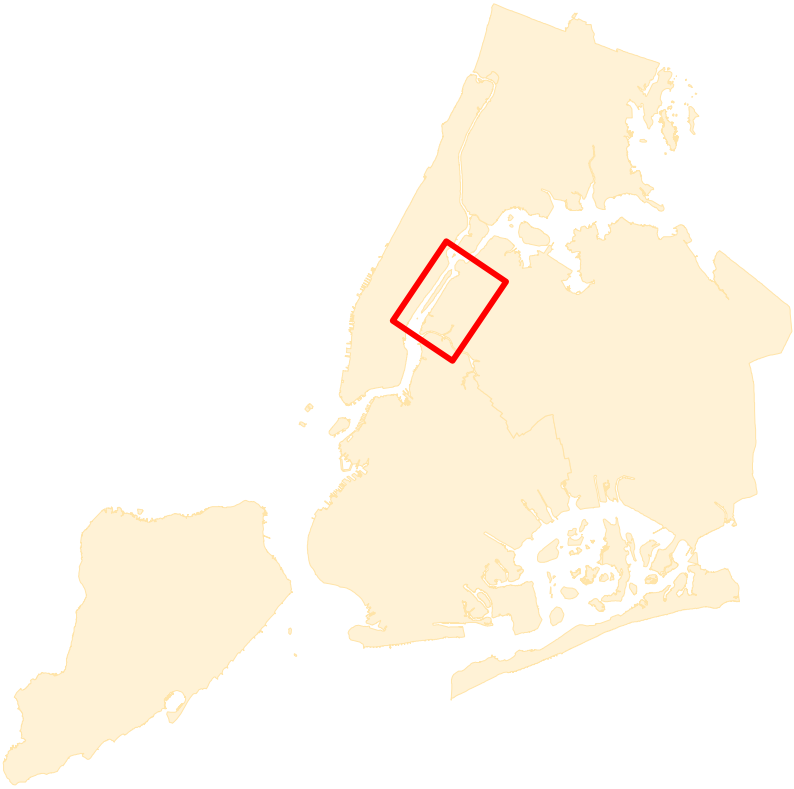
The objectives of this study are to:

1. Enhance the connections between the neighborhoods and destinations, such as waterfront parks and cultural institutions, of Western Queens.
2. Create and enhance connections to neighborhoods outside Western Queens.
3. Create and enhance connections to Roosevelt Island.
4. Improve mobility throughout the neighborhood by establishing new bike lanes, new transit services, and enhanced streetscapes.

The study is a comprehensive examination of transportation issues and opportunities within the rapidly developing western section of Queens between the East River on the west, Steinway Street to the east, Newtown Creek to the south, and Astoria Boulevard to the north, as well as access and egress to Roosevelt Island. This report presents analyses based on fieldwork, existing land use and zoning, recent and potential future land use and infrastructure developments, demographics, literature search, field data, and crash data. Extensive community outreach was undertaken to gain an understanding of community needs and desires. The analyses and community input led to a series of regional and local recommendations, including:

- Identifying ways to improve transit service for waterfront communities on the East River;
- Changes to the bus network to improve access to Roosevelt Island, Halletts Point, and Hunter's Point;
- Expanded East River ferry service;
- A new entrance ramp to the Long Island Expressway;
- Traffic calming, intersection improvements, and streetscape enhancements along the 21st Street and Vernon Boulevard corridors;
- Improved access to Roosevelt Island via a protected bike lane and a redesigned bridge/parking garage complex;
- A proposed new paradigm for mixed-used industrial streets;
- Strategic intersection improvements throughout the study area.

All of the recommendations require further analyses and design work by the applicable operating agency, such as the New York City Department of Transportation or the Metropolitan Transportation Authority. The department will continue its dialogue with these agencies to facilitate implementation.



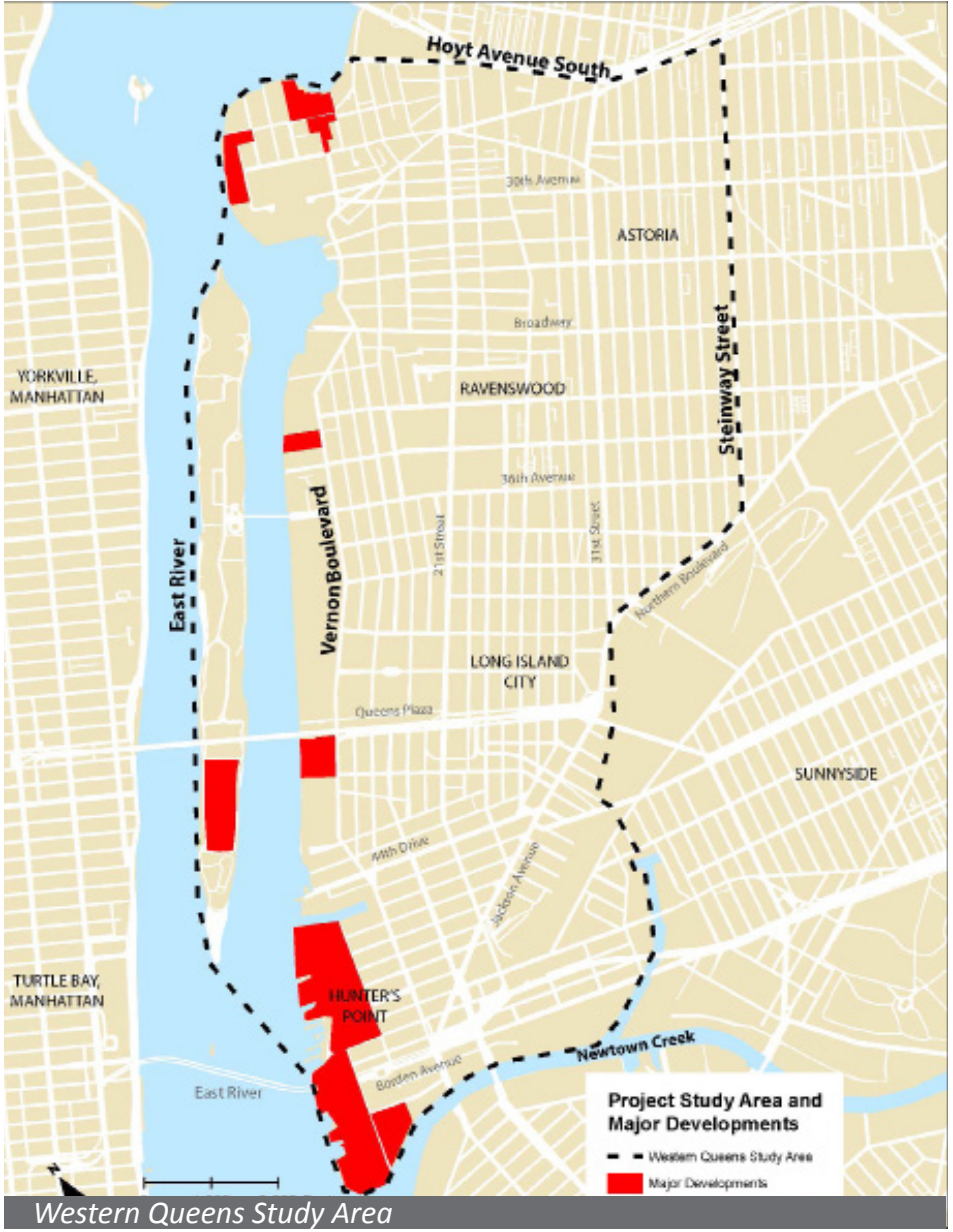
INTRODUCTION

Background and Study Area

This study examines transportation issues within an area of Western Queens bounded on the north by Hoyt Avenue South, Steinway Street on the east, Newtown Creek on the south, and Roosevelt Island to the west. The study area encompasses the neighborhoods of Hunter's Point, Ravenswood, Halletts Point, Dutch Kills, and Astoria in Queens and Roosevelt Island in Manhattan. The purpose of the study is to evaluate the study area's transportation needs in light of significant amounts of new development along the waterfront and inland blocks.

Since 2002, zoning changes approved by the City Planning Commission and City Council have set the stage for significant population growth in Western Queens, particularly in the Queens Plaza/Court Square area, where 11,400 housing units have been produced to date, and more than 10,000 units are in various stages of planning or construction. Large-scale developments are planned at Halletts Point, where 2,644 units are expected by 2022, and Astoria Cove, where 1,723 new units are projected by 2023. Other recent zoning changes in the Hunters Point, Dutch Kills and Astoria neighborhoods have produced some 4,700 units to date. New projects and zoning initiatives are expected to be undertaken in the Queens Plaza/Court Square vicinity and along the East River waterfront between Newtown Creek Basin and the Queensboro-Ed Koch Bridge, potentially resulting in additional growth of up to 11,000 units. Based on the average household size for Western Queens in the last census, the completion of all of these units is projected to add more than 60,000 residents to the area by 2030.

Cornell Technion, a new applied sciences engineering university, has started construction of a new campus on Roosevelt Island; the first phase is expected to be completed in 2017. It will provide 442 housing units for about 100 faculty members and the balance for students, as well as 490,000 square feet of academic, conference and business location spaces. Phase 2 is planned to be completed in 2038, and it will add housing for an additional 142 faculty members and 510 students and 820,000 square feet of academic and business location spaces.



Western Queens Study Area

In response to this growth, new bike lanes have been added, Queens Plaza and Jackson Avenue, two major thoroughfares, have been redesigned and transformed, and several streets and intersections have been redesigned to improve traffic and pedestrian safety. However, a comprehensive analysis of the study area's transportation network was needed to reflect changing travel patterns and needs resulting from both an increase in population density as well as the introduction of housing,

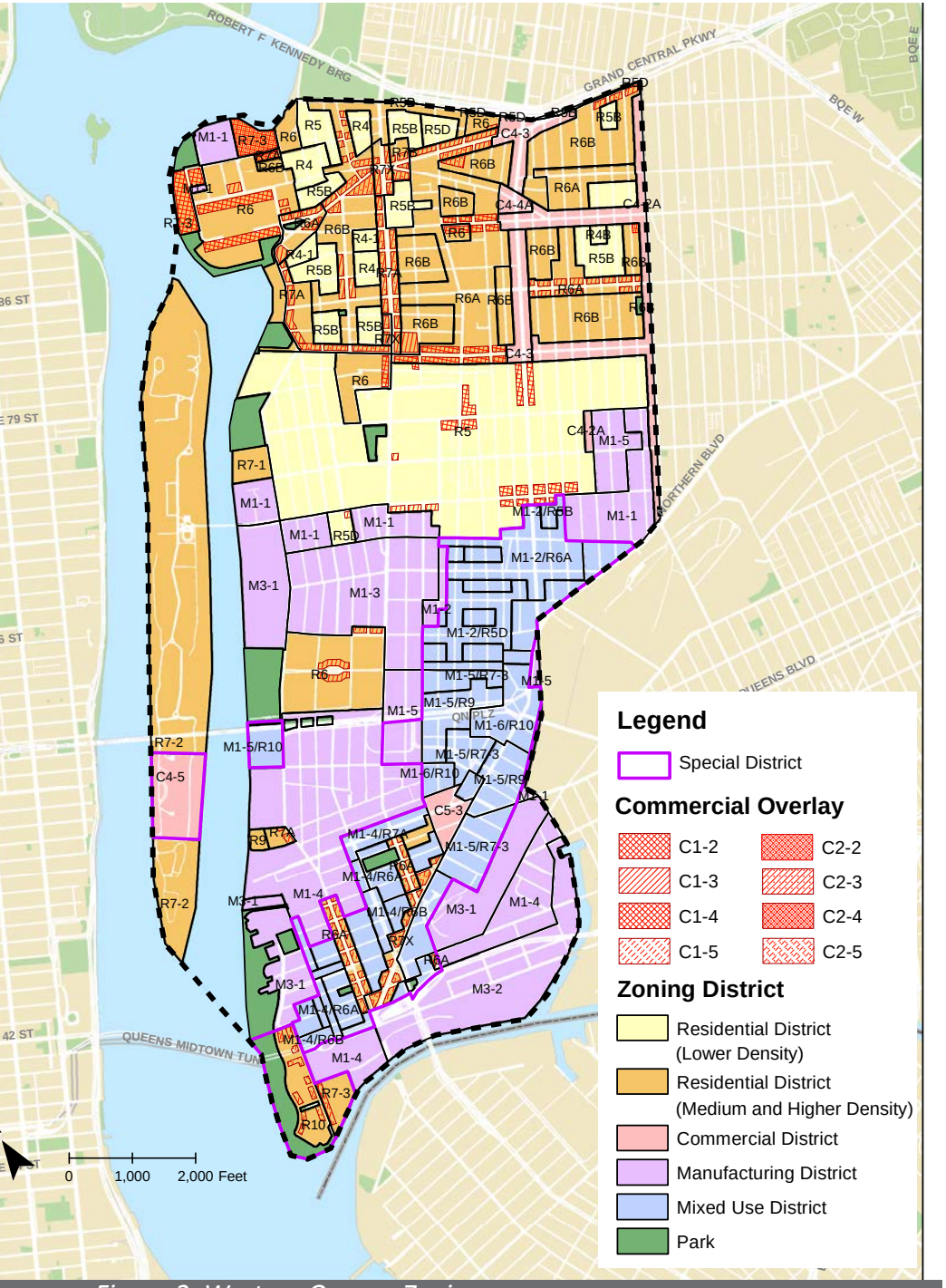


Figure 2. Western Queens Zoning

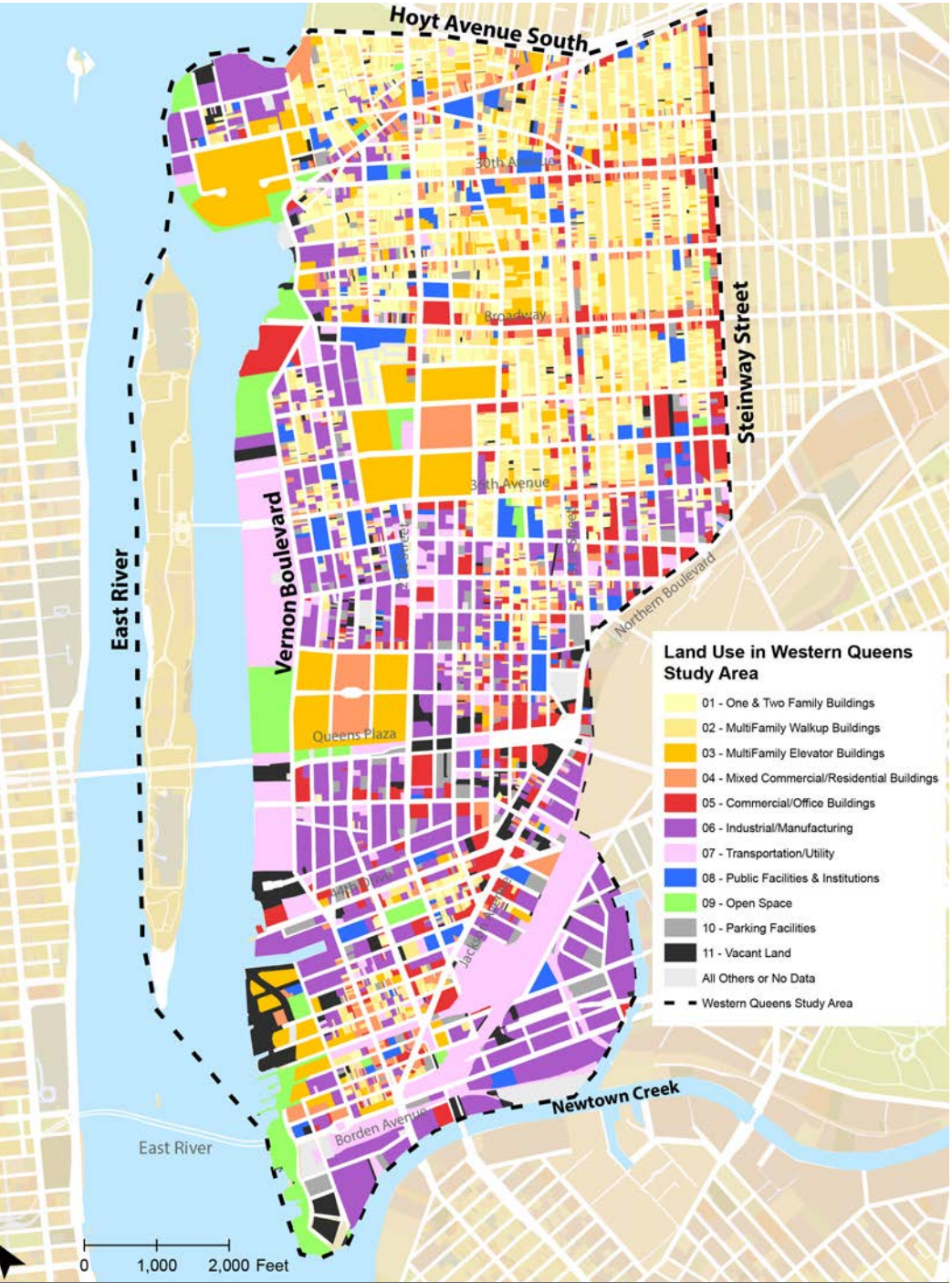
parks, and retail development to areas such as the waterfront that have traditionally not been well-served by mass transit.

As a result of the continuing development of Western Queens, the study area is expected to see significant residential and employment growth. The new technology development on nearby Roosevelt Island will bring commuters traveling to work and school. Much stronger connections will be needed between Long Island City, Hunter's Point, Astoria and Roosevelt Island due the rapid pace of residential developments in these areas. Burgeoning employment centers will also benefit from being better connected to Brooklyn, Manhattan, Long Island and New Jersey.

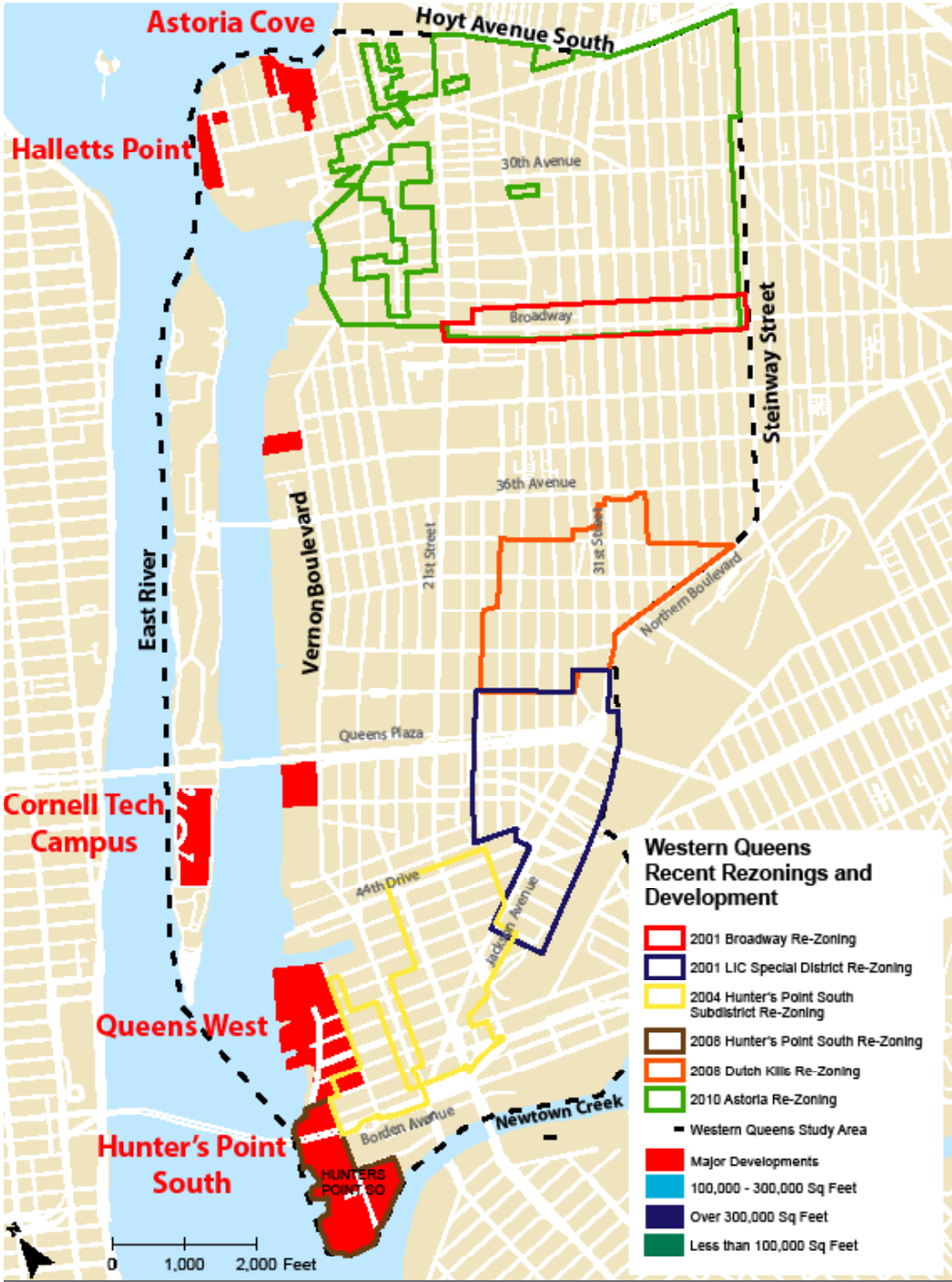
Zoning and Land Use

The northern third of the study area is generally characterized by low- to medium-density residential uses and three large New York City Housing Authority campuses: Astoria Houses, Ravenswood Houses, and Queensbridge Houses. Queensbridge Houses is the nation's largest public housing development. The southern two thirds of the study area is characterized by a mix of low to high density residential and commercial uses and precincts of solid industrial uses. Medium- to high density residential development characterizes the northern and mid sections of Roosevelt Avenue, with the Cornell Technion campus under construction in the southern end of the island.

Significant land use changes have been occurring along the Queens East River waterfront and on inland blocks along and adjacent to Jackson Avenue and Northern Boulevard between Vernon Boulevard and 31st Street. These changes have been due in large part to public- and private-sector initiated zoning changes over the past three decades, although some of the new commercial development has occurred through changes from industrial to office use allowed by zoning. Roosevelt Island will also experience a significant land use change as the former Goldwater Hospital site is redeveloped with the Cornell Technion University campus.



Western Queens Land Use



The study area's zoning generally reflects its land uses. Low- to medium-density residence districts are generally mapped in the northern third of the study area, the Special Long Island City Mixed Use District, a special district allowing residential, commercial, industrial, and community facility uses, is mapped in a roughly diagonal area between the southern waterfront and 37th Street, and manufacturing and residence districts are mapped in between. Roosevelt Island is zoned with residence districts and local commercial overlays.

Census Data

Census data for the study was drawn from the 2010 census, using the Census Transportation Planning Products (CTPP). The Department of City Planning's Transportation Division, with input from the Population Division, aggregated data for all census tracts within the study area boundary to analyze current conditions and trends within the study area.

Data revealed vehicle availability within the study area at 45 percent of residents having access to at least one vehicle. Transit mode share for work-bound trips from the study area is high, at 70 percent, which is higher than the New York City average of 56 percent. Automobile mode share for work trips into the study area is 48 percent, with 43 percent of commuters into the study area taking transit. A majority of residents have a commute time of less than an hour.

EXISTING CONDITIONS

Transportation Networks

Street Network

The streets of Long Island City and Astoria are largely laid out on a grid plan. However, portions of the grid are interrupted by large super-blocks and diagonal streets that add complexity to traffic circulation.

Vernon Boulevard, 21st Street and 31th Street run north to south through the study area, connecting the neighborhoods of Astoria, Long Island City and Hunter's Point. These arterials also provide access to the RFK/Triborough Bridge and the Queens-Midtown Tunnel. Major east-west arterials include Astoria Boulevard, 30th Avenue, Broadway, 36th and 37th avenues, Queens Plaza, 44th Drive, and Borden Avenue. Jackson Avenue and Northern Boulevard are significant thoroughfares that run diagonally through the study area.

Truck Routes

The New York City Truck Route Network is a set of roads that commercial vehicles must use within New York City. This network is comprised of two distinct classes of roadways: local truck routes and through truck routes.

All vehicles defined as a truck (two axles and six tires or three or more axles) are required to follow the truck route network. Commercial vehicles that do not meet the definition of a truck are not required to follow this network, but must follow all posted signs regarding the operation of commercial vehicles.

Trucks and commercial vehicles are prohibited from traveling on most parkways in New York City.

Local Truck Routes

Local truck routes are designated for trucks with an origin and/or destination within a local area or borough. This includes trucks that are traveling to make a delivery, loading, or a servicing trip. Trucks should only use non-designated routes for the purpose at the beginning or end of a trip, when traveling between their origin/ destination and a truck route.

The local truck route network within the study area includes:

- Vernon Boulevard from Main Avenue to Borden Avenue
- Steinway Street from Astoria Boulevard to Northern

Major Corridors

Area Truck Routes

Boulevard
- Main Avenue connecting Vernon Boulevard to Astoria Boulevard
- Astoria Boulevard connecting Astoria Boulevard to Astoria Boulevard South at 29th Street
- Broadway from Vernon Boulevard to Northern Boulevard
- Ed Koch Queensboro Bridge
- Borden Avenue

Through Truck Routes

Through truck routes are primarily composed of major urban arterials and highways and must be used by trucks that have neither an origin nor destination within a local area or borough.

The Through Truck Routes include:

- 21st Street from Main Avenue/Astoria Boulevard to Borden Avenue
- Jackson Avenue/Northern Boulevard from Steinway Street to Vernon Boulevard / Borden Avenue
- Astoria Boulevard South from 29th Street to Steinway Street
- Queens Plaza North and South from Vernon Boulevard to Jackson Avenue/Northern Boulevard
- Crescent Street from Queens Plaza North to 41st Avenue and 41st Avenue from Crescent Street to 21st Street
- Thomson Avenue from Jackson Avenue east to Queens Boulevard
- Long Island Expressway (I-495) including Queens-Midtown Tunnel east into Nassau County

On-street Parking

Residential and Commercial portions of the study area experience high demand for on-street parking. Curbside regulations vary within the area. Most of the curb regulations in the northern part of the study area are governed by alternate side street cleaning regulations. South of the Queensboro Bridge, alternate side street cleaning regulations are less common. Hunter's Point has no alternate side street cleaning regulations and few parking meters.

Parking meters are primarily located on commercial corridors. The northern part of the study area has no metered parking west of 21st Street.

On-street parking on most streets

is typically governed by more than one curbside regulation. The parking signs regulate parking either during a specific time of day or on a specific day of the week. The curbside regulations also include “No Parking Anytime” and “No Standing” signs, pertaining to a specific use such as a school or a church. There are several such areas scattered throughout the entire study area.

Subways

Five subway lines from Manhattan and Brooklyn converge in the Long Island City Core, a roughly triangular-shaped area bounded by 23rd Street, 41st Avenue, Northern Boulevard, and Jackson Avenue. These lines then fan out to Astoria, Flushing, and Jamaica. Three major stations – Court Square-23rd Street, Queens Plaza, and Queensboro Plaza – line the perimeter of the LIC Core, providing transit access from this portion of the study area to destinations throughout Brooklyn, Manhattan and Queens.

While the eastern portion of the study area has excellent transit access, much of the western portion of the area, particularly the waterfront, is relatively far from the subway, and connected to it by bus (see below.) This is particularly true in Astoria, where the nearest subway station is one mile from the waterfront. However, the southwestern portion of the study area is roughly one-half a mile away from the 7 and G trains. Eight subway routes traverse the study area: the 7, E, F, G, M, N, Q, and R.

On Roosevelt Island, the F train stops close to the tram station, at roughly the mid-point of the island.

The routes and stations within the study area are described in the appendix.

Commuter Rail

The Long Island Rail Road provides peak-directional service to the Hunterspoint Avenue and Long Island City stations, both located at the southern limits of the study area. Most trains serving these stations terminate at Oyster Bay, Huntington, Port Jefferson, Patchogue, Speonk, or Montauk. On most weekdays, 10 trains serve Hunterspoint Avenue in the AM peak and 11 in the PM peak, while five trains serve Long Island City in each peak period. No service is available at either of these stations on weekends or holidays.

Subway and Rail Map

Existing Bus Network

The Long Island City station is lightly used, while the Hunterspoint Avenue station experiences heavy activity during peak periods when riders transfer to the 7 train. A new LIRR station is planned for construction underneath the Queens Boulevard viaduct as part of the LIRR's project to bring LIRR service to Grand Central station.

Buses

Fourteen bus routes traverse the study area: the B32, B62, Q18, Q32, Q39, Q60, Q66, Q67, Q69, Q100, Q101, Q102, Q103 and Q104. While there are many bus lines, some run more frequently than others, and portions of the study area are left with limited transit options. The low frequency routes, such as the Q102 and Q103, have long headways of 20 to 30 minutes. Most of the new waterfront development is served by these two routes. A route-by-route description has been provided in the appendix.

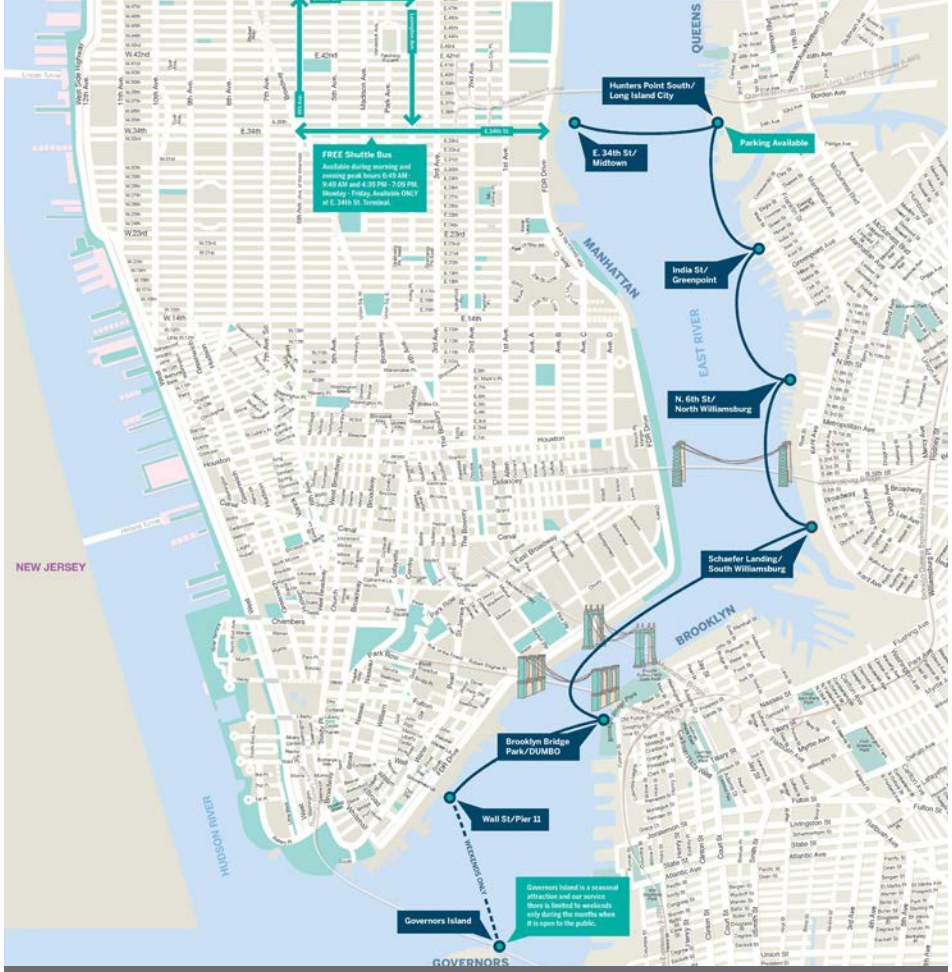
Tram and Access to Roosevelt Island

The Roosevelt Island Tram runs between Roosevelt Island just north of the 59th Street Bridge and 2nd Avenue and 60th Street in Manhattan. Service operates at 7- to 8-minute intervals during peak hours and 15-minute intervals during midday hours and weekends. Service does not operate between 2:00am and 6:00am weekdays and 3:30am and 6:00am weekends.

The Q102 bus also serves the entire length of Roosevelt Island, connecting it to Queens Plaza and Astoria. A more detailed discussion of Q102 service is included in the bus section of the appendix.

Intra-island travel is provided by the Roosevelt Island Operating Corporation's Red Bus fleet. Service is provided at 7- to 8-minute intervals during peak hours and every 15 minutes at all other times the service operates. Red Bus service runs at all times except between approximately 3:45am and 5:45am daily.

Until the mid 1950s, pedestrians and motor vehicles were brought to the island via an elevator at the midpoint of the 59th Street Bridge. This service was ended shortly after the current bridge linking the island to 36th Avenue in Ravenswood in 1955.



East River Ferry System. Map Source: NY Waterway.

Ferry

East River Ferry service operates between Pier 11 in Lower Manhattan and East 34th Street and 1st Avenue, via Brooklyn Bridge Park, Schaefer Landing in South Williamsburg, North 6th Street in North Williamsburg, India Street in Greenpoint, and a stop in the study area at Hunter's Point South in Long Island City. During summer weekends, ferry service is extended to Governors Island.

Service within the study area runs between 6:45am and 8:25pm weekdays, and between approximately 10:00am and 9:00pm weekends. The East River Ferry is scheduled at 20-minute intervals during AM and PM peak hours, and 30-minute intervals midday. Weekend service runs at 45-minute intervals.

The city plans to expand this network to serve Roosevelt Island and Astoria in the future.

Pedestrian Network

The pedestrian network and streetscape vary greatly within the study area. In some neighborhoods the pedestrian network has gaps and the infrastructure is deficient, and in others the infrastructure has been recently improved and is lined with trees, benches and decorative pavers.

Crash Data

A crash analysis was performed in the study area in order to identify any high crash locations that need to be addressed. The two locations with high numbers of crashes are the approaches to the Queensboro Bridge and Triborough Bridge. Crash data is recorded by the NYC Police Department 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 their ALIS (Accident Location Information System) database. ALIS is a web-based system that visually displays a crash data query in a GIS format. The New York City Department of Transportation geocoded the locations of all NYSDOT-provided data. This database was used to perform crash analysis for this project, located in the appendix.

Traffic Analysis

This study does not have a detailed traffic analysis study for its recommendations and instead attempts to develop as many concepts and solutions for the area's transportation issues.

The reason for this is to not duplicate data collection efforts by others.

At the project start, traffic data was just collected or was in the process of being collected for each of the major projects in the study area, in addition to comprehensive data collection effort for the New York City Department of Design and Construction's (NYCDDC) and NYCDOT's joint Hunter's Point Street Reconstruction project.

A preliminary look at NYCDOT's traffic data in the Traffic Information Management System and the vehicle turn simulation software AutoTurn was used to verify many of the recommendations.

Existing Bicycle Network

Bicycle Network

The bicycle network within the study area, which includes on-street bike lanes and off-street bike paths, is well developed from north to south, but offers fewer options for cyclists traveling east to west. Below is a description of the bike facilities within the study area.

Major bicycle corridors in the study area:

- Astoria Boulevard / Hoyt Ave
- RFK Triborough Bridge
- Halletts Point
- 35th Street & 36th Street
- 28th Street & 29th Street
- Queens Plaza
- Ed Koch Queensboro Bridge
- 23rd Street
- 44th Drive
- Hunter's Point Area

Existing Transportation Studies and Infrastructure Projects

Over the last few years, there have been numerous studies and infrastructure improvements in Western Queens in response to new and expected development. The Western Queens Transportation Study will consider these studies and infrastructure improvements when making recommendations.

- Hunter / Crescent Triangle Pedestrian Improvements
- Queens Plaza Bike and Pedestrian Improvement Project
- Queens East River and North Shore Greenway Master Plan
- LIC Links
- DDC Long Island City/Hunter's Point Area-Wide Reconstruction Project
- NYCDOT Bicycle Facilities Plans
- Safe Streets for Seniors
- WalkNYC
- NYCEDC Citywide Comprehensive Ferry Study Update

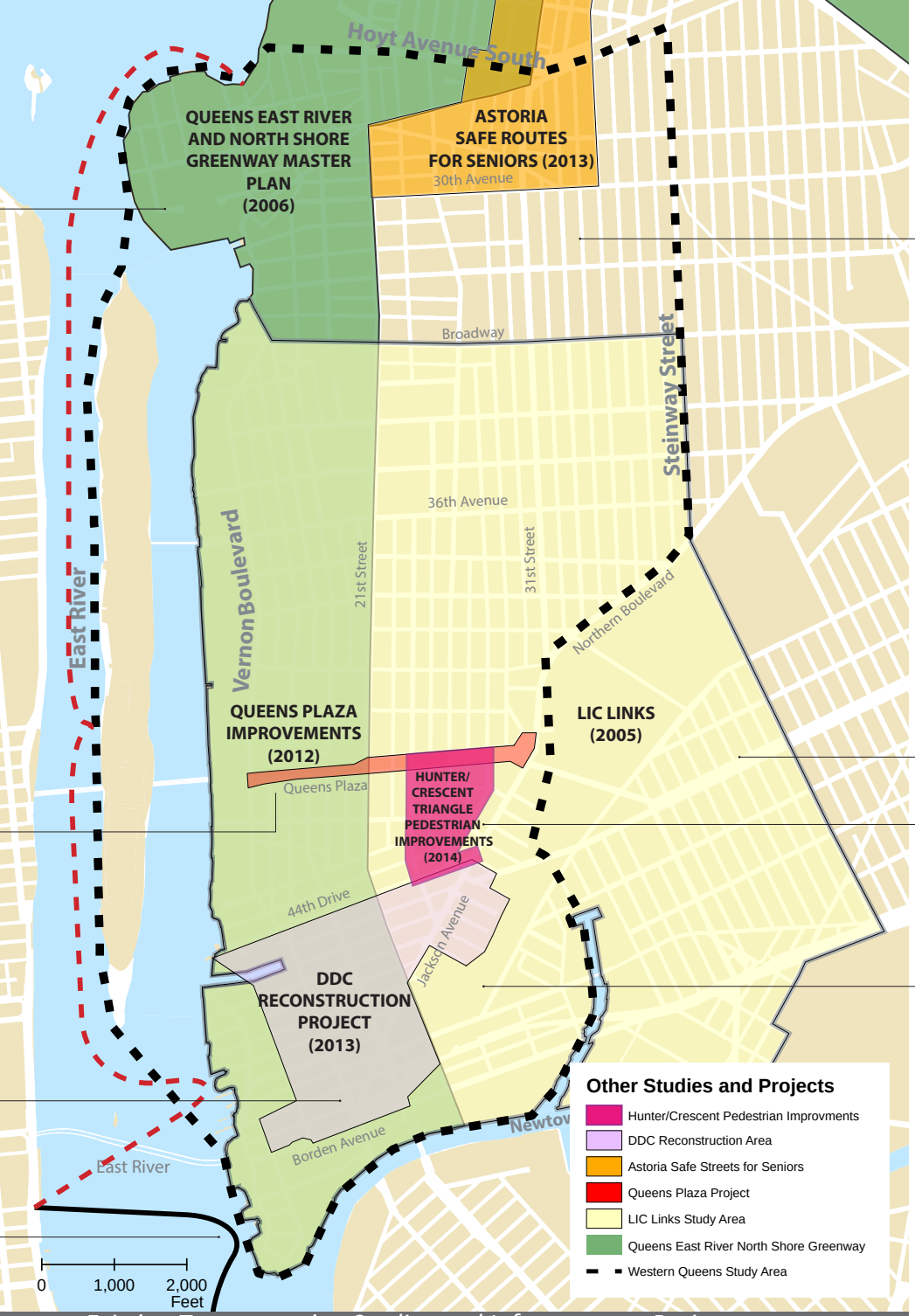
Greenway implemented along much of the East River

NYC DOT's ongoing bicycle network development continues within our study area

Capital construction of Queens Plaza to improve median, construct a two-way seperated bike lane and park space

Ongoing Hunter's Point Reconstruction project between DOT and DDC

Expansion of East River Ferry System to Long Island City North, Roosevelt Island and Astoria



Existing Transportation Studies and Infrastructure Projects

The DOT Safe Routes for Seniors study area identifies places where seniors are at higher risk of traffic crashes and seeks to implement traffic calming and pedestrian safety initiatives particulaly geared to an aging population

LIC Links, a DCP Queens Office Study, made recommendations for improving connections to the waterfront by improving pedestrian connections

Pedestrian Improvements in the Long Island City CBD.

The LIC Partnership has been instrumental in installing DOT's new wayfinding program WalkNYC, which provide maps with local destinations and walking distances

OUTREACH & ISSUES

Community Outreach Process

Following the initial presentation at the Noguchi Museum in June 2013, outreach with stakeholder groups helped identify issues to analyze further. Stakeholders included residents, business owners and visitors. In addition, the study team undertook a months-long outreach effort to engage those who travel in the study area and use their feedback to direct and prioritize the recommendations. Stakeholder groups included:

- Queens Community Board 1 Transportation Committee
- Queens Community Board 2 Transportation Committee
- Manhattan Community Board 8
- Roosevelt Island Operating Corporation
- Dutch Kills Civic Association
- Long Island City Partnership
- Long Island City Chamber of Commerce
- Transportation Alternatives
- Greenshores NYC
- Western Queens Technical Advisory Committee, comprised of city agencies, local stakeholders and elected officials.

Key issues identified by stakeholders included:

Multi-modal Transportation Network at Court Square

Mass Transit

- Infrequent bus service along Vernon Boulevard.
- Too few east-west bus routes in the north half of the study area between the N/Q subway stations and the waterfront.
- Lack of bus service between Hunter's Point South/Queens West and Manhattan as well as to other Queens locations such as retail destinations along Steinway Street and Northern Boulevard.
- Infrequent bus service between Roosevelt Avenue and Queens' waterfront and retail destinations.

Pedestrian Issues

- Sidewalks are frequently cracked or non-existent and pedestrian lighting levels are low, particularly under the study area's many elevated structures.
- Many intersections, particularly along major corridors such as Vernon Boulevard and 21st Street, do not have crosswalks, stop signs, or traffic lights. Intersections along 31st Street feel unsafe because of multiple subway columns.
- Lack of street trees.
- Insufficient crossing times at Queens Plaza.
- Conflicts with cyclists, including a lack of enforcement of the bicycle prohibition in Dutch Kills Green and a lack of signage alerting pedestrians that Queens Plaza Greenway allows two-way bike traffic.
- Traffic signals along 31st Street are hard for pedestrians to see, and signals at some intersections do not provide enough crossing time.
- Lack of alternatives to the Pulaski Bridge for crossing Newtown Creek into Brooklyn.

Bicycle Network

- Lack of east-west bicycle lanes, particularly in the northern section of the study area.
- Clearer markings are needed to direct bicycles from the Queens Plaza Greenway to the north-bound bike lane on 28th Street.
- The Greenway in front of Queens Bridge Houses that connects

the Queens Plaza Greenway with the East River Greenway needs improvement.

- There is no bike lane along Jackson Avenue.
- Bicycle access to and from the Roosevelt Island Bridge is unsafe.
- Lack of alternatives to the Pulaski Bridge for crossing Newtown Creek into Brooklyn.

Street Network

- The gateway to Roosevelt Island from Queens is unattractive.
- Inadequate notice of low clearances for trucks on 31st Street.

Long crosswalks with faded markings; overwhelming wayfinding geared toward motorists; and the lack of connectivity within the bike network are pervasive issues in the study area

Current conditions make it difficult to travel between some points within the study area and especially to Roosevelt Island. Transit connections for waterfront areas are primarily east-west, rather than north-south.

Figure 15. Existing Bicycle Network on Roosevelt Island Bridge

Figure 16. Existing Bicycle Network on Roosevelt Island Bridge

RECOMMENDATIONS

Planning Vision

The Department of City Planning, incorporating extensive community feedback, has developed a vision for Western Queens. The goal is providing better connections between neighborhoods and creating connections between new and existing development. The planning vision takes into account the existing land use and transportation network, and seeks to improve the transportation network both for future development and the needs of existing residents, workers and visitors.

Our vision is a transportation network in Western Queens that allows for easy and safe travel not only to points outside the area, but also among the diverse neighborhoods of the area.

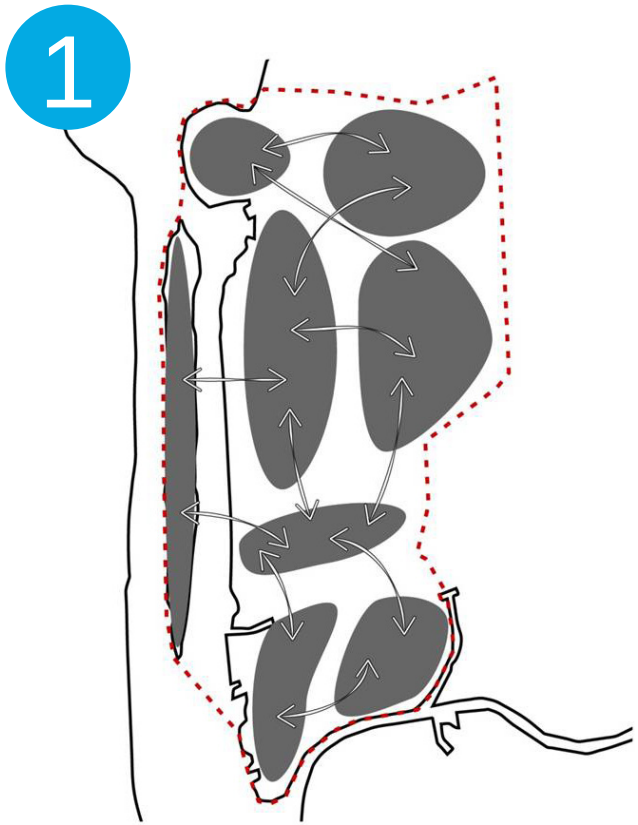
This vision includes improved access to destinations such as transit hubs, employment centers and regional parks. By providing a better experience and a network that is well connected, existing and new residents can increase the amount of walking and biking they do in the area. This in turn can reduce pressure on the existing infrastructure and help avoid certain automobile trips to help alleviate congestion and pollution.

Additional planning objectives:

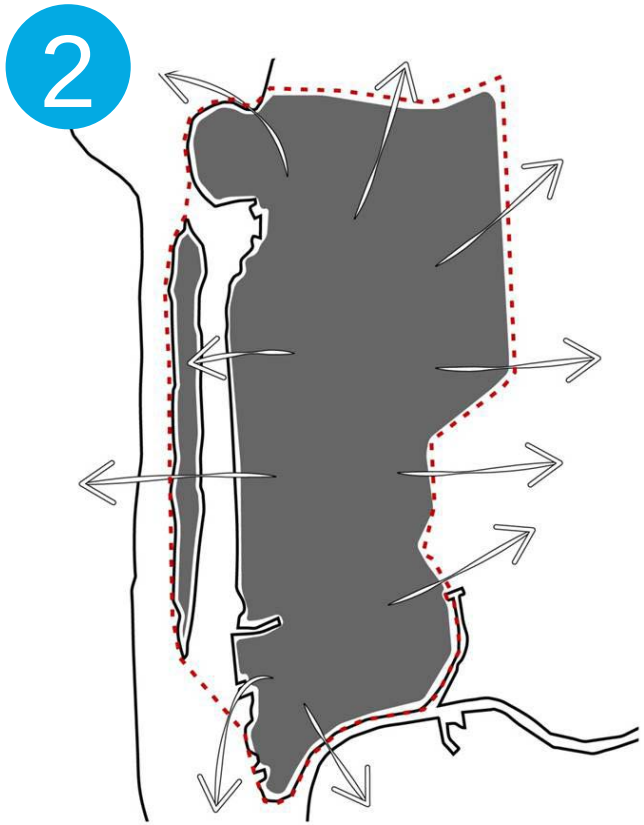
- Modify the bus network to better serve the existing and projected populations and land uses
- Provide better north-south connections with a focus on redesigning Vernon Boulevard and 21st Street to better accommodate pedestrians
- Identify ways to improve the existing industrial streets to meet the needs of the business community while providing safe, comfortable and convenient places to walk
- Improve pedestrian and bicycle infrastructure to better connect Western Queens to Roosevelt Island
- Support and provide guidance for ongoing transportation improvement projects
- Identify ways to improve public transportation connections to job centers, including those in Brooklyn, and to LaGuardia Airport.

Key Goals

In order to achieve the planning vision and attempt to solve the transportation issues in the study area, we have identified five key goals that our recommendations support.



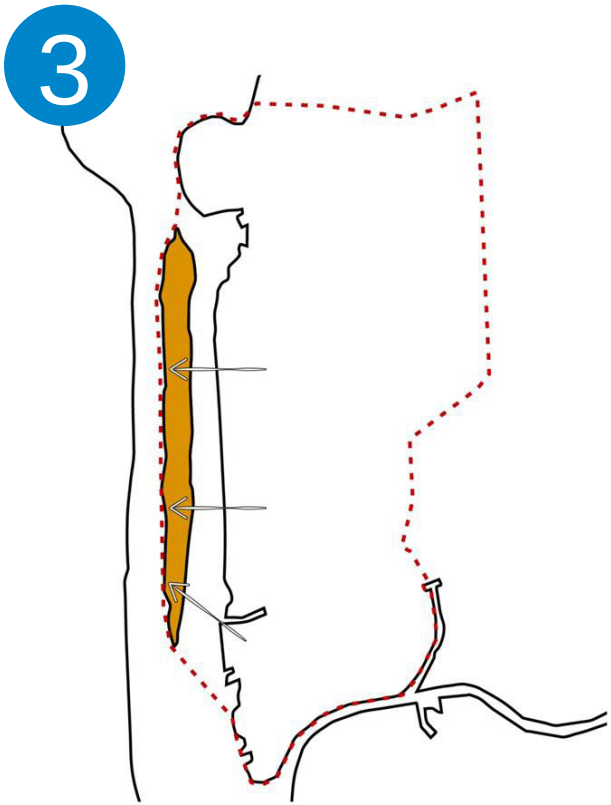
1. Enhance connections between the various neighborhoods of Western Queens



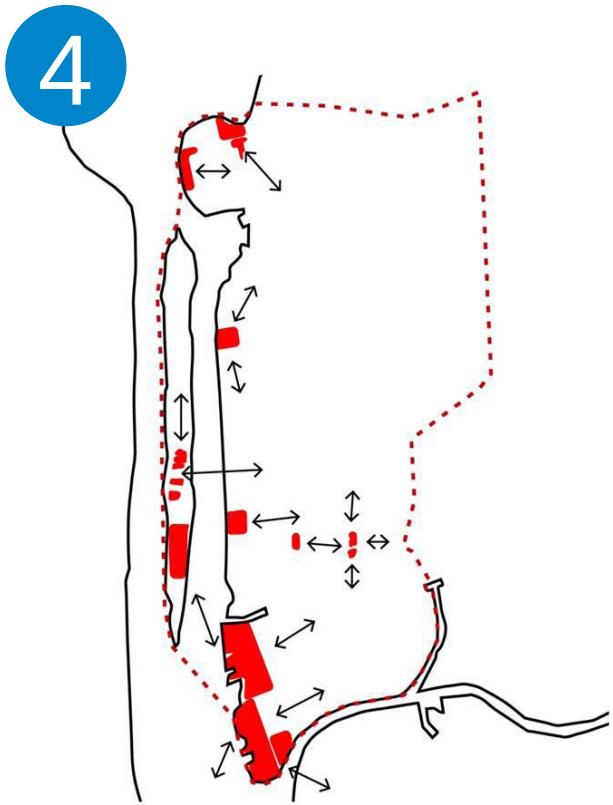
2. Create and enhance connections to neighborhoods outside Western Queens

Key Goals (continued)

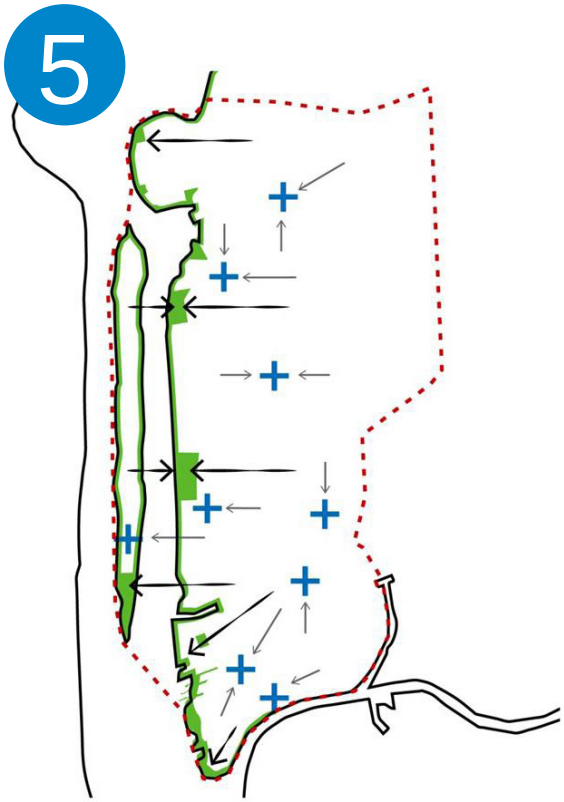
In order to achieve the planning vision and attempt to solve the transportation issues in the study area, we have identified five key goals that our recommendations support.



3. Create and enhance connections to Roosevelt Island



4. Link existing and new development and improve access and mobility throughout the neighborhood



5. Connect new and existing destinations such as waterfront parks and cultural institutions

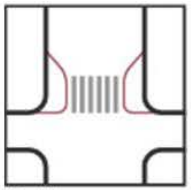
Overview of Recommendations

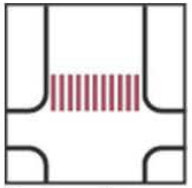
To achieve the goal of improving the overall transportation network while providing enhanced choices for people, the recommendations focus on improving all transportation modes.

For purposes of this report, the recommendations are divided into two broad categories. The first is Regional Recommendations, meaning those strategies that will provide better transportation options into and out of the study area. Next are Local Recommendations, which provide better options for travel within the study area.

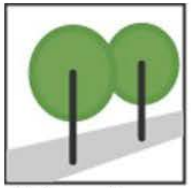
While the emphasis will be on pedestrians and bicycles, there are transit, ferry and automobile recommendations as well. The icons below indicate the focus of each recommendation:

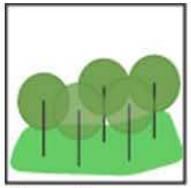

Lighting improvements


Bulb-outs


Pedestrian Crossings


Wayfinding


Sidewalk Improvements


New Open Space


Bike Facilities


Bike Routes


Bike Share

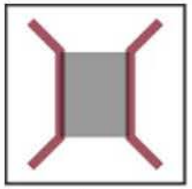

Street Operation Changes


Signal Changes


RRFBs


Park Smart


Bus Route Changes


Infrastructure Improvements


New Express Subway Service


New Ferry Route/Stop


New Transit-way

Recommendation Strategies

The icons below help to illustrate the strategies that are used for each recommendation:

Regional Recommendations

1. Technology Corridor Transit Improvements
2. Bus Network
3. Rail Network
4. Ferry Service
5. Highway Ramp from Pulaski Bridge to LIE

Local Recommendations

1. Safe Corridors

a. 21st Street
b. Vernon Boulevard
c. Crescent Street

2. Bicycle Network

a. 36th Avenue Bike Lane
b. Access to Roosevelt Island
c. Queens Plaza Bike Lane
d. Queens Plaza and East River Greenway Connection

3. Streetscape Improvements

Mixed-use Street Design
Pedestrian Lighting Under Elevated Structures
Pedestrian Lighting on Key Corridors
Wayfinding Signs
Queensboro Bridge Signs

4. Strategic Site Improvements

Steinway Street
Jackson Avenue Between 47th Road and 21st Street
44th Drive Improvements
Newtown Avenue and 30th Avenue
Borden Avenue and 11th Street
Queensboro Plaza Upper Level Windscreen

Figure 16. Overview of Recommendations

NYC PLANNING

REGIONAL RECOMMENDATIONS

This section outlines recommendations that affect the transportation system for people traveling within the Western Queens study area and between the area and other locations. By improving transportation options, we can facilitate a broader geographic connectivity within the city and region.

REGIONAL RECOMMENDATIONS

Regional Recommendations

This study document provides recommendations for a variety of transportation modes. The study aims to improve travel conditions within the Western Queens study area, with particular focus on access to Roosevelt Island and connections between neighborhoods. The recommendations pertain to transportation facilities and services located within and nearby the study area. The regional recommendations include:

1. Technology Corridor Transit Improvements
2. Bus Network Changes
3. Subway Network Express N/Q Service
4. Sunnyside Commuter Rail Station
5. Ferry Service
6. Highway Ramp from Pulaski Bridge to Long Island Expressway

Recommended Regional Connections

Technology Corridor Transit Improvements

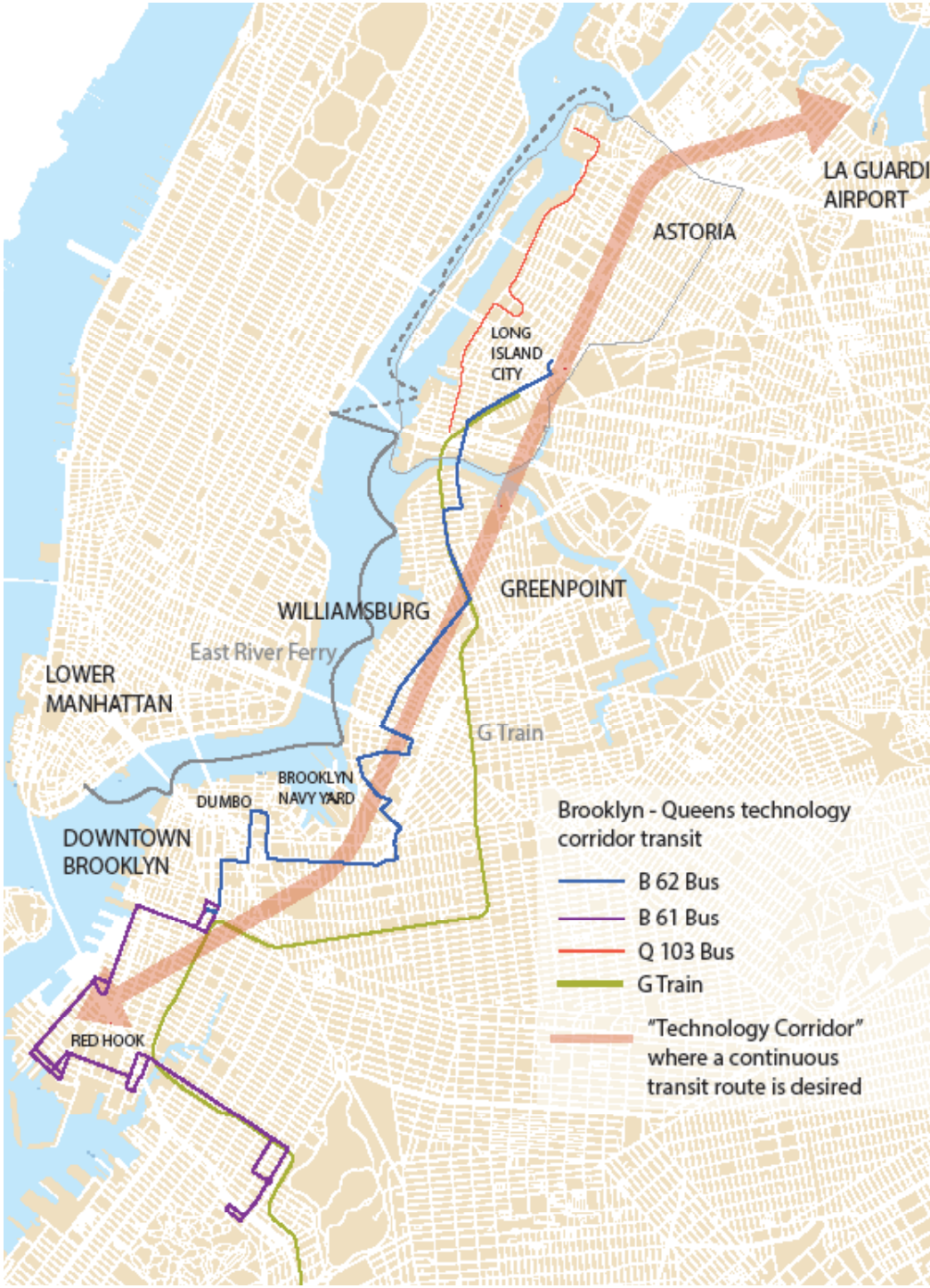
Over the past decade, multiple rezonings and ongoing redevelopment has led to an increase in population along the Brooklyn and Queens East River waterfront. The existing public transportation system is not designed for trips between waterfront areas and it is our recommendation to initiate a study of transit improvements along this corridor.

Background

Technology and other creative industries have shown significant growth in Brooklyn and Queens, in areas such as the Brooklyn Navy Yard that have emerged as important hubs (see Figure). The continuing economic development of the Brooklyn Tech Triangle (an area encompassing the Brooklyn Navy Yard, Dumbo and Downtown Brooklyn), Cornell-Technion University'sTechnology Campus at Roosevelt Island, and the Long Island City Core and vicinity can establish these areas as a regional technology center. These communities are near each other and are served in varying degrees by ferries, subways, and buses, but links among these areas are limited, and in some cases the transit service is a long walk from offices and residences. Transit improvements designed specifically to serve this "Technology Corridor" may be able to better serve trips in the corridor by filling in the gaps left by other transit services in the area.

Existing Waterfront Neighborhoods and Destinations

- The East River Ferry service, which currently connects Midtown and Lower Manhattan via Long Island City and the Brooklyn waterfront and will connect Roosevelt Island and Hallets Point in the future, will provide additional options to the waterfront area itself, as well as some aditional capacity.
- The G subway line, which links some of the waterfront neighborhoods, has infrequent service and is often a long walk from the waterfront. Additionally, the G line has only two stops in Western Queens which only serve Long Island City and do not provide a transfer to subway service to points north. In Brooklyn, the line runs far inland south of Greenpoint, anddoes not serve the Navy Yard area or DUMBO.
- Travel between most points within the Technology Corridor is slow, or requires multiple services. Right now, the area is served by three bus routes, one from Red Hook to the Williamsburg Bridge, a second route from the Williamsburg Bridge to Queens Plaza and the third from Queens Plaza to Astoria. A bus trip from the study area to downtown Brooklyn requires one or two transfers.



A more detailed study of options for transit improvements, including the potential for a new transit service between Brooklyn and Queens, is recommended. This alternatives analysis will need to be conducted to project future transit demand, evaluate potential transit options and determine modes, routes, and alignments for transit improvements. The alternatives analysis will need to consider a number of issues in order to determine the best routes and type of service, several of which we have identified and listed below:

Impact on the existing transit network:

- A new transit service can complement the existing bus system, especially if a dedicated lane is created and shared with existing buses. However, several considerations remain:
- The G subway train currently serves a large number of long distance trips that are peripheral or hub-bound rather than tech corridor trips, due to station spacing, land uses and job centers locations.
- Station spacing also makes feeder bus service ineffective for serving technology corridor trips.
- The impact on longer distance riders is anticipated to be small but requires further study.

Street alignment changes:

- Dedicated transit lanes require the use of a traffic lane in some areas, the streets are already narrow. Possible ways to accommodate a dedicated transit lane include:
- Removal of parking on one side of the street and changes to left or right turns at certain locations.
- Reduction of sidewalk width or the number of vehicle lanes, where appropriate.
- Utility lines may need to be relocated or constructed for certain types of transit service.

Capacity constraints:

- The Pulaski Bridge is the only available crossing for Newtown Creek within the study area. Travel lanes on the bridge are being reduced for an expanded bicycle and pedestrian Greenway. However, current traffic volumes are generally low, and excess vehicular capacity is likely to remain even with the new Greenway.
- Streets in proximity to locations such as the Queensboro Bridge and the Robert F. Kennedy Bridge (aka Triborough Bridge) are generally characterized by high traffic volumes and limited capacity. Congested locations in the surface transportation network would need to be considered in assessing capacity within the technology corridor for a transitway.
- One potential concept, illustrated in the figure to the left, can be used where wide streets exist, and could connect to numerous subway stations, providing an integrated transit option.

An Additional Newtown Creek Crossing

During the public outreach process, the community expressed a strong desire for better pedestrian and bicycle connections across Newtown Creek into Brooklyn. At present, the only connection is the Pulaski Bridge. Creating an additional crossing presents challenges, as any bridge would need to be high enough to maintain Newtown Creek as a navigable waterway, and the costs of constructing a bridge would be substantial. Nonetheless, the concept of another pedestrian and bicycle crossing is one that should be explored as plans for the Newtown Creek area are developed.

Bus Network Changes

The bus network in Western Queens warrants a reexamination in light of the substantial land use changes that have occurred and will continue to occur well into the future. In order to accomplish this goal, two focus areas were identified.

Existing Bus Network

Proposed Bus Network Changes

Focus Area 1: Connecting the Waterfront and Inland Neighborhoods

The existing bus network is based upon a "Hub and Spoke" model, bringing residents from inland Western Queens neighborhoods to Queens Plaza, where transfers are available to many subway lines. In contrast to the bus routes serving Queens Plaza, which run frequently, the Q103 service, which runs the length of Vernon Boulevard from Halletts Point to the Vernon/Jackson subway station, runs every 15 minutes. Access to the waterfront from other parts of Queens is more limited, with the Q104 providing access from Sunnyside to its waterfront terminal at Broadway/Vernon Boulevard, the Q18 providing access from Flushing to its waterfront terminal at Halletts Point and the Q102, which runs from Roosevelt Island to Halletts Point via Queens Plaza, 31st Street under the elevated N/Q tracks, and Astoria Boulevard.

As the study area population continues to grow, particularly along the waterfront and in the vicinity of Queens Plaza, modifications will be required to existing bus routes to better connect new residents, employees, and students in the study area to other parts of Western Queens and other parts of the City. In order to improve bus service along the waterfront, the following changes should be explored:

Recommendations

Hallets Point

- Extend the Q104 route to Halletts Point to connect the new Hallets Point and Astoria Cove developments, Astoria Houses, and the waterfront with Astoria, Ravenswood and Sunnyside.

Roosevelt Island

- Extend the Q104 route to Roosevelt Island, linking nearby Queens neighborhoods to the waterfront and Roosevelt Island while improving bus transportation on Roosevelt Island to the large shopping destinations on Northern Boulevard such as the Stop and Shop Supermarket, Best Buy and Home Depot.
- Extend the Q39 route to Roosevelt Island, taking over the Q102 southern segment and providing access to the waterfront and Roosevelt Island from Glendale, Maspeth, Ridgewood and Sunnyside.
- A new bus stop at the F train stop on Roosevelt Island for MTA buses is recommended to help the Roosevelt Island Red Bus cope with the extremely heavy bus loads within the island.

Inland

- Extend the Q67 route to take over Q102 route on 31st Street. This service could be extended to the north or to Randall's Island if demand warrants.

Existing Bus Network

Existing Bus Network

Focus Area 2: Connecting Hunter's Point to Nearby Areas

Located in the southwest corner of the study area, the Queens West and Hunter's Point South developments will house approximately ten thousand households when complete. Current census data shows that nearly 90% of new residents of Queens West use public transportation for their daily commute to work. These developments are served by the Q103 bus, which runs along Vernon Boulevard, and the # 7 Vernon/Jackson station, also at Vernon Boulevard. The #7 service is frequently close to capacity by the time trains arrive at the Vernon/Jackson station during the morning rush hour, and there isn't bus service from the waterfront to other subway stations in the neighborhood. Other subway stations are approximately one mile from the waterfront. New and modified bus service is recommended to relieve congestion on the #7 line and provide additional mass transit options to the growing Hunter's Point population.

Recommendations

In order to both alleviate crowding with the projected population increases in the future and provide an alternative for times when the station needs to be taken out of service, a new bus route from the waterfront to Manhattan is recommended through the Queens Midtown Tunnel. A potential variant of this route can be an extension of the Q103 bus route.

Other recommendations include:

- Establish a new bus service from Hunter's Point to Astoria via Jackson Avenue and Steinway Street. This route would provide an easy, direct travel option from the new developments to the popular shopping and restaurant district along the Steinway Street corridor, provide access to the subway hub at Court Square, and lower the number of automobile trips in this heavily congested area.
- Extend the Q103 bus route further south and into the Hunter's Point South

development to serve the approximately 10,000 residents who will occupy this development

- This southern extension of the Q103 bus will allow riders from northern neighborhoods to have a direct connection with the East River Ferry. The schedule for both services should be adjusted to accommodate a seamless transfer.

Our map of the recommended bus route changes shows three routes (Q18, Q19 and Q104) running on different avenues, rather than all together on one street. There are benefits of either arrangement.

Buses All on One Street: This option features high frequency service, since any of the three lines can take passengers to/from the waterfront, which can improve service and ridership along the corridor. However, the high number of transferring passengers would need to be accomodated at subway stations.

Separate Avenues: This option features service from the Halletts Point peninsula to the three different subway stations and business districts on Broadway, 30th Avenue and Astoria Boulevard. Evening commuters would have less frequent service in this scheme, since bus service to the waterfront is not concentrated at one station or corridor.

Cost and Reliability
As part of an ongoing dialogue between NYC DCP and the MTA Bus Company and MTA NYCT Buses, we have worked carefully to choose routes that are not cost prohibitive and will not negatively impact bus reliability. Several recommended routes have been chosen in anticipation of future demand while others are logical connections to destinations that exist today. With that in mind, we have primarily suggested route extensions that do not run on overly congested corridors or over too long of a distance, since cost is generally measured on a per-mile basis.

Ferry Service

Existing East River Ferry service connects Long Island City to 34th Street, Greenpoint, Williamsburg, Brooklyn Bridge Park, and Lower Manhattan at Pier 11. During our outreach process, the community expressed interest in expanded ferry routes including service to Roosevelt Island, Astoria and Long Island City.

The New York City Economic Development Corporation recognizes the enormous ridership potential of the East River waterfront communities, especially with the future large-scale residential developments planned.

While the city is committed to many routes, only the Astoria and Lower East Side routes will serve the study area. The former connects Astoria, Roosevelt Island and Long Island City to Midtown and Lower Manhattan. The Lower East Side route connects Long Island City with Midtown, the Lower East Side and Lower Manhattan.

These routes connect several of the new high density residential areas with several of the most attractive commuter destinations. The Astoria route includes a stop on Roosevelt Island, which will become a trip generator after the completion of the Cornell-Technion campus.

Recommendation

- Implement the ferry plan developed by the City.
- Locate ferry landings at Roosevelt Island, Hallets Point and Long Island CIty North.
- Coordinate Q103 schedule with ferry to facilitate intermodal transfers.

Proposed East River Ferry Service

For connecting to the destinations along the Brooklyn waterfront, ferry service provides another transit option (in addition to the other transit improvement recommendations discussed previously). Integration into the route could also continue to spur economic development by providing relatively short rides to new destinations such as Cornell Technion on Roosevelt Island , Astoria Cove and LIC North.

Rail Network

Astoria Line (N and Q) Express

Western Astoria is served by one rapid transit line, the Astoria Line. N and Q trains run on this line over 31st Street from Ditmars Boulevard in the north to Queensboro Plaza in the south, making intermediate stops at Astoria Boulevard, 30th Avenue, Broadway, 36th Avenue, and 39th Avenue. After Queensboro Plaza, an important transfer point to the Flushing Line's Number 7 train, the line turns to the west and crosses under the East River via the 60th Street Tunnel. The Astoria Line features a center express track, currently unused for revenue service except during special circumstances.

In the proposed service: Queensboro Plaza, Astoria Boulevard, and Ditmars Boulevard are served by express trains and local trains. 39th Avenue, 36th Avenue, Broadway, and 36th Avenue are served by local trains only.

Proposed Astoria Line Express Service (Map: MTA)

Recommendation

Study an express train for the Astoria Line from Astoria Boulevard to Queensboro Plaza. Like the 7 train, the express N or Q train would run only during peak hours in the peak direction. This service would help residents of northern Astoria reach the central business district in less time, as well as more evenly distribute ridership to prevent overcrowding. In the summer of 2001, the MTA experimented with peak hour express service on the Astoria Line, but found that demand did not support the additional trains; express trains were mostly empty (with 65% choosing the local train). However, with increasing development, and population growth in northern Astoria, ridership is expected to increase, and an express service may make sense in the long term.

Additionally, routing the Q18 and Q19 buses down Astoria Boulevard would direct riders to use the express station instead of a local station as a transfer point for waterfront- bound trips.

LIRR/NJT/MNRR Commuter Railroad Station

Currently, Long Island Rail Road trains pass through the central business district of Long Island City on their way to Penn Station New York. New Jersey Transit trains make the same move in reverse, passing LIC to access their storage yard in Sunnyside.
The LIRR is seeking funding for a new station in the Sunnyside Yard underneath the Queens Boulevard viaduct.

Proposed Sunnyside Commuter Rail Station

Recommendation

As shown here, sufficient space exists for a railroad station along the LIRR mainline to serve New Jersey Transit and Metro North. A new regional commuter rail station at this location would provide Long Island City with access to regional workforce and provide existing workers with a new one-seat alternative method of traveling to work.

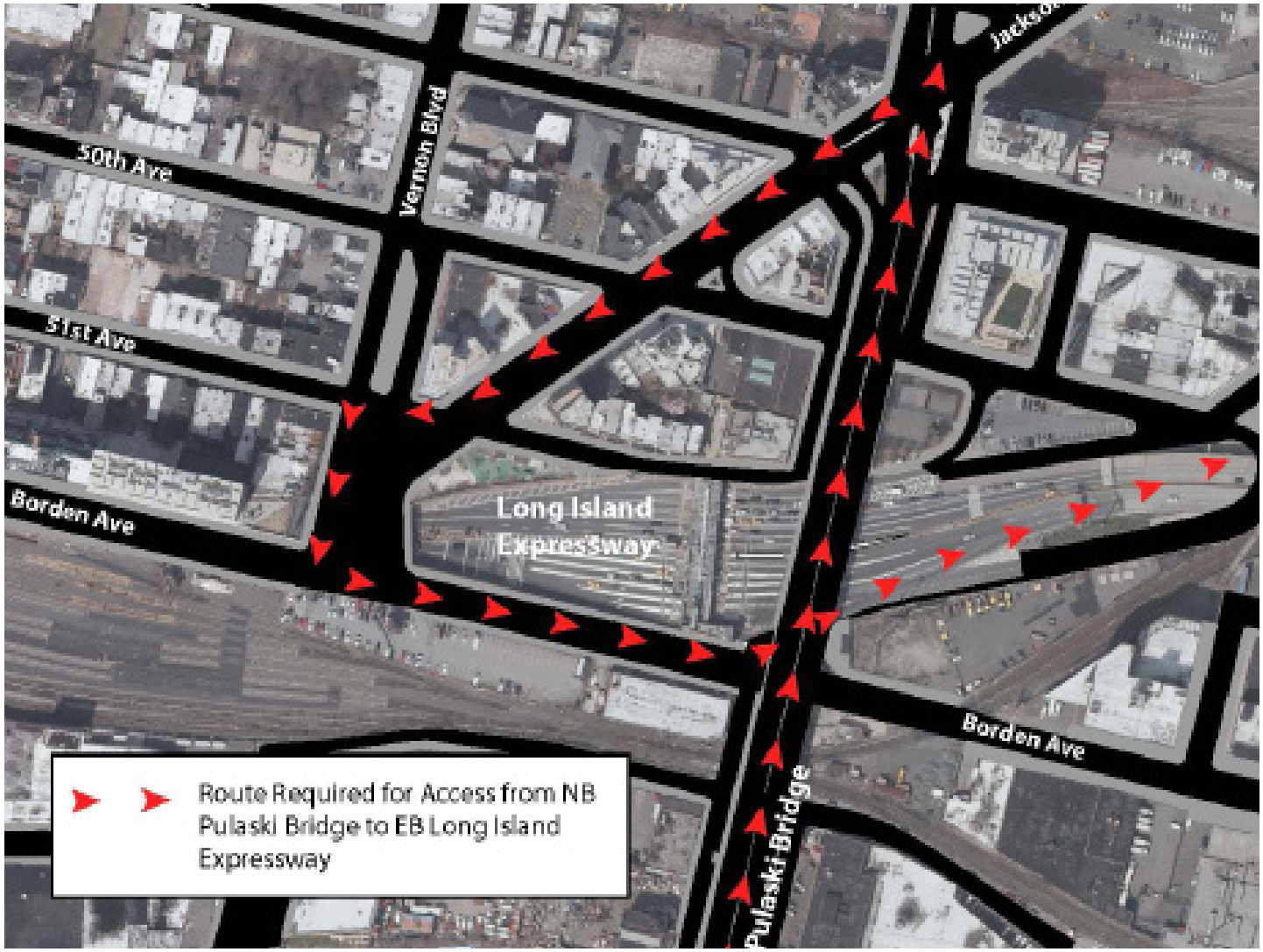
Building a rail station in this area would require further study and major capital investment. This study recommends that the potential for such a station be explored in future transportation investment

plans.

Pulaski Bridge Highway Ramp to LIE

The Pulaski Bridge serves several distinct traffic flows. Some of them are local trips, originating and ending in either Northern Brooklyn or Western Queens and are diffused through the many streets of those areas. Other trips are more long distance in nature, crossing the Pulaski Bridge southbound to obtain access to the local streets of Greenpoint to bypass the BQE or travel northbound from Greenpoint to access the Long Island Expressway or the RFK (Triborough) Bridge via 21st Street.

Since the Pulaski Bridge has no direct connection to the Long Island Expressway, traffic is required to use local streets after the bridge to gain access to the expressway. The current traffic flow configuration allows access through southbound Jackson Avenue, Vernon Boulevard and finally, Borden Avenue to the highway entrance. This traffic pattern routes traffic through the local commercial district along Vernon Boulevard, requiring turns at intersections that have heavy pedestrian activity, with many stores, subway entrances and bus stops.



Proposed Ramp to Long Island Expressway

Recommendation

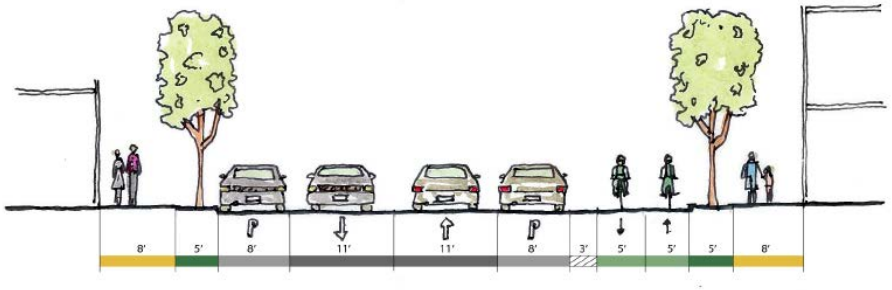
Construct a ramp to directly connect the northbound Pulaski Bridge and the eastbound Long Island Expressway. Along the northbound Pulaski Bridge, a stub ramp was constructed with support columns for an exit ramp to the eastbound Long Island Expressway. However, further study would be required to examine the feasibility of building a ramp at this location. Constructing this ramp would remove commercial traffic originating in the Greenpoint and North Brooklyn IBZ from the local streets of Vernon Boulevard and Jackson Avenues.

This recommendation is mindful of the proposed bicycle lane on the southbound side of the Pulaski Bridge and is not anticipated to result in any adverse impact to that project. The properties this ramp would fly over are publicly owned properties by NYSDOT and the MTA.

LOCAL RECOMMENDATIONS

Improving connectivity on the local scale is vital to creating cohesiveness within Western Queens. Various barriers for cyclists and pedestrians, such as a segmented bike lane network and streets that do not feel safe to cross and contribute to the disconnect between neighborhoods within the study area.

To link the various destinations and neighborhoods in the study area, this section will provide recommendations to improve transportation conditions and local connections. The goal of these recommendations is to improve north-south and east-west corridors between the waterfront, the inland area and throughout the study area.



LOCAL RECOMMENDATIONS

Overview of Local Recommendations:

Section 1. Safe Corridors

Section 2. Bicycle network and access to Roosevelt Island improvements

Section 3. Streetscape Improvements

Section 4. Strategic Site Improvements

Map of Local Recommendations

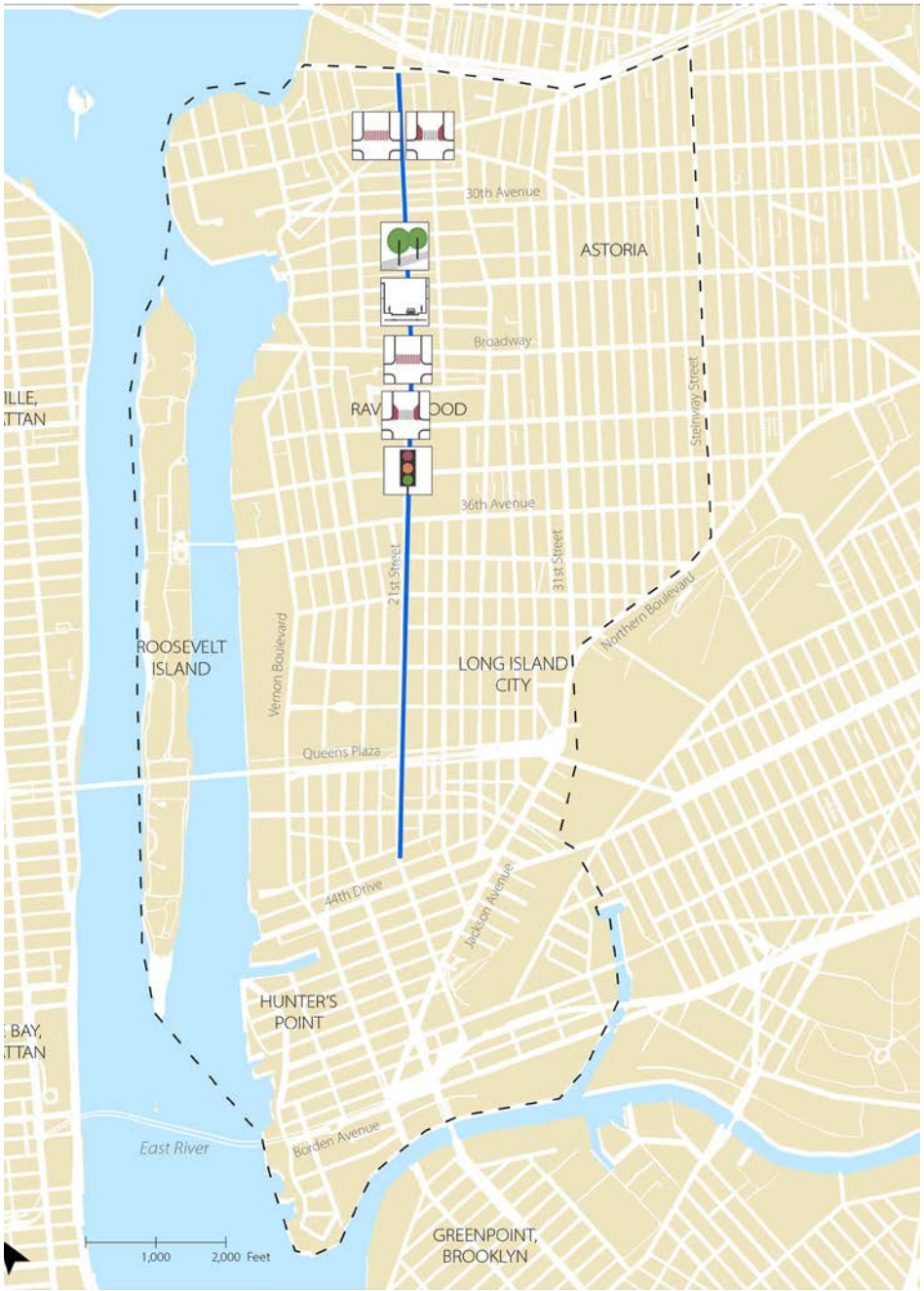
Section 1: Safe Corridors

The Western Queens neighborhoods within the study area - - including Hunter's Point, Long Island City's Downtown, Ravenswood, Astoria, and Halletts Point - - are connected by several major north-south corridors, primarily Vernon Boulevard and 21st Street. The recommendations summarized below, and described in detail later in this chapter, address issues that would improve these corridors and intersections by increasing safety, mobility and sense of place. The major recommendations for the areas' safe corridors are as follows:

Locations of Safe Corridor Recommendations

21st Street Corridor

This corridor contains both a physical and psychological barrier that prevents the neighborhoods to the east and west of the street from feeling like a cohesive community. The following recommendations represent potential corridor-wide street redesign options that can help convert 21st Street from a barrier into a destination:



Location of Recommendations on 21st Street Safe Corridor

21st Street Corridor

Corridor-wide Traffic Calming

21st Street runs the length of the study area from Borden Avenue in the south to Hoyt Avenue South in the north. There are two travel lanes and one parking lane in each direction. The route is a local truck route, and is also used by the Q66, Q69 and Q100 buses.

Issues

Difficult pedestrian crossings

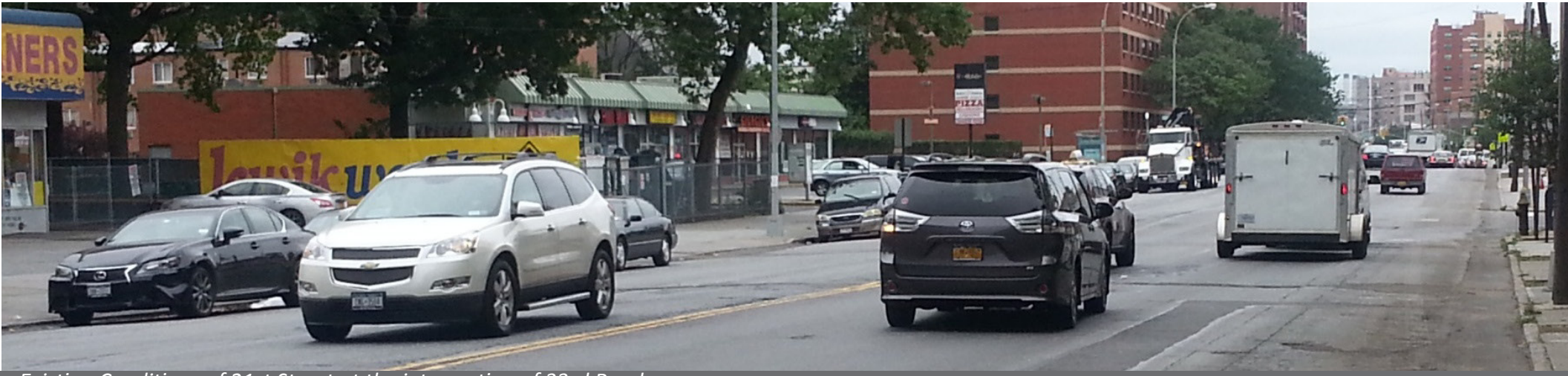
- Multiple large pedestrian generators line the street, including Ravenswood and Queensbridge Houses and several schools, playgrounds, libraries and community centers.
- The 60-foot roadbed along most of 21st Street creates long crossing distances for pedestrians.
- Many intersections do not have signals or crosswalks.
- In the middle section between Broadway and Queens Plaza, superblocks created by NYCHA properties and auto-oriented land uses result in long distances between crossings. Instead of walking to a safe crosswalk, which may be hundreds of feet away, many pedestrians cross mid-block to reach their destination.

Traffic Safety

- The parking lane is rarely used to its full capacity; the excess roadway is used to gain speed and maneuver around turning vehicles.
- Left-turning vehicles are a significant source of delay along the corridor, both at intersections and at midblock driveways. This creates dangerous conditions for large trucks, which must often change lanes to accommodate a left-turn queue.
- As reflected in the crash data, 21st Street has been the site of a moderate number of vehicular, pedestrian and bicycle crashes over the last several years.

Streetscape

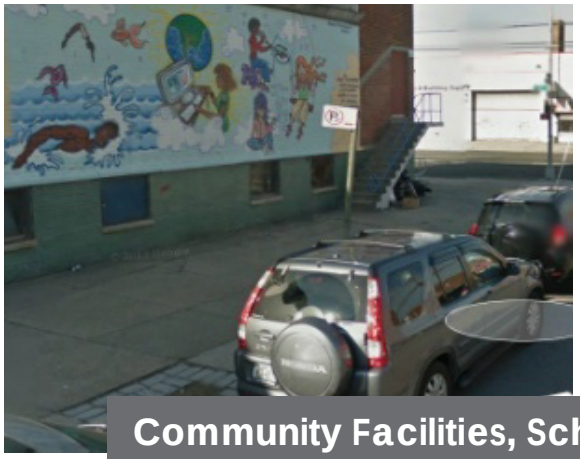
- The wide sidewalks along 21st Street are mostly in disrepair with scarce pedestrian amenities due to the auto-oriented businesses that line the street. As more residents move into the area, 21st Street could become an aesthetically pleasing corridor that serves as a conduit to connect the northern and southern parts of the study area as well as knit together the neighborhoods to the east and west of the corridor.



Existing Conditions of 21st Street at the intersection of 33rd Road

Land Uses and Considerations along 21st Street

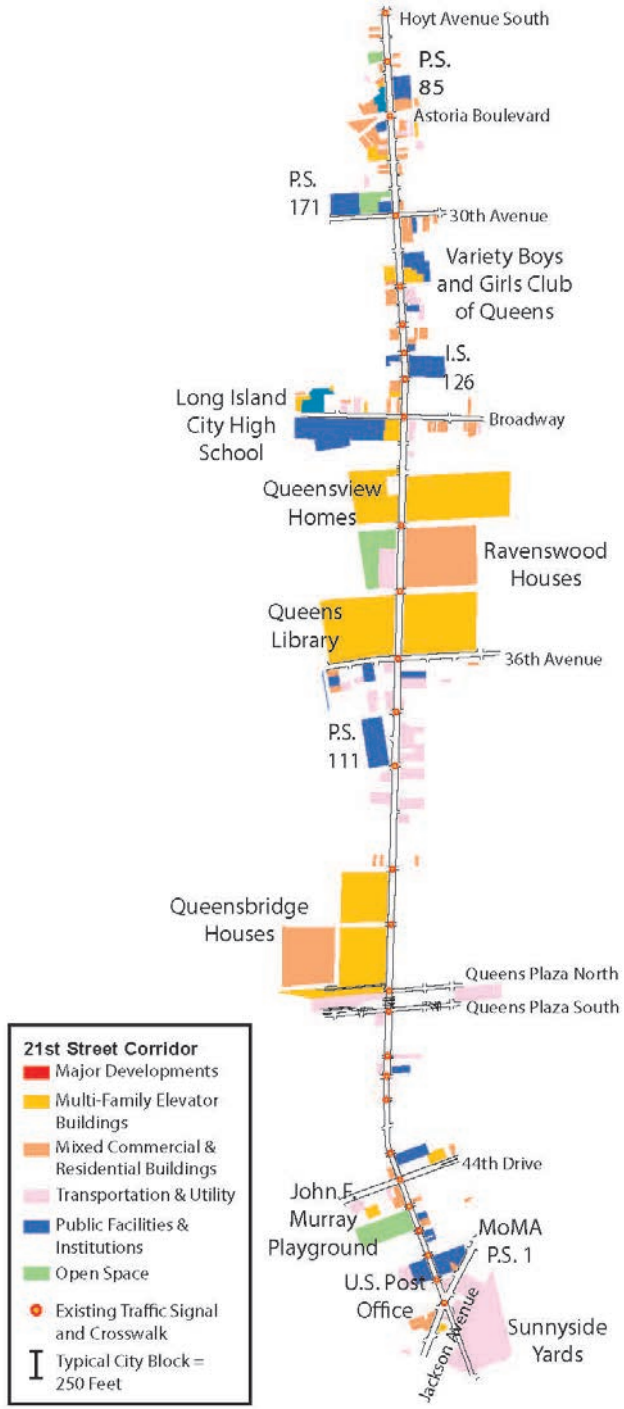
New Residential Construction



Community Facilities, Schools and Senior Centers

Sanitation Depot

NYCHA Properties Ravenswood & Queensbridge



Existing Site Plan of 21st Street at 33rd Road

Site Plan of Proposed recommendations for 21st Street Corridor

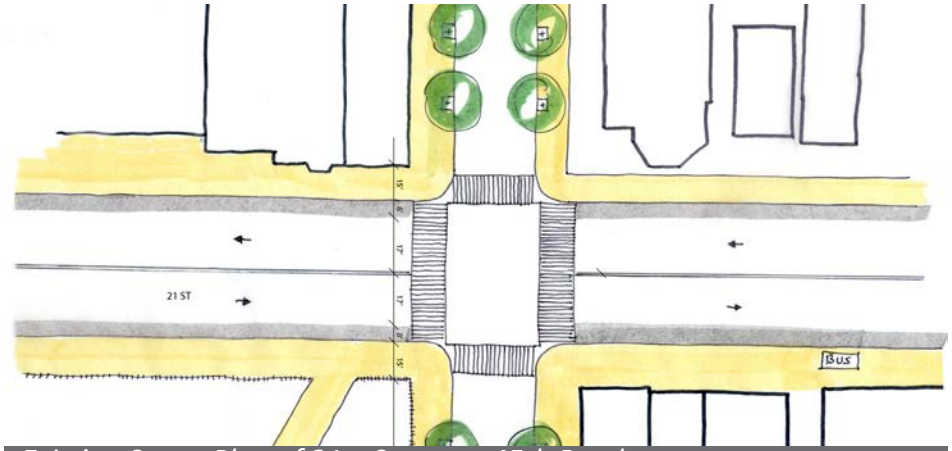
Existing Street Conditions of 21st Street at 33rd Road

Rendering of Proposed recommendations for 21st Street Corridor

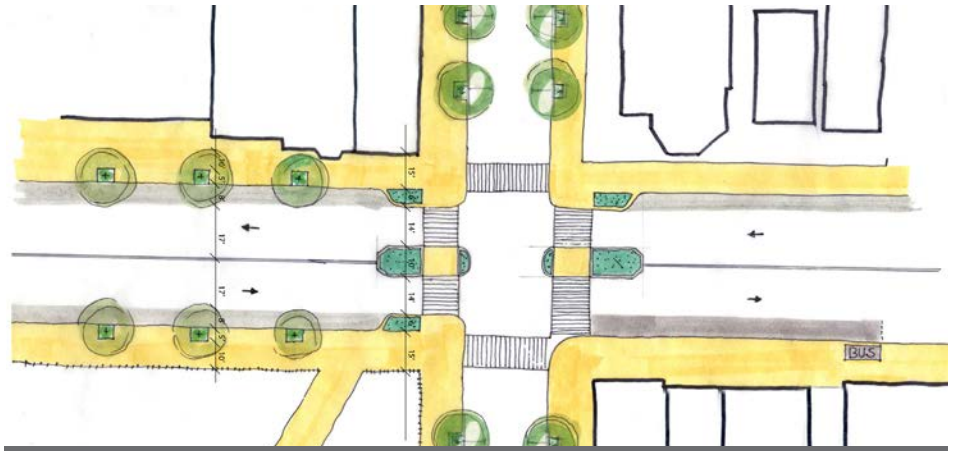
Existing conditions on 21st Street present both a physical and psychological barrier that prevents the neighborhoods to the east and west of the street from feeling like a cohesive community. The corridor is home to many sources of heavy pedestrian traffic, including community facilities, public housing, and retail. 21st street is difficult to cross, has few pedestrian amenities, and traffic is often delayed due to turning vehicles. The following recommendations improve the safety, operations and aesthetics of 21st Street corridor.

Recommendations

- Add signals and high visibility crosswalks at appropriate intersections
- Utilize leading pedestrian intervals (LPI) to give pedestrians a “head start” to start crossing while the signal is red in all directions. LPI gives pedestrians a safer place to cross and brings them to the attention of motorists
- Shorten the crossing distance by installing curb extensions and pedestrian medians. This would also provide more visibility to



Existing Street Plan of 21st Street at 45th Road



Site Plan of Proposed recommendations for 21st Street

Existing Street Conditions of 21st Street at 45th Road

Rendering of Proposed recommendations for 21st Street

pedestrians and increase their awareness about making safe crossing decisions

- Stripe the boundary of the parking lane to prevent its use as a driving lane. Creating clarified lane markings would help calm traffic and prevent the parking lane from being used as a de facto travel lane
- Provide pedestrian-scale lighting, street trees and benches. Improving the pedestrian experience by adding benches, pedestrian-scale lighting, trash receptacles, street trees and other greenery would provide pedestrians with a safe and inviting environment.
- Provide leading left turn signal phases at high-volume intersections along the corridor, such as at Astoria Boulevard.
- Improve drainage along the corridor and improve the streetscape, the study recommends incorporating DEP's green infrastructure program to include bioswales, permeable pavement and stormwater greenstreets whenever a major street construction project is taking place.

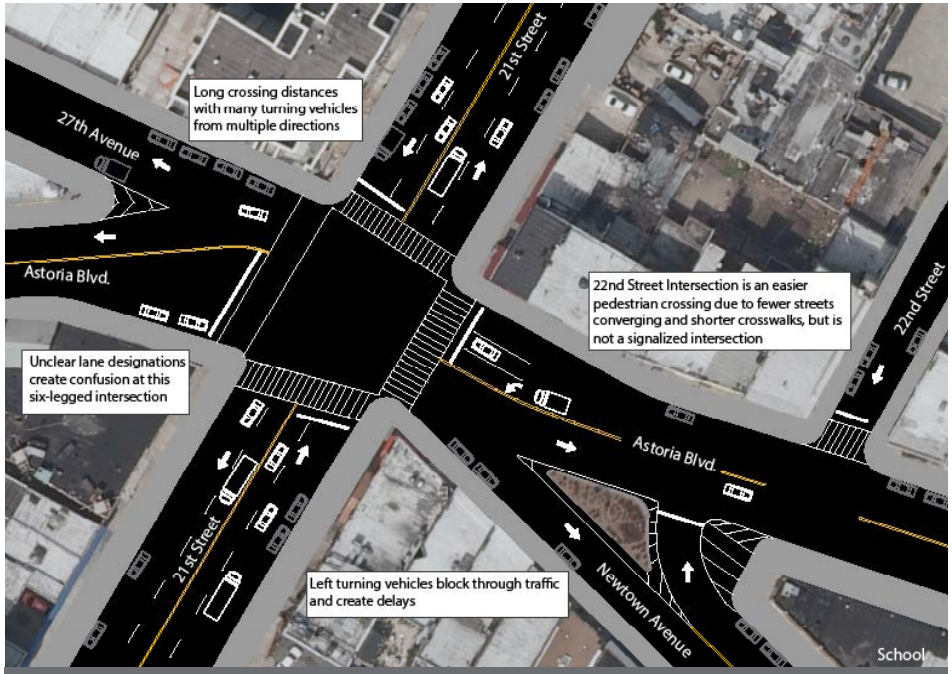
21st Street Corridor

21st Street and Astoria Boulevard

This complex, six-leg intersection has crosswalks up to 80 feet long and multiple pedestrian-vehicle conflicts. It was initially identified by members of the community as a difficult intersection to navigate due to wide streets and the irregular geometry of the approaches.
It has also been identified by NYCDOT as part of the Astoria Senior Pedestrian Focus Area, due to the nearby senior centers and the high proportion of pedestrian crashes involving seniors.

Issues

- 21st Street is a relatively high volume street, and several of the streets carry heavy vehicle traffic.
- 21st Street and Astoria Boulevard are both Truck Routes.
- MTA buses are routed through this intersection as well: the Q69 and Q100 buses run along 21st Street, the Q102 runs along Astoria Boulevard and Newtown Avenue, and the Q19 runs southbound on 21st Street and eastbound onto Astoria Boulevard.
- High volumes of vehicles queue on 21st Street to make left turns, causing delays.



Existing Intersection of 21st Street and Astoria Boulevard

Western Crossings

- The crosswalk on the western side of 21st Street is 80 feet long and has faded markings; pedestrians do not have an area to wait safely if they cannot complete the crossing in one cycle.
- A signal pole is located in the crosswalk, providing a potential obstruction for pedestrians.
- As 27th Avenue and Astoria Boulevard converge, a large portion of the roadway remains unused -- only marked by a small striped triangle that causes confusion and conflicts for motorists.

Eastern Crossings

- The crosswalk on the eastern side of 21st Street is 60 feet long.
- As Newtown Avenue and Astoria Boulevard diverge, vehicles headed to Newtown Avenue can gain speed on the street due to the irregular geometry and excess street width, creating unsafe conflicts between vehicles and pedestrians.
- At the northeast corner of 21st Street and Astoria Boulevard, the roadbed widens to accommodate a bus stop. Currently, no buses stop at this location and the wide road creates unnecessarily long pedestrian crossing distances and driver confusion.

22nd Street Intersection

- 22nd Street intersects Astoria Boulevard creating a T-intersection with no north-south pedestrian crossings. This is a key location in need of safer crossings and additional pedestrian space.

Recommendations

Western Crossings

- Construct a concrete median to offset left-turn traffic from eastbound Astoria Boulevard, to align the intersection and provide a pedestrian refuge space. Offsetting left-turn traffic brings vehicles closer to their destination and limits conflicts with pedestrians and through traffic. The median provides safer crossings for pedestrians by reducing the crossing distance.
- Install high visibility crosswalk and pavement markings to alert motorists to pedestrian crossing.
- Relocate the signal in the crosswalk to the new concrete median to allow clear passage through the crosswalk.
- Construct a concrete area at the existing triangular striped space between 27th Avenue and Astoria Boulevard, to align the roadway and prevent vehicles from making illegal U-turns.

Recommendations

Western Crossings (continued)

- Install overhead signage on the westbound approaches on Astoria Boulevard indicating the appropriate through lane. Narrowing and clarifying the roadway for westbound traffic will reduce speeds and create safer conditions for all users.

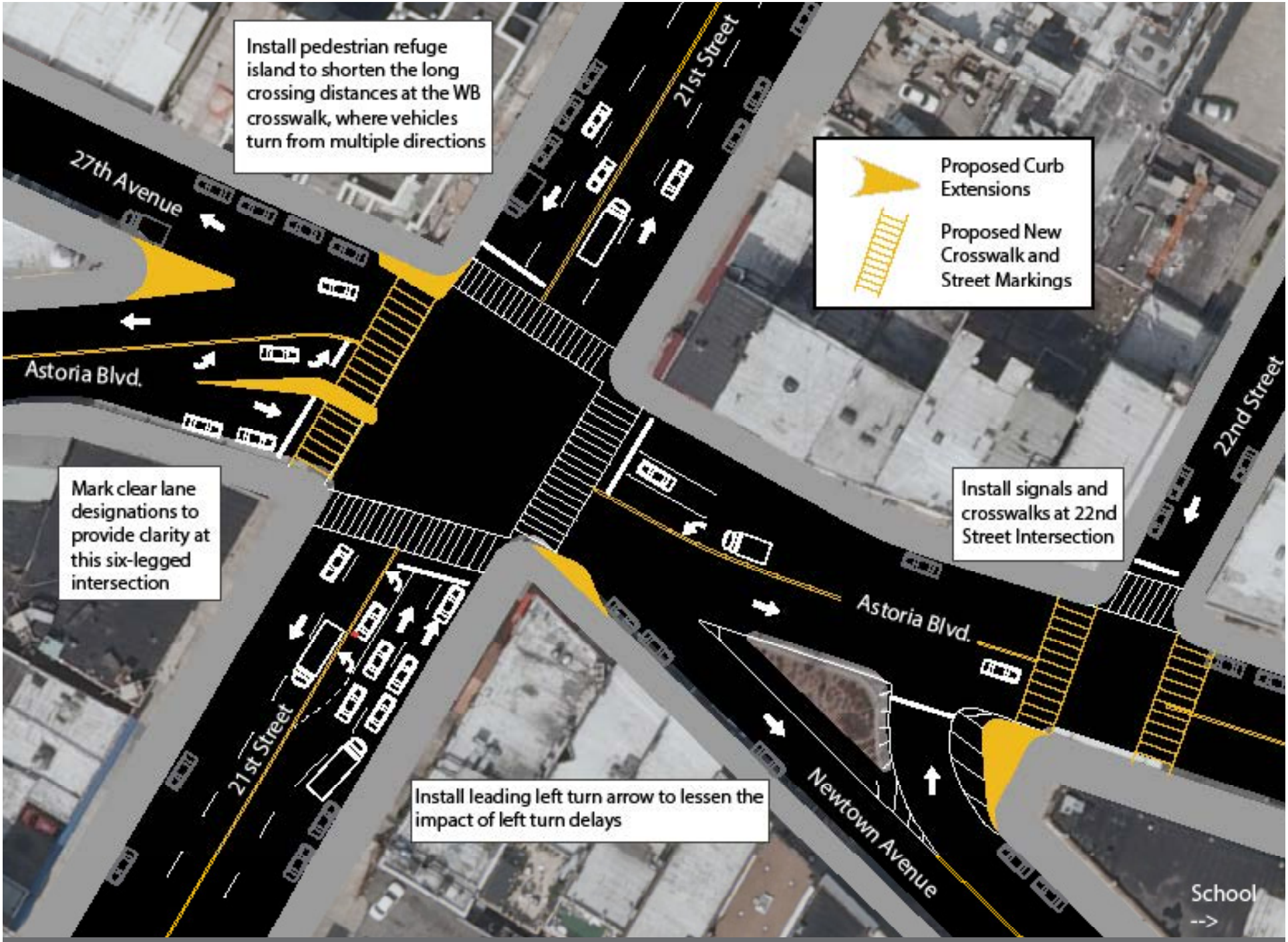
Eastern Crossing

- Construct a curb extension on the southeast corner of the intersection to slow eastbound vehicles on Newtown Avenue and provide better sight lines for pedestrians attempting to cross
- In the future, the Newtown Avenue slip lane would be an ideal candidate for street closure and creation of a public plaza, but will require further study to ensure traffic flow and emergency access are maintained.
- Improve clarification by installing high-quality pavement markings and overhead signage at this intersection.

22nd Street Intersection

- Construct a curb extension or bulb-out at the existing striped space at Newtown Avenue, Astoria Boulevard and 22nd Street to provide a pedestrian refuge and better align the intersection.
- Install a new signal at 22nd Street and Astoria Boulevard; install a high visibility crosswalk to provide a shorter and regular crossing.

Additional study, particularly in conjunction with the Astoria Senior Pedestrian Study, should be undertaken to increase safety at this intersection.



Recommended Changes to Intersection of 21st Street and Astoria Boulevard

21st Street Corridor

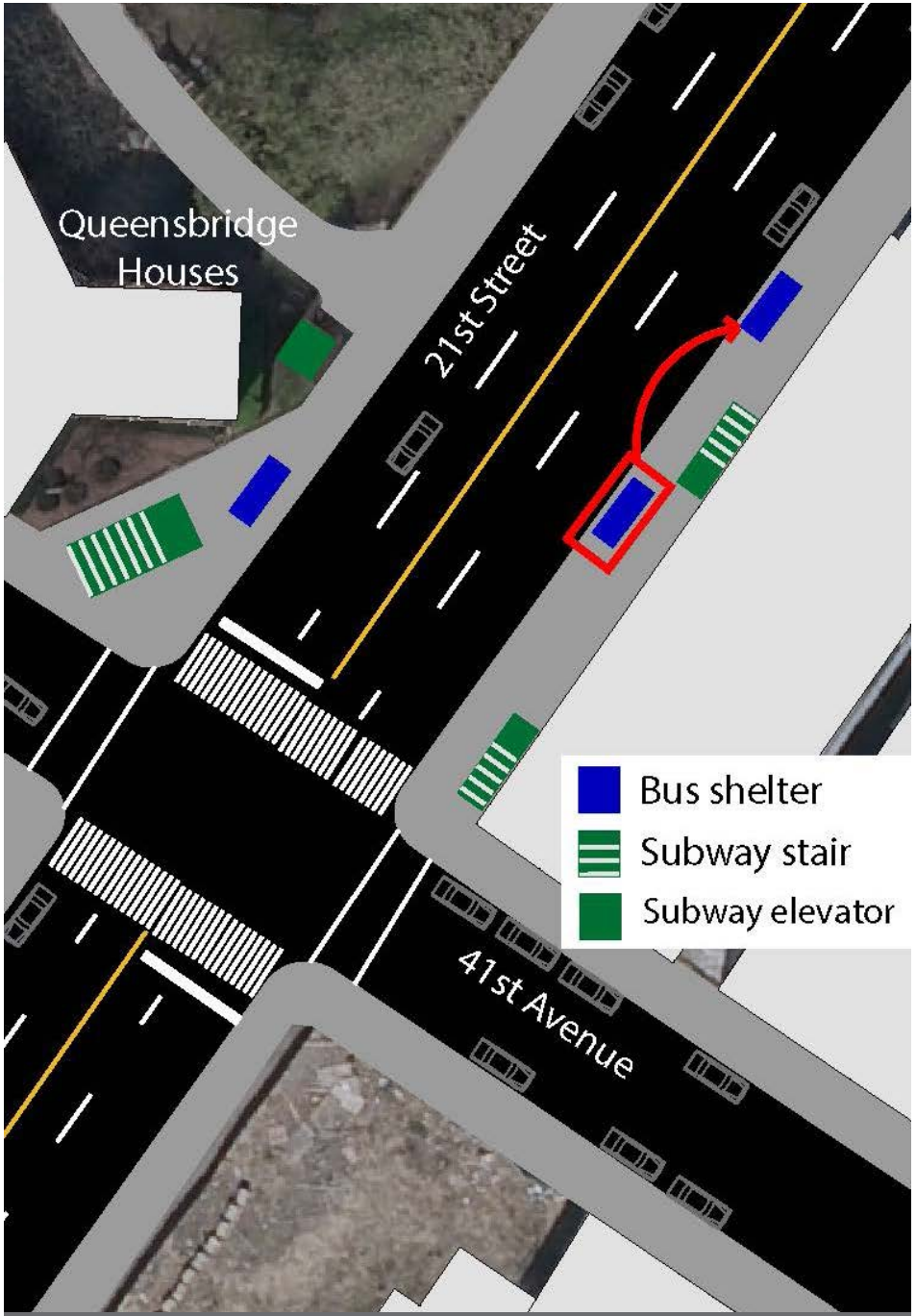
Bus Stop Relocation: 21st Street / Queensbridge F Train

The intersection of 21st Street and 41st Avenue, on the eastern edge of the Queensbridge Houses, is the site of the 21st Street / Queensbridge stop on the F train and a major bus stop that serves the Q66, Q69, Q100, Q102, and Q103 buses. On the northeast corner of the intersection, the bus stop and subway stair are in close proximity, leading to pedestrian congestion.

Recommendation

To help ease crowding, the bus stop is recommended to be moved northward, away from the subway station. Care should be taken to keep the bus stop out of the turning radius of trucks entering and leaving the driveway approximately 170 feet north of the intersection.

Existing subway stair and bus shelter



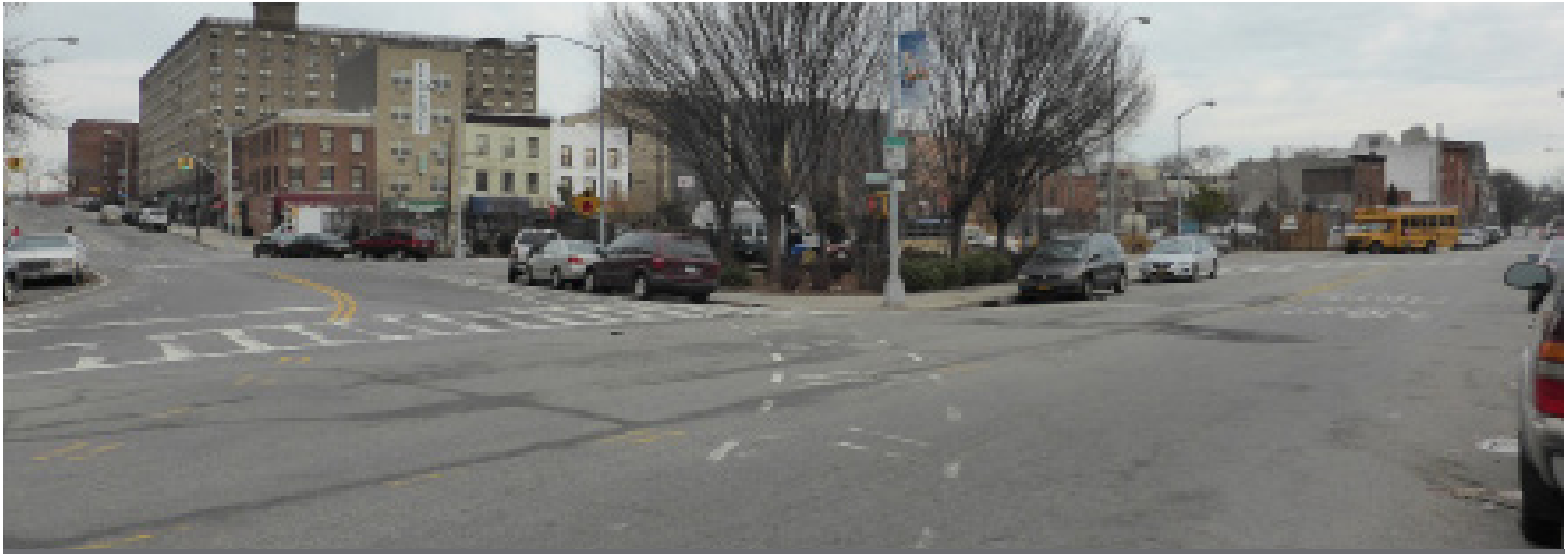
Recommended Changes to Intersection of 21st Street and Astoria Boulevard

Vernon Boulevard Corridor

Vernon Boulevard runs along the waterfront connecting residential, industrial and commercial neighborhoods, similar to 21st Street. A key difference on this corridor is the lower traffic volume and the opportunity for achieving all five goals of our planning vision. Existing plans have been implemented on the corridor, most recently with a two-way protected bicycle lane added to Vernon Boulevard from 46th Avenue to 30th Road. With that in mind, several challenges remain in creating an inviting, safe and cohesive corridor for all users.

Issues

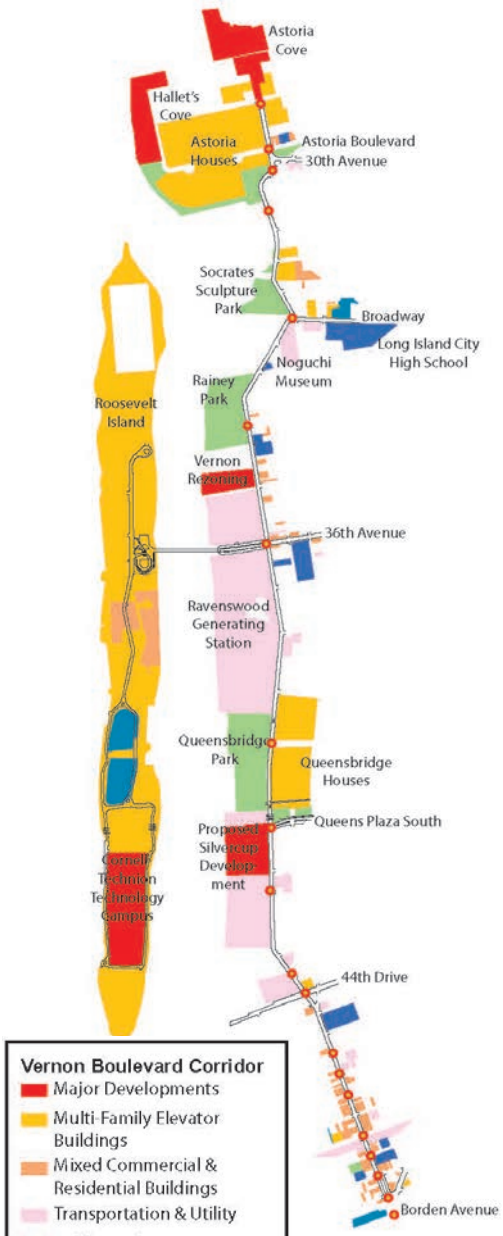
- High volumes of pedestrians from the intensively clustered housing at Astoria and Queensbridge Houses, as well as future residential developments of Astoria Cove, Halletts Cove and Silvercup West.
- Parks and cultural facilities along the waterfront that serve as community anchors that need enhanced pedestrian access.
- The future development on Roosevelt Island will likely bring even more residents and visitors utilizing Vernon Boulevard.



Existing conditions on Vernon Boulevard at 8th Street

Land Uses and Considerations along Vernon Boulevard

Limited Pedestrian Amenities



NYCHA: Astoria Houses

New Residential Construction

NYCHA: Queensbridge Houses

Vernon Boulevard Corridor

Improved Pedestrian Crossings

Due to its nature as a waterfront road, Vernon Boulevard is mostly comprised of streets coming to an end at T-intersections. Many of these streets carry low traffic volumes and are controlled by stop signs as vehicles turn onto Vernon Boulevard.

Because of this unusual traffic pattern, vehicles traversing Vernon Boulevard can travel considerable distances without traffic signals or stop signs. However, the bus stops, parks and cultural amenities on the waterfront generate significant pedestrian traffic across Vernon Boulevard.

While a signal or stop sign is typically used to remedy this issue, NYCDOT follows Federal guidelines for such devices, which require a minimum amount of traffic volume to justify use. These intersections do not meet these criteria. Additionally, NYCDOT requires that any painted crosswalk be accompanied by a control device such as a signal or stop sign.

As a result of these conditions, it is difficult to provide safe pedestrian crossings without slowing traffic with additional traffic signals or stop signs. In order to provide safe pedestrian crossings, measures can be taken – such as painting crosswalks, installing a crosswalk sign, stop signs and/or signals -- in order to communicate to the driver that a crosswalk is approaching and to be alert for pedestrians. On most streets in New York City, the required minimum measure is a painted crosswalk with a traffic control device, such as a stop sign or traffic signal.

Recommended Rapid Response Flashing Beacon Locations

Recommendation

Because traditional traffic control measures and crosswalks cannot be implemented on this corridor, this study recommends that the Rapid Response Flashing Beacon (RRFB) be added to the toolbox of pedestrian crossing measures (see figure or visit: https://www.youtube.com/watch?v=kM_Z9kV4gvY for a video demonstration). Vernon Boulevard is a prime candidate for a pilot program to understand the effectiveness of RRFB's on New York City streets, due to its unique nature of few crossings and a large number of attractions on the waterfront.

- RRFB's serve as a warning signal to drivers that a pedestrian is currently present in the crosswalk.
- The device is activated by the pedestrian with an immediate response of a rapidly flashing yellow wig-wag light mounted on the pedestrian crossing sign.
- RRFB's are unlit when not activated – unlike similar flashing yellow light measures.
- Safe crossings can be provided on streets where low volumes of pedestrians make crossings uncommon and unexpected to drivers
- RRFB's are a low-cost and low-maintenance pedestrian accommodation where higher cost measures cannot be justified.

While NYCDOT may not currently make use of Rapid Response Flashing Beacons, we believe that they have potential on a corridor such as Vernon Boulevard, where signal warrants may not necessarily be met at all intersections (due to low volumes), but pedestrians still need a way to cross the street safely to the many bus stops on the other side (and currently have very few opportunities to do so, although ADA pedestrian crossing ramps are present with tactile strips). The use of RRFB's may require further study, including an analysis of specific conditions that warrant implementation, but as it has proved quite effective in other areas, we believe it should be strongly considered alongside any other solutions NYCDOT may recommend. Our primary concern is creating more frequent, safe crossings across Vernon Boulevard, using the tool that proves most appropriate.

A Rapid Response Flashing Beacon (Image source: Federal Highway Administration

Vernon Boulevard Corridor

Vernon Boulevard at 8th Street and Main Avenue

Located in the Halletts Point area, Vernon Boulevard, 8th Street, Main Avenue, Astoria Boulevard, and 30th Avenue meet in close proximity, creating a highly complex series of intersections that are difficult to navigate for both pedestrians and drivers.

Issues

Nearby Pedestrian Generators

- Astoria Houses is located at this intersection with thousands of residents.
- Future Development at Astoria Cove and Halletts Point is located nearby.

Irregular Intersection

- Astoria Boulevard is a two-way roadway for the majority of its length; in the vicinity of this intersection, it converts to a 45-foot wide, one-way westbound roadway.
- An isolated Greenstreets triangle exists in the intersection.
- An expanse of roadbed exists at the nexus of these streets without clear pavement markings, with many observed illegal vehicle maneuvers.
- North and South Bicycle traffic is faced with unclear signage and difficult conditions to navigate.

Difficult Pedestrian Crossings

- Naturally desired crossings are unmarked and require using multiple crosswalk legs to reach the desired destination at the opposite side of the street.
- Motor vehicle flow through the intersection is nearly constant, due the multiple legs converging.
- Wide open area of pavement is difficult to cross.
- Lack of high quality, safe pedestrian accommodations discourages pedestrian activity at this location, as observed by the study team.

Existing Conditions at Vernon Boulevard and Astoria Boulevard

Recommendations

Normalize Intersection

- Convert the segment of Astoria Boulevard between Main Avenue and 8th Street into a two-way street to continue the existing pattern of two way traffic flow.
- Align 8th street to meet Vernon Boulevard at an orthogonal intersection using curb extensions.
- Reroute Q18 as described in “Bus Network Changes” section of this report, pg. #.
- Close 30th Avenue between Main Avenue and 8th Street. If community response is positive, permanently add the triangle to the community garden to expand green space.
- If land uses along Main Avenue change in the future and driveway access is no longer needed, a full alignment and ideal orthogonal intersections can be created by closure of this street (from 30th Avenue to Vernon Boulevard.)
- Improve clarification by installing high-quality pavement markings and signage at this intersection.
- Improve signage for cyclists.

Recommended Changes to Street Layout of Intersection at Vernon Boulevard and Astoria Boulevard

Create Safer Crossings

- Designing this location with right angle intersections will resolve pedestrian crossing issues by eliminating the long, low visibility, angled crosswalks. Further traffic and turning radius analysis may be necessary for the modified approaches.

Vernon Boulevard Corridor

Vernon Boulevard at 11th Street and Broadway

The intersection of Vernon Boulevard, Broadway and 11th Street is an irregular intersection that requires drivers, pedestrians and cyclists to make complex maneuvers with limited visibility.

Issues

Irregular Intersection

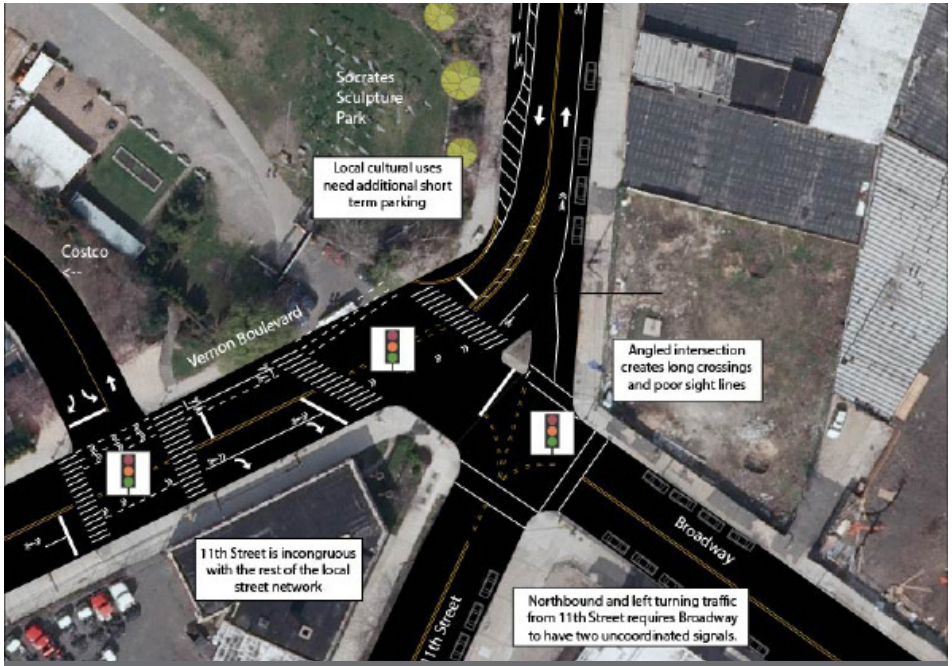
- The non-orthogonal nature of this intersection creates conditions of low motor vehicle visibility and confusion.
- The legs of this intersection create pedestrian crossings that are longer than normal, and often require use of multiple crosswalks to complete a direct crossing.
- The T-intersection creates a condition where crosswalks are difficult for pedestrians to cross due to constant merging and turning movements.

High Volumes of Pedestrians and Cyclists

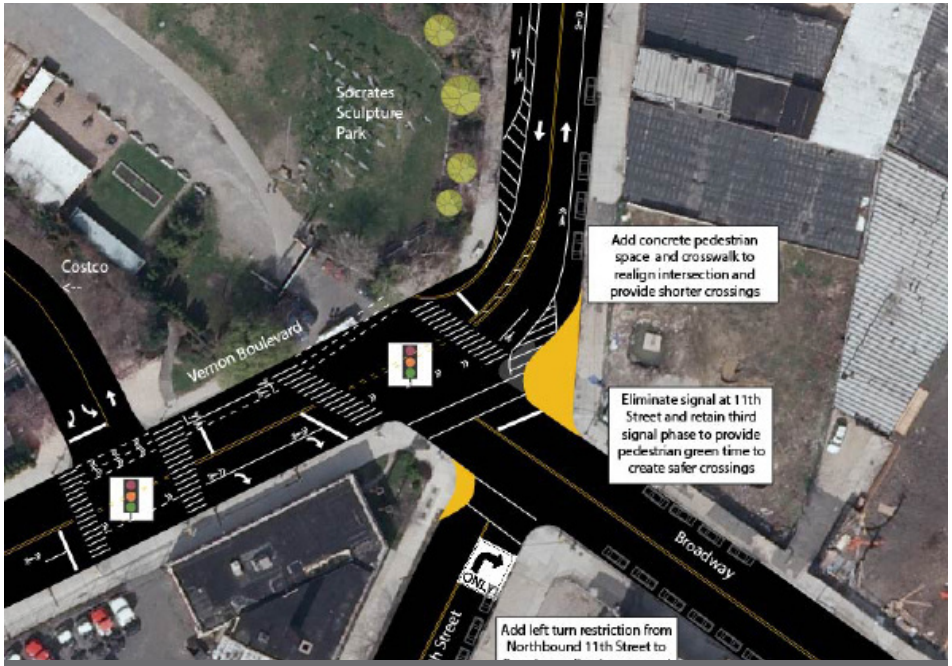
- Since the intersection is adjacent to the Socrates Sculpture Park and Costco, and nearby other cultural facilities like the Noguchi Museum, it is a significant generator of pedestrian and cyclist traffic.
- The recently constructed greenway provides a two-way protected bicycle path on the southbound side of Vernon Boulevard that has helped to create a safe facility for cyclists.
- Pedestrian and motorist issues should be better addressed in order to improve the safety and functioning of the intersection.

11th Street

- The signal phasing at the intersection creates significant motorist delay and uncertainty regarding the expected movements of other users, and create frequent conflicts between vehicles and pedestrians.



Existing Conditions at Broadway and Vernon Boulevard



Proposed Changes to Intersection at Broadway and Vernon Boulevard

Recommendations

In order to address community concerns and create safer pedestrian crossings, calm vehicular traffic, and clarify the roadway, below are several recommended treatments for these intersections. Further traffic and turning radius analysis may be necessary for the modified approaches.

Normalize Intersection

- Install curb extensions or bulb-outs at the northeast corner at Broadway to add more pedestrian space and create safer conditions
- Replace the slip lane with a curb extension to normalize the intersection and provide better sight lines for traffic turning onto Vernon Boulevard.
- Improve clarification by installing high-quality pavement markings and signage at this intersection.

Pedestrian and Cyclist Safety

- Assess signal timing across Vernon Boulevard to determine if additional pedestrian crossing time is warranted. Due to the volume of turns from Broadway onto Vernon Boulevard, pedestrians rarely have a safe opportunity to cross, even when they have the right-of-way.
- Provide a Leading Pedestrian Interval (LPI) or dedicated conflict-free crossing to improve safety at this location for children and other pedestrians crossing to the destinations on the western side of the street.
- Add crosswalk on eastbound side.

11th Street

- Prohibit left turns from westbound Broadway to 11th Street and from Broadway to 11th Street to reduce complexity and potential conflicts at the intersection.
- Northbound traffic flow would be accommodated by restoring two-way traffic utilizing the wide roadbed on 14th Street between Broadway and Astoria Boulevard.

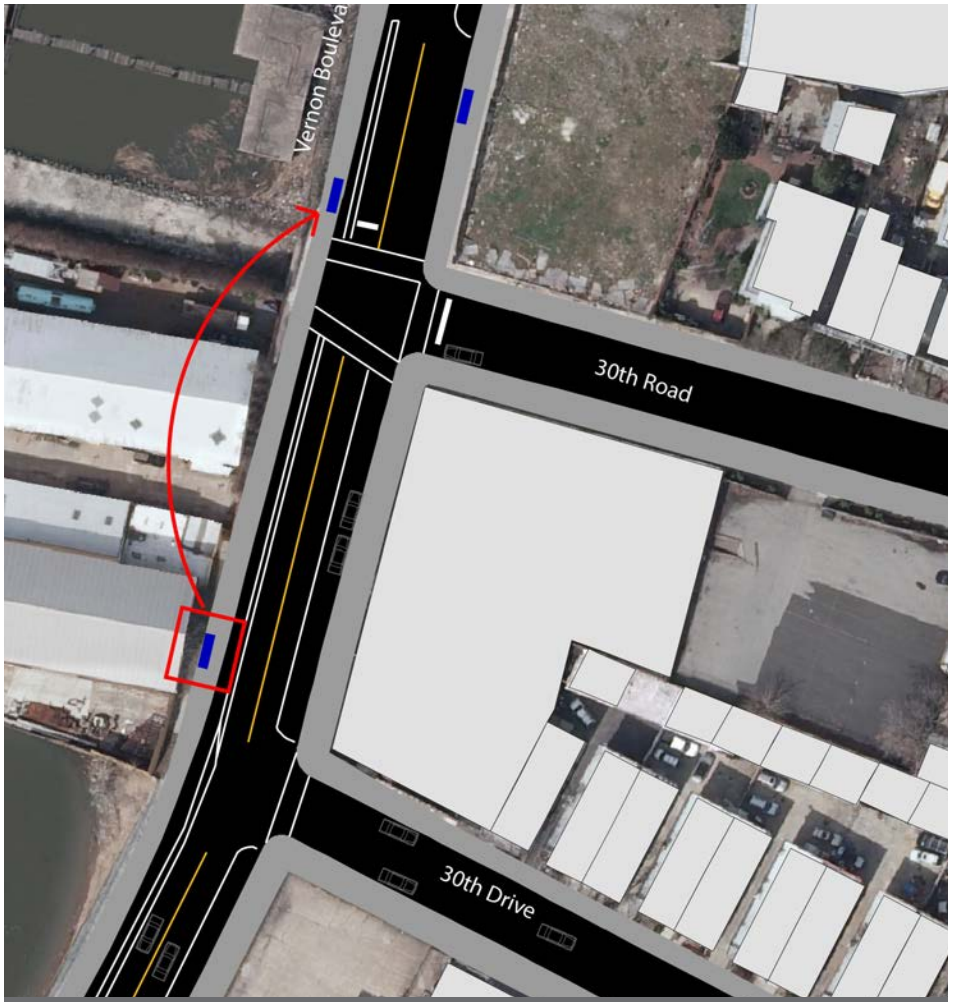
Vernon Boulevard Corridor

Bus Stop Relocation: Vernon Boulevard and 30th Drive

The current southbound bus stop on Vernon Boulevard and 30th Drive, served by the Q103 bus, is poorly located. This bus stop is located at an uncontrolled intersection, making it hazardous for pedestrians to attempt to reach it from the more heavily-populated east side of Vernon Boulevard. It is also only one block away from the next southbound bus stop, at Vernon Boulevard and 31st Avenue.

Recommendation

To remedy this, the bus stop on 30th Drive should be moved one block north, to the intersection of Vernon Boulevard and 30th Road. This is a controlled intersection, and thus a much safer place for pedestrians to cross. Moving the stop to this location would also create larger spacing between bus stops, in keeping with MTA guidelines. Such a change would require some re-striping of the southbound bicycle lane on Vernon Boulevard.



Recommended Changes to Bus Stop at 30th Drive and Vernon Boulevard

Vernon Boulevard Corridor

Vernon Boulevard Streetscape along Ravenswood Generating Station

Along Vernon Boulevard between 40th and 38th avenues adjacent to Ravenswood Generating Station, the sidewalk on the western side of Vernon Boulevard becomes extremely wide. During the public outreach process, community members frequently asked that the pedestrian and cycling environment on Vernon Boulevard be improved. This excessively wide sidewalk provides an opportunity to plant additional trees, create permeable areas to absorb stormwater runoff and provide greater resiliency in case of flooding on this waterfront street.

Recommended Changes to Ravenswood Generating Station Streetscape

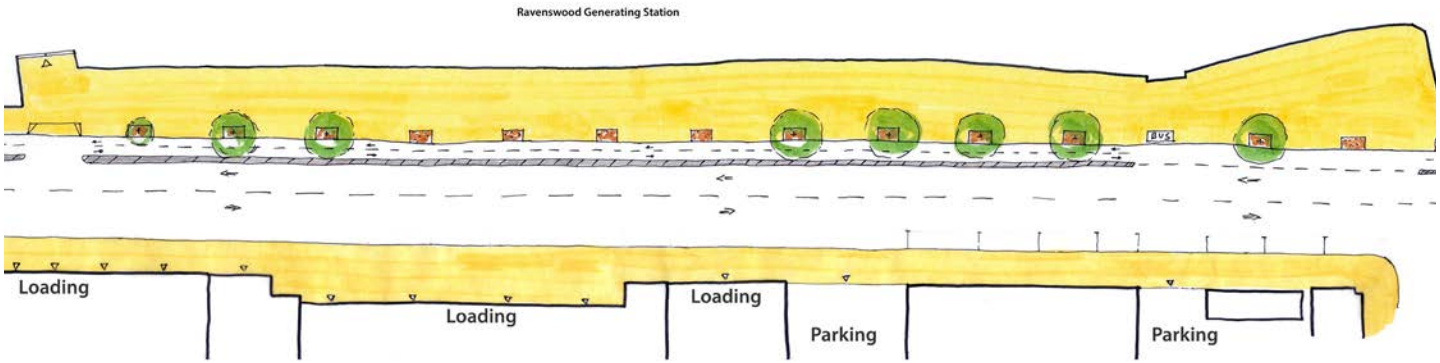
Issues

The wall that runs along the length of these blocks is a blank brick facade about 8 feet tall. This wall and the few, fairly small street trees create an uninviting environment for pedestrians.

Although there are few destinations along this stretch of Vernon Boulevard, the adjacent uses are significant pedestrian generators. This area is just north of the Queensbridge Houses and is the location of several bus stops (indicated on the map by blue boxes), the Q102 has stops at 40th Avenue and both the Q102 and Q103 have stops at 38th Ave. Queensbridge Park is just to the south of this stretch, and two blocks north is the Roosevelt Island Bridge at 36th Avenue.

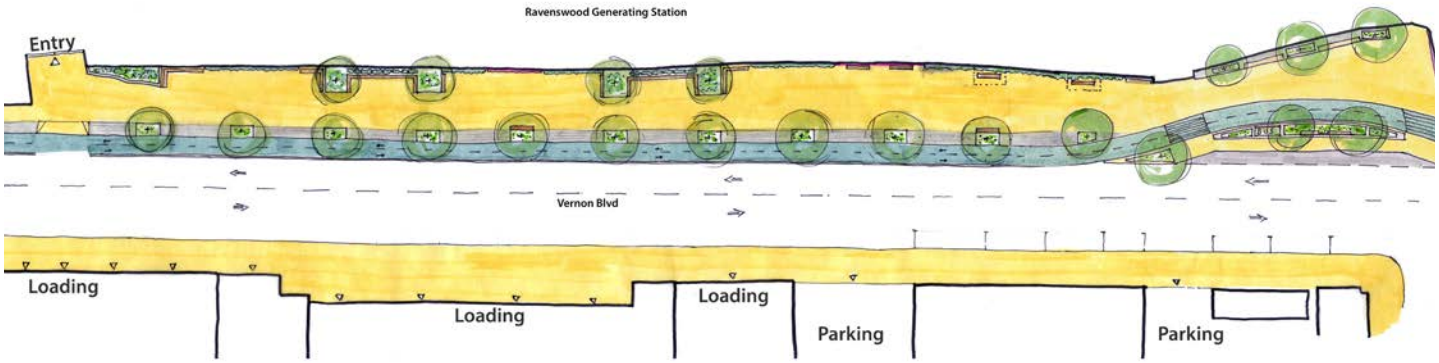
For cyclists, although there is a two-way protected bike lane along these blocks on Vernon Boulevard, the industrial uses on the east side of the street have several loading zones. Large trucks backing out and waiting to make deliveries often obstruct the bike lane and create potential hazards for cyclists. Vernon Boulevard faces significant issues with drainage and ponding, creating unsafe and unsightly bike and pedestrian conditions.

Existing Ravenswood Generating Station Streetscape



Existing Street Layout Along Ravenswood Generating Station Streetscape

Rendering of Recommended Changes to Ravenswood Generating Station Streetscape



Site Plan of Recommended Changes to Ravenswood Generating Station Streetscape

Recommendations

The following recommendations will improve the quality of the streetscape for pedestrians and cyclists along this segment of Vernon Boulevard.

- Construct a protection barrier to create a buffer between the bike lane and the street. A concrete jersey barrier will prevent trucks from standing or backing up into the bike lane or tree pits
- Plant trees in existing empty tree pits.
- Introduce green infrastructure techniques to mitigate storm water runoff while enhancing and beautifying this space for all users, providing a full “canopy” of the street to draw attention away from the Ravenswood Generating Station.
- Permeable pavement, bioswales and enhanced tree pits absorb run-off and filter storm water to prevent overburdening the existing sewer system.

Vernon Boulevard Corridor

Vernon Boulevard Mall

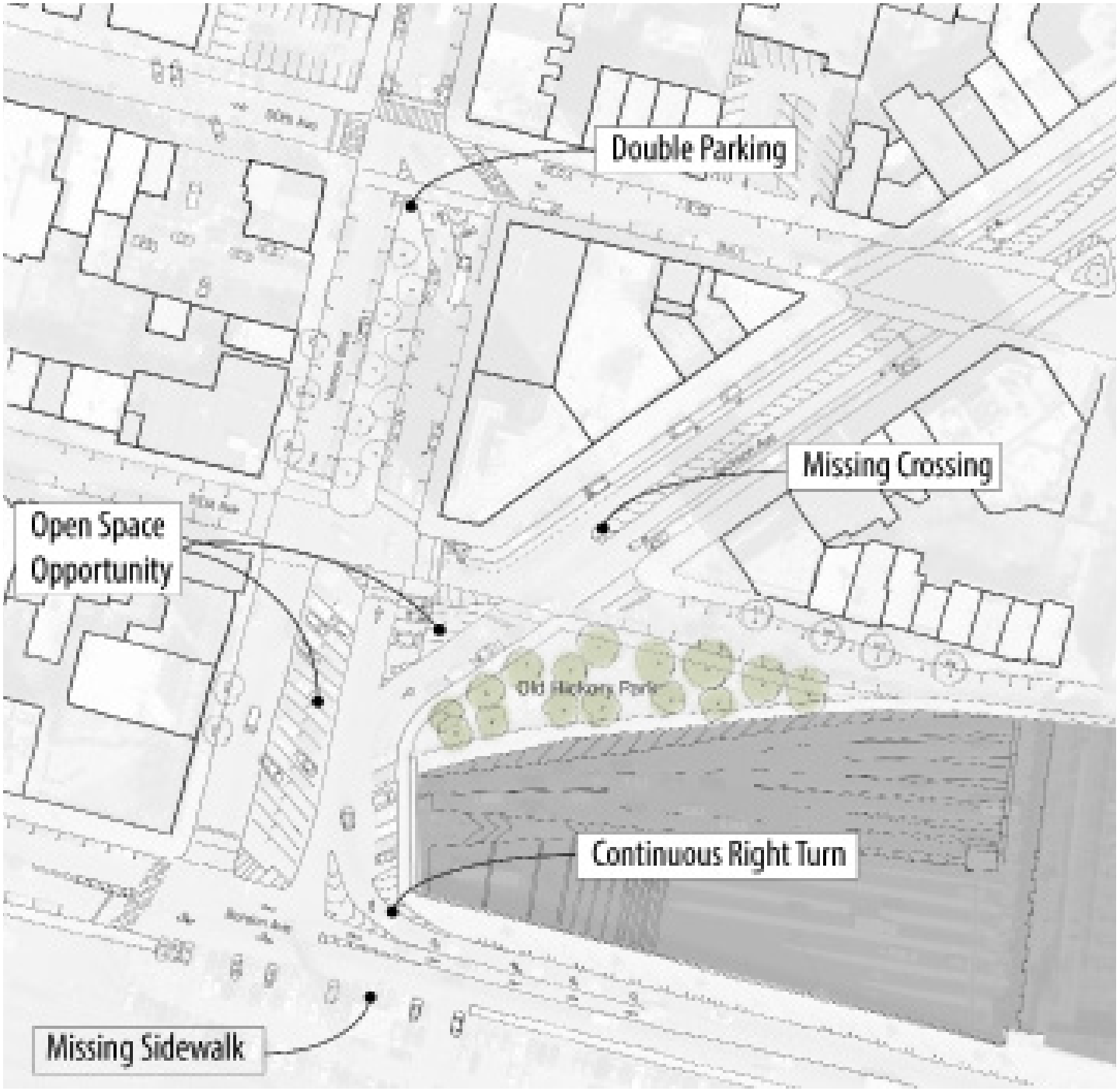
At the southern end of the Vernon Corridor is the Vernon Boulevard Mall, a New York City Greenstreet, between 51st and 50th avenues. Just to the south is the Vernon-Jackson hub, a critical intersection for the study area, currently being studied in a joint Hunter's Point Reconstruction project between NYCDOT and NYCDDC. The study team has been working closely to coordinate our recommendations for this intersection with NYCDOT/NYCDDC and has undertaken an in-depth review of the multiple appropriate changes for this intersection.

The confluence of vehicular, bike and pedestrian traffic creates safety and operational challenges due the complex geometry of the intersection. Addressing these challenges while also addressing the major parking issues and public space potential presents an opportunity to create a great place.
While this intersection requires critical attention in this study, the separate project being undertaken by NYCDOT and NYCDDC will address the reconstruction of this intersection. The scope for their proposal includes changes to traffic patterns, roadway alignment, parking and public spaces. Their broad recommendations cover a variety of possible solutions to reconfigure traffic and public space to improve safety and operation at this transportation hub. (A detailed list of potential broad recommendations from the DOT/DDC scope of work for Vernon-Jackson in the appendix.)

Issues & Considerations

- This is a major local hub that anchors the southern end of the Vernon Boulevard and Jackson Avenue neighborhood retail corridors.
- The existing Vernon Boulevard Mall is lacking in sufficient seating, landscaping and other amenities.
- The existing playground at Old Hickory Park at the southeast corner of Jackson Avenue and 51st Avenue needs crosswalks to provide safe access.
- Long-term metered parking south of the Vernon Boulevard Mall results in commuter and placard parking and traffic congestion
- Provides vehicle access to the nearby Queens Midtown Tunnel and Long Island Expressway
- Location of the Vernon-Jackson station of the #7 subway, one stop from Grand Central Station.
- Southern terminus of the Q103 bus route.
- Significant amounts of local foot and bicycle traffic.
- The Pulaski Bridge is two blocks to the north on Jackson Avenue.
- The intermodal transfer point, local transportation facility and neighborhood retail corridor attracts commuters from the local area and from the growing waterfront communities in Long Island City, Astoria and Greenpoint.

Existing Conditions at Vernon Boulevard Mall



Existing Conditions at Vernon Boulevard Mall

- Multiple complex intersections lead to conflicts and confusion at times.

In order to address these issues and the operational issues identified by DOT, in the appendix are several potential considerations and recommendations for this DDC study to investigate further.

Recommendations

Due to the complexity of this intersection and location of the public space in the center of the street, there are many options for improving this location. Several options are all-encompassing, and other options are different proposals for changing a single element. For example, there are two options for improving the median. In all instances, improved pavement markings and signage is recommended. All parking lost will be replaced along Borden Avenue.

- Option 1: ***Improve the existing public spaces*** and convert the existing angled parking in the center median between Borden and 51st avenues to a pedestrian space with paint and bollards or more permanently with concrete. This would essentially extend the existing mall from 50th Avenue, providing enhanced public space and parallel parking along the mall. This will

Proposed Option 1 for Vernon Boulevard Mall

Proposed Option 2 for Vernon Boulevard Mall

also eliminate all irregular intersections at the hub.

- Option 2: ***Shift the center median on Vernon Boulevard between 50th and 51st avenues*** to the east side of the street and join with existing public space. The center median on Vernon currently used for angled parking between Borden and 51st avenues would be removed in order to align with the rest of Vernon Boulevard. Realigning the street would simplify the roadway, providing parallel or angled parking along the new eastern side of the street. In addition, regularization of the intersections would make turning movements safer and provide an enhanced public space. Marking the bike lane between the existing sidewalk and the new enhanced greenstreet would delineate private from public space.

Components of Recommendations

- ***Close the slip lanes on Vernon Boulevard at both Borden and Jackson avenues*** to regularize this section of the intersection and provide controlled, marked pedestrian crosswalks to improve pedestrian safety.
- ***Direct crosswalks to public space:*** High volumes of pedestrians were observed crossing illegally from the northeast corner of the intersection to the public space located in the center mall. Currently accessing the center mall requires two crossings – some pedestrians are unwilling to take a longer route and choose the direct path. A direct crosswalk would resolve this issue.
- ***Stewardship of public space:*** The added public space could be enhanced with streetscape amenities with the stewardship of a local maintenance partner. Providing seating, bicycle parking, street trees and other plantings would create an attractive pedestrian environment that builds upon its location as a transportation node to create a gathering place in the community.
- ***Reverse traffic flow on 50th and 51st Avenues:*** The current flow on 51st Avenue is westbound. This flow inhibits traffic access to northbound Jackson Avenue, requiring the use of a slip lane from Vernon Boulevard to Jackson Avenue. Reversing traffic flow on this street would allow placement of crosswalks to the playground on 51st Avenue and Vernon Boulevard since the slip lane would be unnecessary. 50th Avenue would be reversed between Jackson and the waterfront to conform to the rest of the grid.
- ***Traffic calming on Jackson Avenue:*** Various treatments could achieve the operational and traffic calming goals for the local street network as well. The "road diet" completed by the EDC on Jackson Avenue between Queens Plaza North and 23rd St could be extended from 23rd Street to Vernon Boulevard. This would involve adding curb extensions, crosswalks, landscaped medians and plantings.
- ***Jackson Avenue long term changes***: As the character of this neighborhood continues to evolve—particularly with more residential and fewer industrial uses--more progressive solutions may be appropriate on the adjacent segment of Jackson Avenue from 11th Street to Vernon Boulevard. With planned bicycle and pedestrian improvements to the Pulaski Bridge, this transportation hub is likely to become even more heavily trafficked by non-motorized modes. Due to its diagonal nature, Jackson Avenue cuts through the grid at an angle and could be redesigned as a series of pedestrian-only street segments. Maintaining through connections on east-west streets and clarifying the street network would retain connectivity while better accommodating cyclists and pedestrians.
- ***Parking:*** All parking that is removed in order to implement these recommendations can be replaced by installing angle parking on Borden Avenue between Vernon Boulevard and Fifth Street.

Existing Conditions at Vernon Boulevard Greenstreet

Proposed Changes to Vernon Boulevard Greenstreet

Vernon Boulevard Corridor

PARK Smart on Vernon Boulevard

Availability of parking is a concern within the study area. With significant future development projected to bring in many new residents, competition for scarce parking is likely to increase along neighborhood retail and commercial areas.

One way scarce parking has been addressed in other parts of the city is with the PARK Smart system. PARK Smart, an initiative of the New York City Department of Transportation, uses dynamic pricing and extended meter hours to help manage parking supply. Dynamic pricing offers a low cost for the shortest time segment and as the user requests more meter time, the price per segment increases progressively, effectively making it cost more for the longer you stay. A sample price structure is shown to the right.

This program has been piloted in neighborhoods such as Park Slope, Brooklyn, and Jackson Heights, Queens. In Jackson Heights, the parking time limit on Roosevelt Avenue was raised from one hour to two, while lowering short-term parking rates in other lower demand areas, offering longer-term parking to those who need it while also encouraging faster turnover. In Park Slope NYCDOT undertook a full analysis of the program and found several changes:

- Area traffic volumes decreased 7%
- Parking Duration (length of stay) decreased 20%
- Number of unique vehicles parked increased 18%
- Parking spot usage remained steady from 88% in 2009 to 87% in 2010

Recommendation

A similar approach for PARK Smart used in other neighborhoods is recommended for Long Island City, particularly along the retail corridor of Vernon Boulevard. A focused study could identify potential zones to re-price, as well as propose a new rate structure. Following community board approval, NYCDOT would then launch a six-month pilot to test the efficacy of the program. If successful, PARK Smart could help reduce cruising and increase parking availability in Long Island City.

	Current Rate	Progressive Rate
15 Minutes	25 c	
30 Minutes	50 c	
60 Minutes	$1.00	$1.50
90 Minutes	$1.50	$2.50
120 Minutes	$2.00	$4.00

Existing metered parking rates and PARK Smart rates (NYCDOT)

Section 2: Bicycle Network Recommendations

With multiple rezonings, major projects and the Cornell-Technion University being built on Roosevelt Island, it is anticipated that new travel patterns and desired trips will emerge as business activity expands and students and faculty seek housing in Western Queens.

While the distances are short, the current bike network is underdeveloped and several links between areas are lacking, especially between Roosevelt Island and Western Queens and east- west neighborhood connections within Western Queens. Bicycle improvements from Roosevelt Island to the Astoria Subway Line along 36th Avenue will create a backbone for the northern portion of the study area, in much the same way as the Queens Plaza Path has done to the south.

Bicycle Network Recommendations:

- Add a two-way protected bicycle lane on 36th Avenue from 24th Street across the Roosevelt Island Bridge
- Enhance the descent from the Roosevelt Island Bridge to the street level on the island
- Improve the plaza at the Roosevelt Island Greenway
- Reduce bicycle-pedestrian conflicts at Dutch Kills Green and connect the Queens Plaza bike lane to the 29th Street bike lane
- Reconstruct Queensbridge Park Greenway between 21st Street and Vernon Boulevard
- Enhance bicycle infrastructure

Bicycle Network Recommendations

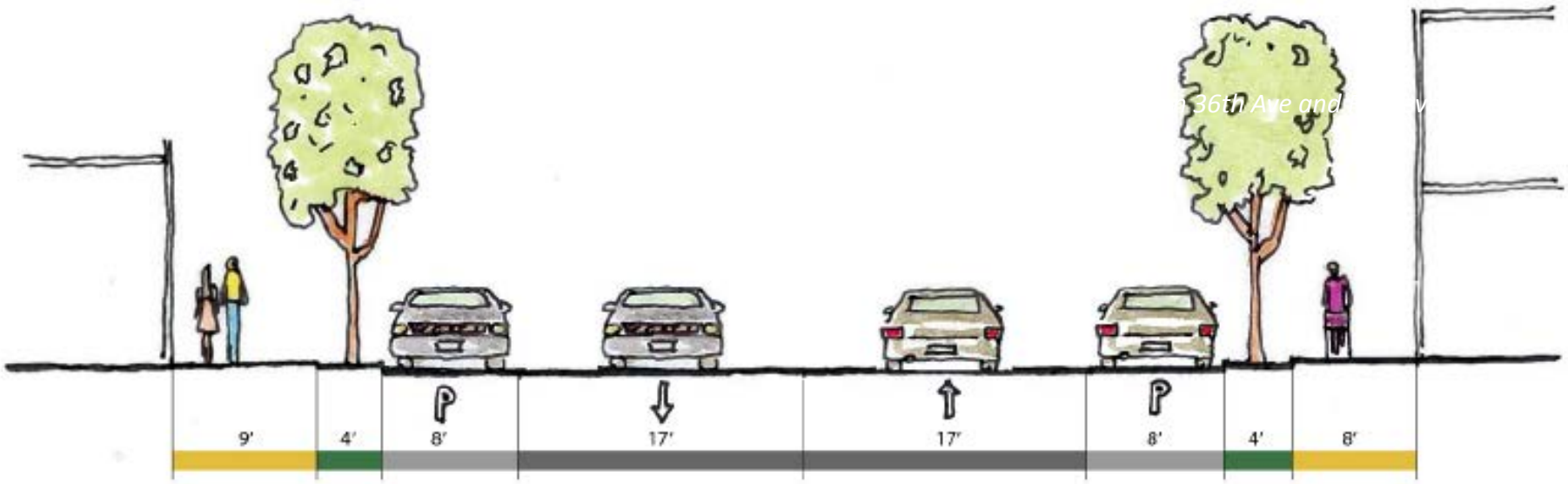
36th Avenue Bicycle Route

On the Queens side of the Roosevelt Island Bridge, a bicycle and pedestrian path exists, but leads onto 36th Avenue. This is a lightly used street that connects several major locations, including the Astoria Line 36th Avenue subway station, Ravenswood Houses and the bridge to Roosevelt Island. The street serves one lane of traffic in each direction, yet widens from the typical 37 feet to 50 feet west of 24th Street. This change in roadbed width:

- Encourages double parking and speeding
- Creates a longer street crossing distance that is difficult to cross.

36th Avenue is situated in a prime position to be leveraged as a bicycle route, bounded by the Vernon Boulevard protected bike path to the west, the north-south bicycle lanes on 28th & 29th Streets, the subway at 36th Avenue Station and provides a direct route towards the Roosevelt Island Bridge Bicycle Lanes.

Existing street configuration on 36th Ave and Roosevelt Island Bridge



Existing street configuration on 36th Ave

Recommendation

With the many changes happening in the study area, the 36th Avenue corridor may see heavy non-motorized use, due to a significant number of students that may choose to live in Western Queens while attending Cornell-Technion University planned for Roosevelt Island. The existing 50 foot wide roadbed presents an opportunity to install a bicycle lane. Where the roadway becomes narrow at 24th Street, a shared lane is proposed to connect with the existing bicycle lanes on 28th and 29th Streets and the subway station at 36 Avenue with a potential bicycle parking facility at that location.

This proposed reconfiguration of 36th Avenue would serve as the backbone for bicycle access from Western Queens to Roosevelt Island and would link many facilities, shown to the right.

Proposed street configuration on 36th Ave

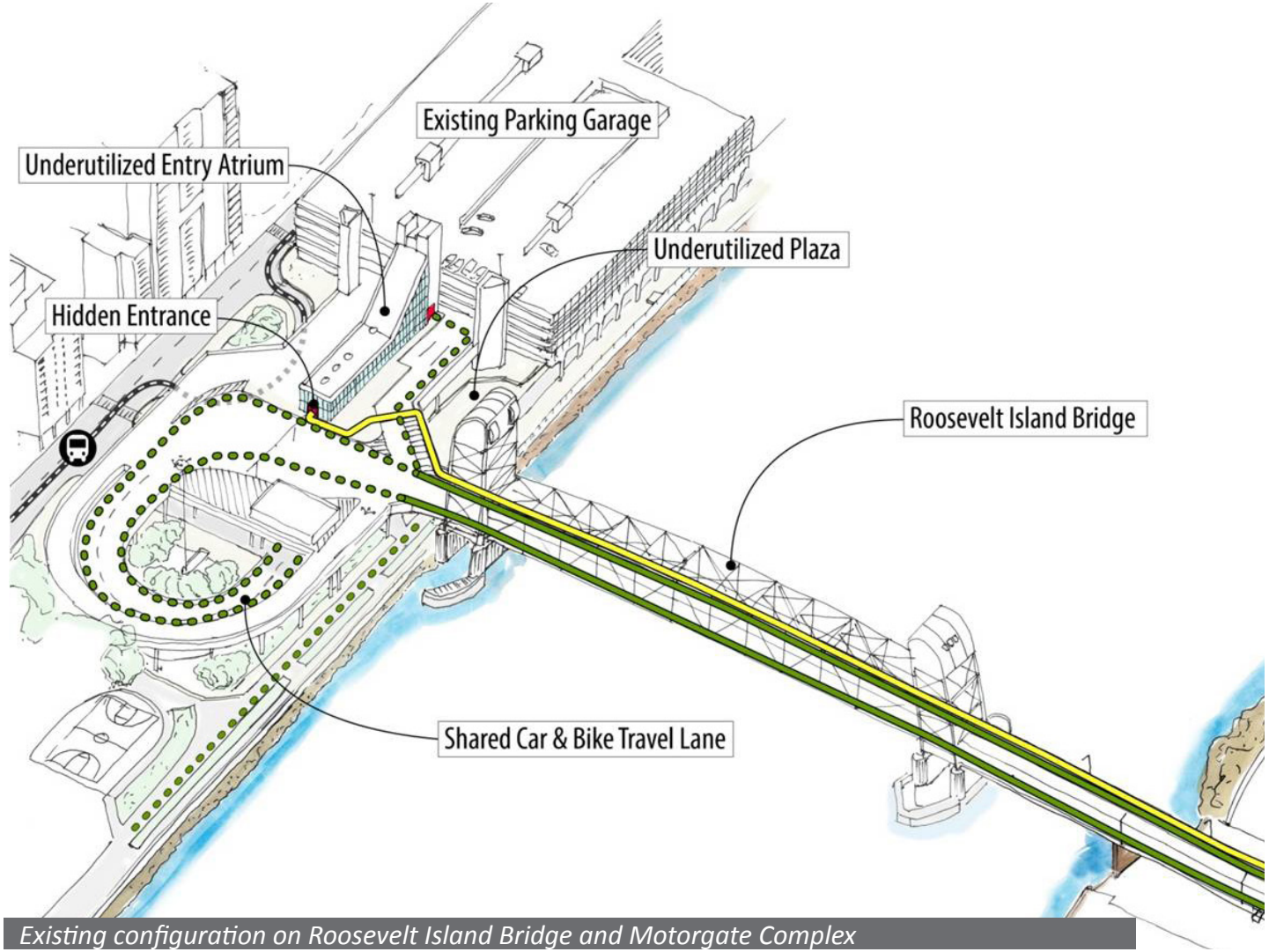
Connections to Roosevelt Island

After the development of the Cornell-Technion campus is complete, Roosevelt Island will become a major education, employment and recreation destination. Currently, the Roosevelt Island Bridge provides a connection between Western Queens and Roosevelt Island for cars, buses, pedestrians and cyclists. As demand to access the island increases, providing high quality connections for pedestrians and cyclists will mitigate congestion on Roosevelt Island. Recommended bus network changes, discussed in previous chapters, that improve regional mobility would also improve the connections between Western Queens and Roosevelt Island. Below are specific pedestrian and bicycle infrastructure improvement recommendations for both sides of the Roosevelt Island Bridge.

Roosevelt Island Bridge and Access Improvements for Pedestrians and Cyclists

The bridge linking Roosevelt Island to Queens at 36th Avenue provides vehicular, cyclist and pedestrian access to the island, with two vehicular lanes, two bike lanes and a pedestrian path. The current setup is designed to deliver vehicles directly inside the upper level of the Motorgate Garage Complex on Roosevelt Island, without funneling them onto Main Street. While many vehicles utilize the garage, many others require access to the island's streets and head down using a narrow spiral ramp. Alternatively, vehicles may use the ramps within the garage to gain access to Main Street.

Bicycle lanes are provided on both sides of the bridge, buffered by plastic bollards, channeled directly



Existing configuration on Roosevelt Island Bridge and Motorgate Complex

into the spiral ramp to provide direct access to Main Street on the island. Due to safety concerns, many cyclists prefer to use the pedestrian facilities to access the street level.

Pedestrians

For pedestrians, a pathway is provided along the north side of the bridge structure and leads to the Motorgate Garage. Where the path ends, a crosswalk is provided for crossing the garage entry road to access the garage stairwell or elevators. Existing escalators are currently closed due to extremely low demand and high costs of operation.

As cyclists and pedestrians make their way down to the Roosevelt Island street level, there is not currently a clear connection to the Roosevelt Island Greenway along the eastern side of the island. A large underused plaza (currently used for RIOC storage), sits between the Motorgate Parking Garage and the Roosevelt Island Bridge along the Greenway.

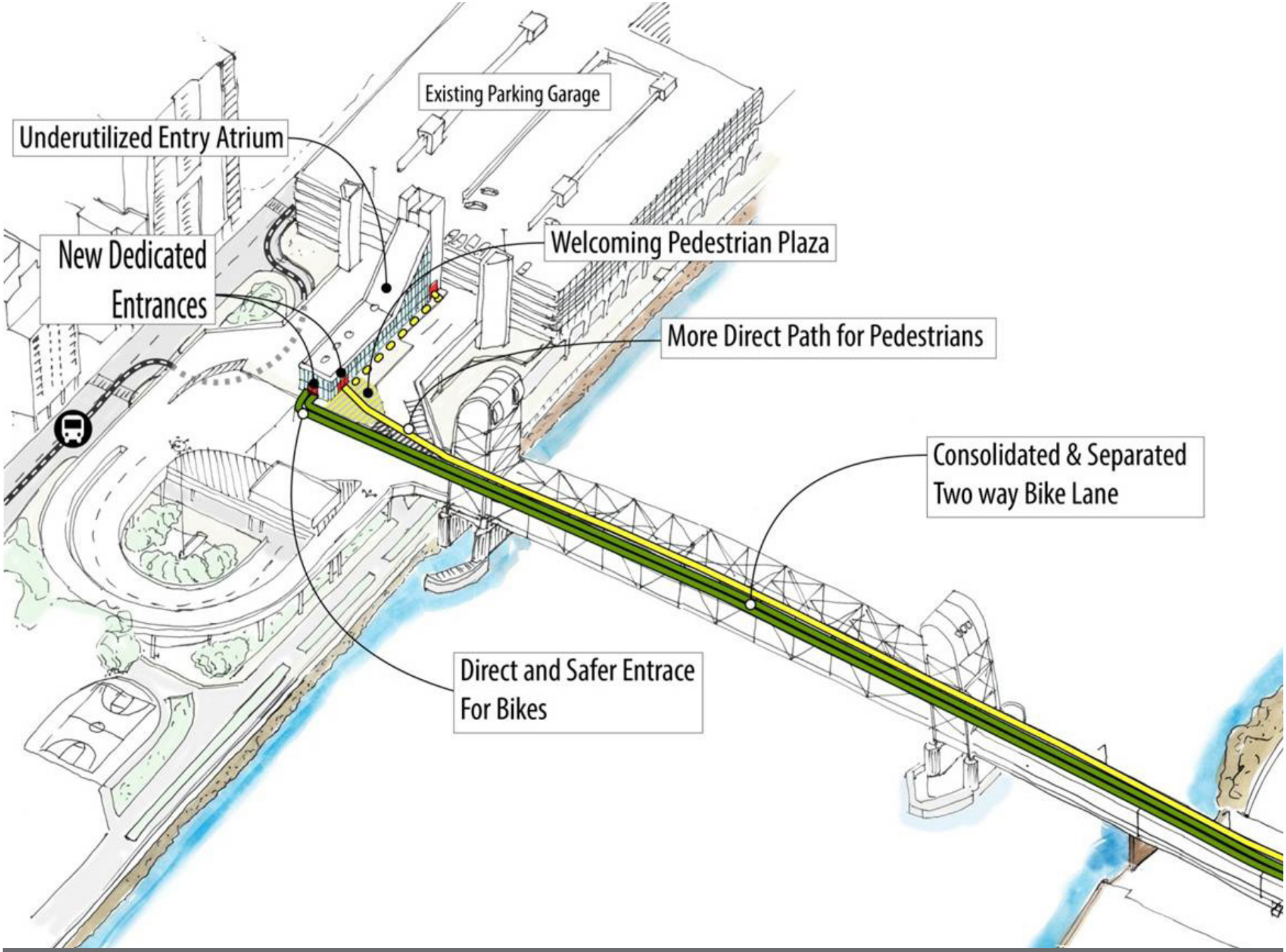
Bicycles

With the large number of students projected to attend the Cornell-Technion Campus on the island, an environmental impact statement (EIS) was conducted. The measures identified in the EIS to mitigate the impact on the transportation network address the vehicular network, operations on the Q102/Red Bus and widening the sidewalk at the Roosevelt Island Subway Station. This study recommends going beyond those measures to consider this new population's needs, travel choices available and overall, how the students, faculty and staff of this new facility will live and work in the city.

With new residential development throughout Western Queens and particularly the Cornell-Technion Campus on Roosevelt Island, a much heavier pedestrian and bicyclist load could be placed on the bridge. To access the island, cyclists either use the spiral ramp or use the Motorgate Garage to access the stairs or elevator. These options both have safety concerns, and could be overburdened by an increase in demand in the future.

Existing configuration of Roosevelt Island Bridge - Facing east

Existing Bike/Ped connection between RI Bridge and Motorgate



Proposed configuration of Roosevelt Island Bridge and Motorgate for bicycles and pedestrians

Recommendations

Convert the existing configuration of one bike lane on each side of the bridge to a two-way protected lane on the north side of the bridge made out of a non-slip material. This would allow the bridge path to connect with the existing Vernon Boulevard two-way protected path and the proposed bicycle lane on 36th Avenue. The two-way lane across the bridge could lead directly into the Motorgate Plaza for cyclists to access street level.

Upgrade the existing entrance to the Motorgate facility to create a more engaging entrance for pedestrians and the high volumes of people that will be entering Roosevelt Island each day after the construction of the Cornell-Technion Campus.

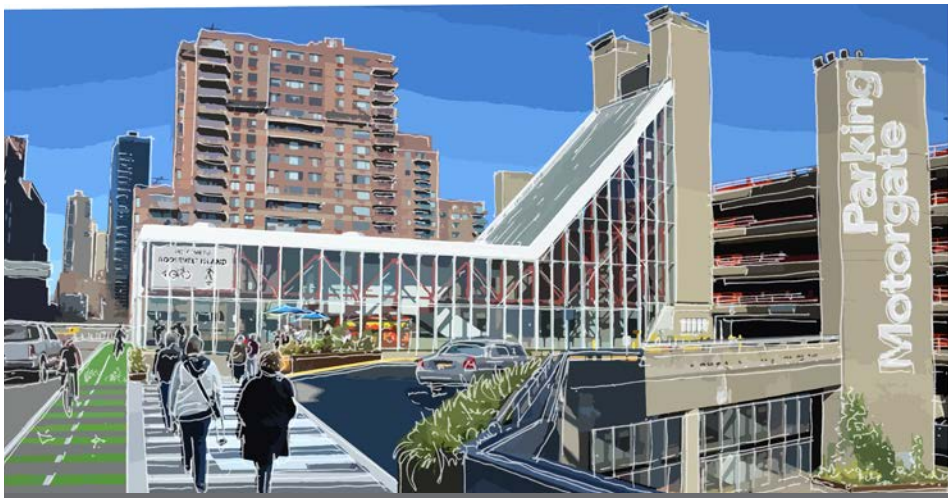
Add a pedestrian crosswalk and enhance the space with plantings, seating and signage to improve this pedestrian and bicycle connection.

To better connect the existing bicycle infrastructure with the Roosevelt Island Greenway, the study recommends:

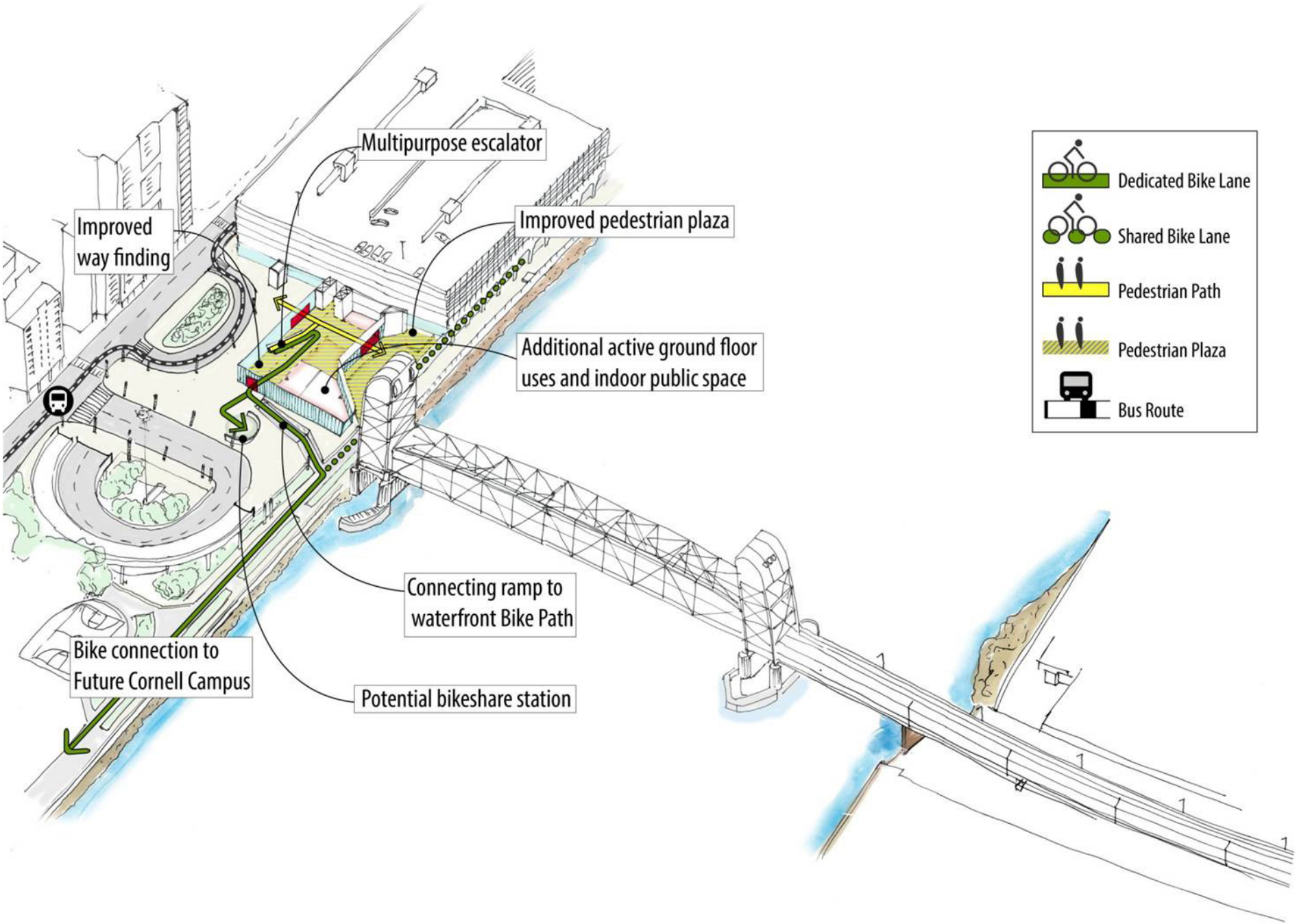
- Providing an exit from the Motorgate Parking Garage directly onto the plaza space
- Adding movable seating and tables, greenery and plantings
- Activate the open space with temporary uses such as farmer's markets
- In the long term, add retail uses that front the plaza and the Greenway

In the long run, this study recommends that the city and RIOC work together to design and construct a ramp directly from the bridge to the greenway located below that can accommodate increased demand. This would provide safer and more direct access than the current system of pedestrians and cyclists using the garage facilities for access. Cornell, in consultation with RIOC is currently undertaking a study to identify improvements to the Greenway within the island. Alternatively, as a less expensive option, the closed portions of the

Proposed bike path configuration on north side of the bridge



Proposed configuration of RI Bridge and Motorgate connection



Proposed configuration of interface between Motorgate Complex and Roosevelt Island Greenway

Motorgate Garage and plaza can be replaced with switchback ramps or a flat “shopping cart style” escalator in order to provide direct access to the Motorgate bus stop waiting area at street level.

These recommendations have the advantage of channeling the projected additional cyclists and pedestrians to the Roosevelt Island Greenway rather than Main Street. Main Street is not preferred for two reasons: first, the bridge exit at Main Street is at a heavily used bus stop and would be adding unnecessary conflict at the most highly used intersection on the island. Second, this setup would direct bicycles to use the narrow Main Street, the only thoroughfare on the island with heavy bus and delivery truck use. It is safer, more direct and provides a higher quality streetscape connection to use the bridge to greenway plaza ramp option, and as such, is recommended by this study.

Existing connection to Roosevelt Island Greenway from Motorgate Garage

Proposed connection to Roosevelt Island Greenway from Motorgate Garage

Queens Plaza Greenway

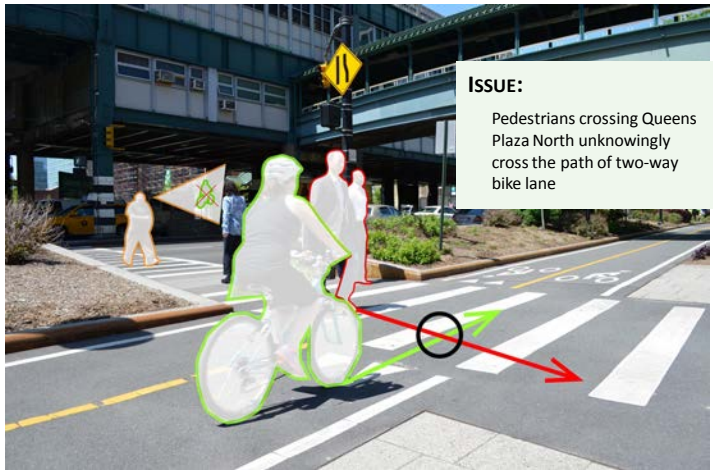
Queens Plaza, a busy commercial center located near the Queensboro Bridge, has been the subject of major multi-million dollar capital improvements over the past decade funded by the city as well as local partners, notably the LIC Partnership. The treatments have improved the area greatly, but with the implementation of a new bicycle path, a new vehicle traffic pattern and new pedestrian medians, entirely new, yet different transportation problems have arisen.

Bike & Pedestrian Intersection Conflicts

As pedestrians cross the street, many are unaware that they are crossing an active bikeway in the median of Queens Plaza North. Queens Plaza often cannot be completely crossed within the time allotted to the walk signal, especially for those with slower walking speeds. Because of this, pedestrians often get "stuck" on the extremely narrow medians in the center of the street. Due to the heavy motor vehicle congestion approaching Queens Plaza, a longer walk signal would exacerbate delays.

Recommendations

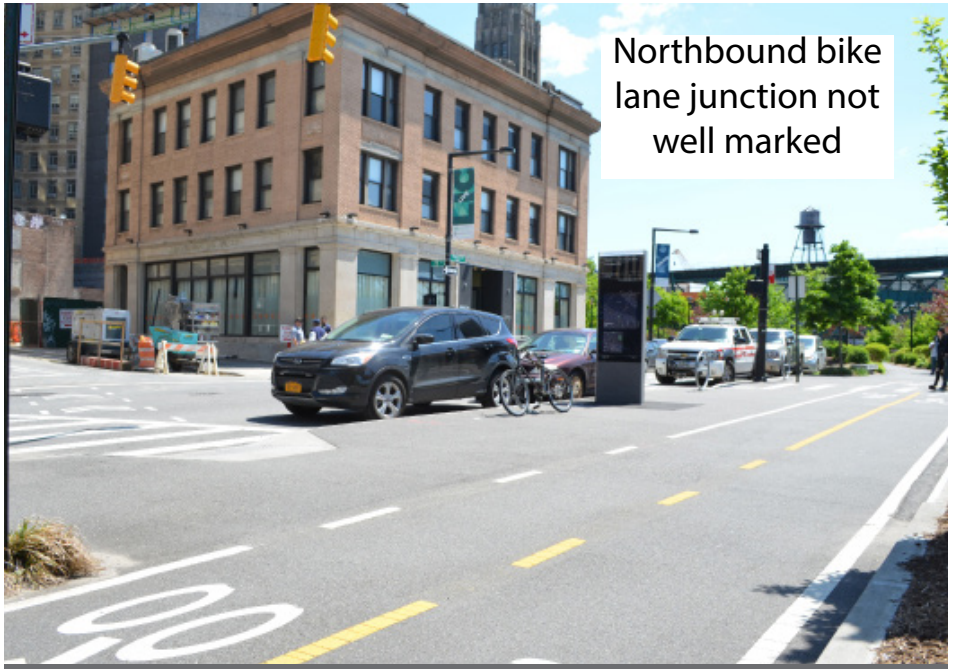
- Install a sign adjacent to the countdown clock walk signal, alerting pedestrians of the two-way bicycle traffic.
- Install signs alerting cyclists to crossing pedestrians at critical points.
- Install signs informing slower pedestrians that they may be unable to complete the crossing in one attempt or signal phase.



Existing bike path and signage recommendation at Queens Plaza

Dutch Kills Green Bicycle Issues

Dutch Kills Green is a newly developed park at the east end of the Queens Plaza North median and prohibits through bicycle traffic. However, the bicycle path leads directly into the park, with no signage communicating otherwise. Cyclists often ride through Dutch Kills Green instead of using Queens Plaza North for westbound destinations or the 29th Street bike lane for northbound destinations. For pedestrians, this can create potentially dangerous conditions when in conflict with cyclists.



Existing bike path at 29th Street at Queens Plaza

Recommendations

Construct a physical separation between the entrance of Dutch Kills Green and the Queens Plaza Greenway in order to discourage through bicycle traffic within the park.

Alternatively, the bicycle restriction in the park can be reinforced by:

- Install signs and pavement markings to reinforce the connection between the Queens Plaza North and 29th Street bike lanes and away from Dutch Kills Green.
- Install “No Bicycle Riding” signs and rumble strips at all entrances to the park to reduce the instance of well-meaning cyclists riding in the park.

Proposed street markings at 29th Street at Queens Plaza

Queens Plaza Greenway

Queens Plaza North Greenway to Waterfront

The existing capital project for the protected two-way bike lane on Queens Plaza North ends at 21st Street. For cyclists continuing toward the waterfront, the quality of the bike lane is diminished. From 21st Street to Vernon Boulevard the existing path is uneven and broken pavement; no bike lane markings; poor lighting and an unpleasant view of the storage area underneath the Queensboro Bridge. Cyclists may not be aware that this lane connects to the Vernon Boulevard Greenway.

Existing path on Queens Plaza west of 21st Street

Recommendation

In order to maintain a high-quality protected two-way bicycle facility along the length of Queens Plaza North, extend the Greenway treatment from 21st Street to Vernon Boulevard.

Install bike lane markings, provide well-maintained pavement, improve lighting, and enhance visual corridors to the waterfront.

Proposed bike land and pedestrian path

Bicycle Infrastructure

In the study area, cycling provides access to residential and cultural uses on the waterfront that aren't as well-served or easily accessed by other modes. However ridership is dependent on supportive facilities such as clear routes, and safe places to ride and store a bicycle. Significant progress has been made in providing an on-street bicycle network with added infrastructure recommended in this report, but supporting bicycle infrastructure is needed.

Bicycle Parking

NYC DOT's Bike Program installs bicycle City Racks at the request of individuals, Community Boards, elected officials or other groups (via an online request form: http://www.nyc.gov/html/dot/html/bicyclists/cityrack-suggest.shtml). These do not require maintenance partners, but have certain location requirements. Another option is a bike corral -- several City Racks that are installed in the street – which does require a maintenance partner.

Bike Share

New York City's bike share program, Citi Bike, has seen rapid expansion in usage and popularity since its launch in May 2013. The first phase of stations and bikes was concentrated in Manhattan south of 60th Street and Downtown Brooklyn. It was originally planned to include parts

Bike corral

Bicycle Infrastructure

of Queens, including stations from Hunter's Point to 41st Avenue in Long Island City. However, due to logistical issues caused by Hurricane Sandy, this was not possible in Phase I. Long Island City and Astoria community members continued to express strong interest in bringing Citi Bike to their neighborhood, and in 2015, Long Island City was included in the first expansion of the system. While 12 stations are now located in the southern part of the neigbhorhood, the LIC Links study previously identified additional potential locations for bike share stations, including:

- Museum of Moving Image
- Along 31st Street near Astoria subway line
- Queensbridge Houses
- Ravenswood Houses

These potential locations for Citi Bike are close to subways and local attractions to improve local connectivity options for Western Queens. With Citi Bike planning to expand northward into Astoria in a future phase of expansion, considerations such as station density and connectivity to other modes should be kept in mind in order to build the most effective bicycle share network possible.

Citibike Bicycle Share

Section 3: Streetscape Recommendations

As residential and employment uses in Western Queens become more dense, more people will be using the transportation network to travel in and around the study area. To avoid worsening congestion, we should promote non-motorized modes such as walking and biking for incoming as well as existing residents.

These streets must feel safe, connected and interesting for people to feel comfortable traversing the area as pedestrians and cyclists. These recommendations will provide streetscape recommendations to ensure that all modes are accommodated by the streets, that streets and sidewalks are safe and well-lit, and one can easily navigate around the study area.

Streetscape Recommendations:

The overall recommendations for streetscape improvements are to:

- Provide a conceptual design framework for mixed-use streets.
- Improve lighting on key corridors, over sidewalks and under elevated structures.
- Expand pedestrian wayfinding.

Overview of Streetscape and Lighting Recommendations

Mixed-use Streets: A Conceptual Design Framework

Mixed-use streets cater to diverse use groups such as residential, commercial, light industrial and community facility and as such pose an inherent conflict between the needs and use of the public realm.

Issues

Many industrial buildings do not have loading areas that accomodate the full needs of businesses. As a result, these businesses use the sidewalk and road space in variety of ways which conflicts with pedestrian activity. Many mixed-use streets lack basic street amenities such as sidewalks, adequate lighting and street trees that create a less inviting environment for residential uses and at the same time do not allow daily workers to linger or rest during breaks and lunch time. Businesses are concerned that pedestrian improvements will create conflicts with industrial business activity. These concerns may be addressed by a design and planning strategy that caters to multiple stakeholders. Several of the streets and avenues in the study area serve multiple land uses, with the use of the roadway and sidewalk differing greatly

Mixed-use streetscape in the study area

depending on the users.

Goals

The goal of this recommendation is to explore the potential for a more flexible set of street prototypes that could change over time and meet the needs of existing street users. The key principles include:

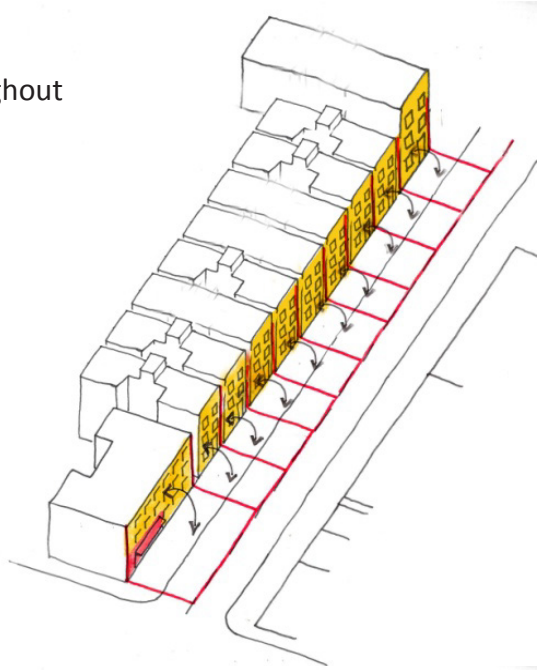
- Meeting the needs of the existing businesses
- Maintaining a walkable and pedestrian-friendly environment
- Greening the streets where possible
- Enhancing the neighborhood character by introducing additional amenities within the public realm

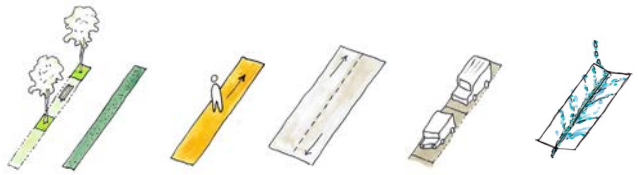
Concept

In typical residential/commercial streets there are standard treatments, alignments and uses. These tend to be uniform and constant along the length of the street. Streets typically provide a continuous clear path for pedestrians, continuous clear path (road) for traffic, drainage and other common delineated areas such as parking spaces, tree pits/ planting and benches.

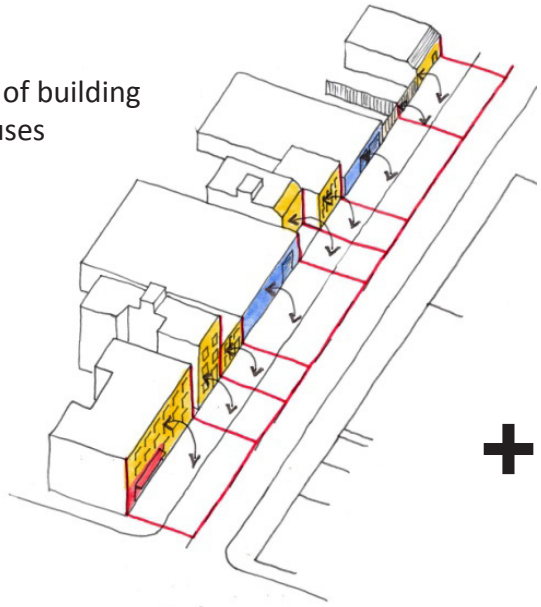
In mixed-use streets the reality is different while the street design is similar; the industrial uses of

Typical Street:
Similar uses throughout





Mixed-use Street:
Evolved with a mix of building typologies & land uses



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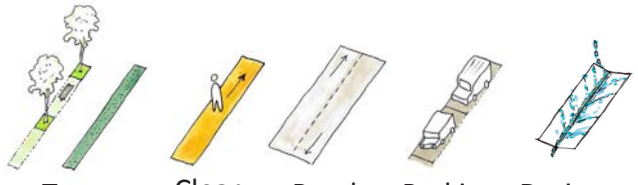


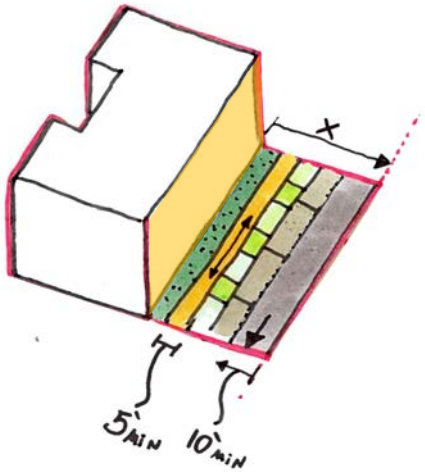
the street have needs that do not match the typical street's design. As a result of this misalignment, industrial users park on the sidewalk, occupy it for temporary storage, damage the greenery that already exists and frequently do not allow for a minimal clear path for pedestrians.

In order to balance these needs, a flexible framework that takes into account the consistent treatments that must exist in the street as well as the "use-dependent" treatments should be considered and further studied. This approach creates a non-uniform street design that allows for multiple users to co-exist within the same space.

When applying a conceptual use-dependent approach to street design and treatment, we should consider the variety of uses that are located adjacent to the public

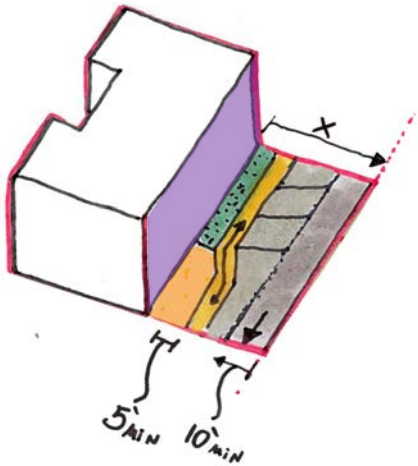
The use that occurs within the private property impacts how the street functions directly adjacent to it:

Residential



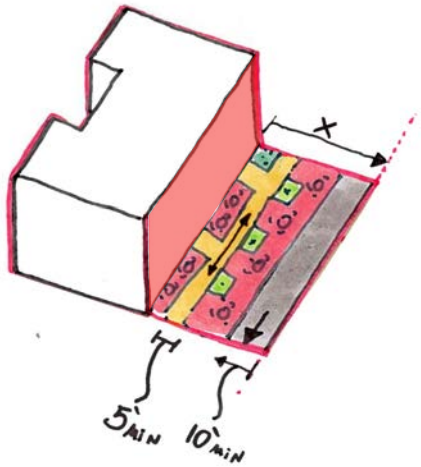
- Planting
- Clear path
- Trees
- Parking
- Road

Industrial



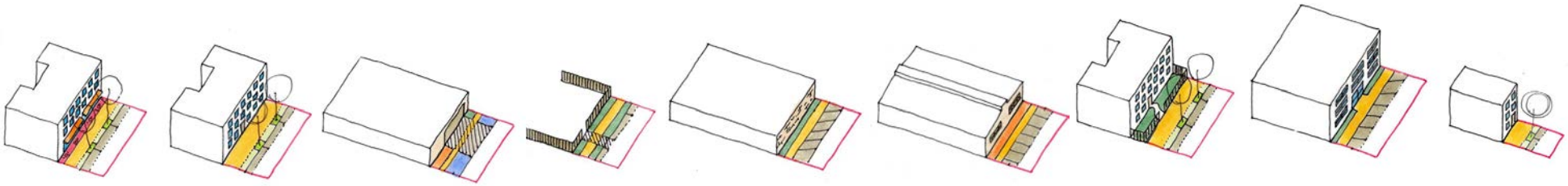
- Storage
- Clear path
- Parking
- Road

Commercial



- Seating
- Clear path
- Trees & Seating
- Road

To some degree, the street treatment could respond to the adjacent use and physical elements:



Commercial | Residential | Loading Area | Storage/Fence | Blank Wall | Industrial | Planted setback | Institution | Residential

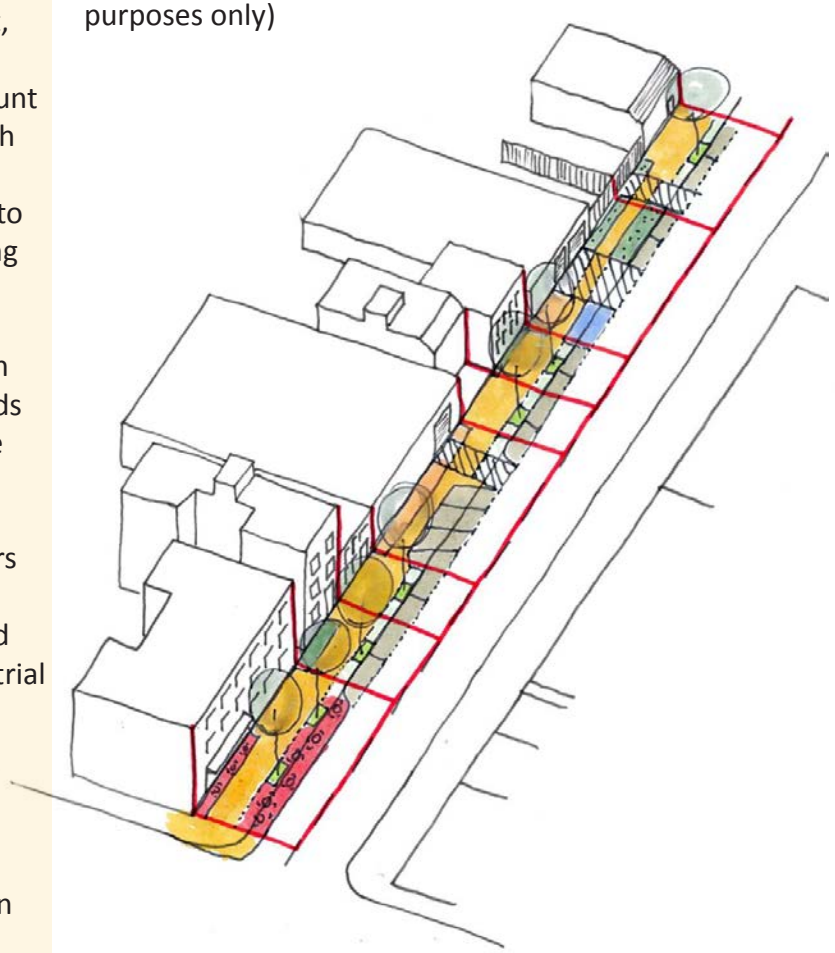
realm and might have different needs. In residential use for example, the adjacent treatment to the street might take on a more traditional design with a clear path for pedestrians, planting strip for street trees, parking lane and a travel lane. Adjacent to industrial uses, the street design might be informed by the type of activity of the user by providing delineated spaces for loading and daily storage. The design can also react to physical facade elements such as blank walls or fences as an opportunity to beautify the street and provide a planted buffer to contribute to a more pedestrian friendly environment.

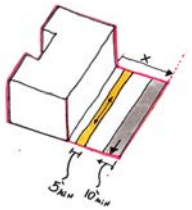
Recommendations

To meet the needs of both residents and industrial businesses who co-exist in the same street, a new street typology could be explored which takes into account this diverse group of users. With this approach industrial streets could be safe and comfortable to walk on and support the existing uses.

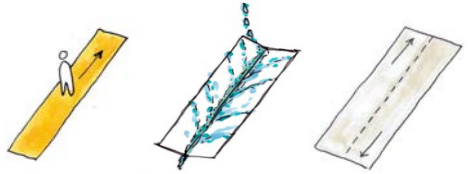
The street will be designed with a built-in flexibility that responds to adjacent uses along it. These uses will all allow a continuous and consistent clear path for pedestrians, traffic lanes for cars and will allow drainage. Street furniture and green space could serve both residents and industrial uses. Should uses and needs change over time, the design of the streets could respond to change while following design guidelines and maintaining the basic consistent uses needed on each street.

Mixed-use design concept scenario
(for illustration purposes only)

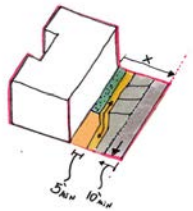




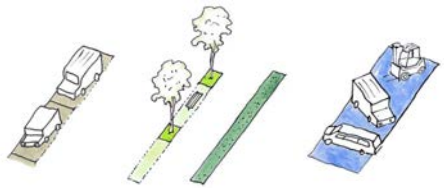
Consistent Streetscape Elements:
Continuous treatment along the street length



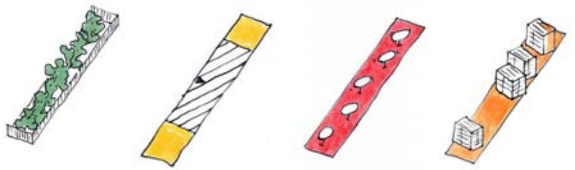
Clear path Drainage Road



Varied Streetscape Elements:
That might vary depending on the adjacent use



Parking Trees Grass strip Flexible path



Planting buffer Loading path Seating Storage

Pedestrian Lighting

Lighting is a critically important amenity for pedestrian uses. Proper lighting makes a space feel safe and inviting, reduces crime, and attracts more users. However, in many parts of the Western Queens study area, pedestrian lighting is insufficient or nearly non-existent.

These conditions diminish safety at intersections when motorized and non-motorized users cannot see each other easily. In addition, dark areas generate a sense of vulnerability and discourage walking on what would otherwise serve as excellent walking routes. To encourage walking, both roadway and pedestrian-scale lighting at these key locations should be addressed.

Street corridors that bring pedestrians to community facilities and amenities should be considered for improved, sidewalk-oriented lighting. Of those, the high priority street corridors are streets that provide connections to transit, the waterfront amenities and local retail uses. These are thoroughfares that are already used and can accommodate additional pedestrian (and perhaps vehicular) traffic without negatively impacting existing residential areas.

Other high priority locations are the industrial corridors within the study area. Because industrial zones generally see very little pedestrian traffic, priority is given to infrastructure for automotive and truck travel, loading zones, and storage. However, residential development along the formerly-industrial waterfront is bringing a change in the character of the area. Pedestrians often need to walk along these industrial street segments to access transit.

Lighting under elevated transportation infrastructure

Recommendations

Key high-priority streets for increased lighting are highlighted on the map in orange and yellow include: major thoroughfares for motor vehicles, cyclists and pedestrians; and spaces underneath transportation structures, such as elevated subway tracks and vehicle bridges.

Street corridors to consider for ***improved, pedestrian-scale lighting*** include (in orange):

- Borden Avenue
- 44th Drive
- 41st Avenue
- 21st Street, especially between Queens Plaza and 41st Avenue
- 36th Avenue between 21st Street and the waterfront & bridge to Roosevelt Island
- Broadway between 21st Street and the waterfront
- 30th Avenue between 21st Street and the waterfront
- Vernon Boulevard, especially around parks
- Non-improved sections of Jackson Avenue
- Northern Boulevard

Install or relocate lighting over sidewalks instead of over roadways underneath elevated transportation structures. Listed by responsible agency* (in yellow):

MTA New York City Transit

- Underneath 31st Street Astoria Elevated Line
- 23rd Street between Queens Plaza and Sunnyside Yard
- Queens Plaza Between 22nd Street and the Astoria Elevated Line above 31st Street.

NYC DOT

- Underneath Pulaski Bridge where it passes above the following intersections: 11th Street at 53rd Ave, Borden Ave, 51st Street and 50th Street.
- Lighting improvement here should also include lighting on the Greenpoint side of the bridge at intersections of Clay Street, Box Street, Paidge Avenue and Ash Street
- Queens Plaza between the waterfront and the end of the bridge ramp (midway between 22nd& 23rd Streets)
- The Ed Koch (Queensboro) bridge ramps above 13th Street and Dutch Kills Street and locations where the ramp passes over local streets shown on the map.
- 23rd St under NYCDOT Queensboro Bridge Upper Deck Ramp

*For the shared assets located above Queens Plaza, a joint MTA New York City Transit and NYCDOT lighting program would be appropriate.

Lighting Recommendation locations

Pedestrian Navigation

WalkNYC Signage

Existing wayfinding signage in the study area is not comprehensive enough to truly provide a network of directional signage for any mode. WalkNYC has been helpful in directing pedestrians in the Queens Plaza and Court Square areas, but other wayfinding signage in the area is limited.

In the Long Island City neighborhood, WalkNYC was implemented with coordination from the LIC Partnership. With significant new developments in LIC, Astoria and Roosevelt Island, expanding WalkNYC throughout the study area will greatly enhance the pedestrian environment.

To expand the program to other neighborhoods, NYC DOT works with community partners to identify and observe popular destinations, primary pedestrian routes, parts of the neighborhood that are difficult to navigate, and focuses on routes between transit services, landmarks and public spaces. Site selection and installation of the WalkNYC kiosks must provide an unobstructed path on the sidewalks, providing an area clear for pedestrian circulation and ensuring that the visual quality of the street is not degraded.

Recommendation

As future developments in the neighborhood occur – additional parks, institutions and public spaces – the WalkNYC kiosks should remain as current as possible, with help from coordinating partners.

Locations for siting new WalkNYC kiosks should focus on areas:

- Near transit hubs and subway stations
- Around parks and recreational facilities: Rainey and Queensbridge Parks
- Near cultural institutions and other destinations: Socrates Sculpture Park, the Noguchi Museum

WalkNYC signage on Queens Plaza South

Section 4: Strategic Site Improvements

This final section of recommendations identifies strategies to improve safety, clarity and operations, and improve the pedestrian environment at key sites throughout the study area.

This section concludes with an overview of NYC DOT projects currently underway. This study provides considerations to take into account when redesigning corridors and intersections within the study area.

Strategic Site Recommendations:

- PARK Smart on Steinway Street Retail Corridor
- Pedestrian safety improvements at Newtown Avenue and 30th Avenue
- Traffic calming and changes to traffic signals at Jackson Avenue to improve pedestrian safety
- Pedestrian streetscape improvements on 44th Drive at the waterfront
- Install traffic signal at Borden Avenue and the Long Island Expressway ramp
- Clarify vehicular signage at the approach to the Queensboro Bridge
- Install windscreen on upper level of Queensboro Plaza subway station
- Traffic calming and parking changes on both 24th Street and 14th Street

PARK Smart on Steinway Street Retail Corridor

Due to high demand and low turnover on the retail stretch of Steinway Street, parking can often be difficult to find. This often leads to cars double parking or driving around the block looking for an available space, which both increase congestion and pollution in the neighborhood. As residential development continues in Astoria and nearby neighborhoods, this issue is likely to increase.

One way this has been addressed in other parts of the city is with the PARK Smart system. PARK Smart, an initiative of the New York City Department of Transportation, uses dynamic "supply and demand" pricing and extended meter hours to help manage parking supply. Dynamic pricing offers a low cost for the shortest time segment and as the user requests more meter time, the price per segment increases progressively, effectively making it cost more for the longer you stay. See Vernon Boulevard Corridor section for a more detailed description of NYCDOT PARK Smart pilot project findings.

	Current Rate	Progressive Rate
15 Minutes	25 c	
30 Minutes	50 c	
60 Minutes	$1.00	$1.50
90 Minutes	$1.50	$2.50
120 Minutes	$2.00	$4.00

PARK Smart meters (Source: NYC DOT)

Recommendation

A similar approach is recommended for Steinway Street around the dense retail corridor. During our public meetings, several local businesses have made recommendations for a study as well:

- The study team has been asked by merchants on Steinway Street to include all of Steinway and not one small segment.
- It was also suggested that one block distance of all side streets that intersect with Steinway Street be included in the program

Following community board approval, NYCDOT would then launch a six-month pilot to test the efficacy of the program. If successful, PARK Smart could help reduce cruising and increase parking availability in Astoria.

Parking conditions on Steinway Street

Halletts Point Connectivity

Link Halletts Point with Northern Astoria

Current Conditions
The link between 26th Avenue in the Halletts Point peninsula and Shore Boulevard is an unbuilt mapped street on the official city map. Currently, a small structure is encroaching the right-of-way for the mapped street but the path is otherwise clear of obstructions.

Traffic Network
Currently, the traffic network is setup without a direct connection from Halletts Point to the north. Traffic must utilize 27th Avenue or Astoria Boulevard to reach streets that head north and must either use the verynearby narrow streets or head east tot 21st Street in order to travel north.

Issues

Nearby Pedestrian Generators

- Astoria Houses is located at this intersection with thousands of residents.
- Future Development at Astoria Cove and Halletts Point is located nearby.

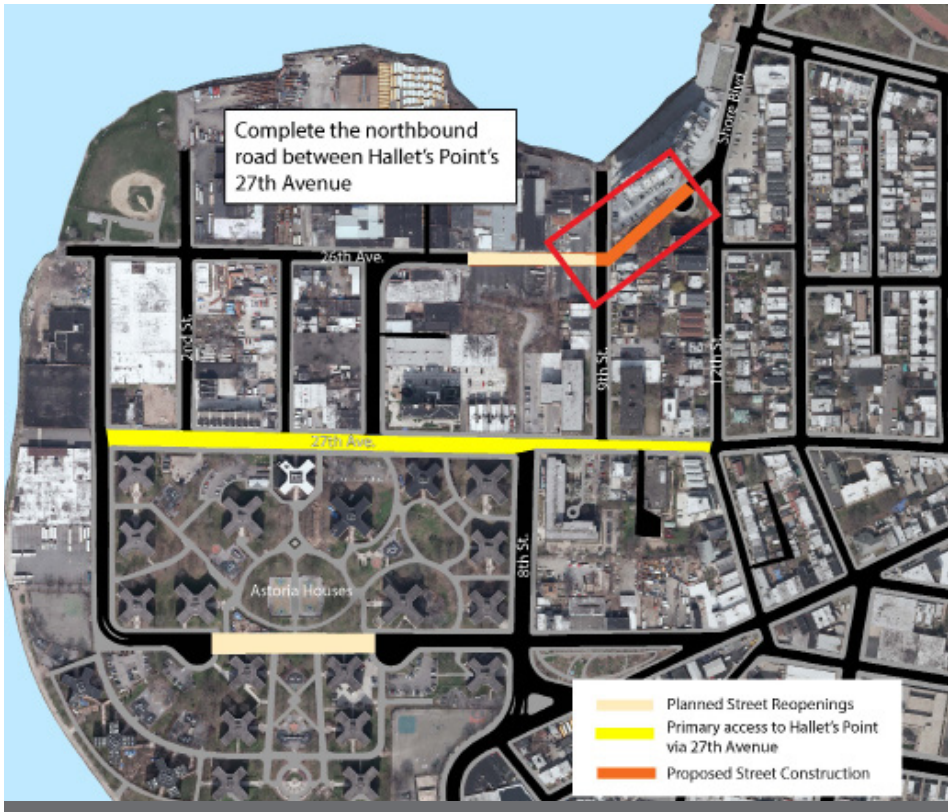
Traffic Network

- Astoria Boulevard is a two-way roadway for the majority of its length; in the vicinity of this intersection, it converts to a 45-foot wide, one-way westbound roadway.
- 27th Avenue exists as a two-way roadway for much of its lenth and become a one-way westbound roadway just before 21st Street, directing all inland traffic to Astoria Boulevard.
- Astoria Boulevard becomes a pedestrian mall as it passes through Astoria Houses, routing all motor vehicle traffic to 27th Avenue.
- 8th Street provides a southbound connection and feeds into Vernon Boulevard after one block.

Currently Planned Street Reopenings

- The Halletts Cove project will reopen the pedestrianized Astoia Boulevard through Astoria Houses
- The proposed Astoria Cove project will reopen 26th Avenue between 4th Street and 9th Street.

Existing Conditions at Shore Boulevard and 26th Avenue



Recommended Changes to Street Layout of Intersection at Vernon Boulevard and Astoria Boulevard

Recommendation

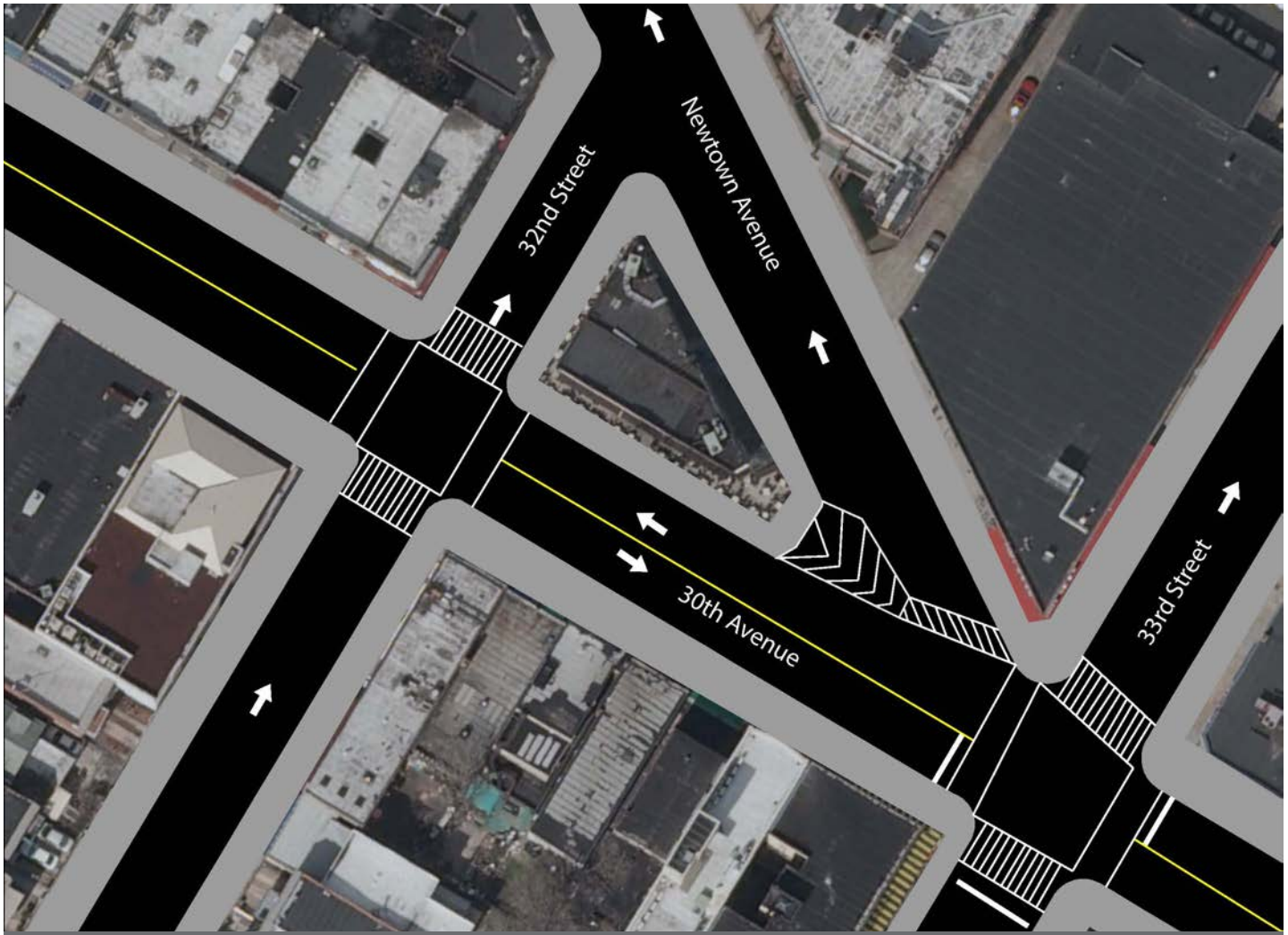
Construct the unbuilt road segment between 9th Street and Shore Boulevard (shown above in Orange.) Since the effects of this connection will take pressure off many streets and intersections throughout the nearby area as the overall development in the area increases, this waterfront link is a longer-term planning strategy to get ahead of future traffic increases in the area.

Newtown Avenue & 30th Avenue

Between 32nd and 33rd Streets, Newtown Avenue and 30th Avenue meet at an angle, forming an irregular intersection. Due to the combination of high pedestrian volumes and the irregular geometry, this intersection was identified by the community as dangerous to navigate as a pedestrian, whom make up the vast majority of road users at this location.

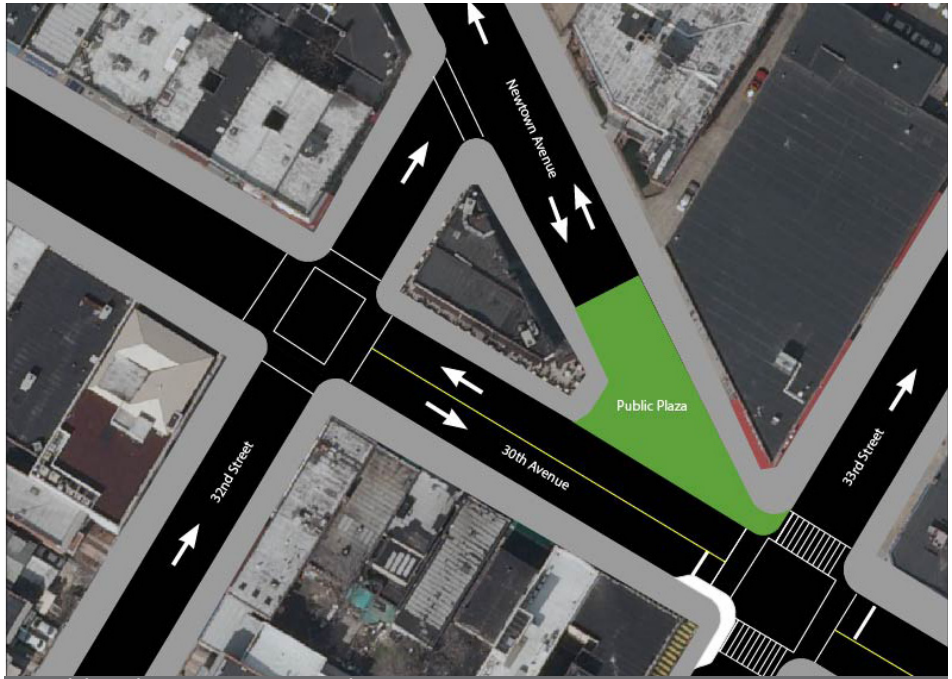
Issues

This location has many pedestrian generators that ensure that the street is used continuously throughout the day. One block to the west is the 30th Avenue stop on the N/Q subway line, and the Q18 bus – which has frequent service in the area – runs along 30th Avenue. The avenue is lined with retail shops, including restaurants, groceries, and pharmacies, creating an active commercial corridor. High pedestrian volumes were observed in a study by the NYC DOT: during a peak period, 166 vehicles per hour used this segment while 534 pedestrians per hour crossed Newtown Avenue.



Existing conditions at Newtown Avenue and 30th Avenue

Curb Extension Recommendation



Public Plaza Recommendation

Recommendations

In 2012, NYCDOT proposed several solutions to calm traffic at this intersection and create more pedestrian friendly conditions. P.S. 17, located at 29th Street, is part of DOT's School Safety Program due to the high rate of nearby vehicle accidents. The district was in the 89th percentile of intersection crashes in Queens between 2006 and 2010.

Curb Extension Recommendation

One proposal includes three curb extensions that would add pedestrian space and create safer crossings. Sidewalk extensions would shorten crossing distances, provide pedestrian space, retain parking, and calm traffic turning onto Newtown Avenue. All vehicles including trucks would still be able to safely make turns onto Newtown Avenue and emergency access would not be affected.

Public Plaza Recommendation

Astoria is one of the ten neighborhoods in NYC with the least amount of open space (based upon data from NYCDOT's original 2012 proposal.) This public plaza would add 4,700 square feet of open space to a district that needs it, in a location that would not affect vehicle traffic, and would be heavily utilized by pedestrians. The public plaza would span the width of Newtown Avenue, beginning at 30th Avenue. To the east of 32nd Street, Newtown Avenue would be converted to a two-way segment to maintain access the driveway between the grocery and residential uses on the right side of the street. The closure of this section of Newtown Avenue is not expected to significantly increase traffic on the surrounding streets..

In addition, this space would provide a valuable public amenity for local residents and visitors to the district. Paint, gravel, planters, and flexible bollards would delineate the space; granite blocks, movable tables and chairs, benches, bike parking and umbrellas would provide an enjoyable space for the public. An application was already submitted for this intersection in 2009 by a community group, with the Central Astoria Local Development Coalition acting as the community partner responsible for maintenance of the plaza.

Jackson Avenue Traffic Calming

Jackson Avenue is the main corridor of the Long Island City business district. While large scale projects undertaken by the city over recent years have transformed the avenue into an attractive, landscaped boulevard with new lighting, streetscape amenities and an improved roadway design, these improvements were implemented on the corridor between Queens Plaza and 23rd Street. West of 23rd, the avenue is unchanged at the original 60 foot width, with several irregular intersections creating large crossing distances for pedestrians. In addition, while the corridor is designed for 2400 vehicles per hour, current volumes are lower than 900 vehicles per hour.

Recommendations

The low volumes of traffic allow for several measures to improve pedestrian safety:

- Utilize curb extensions at high volume crossings to reduce crossing distance
- Introduce Left-turn signal phase at Jackson Avenue and 21st Street to clarify vehicle movements
- Adjust signal timing at irregular intersections to allow for leading pedestrian intervals.
- Install crosswalks at Jackson Avenue at 47th Avenue to connect subway stations to nearby pedestrian generators
- Portions of the corridor are good candidate for plaza program, if land uses change the character and needs of the area.

Existing Conditions at Jackson Avenue and 21st St.

Proposed treatment at Jackson Avenue and 21st St.

44th Drive Street Improvements

44th Drive is a street within the study area that provides access to planned parkland along the waterfront. The parkland pier, built in 1913, was partially demolished in 2007 by the U.S. Army Corp of Engineers. It will be reconstructed by the Department of Parks and Recreation (DPR) and will include a Public Access Area. Beneath the pier is a sewer outfall owned by the Department of Environmental Protection (DEP) which will also be rebuilt. The scope of work for the $4.6 million project includes the demolition and replacement of the pier deck and sewer outfall, new substructure for the pier deck and sewer outfall and repairing existing chambers of the sewer outfall. The public access area will be furnished with a Sea Rail, 1964 World's Fair Benches and Candela – Flushing Meadow Park lights.

Issues

Currently, the lack of sidewalks along much of 44th Drive west of Vernon Boulevard creates an impediment to pedestrian activity. In addition, several encroachments exist along the street with mechanical equipment and vehicles parked on the sidewalk, and wide curb cuts permitting truck loading along wide stretches of the street.

Recommendations

In order to provide a pedestrian connection from Vernon Boulevard to this new waterfront amenity, recommendations for 44th Drive include:

- Remove encroachments on the sidewalks and street
- Relocate mechanical equipment
- Relocate the fence of the existing parking facility to the recorded lot line
- Install and maintain sidewalks between Vernon Boulevard and the waterfront to the standards set forth by NYCDOT in the Street Design Manual
- The sidewalk should extend from the existing public right-of-way near Vernon Boulevard to the waterfront, providing unobstructed pedestrian access to the future amenities at the pier.

Existing conditions on 44th Drive between Verson Boulevard and the waterfront

Proposed sidewalk on 44th Drive between Verson Boulevard and the waterfront

Traffic Signal at Borden Avenue & LIE

Borden Avenue at the Long Island Expressway is a poorly functioning unsignalized intersection, due to the mixing of high volume free-flowing entrance and exit traffic from the LIE and lower volumes of local traffic. Lengthy delays are common for local traffic and the free-flowing nature of the entrance and exit traffic makes safe judgment of the intersection difficult. A traffic signal can resolve these problems.

Issues

- Due to its access to the highway, Borden Avenue, a major east-west, two-way street, sees heavy traffic throughout the day.
- There are two exits from the Queens Midtown Tunnel and one entrance to the eastbound Long Island Expressway at the intersection with 11th Street, a minor two-way street that runs north-south and is controlled by a stop sign.
- Site visits determined that making a left turn from northbound 11th Street onto Borden Avenue is difficult.
- In addition to existing traffic, new development at Hunter's Point South is projected to be an additional traffic generator.

Recommendation

- Pending future increases in volume, conduct traffic signal warrant analysis for this intersection
- Pedestrian safety features should be considered as part of the intersection analysis for Hunter's Point South.

Proposed traffic signal at Borden Avenue and the LIE

Signage to Queensboro Bridge

During our community outreach, the public expressed the need for improved vehicular signage for the Ed Koch (Queensboro) Bridge. Ed Koch Bridge traffic does not have signs indicating which lanes lead directly to the bridge and which lead to local streets for Manhattan bound traffic or which lanes lead to highways and local streets for Queens bound traffic.

Recommendation

Overhead directional signs can provide reassurance and eliminate driver confusion at this complex approach. This study recommends installing overhead highway signs for all approaches and exits to and from the bridge, while ensuring adequate vertical clearance for trucks. This form of signage is currently in use on the elevated portions of the 7 Line. Real-time digital signs displaying travel time via different routes have been installed in many high traffic locations throughout the region and the study team recommends that the approaches and exits to the bridge be added to that program, which utilizes a system known as “Intelligent Transportation Systems” or “ITS.”

With the development of Cornell-Technion, directional signage to Roosevelt Island should also be examined. Providing signage for vehicles from the Ed Koch (Queensboro) Bridge, Long Island Expressway, Grand Central Parkway and Robert F Kennedy (Triborough) Bridge would provide better circulation throughout the area and better access to Roosevelt Island.

Existing signage on 7 train structure

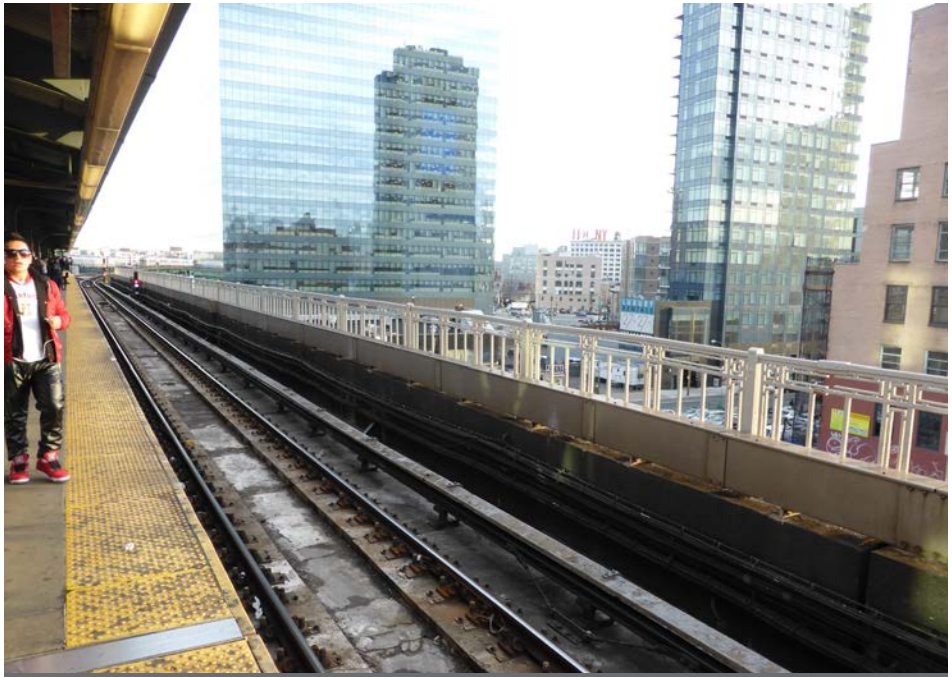
Proposed signage at Queens Plaza and bridge approach

Queensboro Plaza Upper Level Windscreen

Queensboro Plaza is an important transit link in Western Queens, connecting the Astoria Line (N/Q trains) with the Flushing Line (7 train). Because the station is elevated, riders are susceptible to the elements while waiting for their trains. This is a particular issue during the cold and windy winter months. On the lower level of the station, serving Manhattan-bound trains, this has been mitigated by the use of a wind screen. However, no such structure exists on the upper level, and community members have voiced concerns about the cold and wind.

Recommendation

Install a windscreen on the upper level of the Queensboro Plaza station to reduce the chilling effects of the wind.



Existing Upper level platform at Queensboro Plaza

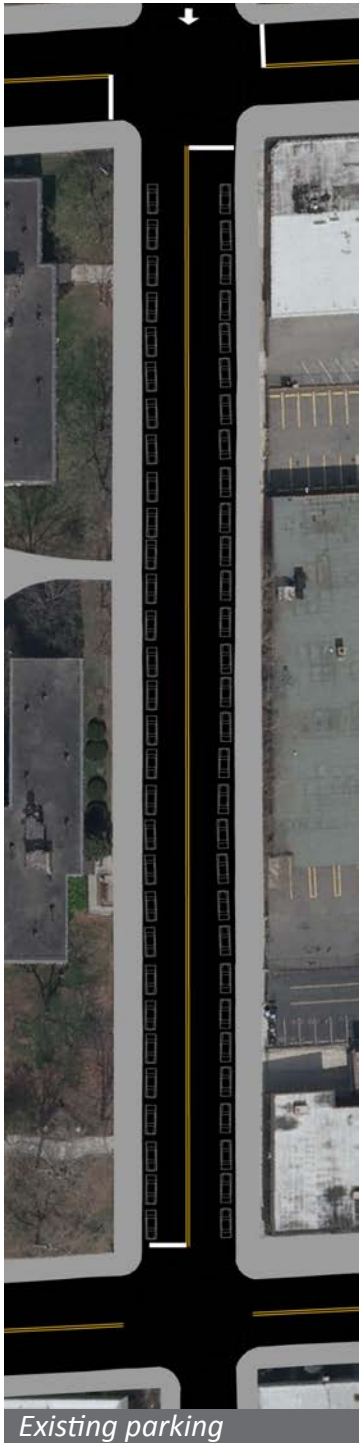
Proposed windscreen on lower level platform

24th Street Angled Parking

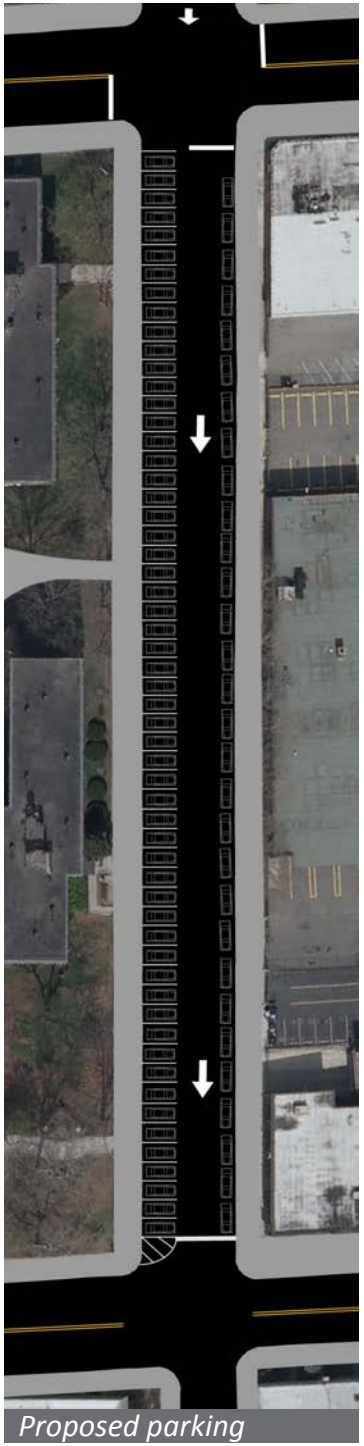
Forming the eastern edge of Ravenswood Houses, 24th Street is used both for travel and parking. Between 34th and 35th Avenues, it is a one-way, southbound roadway with perpendicular parking on the west side of the street and parallel parking on the south side of the street. Between 35th and 36th Avenues, it is two-way roadway with parallel parking on both sides of the street. Past 36th Avenue, it once again becomes a one-way, southbound street. On-site surveying revealed that these parking spaces are highly utilized, especially overnight.

Recommendation

In order to conform to the overall street grid, the two-way segment of 24th Street between 35th and 36th avenues could be converted to a one-way, southbound facility. In conjunction with a two-way conversion of Crescent Street, this will allow for extra parking space to be provided to meet the needs of the neighborhood, while maintaining local traffic circulation. Since the width of the street is consistent with the previous and following blocks, no larger-scale changes would be needed to maintain the consistency of the streetscape.



Existing parking



Proposed parking

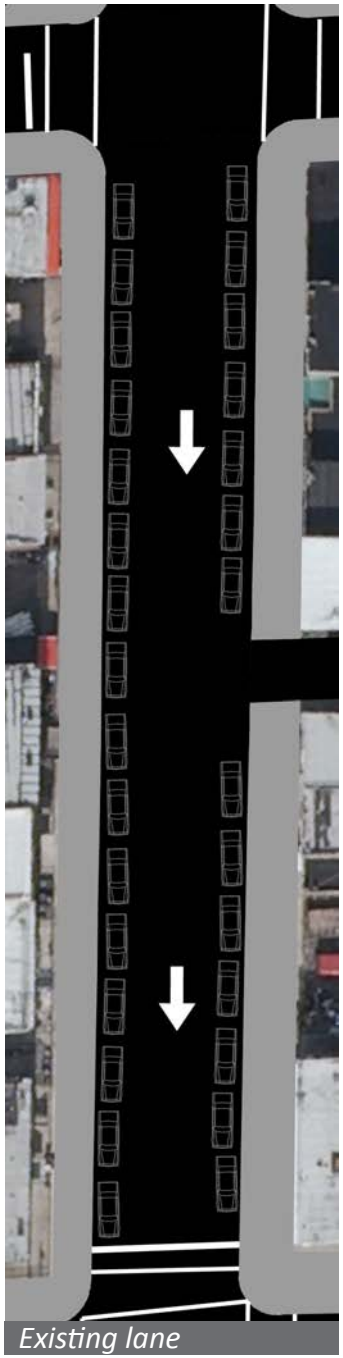
14th Street Two-way Conversion

Occasionally, streets are built with large dimensions that are later rendered obsolete due to construction that cuts off the street from the grid, alternatives that are built, or structures are built in the right of way.

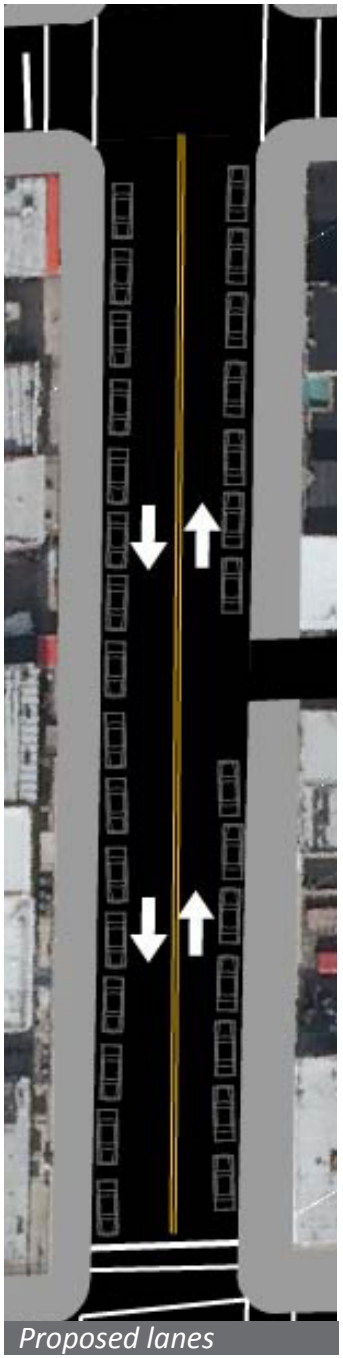
14th Street in Astoria runs from Astoria Boulevard to Broadway, for eight blocks or approximately one-half mile. South of Broadway, remnants of 14th Street exist sporadically but were mostly removed during the construction of Ravenswood Houses. The intact segment is 45-feet wide and currently runs one-way southbound for six of eight blocks, with mostly neighborhood retail and residential buildings. Additionally, this street is the only possible north northbound route between Vernon Boulevard and 21st Street.

Recommendation

The width allows for full two-way operations on this street. This will narrow the street, improve local circulation and provide safety benefits by reducing the width of the lane from 27 feet to 13.5 feet each. Implementing this recommendation would require additional analysis to determine how traffic volumes would change on this and surrounding streets.



Existing lane



Proposed lanes

NYC DOT/DDC RECONSTRUCTION PROJECT

A current city project is examining the Hunter's Point area as a target for street reconstruction. In the scope of work, several of that project's focus areas align with focus areas of this Transportation Study. Rather than develop isolated recommendations, this section will outline our recommendations for these areas in the context of the other project. This list does not include Vernon/Jackson hub and malls or Jackson Avenue Traffic calming, which are discussed above.

Jackson Avenue and 21st Street

To alleviate high-speed turns currently being made by drivers travelling southwest on Jackson Avenue to westbound 47th Avenue (a popular shortcut), sidewalk widenings and curb extensions should be explored. Also, pedestrian crossings can be shortened at this busy intersection by adding curb extensions at other key corners.

Pulaski Bridge approach

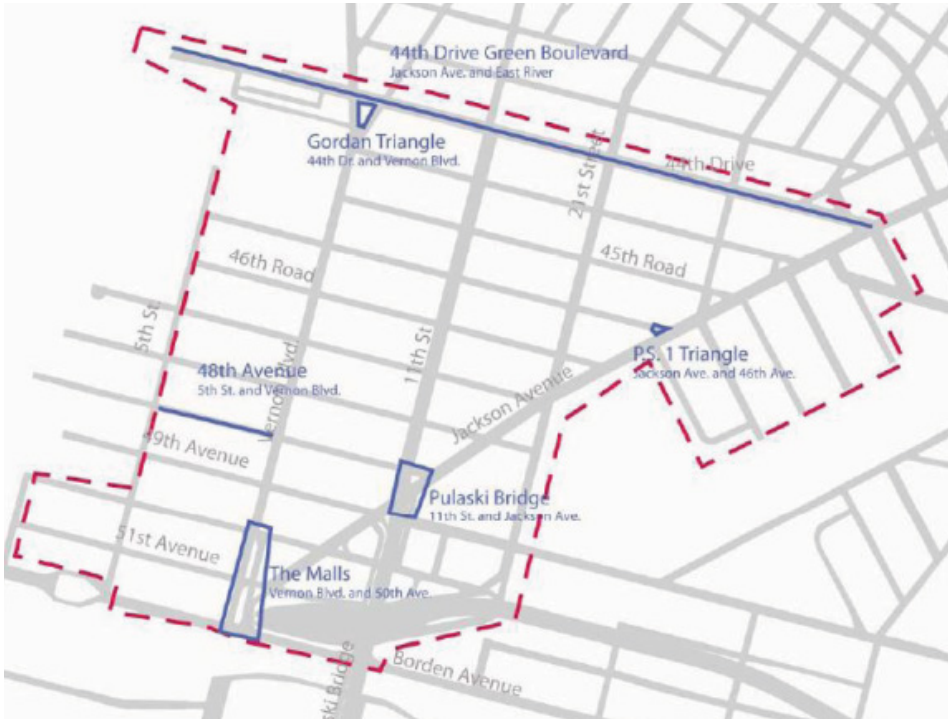
At the Pulaski Bridge approach , it is proposed to shortened pedestrian crossings and an improved interface between the on street bike network and the bridge path.

- Extra consideration needs to be taken to provide the most direct bicycle route to final destinations.

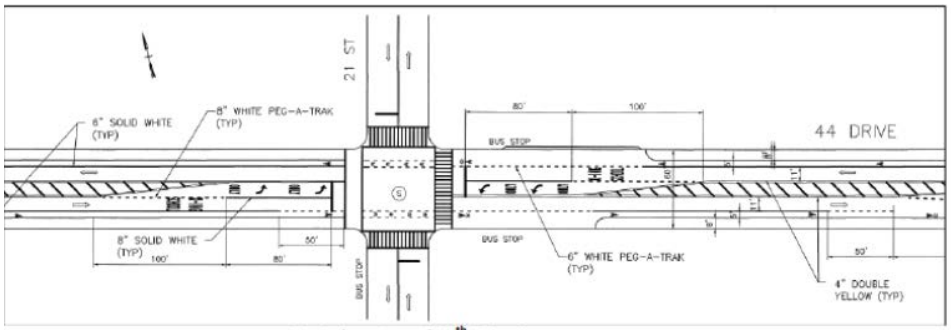
44th Drive from the waterfront to Jackson Avenue

This street would benefit from additional capital improvements to turn it into a "green boulevard" given the strong east-west connection it provides across the neighborhood. Possible improvements include: a physically separated bike lane, a raised median, additional street trees and streetscape improvements to improve connections to key public places.

The recent rezonings on 44th Drive have changed the land use between Court Square and 11th Street. However, the remaining two blocks of the street are zoned for industrial uses and are currently occupied by industrial businesses. Common improvements such as physically



Above: Public space in Hunter's Point South
Below: Potential redesign for 44th Drive at 21st Street (NYCDOT)



Typical section of 44th Drive improvements

separated bike lanes and raised medians may not be appropriate. Potential improvements for industrial zones include:

- Wherever practical, soften the sidewalk with bioswales instead of trees, to allow for easier unimpeded business operations.
- Create “shared zones”, where a narrower sidewalk is clearly defined and buffered against the street. Establish a shared parking/loading/pedestrian zone using pavement treatments such as thermoplastic cobblestone.
- Narrow streets using painted striped buffers rather than concrete to facilitate industrial loading and unloading zones.
- When planning for street trees, consideration should be given to the subway connection to the 53rd Street tunnel, located underneath 44th Drive.
- The street near waterfront should be built to proper standards including parking, sidewalks and enforcing against encroachments (See 44th Street at Waterfront)
- Should land use patterns between 11th Street and the waterfront change in the future, the original proposal should be implemented.

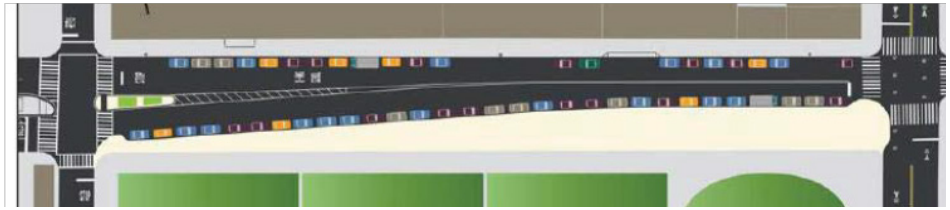
48th Avenue Corridor

The Queens West neighborhood has transformed 48th Avenue into a quiet residential street. However, the width of the roadway does not reflect this change. In addition, parking is in heavy demand in this area, both long term and high-turnover short term parking.

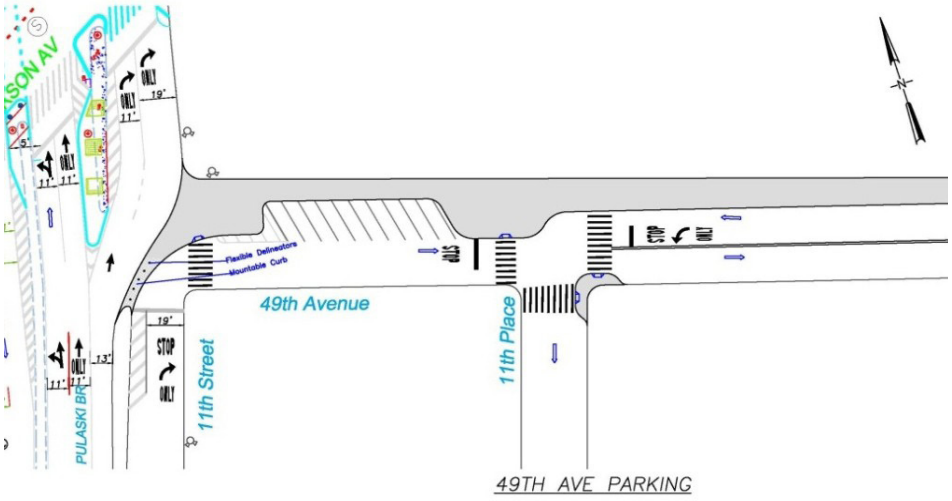
- The segment between Vernon Boulevard and 5th Street is currently 73 feet wide, or 103 feet wide including sidewalks. There is ample room for additional public space furnished with benches, bicycle parking, trees and other street furniture on the south side of the street alongside Hunter’s Point Community Park. This change will reinforce the quiet, residential character of the area by reducing traffic speed and providing higher quality public space.
- The segment between 5th Street and Center Boulevard is also 73 feet wide, or 103 feet wide including sidewalks. The lanes alongside the center median could be repurposed as long term parking, striping a buffer between the parking lane and the concrete median to allow for door opening. This treatment will accommodate approximately 40 new parking spaces and create a narrow street- meeting the community’s requests for traffic calming and providing for more parking.

49th Avenue between 11th and 21st Streets

Right turns from northbound 11th Street frequently conflict with right turns from the Pulaski Bridge. It is proposed to prohibit right turns from the bridge. The one-way street may also be narrowed, adding new pedestrian space and traffic calming to the newly-residential street.



Above: Potential redesign for 48th Avenue
Below: Potential redesign for 49th Avenue at 11th Street (NYCDOT)



11th Street between Jackson Avenue and 44th Drive

The project proposes removing one moving lane in each direction, adding left turn bays and a bike lane, and widening the median to accommodate trees or plantings.

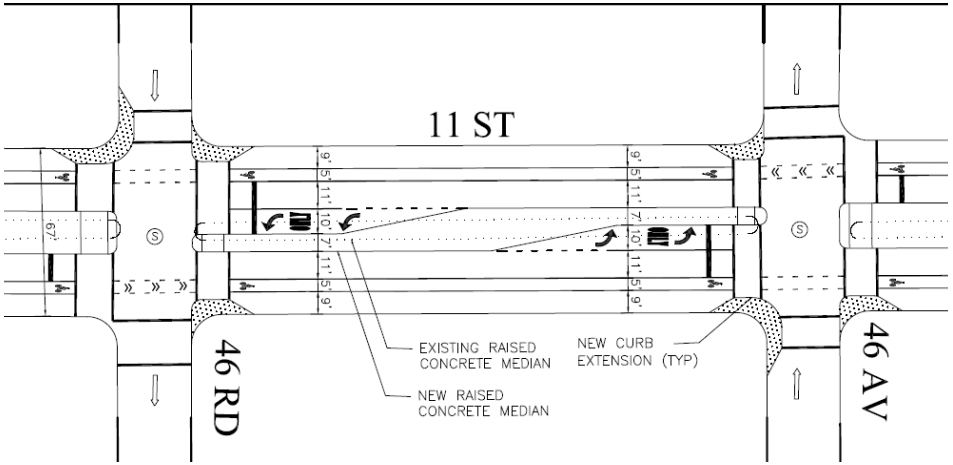
Gordon Triangle at Vernon Boulevard and 44th Drive

This is an existing park (Gordon Triangle) bounded by Vernon Boulevard, 44th Drive, 10th Street and 45th Avenue. Located in a mainly industrial area of Hunter's Point, it serves local workers and residents on nearby streets. The park is in usable condition but could be better utilized if it were more closely connected to its surroundings. Like many New York City public spaces, it is surrounded on all sides by roadways with moving traffic. There are at least two interventions that could enhance this park's role as a community amenity:

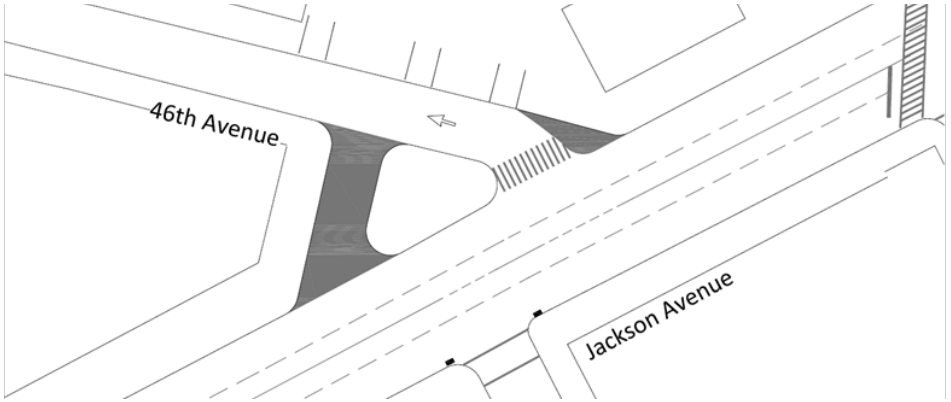
1. Simplifying the traffic patterns and normalizing the intersection alignment surrounding the triangle to better connect it to the surrounding sidewalks, e.g. by expanding the triangle, narrowing 10th Street and adding curb extensions.
2. Improving 44th Drive as a connector to and from the triangle (see "Intersection & Corridor Safety Enhancements" above)

Jackson Avenue and 46th Avenue

There is an existing "Greenstreets" triangle at Jackson Avenue and 46th Avenue, however it is not currently designed as usable public space and is separated from the sidewalk by a little-used slip lane. The currently approved design of the triangle, developed as part of the Jackson Avenue Streetscape project, maintains the triangle configuration and incorporates new plantings and seating. DOT's Pedestrian Projects Group has developed an alternative proposal to close this slip lane and expand the public space. A future DOT in-house project may implement the closure using temporary materials. This study should explore a capital rebuild of this small slip as it has potential to be a great benefit to the community.



Above: Potential redesign for 11th Street at 46th Road
Below: Potential redesign for Jackson Avenue at 46th Road, near MoMA P.S. 1. (NYCDOT)



Sunnyside Yard Street Ends

The city has conducted studies of the street ends abutting the Sunnyside Yard and areas beneath the Queensboro Bridge ramps, identifying them as areas for open space and pedestrian improvements. While the Queensboro Bridge ramps are outside the study area, the Sunnyside Yard street ends fall within the project scope. The street ends should be evaluated for potential access and public space improvements.

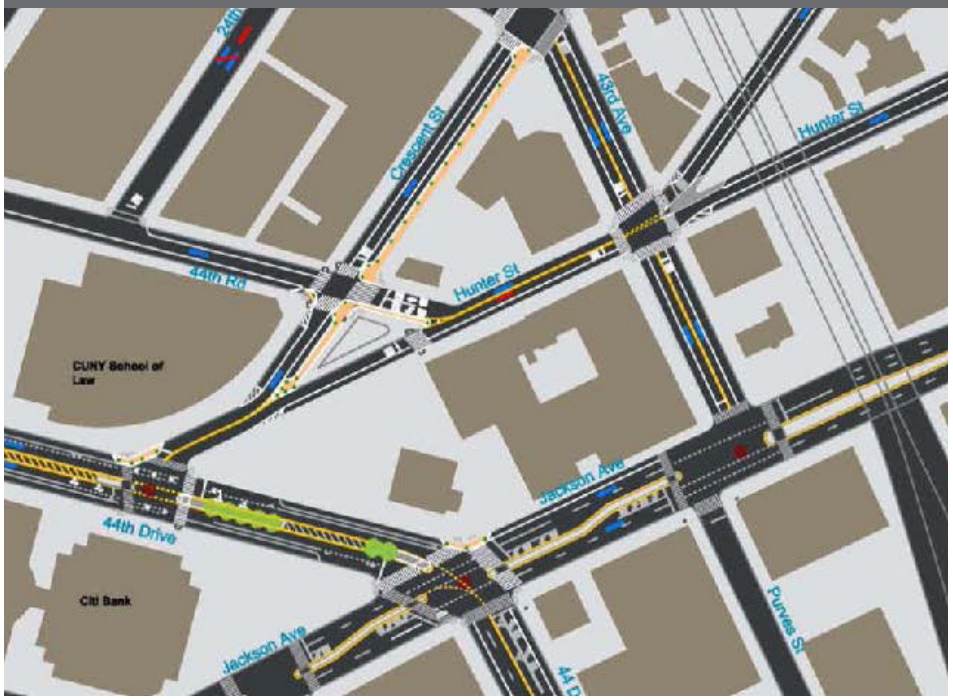
Court Square Area

Jackson Avenue adjacent to Court Square Park was already improved as part of the EDC/DCP project. However, the other streets adjacent to the park (Court Square north and south segments) should be improved to better facilitate pedestrian connections between the adjacent subways, the park, and Thomson Avenue, a popular pedestrian route to LaGuardia Community college, offices, and other sites on the eastern side of the rail yards. The park could also potentially be expanded by narrowing the adjacent roadways. One potential option is a raised roadway on the south side of the park to facilitate the pedestrian connection between Thomson Avenue and the subway entrance on the southeast corner of Jackson Avenue and Court Square (see below).

Hunter/Crescent Area Triangle

- Extend sidewalk on Crescent St from Hunter St to 43rd Ave with LIC Partnership for planter maintenance
- Extend 27th St triangle to intersection between Hunter St and 43rd Ave
- Enlarge green pedestrian safety islands at 42nd Rd and 28th St and clarify lane assignments
- Convert Hunter St between 44th Dr and 43rd Ave; & Crescent St from 42nd Rd to 43rd Ave from one-way to two-way traffic
- Install green pedestrian safety island at 44th Dr / Hunter St with truck turn restriction
- Investigate all-way stop control at Hunter St & 43rd Ave; Crescent St & 44th Rd; Crescent St & 42nd Rd

Above: 3. Sunnyside Street End locations
Below: Potential redesign for Hunter/Crescent Triangle



This report contains an assessment of existing conditions and future opportunities in Western Queens. Common issues throughout the area include poor sidewalk and pedestrian conditions, inadequate bicycle facilities, complex and confusing intersections, inadequate connection to Roosevelt Island, and lack of transit to areas of new and planned development. Recommended improvements, such as new and reconfigured transit links, specific street treatments, and operational changes have been developed to address these needs.

The next steps are to further assess the feasibility of proposed recommendations that require changes such as signal timing changes, the addition of new signals, bus route changes or moving of bus shelters, new crosswalks, and other improvements while working in cooperation with the New York City Department of Transportation, New York City Department of Parks and Recreation, the Metropolitan Transportation Authority, and the New York City Police Department. This will require field tests and a detailed evaluation of the effectiveness and feasibility of proposed improvements, including additional traffic and engineering analyses.

Western Queens is a tapestry of varied, diverse neighborhoods. With recent and anticipated development, it is more important than ever that transportation be safe and effective. The improvements highlighted in

APPENDIX

I. Vernon Jackson Hub Parking
II. Subway Route Descriptions
III. Subway Station Descriptions
IV. Bus Route Descriptions
V. Crash Data and Analysis

I. Vernon Jackson Hub Parking

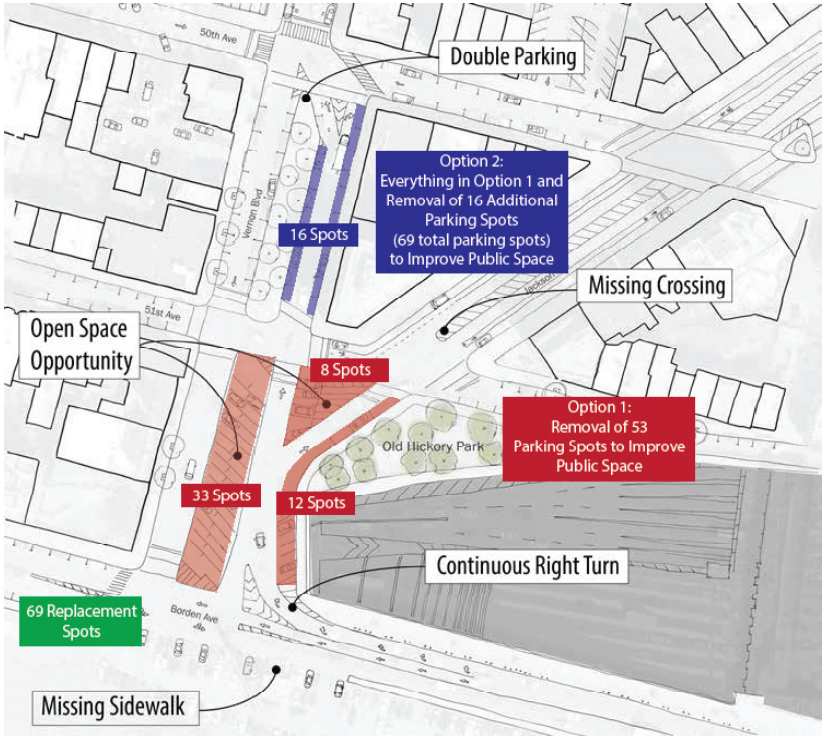
Issues

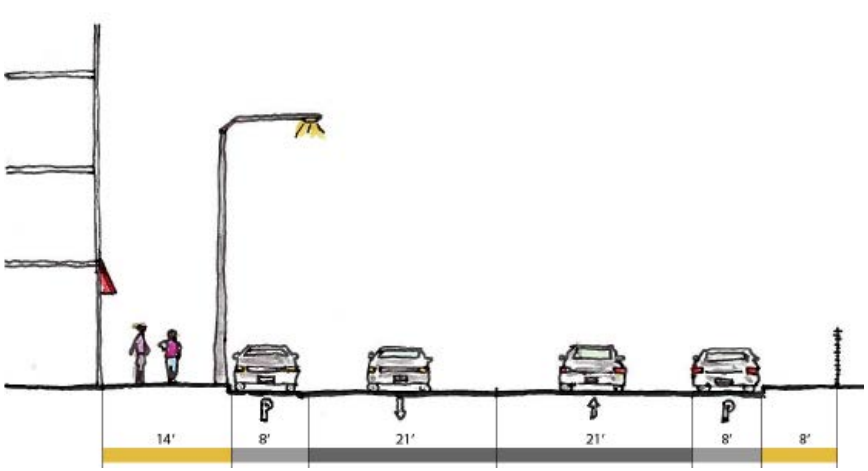
The recommendations for the Vernon Boulevard and Jackson Avenue Hub propose changes to the center malls and center parking area along Vernon Boulevard. One recommendation includes expanded green medians in place of the existing parking area along Vernon Boulevard, between Borden Avenue and 51st Avenue. Such a configuration will result in the loss of 69 parking spots.

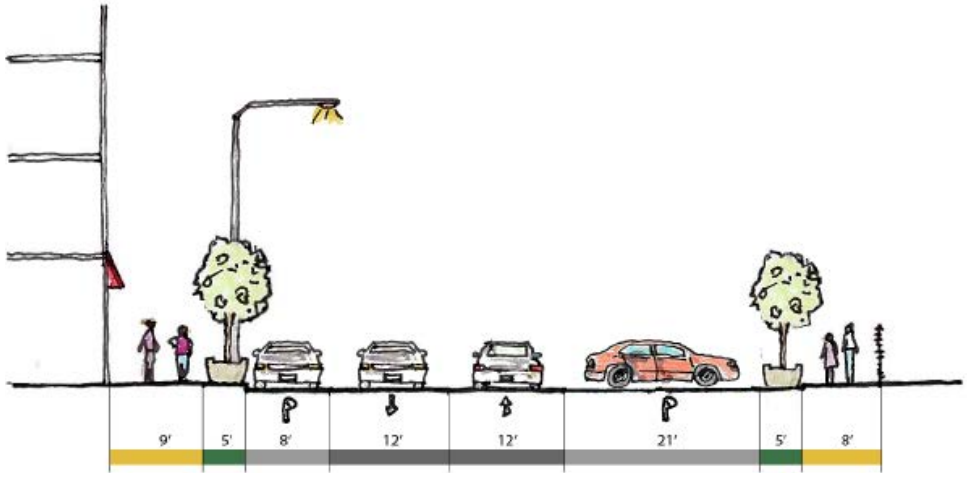
The area where this parking is located in a neighborhood retail business district, with high demand for short term parking. In order to accommodate this demand, parking spots should be relocated to a nearby location.

Recommendation

To facilitate the demand for parking for the retail area along Vernon Boulevard, additional parking should be implemented on the southern side of Borden Avenue, along the Long Island Railroad yard from 2nd Street to Vernon Boulevard. This configuration can accommodate 90 degree angled parking to replace any parking lost.







II. Subway Route Descriptions

This route runs along the Flushing Line between Times Square-42nd Street in Manhattan and Main Street, Flushing, Queens. In June 2014, the Flushing Line is scheduled to be extended west to a new station at 11th Avenue and 34th Street.

7 service runs at all times. East of Queensboro Plaza, express service runs Manhattan-bound from approximately 6:30am to 10:00am and Flushing-bound from approximately 3:00pm to 10:00pm. Local trains continue to run in the peak direction during these hours.

Express and local trains both make all stops within the study area, where trains are generally scheduled every 2 to 5 minutes during peak hours in both directions. Trains are scheduled at 5- to 6-minute intervals weekday and Saturday middays.

This route runs via the 53rd Street Tunnel and Queens Boulevard line within the study area. E service runs between Chambers Street-World Trade Center, Manhattan and Jamaica Center, Queens. (Limited peak-hour service also runs to 179th Street, Jamaica, Queens.)

E service runs at all times. Trains run express along the Queens Boulevard Line from approximately 5:30am to 11:00pm Manhattan-bound and 6:30am to midnight Jamaica-bound every day. E trains make all local stops overnights. E trains run local in Manhattan.

E trains are scheduled to run every 4 to 6 minutes in both directions during AM and PM peak hours. Weekday midday service is scheduled at 6- to 8-minute intervals, and Saturday midday service is scheduled at 7- to 9-minute intervals.

This route runs via the 63rd Street Tunnel and Queens Boulevard within the study area. F service runs between Stillwell Avenue-Coney Island, Brooklyn and 179th Street, Jamaica, Queens. (On weekdays, some trains terminate at Kings Highway, Brooklyn.) The F train is the only subway service with a stop on Roosevelt Island. 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 6 minutes in both directions during AM and PM peak hours. Weekday

midday service is scheduled at 6- to 9-minute intervals, and Saturday midday service is scheduled at 10-minute intervals.

This route enters the study area from the south, crossing under Newtown Creek, before making stops at 21st Street and Court Square, the route's northern terminus. G service runs south to Church Avenue, Brooklyn.

G service runs at all times.

Brooklyn-bound G trains are scheduled at 6- to 8-minute intervals during the AM peak; all other peak service in both directions generally runs at 7- to 10-minute intervals. Saturday midday service is scheduled for 10-minute intervals.

Although M service runs at all times between Metropolitan Avenue in Middle Village, Queens and Myrtle Avenue in Brooklyn, M service runs only runs through the study area to its northern terminus at 71st Avenue-Forest Hills, Queens from approximately 6:00am to midnight weekdays. M trains operate local via the 53rd Street Tunnel and Queens Boulevard Line.

M service runs at somewhat erratic intervals – the December 2012 timetable shows headways at Queens Plaza of between 4 and 14 minutes. Weekday midday intervals range from 7 to 12 minutes.

N service runs between Stillwell Avenue-Coney Island, Brooklyn and Ditmars Boulevard, Astoria, Queens. Within the study area, N service runs via the 60th Street Tunnel and Astoria Line. Although local in Manhattan and Queens, N trains operate via the Manhattan Bridge and run express in Brooklyn except between approximately 11:00pm and 6:00am every day, when N service runs local in Brooklyn and via lower Manhattan. A small quantity of N runs do not continue into the study area and end at 57th Street, Manhattan weekdays.

N service operates at all times.

Peak N service is generally scheduled at 6- to 11-minute intervals. Midday service on both weekdays and Saturdays is scheduled at 10-minute intervals.

Q service runs between Stillwell Avenue-Coney Island, Brooklyn and Ditmars Boulevard, Astoria, Queens. Within the study area, Q service runs via the 60th Street Tunnel and Astoria Line. Q service runs express in Manhattan and local in Brooklyn via the Manhattan Bridge.

Q service operates at all times, but does not normally enter the study area on weekends and between 11:30pm and 6:00am on weekdays, when the Q terminates at 7th Avenue and 57th Street. A small quantity of Q runs also end at 57th Street weekdays during non-overnight hours.

Peak Q service is generally scheduled at 6- to 12-minute intervals. Weekday midday service is scheduled at 10-minute intervals.

R local service runs between 95th Street-Bay Ridge , Brooklyn and 71st Avenue-Forest Hills, Queens. Within the study area, R service runs via the 60th Street Tunnel and Queens Boulevard Line.

R service runs at all times, but does not operate into the study area between approximately midnight and 6:00am every day. Overnights, R service operates as a shuttle only in Sunset Park and Bay Ridge, Brooklyn.

Brooklyn-bound R service is scheduled at fairly consistent 10-minute intervals throughout the day, but Queens-bound R service operates at 6- to 9-minute intervals during peak hours and at 10-minute intervals middays. Saturday midday intervals are 10 minutes in both directions.

III. Subway Station Descriptions

Vernon Boulevard/Jackson Avenue
This station along the 7 train serves the Hunter's Point community and is a one-half mile walk from the new Hunter's Point South development. The 7 line runs along the Flushing Line between a new station at 11th Avenue and 34th Street in Manhattan and Main Street, Flushing, Queens. 7 service runs at all times. East of Queensboro Plaza, express service runs Manhattan-bound from approximately 6:30am to 10:00am and Flushing-bound from approximately 3:00pm to 10:00pm. Local trains continue to run in the peak direction during these hours.

21st Street
This station along the G train serves the southeast portion of the study area. This route enters the study area from the south, crossing under Newtown Creek, before making stops at 21st Street and Court Square, the route's northern terminus. G service runs south to Church Avenue, Brooklyn. G service runs at all times.

Court Square
This station serves the E, M and G trains directly in Long Island City. The E route runs via the 53rd Street Tunnel and Queens Boulevard line. E service runs between Chambers Street-World Trade Center, Manhattan and Jamaica Center, Queens. (Limited peak-hour service also runs to 179th Street, Jamaica, Queens.)

E service runs at all times. Trains run express along the Queens Boulevard Line from approximately 5:30am to 11:00pm Manhattan-bound and 6:30am to midnight Jamaica-bound every day. E trains make all local stops overnights and run local in Manhattan.

Although M service runs at all times between Metropolitan Avenue in Middle Village, Queens and Myrtle Avenue in Brooklyn, M service runs only runs through the study area to its northern terminus at 71st Avenue-Forest Hills, Queens from approximately 6:00am to midnight weekdays. M trains operate local via the 53rd Street Tunnel and Queens Boulevard Line.

Queens Plaza
This station, located northeast of the Court Square station in Long Island City, serves the E, M and R trains. Due to Hurricane Sandy-related reconstruction of the Montague Street Tunnel, weekday R local service runs in two sections: between Bay Ridge-95th Street and Court Street in Brooklyn, and between Whitehall Street in Lower Manhattan and Forest Hills-71st Avenue in Queens.

Queensboro Plaza
This station, located on Queens Plaza South between 25th Street and 27th Street, serves the N, Q and 7 trains. N service runs between Coney

Island-Stillwell Avenue, Brooklyn and Ditmars Boulevard, Astoria, Queens. Within the study area, N service runs via the 60th Street Tunnel and Astoria Line. Although local in Manhattan and Queens, N trains operate via the Manhattan Bridge and run express in Brooklyn except between approximately 11:00pm and 6:00am every day, when N service runs local in Brooklyn. A small quantity of N trains runs do not continue into the study area and end at 57th Street, Manhattan weekdays.

N service operates at all times.

Q service runs between Coney Island-Stillwell Avenue, Brooklyn and Ditmars Boulevard, Astoria, Queens. Within the study area, Q service runs via the 60th Street Tunnel and Astoria Line. Q service runs express in Manhattan and local in Brooklyn via the Manhattan Bridge.

Q service operates at all times, but does not normally enter the study area on weekends and between 11:30pm and 6:00am on weekdays, when the Q terminates at 7th Avenue and 57th Street. A small quantity of Q runs also end at 57th Street weekdays during non-overnight hours.

21st Street/Queensbridge
This station is the only location within the study area that serves the F train. The entrances to this station are located at the intersection of 21st Street and 41st Street, adjacent to Queensbridge Houses. The F route runs via the 63rd Street Tunnel and Queens Boulevard within the study area. F service runs between Coney Island-Stillwell Avenue, Brooklyn and 179th Street, Jamaica, Queens. On weekdays, some trains terminate at Kings Highway, Brooklyn. The F train is the only subway service with a stop on Roosevelt Island. F service, which runs express along the Queens Boulevard Line and local in Manhattan and Brooklyn, operates at all times.

36th Street
The 36th Street station is located on the eastern boundary of the study area at Northern Boulevard. The station serves the M and R lines.

Steinway Street
The Steinway Street station, also at the eastern boundary of the study area, is located along the Steinway Street commercial corridor. This station also serves the M and R lines.

The **39th Avenue**, **36th Avenue**, **Broadway**, **30th Avenue** and **Astoria Boulevard** elevated stations all run along 31st Street in Astoria and serve the N and Q lines.

IV. Bus Route Descriptions

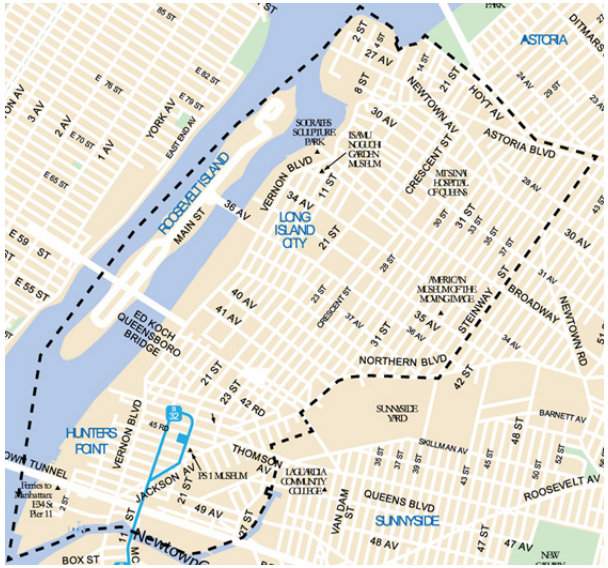


Image: MTA

B32

The newest of the routes serving the study area, B32 service was inaugurated in September 2013. This route runs between Williamsburg Bridge Plaza in Brooklyn and Court Square in Long Island City. Within the study area, the B32 runs along the Pulaski Bridge, and then in a clockwise terminal loop along 11th Street, 44th Drive, 21st Street, and Jackson Avenue.

B32 service within the study area runs from approximately 7:00am to 9:30pm 7 days a week.

B32 buses are scheduled to run every 30 minutes throughout their operating hours.

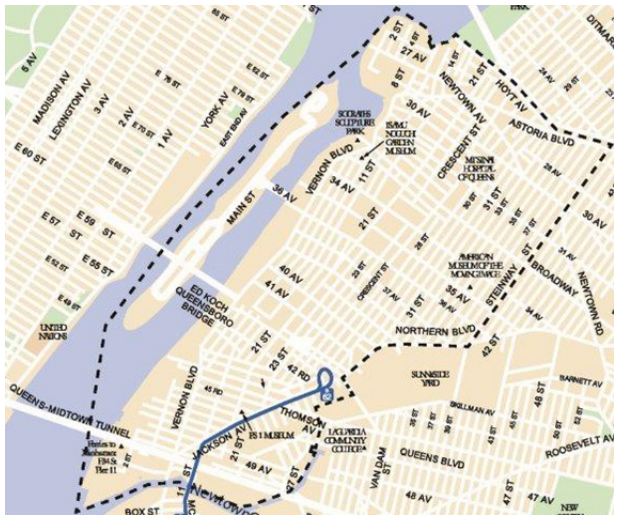


Image: MTA

B62

This route runs between Boerum Place and Livingston Street in Downtown Brooklyn, and Queens Plaza South and Jackson Avenue. Within the study area, the B62 route primarily runs along the Pulaski Bridge and Jackson Avenue; its northern terminus loops via 42nd Road, 28th Street and Queens Plaza South.

B62 service runs at all times.

B62 buses are largely scheduled at 7- to 12-minute intervals during peak and evening hours, and at 8- to 12-minute intervals weekday middays and Saturday middays.

Image: MTA

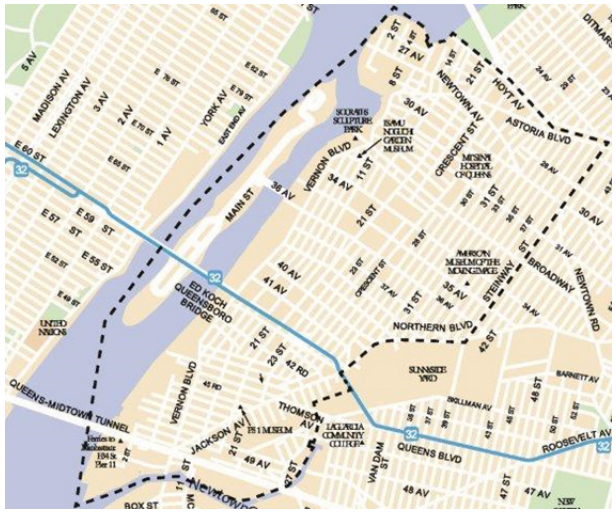


Image: MTA

Q18

This route runs between 27th Avenue and 2nd Street in Astoria, and 69th Street and Grand Street in Maspeth. Within the study area, the Q18 route primarily runs along 30th Avenue.

Within the study area, Q18 service does not run between approximately 2:00am and 4:30am, but runs at all other times every day.

Q18 buses are largely scheduled at 8- to 15-minute intervals during peak hours, at 12- to 20-minute intervals weekday middays, and at 20-minute intervals Saturday middays.

Q32

This route runs between 7th Avenue and West 32nd Street in Manhattan, and Northern Boulevard and 81st Street in Jackson Heights. Within the study area, the Q32 route primarily runs the Ed Koch (Queensboro) Bridge and Queens Plaza.

Within the study area, Q32 service does not run between approximately 2:00am and 5:00am weekdays, 1:30am and 6:00am Saturdays, and 11:30pm and 6:30am Sundays.

The Q32 schedule is strongly peak directional, with 6- to 14-minute intervals during Manhattan-bound AM peak and Queens-bound PM peak periods. Buses are scheduled at 10-minute intervals weekday middays, and at 10- to 12-minute intervals Saturday middays.

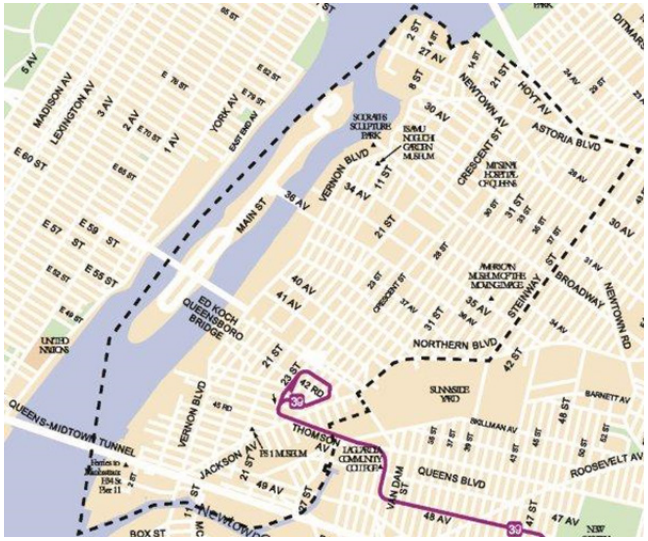


Image: MTA

Q39

This route runs between Queens Plaza South and 28th Street, and Cooper Avenue and 60th Lane in Ridgewood. Within the study area, the Q39 route primarily runs along Thompson Avenue, Jackson Avenue, 23rd Street, and Queens Plaza South.

Q39 service runs at all times.

The Q39 schedule is peak directional, with 4- to 8-minute intervals Queens Plaza-bound during AM peak hours, and 8- to 10-minute intervals at 12- to 20-minute intervals Ridgewood-bound during PM peak hours. Buses are scheduled at 10- to 20-minute intervals weekday middays, and at 20-minute intervals Saturday middays.

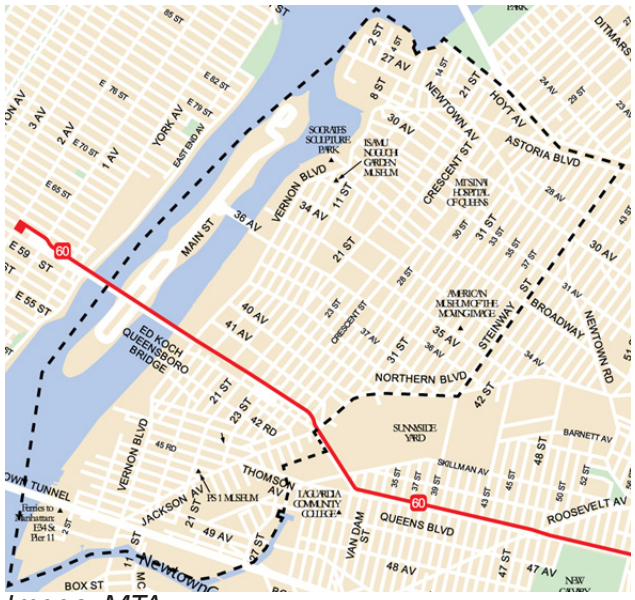


Image: MTA

Q60

This route runs between 2nd Avenue and 60th Street in Manhattan, and 109th Avenue and 157th Street in Jamaica. Within the study area, the Q60 route primarily runs along Queens Plaza and Queens Boulevard.

Q60 service runs at all times.

Q60 buses are largely scheduled at 5- to 13-minute intervals during peak hours, 7- to 13-minute intervals weekday middays, and at 10-minute intervals Saturday middays.

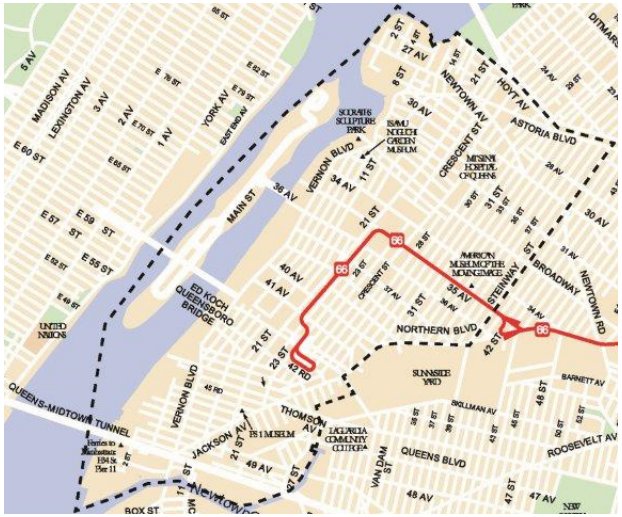


Image: MTA

Q66

This route runs between Queens Plaza South and 28th Street, and Roosevelt Avenue and Main Street in Flushing. Within the study area, the Q66 route primarily runs along Queens Plaza South, 42nd Road, 21st Street, and 35th Avenue.

Q66 service runs at all times. However, not all weekday peak period trips extend into the study area – several to and from points east terminate at Northern Boulevard and 51st Street .

Q66 buses within the study area are largely scheduled at 8- to 15-minute intervals during peak hours, 10- to 12-minute intervals weekday middays, and at 10- to 14-minute intervals Saturday middays.

Image: MTA

Q67

This route runs between Queens Plaza South and 28th Street, and Metropolitan Avenue and Fresh Pond Road in Middle Village. Within the study area, the Q67 route primarily runs along Jackson Avenue, 21st Street, 49th Avenue, 27th Street and Borden Avenue.

Within the study area, Q67 service runs between approximately 3:00am and 11:30pm weekdays, 7:00am and 11:30pm Saturdays, and 9:00am and 11:30pm Sundays.

Q67 buses are largely scheduled at 10- to 20-minute intervals during peak hours. Twenty- to 30-minute intervals are scheduled weekday middays, and 60-minute intervals are scheduled Saturday middays

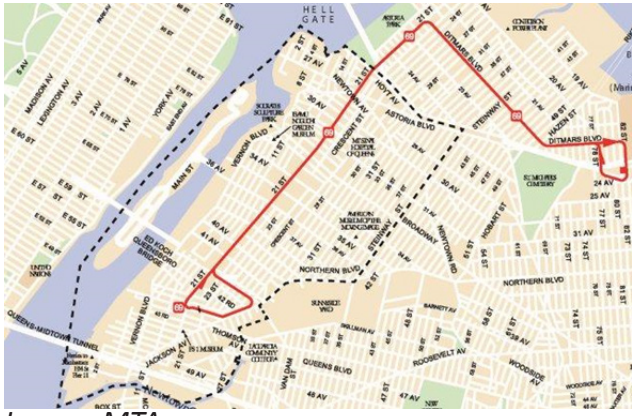


Image: MTA

Q69

This route runs between Queens Plaza South and 28th Street, and Astoria Boulevard and 82nd Street in Jackson Heights. Within the study area, the Q69 route primarily runs along 21st Street and Ditmars Boulevard. The Q69 and Q100 routes run as a sort of express-local pair along 21st Street, with the Q69 serving all local bus stops and the Q100 maxing limited stops only.

Within the study area, Q69 service runs between approximately 5:00am and 1:00am weekdays, 5:00am and 12:30pm Saturdays, and 6:30am and 12:30am Sundays.

Q69 buses are largely scheduled at 6-minute intervals during the AM peak and 7- to 8-minute intervals during the PM peak. Fifteen-minute intervals are scheduled for both weekday and Saturday middays

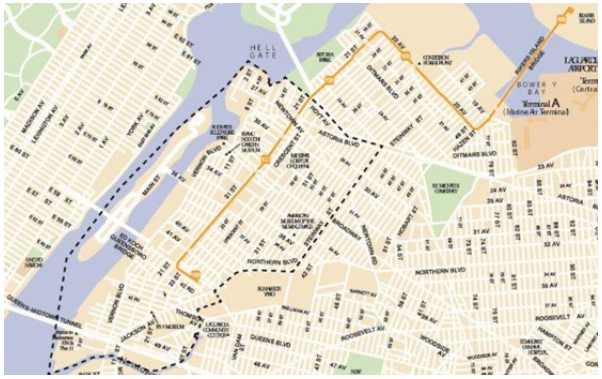


Image: MTA

Q100

This route runs between Jackson Avenue and Queens Plaza South, and Rikers Island, Bronx. Within the study area, the Q100 route primarily runs along 21st Street. The Q69 and Q100 routes run as a sort of express-local pair along 21st Street, with the Q69 serving all local bus stops and the Q100 maxing limited stops only.

Within the study area, the Q100 makes only the following six stops:

- 21st Street and Astoria Boulevard
- 21st Street and 30th Avenue
- 21st Street and Broadway
- 21st Street and 41st Avenue (transfer for F train service)
- Queens Plaza south and 27th Street
- Jackson Avenue, south of Queens Plaza South.

Q100 service runs at all times. Q100 peak service actually occurs on Sundays – an unusual if not unique arrangement in the MTA network – with 8-minute scheduled headways between about 11:30am and 4:00pm.

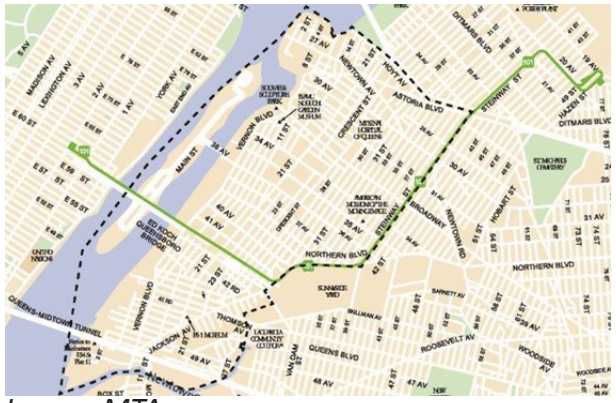


Image: MTA

Q101

This route runs between 2nd Avenue and 61st Street in Manhattan, and 19th Avenue and Hazen Street, at the northeastern edge of Astoria. Within the study area, the Q101 route primarily runs along Northern Boulevard.

Q101 service runs at all times.

Q101 buses are scheduled at 12- to 15-minute intervals during peak hours. Twenty-minute intervals are scheduled for weekday middays, and 30-minute intervals for Saturday middays. As of May 2013, five buses operate in each direction during the peak hours of 7:00am to 8:00am and 5:00pm to 6:00pm.

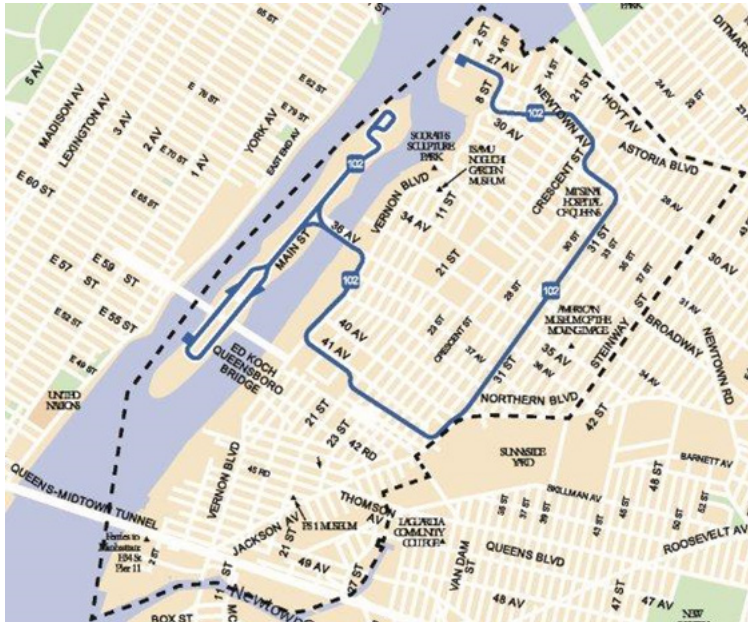


Image: MTA

Q102

Although Q102 service has two fixed endpoints – Goldwater Hospital on Roosevelt Island in Manhattan, and 27th Avenue and 2nd Street in Astoria – this complicated route virtually encircles the entire study area. From 2nd Street, the route makes its way to 31st Street and then Northern Boulevard, from where it runs south to Queens Plaza . After passing through the Queensbridge Houses via 41st Avenue, Q102 service runs north onto Vernon Boulevard and then over the Roosevelt Island Bridge. Once on the island, Q102 buses turn north to Bird S. Coler Hospital, then loop south down the length of the island to its terminal at Goldwater (the future Cornell-Technion campus). After departing the terminal, these buses run north up Main Street to the Roosevelt Island Bridge, cross the bridge, then retrace the entire route described above.

Q102 service runs between approximately 5:00am and 1:30am every day.

Q102 buses are scheduled at 15-minute intervals during the AM peak. Twenty-to 30-minute intervals are scheduled weekday middays and during the PM peak, and 30-minute intervals are scheduled Saturday middays. As of May 2013, four buses per hour operate in each direction during the peak hours of 7:00am to 9:00am

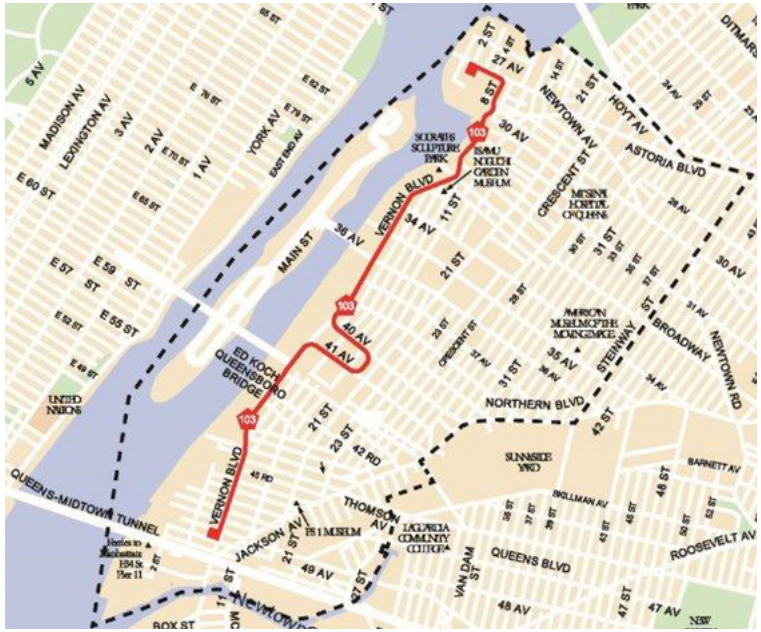


Image: MTA

Q103

This route runs between Borden Avenue and Vernon Boulevard in Long Island City, and 27th Avenue and 2nd Street in Astoria. The Q103 primarily runs along Vernon Boulevard, but makes a detour via 41st Avenue, 21st Street and 40th Avenue to connect with the 21st Street-Queensbridge (F) subway station.

Q103 service runs weekdays only, between approximately 5:45am and 7:45pm.

A September 2013 service increase resulted in Q103 buses scheduled at 15-minute intervals during AM and PM peak hours, and at 60-minute intervals weekday middays. As of September 2013, four buses per hour operate in each direction during the peak hours of 7:00am to 9:00am, and three buses per hour operate in each direction during the peak hours of 4:00pm to 7:00pm.

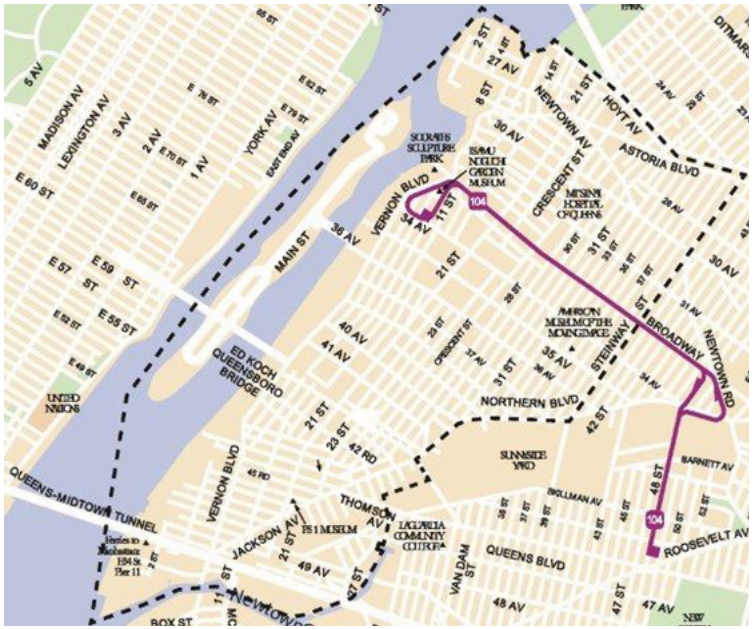


Image: MTA

Q104

This route runs between Queens Boulevard and 48th Street in Sunnyside, and 34th Avenue and 11th Street in Ravenswood. Within the Study area, Q104 service primarily runs along Broadway.

Q104 service runs between approximately 6:00am and midnight every day.

Q104 buses are scheduled at 20-minute intervals during the AM and PM peak hours, and at 30-minute intervals weekday and Saturday middays. As of May 2013, three buses per hour operate Ravenswood-bound during the peak hours of 7:00am to 10:00am and 3:00pm to 7:00pm, and Sunnyside-bound during the peak hours of 6:00am to 9:00am and 2:00pm to 6:00pm.

V. Crash Data and Analysis

In 2013, in order to inform research for the Western Queens Transportation Study, crash data was queried for the years 2009 through 2011 (the most recent available data) for total crashes, pedestrian crashes, and bicycle crashes within the study area. This data is conveyed graphically in the following three crash frequency maps for the study area. The crash data was filtered to show only locations with a significant number of crashes. For total crashes from the years 2009 through 2011, the thresholds used for this study are as follows:

- 10 to 22 crashes (moderate frequency)
- 23 to 35 crashes (high frequency)
- 36 to 99 crashes (very high frequency)

For pedestrian crashes the thresholds used for the same three year period are:
- 3 to 4 crashes (moderate frequency)
- 5 to 7 crashes (high frequency)

For bicycle crashes the threshold used:
- 3 crashes (moderate frequency)

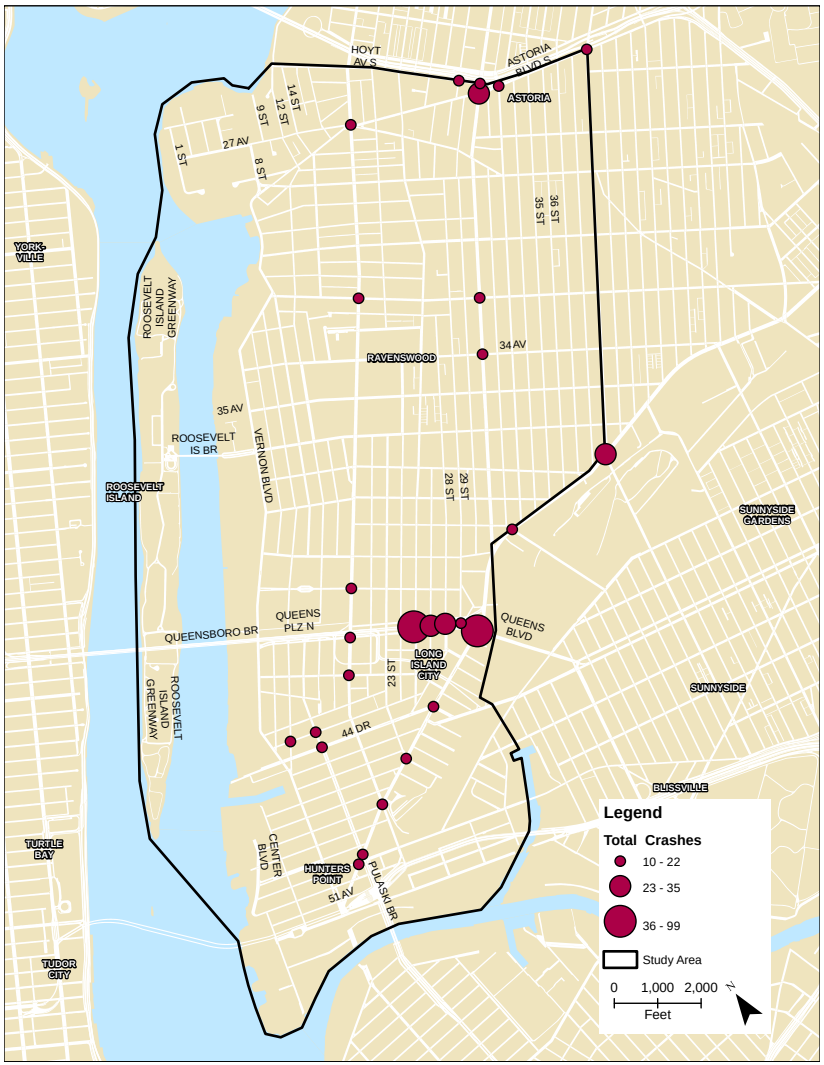
Total Crashes

Analysis of data for the last three years indicates that the western part of the study area, along the waterfront, does not have a high number of crashes, likely because traffic volumes are low. Most of the intersections within the study area that do have a significant number of crashes are clustered in the south, along Jackson Avenue and Queens Plaza.

Jackson Avenue is a major vehicular corridor that bifurcates the Queens street grid. The artery carries significant vehicular volumes, and multiple minor arterials terminate at the street with irregular geometry, providing opportunities for vehicular conflicts.

Queens Plaza was recently the focus of the Queens Plaza Bicycle and Pedestrian Improvement Project, a major multi-million dollar reconstruction project which addressed safety and circulation issues around Queens Plaza and at the interface of the Ed Koch Queensboro Bridge. The most recent crash data available was collected prior to the reconstruction project future crash analysis will likely reveal much lower crash rates because of these improvements. The plaza is a complex site broken up by several transportation infrastructure elements that now supports cyclists and pedestrians from the Queensboro Bridge to Queens Boulevard. The data indicates that this site was a high crash location, including a moderate amount of pedestrian and bicycle crashes.

The intersection at 41st Avenue and 21st Street also has a moderate crash rate. 21st Street is a two-way arterial that carries heavy vehicular volumes, and 41st Avenue is a two-way street east of 21st Street and a one-way westbound street west of 21st Street. While this intersection has orthogonal geometry, it also has an atypical traffic pattern that may be contributing to the crash rate. This intersection is the location of the

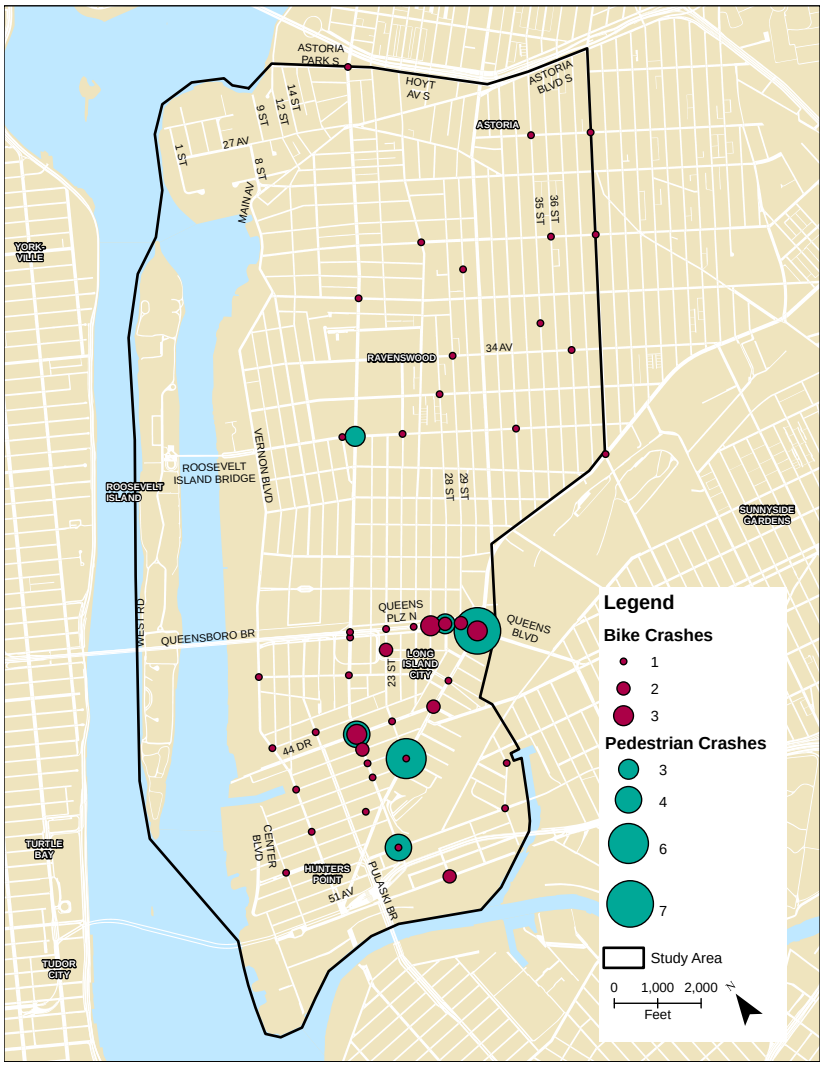


first Queens stop on the F train and is therefore considered to be one of the gateways into Queens from Roosevelt Island. The site is also located adjacent to Queensbridge Houses and sees a significant amount of pedestrian traffic.

A small cluster of intersections in Long Island City have moderate crash frequencies. The intersections are 44th Road and 10th Street, 44th Road and 11th Street, and 11th Street and 44th Drive. Both 44th Road and 10th Street are one-way streets with one travel lane. However, there are no painted crosswalks or traffic controls directing traffic through the intersection. The intersection of westbound 44th Road and 11th Street, a two-way street, is controlled by crosswalks and a traffic signal. Sidewalks are wide at this location; an elevator repair company located on the northeast corner of the intersection has a common practice of parking on the sidewalk adjacent to the property. A a warehouse with curb cuts on the southeast corner of the intersection also contributes to vehicular conflicts. Lastly, the intersection of 11th Street and 44th Drive has irregular geometry. 11th Street widens significantly south of the intersection and 44th Drive is a major two-way arterial with two travel lanes in each direction. This signalized intersection was recently painted with a bike lane, clear crosswalks, and other roadway markings, including left turn bays along 44th Drive. A bicycle lane is proposed for 11th Street.

43rd Avenue and 21st Street are both two-way streets; however, 43rd Avenue is not painted with a double yellow center line. Although the intersection is signalized, roadway markings are faded. A diner on the northwest corner of the intersection is set back from the property line with a parking lot and cub cut. A paper manufacturer with a garage and curb cut is located on the southwest corner of the intersection. These curb cuts create opportunities for conflict, possiblycontributing to the moderate crash rate.

The remaining moderate crash locations are in the northern part of the study area. Broadway and 21st Street are both two-way streets that converge at a signalized intersection. A diner with a parking lot is located on the northeast corner and a gas station is located on the southeast corner. The curb cuts for these uses create opportunities for vehicular



conflict.

Astoria Boulevard, 21st Street, 27th Avenue and Newtown Avenue is a six-legged intersection where several streets converge to create irregular geometry. The traffic signal at this intersection has three phasesThere are many opportunities for vehicular conflict at this intersection.

The last two intersections examined for this analysis are 31st Street and Broadway and 31st Street and 34th Avenue. These two intersections have similar characteristics. They are both located beneath the N/ Q elevated trains and all of these streets are two-way with one travel lane in each direction. The elevated structure may obstruct some visibility for motorists. Furthermore, both intersections have poor pavement conditions and roadway markings are faded in some areas.

Pedestrian and Bicycle Crashes

Several intersections within the study area have moderate pedestrian and bicycle crash frequencies, mainly clustered near Jackson Avenue and Queens Plaza. However, there are a few other locations which are worth highlighting.

The first intersection is 36th Avenue and 21st Street, which are both two-way arterials with two travel lanes in each direction. The northwest corner of the intersection is adjacent to Ravenswood Houses and the southwest corner of the intersection is adjacent to a gas station with several curb cuts. This intersection is also the site of a Q69 bus stop. The combination of pedestrian volumes from the adjacent residential uses and the many curb cuts used to access the gas station creates pedestrian conflicts.
The intersection of 44th Drive and 21st Street is a site of moderate crash frequencies for both pedestrians and cyclists. 44th Drive is a two-way arterial with two travel lanes and 21st Street is a two-way arterial that carries significant volumes, including heavy vehicles. The intersection is signalized and painted with clear crosswalks and other roadway markings including left turn bays and a bicycle lane.

The intersection of 49th Avenue and 21st Street is a site of moderate crash

frequencies for pedestrians. Both 49th Avenue and 21st Street are wide streets that carry two-way traffic. 21st Street south of 49th Avenue leads to and from the Queens-Midtown Tunnel. The intersection has a traffic light and painted crosswalks.