RICHMOND TERRACE

EXISTING CONDITIONS REPORT 2023

Contributors

NYC Department of City Planning

Daniel Garodnick, Chair
Edith Hsu-Chen, Executive Director
Laura Smith, Deputy Executive Director, Strategic Planning

STATEN ISLAND BOROUGH OFFICE

Catie Ferrara Iannitto, Director
George Todorovic, Deputy Director
Amy Obonaga, Team Leader Urban Designer
Rasika Girish Deosthali, Borough Planner
Kari Bailey, Borough Planner
Vincent Giordano, Community Planner
Puneet Singh, Community Planner
Oliver Vega, Borough Planner
Lydia Smith, Office Manager

TRANSPORTATION DIVISION

Jack Schmidt, Director of Transportation Engineering and Program Administration
Olga Olovyannikov, Senior Transportation Planner

Richmond Terrace Corridor Transportation Study

Unified Planning Work Program

New York City Department of City Planning
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Summary of Key Takeaways

The New York City Department of City Planning (DCP) conducted the Richmond Terrace Corridor Study with funding from the Federal Highway Administration. The study area is located on the North Shore of Staten Island and is bounded by Jersey Street to the east, the Bayonne Bridge to the west, the Kill Van Kull waterfront to the north, and a southern boundary representing a half mile from the corridor. The intent of the study is to:

1. **Provide a comprehensive analysis of existing demographic, socioeconomic, land use and zoning, and transportation conditions of the study area.**
2. **Highlight the interconnectedness between the land use, transportation, and other planning challenges and opportunities surrounding the corridor.**
3. **Build off of the community's vision as established in previous studies and ongoing studies to advance the City's commitment towards developing specific land use and transportation recommendations to allow for and support vibrant, mixed use neighborhood centers, create quality jobs and workplaces, reconnect people with the waterfront, and improve transportation connections and mobility along the corridor.**

The existing conditions analysis of the Richmond Corridor produced the following findings:

Population

Over the past decade, the study area's population is growing at a faster growth rate (8.4 percent) than both Staten Island (5.8 percent) and New York City (7.7 percent) with Latinx and Black making up a majority of the population.

Access to Affordable Housing

Rental housing comprises approximately half of the occupied housing stock on the North Shore (49.3 percent). Nearly 60 percent of all North Shore renters are rent burdened, and 35 percent are severely rent burdened. Additionally, almost half the population (46.4 percent) has an annual income of less than $50,000, and 21.2 percent of residents live below the poverty level. Most of the North Shore is zoned for and developed with low density homes, which inhibits the creation of both regulated and unregulated affordable housing in the area and is a major driver of rent burden across the North Shore. While seven of the 10 NYCHA developments

on Staten Island are located on the North Shore, only 15 percent overall of housing stock on the North Shore is controlled for affordability, compared to 50 percent citywide (NYC Department of Housing Preservation and Development's Bay Street Corridor Housing Plan, 2018).

Access to Transit

Although Staten Island is known for its reliance on cars, almost half the population of the North Shore (47 percent) commutes using alternative modes of transportation, and approximately one-third of North Shore households do not have access to a vehicle. These commuters face some of the longest commutes in the City. Meanwhile, 75 percent of people who work on the North Shore and may live elsewhere commute via car, making them more likely to drive than North Shore residents. Disinvestment in public transportation since the 1950s, including the discontinuation of ferry service to New Jersey and a passenger and freight rail line, has impacted the vibrancy of these neighborhoods among other economic factors. The MTA has conducted an alternatives analysis study and proposed revitalizing a city-owned, former transit right-of-way that runs parallel to Richmond Terrace with a Bus Rapid Transit (BRT) system. The new bus lines would traverse the entirety of the North Shore and reduce travel times by an estimated 25 minutes in some neighborhoods.

Public Health

Before the pandemic, the North Shore faced significant public health challenges, including higher rates of obesity; mental health, asthma, and diabetes adult hospitalizations; and uninsured persons than Staten Island and NYC. These conditions left the North Shore vulnerable during the COVID-19 pandemic when it experienced mortality rates that exceeded that of Staten Island during the April 2020 peak and NYC during the January 2021 peak.

Richmond Terrace Widenings

There are several stretches of Richmond Terrace, a major east to west arterial, that are underbuilt to its mapped width. Richmond Terrace is mapped as 100 feet wide throughout the study area, but only built out to 48 to 60 feet, including at a city-owned portion of a mapped street in New Brighton between York Avenue and Franklin Avenue. This presents opportunities to widen the corridor and provide safe and accessible transportation options.

Vehicle and Pedestrian Level of Service

DCP collected data on pedestrian and vehicle volumes, turning movements, and vehicle classifications at twelve intersections along the corridor and conducted a Level of Service (LOS) analysis, which is an evaluation of the capacity and performance of the street and sidewalk network during peak hours that assigns values ranging from A (free flow) to F (poor or failing). The data collection locations were chosen based on the locations of signalized or major

Summary of Key Takeaways

intersections, neighborhood destinations, proposed BRT stations, and other major trip generators. The LOS analysis for pedestrians and vehicles indicated that the corridor mostly operates at acceptable levels, except at the following intersections, which have vehicle travel lanes and pedestrian corners that operate at a LOS of E or F:

VEHICLE ANALYSIS

- Jewett Avenue and Richmond Terrace: nearby to industrial job centers and auto-related commercial uses.
- Port Richmond Avenue and Richmond Terrace: at the start of the Port Richmond Avenue commercial corridor and near active waterfront uses.

PEDESTRIAN CORNER ANALYSIS

- Bard Avenue and Richmond Terrace: near Snug Harbor and Walker Park in the Randall Manor neighborhood.
- Clove Road and Richmond Terrace: in a transitional area between residential uses in the Port Richmond neighborhood and large industrial uses.
- Nicholas Avenue and Richmond Terrace: in a transitional area between industrial uses and the residential Elm Park neighborhood, near the access to the Bayonne Bridge.

Land Uses and Underbuilt Sites

The North Shore is largely characterized by single- and two-family homes, which comprise over 80% of the lots and 52% of the total lot area within the study boundary. In the study area, there are over 500 sites with significant development potential (e.g., currently developed to less than 50% of the maximum floor area permitted by Zoning). This includes vacant sites, which are one of the most prevalent land uses in the study area, comprising 5 percent of the total lots and 8.7 percent of the land in the study area. These underbuilt sites have the potential to introduce over 2,000 new housing units and over two million commercial and manufacturing square footage under existing zoning conditions.

Next Steps

Although this study does not provide specific recommendations, it identifies critical next steps in fulfilling the City's commitment to advance the community's vision for the corridor, as determined in previous studies, while also addressing the challenges and opportunities presented in this report:

1. Develop targeted interventions at intersections where vehicular and pedestrian LOS is poor.
2. Analyze Richmond Terrace in future build out of underdeveloped sites.
3. Implement street design improvements that enhance safety for all users of Richmond Terrace.

4. Advance community discussions about new and ongoing planning challenges.

Draft North Shore Work Plan Timeline

The following draft timeline presents a potential work program for implementing these next steps over the course of approximately two years and underscores the importance of public and stakeholder outreach throughout the process:

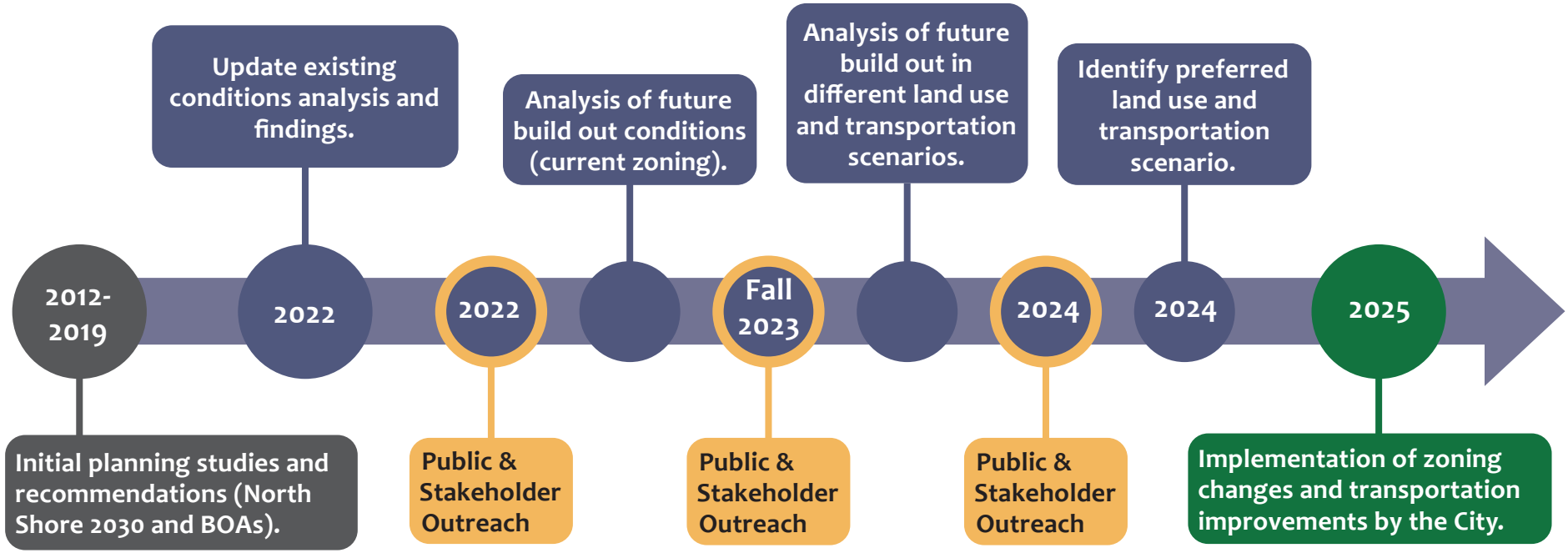
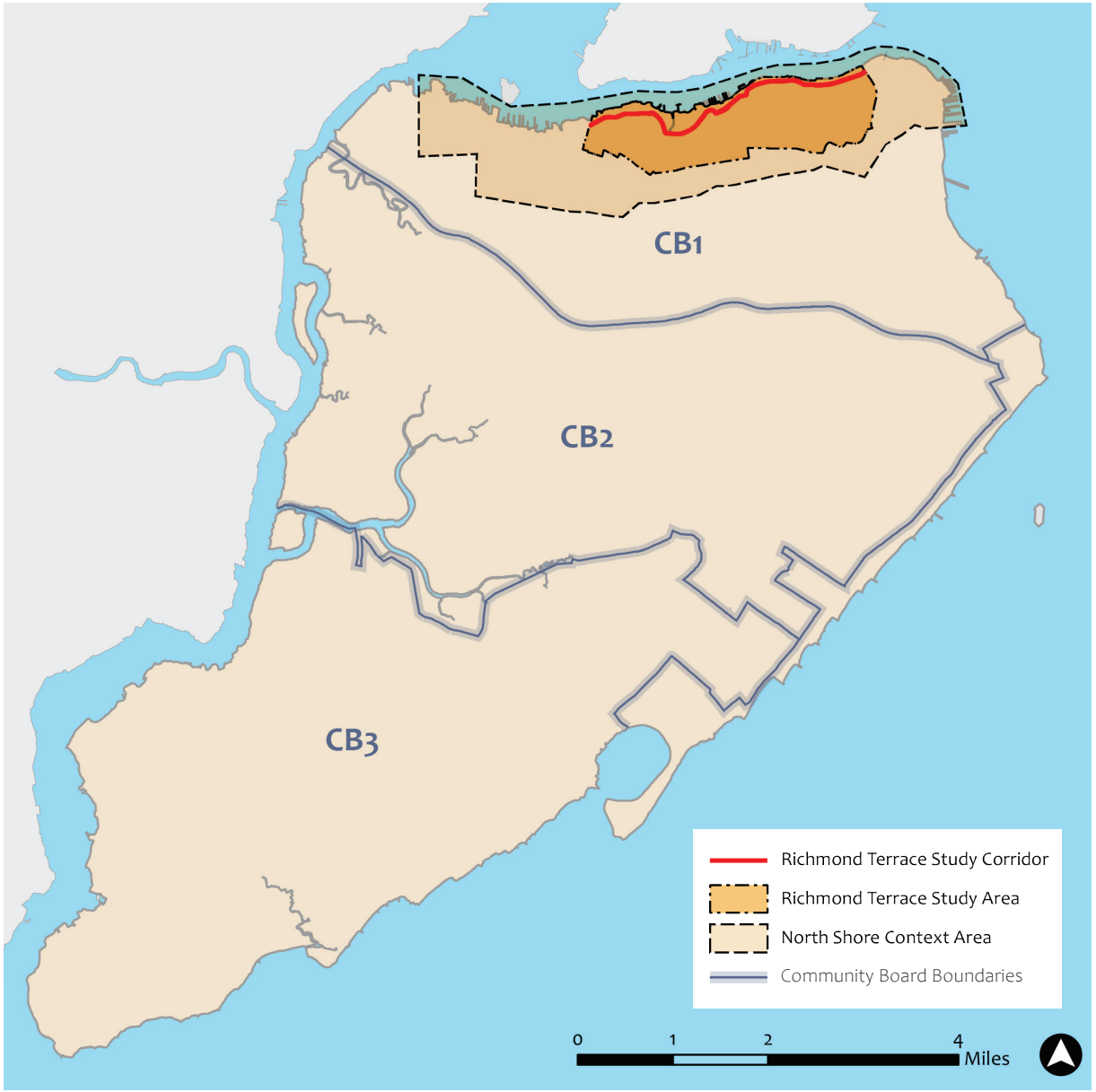


FIGURE 1

Study Introduction and Purpose

MAP 1: Richmond Terrace Study Boundaries.



In 2020, the New York City of Department of City Planning (DCP) received approval from the New York Metropolitan Transportation Council (NYMTC) for Federal Highway Administration grant funding to support an existing conditions analysis of the Richmond Terrace Corridor. DCP recognizes the importance of Richmond Terrace to the everyday lives of Staten Islanders, continuing investment in the revitalization of North Shore neighborhoods, and achieving the goals identified in previous community-based planning studies. Since the release of prior community-based plans for this study area, new conditions warranted an updated study to highlight the planning challenges and opportunities surrounding the corridor, including traffic and safety concerns expressed by the community, and provide critical next steps in developing specific land use and transportation scenarios to be addressed as part of a future work program.

This study provides a comprehensive analysis of existing land use, zoning, socioeconomic, and vehicular, pedestrian, and other transportation conditions along Richmond Terrace, which is Staten Island's northernmost arterial street that provides critical access to homes, jobs, and key destinations on Staten Island's North Shore. Richmond Terrace is one of the very few continuous east-west corridors north of the

FIGURE 2: Aerial of the Richmond Terrace corridor between Pelton Avenue and Broadway

Staten Island Expressway and spans over six miles from the St. George Ferry Terminal to the New York Container Terminal in Arlington. The built roadbed and alignment of Richmond Terrace is defined by its proximity to the Kill Van Kull waterfront and adjacent industrial waterfront lots, resulting in several tight turns, most notably when it passes through the West Brighton and Port Richmond neighborhoods.

The corridor traverses some of Staten Island's oldest neighborhoods that have historically accommodated a range of land uses, including industrial jobs along the waterfront, upland residential dwellings, and vibrant retail corridors. Dating back to the 1800s, Richmond Terrace provided access to waterfront-dependent businesses that stretched along the Kill Van Kull waterfront and served an important role in the local and regional economies. Maritime businesses, such as New York Container Terminal, Caddell Dry Dock and Repair, Reinauer Transportation, and Moran Towing, continue to be active businesses today. Meanwhile, residential, and commercial development in the upland neighborhoods supported this maritime economy. Port Richmond Avenue was the location of the first bank on Staten Island and became known as the borough's "Fifth Avenue" in the 1920s. In West Brighton, the Markham Gardens site provided temporary housing for shipyard workers supporting the war efforts and was eventually converted to public housing.

Investment in public transit served a critical role in this growth. Dating back to the 1700s, ferry services connected Staten Island with Manhattan and New Jersey and had landings in Port Richmond and St. George. Port Richmond grew into a hub for streetcars, which connected ferry landings to the upland residential neighborhoods. In 1890, passenger and freight rail service began between Arlington Yard and St. George. These services formed an interconnected

FIGURE 3: Historic Richmond Terrace, Port Richmond, SI.
Wide street with electric poles and trolley, and a pink Victorian house.

FIGURE 4: Historic Richmond Terrace, New Brighton, SI.
Horse and carriage parked in front of home, light poles, and trolley tracks.

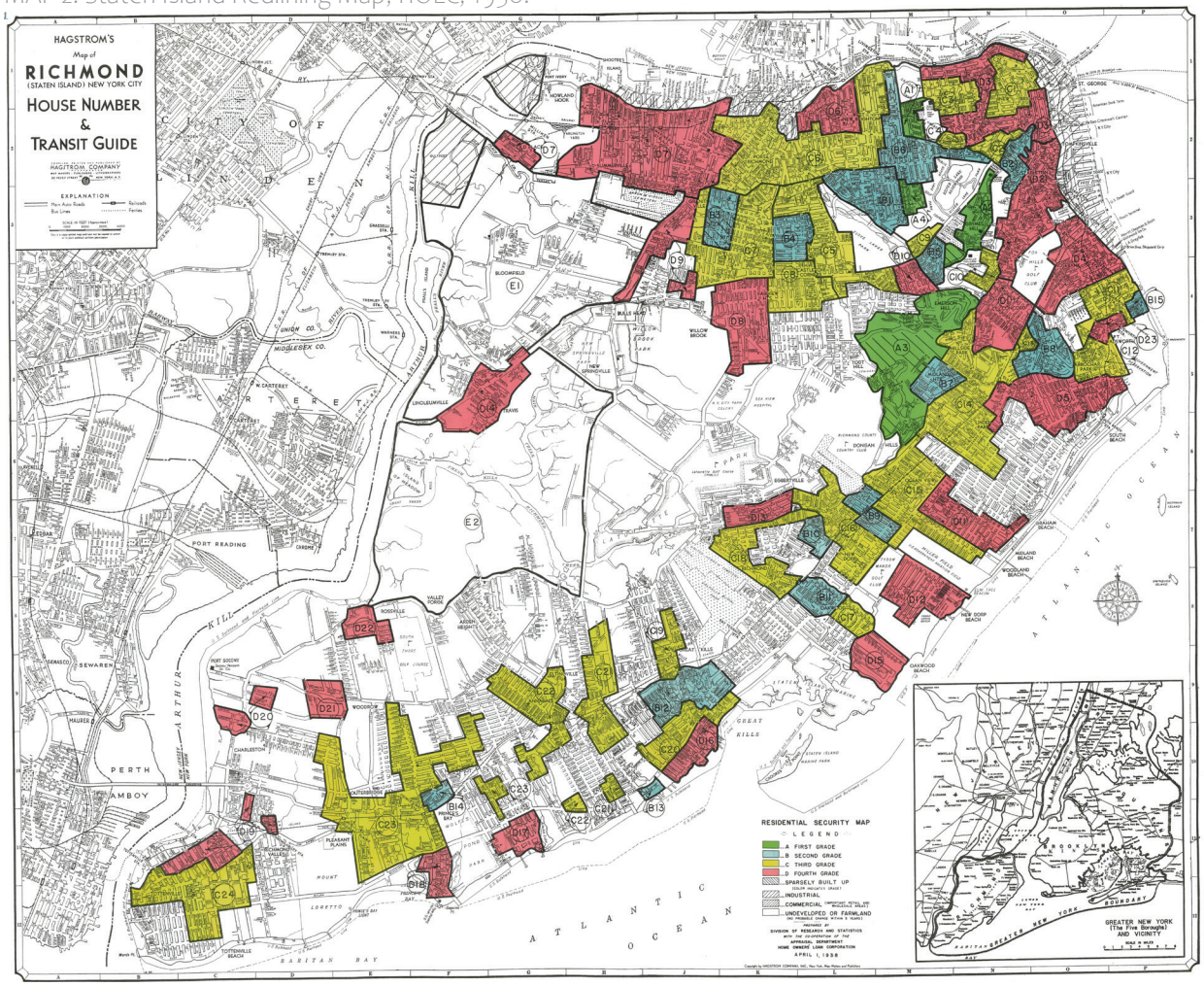
transportation network on the North Shore that facilitated the movement of people and goods to residential, commercial, and job centers on the island. In 1898, Staten Island was consolidated as a borough of New York City.

This period of growth lasted until the mid-1900s when the area experienced a decline of industries along the waterfront and a disinvestment in public transit, resulting in many underutilized contaminated sites and a lack of equal and efficient transportation options on the North Shore. The opening of the Bayonne Bridge in 1931 provided a new connection to New Jersey, but it was followed by the discontinuation of all ferry service between Port Richmond and Bergen Point in 1961. Additionally, the North Shore Rapid Transit Line halted passenger and freight service in 1953 and 1989, respectively. Currently, there is only a small portion of the right-of-way that is active in the westernmost portion of the North Shore serving freight rail access to the New York Container Terminal.

This disinvestment in public transportation occurred shortly after the federal government's Home Owners' Loan Corporation deemed most of the North Shore to be hazardous for banks and mortgage lenders—a practice later known as "redlining"—or a declining neighborhood as part of their area descriptions created between 1935 and 1940. Redlining directed public and private capital away from redlined areas, which were usually comprised of Black and immigrant communities, and towards neighborhoods predominantly made up of American-born white families. These racist and discriminatory practices have had intergenerational impacts on the communities they targeted, upheld housing segregation, prevented generational wealth through property ownership, and inhibited access to opportunity; these inequities persist to this day.

Despite this decline, the corridor has recently experienced significant residential and commercial growth in areas with greater transit access. Over the past 10 years there has been significant private and public investment in the St. George neighborhood immediately east of the Richmond Terrace Corridor study area. The Lighthouse Point, River North, and Empire Outlets proposals in St. George will combine to create 850 new housing units, over 425,000 square feet of commercial space, and 600 jobs along or near Richmond Terrace. There is an opportunity to continue the revitalization of the North Shore west along Richmond Terrace by building off of previous recommendations for transportation improvements for Richmond Terrace and fulfilling the community's land use vision for the area, which includes the creation of new affordable housing, jobs, commercial, and safe and efficient transportation opportunities along the corridor.

MAP 2: Staten Island Redlining Map, HOLC, 1938.



Previous Planning Studies

The Richmond Terrace Corridor study builds off important planning work achieved in previous studies and works in tandem with ongoing studies. These studies include the following:

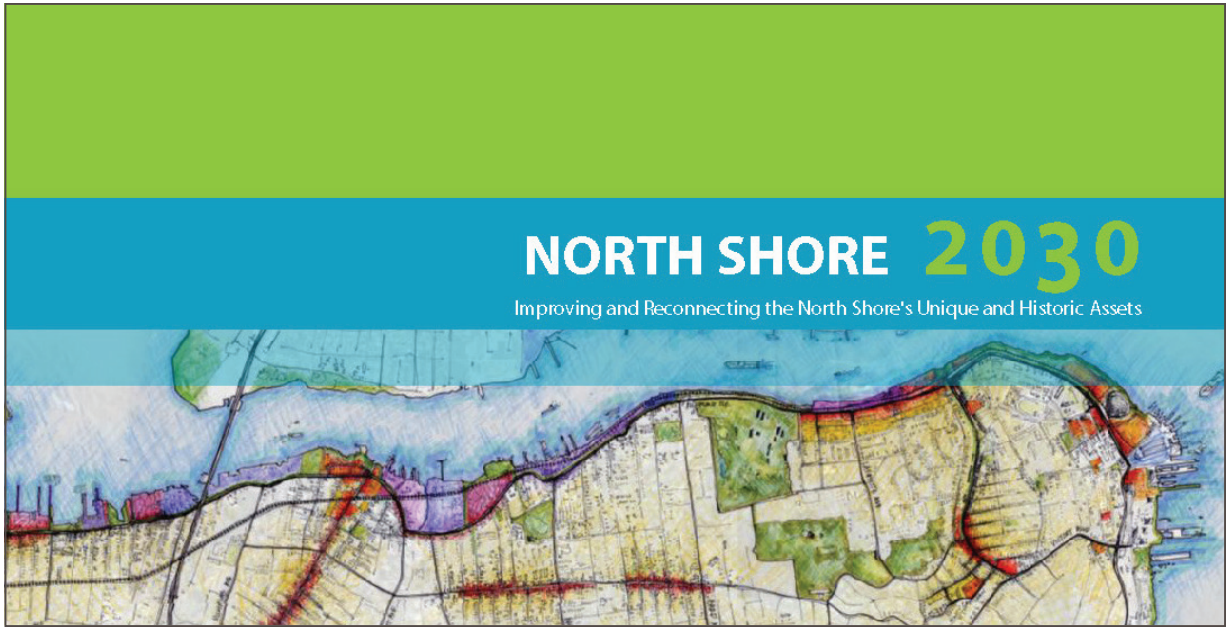


FIGURE 6: North Shore 2030 Report Cover, 2011. Source: DCP

North Shore 2030

In 2012, the City released the North Shore 2030 report, a product of extensive outreach to local stakeholders, elected officials, and city agencies to develop a vision for six North Shore Neighborhood Opportunity Areas along or near Richmond Terrace defined as St. George, Jersey Street, New Brighton, West Brighton, Port Richmond, Mariners Harbor-Arlington. The report identified four community-driven strategies toward achieving this vision:

- Support and Create Neighborhood Centers
- Create Quality Jobs and Workplaces
- Reconnect People with the Working Waterfront
- Improve Connections and Mobility

North Shore Rapid Transit Alternatives Analysis and Bus Rapid Transit Proposal

In 2012, the Metropolitan Transit Authority (MTA) released the Staten Island North Shore Alternatives Analysis (SINSAA) to study public transit alternatives for the North Shore. The SINSAA recommended revitalizing a former transit right-of-way that traverses the North Shore and runs parallel to Richmond Terrace with Bus Rapid Transit (BRT). In 2019, the MTA advanced the design and environmental review work, including a Public Scoping Meeting on October 19, 2019.

At the time of this report, the MTA is overseeing preparation of an Environmental Impact Statement (EIS) for the Staten Island North Shore BRT. When completed, the Draft EIS will help inform DCP's planning for the future of surrounding neighborhoods. This study recognizes the MTA's progress on the project and uses it to inform the existing conditions analysis.

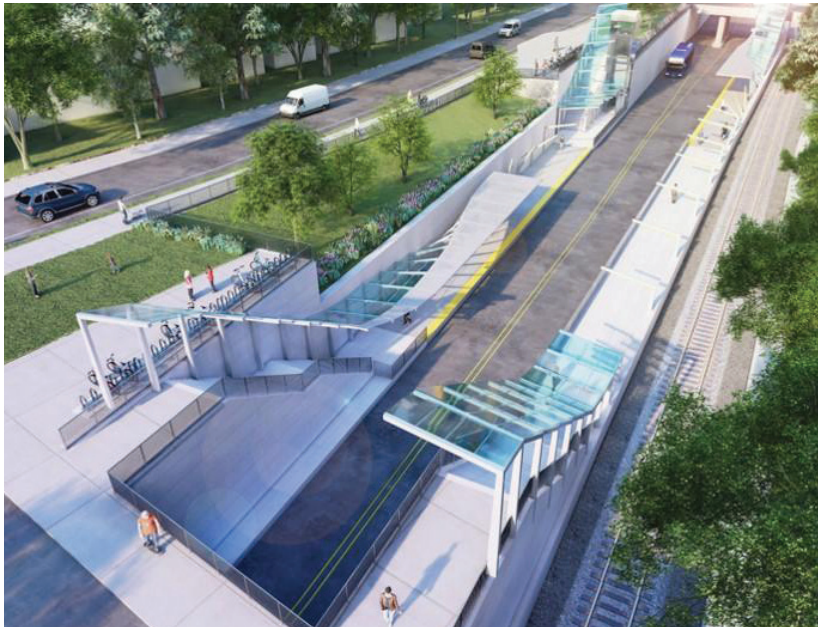


FIGURE 7: SI North Shore BRT: Mariner's Harbor Station Rendering. Source: MTA

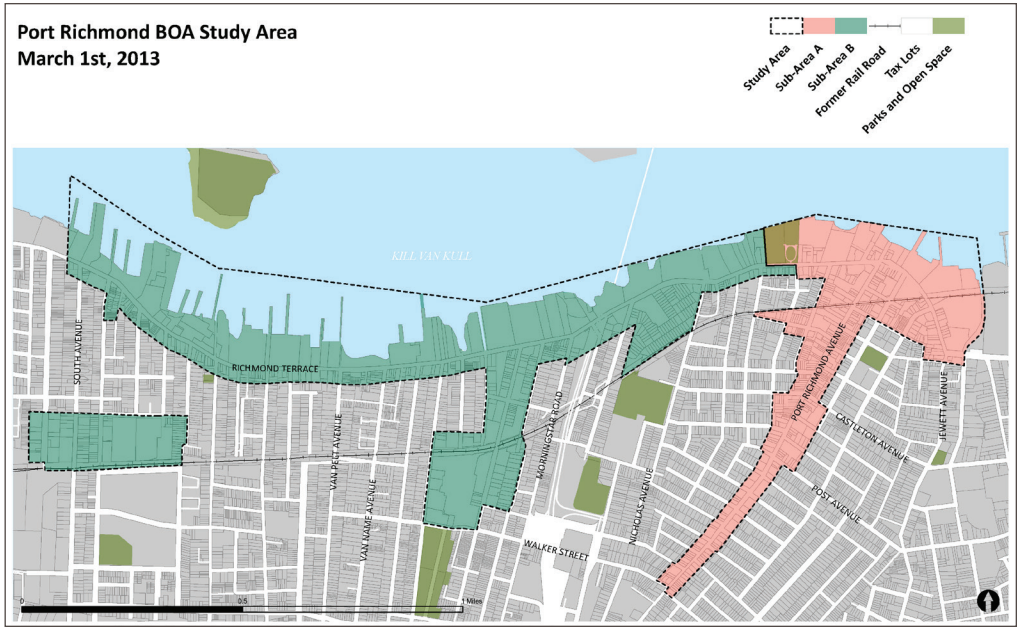


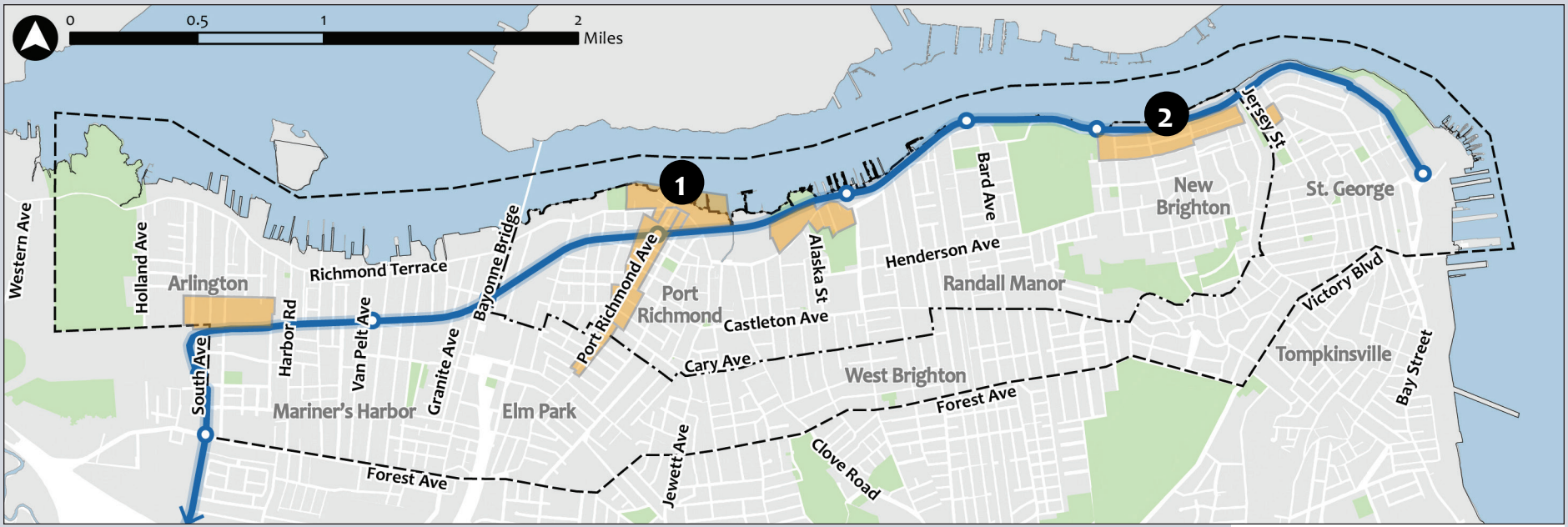
FIGURE 8: Port Richmond BOA Study Area Map, 2013. Source: DCP

Brownfield Opportunity Areas

The West Brighton and Port Richmond Brownfield Opportunity Area (BOA) studies continued the work of North Shore 2030 by providing more detailed planning recommendations for specific neighborhoods. Local Development Corporations led both studies to develop revitalization plans for the New Brighton, Livingston, West Brighton, Port Richmond, Elm Park, Mariner's Harbor, and Arlington neighborhoods, which have a legacy of underutilized, contaminated, or vacant sites. The studies produced the following recommendations and City commitments for land use and zoning changes at strategic redevelopment sites, improving resiliency to coastal flood risk, and transportation improvements along Richmond Terrace:

- Establish a mixed-use corridor district along Richmond Terrace in Port Richmond and New Brighton to create new affordable housing, job opportunities, and waterfront destinations to support maritime businesses.
- Encourage the expansion of commercial uses to support maritime jobs and businesses.
- Explore pedestrian and bicycle improvements along the Snug Harbor waterfront as part of the North Shore Greenway proposal.
- Explore potential land swap proposals with property owners to create a transitway running contiguous to Richmond Terrace.
- Explore potential designs for the construction of street improvements on city-owned portion of Richmond Terrace between Jersey Street and Lafayette Avenue to improve traffic flow and safety.
- Provide bicycle lanes from upland neighborhoods to Richmond Terrace and waterfront destinations and open spaces.

The New York State Department of State designated both the West Brighton and Port Richmond areas as BOAs in 2016 and 2019, respectively, which made redevelopment efforts in these areas eligible for additional State funding and assistance.



MAP 3: North Shore Context Area with proposed rezoning areas from previous studies and proposed BRT route.

FIGURE 9: Port Richmond-Mariners Harbor Brownfield Opportunity Area (BOA). January 2019, Northfield LDC.

2 LARGE SCALE DEVELOPMENT OPTION SLENDER TOWER - UP TO 12 STORIES

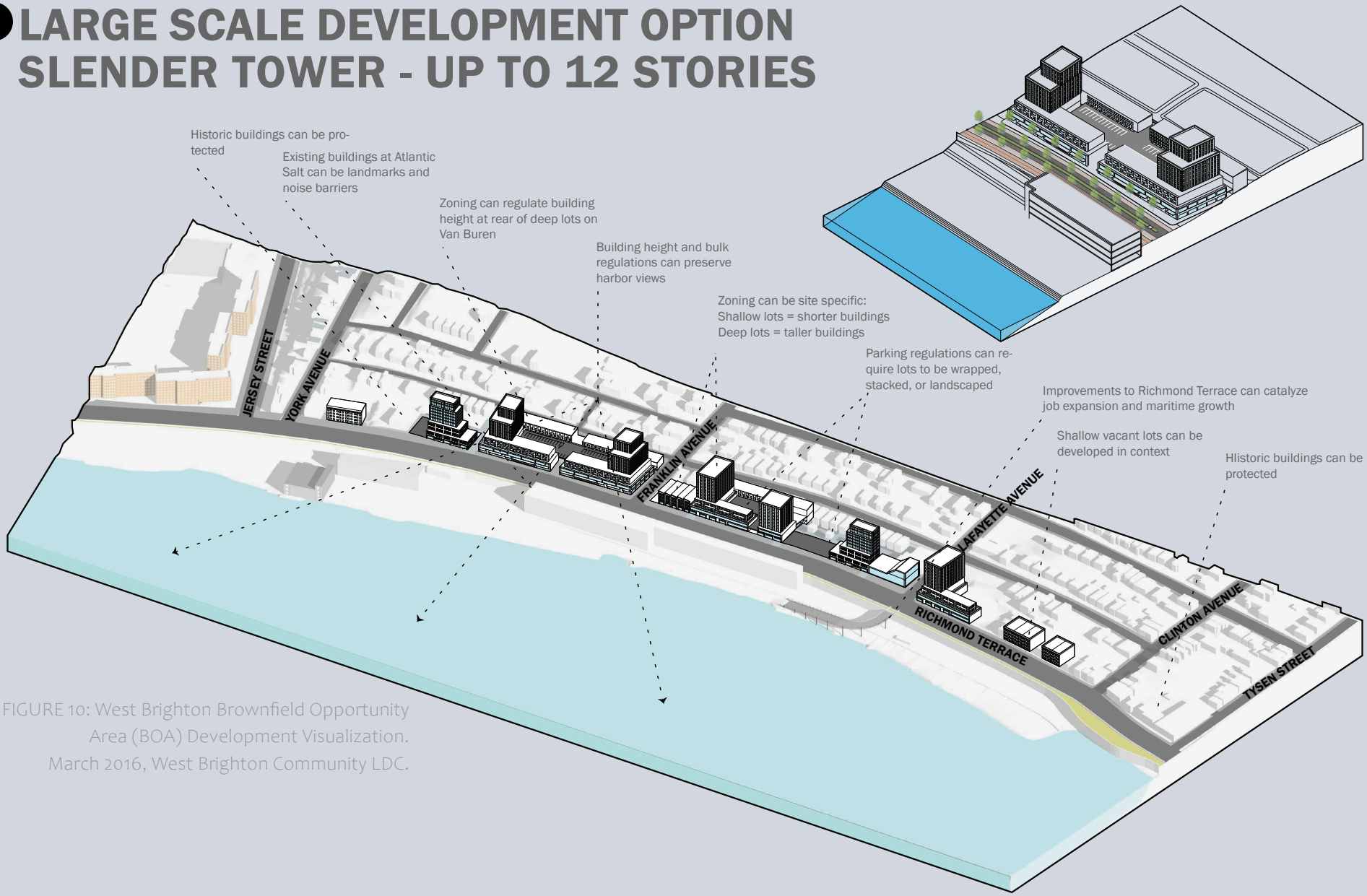


FIGURE 10: West Brighton Brownfield Opportunity Area (BOA) Development Visualization. March 2016, West Brighton Community LDC.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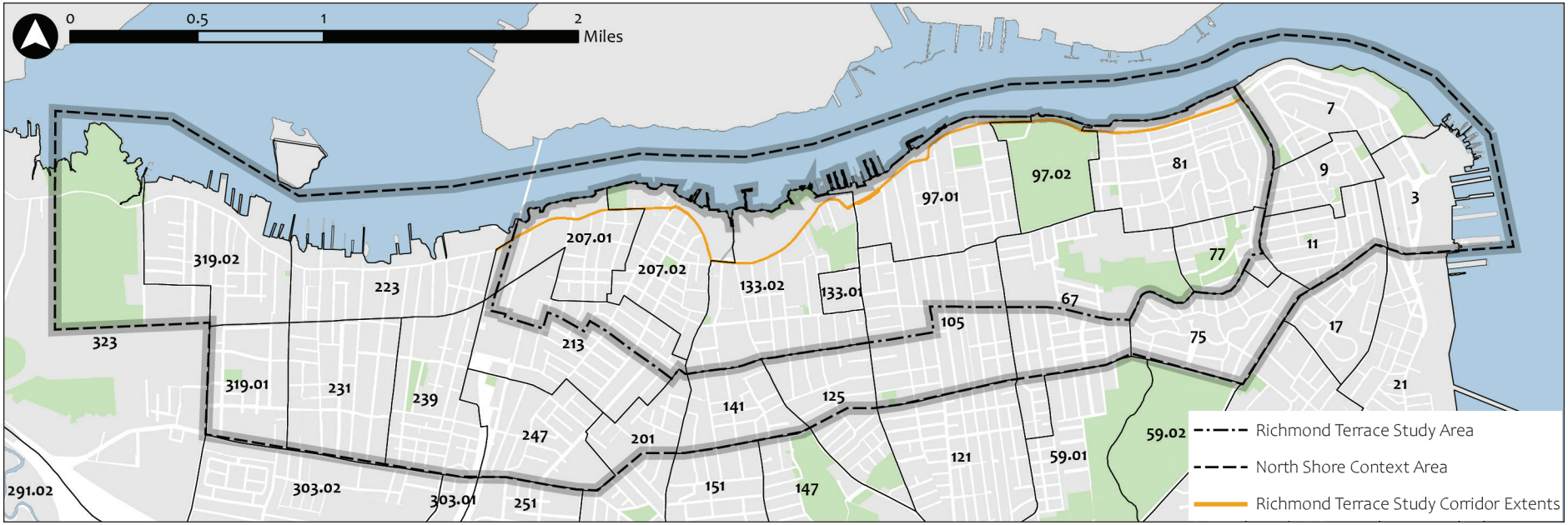
Study Area and Data Collection

Methodology



MAP 4: North Shore Context Area Census Tracts. Census Tract boundaries were updated in 2020.
Census Tracts within the Context area: 3, 7, 9, 11, 67, 75, 77, 81, 97.01, 97.02, 105, 125, 133.01, 133.02, 141, 207.01, 207.02, 213, 223, 231, 239, 247, 319.01, 319.02, and 323.

Study Area Boundaries

The study area boundaries are the Bayonne Bridge to the west, the Kill van Kull waterfront to the North, Jersey Street to the east, and Brighton Avenue, Castleton Avenue, Cary Avenue, Post Avenue, Palmer Avenue, Hatfield Place, and Innis Street to the south. The neighborhoods within the study area are New Brighton, Livingston, Randall Manor, West Brighton, Port Richmond, and Elm Park. The study area boundaries overlap with portions of the West Brighton and Port Richmond Brownfield Opportunity Area (BOA) study areas to ensure land use and transportation recommendations identified previously remain current based on existing conditions. The southernmost boundary reflects the approximate half-mile walkshed around the Richmond Terrace corridor that captures the residents, establishments and institutions that most likely use the corridor frequently. A half-mile walkshed is often cited as how far people would walk for destinations, such as a transit stop.

Greater North Shore Context Area

This study also utilizes a North Shore context area with the boundaries that extend further south to Victory Boulevard and Forest Avenue and west to South Avenue and Mariners Marsh. The context area is intended to provide additional insight to the broader land use, transportation, demographic, and socioeconomic characteristics on the North Shore. It also aligns with the boundaries of the North Shore 2030 study and facilitates a comparison of change over time. The sources for the context area data include:

- DCP's MapPluto
- 2020 Census
- American Community Survey (ACS)
- Census Transportation Planning Products Program (CTPP)
- Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics.
- New York State Department of Labor's Quarterly Census of Employment and Wages (QCEW), 2019Q3.

MAP 5: Study Area, Context Area, and Data Collection Intersections Map.

Richmond Terrace Transportation Level of Service Analysis

DCP collected and analyzed transportation data to determine the vehicular and pedestrian level of service (LOS) of Richmond Terrace under current conditions. The data was collected in conjunction with the consulting firm Traffic Databank in October 2021. The COVID-19 pandemic has impacted traffic, transit, and travel patterns throughout the city since March 2020. When this data was collected in October 2021, traffic levels had generally returned to pre-pandemic levels, while transit ridership continues to recover and is still lower than pre-pandemic levels. In the analyses, DCP used the methodologies presented in the 2000 *Highway Capacity Manual* (HCM2000).

Appendix A contains a complete description of the methodology used in each analysis. The results are provided in the Findings section of this report. The HCM summary package for each analysis is on file at DCP.

Vehicular Level of Service Analysis

SIGNALIZED INTERSECTIONS

Vehicular LOS is an evaluation of the capacity Vehicular LOS is an evaluation of the capacity and performance of signalized intersections by lane groups, which are based on traffic movement during each signal phase, for average delay per vehicle vehicular capacity.

The capacity of an intersection represents the throughput of a facility (i.e., the maximum number of vehicles that can be served in one hour). Capacity analysis results in the volume-to-capacity ratio (v/c ratio): the proportion of capacity (i.e., supply) utilized by the existing traffic volume (i.e., demand). High v/c ratios (greater than 0.85) indicate some traffic congestion, and low v/c ratios (less than 0.60) indicate minimal disruptions to traffic flow.

The performance of an intersection is based on the estimated average delay time (i.e., the average stopped time per vehicle) for each vehicle utilizing a roadway segment. Delay time is determined by the capacity of a lane group,

Vehicular Level of Service Definitions for Signalized Intersections

FIGURE 11

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

Vehicular Level of Service Criteria for Unsignalized Intersections

(Seconds per Vehicle)

FIGURE 12

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

Source for all tables on this spread: Highway Capacity Manual, Transportation Research Board, National Research Council, 2000

Pedestrian Level of Service Criteria (Pedestrian Flow Rate per Minute)

FIGURE 13

Flow Quality	Space (Sq Ft/Ped)	Description	Density
LOS A	> 130	Unrestricted	2 PFM or less
LOS B	> 40	Slightly restricted	3 to 7 PFM
LOS C	> 24	Restricted but fluid	8 to 10 PFM
LOS D	> 15	Restricted; necessary to continuously alter walking stride and direction	11 to 15 PFM
LOS E	> 6	Severely restricted	16 to 25 PFM
LOS F	< 6	Forward progress only by shuffling; no reverse movement possible	26 PFM or more

the amount of green time allotted to a lane group, and the signal cycle length. Delay time is the factor which determines the LOS for a lane group.

Short delays receive a good LOS while long delays receive a poor LOS. For example, an average delay of up to ten seconds per vehicle corresponds to LOS A, while an average delay of 45 seconds corresponds to LOS D.

UNSIGNALIZED INTERSECTIONS

LOS for a stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement or stop-controlled approach with drivers on the major street. Capacity analysis at an unsignalized intersection depends on a clear description and understanding of the intersection of drivers on the minor movement.

LOCATIONS FOR DATA COLLECTION

A total of 12 intersections were selected for analysis, of which 11 are signalized and 1 is unsignalized. The unsignalized intersection is Richmond Terrace and Tysen Street. Map 5 illustrates the locations of selected intersections within the study area.

Traffic volume, turning movement, and vehicle classification counts were performed during the weekday morning, midday, and evening peak hours, as well as during the midday on Saturday, which represent the hour interval with the most traffic volume and, thus, the highest capacity requirements. Peak hour was identified as 7:00 AM to 8:00 AM for the morning period, 1:00 PM to 2:00 PM for the midday period, 3:45 PM to 4:45 PM for the evening period and 1:30 PM to 2:30 PM for Saturday.

Pedestrian Level of Service Analysis and Methodology

The pedestrian LOS analysis determines existing volumes, pedestrian flow patterns, and LOS at three locations along the sidewalk:

- **SIDEWALK MIDBLOCK ANALYSIS**
  Measures the average flow rate LOS for pedestrians, which occurs when transit vehicles release large groups of pedestrians in a short period of time.
- **STREET CORNER ANALYSIS**
  Measures sidewalk flows, pedestrian crossings, and other queued pedestrians waiting for the traffic signal to change.
- **CROSSWALK ANALYSIS**
  Operation and LOS of crosswalks during four peak periods.

Pedestrian LOS is measured by the pedestrian flow rate per foot of width per minute (PFM). The PFM indicates the quality of pedestrian movement and comfort and is defined by a density-comfort relationship. Crosswalk analyses were conducted for the average pedestrian flow conditions during a full peak hour and were recorded in 15-minute increments.

LOCATIONS FOR DATA COLLECTION

Field observations identified the eight locations (see Map 5) for data collection that seem to be near neighborhood destinations, more pedestrian traffic, or located near proposed BRT stations.

The North Shore Context Area

FIGURE 14

Population Growth Rate by Borough, 2010-2020

2010 & 2020 U.S. CENSUS

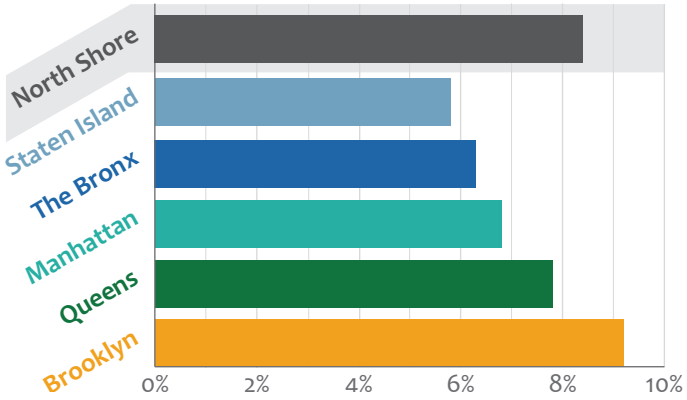
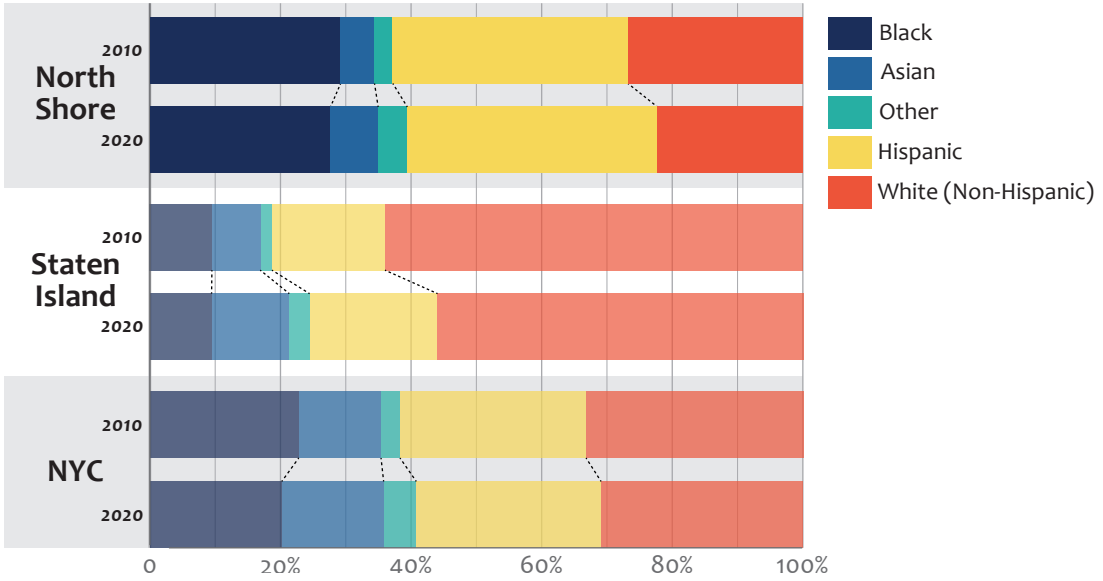


FIGURE 15

Population Makeup by Race, 2010-2020

2010 & 2020 U.S. CENSUS



Population, Demographic, and Socioeconomic

Population Growth

The North Shore's total population is growing, including in its BIPOC and elderly communities.

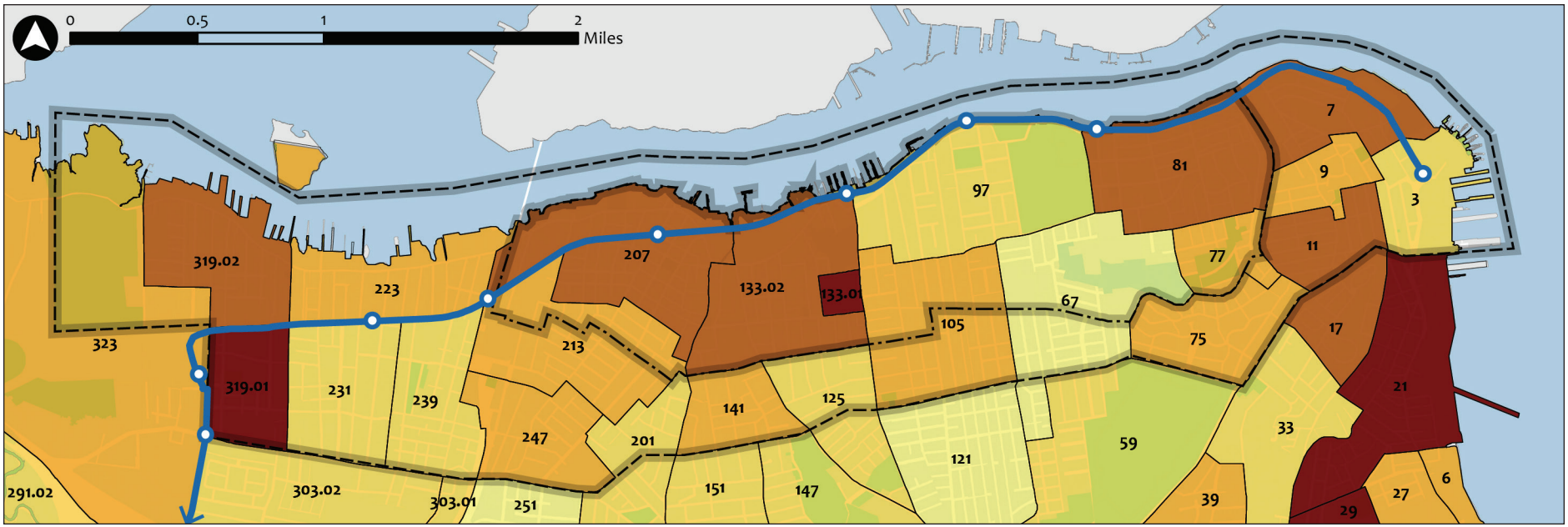
From 2010 to 2020, the population of the North Shore increased by 8.4 percent to 86,755, representing 17.5 percent of Staten Island's total population (495,747). This is a faster growth rate than both Staten Island (5.8 percent) and New York City (7.7 percent). Relative to boroughwide statistics, the North Shore has a significantly larger percentage of Latinx (38 percent) and Black (28 percent) populations, representing the two largest race groups in the context area.

The Latinx population has grown by 15.6 percent since 2010, second only to the Asian population which grew by 52 percent but represents just seven percent of the North Shore's total population. Puerto Rican and Mexican are the two largest Latinx subgroups in the North Shore at 41.9 and 25.2 percent of the total Latinx population, respectively. The only group that experienced a population decline was White, non-Hispanics which decreased by approximately 10 percent.

Consistent with citywide trends, the North Shore population is aging. Over the past 10 years, the median age increased from 32.7 to 36 with the largest increases occurring in the 55 to 74 age group. However, the North Shore has a younger population than Staten Island (40) and New York City (36.7).

Household Income

Existing socioeconomic conditions present housing affordability challenges for North Shore residents. According to the 2015 to 2019 ACS, median income in the context area is $55,368, and 46.4 percent of households have an annual income of less than $50,000.



MAP 6: Median Household Income by Census Tract, 2015-2019 ACS.
The data is shown on 2010 Census Tracts, as the data was collected before boundaries were updated in 2020.

Furthermore, 18 percent of the North Shore households have an income of less than $10,000. This greatly exceeds the percentage at the boroughwide (7.3 percent) and citywide level (8.5 percent).

Rental housing comprises approximately half of the occupied housing stock on the North Shore (49.3 percent). Although median rent is only slightly lower on the North Shore ($1,155) than Staten Island ($1,319) and New York City ($1,443), nearly 60 percent of all North Shore renters are rent burdened (spend more than a third of their income on rent), and 35 percent are severely rent burdened (spend more than half of their income on rent).

FIGURE 16
Median Household Income
2015-2019 ACS

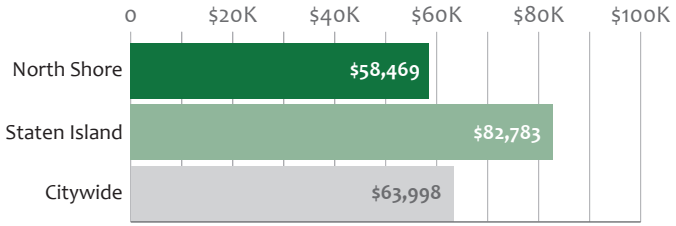
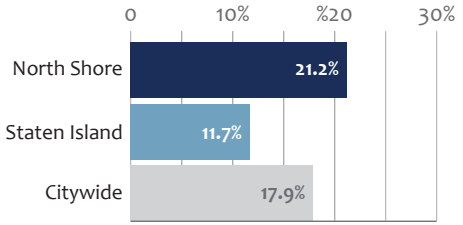
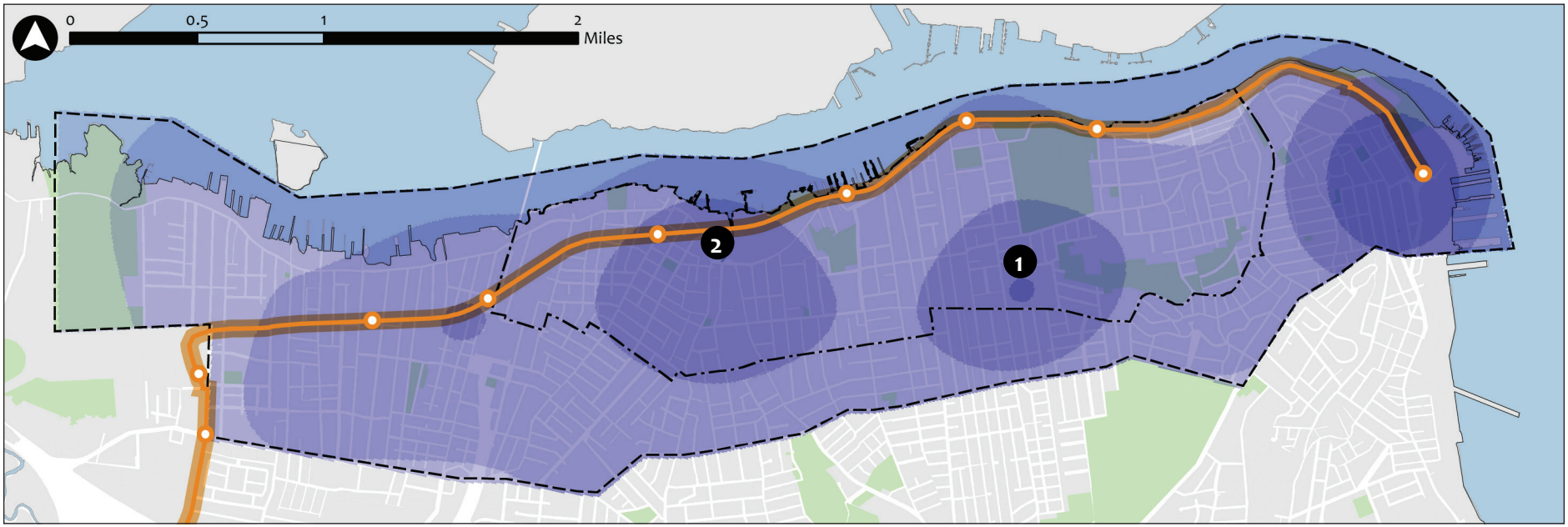


FIGURE 17
Household Income in the Past 12 Months Below Poverty Level
2015-2019 ACS





MAP 7: Geography of jobs along the North Shore.
Source: Longitudinal Employer-Household Dynamics (LEHD) data, 2019.

Geography of Jobs

According to the NYS Department of Labor's 2019 Quarterly Census of Employment and Wages (QCEW) microdata processed by the Department of City Planning, the three largest industries on the North Shore are healthcare and social assistance (43 percent), public administration (10 percent) such as government employees and other civil servants, and transportation and warehousing (8 percent).

The U.S. Census Bureau's OnTheMap application was used to query 2019 Longitudinal Employer-Household Dynamics (LEHD) data and visualize the distribution and concentration of jobs along the North Shore. As shown on Map 7, jobs are spread throughout the district with the largest job centers located at:

1. Richmond University Medical Center
2. Industrial waterfront block in Port Richmond that includes the NYC Department of Environmental Protection's Port Richmond Wastewater Treatment Plant, NYC Department of Transportation's Staten Island Maintenance and Repair facility, and the North Shore Industrial Park.

Other large job centers in the area include big box stores along Forest Avenue, the industrial and auto related businesses between Clove Road and Jewett Avenue, a Con Edison site between Bard and Davis Avenues, nursing homes and assisted living facilities in New Brighton, and the concentration of public sector jobs in St. George.

The geographic distribution and diversity of jobs throughout the North Shore underscores the importance of Richmond Terrace as a continuous east-west thoroughfare providing access to North Shore neighborhoods. It also illustrates the potential of the proposed North Shore BRT to connect people to job centers throughout the area via rapid transit.

FIGURE 18: NYC Department of Transportation's Staten Island Maintenance and Repair facility, a major employer along Richmond Terrace.

FIGURE 19

SARS-CoV-2 (COVID-19) Deaths per 100k

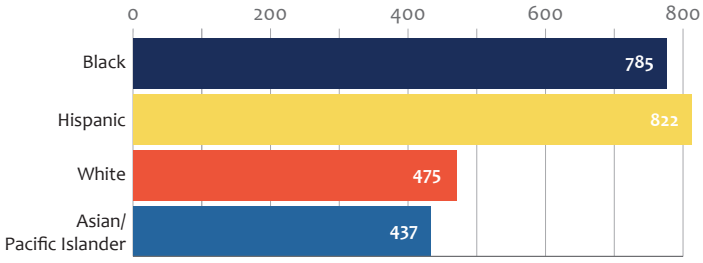
US DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Mortality Rate per 100K	North Shore	Staten Island	Citywide
April 2020	121	119	152
January 2021	30	36	25

FIGURE 20

SARS-CoV-2 (COVID-19) NYC Cumulative Deaths per 100K by Race

DATA AS OF 01-26-2022, US DEPT. OF HEALTH AND MENTAL HYGIENE



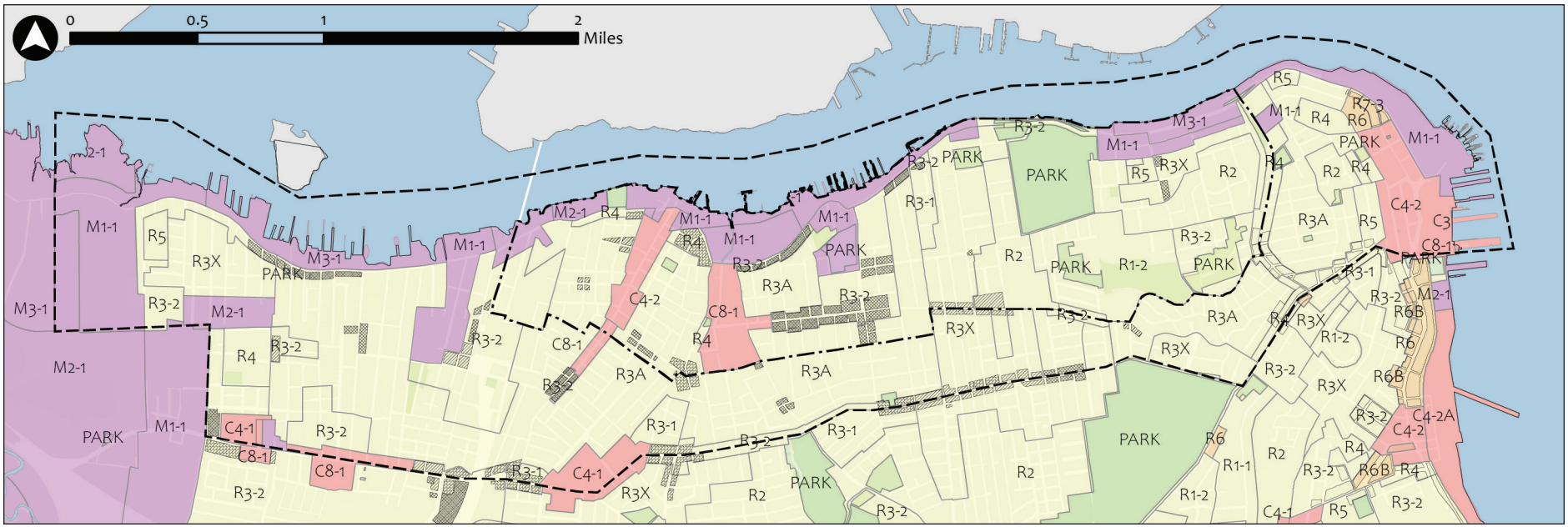
Public Health

The North Shore has faced significant public health challenges before and during the pandemic.

The New York City Department of Health and Mental Hygiene's 2015 Community Health profile of Staten Island's Community District 1, which encompasses the context area, described the area's several ongoing public health challenges. The profile indicates that 33 percent of Community District 1's adult population is obese, exceeding both Staten Island (29 percent) and NYC (24 percent). Community District 1 also has a higher mental health, asthma, and diabetes adult hospitalization rates than boroughwide and citywide statistics.

One in six North Shore adults do not have health insurance, and one in nine goes without needed health care, both of which exceed the boroughwide average.

In April 2020 and January 2021 when the city experienced spikes in COVID-19 rates, the North Shore's mortality rate, specifically Zip Codes 10301, 10302, 10303, and 10310, exceeded that of Staten Island and NYC, respectively. Additionally, the overall mortality rate was significantly higher for the borough's Black and Latinx populations, and about 31 percent of these populations reside in the North Shore.



MAP 8: North Shore Zoning Map.

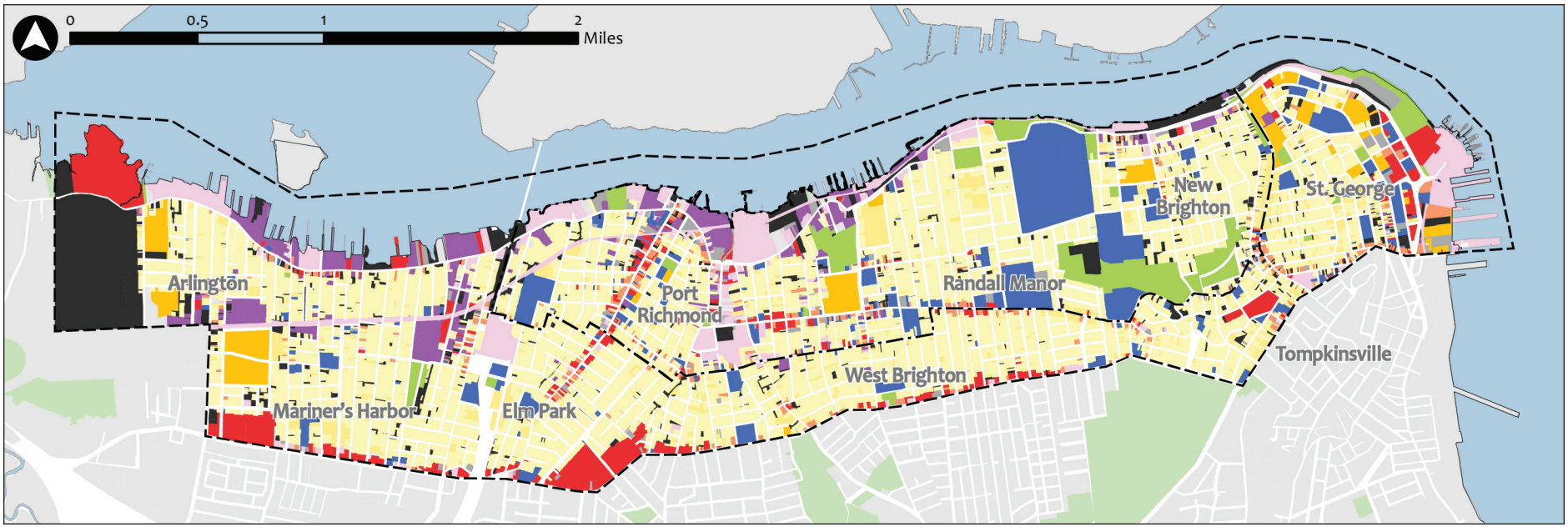
Zoning and Land Use

The North Shore has an older building stock, most of which were constructed before the opening of the Verrazzano-Narrows Bridge.

Some of Staten Island's oldest neighborhoods reside on the North Shore, which is reflected in the age of its existing building stock. About 74 percent of buildings on the North Shore were constructed in 1964 or earlier with the largest increase in development occurring between 1910 and 1940. This coincides with the growth of the industrial waterfront and reflects the need for workforce housing. Building construction precipitately declined following the end of World War I, the start of the Great Depression, and disinvestment in public transit and does not experience a significant increase until the 1990s and early-2000s. This is immediately followed by another significant decrease in construction leading up to the Great Recession in 2008. Despite the prevalence of developable lots in the study area (as discussed in Findings section of the report), building construction remains at one of its lowest levels since 1890.

Most of the North Shore is zoned and developed with low density homes, which inhibits the creation of both regulated and unregulated affordable housing in the area.

Low-density residential developments (single- to two-family homes) comprise of over 80% of the lots and 52% of the total area of the North Shore. These residential uses are predominantly



MAP 9: North Shore Land Use Map.

Richmond Terrace Study Area

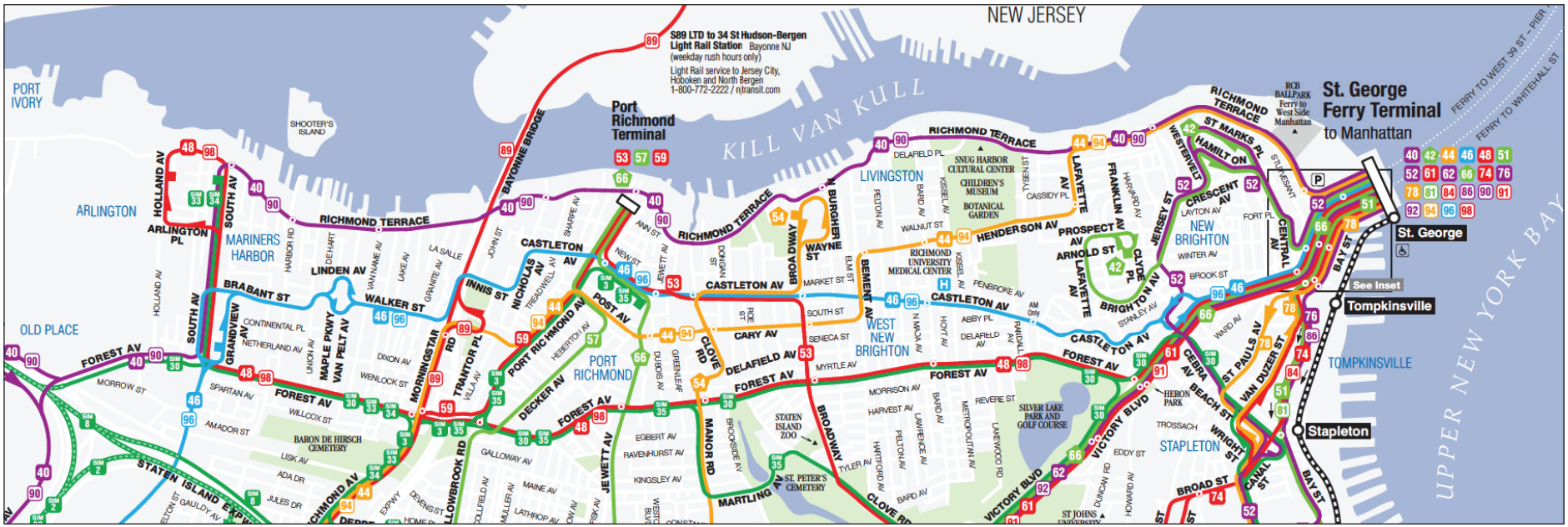
North Shore Context Area

Land Use

- One & Two Family
- MultiFamily Walkup
- MultiFamily Elevator
- Mixed Commercial/Residential
- Commercial/Office
- Industrial/Manufacturing
- Transportation/Utility
- Public Facilities & Institutions
- Open Space
- Parking Facilities
- Vacant Land

located south of Richmond Terrace in the upland neighborhoods. The average building height is 2.5 stories, and the average amount of units per lot is 2. These developments reflect the underlying low-density zoning districts mapped in the area (R1-2, R2, R3-1, R3-2, R3A, and R3X), which make up 87.7 percent of the lots and 60.5 percent of the total area in the study area. Including both low and higher density districts, residential zoning comprises of 91.3 percent of the lots and 65 percent of the area in the study area.

Despite the significant amount of residential zoned lots and vacant sites (5.3 percent of total lots and 8.7 percent of total square footage), these existing zoning and land use conditions contribute to the lack of affordable housing options on the North Shore. According to the NYC Department of Housing Preservation and Development's (HPD) Bay Street Corridor Housing Plan in 2018, only 15% of Community District 1's housing stock is subject to government regulations that control for affordability. In contrast, per HPD's analysis of the 2017 New York City Housing and Vacancy Survey, 58 percent of the housing stock in NYC is subject to such regulations for affordability. According to New York University's housing and neighborhoods data hub, multi-family housing provides 60 percent of the regulated affordable housing on the North Shore, but this typology represents only 3.6 percent of the total lots in the area. Multi-family buildings within the study area tend to be dispersed along Richmond Terrace or north-south connector streets that feed into the corridor. For example, Broadway has a residential density of about 23 units per acre and contains the Markham Gardens and the NYC Housing Authority's (NYCHA) West Brighton I and II multi-family developments, and Jersey Street has a density of about 30 units per acre and includes NYCHA's Richmond Terrace Houses. In contrast, Richmond Terrace has a density of about 3 units per acre.



MAP 10: Staten Island Bus Network Map, January 2022. Source: MTA

Transportation

Modes of Travel

Despite the lack of access to rapid transit, many North Shore residents rely on alternative modes of travel.

Staten Island is known for its reliance on cars as 64 percent of the population drives to work; however, according to the 2015-2019 ACS, almost half the population of the context area (44 percent) commutes using alternative modes of transportation. Additionally, over one-third of residents (34.2 percent) do not have access to a vehicle.

Within the context area, the existing public transit network consists of local and express buses, the Staten Island Ferry and NYC Fast Ferry services connecting St. George to lower Manhattan and Hudson Yards, and the Staten Island Railway (SIR) station in St. George. The commuters that rely on these modes of public transit face the longest travel times on the North Shore, more than double that of motorists. The median travel times are listed below:

Mode	Median Commuter Travel Time
Drove Alone	20-29 Minutes
Bus	45-59 Minutes
Subway, Railroad, or Ferry	75-89 Minutes

FIGURE 21

These are some of the longest commuting times in the borough and City, which have mean travel times to work of 45 and 41.5 minutes respectively, despite that 56 percent of North Shore residents work on Staten Island. In fact, 55 percent of bus riders in the area work on Staten Island.

The lack of alternative modes of transportation into the North Shore limits commuting options for workers who live outside the area.

FIGURE 22: Buses on Port Richmond Ave.

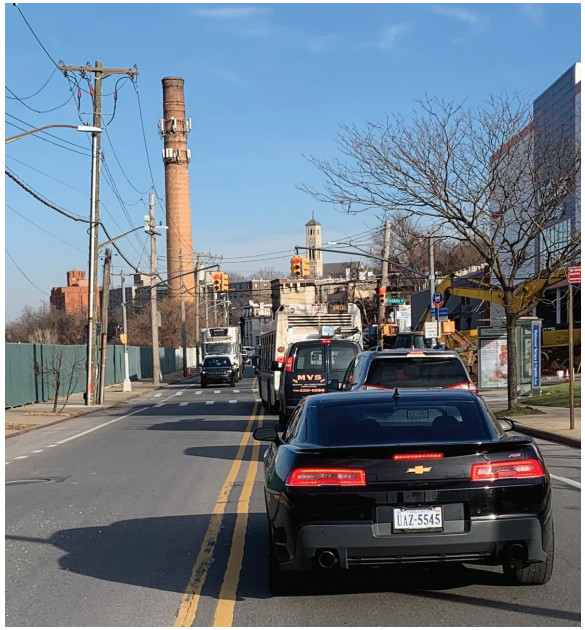


FIGURE 23: Eastbound Richmond Terrace traffic queue at the Jersey Street intersection.

FIGURE 24: Worn shared lane marking on westbound Richmond Terrace at Snug Harbor.

Per the 2012-2016 CTPP, about 75 percent of the 23,575 people who work in the North Shore commute via car, making them more likely to drive than the context area's residents. A significant majority of these workers live on Staten Island (77 percent), and 12 percent commute from outside New York City, predominately from New Jersey. The number of workers commuting to jobs on the North Shore via car leads to congestion on the area's main thoroughfares including Richmond Terrace.

FIGURE 25

Commute Mode Share

STATEN ISLAND NORTH SHORE, 2015-2019 ACS

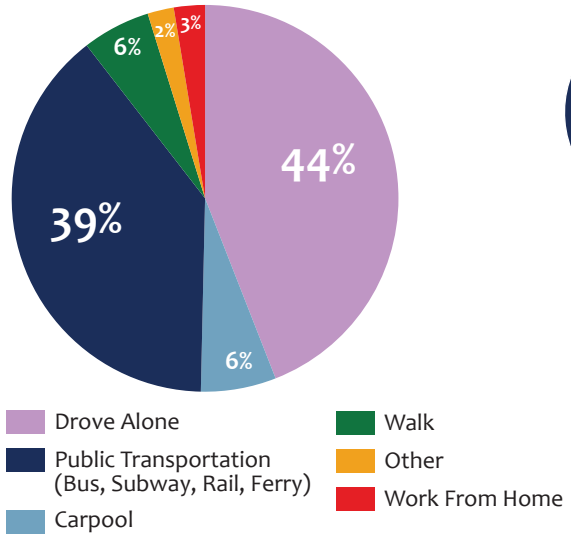
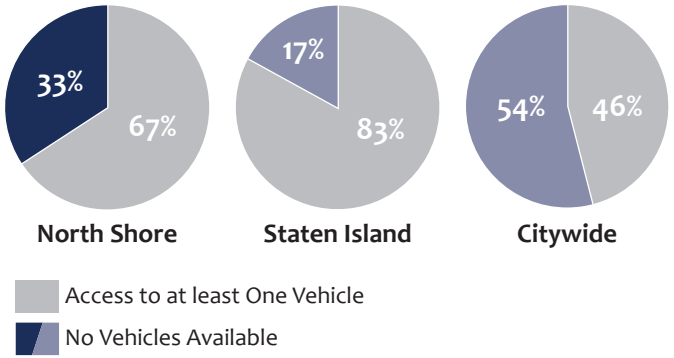


FIGURE 26

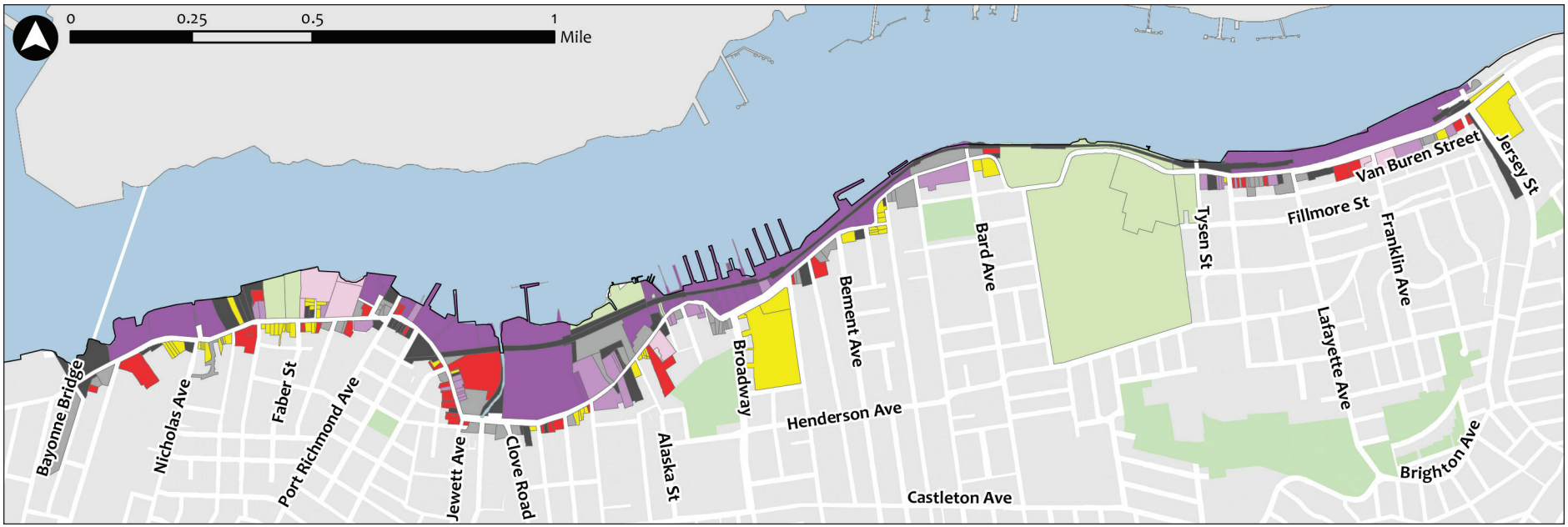
Household Access to Vehicle

NORTH SHORE 2030 CONTEXT AREA, 2015-2019 ACS




CROWN
WINES
LIQUORS
PLAY
HERE
8245

Richmond Terrace Corridor



MAP 11: 2021 manual survey of land uses along Richmond Terrace.

Richmond Terrace Land Use Survey

- Auto Related
- Storage/Warehouse
- Light Industrial
- Heavy Industrial
- Food and Beverage/ Dry Retail/Services
- Residential
- Park
- Vacant

Land Use

Industrial uses largely define the character along Richmond Terrace.

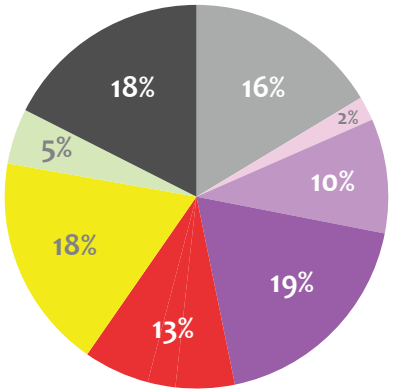
Within the Richmond Terrace Corridor study area, industrial or auto related uses make up approximately 45 percent of the lots along Richmond Terrace, which reflects the lasting impact of the area's historical working waterfront. Residential and vacant land uses each represent 18 percent of the lots fronting Richmond Terrace. There are only seven active local retail and commercial lots with frontage on the corridor. Because of the minimal commercial lots, there are many areas along Richmond Terrace where residential and industrial lots are adjacent, which affect the quality of life for residents. However, the significant amount of vacant lots along the corridor presents an opportunity to address some of these land use conflicts and buffer between uses.

Industrial land uses along Richmond Terrace affect the public realm and the travel experience on the corridor. Unlike for residential and commercial developments, manufacturing uses are not subject to street tree planting requirements or perimeter landscaping requirements, resulting in a lack of plantings along several stretches of Richmond Terrace, including the portions running through New Brighton and West Brighton. These industrial segments also tend to have minimal public seating and amenities (there are only seven city benches in the study area, none along Richmond Terrace), undersized or missing sidewalks, and opaque fencing (a requirement around manufacturing sites) that creates a barrier between users and waterfront views. Additionally, the prevalence of auto related uses along the corridor (16 percent of total lots) results in many large curb cuts and conflicts with pedestrians.

FIGURE 27

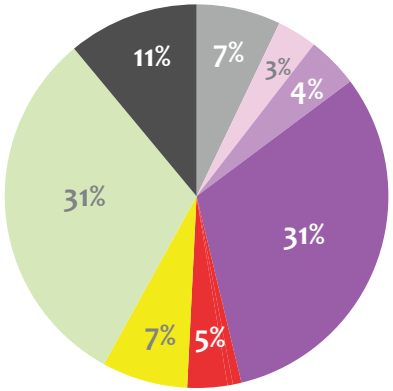
Richmond Terrace Corridor Land Use Survey, 2021

PARCEL COUNT BY LAND USE



LAND USE	PARCEL COUNT BY LAND USE	PCT. OF TOTAL
Auto related	56	16%
Storage/Warehouse	7	2%
Light manufacturing	33	10%
Heavy Manufacturing	64	19%
Food and Beverage/Dry Retail/Services	44	13%
Residential	62	18%
Park	16	5%
Vacant	60	18%
Total	*342*	

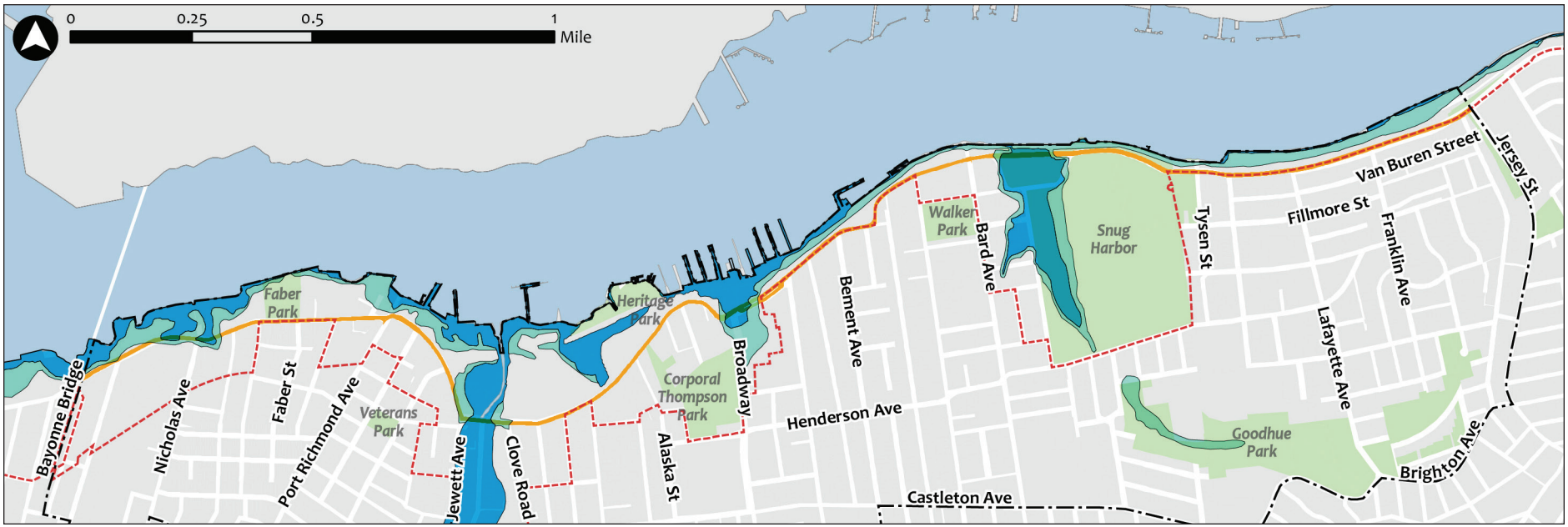
TOTAL LOT AREA BY LAND USE



LAND USE	TOTAL LOT AREA BY LAND USE (ACRES)	PCT. OF TOTAL
Auto related	22.6	7%
Storage/Warehouse	10.7	3%
Light manufacturing	13.7	4%
Heavy Manufacturing	100.1	31%
Food and Beverage/Dry Retail/Services	14.5	5%
Residential	23.1	7%
Park	98.5	31%
Vacant	35.1	11%
Total	*318.3*	

Most of the North Shore's parks are located along Richmond Terrace and provide some of the area's few access points to the waterfront.

There are 15 city-owned parks properties in the study area, 11 of which are located within a ¼ mile walkshed of Richmond Terrace (Snug Harbor, Corporal Thompson, Faber Park, Veterans Park, Walker Park, and Heritage Park), highlighting the importance of the corridor in providing safe pedestrian access to key destinations on the North Shore. Because most of the Kill Van Kull waterfront consists of industrial lots, the existing waterfront parks (Snug Harbor, Heritage Park, Faber Park) provide residents with some of the few publicly accessible waterfront areas and tree-lined segments of the corridor that enhance the experience of walking along Richmond Terrace.



MAP 12: 100-Year and 500-Year Floodzone along Richmond Terrace.

Flood Risk

Portions of Richmond Terrace are located in the floodplain resulting in resiliency challenges for transportation infrastructure and the surrounding buildings.

Richmond Terrace's proximity to the waterfront presents resiliency challenges to the corridor and land uses. The floodplain extends along the Kill Van Kull and overlaps with many of the corridor's industrial job centers along the waterfront, Jewett Avenue, Clove Road. Some upland residential neighborhoods in Livingston and West Brighton are also located within the floodplain. These areas and some north-south streets (Nicholas and Bement Avenues) are prone to flooding during significant rain events, as demonstrated during Hurricane Ida.

Within the study area, approximately 35 percent of Richmond Terrace's roadbed and 5% of buildings (417 buildings) are located in the 100-year and 500-year floodplains, including the NYC Department of Environmental Protection's Port Richmond Wastewater Treatment facility. In 2008, flood-resistant design standards in the NYC Construction Codes were updated. However, 81 percent of the total buildings in the floodplain were built before these updated standards, potentially leaving them vulnerable to more extreme weather events due to climate change and sea level rise.

Following Hurricane Sandy in 2012, the City led several initiatives to improve the ability of homeowners and business owners to withstand and recover from future storms.

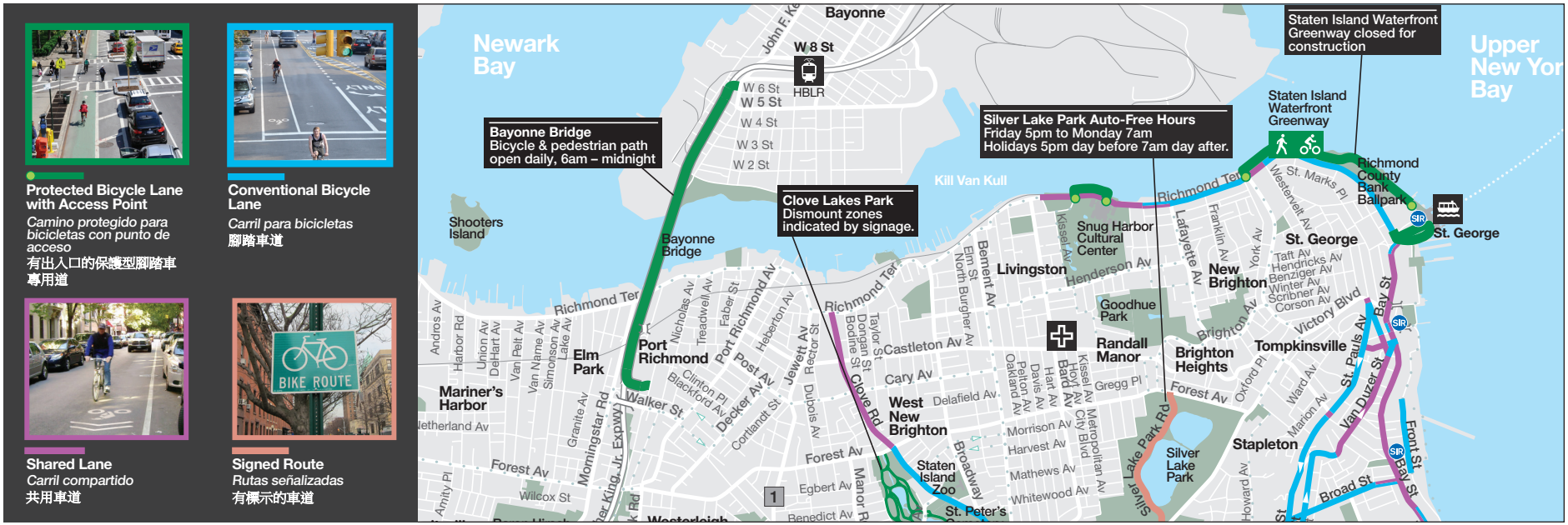
FIGURE 28: Debris left in the aftermath of Hurricane Sandy near the intersection of Bank Street and Richmond Terrace, 2012.

FIGURE 29: Standing water left in the aftermath of Hurricane Sandy along Richmond Terrace.

On May 12, 2021, the City Council adopted Zoning for Coastal Flood Resiliency (ZCFR), which helps facilitate the resilient design of new and retrofitted buildings in the flood zone to better protect them from flooding and reduce flood insurance costs. ZCFR also included regulations that will help New Yorkers recover quickly from other future disasters. In 2021, the impacts of Hurricane Ida demonstrated the vulnerability of many inland Staten Island neighborhoods to extreme rain events, including Port Richmond, highlighting the need for future policy interventions to consider different types of flooding.

FIGURE 30: Flooding on Jewett Ave during Hurricane Ida, 2021. Source: silive.com

FIGURE 31: Flooded basement in a Staten Island home during Hurricane Ida, 2021. Source: silive.com



MAP 13: Staten Island Bicycle Network Map, 2021. Source: NYc DOT

Transportation

Richmond Terrace is a major arterial, but is constrained in providing service for all users.

Within the study area, Richmond Terrace ranges from a built width of 45 to 60 feet, including roadways, sidewalks and planters. The narrow width of Richmond Terrace results in subpar travel conditions for all roadway users:

Motorists

There is one driving lane in each direction and minimal passing or turning lanes, leading to bottlenecks at some signalized intersections during peak travel times. On-street parking is inconsistent and depends on the width of the roadway.

Pedestrians

Sidewalks are oftentimes undersized (less than 5 feet in width), in disrepair, and missing in some areas. As illustrated in Map 16, distance between north-south pedestrian crossings on Richmond Terrace is often greater than ¼ mile, creating unsafe crossing conditions for bus riders and limiting connectivity between residential areas and waterfront trip generators such as industrial jobs and recreational destinations. Existing pedestrian infrastructure connecting to and along Richmond Terrace is discussed in greater detail in the Street Sections section of the report.

Cyclists

Since Richmond Terrace is flat relative to hilly areas further inland (e.g., in St. George) and one of the few east-west continuous streets on the North Shore, it has the potential to serve as a major bike corridor for the surrounding communities. However, bike infrastructure is currently lacking in the area. The only existing bike facilities along Richmond Terrace alternate between unprotected bike lanes and sharrows (shared bike and vehicle traffic) between St George and Snug Harbor, leaving cyclists mixed with motorists and truck traffic throughout most of the corridor. This creates unsafe conditions

FIGURE 32: Cyclists biking along a narrow sidewalk on Richmond Terrace.

along Richmond Terrace particularly in areas with tight turns and minimal shoulder space. These bike lanes and sharrows end abruptly at Snug Harbor and do not provide a connection to designated bike paths and shared lanes along Clove Road, the Bayonne Bridge, and the Goethals Bridge, resulting in a fragmented bicycle network in this section of the North Shore. Bicycle network connectivity to and from Richmond Terrace is also lacking as there is only one designated north-south bike route that intersects with Richmond Terrace (a shared lane along Clove Road). The Citi Bike service area does not currently include Staten Island.

Transit Riders

Local buses travel in mixed traffic as there are no dedicated bus lanes within the study area. Narrower sections of Richmond Terrace have minimal shoulder space for buses to pull over for passengers, resulting in the buses blocking passing traffic and further bottlenecks. There are 11 bus shelters in the study area, three of which are located at a bus stop along Richmond Terrace.

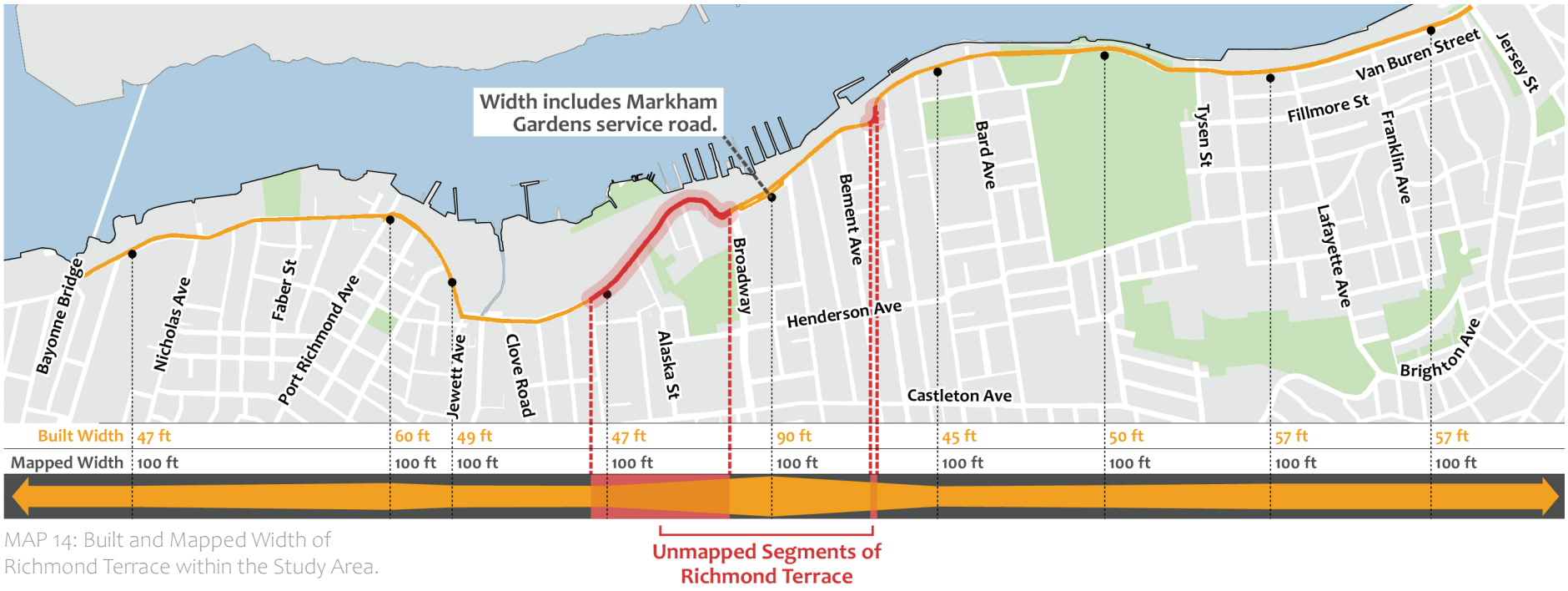
The study area is predominantly served by local buses that have some of the highest ridership numbers in the borough. There are nine local buses that either provide local or limited service through the study area (S40/90, S42, S44/94, S46/96, S53, S54, S57, S59, and S66) and two express buses (SIM3 and SIM35). In 2019, three of the study area's local buses (S53, S46/96, and S44/96) were within the top five highest ridership local routes operating on Staten Island. However, in recent years, the Staten Island bus system has been experiencing a decrease in ridership. Boroughwide bus ridership decreased by 12.88 percent between 2015 and 2019, a trend that accelerated because of the COVID-19 pandemic, which contributed to a 39 percent decrease in ridership between 2019 and 2020.

The buses in the study area with the fastest average peak hour speed are the S59 (14 mph) and S40 (12.9), which are comparable to the borough wide average (13.74 mph) and significantly faster than the citywide average (7.96). The S53 had the slowest average peak hour speed (10 mph) of the bus routes in the study area.

Trucks

The study area contains two designated local truck routes and one designated through truck route. Through truck routes are designated for trucks having neither an origin nor a destination within the local area, and local truck routes are designated for trucks with origins or destinations within an area for the purpose of delivery, loading, or providing services. Truck routes within NYC are governed by the Rules of the City of New York, Volume II, Chapters 4-13, 2019. These regulations apply to vehicles designed for the transportation of property and have either two axles and six tires or three or more axles.

- **RICHMOND TERRACE**
  An east-west local truck route extending from Western Avenue in the New York Container Terminal in Howland Hook to Bay Street in St. George. Local truck traffic from Richmond Terrace can access or egress the Dr. M.L.K. Jr. Expressway and Staten Island Expressway, which are arterial highways and through truck routes located just south of the study area, via Port Richmond and Forest Avenue.



MAP 14: Built and Mapped Width of Richmond Terrace within the Study Area.

- **PORT RICHMOND AVENUE**
  A north-south local truck route running from Richmond Terrace to Forest Avenue in Port Richmond and providing truck access and egress to the Dr. M.L.K. Jr. Expressway and Staten Island Expressway at Forest Avenue.

- **DR. M.L.K. JR. EXPRESSWAY**
  A north-south through truck route running from the Bayonne Bridge to the Staten Island Expressway at the westernmost portion of the study area.

Richmond Terrace is underbuilt to its designated width on the City Map.

As discussed in the North Shore 2030 and West Brighton and Port Richmond BOA studies, there are several stretches of Richmond Terrace where the roadbed is not built to its mapped width, per the City Map. Richmond Terrace is mapped up to 100 feet wide throughout most of the study area, but only built out to 48 to 60 feet. The primary obstacle to fully building out Richmond Terrace is that there are 131 lots and 70 buildings located within its mapped width. However, there are 24 vacant lots that could consider potential widenings in redevelopment plans. Additionally, there is a city-owned portion of the mapped street in New Brighton between York Avenue and Franklin Avenue that could be preserved for future widening opportunities.

There are also segments of Richmond Terrace that are not mapped streets or align with how the mapped roadbed appears on the City Map. One segment occurs between Taylor Street and Broadway in West Brighton where Richmond Terrace is a Record Street, which is a street that is not officially mapped but is physically improved and has been dedicated to public use by a private owner. Another instance is between Bement and Pelton Avenues where the unbuilt, mapped portion of Richmond Terrace runs through the campus of Caddell

FIGURE 33: Missing sidewalk along Richmond Terrace.

FIGURE 34: Truck parking in the bike lane and on the sidewalk along Richmond Terrace.

Road Safety

Dry Dock and Repair, but the existing Richmond Terrace roadbed follows Pelton Avenue briefly and then curves sharply north to return to the alignment as delineated on the City Map. Although the discrepancies between the mapped and built widths of Richmond Terrace do not adversely affect access to the public and city services, it does create unclear conditions for property owners who own lots with a street mapped on it. For example, if a property owner pursued a development on a portion of their site where Richmond Terrace is mapped, they would be required to seek City approvals for a waiver of General City Law 35 for construction in the bed of a mapped street.

While crash frequency and severity along Richmond Terrace are lower than many other arterials on Staten Island, crashes are more prevalent near key destinations.

Between 2015 and 2019, 261 crashes occurred on Richmond Terrace between Jersey Street and the Bayonne Bridge. 213 of these crashes, or 82%, occurred at intersections as opposed to mid-block locations. The five locations along the corridor with the highest number of crashes are Lafayette Avenue,

RICHMOND TERRACE CRASHES BY MODE

NYC DOT, 2015-2019

Crash Type	Crash Count	Injuries	Fatalities
Total Crashes	261	251	0
Pedestrian	17	18	0
Cyclist	18	18	0
Motorist Only	226	215	0

FIGURE 35

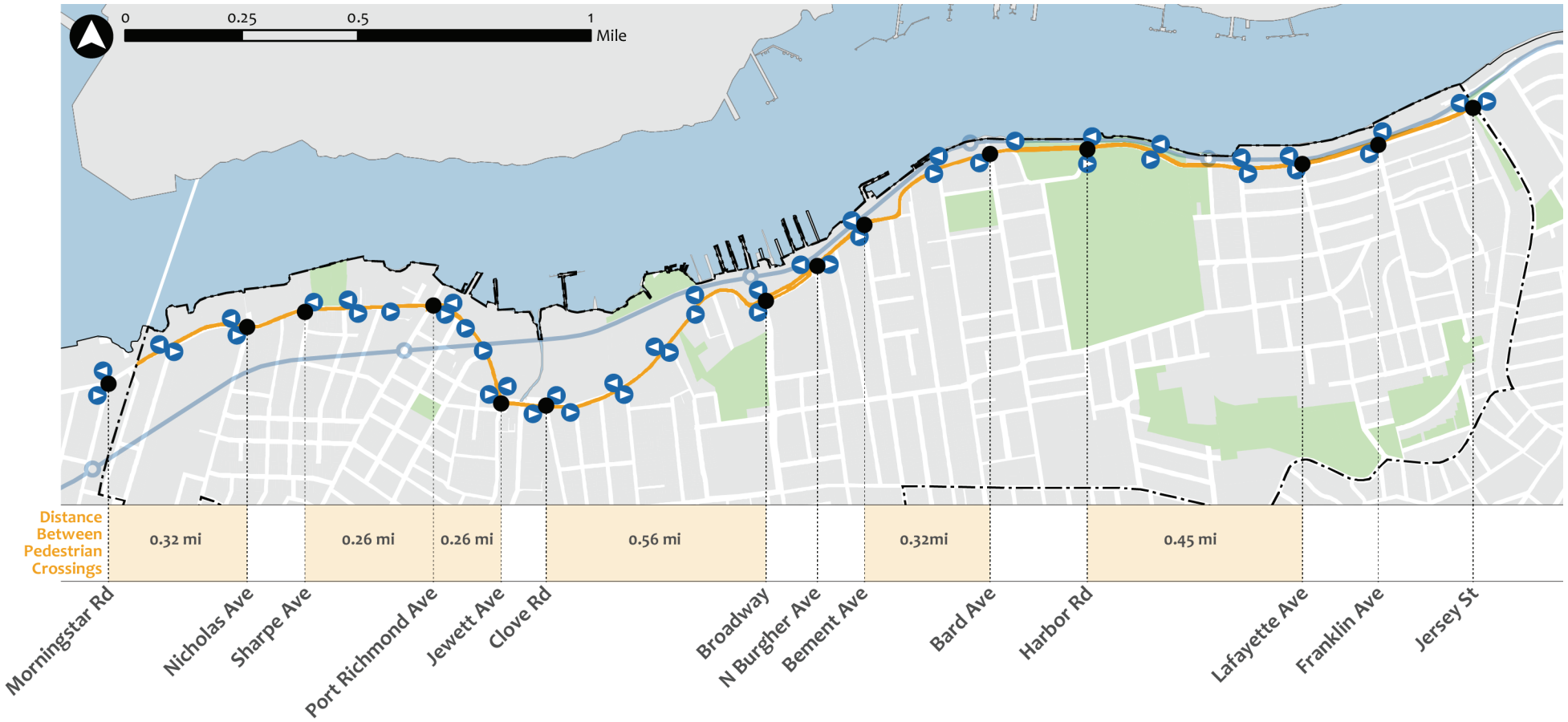
Bard Avenue, John Street, Broadway, and Jewett Avenue. In addition to these individual intersections, clusters of crashes occurred between Nicholas Avenue and Port Richmond Avenue, Jewett Avenue and Clove Road, Broadway and Bement Avenue, and Lafayette and Jersey Street.

MAP 15: Crashes along Richmond Terrace, aggregated to mid-block and intersections.

These high crash areas are located on segments of Richmond Terrace that contain destinations that result in more conflicts between turning vehicles. For example, the cluster of crashes between Broadway and Bement Avenue is located near the Markham Gardens housing development, Corporal Thompson Park, and the Caddell Dry Dock and Repair campus.

17 of the crashes along the corridor involved pedestrians and 18 involved cyclists; however, no single location had more than two pedestrian or two cyclist crashes, meaning these collisions were spread throughout the corridor. The NYC Department of Transportation identified Broadway, Bard Avenue, Port Richmond Avenue, and Castleton Avenue as a Vision Zero Priority Corridors.

Meanwhile, there are a lack of safety measures employed along Richmond Terrace that help reduce potential conflicts between pedestrians and motorists. For example, only 11 intersections within the study area have Leading Pedestrian Intervals (LPIs), which improve safety by showing a walk sign for pedestrians before the green light to car traffic, providing pedestrians a chance to begin crossing the street before cars make turns across the crosswalk. None of the LPIs in the study area are located along Richmond Terrace. Other safety measures that are currently lacking but could be applicable to Richmond Terrace include traffic calming for turning vehicles, consistent lane widths and striping, new pedestrian crossings and enhancements to existing crossings near bus stops and key destinations, and the implementation of bicycle facilities that are physically separated from heavy traffic.



MAP 16: Richmond Terrace Bus Stop Locations and Distance between Pedestrian Crossings

- Richmond Terrace Study Area
- Richmond Terrace Study Corridor Extents
- Signalized North-South Pedestrian Crossing of Richmond Terrace
- Eastbound Richmond Terrace Bus Stop
- Westbound Richmond Terrace Bus Stop
- Proposed BRT Route & Stations

Walkability

Map 16 shows the locations of bus stops and north-south pedestrian crossings of Richmond Terrace throughout the study corridor. As labeled on the map, there are six instances of pedestrian crossings spaced greater than 0.25 miles apart along the corridor. All six of these gaps contain bus stops without marked pedestrian crossings for bus riders to cross Richmond Terrace. Additionally, the lack of consistent north-south pedestrian crossings along the corridor inhibits safe and convenient access to large trip generators including waterfront parks, employers and civic destinations.

The proposed North Shore Bus Rapid Transit alignment is also shown in Map 16, highlighting the importance of safe and frequent pedestrian crossings of Richmond Terrace near proposed station locations.

MAP 17: Street Section Illustration Locations.

Street Sections

To provide additional context to the user experience traveling to and along the corridor, eight sections of Richmond Terrace and four sections of major connectors were recorded. Each section illustrates the amount of roadway space allocated to each mode of transportation and relationship with the adjacent land uses.

Street Section Locations

RICHMOND TERRACE

1. New Brighton Industrial Corridor
2. Franklin Ave
3. Snug Harbor East
4. Snug Harbor West
5. Harbor Rd/Bard Ave
6. Broadway to Clove Rd
7. Park Ave and Clove Rd Industrial and Commercial
8. Treadwell Ave

NORTH-SOUTH STREETS

9. Jersey Street Corridor
10. Bard Ave Corridor
11. Broadway Corridor
12. Port Richmond Ave: Church St to Richmond Terrace

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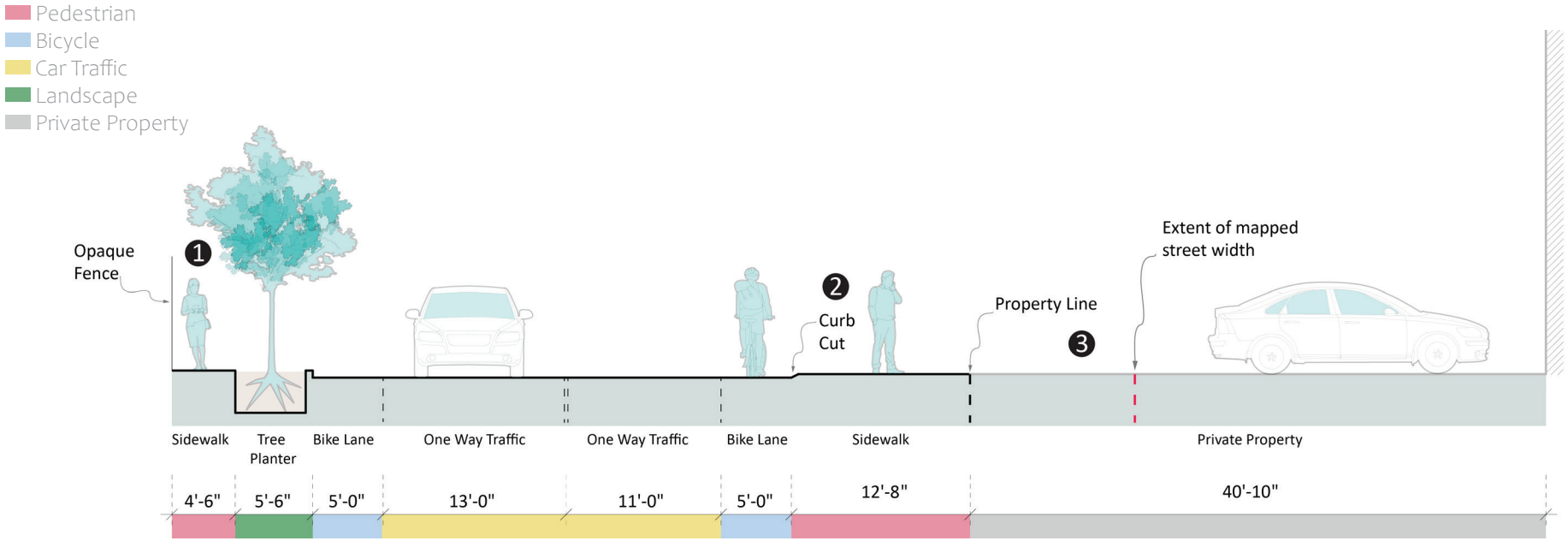


FIGURE 36

Richmond Terrace: New Brighton Industrial Corridor

Planters enhance the experience of traveling along the corridor, but can restrict sidewalk widths where there is limited space. Pedestrians walk very close to opaque fencing along adjacent industrial uses, which is a City requirement for industrial sites. This fencing limits the potential of visual and physical connections to waterfront to be an asset to the surrounding neighborhood, which has been achieved in many other waterfront neighborhoods throughout the city.

The prevalence of curb cuts to facilitate ease of vehicles onto an auto-centric lot creates unpredictable conflicts between pedestrians, bicycles, and motorists and affects safety for all users.

This section illustrates the difference between the built and mapped width and how incorporating the mapped width could potentially address some of the transportation challenges along the corridor.

1. Shallow sidewalk width next to opaque fence causes a very unpleasant walk on the north side.
2. There is a curb cut for most of the corridor, leading to lack of security of pedestrians.
3. The mapped street width falls within the property line of various lots.

FIGURE 37

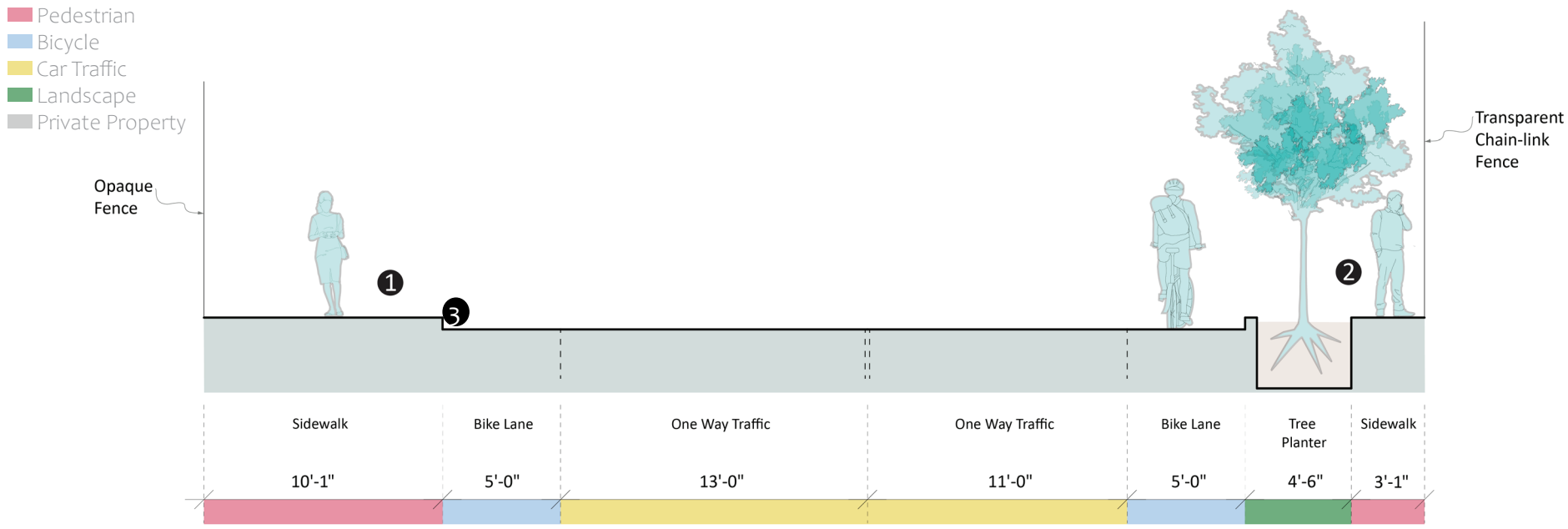


FIGURE 38

Richmond Terrace and Franklin Ave

FIGURE 39

1. Sidewalk width on north side feels comfortable.
2. The narrow sidewalk between the planter and chain link fence makes this feel claustrophobic for a pedestrian.
3. The bike lane's width is less than the DOT standard (5'-6").

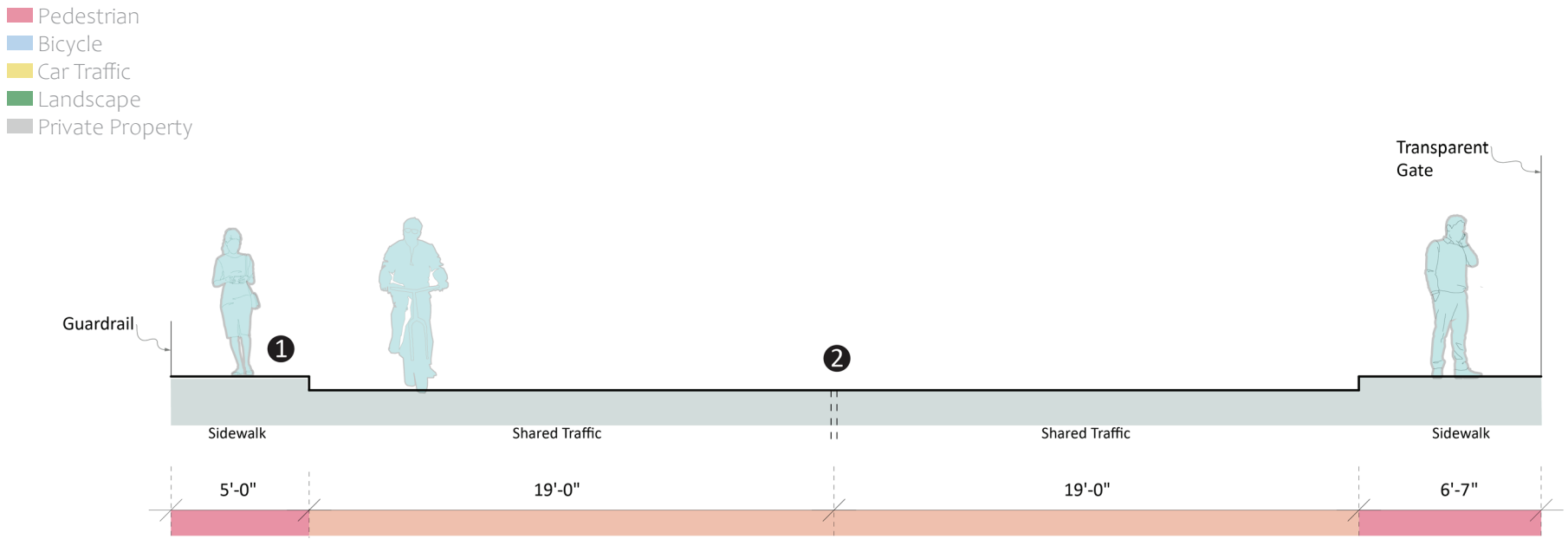


FIGURE 40

Richmond Terrace: Snug Harbor East

1. Sidewalk is narrow and unkept, making it difficult to walk for long stretches.
2. Lanes are wide enough on both sides to accomodate a delineated bike lane.

Snug Harbor is a key North Shore destination that attracts visitors using all modes of transportation: walking, driving, biking, and public transit. However, a significant portion of the built roadbed is dedicated to two moving lanes for vehicles (77 percent of roadbed or 37 feet). Per the American Association of State Highway and Transportation Officials standard, lane widths on arterials are typically 12 feet for bus and truck traffic and 10 to 12 feet for cars. Unnecessarily wide travel lanes can encourage speeding, an issue reported by the community in 2019 when a motorist drove into the landmarked fence along Snug Harbor, resulting in at least $10,000 in damages4. There seems to be an opportunity to reallocate some space to widen sidewalks, especially in instances where utility poles create a very narrow walkway, or provide on-street parking, bicycle facilities, planting, and other amenities that could serve as traffic calming measures designed to reduce speeds.

FIGURE 41

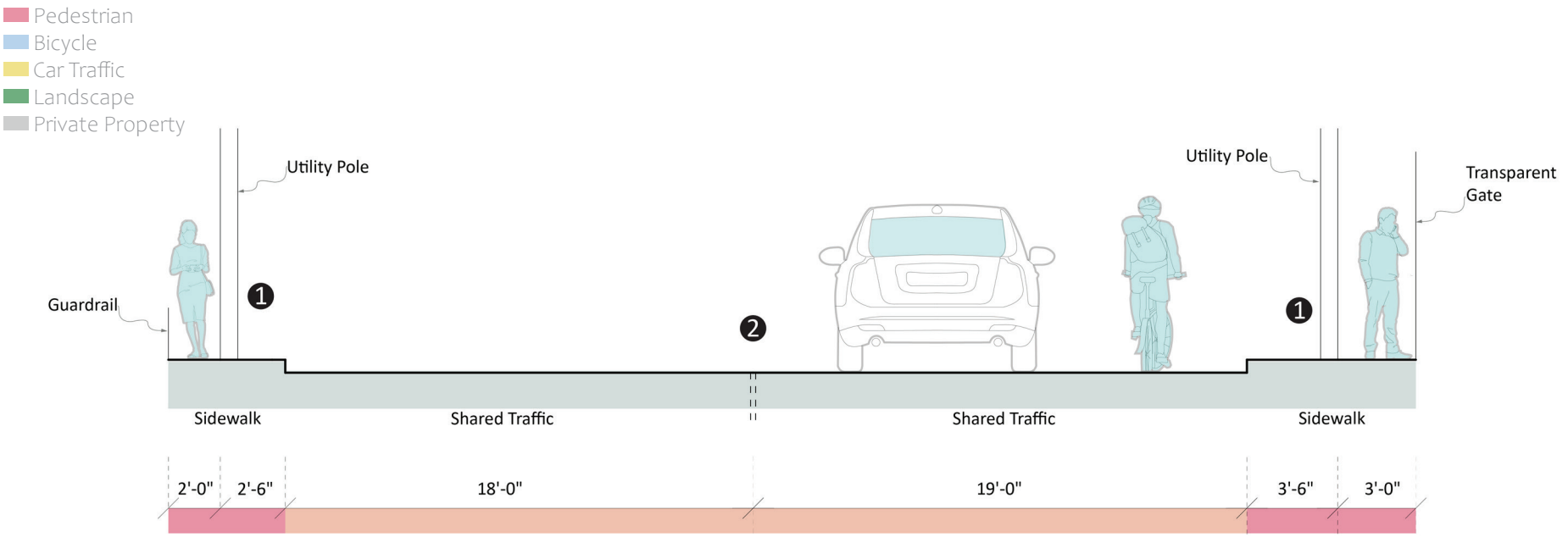


FIGURE 42

Richmond Terrace: Snug Harbor West

FIGURE 43

1. Utility poles on both sidewalks reduce the right-of-way to an unmanageable width.
2. Driving lanes are wide enough to accomodate a delineated bike lane.

Continuing further west along the Richmond Terrace corridor, the street is surrounded by parkland, providing greenery and benches that enhance the experience of traveling along the corridor. Some lawn areas on city-owned land are underutilized and not maintained, presenting an opportunity for widening sidewalks, which are narrow. However, transportation improvements should consider the extensive natural features that exist on the existing parkland and ensuring adequate stormwater drainage since this section is located within the 100-year floodplain. For example, transportation improvements could be combined with green infrastructure that prevents stormwater from

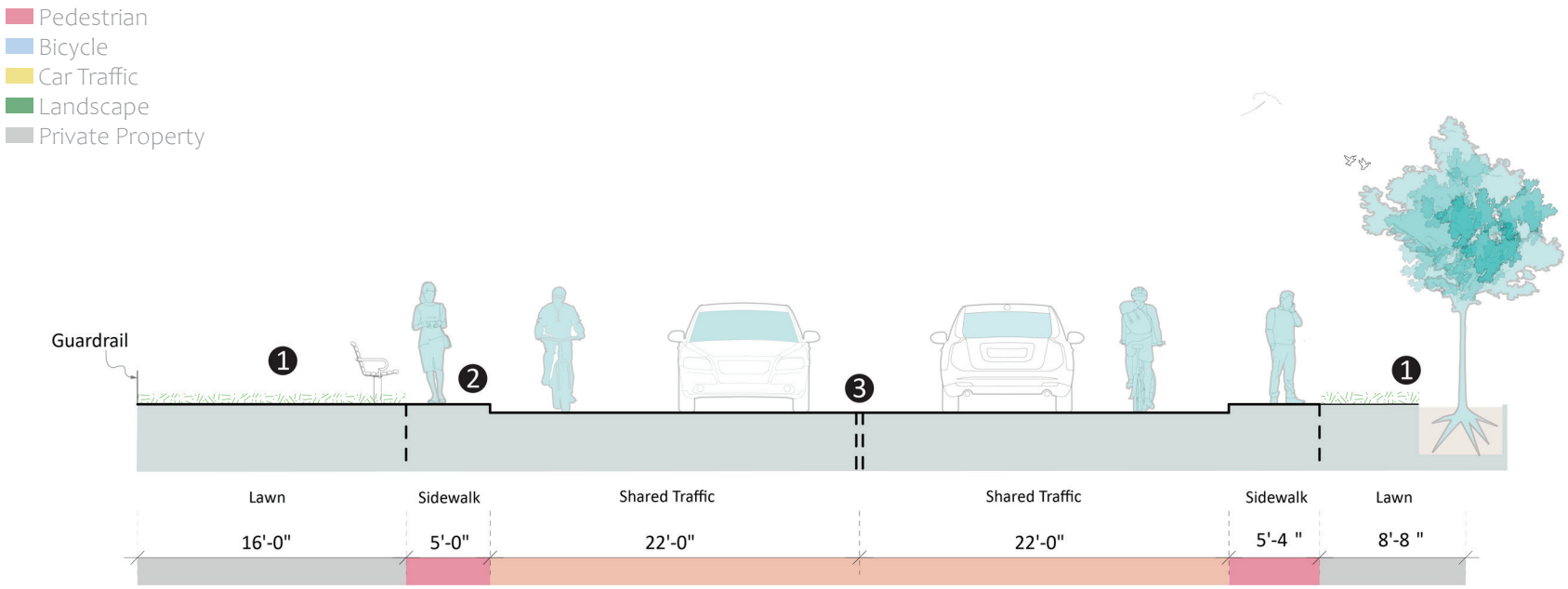


FIGURE 44

Richmond Terrace: Harbor Road & Bard Ave

entering the City's sewer system, which helps to improve the health of local waterways, including the freshwater wetlands located just south of Richmond Terrace in the Snug Harbor campus.

Compared to section of Richmond Terrace that passes through New Brighton, the width of the driving lanes increases between Harbor Road and Bard Avenue. The space within the built roadbed could be reallocated to other amenities and implement traffic calming measures.

1. The NYC Parks lawn provides opportunity to widen sidewalks on both sides.
2. Sidewalk width is shallow.
3. Large road bed provides opportunity for protected bike lanes.

FIGURE 45

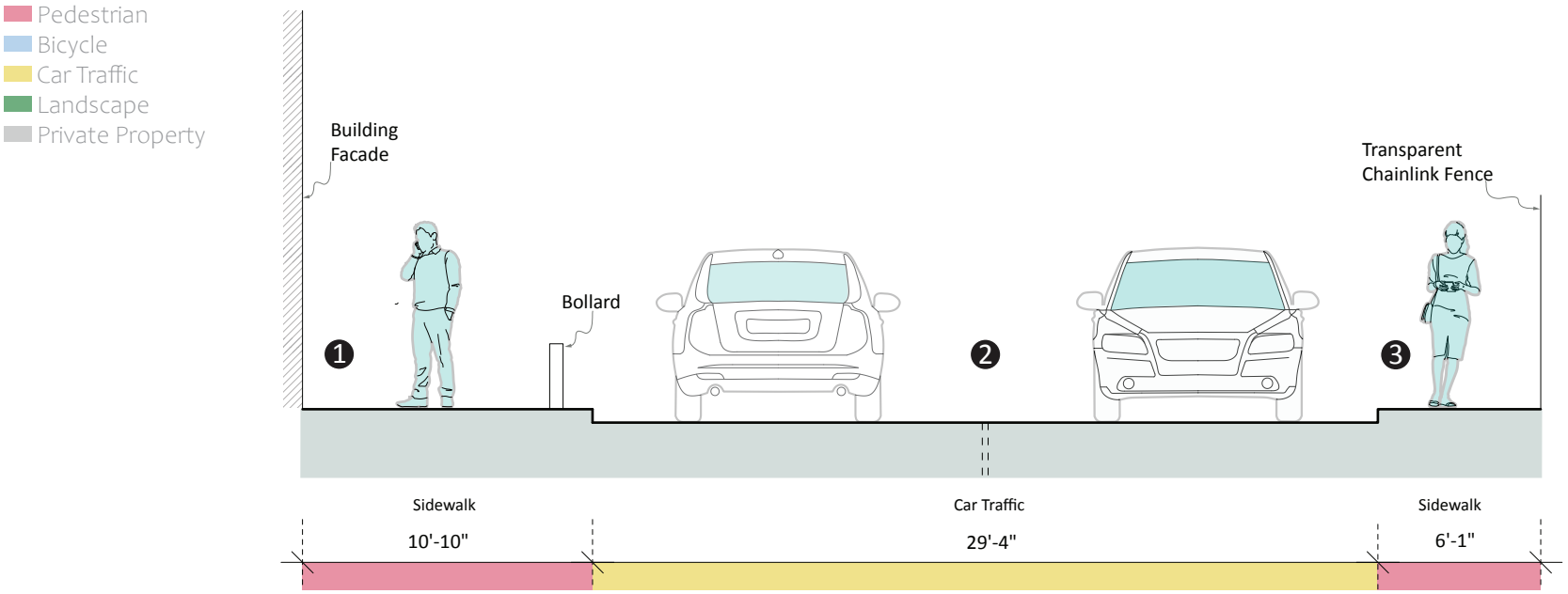


FIGURE 46

Richmond Terrace: Broadway to Clove Road

FIGURE 47

1. North side sidewalk has ample width to accommodate benches, trees, or green infrastructure.
2. Roadbed has enough width to accomodate at least one bike lane.
3. South sidewalk feels uncomfortable due to the auto related uses along the street.

In this section, the roadway narrows to its smallest width in the study area, but this coincides with an increase in the width of the sidewalks, which provides opportunities for pedestrian amenities (e.g. seating) and planters along this mix industrial and commercial area.

The continuous street wall on both sides of the street also creates a more comfortable and interesting experience for people walking and traveling in this area.

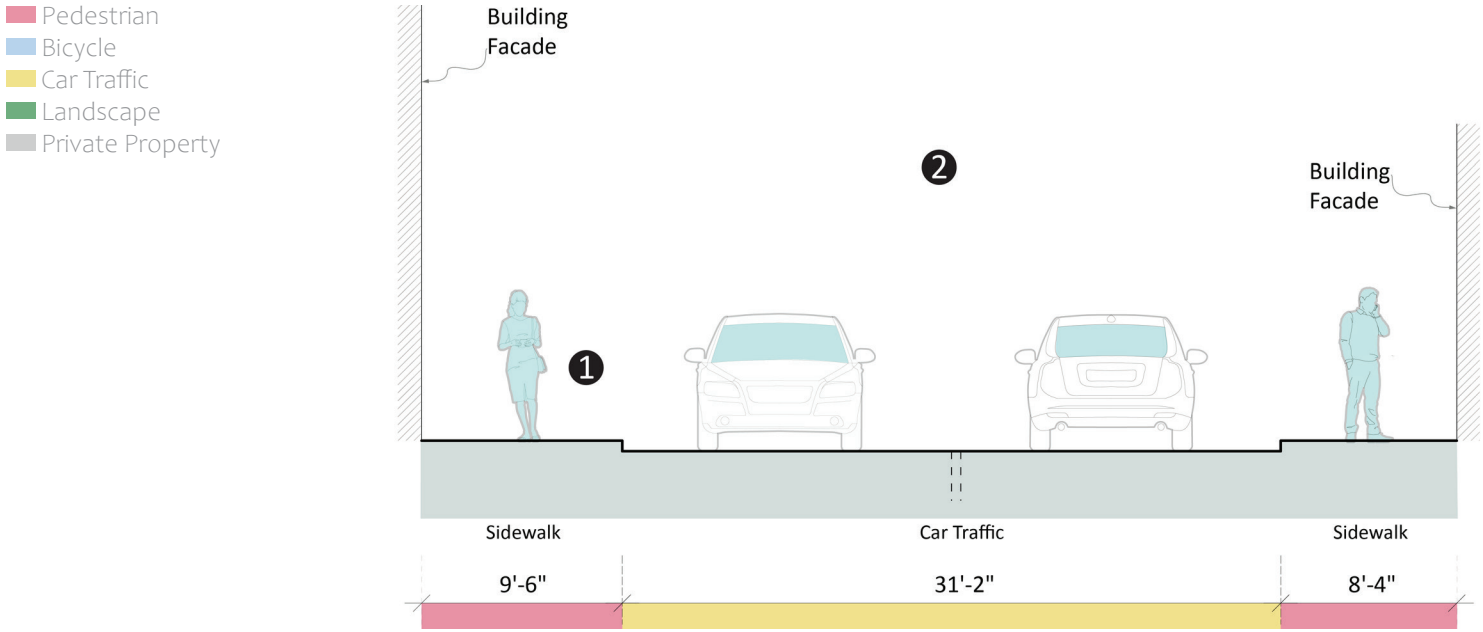


FIGURE 48

Richmond Terrace: Park Avenue and Clove Road Industrial and Commercial

1. Ample space on sidewalks to accommodate seating, planting, or green infrastructure.
2. The corridor feels more comfortable than other segments along Richmond Terrace due to building street walls on both sides.

FIGURE 49

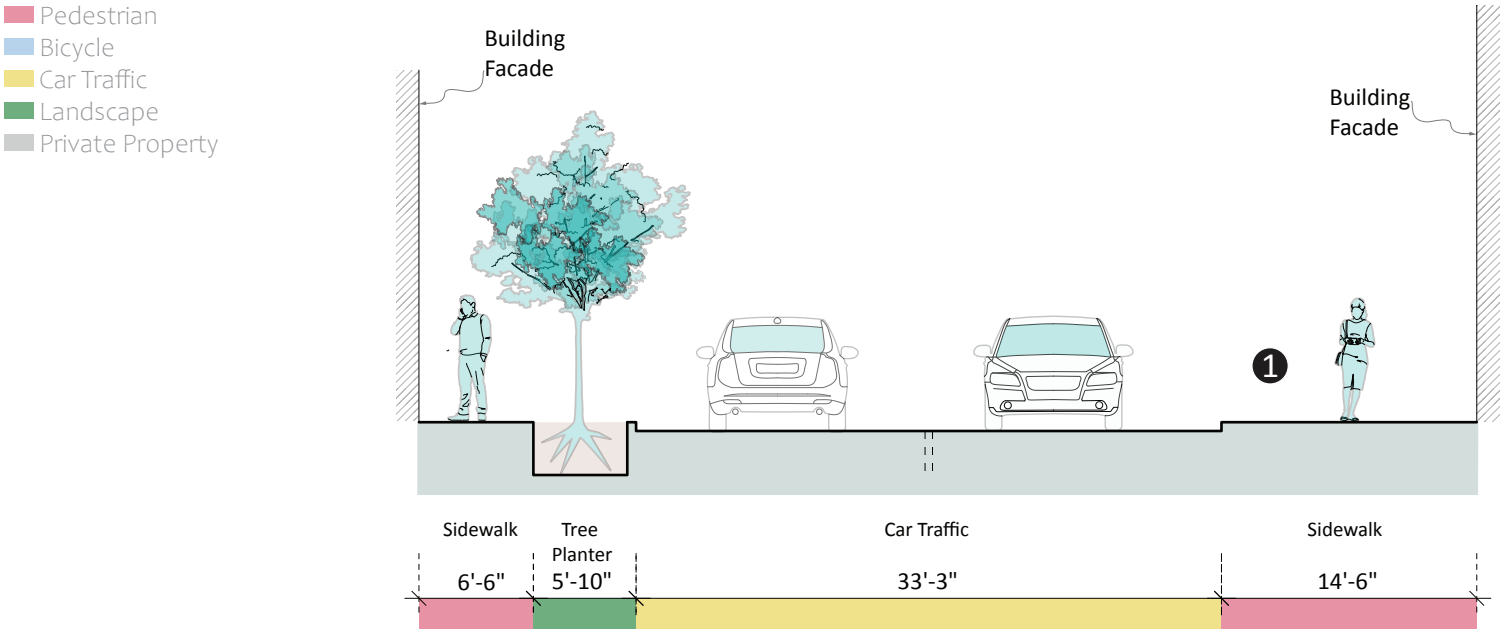


FIGURE 50

Richmond Terrace: Treadwell Ave

FIGURE 51

1 Ample space on sidewalks to accommodate seating, planting, or green infrastructure.

Similar to the preceding section, a reduction in the roadway coincides with an increase in the width of the sidewalks, creating opportunities for other amenities. Because this stretch of the corridor is in the 100-year floodplain, there could be an opportunity to dedicate some of this space to green infrastructure.

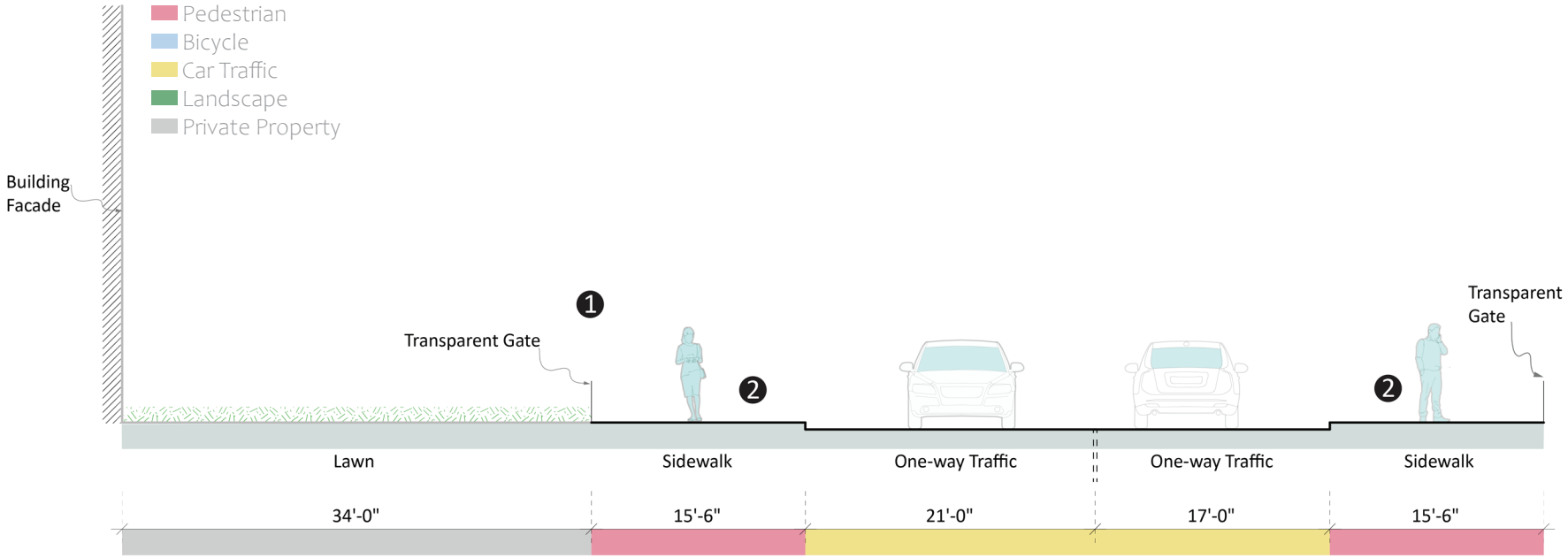


FIGURE 52

North-South Streets

Jersey Street Corridor

1. The gate along the property line creates an unecessary break in the flow of the streetscape.
2. Sidewalks on both sides are very wide.

The sidewalks along Jersey Street are very wide, creating an opportunity to provide amenities (e.g. seating) that might not be feasible along Richmond Terrace and create traffic calming measures for vehicles traveling to or from the corridor. More space could be allocated to the sidewalk by removing the fence surrounding the unused lawn areas on the city-owned NYCHA campus. This fencing also creates a break in flow of the streetscape and does not create an inviting walkway.

Additionally, the wide travel lanes provide on-street parking spaces, which is not available along Richmond Terrace in this area.

FIGURE 53

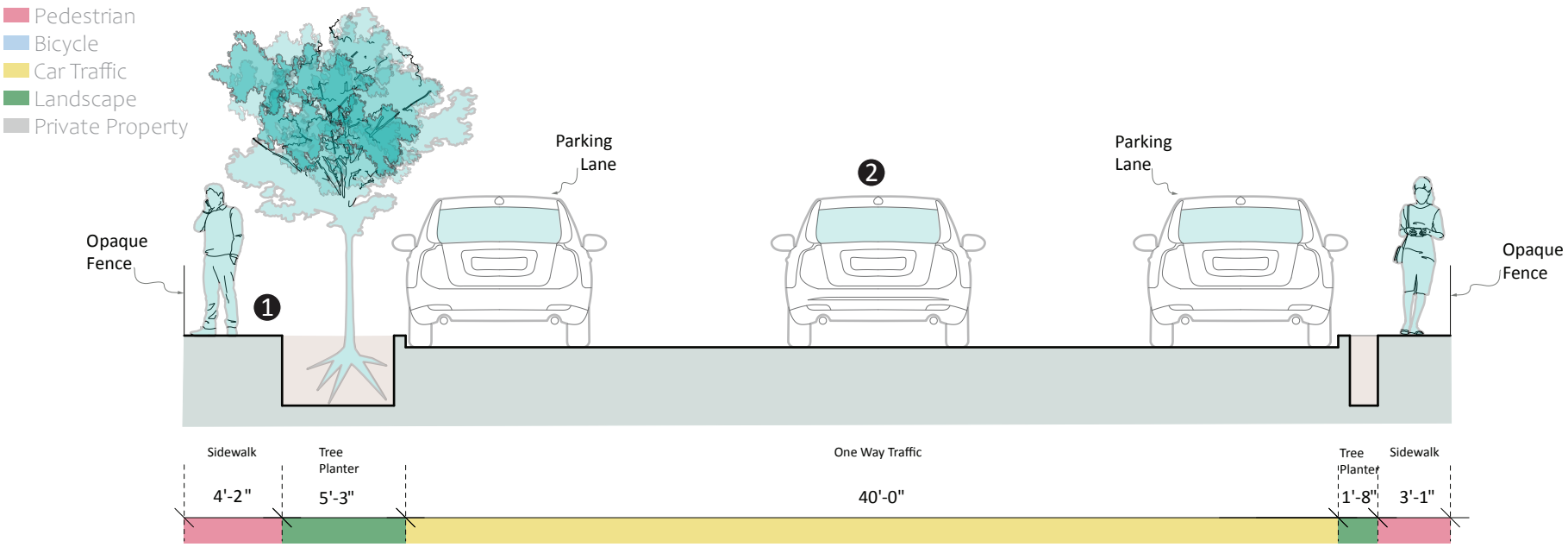


FIGURE 54

Bard Ave Corridor

FIGURE 55

1. Sidewalks on the west side of Bard are too narrow.
2. Roadbed width is very wide for a residential corridor, potential for bike lanes.

The planters create an undersized sidewalk condition. Per DOT's Street Design Manual, sidewalks in low-rise residential areas should be at least 5 feet wide and conform to ADA requirements.

The roadway is very wide for the one-way street, providing excess space for one travel lane and two parking lanes. There is an opportunity to reallocate space to address the narrow sidewalks or introduce bike lanes to address recommendations from the West Brighton BOA study.

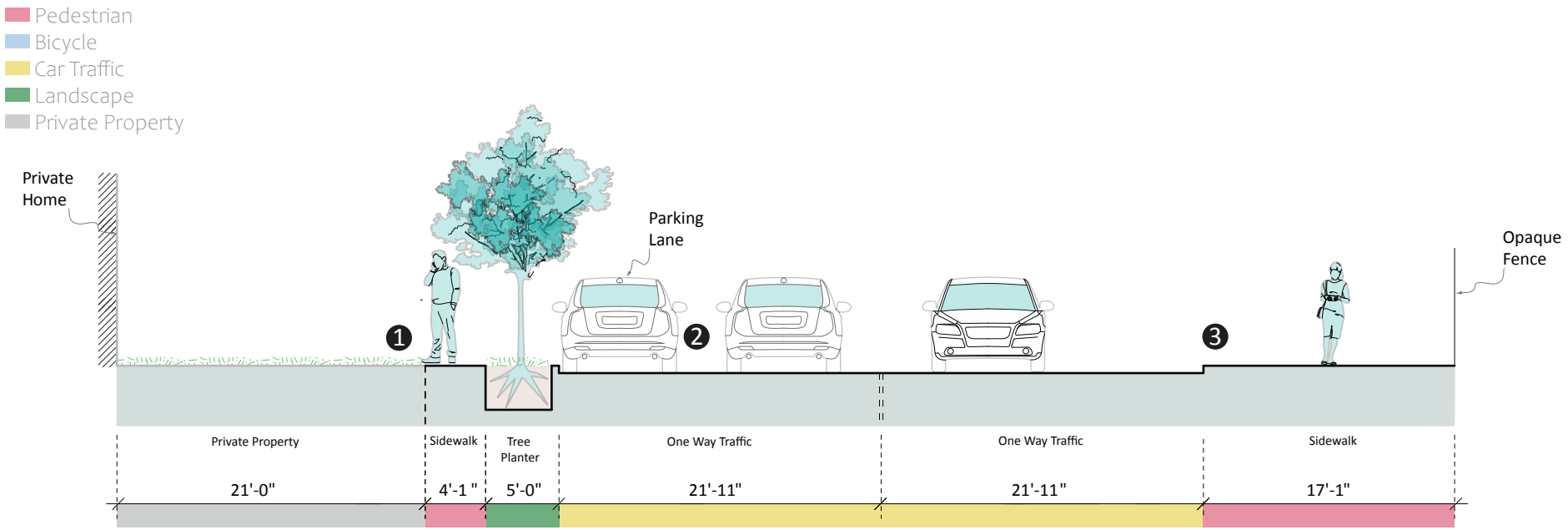


FIGURE 56

Broadway Corridor

1. Sidewalk on east side of Broadway is shallow, opportunity to redesign the streetscape holistically.
2. Roadbed width is very wide, has potential for bike lanes.
3. Sidewalks on the west side of Broadway are quite large.

The sidewalk on the western side of Broadway is very wide, while the sidewalk along the Markham Gardens complex is narrow when passing a planter. A holistic redesign of the street design could reallocate sidewalk space to the easternmost sidewalk.

The wide sidewalk facilitates one of the few bus shelters in the area and could allow for more planters near the intersection of Broadway and Richmond Terrace.

The roadway is wide, providing for on-street parking spaces on both sides of the street. However, there could be an opportunity to reallocate one of the parking lanes to a bike lane, providing safe access to key destinations along Broadway, including Markham Gardens, Corporal Thompson Park, and the West Brighton Houses.

FIGURE 57

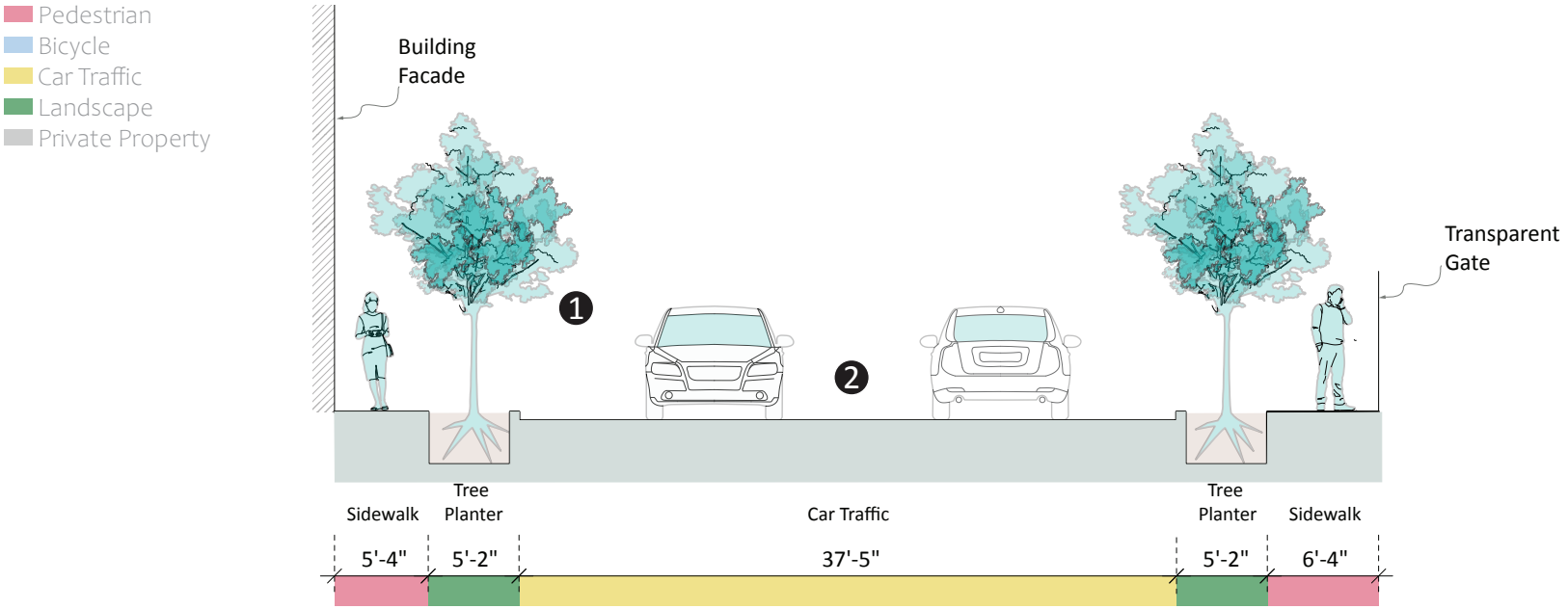


FIGURE 58

Port Richmond Ave: Church St to Richmond Terrace

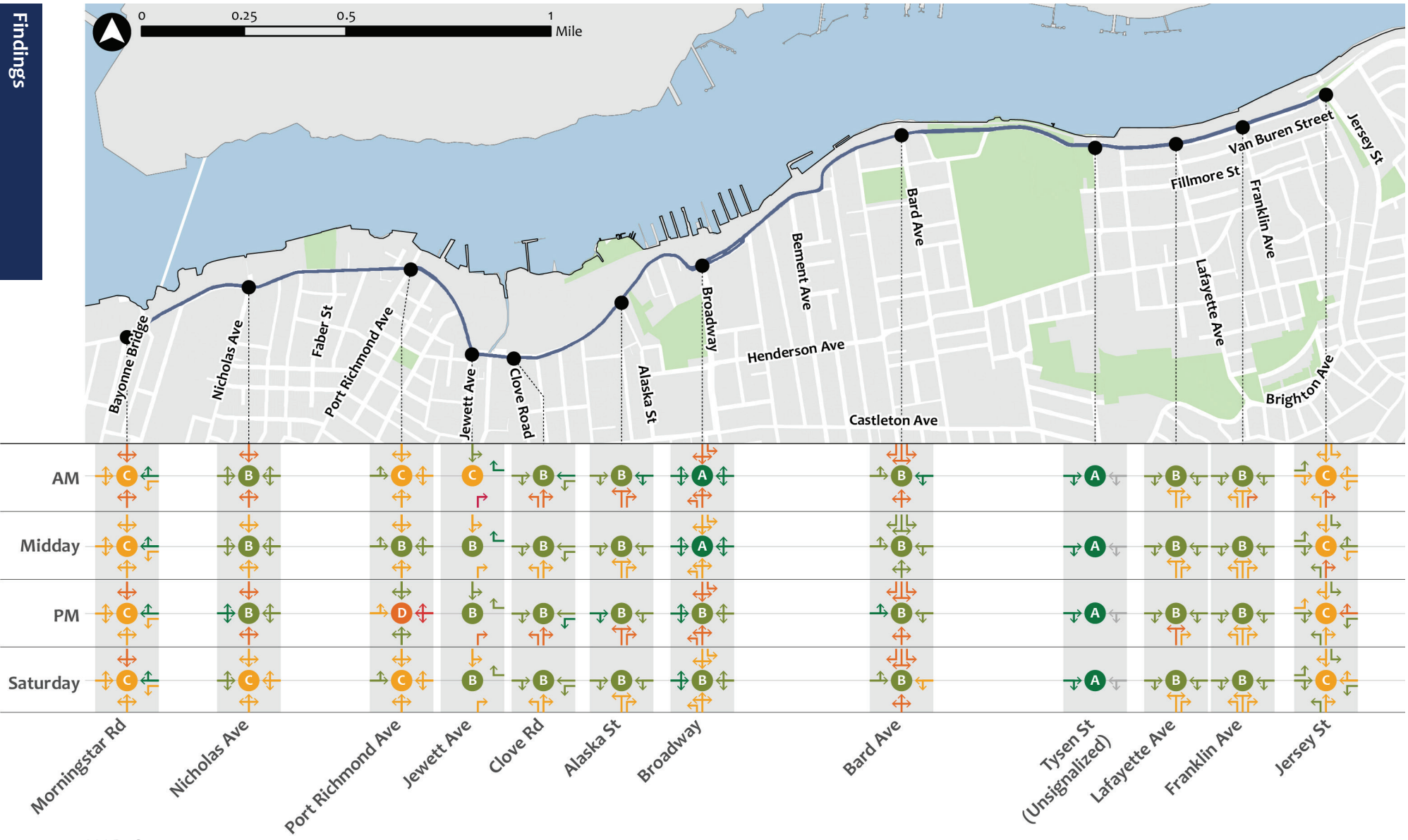
FIGURE 59

1. Trees on both sidewalks creates a pleasant experience for pedestrians.
2. Enough roadbed width to accommodate bike lanes.

The plantings on both sides of the roadbed creates a pleasant experience for traveling along the corridor.

The wide roadway provides for one travel lane in each direction, one parking lane, and a bus drop off lane for the end of the bus line. Reallocating space to bike lanes or pedestrian amenities (e.g. seating) could create more connections between the Port Richmond Avenue retail corridor and Richmond Terrace.

Findings



MAP 18

Existing Vehicular Level of Service (2021)

Existing Vehicular Level of Service

Traffic Analysis

The capacity analysis indicated that most intersection approaches operate acceptably, at LOS D or better, for all peak periods. There are only two intersection approaches along the corridor that operate at LOS E or worse:

1. The northbound, right-turn approach of Jewett Avenue onto Richmond Terrace operates at LOS F with a delay of 91.3 seconds per vehicle during the morning peak hour.
2. The westbound approach of Richmond Terrace serving turning and through traffic at Port Richmond Avenue operates at LOS E with a delay time of 70.2 seconds per vehicle during the evening peak hour.

FIGURE 60: This table displays level of service for all vehicular movements at signalized and unsignalized intersections where data was collected.

Signalized Intersections

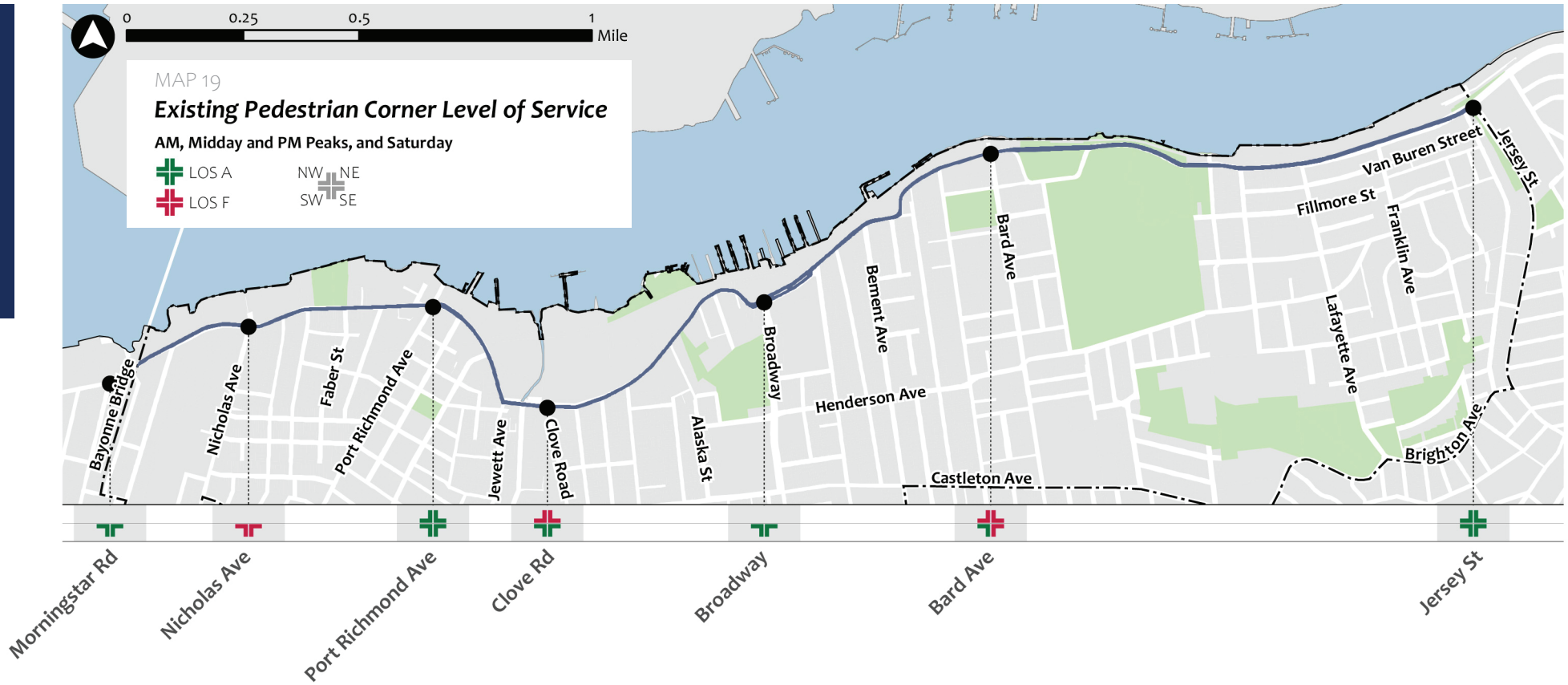
Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Jersey Street													
Eastbound	L	0	19.6	B	0.01	16.4	B	0.02	27.1	C	0.01	19.2	B
	TR	0.81	30.1	C	0.45	15.7	B	0.53	18	B	0.51	16.7	B
Westbound	L	0.16	24.7	C	0.05	17.6	B	0.08	17.2	B	0.06	17.8	B
	TR	0.63	31.9	C	0.65	28.0	C	0.84	38.1	D	0.79	34.5	C
Northbound	L	0.11	25.4	C	0.08	18.2	B	0.19	28.4	C	0.12	18.6	B
	TR	0.09	35.8	D	0.07	25.8	C	0.13	35.7	D	0.09	26.1	C
Southbound	L	0.01	24.2	C	0.02	17.6	B	0.01	26.2	C	0.01	17.5	B
	TR	0.01	34.6	C	0.01	25.0	C	0.01	33.9	C	0.01	25.0	C
Intersection Delay			**30.5**	**C**		**21.6**	**C**		**29.5**	**C**		**25.3**	**C**
Richmond Terrace at Franklin Avenue													
Eastbound	TR	0.71	17.4	B	0.46	12.7	B	0.45	11.4	B	0.51	13.4	B
Westbound	LT	0.56	13.4	B	0.54	14.1	B	0.71	17.3	B	0.73	19.7	B
Northbound	L	0.07	34.0	C	0.06	22.0	C	0.05	33.7	C	0.07	22.1	C
	LR	0	33.0	C	0	21.4	C	0	33.0	C	0	21.4	C
	R	0.22	36.5	D	0.06	22.0	C	0.12	34.7	C	0.07	22.1	C
Southbound													
Intersection Delay			**17.3**	**B**		**14.0**	**B**		**16.0**	**B**		**17.3**	**B**
Richmond Terrace at Lafayette Avenue													
Eastbound	TR	0.72	17.7	B	0.47	12.7	B	0.48	11.8	B	0.52	13.6	B
Westbound	LT	0.54	12.9	B	0.45	12.4	B	0.63	14.8	B	0.55	14.0	B
Northbound	LR	0.11	34.6	C	0.08	22.2	C	0.15	35.2	D	0.12	22.7	C
	R	0.13	34.9	C	0.07	22.1	C	0.08	34.2	C	0.06	22.0	C
Southbound													
Intersection Delay			**17.0**	**B**		**13.3**	**B**		**15.0**	**B**		**14.4**	**B**
Richmond Terrace at Bard Avenue													
Eastbound	LT	0.58	10.7	B	0.55	18.4	B	0.47	9.1	A	0.61	19.6	B
Westbound	TR	0.37	7.9	A	0.53	17.6	B	0.61	11.3	B	0.67	21.0	C
Northbound	LTR	0.13	39.0	D	0.07	17.4	B	0.10	38.7	D	0.07	17.4	B
Southbound	L	0.01	37.7	D	0.01	16.9	B	0.01	37.7	D	0.01	16.9	B
	LR	0	37.6	D	0	16.8	B	0	37.6	D	0	16.8	B
	R	0.08	38.8	D	0.03	17.0	B	0.08	38.7	D	0.03	17.1	B
Intersection Delay			**12.2**	**B**		**17.9**	**B**		**12.3**	**B**		**20.1**	**B**
Richmond Terrace at Broadway													
Eastbound	LTR	0.30	6.1	A	0.21	7.2	A	0.22	5.6	A	0.24	7.4	A
Westbound	LTR	0.40	7.4	A	0.44	9.6	A	0.63	10.9	B	0.55	11.2	B
Northbound	L	0.23	43.2	D	0.15	27	C	0.24	43.5	D	0.12	26.5	C
	LTR	0.14	41.4	D	0.06	25.7	C	0.11	40.8	D	0.12	26.5	C
Southbound	L	0	39.2	D	0	25	C	0.03	39.8	D	0.01	25	C
	LTR	0.01	39.3	D	0.02	25.2	C	0.18	42.0	D	0.01	25.1	C
Intersection Delay			**9.2**	**A**		**9.9**	**A**		**12.0**	**B**		**10.7**	**B**
Richmond Terrace at Alaska Street													
Eastbound	TR	0.61	11.2	B	0.44	10.7	B	0.45	8.7	A	0.50	11.5	B
Westbound	LT	0.49	9.3	A	0.50	11.6	B	0.64	12.1	B	0.55	12.3	B
Northbound	LR	0.08	38.7	D	0.06	24.1	C	0.13	39.3	D	0.12	24.8	C
	R	0.04	38.2	D	0.02	23.7	C	0.04	38.1	D	0.04	23.9	C
Southbound													
Intersection Delay			**11.2**	**B**		**11.6**	**B**		**11.8**	**B**		**12.7**	**B**

Signalized Intersections

Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Clove Road													
Eastbound	TR	0.45	15.4	B	0.37	16.8	B	0.35	14.6	B	0.39	17.1	B
Westbound	L	0.13	11.8	B	0.13	11.0	B	0.16	9.9	A	0.13	11.2	B
	T	0.39	9.6	A	0.41	11.7	B	0.53	11.0	B	0.54	13.6	B
Northbound	L	0.28	38.9	D	0.16	23.3	C	0.40	42.6	D	0.23	24.2	C
	TR	0.27	39.1	D	0.14	23.0	C	0.20	38.5	D	0.13	23.0	C
Intersection Delay			**16.4**	**B**		**15.2**	**B**		**16.1**	**B**		**16.1**	**B**
Richmond Terrace at Jewett Avenue													
Eastbound													
Westbound	R	0.50	5.6	A	0.53	7.3	A	0.78	12.1	B	0.69	10.6	B
Northbound	R	0.94	91.3	F	0.25	30.0	C	0.49	51.3	D	0.25	30.0	C
Southbound	LT	0.62	19.3	B	0.67	24.7	C	0.54	17.5	B	0.69	25.5	C
Intersection Delay			**26.1**	**C**		**16.8**	**B**		**17.3**	**B**		**17.8**	**B**
Richmond Terrace at Port Richmond Avenue													
Eastbound	LT	0.59	19.2	B	0.52	14.8	B	0.72	26.9	C	0.56	15.6	B
Westbound	LTR	0.69	22.5	C	0.59	16.3	B	1.04	70.2	E	0.79	23.3	C
Northbound	LTR	0.19	28.7	C	0.27	23.4	C	0.22	16.2	B	0.19	22.2	C
Southbound	LTR	0.01	26.1	C	0.05	20.6	C	0.04	14.2	B	0.04	20.5	C
Intersection Delay			**21.6**	**C**		**16.6**	**B**		**48.7**	**D**		**20.3**	**C**
Richmond Terrace at Nicholas Avenue													
Eastbound	LTR	0.51	9.5	B	0.41	11.7	B	0.38	7.8	A	0.44	12.1	B
Westbound	LTR	0.66	13.4	B	0.69	18	B	0.79	17.8	B	0.89	30.8	C
Northbound	LTR	0.47	47.1	D	0.31	25.4	C	0.54	49.3	D	0.31	25.5	C
Southbound	LTR	0.01	37.7	D	0.01	21.4	C	0.01	37.7	D	0.01	21.4	C
Intersection Delay			**15.1**	**B**		**16.6**	**B**		**17.8**	**B**		**23.7**	**C**
Richmond Terrace at Morningstar Road													
Eastbound	LTR	0.74	26.5	C	0.71	29.2	C	0.56	23.3	C	0.74	30.3	C
Westbound	L	0.48	22.2	C	0.59	26.3	C	0.74	32.5	C	0.67	29.9	C
	TR	0.27	6.9	A	0.29	8.9	A	0.42	8.3	A	0.36	9.7	A
Northbound	LTR	0.34	43.3	D	0.25	26.6	C	0.39	44.5	D	0.24	26.3	C
Southbound	LTR	0.01	37.7	D	0.01	23.6	C	0.01	37.7	D	0	23.5	C
Intersection Delay			**22.5**	**C**		**23.3**	**C**		**23.1**	**C**		**24.1**	**C**

Unsignalized Intersection

Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Tyson Street													
Eastbound	TR												
Westbound	TL	0.03	9.1	A	0.01	8.1	A	0.01	8.2	A	0.01	8.3	A
Northbound													
Southbound													



Existing Pedestrian Level of Service

Sidewalk Analysis

An analysis of existing conditions at selected intersections shows that all sidewalks operate at LOS A for all peak periods. Figure 61 presents the results of the analysis.

Corner Analysis

Analysis of the existing corners indicates that there are three locations where LOS is F for all peak periods:

1. At the intersection of Richmond Terrace and Bard Avenue, northeast, northwest and southeast corners operate at LOS F during all four peak periods.
2. At the intersection of Richmond Terrace and Clove Road, the northeast and northwest corners operate at LOS F for four peak periods.
3. At the intersection of Richmond Terrace at Nicholas Avenue, the southeast and southwest corners operate at LOS F for all four peak periods.

Figure 62 presents the results of the analysis. The HCM summary package, which documents the existing pedestrian LOS, is on file at the DCP.

Crosswalk Analysis

Analysis of the existing crosswalks shows that, during all four peak periods, crosswalks operate at LOS A. Figure 63 presents the results of the existing crosswalk conditions.

Existing Pedestrian Sidewalk Level of Service (2021)

P/M/F = Pedestrian/Minute/Foot

FIGURE 61

Intersection	Walkway	AM		MD		PM		SAT	
		p/m/f	LOS	p/m/f	LOS	p/m/f	LOS	p/m/f	LOS
Richmond Terrace at Jersey Street	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.1	A	0.1	A	0.0	A	0.1	A
	4	0.1	A	0.1	A	0.1	A	0.1	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.1	A	0.1	A	0.1	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Bard Avenue	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.1	A	0.1	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Broadway	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.0	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0	A	0.0	A	0.0	A
	8	n/s		n/s		0.1		n/s	
Richmond Terrace at Clove Road	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.0	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.1	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	
Richmond Terrace at Port Richmond Avenue	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.1	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Nicholas Avenue	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.2	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.0	A	0.0	A	0.1	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	
Richmond Terrace at Morningstar Road	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	

Existing Pedestrian Corner Level of Service

SF/P = Square Foot per Pedestrian

FIGURE 62

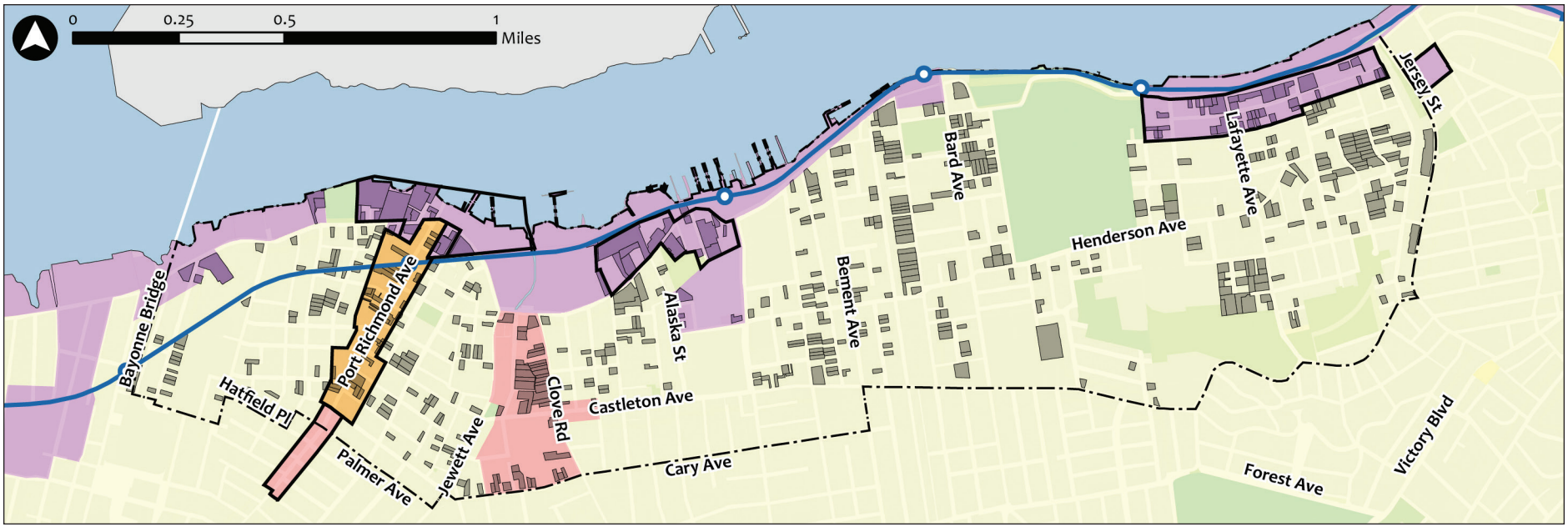
Intersection	Corner	AM		MD		PM		SAT	
		SF/P	LOS	SF/P	LOS	SF/P	LOS	SF/P	LOS
Richmond Terrace at Jersey Street	Northeast	921.70	A	2131.60	A	1531.10	A	3967.30	A
	Southeast	2715.80	A	4029.10	A	3323.70	A	2683.70	A
	Southwest	1143.10	A	1371.70	A	1344.30	A	1027.00	A
	Northwest	186.40	A	277.70	A	236.50	A	186.40	A
Richmond Terrace at Bard Avenue	Northeast	-4614.20	F	-874.60	F	-1551.50	F	-2307.10	F
	Southeast	-8477.70	F	-2843.50	F	-4857.30	F	-4257.70	F
	Southwest	2351.70	A	2609.60	A	3372.50	A	3919.50	A
	Northwest	-1949.00	F	-1120.20	F	-3118.50	F	-1949.00	F
Richmond Terrace at Broadway	Northeast	n/c		n/c		n/c		n/c	
	Southeast	1236.30	A	6277.30	A	1447.40	A	4708.00	A
	Southwest	2603.90	A	8577.30	A	6657.80	A	8568.70	A
	Northwest	n/c		n/c		n/c		n/c	
Richmond Terrace at Clove Road	Northeast	-3285.50	F	-9803.50	F	-4363.80	F	-7861.00	F
	Southeast	698.40	A	2338.10	A	1249.70	A	1487.90	A
	Southwest	651.30	A	1002.00	A	1450.60	A	1181.40	A
	Northwest	-1453.30	F	-3930.50	F	-4898.00	F	-3564.90	F
Richmond Terrace at Port Richmond Avenue	Northeast	2634.50	A	1847.20	A	762.20	A	1498.30	A
	Southeast	14046.70	A	11708.10	A	9348.30	A	14049.70	A
	Southwest	4515.20	A	2252.20	A	1707.60	A	3505.10	A
	Northwest	6344.70	A	6714.40	A	3073.50	A	7611.60	A
Richmond Terrace at Nicholas Avenue	Northeast	n/c		n/c		n/c		n/c	
	Southeast	-348.10	F	-3918.30	F	-422.50	F	-350.10	F
	Southwest	-614.10	F	-6372.70	F	-680.40	F	-802.30	F
	Northwest	n/c		n/c		n/c		n/c	
Richmond Terrace at Morningstar Road	Northeast	n/c		n/c		n/c		n/c	
	Southeast	1632.50	A	13150.40	A	1296.90	A	1613.50	A
	Southwest	1703.20	A	2652.80	A	1134.00	A	2995.80	A
	Northwest	n/c		n/c		n/c		n/c	

Existing Pedestrian Crosswalk Level of Service

SF/P = Square Foot per Pedestrian

FIGURE 63

Intersection	Crosswalk	AM		MD		PM		SAT	
		SF/P	LOS	SF/P	LOS	SF/P	LOS	SF/P	LOS
Richmond Terrace at Jersey Street	North	3414.5	A	5486.5	A	14687.6	A	11098.4	A
	West	2503.0	A	3379.5	A	2925.5	A	2720.0	A
	South	736.9	A	903.4	A	857.4	A	566.4	A
	East	1731.4	A	5561.1	A	2279.1	A	13905.9	A
Richmond Terrace at Bard Avenue	North	10636.1	A	4230.4	A	7053.4	A	7053.4	A
	West	9629.3	A	3262.3	A	18921.6	A	19258.7	A
	South	13194.8	A	13200.3	A	26400.5	A	5276.6	A
	East	23049.7	A	2262.7	A	4003.8	A	7675.0	A
Richmond Terrace at Broadway	North	n/c		n/c		n/c		n/c	
	West	15936.4	A	31882.0	A	31326.3	A	16149.3	A
	South	1865.1	A	7293.1	A	5078.4	A	11793.3	A
	East	3316.5	A	33420.6	A	1732.2	A	6519.0	A
Richmond Terrace at Clove Road	North	3259.4	A	5709.9	A	7610.8	A	7610.8	A
	West	33765.5	A	8670.5	A	33765.5	A	16649.6	A
	South	1685.0	A	4301.2	A	4339.8	A	3420.4	A
	East	6410.8	A	32685.9	A	5336.2	A	16342.9	A
Richmond Terrace at Port Richmond Avenue	North	4638.7	A	3355.9	A	1138.4	A	3076.0	A
	West	25629.5	A	4862.2	A	4788.0	A	12536.1	A
	South	8322.3	A	4959.4	A	3830.3	A	4958.6	A
	East	15873.1	A	6343.0	A	5318.2	A	10760.0	A
Richmond Terrace at Nicholas Avenue	North	n/c		n/c		n/c		n/c	
	West	4452.4	A	33124.2	A	7427.0	A	22789.8	A
	South	1577.3	A	26612.4	A	2593.0	A	1714.7	A
	East	n/c		n/c		n/c		n/c	
Richmond Terrace at Morningstar Road	North	n/c		n/c		n/c		n/c	
	West	6503.3	A	5231.2	A	12847.7	A	26642.5	A
	South	2196.4	A	13523.5	A	1054.5	A	1820.2	A
	East	24909.5	A	24747.8	A	24747.8	A	24586.2	A



MAP 20: Underbuilt Sites with significant development potential in the Richmond Terrace Study Area.

Richmond Terrace Study Area

Underbuilt Sites (developed 50% or less of the floor area permitted by zoning)

BOA Proposed Rezoning Area

Proposed BRT Route & Stations

Thematic Zoning Districts

Residential

Commercial District

Mixed Residential-Commercial District

Manufacturing District

Park

Future Growth Potential

In total, there are over 500 sites with significant development potential (e.g., currently developed to 50% or less of the floor area permitted by Zoning) in the study area, shown on Map 20.

The study area contains a considerable number of vacant sites, which is the second highest land use comprising 5% of the total lots and 8.7% of the land in the study area. This indicates that there is still room for growth on the North Shore to provide housing, commercial, and job opportunities for the neighborhood.

The North Shore Infill Development Opportunities table shows the study area's total existing built square footage by land use, existing residential units, and potential new building square footage and units if the underbuilt sites are redeveloped to their full development potential under existing zoning. The underbuilt site calculations presented the following findings:

1. There are significant opportunities for new homes and industrial job growth and development along Richmond Terrace under existing zoning. Factors that could be limiting market demand in these areas include the lack of transportation access, the cost of remediation for contaminated sites, and existing zoning. However, public investments, such as the North Shore BRT and grant funding for site remediation through the New York State Department of Environmental Conservation Brownfield Opportunity Area program, could help incentivize redevelopment of these sites.

FIGURE 64: Illustration of potential multi-modal improvements along Richmond Terrace.
Source: West Brighton BOA study.

NORTH SHORE INFILL DEVELOPMENT OPPORTUNITIES

CALCULATED USING EXISTING ZONING DISTRICTS

FIGURE 65

Land Use	Existing Built Floor Area	Underbuilt Site Development Potential Under Existing Zoning	Pct. Increase with Full Buildout
Residential	~830,000 sq ft	~2,720,000 sq ft	~330%
Residential Units	*~665 units*	*~2,200 units*	*~330%*
Commercial (Outside of Manufacturing Districts)	~220,000 sq ft	~610,000 sq ft	~280%
Manufacturing District (Manufacturing and permitted Commercial uses)	~350,000 sq ft	~2,000,000 sq ft	~570%
TOTAL	**~1,400,000**	**~5,320,000**	**~380%**

2. Manufacturing districts present the largest infill development potential as measured by percent increase in floor area (570%). The manufacturing zoning along Richmond Terrace reflects the legacy of the North Shore as a center for industrial and maritime businesses, which continues to this day with many active industrial sites. The infill development potential presents an opportunity to balance the expansion of these businesses with zoning changes, as recommended in previous community-based planning efforts, that would establish mixed-use corridor districts in existing underdeveloped manufacturing districts and create transitional areas between residential neighborhoods and the working waterfront.

3. As infill development occurs, the City must be cognizant of its effect on transportation along on Richmond Terrace and the potential for transportation infrastructure investments, such as targeted intersection improvements, the expansion of the bicycle network, the North Shore Greenway, and the North Shore BRT to mitigate any changes to traffic, safety, and pollution.

4. As discussed in the Previous Planning Studies section, the City made commitments to advance rezoning proposals that align with the community's land use vision for the North Shore. The undeveloped sites identified in this study provide a unique opportunity to achieve this vision, but careful planning is required to connect land use changes with transportation improvements, such as the North Shore BRT, to ensure an efficient corridor. The City will continue to lead community engagement efforts to explore and select preferred development scenarios for future transit-rich neighborhoods (immediately surrounding a BRT station) outside of St. George.


Heberton Av
TRUCK ROUTE
LOCAL

Next Steps

The Richmond Terrace Corridor study provides a comprehensive look at the existing conditions of a segment of a critical arterial to the North Shore of Staten Island. It highlights several land use and transportation challenges faced by residents, businesses, and other stakeholders and opportunities to address these challenges and fulfill the community vision identified in previous land use studies. Although this study does not provide specific recommendations, this study is important in identifying opportunities and setting next steps for the City in future planning work and investments along the corridor:

FIGURE 66: Shore Front Parkway, Queens
Source: NYC DOT Street Design Manual

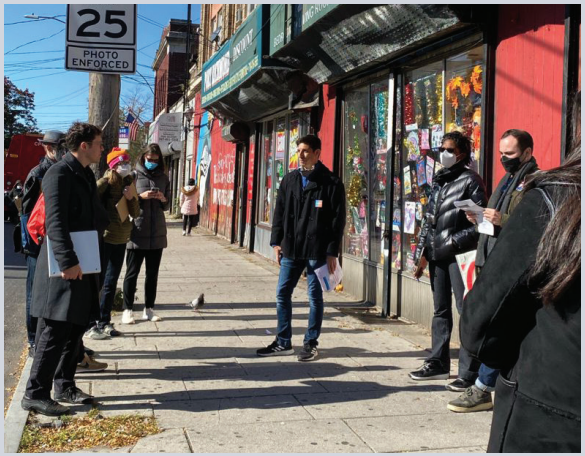


FIGURE 67: NY APA Hindsight Conferece: North Shore BRT Walking Tour. Source: DCP

Develop targeted interventions at intersections where vehicular and pedestrian LOS is poor.

The analysis of Richmond Terrace indicates that the corridor largely functions appropriately based on existing vehicular and pedestrian traffic data. However, there are some sections with poor LOS where interventions may be targeted.

Traffic interventions could include changes to signal timing and allocation of space for turning movements. In instances where corner LOS fails for pedestrian movement, intersection enhancements listed in the NYC Department of Transportation's (DOT) Street Design Manual, such as curb extensions or bulb outs, can create more space for pedestrians and improve the performance of these corners.

Analyze Richmond Terrace in future build out of underdeveloped sites.

The existing conditions analysis identified a significant number of underdeveloped sites throughout the study area. Redevelopment of these sites presents a unique opportunity to introduce land uses that address local planning issues, fulfill the community vision

identified in previous planning studies, and extend the revitalization efforts seen in other parts of the North Shore (St. George and Stapleton) down Richmond Terrace. Redevelopment strategies should also consider potential effects on the transportation network, especially at intersections along Richmond Terrace that are close to failing. By applying the vehicular and pedestrian data collected through this study and with the support from additional funding, DCP should conduct a follow-up analysis to predict how Richmond Terrace would perform from a traffic operations standpoint if these sites are developed under existing and future zoning that aligns with the community's vision for the area.

These analyses should also consider scenarios with transportation improvements, such as the North Shore BRT and Greenway, and how they could accommodate the developments. With the results of these analyses, the City should re-engage with the community as a follow-up to the North Shore 2030 and BOA studies to present the balance between more neighborhood amenities (e.g., affordable housing, retail, job centers) created through zoning changes and the transportation network's ability to support them. After this community engagement, the City should produce a more specific proposal for zoning and land use changes on the North Shore.

Implement street design improvements that enhance safety for all types of transportation users.

Although most of Richmond Terrace functions well, this study identified several locations with unsafe or unpleasant conditions for various roadway users. This includes stretches of Richmond Terrace that do not have sidewalks, bicycle infrastructure, on-street parking, and dedicated passing and turn lanes. These conditions affect the accessibility of neighborhoods and destinations throughout the corridor and are a likely reason for the high performance of pedestrian facilities in the sidewalk and crosswalk LOS analysis; the lack of walkable destinations and quality pedestrian facilities along the corridor are not attracting pedestrian traffic from the surrounding neighborhoods.

The Street Section illustrations included in this study begin to identify locations for where street design improvements can be implemented without adversely affected traffic operations. Additionally, long-term improvements, such as the North Shore greenway proposal, can consider the widening areas of Richmond Terrace and future connections to the North Shore BRT right-of-way and addressing the discrepancies between the mapped and built roadbed.

During the West Brighton BOA study, DCP worked with city and state agencies, property owners, and local stakeholders to explore potential realignments of the right-of-way and unmapped areas portions of Richmond Terrace. The City, specifically DCP, DOT, NYC Economic Development Corporation, NYC Department of Parks and Recreation, and MTA, should continue these conversations with local stakeholders to identify short-term and long-term design and operations changes that can address the safety and efficiency of the corridor by leveraging the city-owned right-of-way and mapped width of Richmond Terrace.

Advance community discussions about new and ongoing planning challenges.

As highlighted in the North Shore Context Area chapter, the Richmond Terrace Corridor and the broader North Shore continues

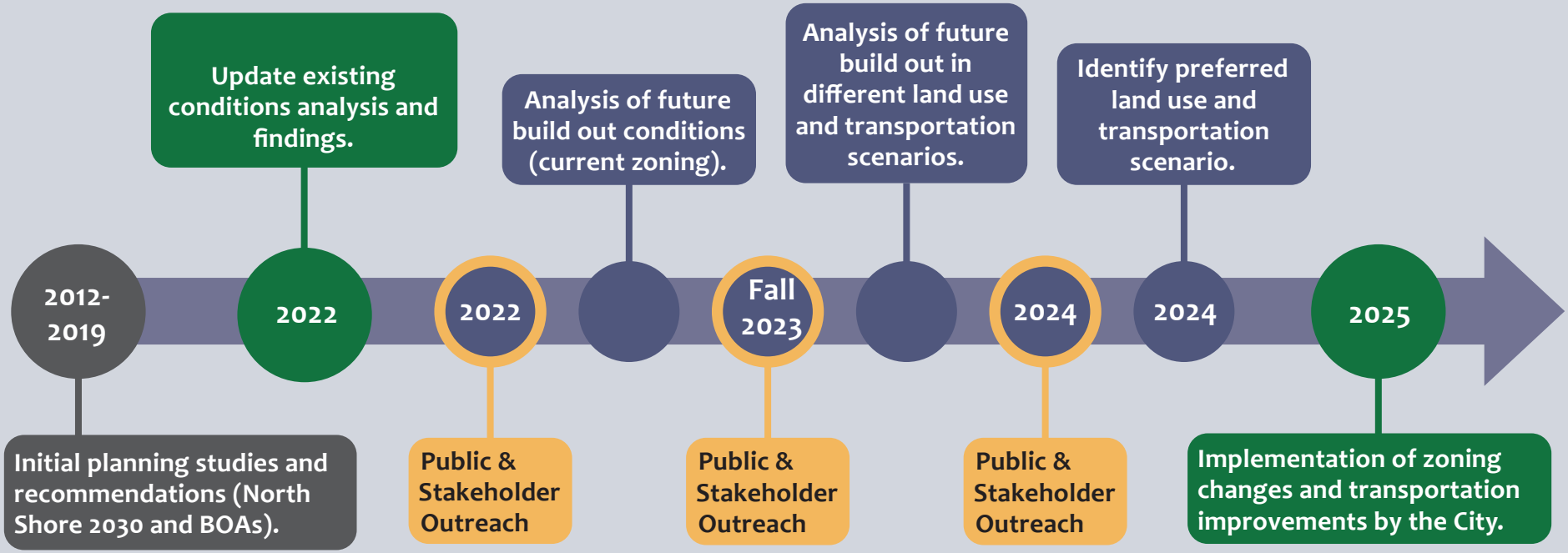


FIGURE 68

to face significant socioeconomic and environmental justice issues, including a lack of access to transit, affordable housing, jobs, healthcare, and the prevalence of brownfields. These conditions leave the area's residents, especially its Black, Indigenous, and People of Color (BIPOC) communities, vulnerable to disruptive events like the COVID-19 pandemic. Investments in the North Shore BRT, new affordable housing and commercial developments, parks and open space expansion, and more can help address these challenges; however, ensuring that the entire community benefits from these investments will require a thoughtful and inclusive planning process that guides future development in the area. DCP will continue to engage local stakeholders to gain further insight to their concerns and understand how the North Shore has changed since North Shore 2030 and the Brownfield Opportunity Area studies were published.

Draft North Shore Work Plan Timeline

The draft timeline above presents a potential work program for implementing these next steps in approximately two years and underscores the importance of public and stakeholder outreach throughout the process.

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Glossary

100-Year Floodplain

Areas vulnerable to flooding from a 1 percent annual chance storm in any given year.

500-Year Floodplain

Areas vulnerable to flooding from a 0.2% annual chance storm in any given year.

Automatic Traffic Recorders (ATR)

ATRs are automatic 24-hour traffic counters laid across the traffic lanes used to collect vehicular traffic data.

Brownfield

Any real property where the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

Brownfield Opportunity Area

A program operated by the New York State Department of State that provides state planning funds to community-based organizations (CBOs) and municipalities to develop community plans for areas with multiple vacant properties or brownfields. There are 20 NYC project that have received BOA funding, including the West Brighton and Port Richmond BOA studies.

Bus Rapid Transit (BRT)

According to the US Federal Transit Administration, BRT is a high-quality transit system that delivers fast and efficient services that may include dedicated lanes, busways, traffic signal priority, off-board fare collections, elevated platforms, and enhanced stations. BRT has similar features to a light rail or subways system, making it more reliable, convenient, and faster than regular bus service.

Control delay

Unit of measure for a vehicular Level of Service analysis at a stop sign-controlled intersection.

COVID-19 Pandemic

The ongoing global pandemic that reached New York City in early March 2020 when the City's first COVID-19 case was confirmed. As of April 14, 2022, 2.33 million New York City residents have been infected with COVID-19 and over 40,000 have died. The pandemic has caused long term public health, economic and social ramifications.

Final Mapped Street

A street whose dimensions and grades are legally established and shown on the City Map or adopted map.

Half-Mile Walkshed

The distance that is cited as the typical extent of the pedestrian catchment area around a destination such as a mass transit station.

Leading Pedestrian Intervals (LPIs)

LPIs are crossing signals that seek to improve pedestrian safety by showing a walk sign for pedestrians before the green light to car traffic, providing pedestrians a chance to begin crossing the street before cars make turns across the crosswalk.

Level of Service (LOS)

LOS is an analysis that evaluates the capacity and performance of the transportation network (e.g., streets and sidewalks) for traffic, specifically vehicular and pedestrian in this study, during peak hours.

Record Street

A street that is not officially adopted into the City Map, but is built and dedicated to public use by the owner/developer.

Rent Burdened

Individuals who spend more than a third of their income on rent.

Severely Rent Burdened

Individuals who spend more than a half of their income on rent.

Volume-to-Capacity (V/C) Ratio

V/C ratio is a measurement used to show how well traffic flow is functioning relative to the amount of traffic the roadway is designed to accommodate. It presents the proportion of capacity (i.e., supply) utilized by the existing traffic volume (i.e., demand). High v/c ratios (greater than 0.85) indicate some traffic congestion, and low v/c ratios (less than 0.60) indicate minimal disruptions to traffic flow.

Appendix A: Methodology for Level of Service Analyses

Vehicular Level of Service Analysis

The operation of signalized intersections for vehicular traffic within the study area was analyzed by applying the methodologies presented in the 2000 Highway Capacity Manual (HCM2000). These procedures evaluate signalized intersections for average delay per vehicle and level of service (LOS), which is a measure of congestion.

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

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

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

Short delays receive a good LOS while long delays receive a poor LOS. For example, an average delay of up to ten seconds per vehicle corresponds to LOS A, while an average delay of 45 seconds corresponds to LOS D.

DCP, in conjunction with the consulting firm Traffic Databank, collected all necessary data for the study. Automatic Traffic Recorders (ATR) were used to conduct automatic 24-hour traffic counts for seven consecutive days (the week of October 18, 2021), during the same week as manual vehicular and pedestrian counts were done, at the following six locations:

1. Richmond Terrace between Jersey Street and Franklin Avenue
2. Richmond Terrace between Bard Avenue and Davis Avenue (or Bement Avenue as an alternative)
3. Richmond Terrace between Broadway and Van Street (or Alaska Street as an alternative)
4. Richmond Terrace between Clove Road and Jewett Avenue
5. Richmond Terrace between Port Richmond and Maple Avenue (or Sharpe

Avenue as an alternative)
6. Richmond Terrace between John Street and Morningstar Road (or Nicholas Avenue as an alternative)

Traffic volume, turning movement, and vehicle classification counts were also collected on Wednesday, October 27, 2021 and Saturday, October 23, 2021 between the hours of 7:00 AM and 9:00 AM, 12:00 PM and 2:00 PM, and 4:00 PM and 6:00 PM on weekdays and 1:00 PM and 3:00 PM on Saturdays at the following locations:

1. Richmond Terrace at Jersey Street/Bank Street
2. Richmond Terrace at Franklin Avenue
3. Richmond Terrace at Lafayette Avenue
4. Richmond Terrace at Tysen Street
5. Richmond Terrace at Bard Avenue
6. Richmond Terrace at Broadway
7. Richmond Terrace at Alaska Street
8. Richmond Terrace at Clove Road
9. Richmond Terrace at Jewett Avenue
10. Richmond Terrace at Port Richmond Avenue
11. Richmond Terrace at Nicholas Avenue
12. Richmond Terrace at Morningstar Road

DCP reviewed all of the collected data to define the hour interval with the highest level of traffic volume, which is defined as peak hour. The peak hour typically represents the most critical period of operation and has the highest capacity requirements. This review identified peak hour as 7:00AM to 8:00AM for the morning period, 1:00 PM to 2:00 PM for the midday period, 3:45PM to 4:45PM for the evening period and 1:30 PM to 2:30 PM for Saturday.

A total of 12 intersections were analyzed, of which 11 are signalized and 1 is unsignalized. The unsignalized intersection is Richmond Terrace and Tysen Street. The traffic analysis focused on the peak hour of traffic volume. The Existing Vehicular Level of Service Table (Figure A) presents the existing LOS conditions for the selected signalized and unsignalized intersections within the study area. For each signalized intersection, the signal timing, cycle length, and phasing were obtained from the New York City Department of Transportation (NYCDOT).

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

Appendix A: Methodology for Level of Service Analyses

Existing Vehicular Level of Service (2021)

This table displays level of service for all vehicular movements at signalized and unsignalized intersections where data was collected.

Signalized Intersections

Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Jersey Street													
Eastbound	L	0	19.6	B	0.01	16.4	B	0.02	27.1	C	0.01	19.2	B
	TR	0.81	30.1	C	0.45	15.7	B	0.53	18	B	0.51	16.7	B
Westbound	L	0.16	24.7	C	0.05	17.6	B	0.08	17.2	B	0.06	17.8	B
	TR	0.63	31.9	C	0.65	28.0	C	0.84	38.1	D	0.79	34.5	C
Northbound	L	0.11	25.4	C	0.08	18.2	B	0.19	28.4	C	0.12	18.6	B
	TR	0.09	35.8	D	0.07	25.8	C	0.13	35.7	D	0.09	26.1	C
Southbound	L	0.01	24.2	C	0.02	17.6	B	0.01	26.2	C	0.01	17.5	B
	TR	0.01	34.6	C	0.01	25.0	C	0.01	33.9	C	0.01	25.0	C
Intersection Delay			**30.5**	**C**		**21.6**	**C**		**29.5**	**C**		**25.3**	**C**
Richmond Terrace at Franklin Avenue													
Eastbound	TR	0.71	17.4	B	0.46	12.7	B	0.45	11.4	B	0.51	13.4	B
Westbound	LT	0.56	13.4	B	0.54	14.1	B	0.71	17.3	B	0.73	19.7	B
Northbound	L	0.07	34.0	C	0.06	22.0	C	0.05	33.7	C	0.07	22.1	C
	LR	0	33.0	C	0	21.4	C	0	33.0	C	0	21.4	C
	R	0.22	36.5	D	0.06	22.0	C	0.12	34.7	C	0.07	22.1	C
Southbound													
Intersection Delay			**17.3**	**B**		**14.0**	**B**		**16.0**	**B**		**17.3**	**B**
Richmond Terrace at Lafayette Avenue													
Eastbound	TR	0.72	17.7	B	0.47	12.7	B	0.48	11.8	B	0.52	13.6	B
Westbound	LT	0.54	12.9	B	0.45	12.4	B	0.63	14.8	B	0.55	14.0	B
Northbound	LR	0.11	34.6	C	0.08	22.2	C	0.15	35.2	D	0.12	22.7	C
	R	0.13	34.9	C	0.07	22.1	C	0.08	34.2	C	0.06	22.0	C
Southbound													
Intersection Delay			**17.0**	**B**		**13.3**	**B**		**15.0**	**B**		**14.4**	**B**
Richmond Terrace at Bard Avenue													
Eastbound	LT	0.58	10.7	B	0.55	18.4	B	0.47	9.1	A	0.61	19.6	B
Westbound	TR	0.37	7.9	A	0.53	17.6	B	0.61	11.3	B	0.67	21.0	C
Northbound	LTR	0.13	39.0	D	0.07	17.4	B	0.10	38.7	D	0.07	17.4	B
Southbound	L	0.01	37.7	D	0.01	16.9	B	0.01	37.7	D	0.01	16.9	B
	LR	0	37.6	D	0	16.8	B	0	37.6	D	0	16.8	B
	R	0.08	38.8	D	0.03	17.0	B	0.08	38.7	D	0.03	17.1	B
Intersection Delay			**12.2**	**B**		**17.9**	**B**		**12.3**	**B**		**20.1**	**B**
Richmond Terrace at Broadway													
Eastbound	LTR	0.30	6.1	A	0.21	7.2	A	0.22	5.6	A	0.24	7.4	A
Westbound	LTR	0.40	7.4	A	0.44	9.6	A	0.63	10.9	B	0.55	11.2	B
Northbound	L	0.23	43.2	D	0.15	27	C	0.24	43.5	D	0.12	26.5	C
	LTR	0.14	41.4	D	0.06	25.7	C	0.11	40.8	D	0.12	26.5	C
Southbound	L	0	39.2	D	0	25	C	0.03	39.8	D	0.01	25	C
	LTR	0.01	39.3	D	0.02	25.2	C	0.18	42.0	D	0.01	25.1	C
Intersection Delay			**9.2**	**A**		**9.9**	**A**		**12.0**	**B**		**10.7**	**B**
Richmond Terrace at Alaska Street													
Eastbound	TR	0.61	11.2	B	0.44	10.7	B	0.45	8.7	A	0.50	11.5	B
Westbound	LT	0.49	9.3	A	0.50	11.6	B	0.64	12.1	B	0.55	12.3	B
Northbound	LR	0.08	38.7	D	0.06	24.1	C	0.13	39.3	D	0.12	24.8	C
	R	0.04	38.2	D	0.02	23.7	C	0.04	38.1	D	0.04	23.9	C
Southbound													
Intersection Delay			**11.2**	**B**		**11.6**	**B**		**11.8**	**B**		**12.7**	**B**

Signalized Intersections

Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Clove Road													
Eastbound	TR	0.45	15.4	B	0.37	16.8	B	0.35	14.6	B	0.39	17.1	B
Westbound	L	0.13	11.8	B	0.13	11.0	B	0.16	9.9	A	0.13	11.2	B
	T	0.39	9.6	A	0.41	11.7	B	0.53	11.0	B	0.54	13.6	B
Northbound	L	0.28	38.9	D	0.16	23.3	C	0.40	42.6	D	0.23	24.2	C
	TR	0.27	39.1	D	0.14	23.0	C	0.20	38.5	D	0.13	23.0	C
Intersection Delay			**16.4**	**B**		**15.2**	**B**		**16.1**	**B**		**16.1**	**B**
Richmond Terrace at Jewett Avenue													
Eastbound													
Westbound	R	0.50	5.6	A	0.53	7.3	A	0.78	12.1	B	0.69	10.6	B
Northbound	R	0.94	91.3	F	0.25	30.0	C	0.49	51.3	D	0.25	30.0	C
Southbound	LT	0.62	19.3	B	0.67	24.7	C	0.54	17.5	B	0.69	25.5	C
Intersection Delay			**26.1**	**C**		**16.8**	**B**		**17.3**	**B**		**17.8**	**B**
Richmond Terrace at Port Richmond Avenue													
Eastbound	LT	0.59	19.2	B	0.52	14.8	B	0.72	26.9	C	0.56	15.6	B
Westbound	LTR	0.69	22.5	C	0.59	16.3	B	1.04	70.2	E	0.79	23.3	C
Northbound	LTR	0.19	28.7	C	0.27	23.4	C	0.22	16.2	B	0.19	22.2	C
Southbound	LTR	0.01	26.1	C	0.05	20.6	C	0.04	14.2	B	0.04	20.5	C
Intersection Delay			**21.6**	**C**		**16.6**	**B**		**48.7**	**D**		**20.3**	**C**
Richmond Terrace at Nicholas Avenue													
Eastbound	LTR	0.51	9.5	B	0.41	11.7	B	0.38	7.8	A	0.44	12.1	B
Westbound	LTR	0.66	13.4	B	0.69	18	B	0.79	17.8	B	0.89	30.8	C
Northbound	LTR	0.47	47.1	D	0.31	25.4	C	0.54	49.3	D	0.31	25.5	C
Southbound	LTR	0.01	37.7	D	0.01	21.4	C	0.01	37.7	D	0.01	21.4	C
Intersection Delay			**15.1**	**B**		**16.6**	**B**		**17.8**	**B**		**23.7**	**C**
Richmond Terrace at Morningstar Road													
Eastbound	LTR	0.74	26.5	C	0.71	29.2	C	0.56	23.3	C	0.74	30.3	C
Westbound	L	0.48	22.2	C	0.59	26.3	C	0.74	32.5	C	0.67	29.9	C
	TR	0.27	6.9	A	0.29	8.9	A	0.42	8.3	A	0.36	9.7	A
Northbound	LTR	0.34	43.3	D	0.25	26.6	C	0.39	44.5	D	0.24	26.3	C
Southbound	LTR	0.01	37.7	D	0.01	23.6	C	0.01	37.7	D	0	23.5	C
Intersection Delay			**22.5**	**C**		**23.3**	**C**		**23.1**	**C**		**24.1**	**C**

Unsignalized Intersection

Intersection	Appr	Existing AM			Existing MD			Existing PM			Existing Sat		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Richmond Terrace at Tyson Street													
Eastbound	TR												
Westbound	TL	0.03	9.1	A	0.01	8.1	A	0.01	8.2	A	0.01	8.3	A
Northbound													
Southbound													

FIGURE A1

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Appendix A: Methodology for Level of Service Analyses

Pedestrian Level of Service Analysis and Methodology

The existing conditions analysis is used to determine existing volumes, pedestrian flow patterns, and LOS. This analysis includes data about the capacity of sidewalks, crosswalks, and intersection corners where pedestrians wait for a green traffic light enabling them to cross the street. This analysis included the following seven locations:

1. Richmond Terrace and Jersey Street
2. Richmond Terrace at Bard Avenue
3. Richmond Terrace and Broadway
4. Richmond Terrace and Clove Road
5. Richmond Terrace and Port Richmond
6. Richmond Terrace and Nicholas Avenue
7. Richmond Terrace at Morningstar Road

The pedestrian LOS, which is measured by the pedestrian flow rate per foot of width per minute (PFM), was analyzed applying the methodologies presented in the 2000 HCM. The PFM indicates the quality of pedestrian movement and comfort and is defined by a density-comfort relationship. Crosswalk analyses were conducted for the average pedestrian flow conditions during a full peak hour and were recorded in 15-minute increments.

Sidewalk Analysis

The sidewalk midblock analysis measures the average flow rate LOS, which occurs when transit vehicles release large groups of pedestrians in a short period of time. The Existing Pedestrian Sidewalk Level of Service Figure A2 presents the results of the analysis.

Corner Analysis

Street corner and crosswalk analyses are more complex than sidewalk analysis since they involve sidewalk flows, pedestrian crossings, and other queued pedestrians waiting for the traffic signal to change. The Existing Pedestrian Corner Level of Service Figure A3 presents the results of the analysis.

Crosswalk Analysis

This is an analysis of the existing crosswalks conditions and LOS during the four peak periods. The Existing Pedestrian Crosswalk Level of Service Figure A4 presents the results of the analysis.

Existing Pedestrian Sidewalk Level of Service (2021)

P/M/F = Pedestrian/Minute/Foot

FIGURE A2

Intersection	Walkway	AM		MD		PM		SAT	
		p/m/f	LOS	p/m/f	LOS	p/m/f	LOS	p/m/f	LOS
Richmond Terrace at Jersey Street	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.1	A	0.1	A	0.0	A	0.1	A
	4	0.1	A	0.1	A	0.1	A	0.1	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.1	A	0.1	A	0.1	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Bard Avenue	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.1	A	0.1	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Broadway	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.0	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0	A	0.0	A	0.0	A
	8	n/s		n/s		0.1		n/s	
Richmond Terrace at Clove Road	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.0	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.1	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	
Richmond Terrace at Port Richmond Avenue	1	0.0	A	0.0	A	0.0	A	0.0	A
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.1	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	0.0	A	0.0	A	0.0	A	0.0	A
Richmond Terrace at Nicholas Avenue	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.2	A	0.0	A	0.0	A	0.0	A
	6	0.1	A	0.0	A	0.0	A	0.1	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	
Richmond Terrace at Morningstar Road	1	n/s		n/s		n/s		n/s	
	2	0.0	A	0.0	A	0.0	A	0.0	A
	3	0.0	A	0.0	A	0.1	A	0.0	A
	4	0.0	A	0.0	A	0.0	A	0.0	A
	5	0.0	A	0.0	A	0.0	A	0.0	A
	6	0.0	A	0.0	A	0.0	A	0.0	A
	7	0.0	A	0.0	A	0.0	A	0.0	A
	8	n/s		n/s		n/s		n/s	

Existing Pedestrian Corner Level of Service

SF/P = Square Foot per Pedestrian

FIGURE A3

Intersection	Corner	AM		MD		PM		SAT	
		SF/P	LOS	SF/P	LOS	SF/P	LOS	SF/P	LOS
Richmond Terrace at Jersey Street	Northeast	921.70	A	2131.60	A	1531.10	A	3967.30	A
	Southeast	2715.80	A	4029.10	A	3323.70	A	2683.70	A
	Southwest	1143.10	A	1371.70	A	1344.30	A	1027.00	A
	Northwest	186.40	A	277.70	A	236.50	A	186.40	A
Richmond Terrace at Bard Avenue	Northeast	-4614.20	F	-874.60	F	-1551.50	F	-2307.10	F
	Southeast	-8477.70	F	-2843.50	F	-4857.30	F	-4257.70	F
	Southwest	2351.70	A	2609.60	A	3372.50	A	3919.50	A
	Northwest	-1949.00	F	-1120.20	F	-3118.50	F	-1949.00	F
Richmond Terrace at Broadway	Northeast	n/c		n/c		n/c		n/c	
	Southeast	1236.30	A	6277.30	A	1447.40	A	4708.00	A
	Southwest	2603.90	A	8577.30	A	6657.80	A	8568.70	A
	Northwest	n/c		n/c		n/c		n/c	
Richmond Terrace at Clove Road	Northeast	-3285.50	F	-9803.50	F	-4363.80	F	-7861.00	F
	Southeast	698.40	A	2338.10	A	1249.70	A	1487.90	A
	Southwest	651.30	A	1002.00	A	1450.60	A	1181.40	A
	Northwest	-1453.30	F	-3930.50	F	-4898.00	F	-3564.90	F
Richmond Terrace at Port Richmond Avenue	Northeast	2634.50	A	1847.20	A	762.20	A	1498.30	A
	Southeast	14046.70	A	11708.10	A	9348.30	A	14049.70	A
	Southwest	4515.20	A	2252.20	A	1707.60	A	3505.10	A
	Northwest	6344.70	A	6714.40	A	3073.50	A	7611.60	A
Richmond Terrace at Nicholas Avenue	Northeast	n/c		n/c		n/c		n/c	
	Southeast	-348.10	F	-3918.30	F	-422.50	F	-350.10	F
	Southwest	-614.10	F	-6372.70	F	-680.40	F	-802.30	F
	Northwest	n/c		n/c		n/c		n/c	
Richmond Terrace at Morningstar Road	Northeast	n/c		n/c		n/c		n/c	
	Southeast	1632.50	A	13150.40	A	1296.90	A	1613.50	A
	Southwest	1703.20	A	2652.80	A	1134.00	A	2995.80	A
	Northwest	n/c		n/c		n/c		n/c	

Existing Pedestrian Crosswalk Level of Service

SF/P = Square Foot per Pedestrian

FIGURE A4

Intersection	Crosswalk	AM		MD		PM		SAT	
		SF/P	LOS	SF/P	LOS	SF/P	LOS	SF/P	LOS
Richmond Terrace at Jersey Street	North	3414.5	A	5486.5	A	14687.6	A	11098.4	A
	West	2503.0	A	3379.5	A	2925.5	A	2720.0	A
	South	736.9	A	903.4	A	857.4	A	566.4	A
	East	1731.4	A	5561.1	A	2279.1	A	13905.9	A
Richmond Terrace at Bard Avenue	North	10636.1	A	4230.4	A	7053.4	A	7053.4	A
	West	9629.3	A	3262.3	A	18921.6	A	19258.7	A
	South	13194.8	A	13200.3	A	26400.5	A	5276.6	A
	East	23049.7	A	2262.7	A	4003.8	A	7675.0	A
Richmond Terrace at Broadway	North	n/c		n/c		n/c		n/c	
	West	15936.4	A	31882.0	A	31326.3	A	16149.3	A
	South	1865.1	A	7293.1	A	5078.4	A	11793.3	A
	East	3316.5	A	33420.6	A	1732.2	A	6519.0	A
Richmond Terrace at Clove Road	North	3259.4	A	5709.9	A	7610.8	A	7610.8	A
	West	33765.5	A	8670.5	A	33765.5	A	16649.6	A
	South	1685.0	A	4301.2	A	4339.8	A	3420.4	A
	East	6410.8	A	32685.9	A	5336.2	A	16342.9	A
Richmond Terrace at Port Richmond Avenue	North	4638.7	A	3355.9	A	1138.4	A	3076.0	A
	West	25629.5	A	4862.2	A	4788.0	A	12536.1	A
	South	8322.3	A	4959.4	A	3830.3	A	4958.6	A
	East	15873.1	A	6343.0	A	5318.2	A	10760.0	A
Richmond Terrace at Nicholas Avenue	North	n/c		n/c		n/c		n/c	
	West	4452.4	A	33124.2	A	7427.0	A	22789.8	A
	South	1577.3	A	26612.4	A	2593.0	A	1714.7	A
	East	n/c		n/c		n/c		n/c	
Richmond Terrace at Morningstar Road	North	n/c		n/c		n/c		n/c	
	West	6503.3	A	5231.2	A	12847.7	A	26642.5	A
	South	2196.4	A	13523.5	A	1054.5	A	1820.2	A
	East	24909.5	A	24747.8	A	24747.8	A	24586.2	A

FIGURE 69: Historical photograph of the Richmond Terrace corridor at Snug Harbor taken from the Kill Van Kull, 1900
Source: The Collection of the Staten Island Museum