THE HYM INVESTMENT GROUP LLC

SUFFOLK DOWNS REDEVELOPMENT

VOLUME I

Draft Environmental Impact Report/
Draft Project Impact Report

OCTOBER 1, 2018



PREPARED BY

vhb

SUBMITTED TO
Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act Office
Boston Planning & Development Agency
City of Revere

PROPONENT
The McClellan Highway Development Company, LLC
c/o The HYM Investment Group, LLC
One Congress Street, 11th floor
Boston, MA 02114

IN ASSOCIATION WITH
DLA Piper
CBT Architects
Beals and Thomas, Inc.
Stoss Landscape Urbanism
ARUP
AKF
SourceOne
Vertex
Haley & Aldrich

THE
HYM
INVESTMENT GROUP, LLC

October 1, 2018

Matthew A. Beaton, Secretary
Executive Office of Energy and Environmental Affairs
Attn: Deirdre Buckley, MEPA Director
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

Re: **Suffolk Downs Redevelopment Project**
Boston, MA

Dear Secretary Beaton and Director Buckley:

The HYM Investment Group, LLC ("HYM") on behalf of The McClellan Highway Development Company, LLC ("MHDC"), collectively the "Proponents," are pleased to submit the enclosed Draft Environmental Impact Report ("DEIR"), as a joint filing that also includes a Draft Project Impact Report ("DPIR") to the Boston Planning & Development Agency ("BPDA"), for continued review under the Massachusetts Environmental Policy Act ("MEPA") for the construction of the Suffolk Downs Redevelopment Project (the "Master Plan Project") located at 525 McClellan Highway in East Boston (the "Project Site"). This DEIR/DPIR filing addresses the requirements of your Certificate on the Expanded Environmental Notification Form ("EENF") dated January 26, 2018, as well as the February 21, 2018 Scoping Determination issued by the BPDA on the Expanded Project Notification Form ("EPNF"). The EENF/EPNF was submitted jointly on November 30, 2017. This DEIR/DPIR is also being submitted to the City of Revere for continued review of the Revere portion of the Master Plan Project.

The Master Plan Project involves redevelopment of the Project Site, which consists of an approximately 161-acre underutilized thoroughbred horse racing facility located within East Boston and Revere, Massachusetts. Approximately 109 acres of the Project Site is in East Boston, and approximately 52 acres is in Revere. Existing facilities at the Project Site include a clubhouse, grandstand, thoroughbred racetrack, an administration building, maintenance buildings, horse barns and extensive surface parking areas. The Boston portion of the Project Site is in the Suffolk Downs Economic Development Area of the East Boston Neighborhood District, which is governed by Article 53 of the Code. The Code identifies the Suffolk Downs Economic Development Area as a Special Study Overlay Area and establishes the Boston portion of the Project Site as a potential location for a Planned Development Area ("PDA"). The Project Site was also recently identified in the *Imagine Boston 2030* plan as a key site for Boston's future growth, specifically as it relates to the creation of housing, and targeted for a new mixed-use development district.

Redevelopment of the Project Site provides a unique opportunity to create additional housing, spur economic development, mitigate climate change in the area and improve connections between several adjoining neighborhoods. HYM proposes that the Master Plan Project include various improvements and benefits for the City of Boston, City of Revere and surrounding areas, as follows:

- Development of a new neighborhood with an active, lively and appropriate mix of uses (including residential, retail, office, lab, hotel and other uses), connected and supported by new open space, neighborhood retail and civic spaces;

- To also meet the needs of surrounding neighborhoods, incorporation of up to 10,000 housing units across the 161-acre site, including townhomes, apartments, condominiums, on-site affordable units and senior housing;
- Investment of over $60 million into a 40-acre site-wide publicly-accessible open space system which will include two large plazas located adjacent to both the Suffolk Downs and Beachmont MBTA Blue Line Stations, an outdoor theater, various active and passive recreation areas, and existing wetland features;
- Investment of over $110 million into on-site infrastructure, including all roadways, sidewalks, cycle tracks, smart utilities and water & sewer infrastructure across the entire 161-acre Project Site;
- Proposed investment of over $50 million in off-site traffic mitigation measures to support major improvements to key regional and local routes and intersections, including the full reconstruction and signalization of Route 1A from Boardman Street to Winthrop Avenue;
- Incorporation of forward-thinking resiliency strategies intended to address future sea level rise and other impacts of climate change including a detailed climate change modeling analysis which has resulted in climate change preparedness recommendations;
- Application of transit-oriented-development principles through integration of the two existing adjacent MBTA Blue Line Stations and alternative travel modes, including new bicycle path connections and Bluebike Stations;
- Incorporation of approximately 500,000 square feet of street-front retail which will be anchored at the new Belle Isle Square adjacent to the Suffolk Downs MBTA Blue Line Station, the new Beachmont Square adjacent to the Beachmont MBTA Blue line Station which are interconnected by the new Main Street Retail Corridor;
- Allocation of 10% of the retail to local businesses and owners with flexible lease parameters;
- Construction of new commercial office and lab space attractive to employers of growing industries, which will enhance and expand job creation and economic opportunity;
- Development of improved connections to adjacent neighborhoods of East Boston and Revere by incorporating new open space and pedestrian and bicycle pathways;
- Creation of significant annual property tax revenue for the City of Boston, estimated at approximately $85.6 million in annual gross tax revenue (or approximately $56.8 million on a net basis) and for the City of Revere, estimated at approximately $43.0 million in annual gross tax revenue (or approximately $30.1 million on a net basis); and,
- Over the term of the Master Plan Project's development, creation of approximately 14,000 new construction jobs and between 25,000 to 50,000 new permanent jobs.

In addition to the above benefits, the following key changes have made to the Master Plan Project since the EENF/EPNF filing:

- Reduction of approximately 300,000 square feet of previously-proposed building uses, or density, in order to create landscaped buffer areas between the Project Site and existing homes on Waldemar Avenue;
- Expansion of the proposed Belle Isle Square, a large plaza to be located adjacent to the Suffolk Downs MBTA Blue Line Station, which will now include additional small retail buildings and/or kiosks, and also provide improved pedestrian and bike access;

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- Creation of a new neighborhood park along Waldemar Avenue, to be designed in collaboration with and for the benefit of the Orient Heights neighborhood, which has limited available space for new parks;
- Introduction of two new streets to the roadway network in order to decrease block sizes in specific areas between the Main Street Retail District and Tomasello Drive.

In addition, the Project Site continues to be a potential location for Amazon's second North American corporate headquarters ("HQ2"). Since the EENF/EPNF filing, Amazon has narrowed down its list of prospective cities to 20, which includes the City of Boston, and stated that it will make a decision on HQ2 by the end of 2018.

We respectfully request that you publish notice of availability of this DEIR in the October 10th edition of the Environmental Monitor. Based upon this schedule, public comments will be due by November 9, 2018 and a decision is anticipated to be issued on or around November 16, 2018. Requests for copies of the DEIR should be directed to Lauren DeVoe at 617-607-0091 or via e-mail at ldevoe@vhb.com.

We look forward to working with you and your staff in your continuing review of this transformational Master Plan Project.

Sincerely,

Thomas N. O'Brien
The McClellan Highway Development Company, LLC
c/o The HYM Investment Group, LLC

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INVESTMENT GROUP, LLC

October 1, 2018

Brian P. Golden, Director
Boston Planning and Development Agency
One City Hall Square
Boston, MA 02201

Re: **Suffolk Downs Redevelopment Project**
Draft Project Impact Report Filing
Boston, MA

Dear Director Golden:

The HYM Investment Group, LLC ("HYM") on behalf of The McClellan Highway Development Company, LLC ("MHDC"), collectively the "Proponents," are pleased to submit the enclosed Draft Project Impact Report ("DPIR"), as a joint filing that also includes a Draft Environmental Impact Report ("DEIR") for continued review under the Massachusetts Environmental Policy Act ("MEPA"), for the construction of the Suffolk Downs Redevelopment Project (the "Master Plan Project") located at 525 McClellan Highway in East Boston (the "Project Site"). This DPIR/DEIR filing addresses the requirements of the February 21, 2018 Scoping Determination issued by your agency on the November 30, 2017 Expanded Project Notification Form ("EPNF"), as well as the Secretary of the Executive Office of Energy and Environmental Affairs ("EEA") Certificate dated January 26, 2018. This DEIR/DPIR is also being submitted to the City of Revere for continued review of the Revere portion of the Master Plan Project.

The Master Plan Project involves redevelopment of the Project Site, which consists of an approximately 161-acre underutilized thoroughbred horse racing facility located within East Boston and Revere, Massachusetts. Approximately 109 acres of the Project Site is in East Boston, and approximately 52 acres is in Revere. Existing facilities at the Project Site include a clubhouse, grandstand, thoroughbred racetrack, an administration building, maintenance buildings, horse barns and extensive surface parking areas. The Boston portion of the Project Site is in the Suffolk Downs Economic Development Area of the East Boston Neighborhood District, which is governed by Article 53 of the Code. The Code identifies the Suffolk Downs Economic Development Area as a Special Study Overlay Area and establishes the Boston portion of the Project Site as a potential location for a Planned Development Area ("PDA"). The Project Site was also recently identified in the *Imagine Boston 2030* plan as a key site for Boston's future growth, specifically as it relates to the creation of housing, and targeted for a new mixed-use development district.

Redevelopment of the Project Site provides a unique opportunity to create additional housing, spur economic development, and improve connections between several adjoining neighborhoods. HYM proposes that the Master Plan Project include various improvements and benefits for the area, including the City of Boston, as follows:

- Development of a new neighborhood with an active, lively and appropriate mix of uses (including residential, retail, office, lab, hotel and other uses), connected and supported by new open space, neighborhood retail and civic spaces;

- In furtherance of the Mayor's *Imagine Boston 2030* plan and to also meet the needs of surrounding neighborhoods, incorporation of up to 7,000 housing units within Boston, including townhomes, apartments, condominiums, on-site affordable units and senior housing;
- Investment of over $60 million into a 40-acre site-wide publicly-accessible open space system which will include two large plazas located adjacent to both the Suffolk Downs and Beachmont MBTA Blue Line Stations, an outdoor theater, various active and passive recreation areas, and existing wetland features;
- Investment of over $110 million into on-site infrastructure, including roadways, sidewalks, cycle tracks, smart utilities and water & sewer infrastructure across the entire 161-acre Project Site;
- Investment of over $50 million in off-site traffic mitigation measures to support major improvements to key regional and local routes and intersections, including the full reconstruction and signalization of Route 1A from Boardman Street to Winthrop Avenue;
- Incorporation of approximately 250,000 square feet of street-front retail which will be anchored at the new Belle Isle Square adjacent to the Suffolk Downs MBTA Blue Line Station and connected to the Main Street Retail Corridor;
- Allocation of 10% of the retail to local businesses and owners with flexible lease parameters;
- Construction of new commercial office and lab space attractive to employers of growing industries, which will enhance and expand job creation and economic opportunity;
- Application of transit-oriented-development principles through integration of the two existing adjacent MBTA Blue Line Stations and alternative travel modes, including new bicycle path connections and Bluebike Stations;
- Development of improved connections to adjacent neighborhoods of East Boston, including Orient Heights, by incorporating new open space and pedestrian and bicycle pathways;
- Adherence to the BPDA's climate change policy with the incorporation of forward-thinking resiliency strategies intended to address future sea level rise and other impacts of climate change;
- Creation of significant annual property tax revenue for the City of Boston, estimated at approximately $85.6 million in annual gross tax revenue (or approximately $56.8 million on a net basis after accounting for additional city services); and,
- Over the term of the Master Plan Project's development, creation of approximately 14,000 new construction jobs and between 25,000 to 50,000 new permanent jobs.

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- Introduction of two new streets to the roadway network in order to decrease block sizes in specific areas between the Main Street Retail District and Tomasello Drive.

In addition, the Project Site continues to be a potential location for Amazon's second North American corporate headquarters ("HQ2"). Since the EENF/EPNF filing, Amazon has narrowed down its list of prospective cities to 20, which includes the City of Boston, and stated that it will make a decision on HQ2 by the end of 2018.

The Proponents will publish notice of submission of the DPIR, as required by Section 80A-2(3) coincident with the filing of this DPIR. Requests for copies of the DPIR should be directed to Lauren DeVoe at 617-607-0091 or via e-mail at ldevoe@vhb.com.

We look forward to working with you and your staff in your continuing review of this transformational Master Plan Project.

Sincerely,

Thomas N. McBrien
The McClellan Highway Development Company, LLC
c/o The HYM Investment Group, LLC

Suffolk Downs Redevelopment

Boston & Revere, Massachusetts

SUBMITTED TO **Executive Office of Energy & Environmental Affairs**
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Beals and Thomas, Inc.	Vertex
Stoss Landscape Urbanism	Haley & Aldrich

October 1, 2018

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1

Project Description

In accordance with the Massachusetts Environmental Policy Act ("MEPA") Massachusetts General Law ("MGL") Chapter 30, Section 61-62I and the regulations promulgated thereunder set forth at 301 CMR 11.00, and Article 80B of the City of Boston Zoning Code and Enabling Act (the "Boston Code"), The McClellan Highway Development Company, LLC ("MHDC", or the "Proponent"), an affiliate of The HYM Investment Group, LLC ("HYM"), respectfully submits this joint Draft Environmental Impact Report/Draft Project Impact Report ("DEIR/DPIR") for the construction of a new transit-oriented mixed-use community at the former Suffolk Downs horse racing facility (the "Master Plan Project", or "Project") set within the neighborhood of East Boston and the City of Revere, Massachusetts (the "Project Site"). This filing is also being submitted to the relevant officials and departments in the City of Revere as part of the development planning and permitting process for the Revere portion of the Project Site.

Overall, the Master Plan Project consists of approximately 10.52 million square feet ("MSF") of development in Boston (which equates to an approximately 2.22 floor area ratio, or "FAR") and approximately 5.68 MSF in Revere set (which equates to an approximately 2.48 FAR), all within many buildings to be constructed individually or in development phases over a 15- to 20-year period. In addition, the Project Site has been identified by the City of Boston and the City of Revere as a suitable potential location for Amazon's second corporate headquarters. In support of the RFP issued by Amazon, an initial office development of approximately 520,000 square feet in the form of two buildings with ground floor retail space, and related infrastructure, public realm, and open space improvements (the "Phase 1 Project") was approved to move forward under the Phase 1 Waiver granted on February 28, 2018 and by the BPDA Board approval received February 14, 2018. Zoning relief for the Phase 1 Project for building height limitations was approved by the Boston Zoning Commission also on February 14, 2018. The Project Site represents an extraordinary economic development opportunity for Boston, Revere, and the region with or without Amazon.

This chapter provides an overview of the proposed redevelopment, and project review history and background. It also describes the existing site conditions and the key elements of the Master Plan Project, including any project changes since the initial Expanded Environmental Notification Form/Expanded Project Notification Form ("EENF/EPNF") filing. This chapter also presents an updated summary of public benefits and community outreach efforts, as well as an analysis of the project alternatives.

1.1 Proposed Master Plan Project Overview

Strategically located within the urban fabric of East Boston and Revere, the approximately 161-acre former Suffolk Downs thoroughbred horse racing facility owned by the Proponent is one of the largest development sites in the Northeast. The Project Site provides the unique opportunity for a new transit-oriented mixed-use neighborhood with the ability to evolve with the ever-changing needs of the community and market conditions.

The proposed conceptual redevelopment plan, or Master Plan Project, involves redevelopment of the approximately 161-acre underutilized Project Site, which is comprised of approximately 109 acres in East Boston and approximately 52 acres in Revere. Existing facilities at the Project Site include the clubhouse, grandstand, thoroughbred horse racing track (the "race track") with infield, a vacant administration building, maintenance buildings, horse barns (many of which are dilapidated and in danger of falling) and extensive surface parking areas. The Boston portion of the Project Site is in the Suffolk Downs Economic Development Area ("EDA") of the East Boston Neighborhood District, which is governed by Article 53 of the Boston Code. The Boston Code identifies the Suffolk Downs EDA as a Special Study Overlay Area, and establishes the Boston portion of the Project Site as a potential location for a Planned Development Area ("PDA"). The Project Site was also recently identified as one of the future growth areas for Boston in the *Imagine Boston 2030*[1] city-wide plan and has long been thought of as a key area for economic development by the City of Revere. The Revere portion of the Project Site is within Planned Development District 1 ("PDD1"), which is governed by Section 17.22 of Zoning Ordinances of the City of Revere (the "Revere Code") and is also located in a new Suffolk Downs Overlay District ("SDOD"), which is governed by Section 17.26 of the Revere Code. The zoning amendment creating the SDOD was approved by the Revere City Council and was signed by the Mayor of Revere on March 27, 2018 to facilitate the development of the Project in Revere as a mixed-use community with a substantial amount of commercial development.

Redevelopment of the Project Site provides a unique opportunity to create additional housing, spur economic development, and improve connections between several adjoining neighborhoods. MHDC proposes that the Master Plan Project include various improvements and benefits for the area and City of Boston and the City of Revere, as follows:

- Development of a new neighborhood with an active, lively and appropriate mix of uses (including residential, retail, office, lab, hotel and other uses), connected and supported by new open space, neighborhood retail and civic spaces;
- In furtherance of the Mayor's *Imagine Boston 2030* plan and to also meet the needs of surrounding neighborhoods, incorporation of approximately 7,000 housing units within Boston, including townhomes, apartments, condominiums, on-site affordable units and senior housing;

[1] http://imagine.boston.gov/

- Investment of over $60 million into a 40-acre site-wide publicly-accessible open space system, which will include two large plazas located adjacent to both the Suffolk Downs and Beachmont MBTA Blue Line Stations, an outdoor theater, various active and passive recreation areas, and existing wetland features;
- Investment of over $110 million into on-site infrastructure, including roadways, sidewalks, cycle tracks, smart utilities and water and sewer infrastructure across the entire 161-acre Project Site;
- Investment of over $50 million in off-site traffic mitigation measures to support major improvements to key regional and local routes and intersections, including the full reconstruction and signalization of Route 1A from Boardman Street to Winthrop Avenue;
- Incorporation of approximately 250,000 square feet of street-front retail which will be anchored at the new Belle Isle Square adjacent to the Suffolk Downs MBTA Blue Line Station and connected to the Main Street Retail Corridor;
- Allocation of 10 percent of the retail to local businesses and owners with flexible lease parameters;
- Construction of new commercial office and lab space attractive to employers of growing industries, which will enhance and expand job creation and economic opportunity;
- Application of transit-oriented-development principles through integration of the two existing adjacent MBTA Blue Line Stations and alternative travel modes, including new bicycle path connections and Bluebike public bike share stations;
- Development of improved connections to adjacent neighborhoods of East Boston, including Orient Heights, by incorporating new open space and pedestrian and bicycle pathways;
- Adherence to the BPDA's climate change policy with the incorporation of forward-thinking resiliency strategies intended to address future sea level rise and other impacts of climate change;
- Creation of significant annual property tax revenue for the City of Boston, estimated at approximately $85.6 million in annual gross tax revenue (or approximately $56.8 million on a net basis after accounting estimated increases in municipal services for the Project) and for the City of Revere, estimated at approximately $43.0 million in annual gross tax revenue (or approximately $30.1 million on a net basis); and
- Over the term of the Master Plan Project's development, creation of approximately 14,000 new construction jobs and between 25,000 to 50,000 new permanent jobs.

1.2 Project Review History and Background

Once a coastal marshland, the Project Site was originally filled through the early 20th century to accommodate a speculative residential development that was never realized. Instead, the Project Site became a thoroughbred horse racing complex in

the 1930s. In its heyday in the 1930s, 40s and 50s, races typically attracted as many as 40,000 daily spectators and contained as many as 12,000 parking spaces. Since then, the race track complex has remained in continuous use until recent years, drawing as many as 24,000 spectators for horse races and other events during its heyday. As such, the Project Site avoided many of the historical industrial uses that occupied similar urban lands in Boston in the 20th century. However, given its historical high traffic destination and its location near Boston's downtown urban core, Suffolk Downs is directly and heavily served by existing mass transit, highways, open space and utility infrastructure networks. Today, while the Project Site is set within the urban fabric of East Boston and Revere, large portions of the Project Site are not publicly-accessible and are essentially cut-off from the surrounding neighborhoods.

The horse racing track and stable operations at the Project Site are now being used on a very infrequent basis and are planned to cease at the time that construction commences for the first building on the Project Site. With the anticipated closure of the existing horse racing complex, the Project Site is perfectly positioned and ready for its next evolution and redevelopment that is fitting for the 21st Century.

Previous redevelopment plans included development of a casino facility, in response to the Massachusetts Gaming Commission's ("MGC") mandate to expand gaming by offering up to three gaming licenses within three separate geographic locations, one of which included the Boston metro area.[2] To compete for the license, Sterling Suffolk Racecourse, LLC, MHDC's predecessor as owner of the Project Site, initiated MEPA review by filing an ENF in January 2013 and, subsequently, a DEIR/EPNF in September 2013 for review of the proposed Caesar's Resort at Suffolk Downs project. At the time of the initial filings, the proposed project included two host communities—Boston and Revere—requiring the casino proponent to negotiate agreements with both. As part of the public review process, it was concluded that the casino project would have one host community—Revere—and that casino facilities would be planned for the Revere portion of the Project Site only. Therefore, to document the change in site and project changes to accommodate gaming facilities solely within Revere, a Notice of Project Change ("NPC") was filed in January 2014 by a new proponent, Mohegan Sun Massachusetts ("MSM") for the revised casino development, which consisted of an approximately 965,000-square foot gaming facility. Subsequent to the successful completion of MEPA review in August 2015,[3] the MGC chose another competing bid for the casino and, therefore, the casino project did not move forward. Eventually, Sterling Suffolk Racecourse, LLC sold the Suffolk Downs property to MHDC in May 2017.

[2] In November 2011, Governor Deval Patrick's signed into law Chapter 194 of the Acts of 2011: An Act Establishing Expanded Gaming in the Commonwealth with the goal of economic investment and job creation in the Commonwealth.

[3] On March 28, 2014, the MEPA office issued a scope for a Supplemental DEIR ("SDEIR") for the study of reduced potential environmental impacts based on the project changes described in the NPC. In response, MSM filed a SDEIR in June 2014.

1.2.1 State and City Review of the Master Plan Project

On November 30, 2017, the Proponent submitted the joint EENF/EPNF with a request for a Phase 1 Waiver for an initial phase of development. On January 26, 2018, the Secretary of Energy and Environmental Affairs ("EEA") issued a Certificate on the EENF, as well as a Draft Record of Decision ("ROD") granting a Phase 1 Waiver both of which were noticed for public review in the MEPA Environmental Monitor the same day. On February 21, 2018, the BPDA issued a Scoping Determination on the EPNF. This joint DEIR/DPIR satisfies both scopes outlined in the Secretary's Certificate on the EENF and in the BPDA's Scoping Determination. Chapter 13, *Response to Comments*, includes a copy of these decisions.

In support of the RFP issued by Amazon, an initial office development of approximately 520,000 square feet in the form of two buildings with ground floor retail space, and related infrastructure, public realm, and open space improvements (the "Phase 1 Project") was approved to move forward without further review by both the EEA Secretary and BPDA Board through issuance of the Final ROD granting the Phase 1 Waiver on February 28, 2018 and by the BPDA Board approval received February 14, 2018. Zoning relief for the Phase 1 Project for building height limitations was approved by the Boston Zoning Commission also on February 14, 2018.

1.2.2 Project Changes Since EENF/EPNF Filing

Refer to Figure 1.6 for the updated site plan. The following summarizes the key changes to the Master Plan Project since the EENF/EPNF filing. These changes are discussed in further detail in subsequent chapters.

- **Site Plan Design**: The conceptual site design of the Master Plan Project has evolved based on the following key factors:
  - The Revere portion of the Master Plan Project development program has been refined based on the approval of the SDOD, which requires a 50 percent minimum of on-site uses within Revere to be commercial (office, retail, hotel, etc.) with the remaining on-site development within Revere allowed to be residential.
  - In the Boston portion of the Project Site, based on community and BPDA feedback, the Proponent and design team have focused on the southernmost Waldemar Avenue edge of the Master Plan Project adjacent to the Orient Heights neighborhood resulting in significant design changes. These changes include pulling larger buildings away from existing houses at the edge of the Project Site resulting in: an expanded Belle Isle Square public plaza; the addition of new townhomes; creation of a landscaped buffer with a community path; and a new neighborhood park.
  - Two new streets have been introduced to decrease block size in specific areas, specifically a new internal street that runs north south parallel to and between the Main Street Retail District and Tomasello Drive to reduce the size of certain

blocks in response to concerns raised by BPDA staff about "superblocks." This change also allows for the shifting of parking and loading access points off of secondary roads onto this new tertiary road.

Refer to Chapter 3, *Urban Design*, for additional information.

- **Building Height:** Building height setbacks have been added along both Winthrop Avenue and Washburn Avenue in Revere, allowing the buildings to transition from the scale of the adjacent areas. These setbacks have been incorporated into the approved zoning for the Revere portion of the site (SDOD) and incorporated into the height zones illustrated in Figure 2.1. (Refer to Chapter 3, *Urban Design*, for additional information on changes to building heights and massing.)
- **Development Program:** Approximately 300,000 square feet of previously-proposed building space, or density, has been eliminated from the overall Master Plan Project as a result of site and building design changes, resulting in a reduction in density. Refer to Table 1-1 for the updated development program for the Project.
- **Uses:** Residential uses are mixed into the commercial cores, such as the Main Street Retail District to support an anticipated 18-hour presence to address concerns about scale and distance of residential and commercial uses from public open space. Additionally, commercial/retail uses have been extended to meet the existing shopping area at Furlong Drive. (Refer to Chapter 3, *Urban Design*, for additional information.)
- **Access to Public Transit:** The Proponent has invested in a new stop and turnaround on Tomasello Drive for the MBTA #119 bus route and added two on-site shuttle bus routes to the Master Plan Project for a future privately-operated shuttle bus system to further encourage the use of public transit (refer to Figure 3.25). Additionally, the Proponent proposes to establish off-site privately-operated shuttle services providing direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station, as well as to the Seaport District. (Refer to Chapter 6, *Transportation*, for additional information.)
- **Open Space:** The proposed open space network has been deliberately designed around the themes of regional connectivity, active uses/recreation, and resiliency (based on greater understanding of potential on- and off-site impacts related to climate changes). (Refer to Chapter 3, *Urban Design*, for additional information.)
- **Climate Change Resiliency:** Based on the modeling results of multiple schematic design conditions that varied the location, amount, and elevation of fill, and aspects of the stormwater management design compared against a baseline condition, the grading plan has been modified for lower grading/reduced fill in select areas to mitigate for/eliminate off-site future flooding conditions at some locations occurring during significant coastal storm surge events and significant rainfall events. The revised approach redirects stormwater volume to Chelsea Creek to reduce the volume of runoff being

discharged to Sales Creek and provide additional flood storage along Sales Creek. The revised drainage plan also provides additional flood storage within the Central Common by re-grading it to a lower elevation. (Refer to Chapter 8, *Climate Change Resiliency*, for additional information.)

- **Sustainable Building Design:** The Proponent has committed to having 50% of the buildings developed as part of the Master Plan Project satisfy requirements for a minimum LEED Gold level and 50% of the buildings satisfy requirements for a minimum LEED Silver level. (Refer to Chapter 4, *Sustainability/Green Building*, for additional information.)
- **Project Phasing:** The Proponent has developed a conceptual project phasing plan that includes the identification of the open space components that are anticipated to be constructed by each development phase. (Refer to Chapter 3, *Urban Design*, for additional information.)

1.3 Site Context and Existing Conditions

The Project Site is currently home to the Suffolk Downs race track facility, which opened in 1935 and remains New England's only operating thoroughbred race track. Most of the original structures still exist on-site, as described more fully below in Section 1.3.1.

As shown in Figure 1.2, the western side of the Project Site is bordered by land that includes a retail shopping center, properties containing fuel storage tanks owned by Irving Oil Terminals Inc. and Global Petroleum (the "oil tank farm"), and McClellan Highway (Route 1A). Winthrop Avenue is located along the northern boundary of the Project Site. The neighborhood north of Winthrop Avenue is Crescent Beach, which in turn borders Revere Beach and the Atlantic Ocean; the Project Site is located less than one mile from the beach and ocean. Washburn Avenue, the MBTA Blue Line, and Bennington Street (which connects East Boston to the City of Revere and is a route for access to the Town of Winthrop (via Saratoga Street, Route 145) lie east of the Project Site. Waldemar Avenue and the Orient Heights residential neighborhood of East Boston are located immediately south of the Project Site.

Beyond Bennington Street, to the east, lies the Belle Isle Reservation where the Massachusetts Department of Conservation and Recreation ("DCR") manages a natural area with pathways, benches, and an observation tower; the reservation is part of the 241-acre Belle Isle Marsh, the last remaining salt marsh in Boston.

1.3.1 Existing Site Conditions

Appendix C of the EENF/EPNF provided a description of the metes and bounds of the Project Site and accompanying site survey plan. As shown on Figure 1.3, the approximately 161-acre Project Site consists of a race track, a vacant administration building, a clubhouse, grandstand, maintenance buildings, horse barns (many of which are dilapidated and in danger of falling) and supporting space for horse handlers and other support staff, as well as site access ways and extensive surface

parking. The race track consists of a one-mile oval racing surface with an infield and surrounding open space, which is not available as a community amenity since the race track is not accessible for public use.

Figures 1.4 and 1.5a through 1.5b present photographs of current site conditions. Sales Creek crosses the Project Site and connects portions of the Revere watershed with the coastal Belle Isle Marsh, which is within walking distance of the Project Site. Sales Creek represents the East Boston and Revere municipal border line through much of the Project Site. Sales Creek is primarily a manmade drainage channel that runs from approximately the northwest corner of the Project Site through the northern portion of the race track infield and continues east of the Project Site and connects to the Belle Isle Inlet and the Rumney Marshes Area of Critical Environmental Concern ("ACEC"). The portion of the Project Site north of Sales Creek includes stables used as part of the race track facilities.

There is also an existing pond on the Project Site, originally constructed in the 1930s (the "infield pond"), as well as other wetlands resource areas. These wetland resources will be preserved and integrated into the proposed open space system that is planned as part of the Master Plan Project, providing an open space oasis within the new urban district of the Master Plan Project.

The main access points to the Project Site are from Route 1A to the west, via Tomasello Road (aka and referred to herein as Tomasello Drive), which is a private way, as well as via Winthrop Avenue at the north end of the Project Site. A secondary access from McClellan Highway (Route 1A) is available via Furlong Drive, which provides access to the retail shopping center located northwest of the Project Site. Two mass transit stops on the MBTA Blue Line (the Suffolk Downs and Beachmont stations) currently serve the Project Site. Refer to Chapter 6, *Transportation*, for a description of existing vehicular site access and circulation, and public transit.

1.4 Project Description

As previously described, the Project Site straddles the cities of Boston and Revere, and has already been designated by both cities for major mixed-use development. The Master Plan Project offers a dynamic mix of uses on the Project Site, including, commercial uses (office, lab, innovation/business incubator space), residential uses, street front retail, as well as an extensive open space system.

The Master Plan Project has been designed to have a strong and interconnected urban design framework that offers the potential to connect to the surrounding neighborhoods and has the ability to incorporate the proposed mix of uses.

Section 3.4 of Chapter 3, *Urban Design*, describes the Master Plan Project's planning principles and design goals, which are generally to:

- Create a vibrant mixed-use, walkable community.
- Provide a variety of housing types to meet the needs of surrounding neighborhoods.

- Enhance and expand job creation and economic opportunity by providing employment opportunities near new and existing residential areas.
- Leverage the proximity to public transit to limit traffic impacts and provide easy access to workplaces and entertainment venues in other Boston neighborhoods.
- Provide a comprehensive (vehicular, pedestrian, and bicycle) transportation network.
- Provide sufficient publicly-accessible open space.
- Activate the public realm with open space amenities and extensive ground-floor retail.
- Provide retail uses aimed at serving the on-site users and complementing existing retail in the surrounding neighborhoods.
- Incorporate sustainability and climate change resiliency district-wide.

1.4.1 Master Plan Project Proposed Development Program

Figure 1.6 presents the proposed conceptual site plan for the Master Plan Project described and analyzed herein. The proposed Master Plan Project offers a dynamic mix of uses on the Project Site, encouraging commercial and innovation uses, diversity of residential uses, creative retail and business incubator/innovation space, as well as parks and community spaces. The Master Plan Project will be anchored at the two existing MBTA Blue Line Stations and then will radiate through the Project Site along a network of new streets, neighborhood retail districts and open spaces. Refer to Table 1-1 below for the proposed development program that is reviewed in this DEIR/DPIR. The Master Plan Project includes a development program intended to have flexibility between uses in order to meet future changes in market conditions and market demand within parameters that will be presented in the FEIR and incorporated in the Boston and Revere zoning approvals.

Table 1-1 Master Plan Project DEIR/DPIR Development Program

Use/Element	Approximate Size
Commercial Office/Lab	Up to 8.0 MGSF
Residential	7.15 MGSF (±7,200 units)[1]
Retail	500,000 GSF
Hotel	550,000 GSF (±918 Rooms)
Total GSF[2]	**16,200,000**
Parking Spaces	±15,250[3]

GSF Gross Square Feet, as defined in the applicable zoning codes.

1 Consists of housing units of various size and type, including home ownership, senior housing, and affordable units (in compliance with Boston's inclusionary housing programs and in coordination with the City of Boston).

2 Represents a not-to-exceed/maximum build-out; to be developed in multiple buildings each of which can be developed together or independently of the others and in differing sequences. Depending on market

conditions or other factors, floor area may be reallocated among different uses, while remaining consistent with the overall proposed mix of uses, site-wide improvements and mitigation commitments to be established through the MEPA, Boston Article 80, and Revere zoning review processes. The flexibility of sequencing is critical to the Master Plan Project's ability to respond to market conditions.

3 Parking to be provided on multiple parcels the majority of which will be provided in structured garages with a limited allocation of on-street parking to support street-front retail uses.

Given the scale of the Project Site, the Master Plan Project is a long-term development that will be implemented in phases over a period of 15-20 years. The Master Plan Project is, therefore, being conceived with an overall development program that provides a degree of flexibility to balance different residential and commercial uses as development proceeds. As discussed in the EENF/EPNF, two program options were considered for master planning purposes. This DEIR/DPIR fully analyzes the potential environmental and community impacts, and presents mitigation measures and public benefits for a refined version of the "pro-commercial" program, or Program A, presented in the EENF/EPNF, which includes the amount of commercial office space sized to meet the full Amazon requirement as outlined in the Amazon HQ2 RFP. The "pro-residential" program, or Program B, presented in the EENF/EPNF consists of less commercial office space (up to 5.25 MSF) and more residential space (up to 10.4 MSF, or approximately 10,000 units). These two programs are intended to be illustrative of end points on a spectrum, and the actual mix of uses when the Master Plan Project is completed will likely fall somewhere between the two, with less commercial space and more residential space than the DEIR/DPIR development program. (The reallocation from commercial to residential uses would occur in Boston as the amount of residential space in Revere is capped under the SDOD zoning.) The DEIR/DPIR development program has been used because it is generally most impactful as it relates to traffic generation and other impacts. However, water demand and sewage generation have been analyzed in Chapter 10, *Infrastructure*, for a range of uses that includes up to 10,000 residential units. Therefore, this DEIR/DPIR presents conservative impact analyses and mitigation plans that will allow for future flexibility based on analysis of the most impactful scenario with respect to each potential impact.

1.4.2 Master Plan Framework

The Master Plan Project has been planned around the goals of porosity, connectivity, and accessibility for this currently closed and unconnected site. The conceptual design of the Master Plan Project is arranged around a strong open space and public realm framework that provides an opportunity to connect the East Boston and Revere neighborhoods adjacent to the Project Site with a continuous fabric of transit oriented commercial and residential development thoughtfully integrated with the open space framework. The key components of this framework include the following, which are described more fully in Section 3.5 of Chapter 3, *Urban Design*:

- Open space network.
- Distinct neighborhoods.
- Urban connections and circulation.

- Adaptability of the Master Plan Project and block morphology.
- Context-sensitive development.

Proposed Uses

There are four distinct neighborhoods proposed within the Master Plan Project that are intended to include a mix of uses with active uses at the ground floor and commercial and/or residential uses in the upper floors. Refer to Figure 3.4 of Chapter 3, *Urban Design*, for the neighborhoods, which are referred to herein as:

1. Belle Isle Square Neighborhood.
2. Beachmont Square Neighborhood.
3. Main Street Retail Corridor.
4. The Panhandle (the land extending to Route 1A).

Two important transit-oriented squares—Belle Isle Square and Beachmont Square—are proposed in proximity to the Suffolk Downs and Beachmont MBTA Blue Line Stations, respectively. The key goal of these urban squares is to create lively pedestrian-friendly access to the stations to encourage public transit usage to and from the Project Site. These squares will be provided with active retail uses and multi-modal transportation opportunities, including bicycle-sharing stations, connections to the shuttle loops, and integration with MBTA local bus routes. These squares are lined with pedestrian-serving retail and services and centered in mixed-use neighborhoods to provide 18 hours-per-day activation.

The TOD Squares are both designed to be linked with a 'Main Retail Street' that straddles the length of the Project Site and provides an active and lively environment to be enjoyed both by the owners, tenants and employees within the Project Site and visitors from the surrounding community (the "Main Street Retail Corridor"). The Proponent will look to attract existing local restaurants and businesses and cultivate an authentic retail feeling for the larger community which will not only serve on-site residents and workers, but also people from surrounding neighborhoods.

Residential and commercial uses (including hotel) are intended to be interspersed across the proposed buildings and four neighborhoods to ensure vibrancy throughout the Project Site. A variety of housing types, including townhomes, apartments, condominiums, and senior housing is proposed to meet the needs of Boston and Revere residents at a variety of price points including affordable and market rate.

Key civic and public realm amenities will also be incorporated throughout the Master Plan Project, including the proposed public plazas at Belle Isle Square and Beachmont Square, a landscaped outdoor theatre, and several active and passive open space areas. In addition, street-level amenities will be encouraged, with local restaurants and on-site retail able to spill out onto adjacent sidewalks and open space areas.

Open Space Network

The Master Plan Project has been planned to reconnect East Boston and Revere with an approximately 40-acre publicly-accessible open space network that represents approximately 25 percent of the overall Project Site area. Key open spaces within the development will include:

- An approximately 15-acre central common.
- A landscaped outdoor theatre.
- Public plazas.
- Passive and active recreational areas.
- Playgrounds, dog runs and several neighborhood-scale open spaces.

As described more fully in Section 3.9 of Chapter 3, *Urban Design*, the new approximately 40-acre open space network will incorporate existing wetland features on the Project Site and will seek to provide connections via community paths to Revere Beach, Belle Isle Marsh, the East Boston Greenway and other nearby open spaces. The vibrant publicly-accessible open space, plazas, and recreation spaces provided in this new development will therefore attract and benefit not just on-site users, but also those from nearby neighborhoods and the wider community.

Sustainability and Resiliency

Given its scale, redevelopment of the Project Site presents a unique opportunity to incorporate sustainable design and climate change resiliency elements in a comprehensive/district-wide manner from the early planning stages. Sustainability is a key theme for the Master Plan Project as it proposes to redevelop an underutilized urban site, use land efficiently by increasing density as a mixed-use TOD, and encourages non-automobile and low carbon modes of transportation.

The Master Plan Project expect to exceed requirements for compliance with Article 37 of the Boston Code by demonstrating that early design elements would meet the Leadership in Energy and Environmental Design ("LEED") version 4 green building rating system ("LEEDv4"), or equivalent requirements necessary to be LEED "certifiable." The buildings in Revere will meet comparable LEED environmental standards. As demonstrated in Section 4.4 of Chapter 4, *Sustainability/Green Building*, the Proponent has committed to having 50% of the buildings developed as part of the Master Plan Project satisfy requirements for a minimum LEED certifiable Gold level and 50% of the buildings satisfy requirements for a minimum LEED certifiable Silver level.

In support of the City of Boston's goal for carbon neutrality by 2050 and the City of Revere's similar goals to reduce GHG emissions associated with development, the Master Plan Project includes a comprehensive energy conservation approach through efficient building planning (i.e., early energy modeling of building typologies) and design combined with the consideration and evaluation of on-site renewable energy opportunities. Based on preliminary energy modeling, overall across all proposed building typologies, the Master Plan Project will exceed the

current Stretch Energy Code requirement for energy efficiency with an estimated energy usage savings of 19.4 percent resulting in a 17.5 percent reduction in stationary source greenhouse gas ("GHG") emissions.[4]

As part of this DEIR/DPIR, the Proponent has undertaken an iterative modeling process that considers the potential impact of the proposed grading and stormwater management approach on both on-site and off-site flooding under current and future predicted climate change conditions. The scope of the model evolved through a collaboration with MEPA, CZM, DCR and MassDEP beyond the requirements of the MEPA Certificate and BDPA Scoping Determination on the EENF/EPNF. The study, which can be used as a regional planning tool for the City of Revere and DCR to understand the impacts of climate change on the Sales Creek Watershed system, demonstrates that without the Project, the Project Site and adjacent areas would be subject to flooding due to projected increases in precipitation and sea level rise. However, with the Project and associated site grading, stormwater management, and open space design, as well as proposed potential resiliency measures, flooding is reduced. Refer to Chapter 8, *Climate Change Resiliency*, for further details on the resiliency study and modeling results, as well as the proposed potential resiliency beneficial measures.

Healthy Community Design

The Master Plan Project will include a welcoming and well-designed bicycle and pedestrian network to encourage sustainable modes of transportation, promote health and wellness, and enhance social interactions and idea sharing within the mixed-use community. Multiple public bikeshare stations will be incorporated throughout the Project Site, to connect cyclists to destinations on-site and beyond.

By providing easy access to the outdoors, a key design goal of the Master Plan Project is to encourage community members to lead active and healthy lifestyles while also engaging them in the larger outdoor environment. Two on-site publicly-accessible walking and biking loops, each over one-mile long, will link the open space network and promote unique opportunities for health and wellness. Additionally, in an effort to embrace Greater Boston's active and healthy lifestyle, the proposed open space network will include fitness facilities and specialty gyms (i.e. rock climbing, cycling). The design strives to create unique opportunities for neighborhood scale retail, including local and small businesses, as well as startups and incubators.

Site Access/Circulation

Two important retail squares at the Suffolk Downs and Beachmont MBTA Blue Line Stations called Belle Isle Square and Beachmont Square, respectively will create pedestrian-friendly access to the stations with active retail uses, multi-modal

[4] Reductions do not account for structured parking.

transportation opportunities, including bicycle stations encouraging public transit usage to and from the Project Site.

As it is built-out, the Master Plan Project will provide for significant enhancements to the key vehicular access points. Primary vehicular access to the Project Site will continue to be provided by Tomasello Drive, a privately-owned roadway through the site, with connections to Route 1A and Winthrop Avenue (Route 145/Revere Beach Parkway). Widening of Tomasello Drive and Route 1A will also be implemented as part of the Master Plan improvements. Tomasello Drive at Route 145 (Revere Beach Pkwy/Winthrop Avenue) will provide additional access connections. To the east of the Tomasello Drive/Winthrop Avenue access, a right-turn in/right-turn out access driveway is proposed to provide access to the northern end of the Project Site. To the east of the right-turn in/right-turn out access driveway a full-access signalized access driveway is proposed, which will facilitate access to the retail corridor and the "spine road" that runs north/south on the Project Site. As a secondary access opportunity, Furlong Drive, a public way from Route 1A to the Shops at Suffolk Downs, will both provide a connection between Route 1A and Tomasello Drive via a publicly-accessible driveway through the shopping plaza.

Refer to Chapter 6, *Transportation*, for further details on proposed site access/circulation improvements.

Parking

The mixed-use nature of the Master Plan Project, including the Project Site's proximity to two MBTA Blue Line stations (Beachmont and Suffolk Downs), provides the opportunity to support a sustainable, multi-modal development that requires fewer off-street parking spaces than those required for "traditional" quasi-urban or suburban developments. A reduced parking provision is representative of an urbanized, highly-effective TOD and aligns with the Master Plan Project's anticipated future mode share characteristics. Refer to Section 6.8.2 of Chapter 6, *Transportation*, for a discussion on the proposed parking supply and the shared parking approach intended to support tenant and market-driven parking demands, yet minimize the number of spaces provided on-site and the associated construction costs and environmental impacts (i.e., single occupancy vehicle trips and associated air emissions).

1.4.3 Anticipated Master Plan Project Phasing

The design of future buildings will be developed based on the finally approved Master Plan Project. It is expected that the Master Plan Project will accommodate a variety of build-out scenarios and will be developed in stages over a range of approximately 15 to 20 years depending on market conditions. Each of the proposed buildings can be developed together with or independently of, and in differing sequences with, the others and the mix of uses presented in Table 1-1 allows the Master Plan Project to remain responsive to evolving market conditions.

Depending on market conditions or other factors, uses are to be allocated to different buildings, while complying with the Master Plan Project's use and dimensional limitations and requirements for site-wide amenities and improvements and mitigation commitments, all of which will be established through the MEPA process, the City of Boston Article 80 review process and City of Revere rezoning and development review processes. The flexibility of sequencing is critical to the Master Plan Project's ability to respond to market conditions.

Figure 1.7 presents the conceptual phasing plan for the Master Plan Project. The initial phases in both Boston and Revere ("Phase 1-B" and "Phase 1-R", respectively) include early development near the two MBTA Blue Line stations, which are "front doors" of the Project Site, it being understood that flexibility of sequencing is critical. Phase 1-B includes approximately 1.39 MSF of development consisting of the Phase 1 Project and three residential buildings and a portion of the townhomes proposed along Waldemar Avenue totaling over 800 housing units, and construction of the Horseshoe Pond landscaped wetland enhancements and Belle Isle Square public plaza with over 100,000 square feet of ground floor retail (described in further detail in Section 3.6.2 of Chapter 3, *Urban Design*). Phase 1-R consists of a total of 1.42 MSF in the form of three residential buildings with over 1,100 housing units, one hotel, and one innovation building, as well as the Beachmont Square public plaza with ground floor retail providing a new connection to the MBTA Beachmont Blue Line Station. Development of Phase 1-R will require the demolition of a portion of the horse barns in the northern portion of the Project Site. Phase 1-B does not require demolition of any buildings, but will result in the removal of a portion of the existing horse racing track.

The Phase 2 development in both cities aims to connect the initial phases with significant build-out of the Central Common (Figure 1.7). Demolition of majority of the remaining horse barns, the clubhouse structure and partial demolition of the grandstand structure would be required for Phase 2. The southern portion of Phase 2 in Boston ("Phase 2-B-South") also includes a development west of Phase 1-B, including the new neighborhood park along the Waldemar Avenue edge of the Project Site. Phase 3 generally includes development west of Phases 1-R, 2-R, and 2-B-Northm, well as major portions of the street network connecting to the Central Common. Phase 3 will require demolition of the remaining portion of the grandstand structure and remaining administrative buildings. Phase 4 generally consists of the build out of parcels along Tomasello Drive, as well as enhancements to the wetland buffer along Tomasello Drive. The final phase, Phase 5, is located in Boston at the entrance of the Project Site off Route 1A.

Refer to Section 3.9.6 of Chapter 3, *Urban Design*, for a more detailed description of the open space elements by development phase.

1.5 Summary of Public Benefits

This section summarizes the many anticipated public benefits associated with the Master Plan Project.

Community Benefits

- Transform an underutilized urban site into a new dynamic mixed-use neighborhood anchored by quality public transit and open space that responds to surrounding uses.
- Enhance job creation and economic development through the incorporation of commercial uses, including an innovation center, office, lab, retail and hotel uses.
- Materially increase housing units in the area which is key priority for the Boston portion of the Project Site, as noted in the *Housing a Changing City Boston 2030* plan.[5]
- Provide a range of housing types (i.e., varying sizes) that will serve a broader set of households (i.e., empty nesters, seniors, families and singles), including hundreds of new senior housing units; and new affordable housing units through compliance with the City of Boston's inclusionary housing programs.
- Provide an expansive approximately 40-acre publicly-accessible open space network, designed to create connections to adjacent neighborhoods in East Boston and Revere and to the surrounding regional assets, such as the East Boston Greenway, Belle Isle Marsh, Constitution Beach and Revere Beach, which open space network represents approximately 25 percent of the overall Project Site area.
- Provide for future community activities and programs aimed at benefiting adjacent neighborhoods of both East Boston and Revere, such as plaza programming (i.e., festivals, farmer's market), open space programming (i.e., recreational activities), Innovation Center programming (i.e., community meetings, seminars, third party workforce training), new Waldemar Neighborhood Park design and programming, public realm/infrastructure improvements, 10 percent of retail space offering at flexible lease parameters, are anticipated to be developed in coordination with the community and other key stakeholders.

Public Use and Enjoyment of the Public Realm and Open Space

- Provide public access to an expansive 40-acre open space network that represents approximately 25 percent of the overall Project Site area with multi-functional open spaces that provide relaxing and restorative places to walk, run, and recreate for a property largely closed off to the public since the 1930s.
- Provide an extensive walking, jogging, and bicycling network throughout the Project Site, specifically the proposed Active Linear Corridor (previously referred to as the "sporty spine") with diverse types of exercise and creative passive and active recreation options runs through the center of the Project Site linking up to a new neighborhood park for the Orient Heights neighborhood – all of which supports healthful living.

5 https://www.boston.gov/sites/default/files/housing_a_changing_city-boston_2030_full_plan_1.pdf.

- Offer a new robust pedestrian and bicycle network throughout the Project Site, as well as an opportunity to connect to off-site regional systems, including the East Boston Greenway, Revere Beach Parkway, and Belle Isle Marsh.
- Provide key community amenities throughout the Project Site to activate the public realm, including distinct neighborhood retail districts, a landscaped outdoor theater, and active and passive recreation areas (including dog-friendly open spaces and playgrounds).
- Provide ground-level amenities with local restaurants and retail encouraged to spill out onto adjacent sidewalks and open space areas. Because the development will bring new populations, including daytime employees and visitors, as well as permanent residents, it is expected that the new retail will complement and support existing retail and restaurants in the surrounding neighborhoods.
- Anchor early development phases with new urban public spaces—Belle Isle Square and Beachmont Square—and in later phases with the creation of the Main Street Retail Corridor.
- Offer a dynamic mix of uses that aim to encourage commercial and innovation businesses a variety of housing types and street front neighborhood retail, all within an extensive publicly-accessible open space network.
- Provide for a variety of living styles for a diverse population, including families, empty nesters, seniors, younger workers, and recent graduates through the creation of multiple neighborhoods designed to include a mix of rental and ownership housing available to residents interested in both market rate and affordable housing.
- Provide for contextual building height and massing that respects the scale of adjacent neighborhoods of the Project Site edges through sets backs and stepping back massing of the larger buildings to create appropriately-scaled development and maximizing views for all buildings while creating privacy.
- Embrace the context of existing marshes and wetlands, protecting and enhancing them with native vegetation where possible and incorporate a diversity of plantings.

Transportation

- Improve connections and transportation access through a cohesive fabric of new urban streets, walking paths, and bicycle connections on- and off-site.
- Create a true TOD community by locating a dense mix of uses immediately adjacent to two public transit stops and emphasizing walk-ability and bike-ability to further reduce the Master Plan Project's overall environmental impact associated with single-occupancy vehicle trips and mobile source air emissions.
- Create retail squares near the Suffolk Downs and Beachmont MBTA Blue Line stations with multi-modal transportation opportunities, including Bluebikes bicycle stations, encouraging the use of alternative transportation modes to access the Project Site.

- Enhance access to public transit by investing in a new stop and turnaround on Tomasello Drive for the MBTA #119 bus route (a preliminary measure currently in place) and continue to work with the MBTA to explore potential future bus routing and stops within the Project Site as the demand is warranted by the Master Plan Project.
- Provide a privately-operated shuttle bus system with two routes interior to the Project Site is proposed to further encourage the use of public transit.
- Establish new, privately-operated shuttle services that would provide direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the Newburyport/Rockport Line), as well as to the Seaport District to encourage alternative modes of transportation and reduce auto-dependency.
- Address pre-existing local and regional roadway and safety issues, as well as potential Project-related impacts in the vicinity of the Project Site through approximately $50 million in off-site improvements at 23 locations, some of which include multiple intersections. Key improvements of regional significance, which are discussed in further detail in Chapter 6, *Transportation*, include:
  - Route 1A infrastructure improvements from south of Boardman Street to Furlong Drive;
  - New ramp connections at the Route 1/Route 16 interchange, consistent with the Lower North Shore Transportation Improvement Study;
  - Significant improvements at Bell Circle;
  - Winthrop Avenue Corridor Improvements from Route 16/Harris Street to Revere Beach Parkway; and
  - Improvements to Day Square.
- Implement a robust Transportation Demand Management (TDM) plan will reduce single occupancy vehicle travel and encourage and incentivize use of alternative modes for all users.
- Provide mostly structured parking facilities with only limited on-street parking provided to support street front retail uses.
- Utilize a shared parking approach within the commercial parking to accommodate the parking needs of other uses (residential, hotel, and retail) to use parking more efficiently and reduce the parking garage footprint on-site.

Climate Change Resiliency

- Proactively plan for the effects of future climate change for anticipated increases in sea level rise and storm surge, precipitation, and extreme temperatures.
- Site design strategies that reduce the impacts of increased precipitation and coastal storm flooding across the Project Site, to off-site neighborhoods, and to nearby infrastructure include:

- A Master Plan that incorporates an extensive open space system covering over 25 percent (over 40 acres) of the Project Site.
- A network of open spaces strategically designed to accommodate potential flooding impacts associated with sea level rise.
- Site grading and drainage plan that raises key portions of the Project Site for flood protection while optimizing flood storage capacity, including a stormwater management system designed to address potential increases in storm intensity due to climate change in accordance with recent BWSC guidance (i.e., to convey and detain the 10-year and 100-year design storm increased rainfall depths of 6.0 and 8.8 inches, respectively)
- Construction of parking garages that can be utilized as flood storage for the Sales Creek watershed system under extreme flooding conditions.
- Targeting building first floor elevations per BPDA design recommendations.
- An upgraded and optimized Bennington Street Pump Station.
- An additional tide gate on the culvert at the eastern limits of the property that will provide flood protection for upstream neighborhoods, as well as the Project Site.
- A robust tree canopy within the Central Common and streetscapes for increased stormwater absorption.

› The Project has targeted a shelter in place strategy for future residence through 2070 for a majority of the Project Site, where reasonable and feasible. This will be achieved by substantially raising the Project Site to provide a roadway network that will have passable corridors during significant storm-events providing access to the Site and enabling most buildings to be located above projected flood elevations.

Environment/Sustainability

Green Building Design

› The Master Plan Project will exceed requirements necessary to comply with Article 37 of the Boston Code, including through design of buildings to meet LEEDv4 under the applicable green building rating system for the given building typology. The future buildings in Revere will be designed to the same LEED Standards as buildings in Boston.

› The Proponent has committed to having 50 percent of the buildings developed as part of the Master Plan Project satisfy requirements for a minimum LEED Gold level and 50 percent of the buildings satisfy requirements for a minimum LEED Silver level.

› The Master Plan Project will contribute to the City of Boston's goal for carbon neutrality by 2050 through a long-term sustainability plan is organized around three (3) major sources of GHG emissions: buildings, transportation, and waste, which are aligned with the City of Boston's reporting of its GHG emissions. As

noted, the future buildings in Revere will be designed to the same LEED standards as buildings in Boston.

› The Master Plan Project is being designed to be consistent with the intent of many of the credits and strategies defined in the LEEDv4 for Neighborhood Development Plan rating system and, thus, is expected to result in a better more sustainable and well-connected neighborhood district.

Energy Conservation/GHG Emissions Reductions

› The Master Plan Project building typologies, as well as the aggregated Master Plan Project will exceed the Stretch Energy Code requirement for 10 percent energy efficiency above code.
  - Preliminary energy modeling for eight (8) different building typologies indicates a 19.4 percent energy usage savings (excluding parking) and 17.5 percent reduction in stationary source GHG emissions for the Master Plan Project. (With parking included, the percent energy usage savings increases to 20.9 percent and GHG emissions savings to 19.6 percent.)[6]

› Incorporate energy conservation measures for the Master Plan Project building typologies (office, multi-family residential, hotel and retail) that aim to exceed the Stretch Energy Code requirement for energy efficiency and result in stationary source GHG emissions reductions.

Water Quality/Stormwater Management

› Provide for new stormwater management treatment systems on-site, which will significantly improve the overall quality of stormwater runoff, and control peak rates of runoff in comparison to the existing conditions.

› Integrate BMPs into the stormwater management system and landscape design to maximize useable open space for the public during dry weather.

› As an extension of the Boston Complete Streets guidelines, incorporate additional stormwater quality enhancement features and opportunities to incorporate low impact development ("LID") techniques, such as rain gardens/biofiltration, tree filters, and green roofs, will be considered in the Master Plan Project design.

› Daylight a culverted portion of Sales Creek to provide an ecological benefit and increasing the stormwater storage capacity of the Sales Creek system.

› Terminate the Concentrated Animal Feeding Operations ("CAFO") associated with the existing thoroughbred race track. Ending the horse stabling operations will have a positive impact on the water quality of the surrounding streams and wetlands.

[6] Parking is broken out from Master Plan Project energy savings and stationary source GHG emissions totals because it is low energy use and includes significant lighting improvements that artificially inflates overall project reductions.

Natural Resources

- Redevelop a previously developed and heavily disturbed site that was filled in the early 20th century for a then-proposed residential development but has been used instead as a thoroughbred horse racing facility since the 1930's.
- Preserve and enhance on-site resource areas and waterways, including daylighting a portion of Sales Creek and bank improvements along the Horseshoe Pond.
- Integrate natural resources into the 40-acre publicly accessible open space network as a positive asset of the Project Site that will enhance the open space and overall character of the development.
- Comply with applicable regulatory provisions for work within wetlands and waterways; work within these areas will be carefully planned to avoid and minimize impacts.
- Manage invasive species on-site.
- Incorporate native landscaping throughout the Project Site, and particularly within wetlands and buffer zones.
- Improve the environmental function of on-site resource areas, including restoration of certain currently disturbed or degraded areas closest to Bordering Vegetated Wetlands ("BVW") and Bank, and removing impervious area within Riverfront Area.
- Materially improve the overall quality of stormwater runoff from the Project Site, which currently has little to no stormwater pollution prevention measures, by mitigating peak runoff rates (the 100-year design storm), providing treatment for the first inch of rainfall to ensure that current on-site wetlands continue to maintain historic flows and functionality, and integrating stormwater management into the open space network.
- Continue to evaluate and avoid/mitigate impacts to wetland resource areas both on-site as development phases are advanced and off-site resulting from improvements related to traffic and/or infrastructure improvements as the design of those improvements are advanced.

Water and Wastewater

- Incorporate low-flow plumbing fixtures and other water conservation and reuse techniques to reduce overall water usage and wastewater generation.
- Reduce water use demand for irrigation needs through a combination of efficient system design, water reuse, and drought-tolerant plantings.
- Reuse of stormwater runoff for landscape irrigation to reduce potable water demand, particularly in the Central Common and other areas, where feasible.
- Inflow/Infiltration ("I/I") mitigation, calculated at a ratio of 4:1 in Boston and 10:1 in Revere in terms of gallons of I/I mitigated or removed from the existing sewer system to gallons of wastewater added, will be implemented to mitigate potential capacity issues in the regional wastewater collection system.

- Provide a dedicated wastewater bypass line that will connect directly to the MWRA system downstream of the Caruso Pump Station to allow Boston and Revere to maintain existing capacities in their local systems for other developments and for the MWRA to maintain existing pumping capacity in the Caruso Pump Station.
- Provide upgrades to the MWRA water main in Winthrop Avenue and to the BWSC water main on Waldemar Avenue, which will improve BWSC customers' water service and provide an additional water supply source.
- Provide for direct connections to the MWRA water mains so that the Master Plan Project would to impact (i.e., reduce water pressure) for the City of Revere's existing customers, specifically within the nearby Beachmont neighborhood.

Other Utilities

- Incorporate Smart Utility Technologies into the Master Plan Project and continue to be explore new technologies throughout the design and implementation of the Master Plan Project as they emerge.
- Develop a broadband system that will serve the current and future connectivity needs of the Master Plan Project's residents, businesses, and other users.

Extraordinary Economic Benefits

- Over the term of the Master Plan Project's development, create approximately 14,000 new construction jobs and 25,000 to 50,000 new permanent jobs.
- Create an overall net fiscal benefit in the form of new annual real estate tax revenue for both Boston and Revere, as well as state sales and business tax revenue for the Commonwealth.
  - Generate approximately $56.8 million annually in net new tax revenue for Boston and approximately $30.1 million in net new tax revenue for Revere at full build-out of the Master Plan Project. [7,8,9]
- In the near term, Phase 1-B and Phase 1-R are estimated to generate a positive annual net fiscal impact estimated at $5.4 for Boston and $5.3 million for Revere, respectively.[10]
- Overall, after accounting for estimated costs of municipal services that may be required as a result of the Project, at full build out, the redevelopment of Suffolk Downs will result in positive fiscal impacts.

7 Estimated property values for future development are based on current rates and not projections.

8 Fiscal impacts do not include existing property taxes associated with the Suffolk Downs property and net out estimated municipal costs associated with the Master Plan Project, including police/fire, public works, education. Therefore, net fiscal benefits will likely be higher over the life of the Master Plan Project if property values increase more than municipal costs.

9 The variance is associated with the size of developable land within each municipality and varying assessed property values/rates.

10 Phases 1-B and 1-R are similar in overall building program representing approximately 1.4 million square feet of development.

1.6 Community Outreach

The Proponent is committed to maintaining an open dialogue with all interested parties. Numerous public and community outreach meetings have been held following the filing of the EENF/EPNF on November 30, 2017. Pursuant to Article 80 of the Boston Zoning Code, a Scoping Session was held, and public meetings were held December 19, 2017 and January 30, 2018. Public Impact Advisory Group ("IAG") meetings were conducted on December 13, 2017 and January 3, January 10 and January 24, 2018. In addition, two additional public IAG meetings were held on June 12, 2018 and September 11, 2018 as a preview to the DEIR/DPIR filing. An extensive series of ongoing public meetings has also been conducted with the Revere Development Advisory Group ("DAG"), which includes a group of elected officials, business leaders, and community representatives appointed by the Mayor of Revere under the SDOD zoning to prepare for the Revere Special Permit process.

The Proponent has continued to engage in a highly public and transparent process to inform city and state agencies, elected officials, community representatives, and the general public about the Master Plan Project. Since the EENF/EPNF filing, the Proponent has held numerous additional meetings with various civic organizations, community representatives, elected officials, municipal departments and state agencies, including, but not limited to those listed below.

Public review and engagement for the Master Plan Project will continue as part of the joint MEPA/Article 80 review process, as well as the City of Revere PUD Special Permit process anticipated for Fall 2018. In addition, the BPDA-established IAG will continue to have an opportunity to give input on behalf of the community during the Article 80-B, Large Project Review for the Master Plan Project, as well as future review of individual development phases and/or buildings as they are advanced, as required.

Regional Community Organizations

- A Better City (ABC)
- Beachmont Improvement Committee
- Boston Harbor Association
- Boston Harbor Now
- Save the Harbor Save the Bay
- First Bristol Corporation
- Friends of Belle Isle Marsh
- Harborkeepers
- Harbor View Neighborhood Association
- Latino Community Leaders & Business Owners
- Mass Audubon
- Metropolitan Area Planning Commission ("MAPC")
- Mystic River Watershed Association ("MyWRA")

- Univision & 1600 AM Radio
- Walk Boston
- Winthrop Chamber of Commerce

City of Boston Community Organizations

- BPDA Site Tour & Open Houses
- Eagle Hill Civic Association
- East Boston Chamber of Commerce
- East Boston Community Soup Kitchen
- East Boston Greenway
- East Boston Harborview Association
- East Boston Land Use Council
- East Boston Main Streets
- East Boston Neighborhood Health Center
- East Boston Main Streets
- East Boston Social Centers
- East Boston Youth Success Initiative
- Gove Street Citizens
- Jeffries Point Neighborhood Association
- Orient Heights Abutters and Neighborhood Council
- Maverick Association of Residents
- Gove Street Citizens
- Waldemar Avenue Residents

City of Revere

- Beachmont Fire Station
- Beachmont Improvement Committee
- Beachmont Neighborhood
- Friends of the Belle Isle Marsh
- Revere Chamber of Commerce
- Ward 2 Committee

1.7 Project Alternatives

As required by the EEA Secretary's Certificate on the EENF, the Proponent has continued to explore opportunities to reduce impacts to environmental resources through site design modifications and the addition of features to further mitigate potential impacts. This section describes and evaluates the project alternatives evaluated, including:

- No-Build Alternative.
- Program A development program and site plan, as presented in the EENF/EPNF.
- Reduced Development Alternative, which has become the Preferred Alternative, or the Master Plan Project, as described and assessed in this DEIR/DPIR.

The focus of this alternatives assessment is on land- and site plan-related parameters in terms of land alteration, impervious area, impacts to wetlands resources, Areas of Critical Environmental Concern ("ACEC"), as well as estimated traffic generation, parking, water usage, and wastewater generation. A comparison of the various alternatives' programs and impacts are presented in tabular form in Tables 1-2 and 1-3 below, respectively.

Also required by the MEPA Certificate, Chapter 5, *Wetlands and Waterways*, discusses alternative site designs that increase buffers to Sales Creek. Chapter 6, *Transportation*, presents information on transportation mitigation alternatives, specifically on the Route 1 corridor between Boardman Street and Route 145. And, Chapter 11, *Historic Resources*, discusses alternatives that reduce impacts to historic resources, including an assessment of adaptive reuse of the existing buildings.

1.7.1 Project Alternatives

The following are key site constraints and considerations, and goals and objectives that guided the development of the build alternatives:

- Site Constraints & Considerations:
  - Vehicular access limited by MBTA rail lines.
  - Need for edges to appropriately address a broad range of existing uses from industrial (oil tank farm) to transit infrastructure (Blue Line train tracks) to residential neighborhoods.
  - FAA restrictions on building heights make it difficult to build to the maximum heights allowed under zoning in certain respects.
- Project Goals & Objectives:
  - Create a vibrant mixed-use, walkable community.
  - Provide a variety of housing types to meet the needs of surrounding neighborhoods and region.
  - Provide significant publicly-accessible open space.
  - Preserve existing wetland resources.
  - Activate the public realm.
  - Enhance and expand job creation and economic opportunity.
  - Leverage the proximity to public transit to limit traffic impacts.
  - Apply sustainable and resilient design district-wide.

No-Build Alternative

The No-Build Alternative would leave in place the existing conditions at the Project Site. This alternative would result in an underutilized horse racing facility with vacant and dilapidated buildings, including the grandstand and clubhouse and vast paved parking areas. Currently the majority of the Project Site is not accessible to the community, as the Project Site has been utilized as a horse-racing facility since the 1930s.

Build Alternatives

EENF/EPNF Program A Alternative

The Program A project alternative presented in the EENF/EPNF included up to 8.0 million square feet of commercial office space and up to 7.45 million square feet of residential space comprised of 7,500 units. The alternative is shown in Figure 1.8 and further detailed in Table 1-2 below. The Proponent made an early commitment to dedicating approximately 25 percent of the Project Site's total land area to create a publicly-accessible open space system. This commitment has been carried through to the alternative presented below. Impacts of this alternative on land alteration, impervious area, wetlands, traffic generation, water use, and wastewater generation are included in Table 1-3 below.

Reduced Development/Preferred Alternative

The EEA Secretary's Certificate directed the Proponent to consider a Reduced Development Alternative that would reduce impervious surfaces, traffic generation, overall development and fill in the floodplain, and increase open space. The Reduced Development Alternative presented in this chapter has ultimately become the Preferred Alternative due to its reduced impacts and increased benefits, which are described in the sections below.

The Reduced Development/Preferred Alternative consists of a reduced development program by approximately 300,000 square feet (from 16.5 MSF to 16.2 MSF) due to site plan changes based on community and BPDA feedback. As described in Chapter 3, *Urban Design*, the Proponent and design team have focused on the southernmost border of the Project Site adjacent to the Orient Heights neighborhood resulting in significant design changes in the Waldemar Avenue edge. These design changes include pulling larger buildings away from existing houses at the southern edge of the Project Site, the addition of new townhomes, and the addition of a landscaped buffer and a new neighborhood open space. Also, the public plaza at Belle Isle Square has been expanded.

Table 1-2 provides a comparison of the project alternatives described above.

Table 1-2 Comparison of Program Alternatives

	No-Build Alternative	EENF/EPNF Program A Alternative	Reduced Development/ Preferred Alternative	Change
Size of Project Site (acres)	161	161	161	No Change
Total Gross Square Feet (GSF)	405,480[1]	16.5 MGSF	16.2 MGSF	(-300,000 GSF)
Commercial Office	None	Up to 8.0 MGSF	Up to 8.0 MGSF	No Change
Residential	None	7,500 units	7,200 units	(-300 units)
Retail	None	550,000 GSF	500,000 GSF	No Change
Hotel	None	500,000 GSF	550,000 GSF	No Change
Building Height (feet)	88	Up to 220	Up to 220	No Change
Parking Spaces	3,028	Up to 16,190[2]	±15,250	(-940 spaces)
Public Realm/Open Space	None[3]	40 acres	40 acres[4]	Negligible

GSF Gross Square Feet, as defined in the applicable zoning codes.
1 Consists of a thoroughbred horse racing facility with a vacant administration building, a clubhouse, grandstand, maintenance buildings, dilapidated horse barns, and support space for horse handlers and other support staff.
2 Based on the preliminary parking ratios presented in the EENF/EPNF.
3 The existing site provides no publicly-accessible open space.
4 Consists of 36 acres of green public open space, including active and passive parks, playgrounds, community paths, and bike paths and an additional 2 acres of public realm area, including the Beachmont and Belle Isle Plazas. Does not include the additional approximately 8 acres of wetlands as green buffers and habitat reserves, or streets and sidewalks.

1.7.2 Comparison of Potential Environmental Impacts

Table 1-3 below provides a tabular comparison of the impacts associated with the alternatives described above. The sections below describe the

Table 1-3 Comparison of Alternatives Impacts

Impacted Element	No-Build Alternative	EENF/EPNF Program A Alternative	Reduced Development/ Preferred Alternative	Change
Land Alteration (acres)[1]	NA	-0-	-0-	No Change
Impervious Area (acres)	±72	±123	±123	No Change
Wetlands Impacts (SF of LSCSF)	NA	±3.5 Million	±3.5 Million	No Change[2]
Vehicle Traffic Generation (net new adt)	890[3]	66,484[4]	65,277[4]	(-1,270)
Parking Spaces (net new)	3,028	13,162	12,222	(-940)
Water Use (GPD)	±30,000	±2,511,000	±2,400,000	(-111,000)
Wastewater Generation (GPD)	±177,000	±2,134,000	±2,000,000	(-134,000)

Note: Refer to the 'Transportation' section below for a comparison on new vehicle trips.
NA Not Applicable
LSCSF Land Subject to Coastal Storm Flowage
SF square feet
GPD gallons per day
adt average daily trips
1 Previously undeveloped land

2 While the footprint (SF) of fill remains the same, the overall volume has been reduced, as described in the 'Site Grading and Stormwater Management' section below.
3 Based on actual counts.
4 Based on CTPS model results.

Site Grading and Stormwater Management

Both build alternatives include raising portions of the Project Site to be resilient to future climate change impacts associated with flooding. As described in detail in Chapter 8, *Climate Change Resiliency*, the site grading and drainage approach was refined from the EENF/EPNF Program A Alternative for the Reduced Development/Preferred Alternative to create additional on-site flood storage capacity based on the site-specific dynamic flood modeling conducted for the this DEIR/DPIR. Existing (pre-construction) conditions were modeled to establish the baseline condition against which subsequent modeled conditions could be compared. Then, using an iterative process, multiple schematic design conditions were modeled using a coastal transect model and a hydrologic and hydraulic model. The modeled conditions varied the location, amount, and elevation of fill, and aspects of the stormwater management design. Each model run was required to balance multiple goals, including: designing a stormwater system that meets the MassDEP stormwater management standards; raising building site elevations to levels resilient to future flooding; increasing flood storage capacity for current and future precipitation conditions; and minimizing off-site flooding impacts. Several alternative grading and stormwater management approaches were developed, modeled, and tested.

The proposed site plan for the Reduced Development/Preferred Alternative continues to raise the grade of the Project Site in key locations to maintain a network of roads, key infrastructure, and building grade elevations (consistent with BPDA design recommendations) that will be dry during significant coastal storms through the design life of the Project. However, as a result of the resiliency modeling, based on the slight increases in off-site flooding for the initial site design of the EENF/EPNF Program A Alternative, the approach to raising the Project Site was revisited for the Reduced Development/Preferred Alternative. To mitigate the potential rises in flooding, alternative lower grading (i.e., less fill) was chosen in select areas, and stormwater management approaches were developed, modeled, and tested. Through various model runs, it was determined that minimizing the stormwater volume discharged to Sales Creek would minimize the off-site impacts, as would providing additional flood storage within the Central Common. As a result, the Project Site grading and the stormwater management system designs were revised to direct a larger proportion of Project Site stormwater to Chelsea Creek to reduce the volume of runoff being discharged to Sales Creek, and to further reduce runoff by providing new and additional flood storage along Sales Creek as part of the Master Plan Project. This included re-grading the Central Common to a lower elevation, which provided additional flood storage capacity that could be taken advantage of during higher probability flood events. This approach resulted in greatly reduced off-site flooding impacts.

The Reduced Development/Preferred Alternative also includes a network of open spaces redesigned to hold additional water to reduce the risk of flooding both on- and off-site compared to the EENF/EPNF Program A Alternative. This includes daylighting Sales Creek and re-grading the Central Common to a lower elevation both of which provide additional flood storage capacity that could be taken advantage of during higher probability flood events. As described in Chapter 10, *Infrastructure*, three large basins, including the Central Common, have been designed to accommodate approximately 4.1 acre-feet of additional storage for flooding from both coastal and significant rainfall events. Section 3.9.3 of Chapter 3, *Urban Design*, describes the proposed multi-functional open space plan, which includes infiltration of first rainfall, retention of stormwater from impervious areas of development, control of tidal inundation, and restoration, improvement, interconnection, and innovative use of on-site natural resources. Additionally, a portion of the below-grade parking garages will be designed to be utilized as flood storage for the Sales Creek watershed system under extreme flooding conditions.

The Master Plan Project will include new stormwater management treatment systems on-site, which will significantly improve the overall quality of stormwater runoff, and control peak rates of runoff in comparison to the existing conditions.

Public Realm and Open Space

The Project made an early commitment to dedicating approximately 25 percent of the Project Site's total land area to create a publicly-accessible open space system. This commitment has been carried in both the Reduced Development/Preferred Alternative and EENF/EPNF Program A Alternative as they both include an approximately 40-acre publicly-accessible open space network designed to reconnect East Boston and Revere, provide both active and passive spaces, build on and create connections to existing wetland resources, including Sales Creek and Belle Isle Marsh, and provide stormwater management functions, as described above and in Section 3.9.3 of Chapter 3, *Urban Design*.

The Reduced Development/Preferred Alternative open space network has been modified to allow for a future connection to the Chelsea River waterfront and includes significant site design and program changes at the Orients Heights edge of the Project Site. These changes include a reduction in the massing of the larger residential buildings behind the proposed townhomes to step down/away from the existing single-family homes along Waldemar Avenue. This helps to ease the height transition into the Project Site, allows the creation of a new on-site public open space, and provides a new denser landscape buffer behind the Waldemar Avenue abutters with a community path that will connect the MBTA Suffolk Downs Station with the new Active Linear Corridor System.

Because the majority of the parking supply is located within building structures, the Master Plan Project is able to accommodate a large amount of open space, which helps limit impervious surfaces, reduce heat island effect, and improve urban design.

Area of Critical Environmental Concern

The portions of the Project Site lying within the Rumney Marshes ACEC have been historically altered and previously disturbed by existing uses on the Project Site. As with the EENF/EPNF Program A Alternative, the Reduced Development/Preferred Alternative is not anticipated to result in adverse impacts to wetlands located within the ACEC. The Project will improve the quality of stormwater runoff discharging to Belle Isle Marsh. As described in Section 5.3.3 of Chapter 5, *Wetlands and Waterways*, the Proponent will develop a program to manage invasive species and incorporate native species into the landscape design where feasible on the Project Site to help restore/preserve the adjacent salt marsh, manage invasive species, and develop a program to manage pesticides on-site.

Traffic and Parking

Generally, the reduced development program associated with the Reduced Development/Preferred Alternative would result in slightly less daily vehicle trips (1,270) compared to the EENF/EPNF Program A Alternative. (Note: The estimated vehicle trips are based on the CTPS regional traffic model, which calculates a very different (i.e., more conservative) traffic generation estimates compared to ITE trip generation rates by use, which is how the daily vehicle trips were estimated for the EENF/EPNF Program A Alternative in the EENF/EPNF.) To further reduce vehicle trips to/from the Project Site, the Reduced Development/Preferred Alternative includes a privately-operated on-site shuttle bus system that provides access to the two adjacent MBTA Blue Line Stations, as well as an off-site shuttle service to regional commuter rail service and the Seaport District to support/encourage the use of public transit (refer to Figure 3.25 for the proposed 2-loop system and Section 6.7.3 for further details on the proposed off-site shuttle service).

The Reduced Development/Preferred Alternative includes a refined parking supply compared to the EENF/EPNF Program A Alternative where it requires approximately 940 less parking spaces. As previously proposed, the majority of the parking will be provided in structured garages with additional on-street parking to support retail and open space uses. As discussed further in Section 6.8.2 of Chapter 6, *Transportation*, the Reduced Development/Preferred Alternative will employ a shared parking approach and, as the design of individual development phase and/or buildings is advanced, the Proponent will look for opportunities to reduce the parking supply at the Project Site through monitoring actual parking use to avoid overbuilding of parking. This will be accomplished through an ongoing analysis of tenant needs, the successful implementation of TDM measures, and future dynamic changes to car ownership and use that are anticipated in light of new technologies that could further reduce and limit private automobile ownership (i.e. car sharing services and autonomous vehicle uses) and, in turn, parking needs. During the construction phasing of the Master Plan Project, parking demand may be accommodated via the use of existing surface parking lots for interim parking needs.

Greenhouse Gas Emissions

The estimated energy usage was modeled and the stationary source GHG emissions were calculated by building typology for the Reduced Development/ Preferred Alternative only, as presented in Chapter 7, *Greenhouse Gas Emissions Assessment*. Overall, the Reduced Development/Preferred Alternative is estimated to reduce energy usage by 19.4 percent and associated stationary source GHG emissions by 17.5 percent without parking areas included (Table 7-18).[11] There is a limited potential decrease in energy usage and stationary source GHG emissions associated with the smaller program of the Reduced Development/ Preferred Alternative compared to EENF/EPNF Program A Alternative although it is assumed the same energy conservation measures would be incorporated into the design of buildings in both alternatives. Additionally, based on the evaluation presented in Section 7.3.6 of Chapter 7, an additional 4 percent energy savings and stationary source GHG emissions reductions could result if all of the available rooftop area was utilized for solar PV (approximately 30 percent) for the Reduced Development/Preferred Alternative.

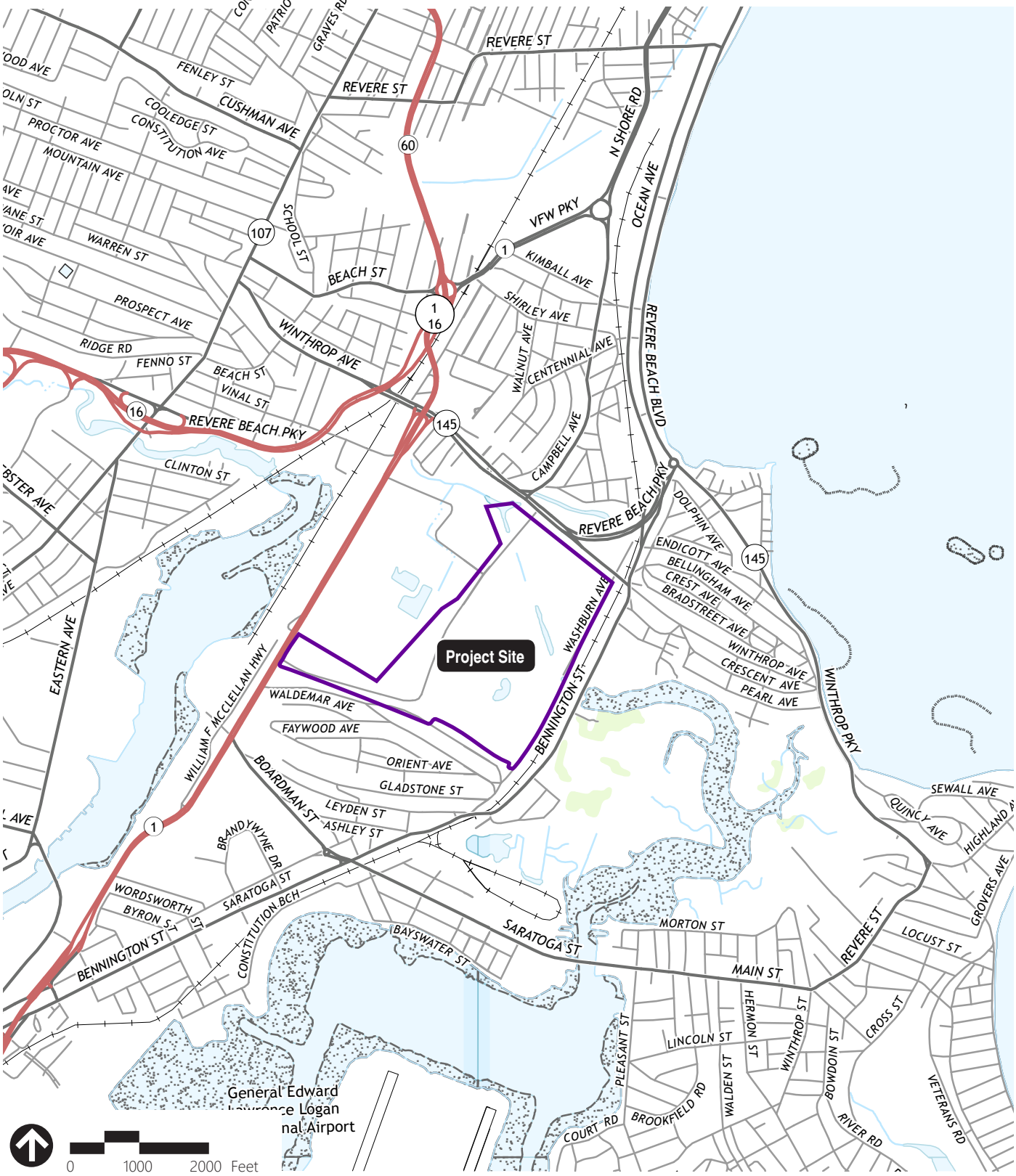
1.7.3 Potential for Further Reduction in Impacts

As the Master Plan Project design progresses, the Proponent will continue to reduce impacts wherever practicable. For example, as each development phase advances, the Proponent will look for opportunities to reduce the parking supply at the Project Site through an ongoing analysis of tenant needs, the successful implementation of TDM measures, and future dynamic changes to car ownership and use that are anticipated in light of new technologies that could further reduce and limit private automobile ownership (i.e., car sharing services and autonomous vehicle uses), and, in turn, parking needs.

While the overall volume of fill has been reduced between the EENF/EPNF Program A Alternative and the Reduced Development/Preferred Alternative, the footprint of LSCSF impacted cannot be further reduced because it is necessary to increase the resiliency of the Project Site to projected flooding increases due to climate change, as described in Chapter 8, *Climate Change Resiliency*.

[11] With parking areas included, the overall energy savings equates to 20.9 percent resulting in a 19.6 percent reduction in stationary source GHG emissions.

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Source: USGS US Topo, Boston North, Lynn, 2015

Project Site

Figure 1.1

Locus Map

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source BING

Project Site

Town Line

Figure 1.2

Project Site Context

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source BING

Project Site

Town Line

Figure 1.3

Existing Conditions

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source:
Digital orthophotograph, MassGIS 2014.

Figure 1.4

Existing Site Photographs
Key Map

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

Prepared by Beals and Thomas, Inc.



1 Suffolk Downs MBTA Blue Line Station (October 20, 2017)



2 Project Site entrance looking north at the intersection of Tomasello Drive with Route 1A (October 20, 2017)



3 View looking east down Tomasello Drive (October 20, 2017)



4 Track and infield (October 20, 2017)



5 Grandstand building from Tomasello Drive (October 20, 2017)



6 Vacant former administration building from surface parking lot (October 20, 2017)

Source:
Photographs taken by Beals and Thomas, Inc.

Figure 1.5a

Existing Site Photographs

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



7 Grandstand building from surface parking lot (October 20, 2017)



8 Eastern property boundary along Washburn Avenue (October 20, 2017)



9 View westerly from intersection of Winthrop Avenue and Revere Beach Parkway to the Project Site entrance at the intersection of Tomasello Drive with Winthrop Avenue (October 20, 2017)



10 Typical view of barns and stable area (January 6, 2017)



11 Sales Creek within infield (July 13, 2017)



12 View of the infield pond (May 25, 2017)

Source:
Photographs taken by Beals and Thomas, Inc.

Figure 1.5b
Existing Site Photographs

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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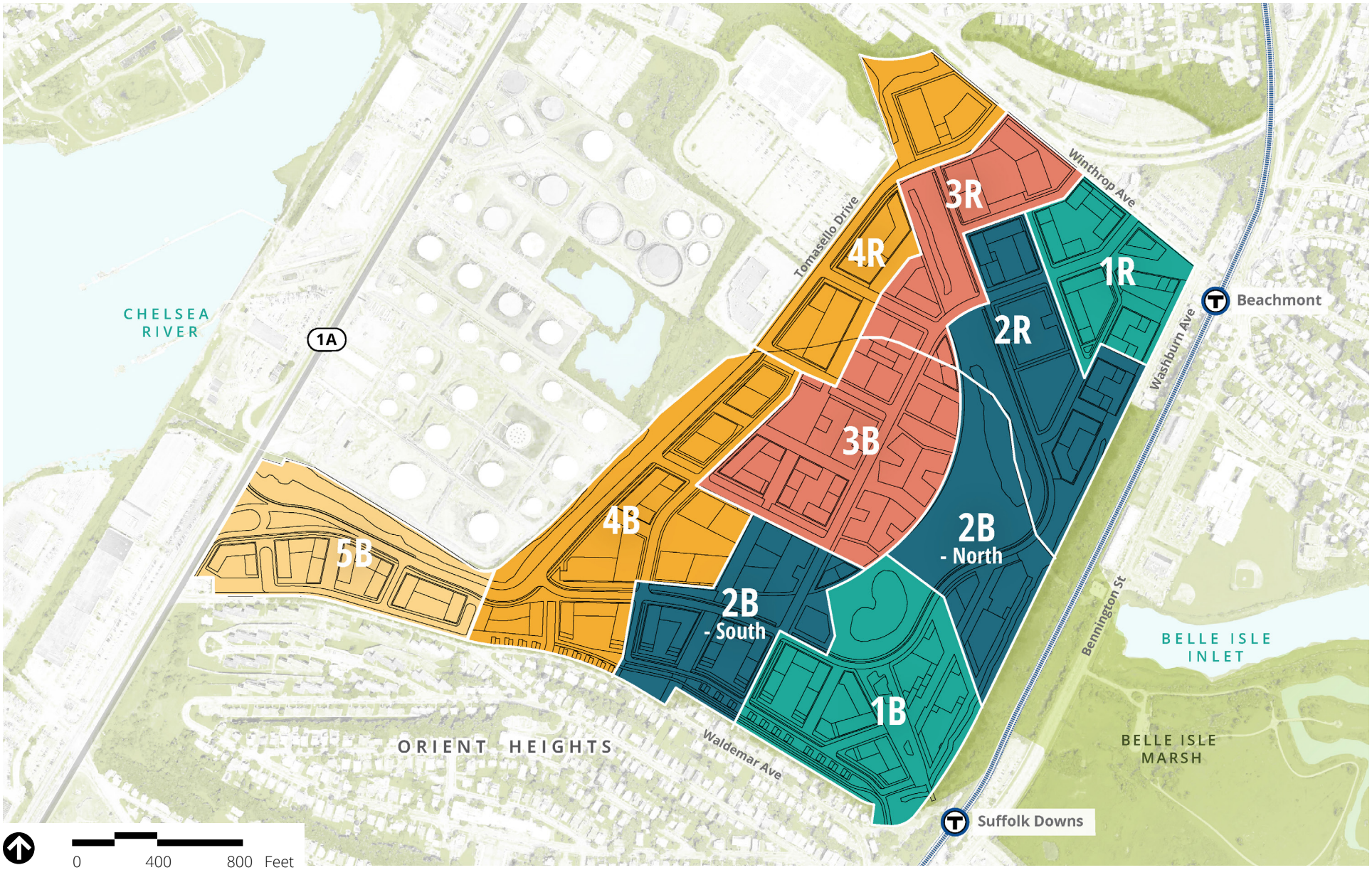


Source: cbt

Figure 1.6
Conceptual Master Plan Project

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Phase 5

'**B**' represents parcels located in Boston and '**R**' represents parcels located in Revere.

Figure 1.7
Conceptual Master Plan Phasing

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

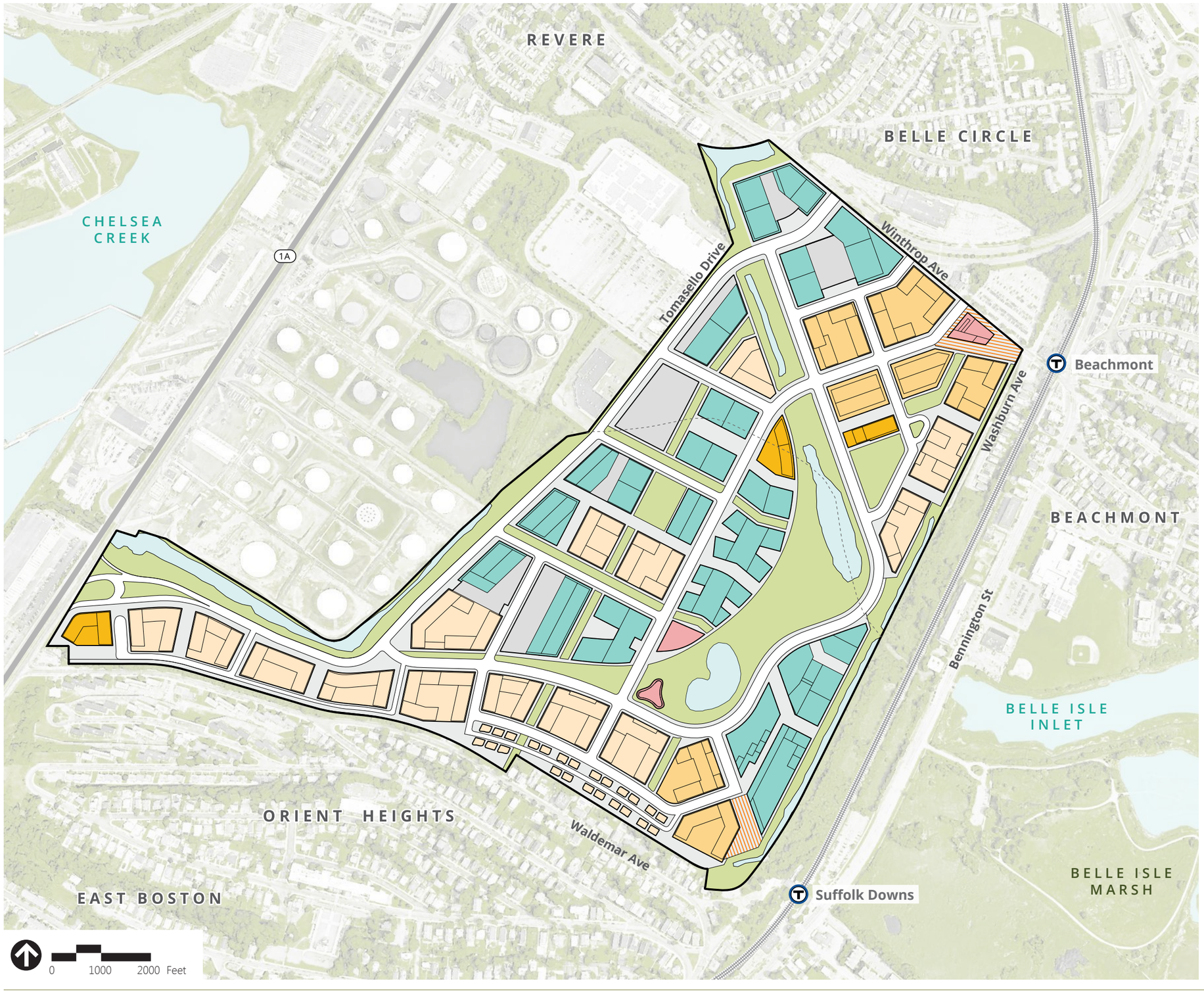


Figure 1.8

EENF/EPNF Program A Alternative

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

2

Regulatory Context and General Information

This chapter addresses anticipated permits and approvals, as well as the local planning and regulatory controls applicable to the Master Plan Project. As described more fully in Chapter 3, *Urban Design*, the Master Plan Project provides a unique opportunity to create a new vibrant mixed-use community, with a new, extensive, approximately 40-acre publicly-accessible open space network representing a quarter of the Project Site. The Proponent has met with, and will continue to meet with, community groups, local and state agencies, and other stakeholders through the ongoing MEPA/Boston/Revere review and permitting process.

As requested in the EEA Secretary's Certificate on the EENF, this chapter provides information on the following topics:

- A list of required permits and approvals and an update on the status of each permit and/or approval.
- How permitting will be addressed within the context of the Master Plan Project and phasing.
- How the Master Plan Project is consistent with state, regional, and local land use plans and policies.

In compliance with Article 80 requirements, Section 1.11 of the EENF/EPNF presented legal information relative to the Project Site. There are no changes or updates to that information at this time.

2.1 Anticipated Permits/Approvals

Table 2-1 below presents a preliminary list of anticipated reviews and approvals of the Master Plan Project by governmental agencies based on currently available information. It is possible that some of the listed reviews and approvals will not be required, or that additional reviews or approvals that will be required are not listed below.

Table 2-1 Anticipated Project Permits and Approvals

Agency/Department	Permit/Approval/Action
Federal	
U.S. Environmental Protection Agency	National Pollutant Discharge Elimination System ("NPDES") and Construction General Permit
	Modification, replacement and/or closure of existing NPDES permit respecting Concentrated Animal Feeding Operation ("CAFO")
Federal Aviation Administration	Determination of Non-Hazard to Air Navigation
U.S. Army Corps of Engineers	Review Under Massachusetts General Permit (if required)
State	
Executive Office of Energy and Environmental Affairs	Massachusetts Environmental Policy Act Review Determination for Public Benefit review for landlocked tidelands*
Massachusetts Office of Coastal Zone Management	Federal Consistency Review
Massachusetts Department of Environmental Protection	Environmental Results Program ("ERP") Certification for Engines
	Superseding Orders of Conditions (if required)
	Notice of Construction/Demolition
	Asbestos Notices (if necessary)
	Modification, replacement and/or closure of existing NPDES permit respecting CAFO
	401 Water Quality Certification (if required)
	Underground Injection Control Registration(s)
	Beneficial Use Determination(s) (if required)
	Chapter 91 License(s) (if required; for off-site transportation improvements only)[1]
Massachusetts Department of Transportation	Vehicular Access Permit*
Massachusetts Water Resources Authority	8(M) Permit (if required)
	Direct Connect Permit (if required)
	Temporary Construction Site Dewatering Permit (if required)
	Permit for Service Extension under the MWRA Water Straddle Policy
Massachusetts Historical Commission	Determination of No Adverse Impact (if necessary)*
Massachusetts Department of Conservation and Recreation	Access Permit
Massachusetts Bay Transportation Authority	Agreement for improvements (i.e., signage, landscaping) at the Suffolk Downs and/or Beachmont MBTA Stations (if required)*
City of Boston	
Boston Planning and Development Agency	Article 80B Large Project Review Adequacy Determination*
	Zoning Relief respecting height for Phase 1 Project*
	Zoning Relief respecting height and FAR for Master Plan Project

* Denotes permit/approval process has been completed for the Phase 1 Project. Refer to Sections 2.3.1 and 2.4.1 for further information

** Denotes permit/approval process has been completed for Revere portion of Master Plan Project. Refer to Section 2.5.1 for further information.

1 As identified in Section 5.4 of Chapter 5, *Wetlands and Waterways*.

Table 2-1 Anticipated Project Permits and Approvals (Continued)

Agency/Department	Permit/Approval/Action
City of Boston (Cont'd.)	
Boston Planning and Development Agency (Cont'd.)	Planned Development Area and Development Plan Approval
	Cooperation Agreement
	Development Impact Project Agreement
	Affordable Housing Agreement
	Certificate of Compliance and Consistency*
Boston Zoning Commission	Zoning Relief respecting height for Phase 1 Project*
	Zoning Relief respecting height and FAR for Master Plan Project
	Planned Development Area and Development Plan Approval
Boston Civic Design Commission	Project Design Review (by building)*
Boston Landmarks Commission	Article 85 Demolition Delay Review
Boston Conservation Commission	Order of Conditions (under the Wetland Protection Act)*
Boston Fire Department	Permits and Approvals for Fuel Storage, Fire Safety Equipment, Alarm System, Sprinkler, Standpipe, Smoke Control and Hydrant*
	Asbestos Removal Permit (if necessary)
Boston Public Works Department	Street Occupancy Permit and Street Lighting
	Permits and Approvals for Curb Cuts
Boston Transportation Department	Construction Management Plan*
	Street Opening/Closing
	Transportation Access Plan Agreement*
Boston Public Improvements Commission	Specific Repair Plan
	Excavation Support License (if required)
Boston Water and Sewer Commission	Sewer Connection and Cross Connection and Extension Permits*
	Water Permit*
	Hydrant Permit*
	Site Plan Approval*
Boston Public Safety Commission	Fuel Storage License and Garage Permit*
Inspectional Services Department	Building Permits*
	Demolition Permits
	Foundation Permits*
	Electrical and Gas Permits*
Boston Employment Commission	Boston Residents Construction Employment Plan*
City of Revere	
Revere City Council	Zoning Code Amendment**
	Master Plan PUD Special Permit
	Permits and Approvals for Fuel Storage

* Denotes permit/approval process has been completed for the Phase 1 Project. Refer to Sections 2.3.1 and 2.4.1 for further information

** Denotes permit/approval process has been completed for Revere portion of Master Plan Project. Refer to Section 2.5.1 for further information.

Table 2-1 Anticipated Project Permits and Approvals (Continued)

Agency/Department	Permit/Approval/Action
City of Revere (Cont'd.)	
Revere Conservation Commission	Order of Conditions (under the Wetlands Protection Act and City of Revere Wetlands Bylaws)
Revere Department of Public Works	Sewer and Water Connection/Extension Permits
	Permits and Approvals for Curb Cuts
	Street Opening Permits
Site Plan Review Committee	Site Plan Review
Revere Project Review Board	Review in connection with the issuance of Special Permit
Revere Planning Board	Review in connection with the Zoning Code Amendment**
	Subdivision Plan Approval (including approval of street layouts)
Revere Inspectional Services Department	Building Permits, Demolition Permits, Foundation Permits, Electrical and Gas Permits

* Denotes permit/approval process has been completed for the Phase 1 Project. Refer to Sections 2.3.1 and 2.4.1 for further information

** Denotes permit/approval process has been completed for Revere portion of Master Plan Project. Refer to Section 2.5.1 for further information.

2.2 Federal

2.2.1 Federal Aviation Administration

All projects subject to Federal Aviation Administration ("FAA") jurisdiction are subject to requirements respecting issuance of Determinations of Non-Hazard to Air Navigation from the FAA. The Master Plan Project will comply with all requirements of the FAA.

2.2.2 U.S. Environmental Protection Agency

The Master Plan Project, including the Phase 1 Project, will comply with all requirements of the US Environmental Protection Agency in accordance with the NPDES and Construction General Permit ("CGP"), to approve a Storm Water Pollution Prevention Plan ("SWPPP"), and to approve closure of the CAFO currently used by the Suffolk Downs horse stables. The existing NPDES permit for the CAFO may be modified or replaced for an interim period after the stables are vacated and before the infrastructure supporting the CAFO are permanently removed.

2.3 Commonwealth of Massachusetts

The Proponent has held numerous meetings with various elected officials and state agencies prior to the preparing this DEIR/DPIR, including:

- Executive Office of Energy and Environmental Affairs ("EEA"), including the MEPA and CZM Offices
- Department of Transportation ("MassDOT")
- Department of Environmental Protection ("DEP")

- Department of Conservation and Recreation ("DCR")
- Massachusetts Bay Transit Authority ("MBTA")
- Massachusetts Water Resources Authority ("MWRA")
- Massachusetts Port Authority ("Massport")

2.3.1 Executive Office of Energy and Environmental Affairs

The content of this DEIR/DPIR responds to the scope of analysis defined in the Certificate issued by the Secretary of Energy and Environmental Affairs on January 26, 2018 (the "EENF Certificate"). A copy of the EENF Certificate is included in Chapter 13, *Response to Comments*. Pursuant to the EENF Certificate, the Master Plan Project is undergoing MEPA review and is subject to preparation of a mandatory EIR pursuant to Sections 11.03(1)(a)(2), 11.03(3)(a)(1)(b), 11.03(6)(a)(6) and (7) of the MEPA regulations because it requires a state agency action and will create ten or more acres of impervious area, alter greater than 10 acres of any other wetlands, in this case existing on-site floodplain resource area (LSCSF and Riverfront Area), generate 3,000 or more new average daily vehicle trips, and construct 1,000 or more new parking spaces at a single location. The Master Plan Project also exceeds applicable thresholds pertaining to wetlands, wastewater, transportation, historic and archaeological resources, and ACECs as identified in 301 CMR 11.03(3)(b)(1)(f), 301 CMR 11.03(5)(b)(3)(c), 301 CMR 11.03(5)(b)(4)(a), 301 CMR 11.03(6)(b)(13), (14), and (15), 301 CMR 11.03(10)(b)(a)(1), and 301 CMR 11.03(11)(b).

Because the Proponent or prospective tenants (such as Amazon) may seek financial assistance from the Commonwealth of Massachusetts with respect to the Master Plan Project, MEPA jurisdiction is broad and extends to all aspects of the Master Plan Project that have the potential to cause Damage to the Environment as defined in the MEPA regulations.

MEPA review respecting both the Phase 1 Project and Master Plan Project was initiated with the EENF filing on November 30, 2017.[1] The EENF included a full analysis of the environmental impacts of the Phase 1 Project and a request from the Proponent for a "Phase 1 Waiver" to allow permitting for the Phase 1 Project to proceed while MEPA review is continuing for the Master Plan Project. The Secretary of EEA subsequently issued the EENF Certificate and Draft Record of Decision ("DROD") to grant the requested Phase 1 Waiver. On February 28, 2018, the Secretary of EEA issued a Final Record of Decision ("FROD") granting the Phase 1 Waiver.

The Project Site contains historically-filled former tidelands that are subject to the Massachusetts Public Tidelands Act (*M.G.L Chapter 91*). However, DEP has previously concluded that the Project Site is considered "Landlocked Tidelands" and is, therefore, not subject to any requirement for a Chapter 91 license or the use and dimensional regulations otherwise applicable under Chapter 91. For such Landlocked Tidelands, the Secretary of EEA is required to make a "public benefits

1 The EENF was filed jointly with the BPDA Article 80 EPNF.

determination", which finds that the proposed project has substantial public benefits. On March 30, 2018, the Secretary of EEA issued a public benefits determination with respect to the Phase 1 Project, finding that the Phase 1 Project has substantial public benefits. At the conclusion of MEPA review for the Master Plan Project, the Secretary of EEA will need to issue a separate public benefits determination finding that the Master Plan Project will have positive public benefits.

2.3.2 Massachusetts Department of Environmental Protection

The Master Plan Project will comply with all requirements of the DEP, which is expected to include an Environmental Results Program ("ERP") Certification for Engines, a Notice of Construction/Demolition, Superseding Orders of Conditions (if required), Asbestos Notices (if necessary), Underground Injection Control Registration(s) for proposed stormwater infiltration systems, Beneficial Use Determination(s) for reuse of demolition materials and review of NPDES approvals for closure of the CAFO. The existing NPDES permit for the CAFO may be modified or replaced for an interim period after the stables are vacated and before the infrastructure supporting the CAFO are permanently removed.

2.3.3 Massachusetts Office of Coastal Zone Management

The Master Plan Project will undergo the federal consistency review process that is implemented by the Massachusetts Office of Coastal Zone Management ("CZM"). The Master Plan Project will comply with all requirements of CZM.

2.3.4 Massachusetts Water Resources Authority

The Master Plan Project will comply with all requirements of the MWRA. Permits from MWRA may include an 8m Permit, Direct Connect Permit, Sewer Use Discharge Permit (or waiver), approval of water service extension from the portion of the Project Site in Revere to the portion of the Project Site in Boston, under the MWRA's "Water Straddle Policy", and/or Temporary Construction Site Dewatering Permit; however, this will be confirmed based upon design and tenants as the Master Plan Project is advanced.

2.3.5 Massachusetts Highway Department

An Access Permit is required from MassDOT for projects that have direct access to a state highway layout and exceed certain parking or traffic thresholds. State Highway Route 1A (McLellan Highway) abuts the Master Plan Project and will be utilized as a principal access route for the Master Plan Project, including the Phase 1 Project. The Master Plan Project, including the Phase 1 Project, will comply with all requirements of the MassDOT Access Permit to be issued for that component.

2.3.6 Massachusetts Bay Transportation Authority

The Master Plan Project will be located in close proximity to the Beachmont and Suffolk Downs MBTA Blue Line Stations in Revere and Boston, respectively, and will encourage the use of this service. At the request of the MBTA, the Proponent is funding an engineering and architectural assessment of the MBTA Suffolk Downs Blue Line Station conditions and compliance with current codes (for fire/life safety and accessibility) to determine the type and cost of improvements that may be needed for the Master Plan Project.

The Master Plan Project involves the anticipated acquisition of temporary and permanent easement or license rights from the MBTA relating to two separate MBTA properties. First, the only proposed perpetual easement rights would impact a small area of MBTA-owned land located adjacent to the MBTA Suffolk Downs Blue Line Station in Boston, where a new pedestrian bridge and walkway improvements are proposed in connection with the Phase 1 Project to allow for better access between the Belle Isle Square and the station. It is likely that a permanent easement would be required to allow for these pedestrian access improvements. The scope of any easement will be determined based upon further design work relating to the pedestrian bridge/walkway, and upon further discussions between the MBTA and the Proponent. It is anticipated that any affected area of MBTA land will be small, that the MBTA would continue to own the underlying land, and that the granting of easement rights would have substantial positive benefits by facilitating access to the station without adverse impacts on the station or adjacent sidewalks, drop off, or turnaround areas. Second, the Master Plan Project may require temporary access and construction license or easement rights in the MBTA-owned commuter parking lot on Winthrop Avenue near the MBTA Beachmont Blue Line Station in Revere, to allow for proposed off-site traffic improvements along Winthrop Avenue. As currently planned, the Proponent intends to complete improvements that include a new traffic signal and realignment of the entrance to the MBTA's commuter parking lot north of Winthrop Avenue for better traffic coordination. The scope of any temporary easement or license rights would be limited in duration and area.

2.3.7 Department of Conservation and Recreation

The Master Plan Project abuts Revere Beach Parkway, which is under the custody and control of DCR, and a DCR Access Permit will be required for proposed curb cuts for access to the Master Plan project from Revere Beach Parkway. DCR also has certain easement rights on the Project Site for drainage improvements on Sales Creek. The Master Plan Project will comply with all requirements of DCR concerning Revere Beach Parkway or the easement rights for areas adjacent to Sales Creek that are held by the DCR.

2.3.8 Massachusetts Historical Commission

There are no historic resources at the Project Site which are listed on the National or State Registers of Historic Places. The Suffolk Downs grandstand, clubhouse and race track are included on Massachusetts Historical Commission ("MHC's") Inventory of Historic and Archaeological Assets of the Commonwealth. The Proponent will consult with MHC regarding the historic impacts from development of the Project Site. In connection with the demolition of the grandstand, clubhouse and race track, the Proponent intends to dedicate one or more locations on the Project Site to commemorate the history of the Suffolk Downs race track and will work with the MHC and other interested parties, including former employees, to recognize this legacy. Refer to Chapter 11, *Historic Resources*, for further information.

2.4 City of Boston

The Proponent has held numerous meetings with various elected officials and City of Boston departments, both before and after the filing of the EENF/EPNF and as part of the studies and outreach undertaken in connection with preparation of this DEIR/DPIR, including:

- Mayor Walsh
- Boston Planning and Development Agency ("BPDA")
- Boston Impact Advisory Group ("IAG") (appointed under the Boston Zoning Code)
- Boston Civic Design Commission ("BCDC")
- Boston Water and Sewer Commission ("BWSC")
- Boston Transportation ("BTD")
- Boston Conservation Commission ("BCC")
- Boston Public Works Department ("BPWD")
- Boston Environment Department ("BED")
- Boston Police Department ("BPD")
- Boston Fire Department ("BFD")
- Boston Parks & Recreation Department ("BPRD")
- City Council Members

2.4.1 Boston Planning and Development Agency/Boston Zoning Commission

The Master Plan Project will comply with all requirements of the BPDA and Boston Zoning Commission ("BZC") in connection with issuance of permits and approvals related to the Master Plan Project. The Proponent intends to seek approval of a Planned Development Area ("PDA") under the Boston Zoning Code. In a PDA, a Development Plan approved by the BPDA and the BZC establishes a new zoning

overlay district and substitutes for the use, dimensional, parking and loading requirements otherwise applicable to the Project Site.

Prior to approval of any zoning relief, including a PDA, the Master Plan Project will be required to complete Large Project Review under Article 80 of the Boston Zoning Code. Under Article 80B of the Boston Zoning Code, which governs Large Project Review, a comprehensive public review is required at the early design stage, to evaluate project impacts and require appropriate mitigation measures, for projects that add 50,000 square feet or more of gross floor area (or 100,000 square feet or more for rehabilitation work or change in use). Large Project Review began with the filing of the EPNF with the BPDA on November 30, 2018. With respect to the Master Plan Project, after a public and agency comment period, on February 21, 2018, the BPDA issued a Scoping Determination setting forth the studies and analysis required to detail the Master Plan Project's impacts and proposed measures to mitigate, limit or minimize those impacts.

Under Article 80, the BPDA must publish notice of receipt of this DEIR/DPIR. Thereafter, based on its review of the DPIR and any public comments, the BPDA may issue a Preliminary Adequacy Determination ("PAD"), waiving the need for further review. If further review is required following the DPIR, MHDC must submit a Final Project Impact Report ("FPIR") for further review. Based on its review of the FPIR and any comments received the BPDA will thereafter issue a Final Adequacy Determination on the Master Plan Project.

Following completion of the Article 80 process, the design development and construction documents for the first phase of the Master Plan Project are subject to BPDA review and approval, and MHDC will enter into agreements, including with the BPDA and the Boston Transportation Department, reflecting various mitigation commitments made during the Article 80 process. Agreements for compliance with the City of Boston's construction employment policies are also required. Under the Boston Zoning Code, the Commissioner of Inspectional Services will only issue a building permit for a project subject to Large Project Review after the Director of the BPDA has issued a Certification of Compliance pursuant to Section 80B-6 of the Boston Zoning Code, which is a finding that the construction plans and specifications for the project comply with the terms of the Final Adequacy Determination, agreements executed with City agencies, and other provisions of the Boston Zoning Code.

As noted, a PDA process will also be completed. The Boston portion of the Project Site is in the Suffolk Downs EDA of the East Boston Neighborhood District, a district which is governed by Article 53 of the Boston Zoning Code. Per Section 53-24 of the Boston Zoning Code, EDAs were established within the East Boston Neighborhood district to encourage economic development that is of "a quality and scale appropriate to the surrounding neighborhoods, and to encourage the diversification and expansion of Boston's and East Boston's economy, with a special emphasis on the creation and retention of job opportunities". Due to the scale and underutilized nature of the Boston portion of the Project Site, the Boston Zoning Code identifies

the Suffolk Downs EDA as a Special Study Overlay Area, which is an area where further comprehensive planning studies may be appropriate. Additionally, Section 53-44 of the Boston Zoning Code establishes the Boston portion of the Project Site as a potential location for a PDA.

The City of Boston's *Imagine Boston 2030* plan supports the redevelopment of the Project Site into a resilient mixed-use neighborhood with a focus on housing given the public transportation connections to downtown and highway connections to the greater metropolitan area. In its plan, the City views redevelopment of the Project Site as an opportunity to strengthen connection between Downtown and East Boston via vehicular, pedestrian, and bike path networks.

The Boston portion of the Project Site is subject to certain currently-existing dimensional, use and design requirements and restrictions outlined in the Boston Zoning Code. Currently, the Boston Zoning Code allows for general office, hotel, general retail, local retail, non-take-out restaurant, research laboratory, hospital uses and various other commercial uses within the Suffolk Downs EDA, but residential uses are not currently permitted on the Boston portion of the Project Site without zoning relief. The Suffolk Downs EDA also limits development to a maximum floor area ratio ("FAR") of 2.0 and a maximum building height of 45 to 55 feet, and provides in Section 53-45(2) that dimensional regulations within a PDA shall be as set forth therein, provided that FAR cannot exceed 2.0 and building height cannot exceed 55 feet in areas of the Suffolk Downs EDA within 250 feet of a street or subdistrict boundary.

The height and massing strategy for the Master Plan Project is discussed in Chapter 3, *Urban Design*. MHDC is proposing the development in Boston of approximately 10.5 million square feet (which would result in a 2.22 FAR), within height districts that have various maximum building heights ranging from 50 feet to 220 feet, as shown on Figure 2.1, through creation of a PDA that establishes a comprehensive long-term development plan with the flexibility to respond to future changes in building design and in market demand for space and the way it is used. In particular, Section 3-1A.a of the Boston Zoning Code allows for creation of a PDA and/or a Master Plan PDA to be established for a proposed development area, and MHDC intends to seek approval for a Master Plan PDA and PDA development plans for the Master Plan Project, which will establish allowed uses, and dimensional requirements, will detail public benefits, and will outline proposed phasing of construction, with design review for particular buildings to be conducted as development proceeds. In connection with obtaining PDA and development plan approvals, the Proponent will seek amendments to the Boston Zoning Code, to allow height and FAR as contemplated by the Master Plan Project, addressing limitations under Section 53-45(2) to the extend necessary to allow for the Master Plan Project's development.

Note that maximum heights for the Revere portion of the Master Plan have previously been approved as part of the new Suffolk Downs Overlay District ("SDOD") zoning (as discussed in Section 2.5.1 below), and heights within the Boston

portion of the Project Site are generally lower that the approved Revere heights (the Project Site is sited along a runway approach and FAA height limitations generally increase moving northward, away from the runway, allowing for somewhat taller buildings in Revere).

Under the Boston Zoning Code, the Commissioner of Inspectional Services will only issue a building permit for a project that is subject to a PDA Development Plan after the Director of the BPDA has issued a Certification of Consistency pursuant to Section 80C-8 of the Boston Zoning Code, which is a finding that the construction plans and specifications for the project comply with the terms of the PDA Development Plan.

Phase 1 Project

The Phase 1 Project was subject to expedited permitting and approvals, in order to address the requirement, in the Amazon HQ2 RFP, of 500,000 square feet of office space that can be occupied on an expedited basis. As of the date of this DEIR/DPIR, the Project Site is one of the locations under consideration for Amazon HQ2. To allow the Phase 1 Project to commence prior to completion of the PDA process, its permitting was fast-tracked with the submission of an EPNF on December 5, 2017. Moreover, because the Amazon RFP process called for development of the Phase 1 Project on an accelerated timeline, which would not allow for completion of the PDA Development Plan process, it required additional zoning relief. The Phase 1 Project was designed to comply with the by-right zoning requirements of the Suffolk Downs EDA with the exception of height limitations. While the proposed height will be within the limits being proposed for the PDA, expedited zoning relief was needed to allow for the issuance of a building permit for a building of this height prior to completion of the full Article 80 and PDA development plan approval process.

The Proponent requested and was granted on February 8, 2018, with respect to the Phase 1 Project, a Scoping Determination waiving (for the Phase 1 Project only) the requirement of further review as permitted under Boston Zoning Code Section 80B-5.3(d). Also on February 8, 2018, the Proponent obtained, with respect to the Phase 1 Project, approval of schematic design plans by the BPDA and Boston Civic Design Commission. On February 14, 2018, an amendment to Table L of Article 53 of the Boston Zoning Code (Text Amendment No. 477) was adopted, allowing for an increased height of 125 feet on a portion of the Project Site that includes the location of the Phase 1 Project.

2.4.2 Boston Civic Design Commission

The Master Plan Project will comply with all requirements related to review of the Master Plan Project by the Boston Civic Design Commission ("BCDC"). Under Article 28 of the Boston Zoning Code, the BCDC is authorized to review the schematic designs of large-scale development projects (gross floor area over 100,000 square feet) and projects of special significance as determined by the BCDC. The purpose of the BCDC review is to assist and advise city officials with the design review of projects that affect the public realm, and to provide a forum for the general public

and the professional design community to participate in the shaping of the city's physical environment. The BCDC review is advisory to the BPDA and the Mayor of Boston. The procedure for BCDC review is more particularly set out in Section 28-13 through 28-16 of the Boston Zoning Code. It is anticipated that BCDC review for the Master Plan Project will be conducted on a building-by-building basis as development proceeds. The Phase 1 Project's design has already been reviewed and approved by the BCDC.

2.4.3 Boston Landmarks Commission

Under Article 85 of the Boston Zoning Code, buildings older than 50 years cannot be demolished without review for historic significance by the Boston Landmarks Commission ("BLC"). As noted above, a number of the existing structures at Suffolk Downs are more than 50 years old and are included on the Commonwealth's Inventory of Historic and Archaeological Assets. The Proponent intends to dedicate one or more locations on the Project Site to commemorate the history of the Suffolk Downs race track and will consult with the BLC regarding the historic impacts from development of the Project Site and, working with the BLC and other interested parties, including former track employees, to recognize this history.

2.4.4 Article 25 Flood Hazard District

Section 25 of the Boston Zoning Code establishes the Flood Hazard District, a zoning overlay district, which includes all special flood hazard areas within the City of Boston as established by FEMA on the latest Flood Insurance Rate Maps and associated Flood Insurance Study. Development within these areas must comply with applicable federal, state, and local regulations. The Proponent is working closely with the BPDA to ensure that the Master Plan Project incorporates best practices to minimize and mitigate flood hazards, including the potential future impacts of climate change.

2.4.5 Inclusionary Housing

The Inclusionary Development Policy ("IDP"), approved by the BPDA in December 2015, established as City of Boston policy that any residential project seeking zoning relief under the Boston Zoning Code must set aside a number of units at least equal to thirteen percent (13%) of the total number of on-site units as affordable to households at specified levels of income within a project. The Proponent will work with the BPDA to be in compliance with the IDP.

2.4.6 Boston Employment Commission

As noted above, MHDC will enter into agreements reflecting the various mitigation commitments made during the Article 80 process. It is expected that this will include an agreement with the Boston Employment Commission respecting a Boston

Residents Construction Employment Plan. The Master Plan Project will comply with all applicable requirements of the Boston Employment Commission.

2.4.7 City of Boston Technical/Design Permits

Boston Public Works

The Master Plan Project will comply with all applicable requirements of the Boston Public Works Department, which is expected to approve street occupancy permits and permits and approvals for curb cuts and street lighting.

Boston Transportation Department

As noted above, MHDC will enter into agreements reflecting various mitigation commitments made during the Article 80 process. It is expected that these will include a Transportation Access Plan Agreement ("TAPA") and an agreement respecting a Construction Management Plan ("CMP") with the BTD. MHDC will also seek BTD permits and approvals for street opening/closing. The Master Plan Project will comply with all applicable requirements of BTD.

Boston Public Improvements Commission

The Master Plan Project will comply with all applicable requirements of the Boston Public Improvements Commission, which is expected to approve Specific Repair Plans for City of Boston streets and sidewalks and excavation support licenses within public ways (if required).

Boston Public Safety Commission

The Master Plan Project will comply with all applicable requirements of the Boston Public Safety Commission, which is expected to approve Fuel Storage Licenses and Garage Permits in connection with individual buildings and parking structures for the Master Plan Project.

Boston Water and Sewer Commission

The Master Plan Project will comply with all requirements of the Boston Water and Sewer Commission, which is expected to approve Sewer Connections and Cross Connections and Extension Permits, Water Permits, Hydrant Permits, approval of a "Water Straddle" Extension (allowing for MWRA Service to be extended from the portion of the Project Site in Revere to the portion of the Project Site in Boston), and Site Plan Approvals in connection with the Master Plan Project.

Boston Inspectional Services Department

The Master Plan Project will comply with all requirements of the Boston Inspectional Services Department, which is expected to issue Building Permits, Demolition

Permits, Foundation Permits, Electrical and Gas Permits in connection with the Master Plan Project.

Boston Conservation Commission

The Project Site includes wetland areas, including Sales Creek, and any construction within the Project Site will be subject to certain requirements under the Massachusetts Wetlands Protection Act (the "WPA"). Review under the WPA will be conducted by the Boston Conservation Commission.

The existing resource areas and buffer zones to wetland resource areas are heavily disturbed or have been altered by the previous uses. MHDC expects to preserve existing wetland areas as part of a significant public open space network to be included in the Master Plan Project. The WPA requires that an Order of Conditions be obtained from the Boston Conservation Commission for any work in Boston within jurisdiction.

The Boston Conservation Commission issued the Order of Conditions for the Phase 1 Project on February 21, 2018 (DEP File No. 006-1568).

Boston Fire Department

Permits and approvals for Fuel Storage, Fire Safety Equipment, Alarm System, Sprinkler, Standpipe, Smoke Control and Hydrant, and asbestos removal (if necessary) require review of various aspects of the Master Plan Project including garage layout and life safety systems and are typically sought when construction drawings and specifications are available for review by the Boston Fire Department. The Master Plan Project will comply with all requirements of the Boston Fire Department in connection with issuance of such permits and approvals as necessary.

2.5 City of Revere

The Proponent has held numerous meetings with various elected officials and City of Revere entities/departments, and appointed public boards and groups, both before and after the filing of the EENF/EPNF, and during and throughout the process of preparing this DEIR/DPIR, including:

- Mayor Arrigo
- Revere City Council
- Economic Development Department
- Department of Planning
- Project Review Board ("PRB) and Development Advisory Group ("PAG"), established under rezoning (described further below)
- Conservation Commission
- Department of Public Works, including the Water/Sewer Division

2.5.1 Revere City Council/Revere Project Review Board/ Revere Development Advisory Group/Site Plan Review Committee

Under existing provisions of the Revere Code, the Revere portion of the Project Site is subject to underlying zoning (under which the zoning designation is PDD1) that allows for a 2.0 FAR as of right and up to a 3.0 FAR pursuant to a special permit. This equates to approximately 4.5 million SF of as-of-right development, and up to approximately 6.8 million SF with a special permit. Allowed building heights under underlying zoning vary, with provisions allowing for certain buildings to be up to 180, 200 and 250 feet depending on the use and location. Allowed uses under the PDD1 zoning include office, retail, restaurant and hotel, with other uses (e.g., residential) by special permit.

To facilitate the development of the Project Site in Revere as a mixed-use community with a substantial amount of commercial development, as well as residential uses, the Proponent sought a zoning amendment that has created a new SDOD, which was approved by the Revere City Council and was signed by the Mayor of Revere on March 27, 2018. The SDOD is a new overlay zoning district, the effect of which will be, upon the future issuance off a master plan PUD special permit, to replace the provisions of the underlying zoning district once the Proponent initiates the first project at the Project Site pursuant to the SDOD zoning. Thereafter, the land would be subject to development in accordance with the provisions of the new overlay zoning, which will include provisions that provide for approved uses, approved maximum heights applicable to different height zones (with maximum building heights ranging from 50 to 200 feet within the different height zones, as shown on Figure 2.1), minimum building setbacks from the SDOD boundary, minimum open space within the SDOD of twenty five percent, an approved FAR limitation of 2.5, approved parking requirements, minimum commercial development within buildings within the SDOD, and provisions for other regulations applicable to property within the SDOD. The SDOD zoning provides for the Proponent to seek a master plan PUD special permit from the Revere City Council, and for this special permit and the SDOD to provide for approval of an overall development program for the Master Plan Project. The SDOD zoning designates a Project Review Board made up of the city engineer, building inspector, city planner, health agent and superintendent of public works which will review the Proponent's preliminary and final master plan PUD special permit submissions and provide a recommendation to the City Council on the final master plan application. The SDOD zoning further provides for a Project Advisory Group, which has been appointed by the Mayor of Revere and incudes residents, elected officials, and department heads. The Project Advisory Group will review the Proponent's master plan special permit submissions and provide input and feedback on the development scenarios outlined in the master plan PUD special permit application. Following the issuance of a master plan PUD special permit, the SDOD zoning provides for subsequent site plan review by Revere's Site Plan Review Committee for individual buildings prior to issuance of a building permit for each building.

The Proponent has been working with staff and elected officials from the City of Revere to prepare an application for a master plan PUD special permit respecting the portion of the Master Plan Project that is proposed for the portion of the Project Site located in the City of Revere. In connection with this process, the Proponent and its project team have had regular meetings with and received input from the city staff, elected officials, members of the public, the PRB, and the PAG.

2.5.2 Revere Planning Board

The Master Plan Project will comply with all requirements of the Revere Planning Board in connection with issuance of permits and approvals respecting the Master Plan Project, including review in connection with the master plan PUD special permit application and Subdivision Plan Approvals.

2.5.3 Revere Floodplain District

Chapter 17.46 of the Revere Zoning Ordinance establishes the Floodplain District, a zoning overlay district which includes all special flood hazard areas within the City of Revere as established by FEMA on the latest Flood Insurance Rate Map ("FIRM") and associated Flood Insurance Study ("FIS"). Chapter 17.12.030 of the Revere Zoning Ordinance provides an exemption for land that is located within the Floodplain District based on the FIRM, but which is above the base flood elevation specified on the Flood Insurance Rate Map. This requires a certification by a professional engineer or surveyor as well as a finding by the Revere Conservation Commission that the land lies above the base flood elevation. As discussed later herein, the portions of the Project Site that constitutes LSCSF, and which are, therefore, subject to regulations applicable to the Floodplain District, have been confirmed through an Order of Resource Area ("ORAD") delineation issued by the Revere Conservation Commission.

2.5.4 City of Revere Technical/Design Permits

Revere Conservation Commission

The Project Site includes wetland resource areas, including Sales Creek, and any construction within the Project Site or within wetlands buffer zones will be subject to certain requirements under the WPA, and to the extent the same is within Revere will also be subject to requirements of the City of Revere Wetlands Bylaw (the "Revere Wetlands Bylaw"). Review under both of these laws will be conducted simultaneously by the Revere Conservation Commission.

The Proponent expects to preserve existing wetland areas as part of a significant publicly-accessible open space network to be included in the Master Plan Project. The WPA and Revere Wetlands Bylaw require that an Order of Conditions be obtained from the Revere Conservation Commission for any work in Revere within jurisdiction.

The Master Plan Project will comply with all requirements of the WPA, the City of Revere Wetlands Bylaw and the Revere Zoning Code, including any requirements of the Revere Conservation Commission or DEP in connection with issuance of permits and approvals related to the Master Plan Project.

Revere DPW Sewer and Water Divisions

The Master Plan Project will comply with all requirements of the Revere DPW, which is has jurisdiction over Sewer and Water Connection/Extension Permits in connection with the Master Plan Project.

Revere Inspectional Services Department

The Master Plan Project will comply with all applicable requirements of the Revere Inspectional Services Department, which is expected to issue Building Permits, Demolition Permits, Foundation Permits, Electrical and Gas Permits.

Revere Public Works Department

The Master Plan Project will comply with all requirements of the Revere Public Works Department in connection with issuance of permits and approvals respecting the Master Plan Project, including review in connection with permits and approvals for sewer and water connection/extension, curb cuts and street opening permits.

2.6 Planning Initiatives

This section identifies the Master Plan Project's consistency with state, regional, and local land use plans.

2.6.1 State/Regional

EO 385, Planning for Growth

Generally, Executive Order 385 ("EO 385") aims "…to actively promote sustainable economic development practices by advocating for state activities that are supported by adequate infrastructure and that are designed in such a way so that they do not adversely impact the natural environment." Given its scale, redevelopment of the Master Plan Project presents a unique opportunity to incorporate sustainable design and climate change resiliency elements in a comprehensive/district-wide manner from the early planning stages. The Project is consistent with EO 385 because it consists of a redevelopment of a previously developed/disturbed urban site with existing infrastructure, including public transit; therefore, reducing environmental impacts, such as traffic, new impervious surface, and new land alteration. The Project will improve water quality through proposed modifications/upgrades to the stormwater management system. The Project aims to create a mix of activity and provides for new employment and diverse housing opportunities, including the creation of approximately 14,000 new construction jobs

up to 50,000 new permanent jobs, as well as over 7,000 new housing units over the term of the Master Plan Project's development in support of the local and state economy. An estimated total annual net fiscal benefit is estimated to be $56.8 for Boston and $29.6 for Revere for the Master Plan Project at full build. The Master Plan Project fulfills the goal of developing and restoring a previously disturbed and currently under-utilized site for a better and higher use while minimizing any environmental impacts through the implementation of mitigation measures, to the extent feasible as demonstrated in this report.

Commonwealth's Sustainable Development Principles

The Project is consistent with several of the Office of Commonwealth Development's Sustainable Development Principles, including:

- **Concentrate Development and Mix Uses.** The Master Plan Project best fits this principle because it consists of redevelopment of an underutilized urban site with existing infrastructure and offers a dynamic mix of uses on the Project Site, encouraging commercial and innovation uses, diversity of residential uses, creative retail and business incubator/innovation space, as well as parks and community spaces.
- **Advance Equity and Expand Housing Opportunities.** The Master Plan Project will increase create a significant amount of housing units of various size and type, including home ownership, senior housing, and affordable units (in compliance with Boston's inclusionary housing programs and in coordination with the City of Boston).
- **Make Efficient Decisions.** The Master Plan Project introduces new pedestrian-friendly and transit-accessible employment and housing opportunities; therefore, reducing traffic.
- **Protect Land and Ecosystems.** The Master Plan Project incorporates existing heavily-disturbed wetland resources, particularly Sales Creek and the infield pond, into the proposed extensive approximately 40-acre open space system with enhanced public access.
- **Use Natural Resources Wisely.** The Master Plan Project promotes sustainable planning and design elements, including energy- and water-efficient building systems and operations, reduced construction and operational waste, and environmentally preferable materials.
- **Provide Transportation Choices.** The Master Plan Project promotes TOD with both rapid transit and bus stops at the Project Site. In addition, transportation choices will be expanded for residents and visitors. Pedestrian and bicycle access and circulation will be enhanced as part of the Project, including the opportunity for several new Hubway bike sharing stations on-site.
- **Increase Job and Business Opportunities.** The Master Plan Project will create approximately 14,000 new construction jobs and 25,000 to 50,000 new permanent jobs and may be a catalyst for future additional redevelopment in the area.

- **Promote Clean Energy.** The Proponent plans to install Electric Vehicle (EV) charging stations and preferred parking throughout the Master Plan Project, as well as further evaluate incorporation of rooftop solar PV systems, where feasible.
- For the Phase 1 Project, the Proponent committed to a comprehensive EV charging program that consists of 100 spaces made up of 30 EV charging stations, 35 EV ready spaces and 35 preferred parking spaces.
- **Plan Regionally.** The Master Plan Project was developed taking into consideration regional context, access, market area, and economics and is consistent with the goals of the MAPC's MetroFuture plan for the Boston Metro region, as well as the redevelopment goals of the cities of Boston as identified in *Boston 2030* and the new overlay zoning district approved for the Revere portion of the Project Site, respectively.

MAPC's MetroFuture

Both the cities of Boston and Revere are located within the Metropolitan Area Planning Council (MAPC) planning area. In May 2008, the MAPC issued its *MetroFuture: Making a Greater Boston Region*.[2] MetroFuture is MAPC's plan for Greater Boston to better the lives of the people who live and work in the region through the year 2030. MetroFuture includes detailed goals for development and preservation, and specific strategies to equitably distribute the benefits and burdens of growth. A key goal of MetroFuture is to focus growth where infrastructure already exists, including public transit in order to preserve natural resources. Specific goals to which the Master Plan Project addresses and/or support include:

- **Sustainable Growth Patterns:** The Master Plan Project consists of redevelopment of an underutilized urban site with existing infrastructure, including public transit, particularly direct access to two MBTA Blue Line Stations and Route 1A;
- **Housing Choices:** New diverse housing opportunities, including affordable housing options;
- **Healthy Communities:** Residents will be safe, healthy, well-educated, and engaged in their community.
- **Regional Prosperity:** New and diverse employment opportunities, including office-, retail-, and hotel-related employment opportunities;
- **Transportation Choices:** Direct access to an existing public transit and introduction of bicycle facilities (cycle tracks, bike lanes, Hubway Stations, bicycle sharing) throughout the Project Site with off-site connections;
- **Healthy Environment:** Protection of on- and off-site natural resources through resilient site design and sustainable/green building features, including energy and water efficient building systems; thereby, reducing the Master Plan Project's impacts on the environment.

2 http://www.mapc.org/wp-content/uploads/2017/08/MetroFuture_Goals_and_Objectives_1_Dec_2008.pdf

MPO's Journey to 2030

The Metropolitan Planning Organization's ("MPO") *Charting Progress to 2040* dated July 2015 is the Boston region's Long-Range Transportation Plan ("LRTP") the presents a vision for the future of the regional transportation system.[3] The MPO "envisions a modern transportation system that is safe, uses new technologies, provides equitable access, excellent mobility, and varied transportation options—in support of a sustainable, healthy, livable, and economically vibrant region." The Master Plan Project supports the vision of varied transportation options by concentrating mixed use development adjacent to two existing blue line transit stations—Suffolk Downs and Beachmont MBTA Blue Line Stations—with pedestrian-friendly and multi-modal access. Additionally, as the Master Plan Project is built-out, it will provide for significant enhancements to the key vehicular access points, including safety upgrades, as needed. Refer to Chapter 6, *Transportation*, for further information on the proposed transportation improvements associated with the Master Plan Project.

2.6.2 City of Boston

Imagine Boston

Imagine Boston 2030 is Boston's city-wide plan prepared over several years between the Fall of 2015 and Summer of 2017.[4] The plan identifies the Project Site for mixed-use development, including residential development. Key goals for the Project Site include:

- Redevelop as a resilient mixed-use neighborhood with a focus on housing and direct public transit connections to downtown Boston.
- Given the transportation connections to downtown, and highway connections to the greater metropolitan area, the Project Site has been identified as a possible new mixed-use district.
- Opportunity to strengthen connection between Downtown and East Boston via vehicular, pedestrian, and bike path networks.

The Master Plan Project is consistent with *Imagine Boston 2030*, including the Walsh administration's comprehensive housing plan, *Housing a Changing City Boston 2030*, because it will create a new mixed-use district with significant amount of housing, including hundreds of affordable units and senior housing units and enhanced access to public transit for future residents. Additionally, as described further in

3 http://www.bostonmpo.org/data/pdf/plans/lrtp/charting/2040_LRTP_Full_final.pdf

4 http://imagine.boston.gov/

Chapter 6, *Transportation*, the Master Plan Project proposes improved vehicular, pedestrian, and bicycle connections both on- and off-site.

Go Boston 2030 Vision and Action Plan

Go Boston 2030 is a blueprint of the City's guiding transportation principles: Equity, Economic Opportunity, and Climate Responsiveness.[5] *Go Boston 2030* identifies its top policies, including repairs to roads and bridges, restructuring all bus routes, and reducing traffic fatalities and crashes.

The Master Plan Project supports the *Go Boston 2030* guiding principles by proposing both on- and off-site transportation improvements to support the dense mix of uses proposed, including traffic/roadway improvements, new pedestrian access, and expanded bicycle facilities—all of which will materially enhance the connectivity of the Project Site to the surrounding area. Also, the mixed-use nature of the Master Plan Project, particularly the introduction of a significant amount of commercial and retail business, will create employment opportunities in East Boston and Revere, as well as a significant amount of new housing to serve new employees and reduce commuting time. Refer to Chapter 6, *Transportation*, for further details on how the Master Plan Project will provide much improved access to the two adjacent MBTA Blue Line stations, as well as expand the area's bicycle network and connections.

Boston Open Space Plan

In January 2015, Boston Mayor Martin J. Walsh released the *Open Space & Recreation Plan 2015–2021*, which will guide Boston's efforts through the year 2021.[6] The plan addresses the following three broad challenge areas:

1. Open Space Access and Quantity;
2. Open Space Quality; and
3. Climate Change and Resilience.

Today the Suffolk Downs site does not have any publicly accessible open space areas. As discussed in greater detail in Section 3.9 of Chapter 3, *Urban Design*, the Master Plan Project has been designed to reconnect East Boston and Revere with an approximately new 40-acre publicly-accessible open space network that represents approximately 25 percent of the overall Project Site area. This new open space network will incorporate existing wetland features on the Project Site and offer a diversity of experiences including active, passive, recreational ecological, environmental, and programmed uses. The Master Plan Project also includes new and improved pedestrian connections throughout the Project Site, and new extensive on-site network of cycle tracks and bike lanes with off-site connections to encourage recreational biking to nearby resources. For the residents and tenants, the Master Plan Project will incorporate a substantial amount of green roof and roof

5 https://www.boston.gov/sites/default/files/go_boston_2030_-_full_report_to_download.pdf
6 http://documents.boston.gov/parks/pdfs/OSRP_2015-2021.pdf

garden/deck areas as an outdoor amenity on the various buildings, as well as provide an environmental benefit (i.e., reduction of heat island effect, maintain a comfortable micro-climate, and help manage the roof runoff). The new approximately 40-acre open space system has been designed and configured to help mitigate these climate change challenges (refer to Section 3.9.3).

East Boston Master Plan

The April 2000 East Boston Master Plan is organized around four focus areas: Reviving the East Boston Waterfront, Enhancing the Neighborhood's Commercial Centers, Strengthening the Residential Neighborhoods, and Shoring up the Airport Edge.[7] For each focus area, the plan provides recommendations regarding land use, open space and public environment, historic resources and heritage, and transportation and parking. The plan also provides development guidance and addresses regulatory issues for each focus area. Specifically, the Route 1A frontage portion of the Project Site was identified as having the opportunity to develop new non-water dependent industrial facilities. As demonstrated by Imagine Boston, the reuse goals for the Project Site have shifted over the past 15 years to a mixed-use district with significant new housing, which the Master Plan Project is consistent with.

2.6.3 City of Revere

City of Revere FY2010-2015 Strategic Plan (draft)

Revere's Strategic Plan includes redevelopment of the Project Site into a vibrant mixed-use district for with primarily commercial and retail spaces.[8] While this plan identifies the previously proposed casino use at the Project Site as a proposed use, in general, economic development is accorded a high priority under the Strategic Plan for Revere. This is demonstrated by the new overlay zoning district approved by Revere City Council for the Project Site, which reinforces that the Master Plan Project is consistent with the City's vision and goals for this area. With the creation of an estimated $29.6 million in annual net fiscal benefit for the City of Revere, and an estimated 14,000 new construction jobs and 25,000 to 50,000 new permanent jobs overall, the Master Plan Project meets the Revere Strategic Plan goals.

City of Revere Open Space and Recreation Plan

The Proponent is aware the City of Revere has indicated they are in the process of updating their current *2010 – 2017 Open Space and Recreation Plan* to be completed by the end of 2018. A key action item that relates the Project Site, is to work with developers to ensure that any future redevelopment includes recreational space. The Master Plan Project is consistent with the City's current plan in that it supports the creation of new public open space (a 40-acre network a portion of that extends across both the Revere and Boston portions of the Project Site and would be entirely

7 http://www.bostonplans.org/planning/planning-initiatives/eastbostonmasterplan
8 http://www.revere.org/docs/RevereStrategicPlan-2010-2015-PublicCommentDraft.pdf

accessible to Revere, as well as Boston residents), including opportunities for active recreation. Refer to Section 3.9.2 of Chapter 3, *Urban Design*, for further details on the open space programming proposed for the Master Plan Project.

City of Revere Master Plan

The City also intends to embark on a full citywide Master Plan to be commenced at the end of 2018 or early in 2019.

2.7 Project Proponent and Development Team

The Proponent and applicant, The McClellan Highway Development Company, LLC, is an affiliate of The HYM Investment Group, LLC. HYM is a Boston-based real estate firm with extensive experience developing some of the area's largest and most complex mixed-use districts and neighborhoods.

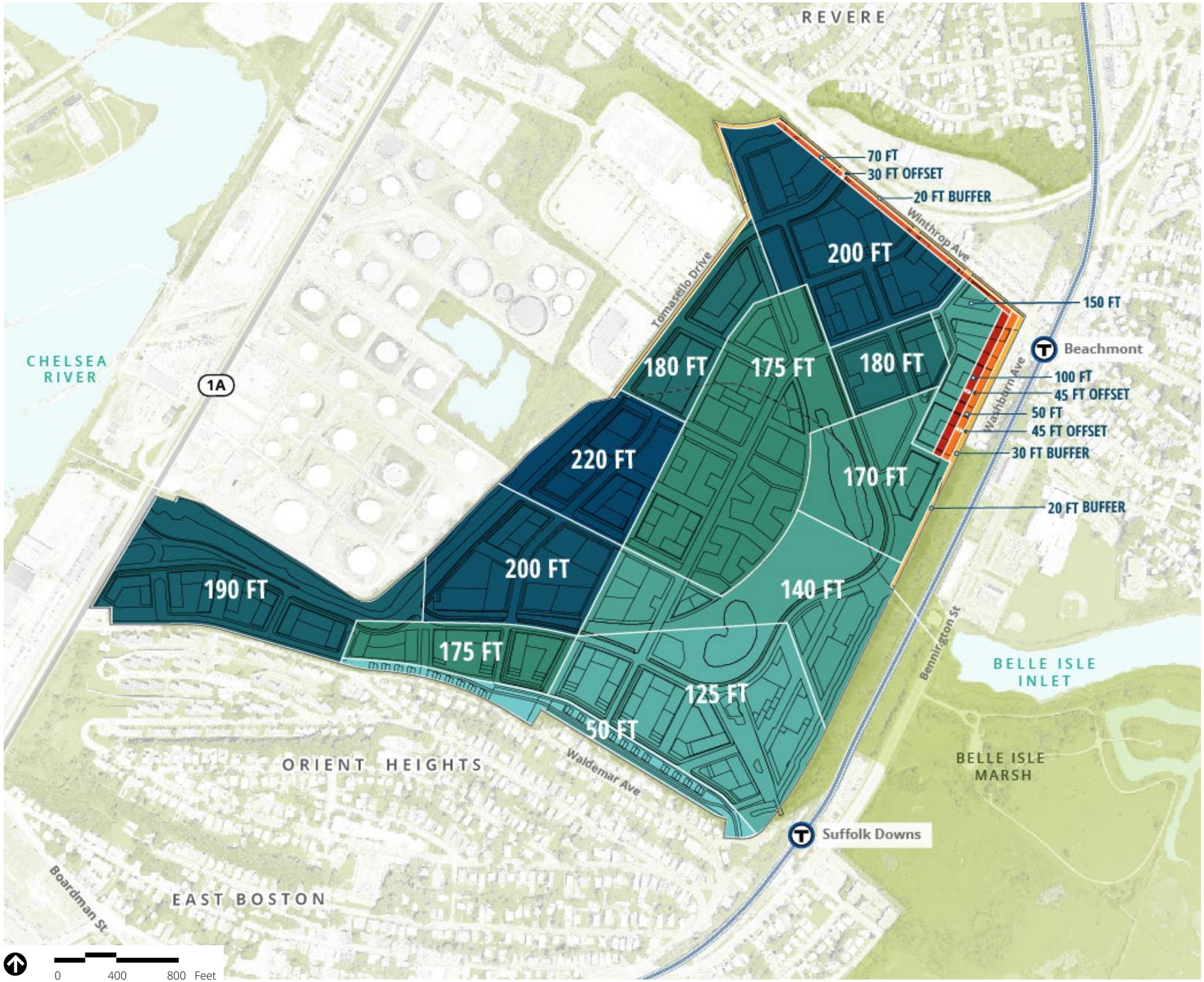
The following lists the key members of the development team for the Master Plan Project (the "Project Team"):

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Source: cbt

Figure 2.1
Building Height Strategy

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

3

Urban Design

This chapter addresses the urban design approach for the Master Plan Project, including changes made as it has been advanced, expanded, clarified, and/or amended from the approach first presented in the EENF/EPNF filing.

Within the context of the City of Boston's *Imagine Boston 2030* plan, the City of Revere's Strategic Plan, and the Commonwealth's planning initiatives, the Master Plan Project provides a unique opportunity to create a new vibrant mixed-use community with an extensive approximately 40-acre publicly-accessible open space network representing approximately one quarter of the Project Site. Currently the majority of the Project Site is inaccessible to the community, as the Project Site has been utilized as a horse-racing facility since the 1930's.

As requested in the BPDA Scoping Determination, specifically the Planning and Urban Design Comments memo dated February 21, 2018 on the EENF/EPNF, this chapter provides information on the following topics:

- Key goals from *Imagine Boston 2030* and stakeholder comments from the November 2017 BPDA open houses, including:
  - Encourage housing and job growth.
  - Support "21st Century Industrial" uses (i.e., technology companies).
  - Prepare for climate change.
  - Improve transportation connections.
  - Invest in the public realm and open space.
  - Encourage contextually sensitive development.
  - Project phasing with and without Amazon HQ2.
- Flexible and adaptable site design.
- Height, uses, and massing.
- Streetscape typologies.
- Mobility, circulation and accessibility, including non-vehicular modes (bicycle, pedestrian, and on-site shuttle system) and connections off-site.
- Describe landmark architecture and civic uses in public realm design.
- Advance the open space plan, including:
  - Types of active and passive recreation and their organization relative to existing public spaces in East Boston.
  - Gateways/Entryways to the site.
  - Connections to regional context (for bicycles and pedestrians to Belle Isle Marsh and for future connection to Chelsea River).

- Public nature of open spaces.
- Approach to planting and wetlands resources.
- Resiliency and sustainability, including reduction of heat island impacts, coastal flooding and increased precipitation.
- Equitability of access to open space.
- Utilization of historic elements on site.

› Materials, as specified, including plans, models, and perspectives.

The advancement and/or resolution of the above-referenced topics is discussed throughout this chapter. Certain specific urban design issues that have been addressed through refinements of the Master Plan Project are noted in Section 3.2 below.

3.1 Summary of Key Findings and Benefits

Redevelopment of the Project Site offers a unique opportunity to create a new mixed-use neighborhood anchored by quality public transit and an extensive open space network that integrates the surrounding natural resources. The Master Plan Project has been planned to have a strong urban design framework that connects to the adjoining neighborhoods and has the flexibility to adapt to a varied mix of uses.

Key findings and benefits related to urban design include:

› **A Dynamic Mixed-Use Program** – The Master Plan Project offers a dynamic mix of uses that aim to encourage commercial and innovation businesses a variety of housing types, street front neighborhood retail, all within an extensive publicly-accessible open space network. This mix of uses and building typologies will be anchored by early development of the two new urban public spaces—Belle Isle Square and Beachmont Square and in later phases by the development of the Main Street Retail Corridor.

› **Creation of Multiple Neighborhoods** – The Master Plan Project provides different styles of living for a diverse population, including families, empty nesters, seniors, younger workers, and recent graduates. The planned new neighborhoods respond to the existing context of Orient Heights, Winthrop Avenue, Beachmont, Belle Isle Marsh, and East Boston Greenway while also reinforcing the framework of the new on-site open space and street networks. These new neighborhoods will be designed to include a mix of rental and ownership housing available to residents interested in both market rate and affordable housing.

The two new neighborhoods to be developed through the Master Plan Project near the existing Orient Heights, Beachmont, and Bell Circle neighborhoods – which are referred to herein as Bell Isle Square and Beachmont Square – will feature a mix of residential buildings with retail, hotel and office uses located adjacent to the two MBTA Blue Line stations. The new centrally located neighborhood is distinguished by the Main Street Retail Corridor focusing more heavily on retail and office uses, but also complemented with residential and civic uses. And, the new western-most neighborhood adjacent to the Orient Heights neighborhood and Route 1A

(referred to herein as the "Panhandle") features more residential uses to compliment the residential context bordering this part of the Project Site.

- **Expansive 40-acre Publicly-Accessible Open Space Network** – The Master Plan Project has been designed to reconnect East Boston and Revere with an approximately 40-acre publicly-accessible open space network that represents approximately 25 percent of the overall Project Site area. The open space network allows for the creation of multi-functional open spaces that provide relaxing and restorative places to walk, run, ride a bike and exercise while also serving to manage stormwater and allow the development to be resilient to future climate change impacts. The open space network builds on and makes connections to existing wetland resources including Sales Creek and Belle Isle Marsh, while allowing future connection to the Chelsea River Waterfront.
- **Protection and Enhancement of Environmental Resources –** The Master Plan Project's open space network embraces the context of existing marshes and wetlands, protecting and enhancing them with native vegetation where possible. Wetland resources on site are made visually available to the public while being protected from physical disturbance. Planting throughout the Master Plan Project takes cues from the coastal context and builds diversity through planting of a range of tree species both in the open space network and the street network.
- **Improved Connections and Transportation Access** – The mix of uses will be interspersed throughout the Project Site to create a cohesive fabric of new urban streets, walking paths, and bicycle accommodations and green connections. Two important retail squares, adjacent to the Suffolk Downs and Beachmont MBTA Blue Line stations, will provide for pedestrian-friendly access to public transit and create multi-modal transportation opportunities. Bicycle stations will be included to encourage the use of alternative transportation modes to access the Project Site. Proposed on-site shuttle bus routes will connect the development to these two transit hubs.
- **Public Realm Activation** – Key community amenities will be incorporated throughout the Project Site to activate the public realm, including three distinct neighborhood retail districts, a landscaped outdoor theater, and active and passive recreation areas (including dog-friendly open spaces and playgrounds). Additionally, ground-level amenities are planned, with local restaurants and retail encouraged to spill out onto adjacent sidewalks and open space areas. Because the development will bring new populations, including daytime employees and visitors, as well as permanent residents, it is expected that the new retail will complement and support existing retail and restaurants in the surrounding neighborhoods.
- **Healthful Living** – The Proponent and its project team recognize that the built and natural environments in which people live, work, and play greatly influence their health and well-being. Therefore, the Master Plan Project is planned with an extensive walking, jogging and bicycling network throughout the Project Site. In addition, an Active Linear Corridor (previously referred to as the "sporty spine") with diverse types of exercise and creative passive and active recreation options runs through the center of the Project Site linking up to a new neighborhood park for the Orient Heights neighborhood. The Active Linear Corridor will offer future

residents, employees, visitors, and the current residents of Orient Heights, Beachmont and other nearby neighborhoods new and fun ways to get outside, connect with their neighbors and be active.

3.2 Summary of Master Plan Project Design Changes

Since the EENF/EPNF filing, the Proponent and design team made key design changes to the Master Plan Project in response to feedback received through public outreach, in the BPDA Scoping Determination, and in Urban Design/Transportation comments.

3.2.1 Key Design Changes

The primary changes made to the Master Plan Project proposed here from the proposal contained in the EENF/EPNF are summarized below. References to other sections herein for further detail are included.

› Based on community and BPDA feedback, the Proponent and design team have focused on the southernmost border of the Project Site adjacent to the Orient Heights neighborhood resulting in significant design changes in the Waldemar Avenue edge. These changes include pulling larger buildings away from existing houses at the edge of the Project Site, addition of new townhomes, and creation of a new neighborhood park.

- The Waldemar Street edge has been improved with the addition of a new neighborhood park that is situated mid-block on Waldemar Avenue and fronts directly on Waldemar and is directly accessible to the Orient Heights neighborhood. This park also sits directly adjacent to the entrance to the new Active Linear Corridor System.
- Near the Suffolk Downs MBTA Station, two residential buildings were pulled back away from the Orient Height neighborhood and additional townhomes were placed between these two buildings and the Orient Heights neighborhood. This is also part of a large redesign of the Belle Isle Square.
- Addition of a dense landscape buffer behind the Waldemar Avenue abutters in this area that also incorporates a new community path which connects the Suffolk Downs T Station with the new Active Linear Corridor System.
- To the area west of the new neighborhood park, previously proposed larger residential buildings have been pulled back from the edge of the Project Site and new townhomes have been added that will front onto Waldemar Avenue. The goal is to "complete the street" in this segment which previously was exposed to Suffolk Downs parking lots. This portion of Waldemar Avenue will now have small scale residential homes and townhomes on both sides of the street.
- The design team also further refined the design of the larger residential buildings behind the townhomes to include additional stepping to further transition height into the Project Site.

- Also, based upon BPDA and community feedback, Belle Isle Square has gone through a material redesign and expansion. Previously, Belle Isle Square was a two-block segment with a smaller plaza area facing the Suffolk Downs MBTA Station. The buildings along this two-block segment have now been pulled back essentially creating a new public square that is two blocks long. The middle of the square now has large plaza areas and two retail pavilions which will allow community gathering and event space in addition to other activation opportunities. Improvements have also been made both for intermodal transit (cyclists, pedestrians, kiss-ride and pickup, bus transfers, and ride share services) and for transit-related retail development. Belle Isle Square has been more carefully integrated into the urban fabric of the Master Plan Project. (Refer to Section 3.6.1 for a description of the current design proposed for this transit-oriented square.)
- Clear definition and elaboration of a retail strategy centered on the Main Street Retail District, including neighborhood-serving retail and opportunities for entrepreneurial start-ups from the surrounding neighborhoods to incubate and grow retail businesses. The Proponent is committed to making approximately 10% of retail space across the Master Plan Project available with flexible lease terms for promising local businesses from East Boston and Revere. (Refer to Section 3.6.3 for a description of the proposed retail strategy.)
- A new internal street that runs north south has been added that is parallel to and between the Main Street Retail District and Tomasello Drive. This new street was added to reduce the size of certain blocks in response to concerns raised by BPDA staff about "superblocks", and make these blocks more consistent in size with other blocks in the Master Plan Project. This also allows for the shifting of parking and loading access points off of secondary roads onto this new tertiary road. (Refer to Section 3.5 for a description of the updated Master Plan Project.)
- Approximately 300,000 square feet of previously-proposed building space has been eliminated from the overall Master Plan Project as a result of site and building design changes, resulting in a reduction in density.

3.2.2 Summary of Responses to Urban Design Comments

The following section provides a summary of responses on how the Master Plan Project aims to address the key goals from *Imagine Boston 2030*, the BPDA Scoping Determination, and Urban Design/Transportation memo (dated February 21, 2018) comments. References to other sections herein for further detail are included.

Imagine Boston 2030 Plan Goals

- The Master Plan Project will encourage housing as the only site in Boston capable of creating more than 5,000 residential units at one location in response to the City's goal of adding more units to the regional housing stock. In total, the Master Plan Project provides the potential for the construction of up to 10,000 housing units for both for rent and for sale, including market rate, senior housing, and affordable housing opportunities.

- The Master Plan Project will encourage job growth by creating a new district to attract employers of growing industries that will enhance and expand job creation and economic opportunity, including the creation of approximately 14,000 new construction jobs and approximately 25,000 to 50,000 new permanent jobs.
- The Master Plan Project will provide new office and/or laboratory space that could support 21st Century Industrial uses i.e., uses related to technology companies that create system networks, digital programs, and data base management (not factory production) that support the development, management, control, maintenance, and logistics of industrial machinery or manufacturing, or other assets located elsewhere and connected by the Internet of Things.
- The Master Plan Project has considered the changing climate by conducting an extensive modeling effort to assess potential on- and off-site impacts related to climate change projections for increased precipitation and sea level rise. (Refer to Chapter 8, *Climate Change Resiliency*, for the results of this study.)
- Through site and open space/landscape design, special attention has been paid to stormwater management approach and innovative landscape strategies have been incorporated. The landscape has been designed to collect and recycle rain water, support connectivity and areas within public opens spaces to accommodate extreme flooding and rising waters.
- The Master Plan Project improves transportation connections by thoughtfully integrating the access and circulation and open space networks to create a vibrant, active, healthful, community and transit-oriented urban realm. See Section 3.7.1 for additional discussion of access and circulation.
- The Master Plan Project incorporates contextually sensitive development through the construction of a mixed-use district with uses (residential, commercial, hotel, retail) complimentary to the existing uses surrounding the Project Site to the north, south, and east.
- The Master Plan Project has been designed to allow for the accommodation of Amazon HQ2, including the Phase 1 Project office development that is proposed as part of what the Master Plan Project proposes to be a larger initial approximately 1.4 million square foot phase of mixed use development in Boston adjacent to the Suffolk Downs MBTA Station. If Amazon chooses the Project Site for its second headquarters, then Amazon's requirements are more likely to dictate the pace of build-out which may then be less than 20 years.

Flexible and Adaptable Site Design

- The proposed buildings, urban spaces, and public open spaces will mark planned view corridors to assist in orientation particularly from site entry points (see Figure 3.28). The detailed design of these elements will be undertaken as the design of each development phase and/or building is advanced.
- Additional diagrams are provided showing vehicle parking and service/loading, and conceptual lobby entrance points (Figures 3.25 and 3.26, respectively).
- The Revere portion of the Master Plan Project development program has been refined based on the approval of the Suffolk Do25wns Overlay District (SDOD) on

March 27, 2018, which requires a 50% minimum of on-site uses within Revere to be commercial (office, retail, hotel, etc.) with the remaining on-site development within Revere allowed to be residential.

Building Height, Uses, and Massing

- The Waldemar Avenue edge has been improved with the addition of a new neighborhood park, a generous community path, the pulling back of several larger residential buildings and the addition of appropriately-scaled new buildings (townhomes) all of which provide an appropriate transition from the Project Site to the Orient Heights neighborhood. A more detailed discussion of the changes along Waldemar Avenue is provided in Section 3.2.1 above.
- Building height setbacks have been added along both Winthrop Avenue and Washburn Avenue in Revere, allowing the buildings to transition from the scale of the adjacent areas. These setbacks have been incorporated into the approved zoning for the Revere portion of the site (SDOD) and incorporated into the height zones illustrated in Figure 2.1.
- Residential uses are mixed into the commercial cores, such as the Main Street Retail District to support an anticipated 18-hour presence and address concerns about scale and distance of residential and commercial uses from public open space. Additionally, commercial/retail uses have been extended to meet the existing shopping area at Furlong Drive.

Street Typologies

- Two new streets have been introduced to decrease block size in specific areas typical block sizes are scaled to comfortable walking distances between intersections while providing plots that efficiently accommodate a variety of residential and commercial building forms.
- There is a variety of interior street types providing a clearly articulated hierarchy based on traffic volume, street level usage, building entry points, and public access to open spaces. The Main Street Retail Corridor is proposed to have pedestrian-scaled blocks with retail frontage to provide an active streetscape. (See Figures 3.23a through 3.23m for the street cross sections.)
- Elements of the Master Plan Project consistent with the Boston Complete Streets Guidelines, as described in Section 3.7.1.
- The block morphology surrounding the Main Street Retail Corridor is defined by a larger vehicular street grid bisected by the Active Linear Corridor and by pedestrian ways and green fingers. Blocks within the other neighborhoods are defined by streets appropriately scaled to mixed use building development.

Mobility, Circulation, and Accessibility

- The Master Plan Project is a TOD that emphasizes public transit, provides on-site shuttle routes connecting to the Project Site to the two adjacent MBTA Blue Line stations, encourages pedestrian activity and biking, and promotes reduced parking

ratios and shared parking, where appropriate, all of which aims to reduce single-occupancy vehicles. (Refer to Section 3.7 for a description of urban connections.)

- Active everyday living is supported through provision of attractive streets, connected open space and planned connections to regional rail, bus, and bicycle systems; walking and cycling will also be encouraged by the Master Plan Project through a series of community paths, cycle tracks and on-street bike lanes.

Public Transit Access Improvements

- Detailed plans of Belle Isle Square and Beachmont Square (see Figures 3.11 and 3.16, respectively) show the connection to MBTA Blue Line Stations by shuttle bus, pedestrians, bicyclists, and vehicles.
- A pedestrian bridge is proposed at Belle Isle Square across a narrow strip of wetland to provide direct connection to the existing MBTA Suffolk Downs Blue Line Station.
- A privately-operated shuttle bus system with two routes interior to the Project Site is proposed to further encourage the use of public transit (see Figure 3.24).
- The establishment of new, privately-operated shuttle services that would provide direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the Newburyport/Rockport Line), as well as to the Seaport District are also proposed. (Refer to Section 6.10.2 for additional information on the proposed off-site connector shuttle routes.)
- The Proponent has invested in a new stop and turnaround on Tomasello Drive for the MBTA #119 bus route and will continue to work with the MBTA to explore potential future bus routing and stops within the Project Site as the demand is warranted by the Master Plan Project.

Pedestrian and Bicycle Facilities

- The proposed mobility network provides pleasant walking alternatives that put 80% of the development within an approximately 10-minute (or a half mile) walk from one or the other of the stations and all development is within an approximately 20-minute leisurely walk (approximately 1,200 yards).
- A system of pedestrian-scaled signage will be incorporated as the Project Site is built out to facilitate wayfinding for pedestrians and bicyclists.
- Tomasello Drive will be upgraded to incorporate pedestrian and bicycle facilities which do not exist today except for a short segment of sidewalk towards Winthrop Avenue. There will be a new pedestrian path adjacent to the wetlands, a dedicated cycle track on the opposite side of the street to better connect with bike paths within the Project Site, and generous sidewalks adjacent to new building development.
- An extensive bicycle network is proposed throughout the Project Site with connections to the Beachmont neighborhood in Revere and Orient Heights in Boston. (Refer to Section 6.8.3 of Chapter 6, *Transportation*, for further details on proposed on- and off-site bicycle access improvements, including potential bicycle

connections beyond these neighborhoods to Revere Beach, Constitution Beach, the East Boston Greenway, and Belle Isle Marsh.)

› The context of the Project Site's southern border at Waldemar Avenue has been reconsidered and revised; a community path providing a pedestrian and bicycle connection, as well as an emergency vehicle ROW has been provided connecting the Orient Heights neighborhood with the Suffolk Downs MBTA Blue Line station.

Civic Uses

› The Master Plan Project calls for the inclusion of civic and community space within the approximately 40-acre open space network. Proposed civic elements include:
  - Outdoor performance theater
  - Innovation Center (which will have community meeting space included)
  - Belle Isle Square and Beachmont Square public plazas (opportunities for outdoor activities and festivals)

› The Proponent is considering how to incorporate elements of the history of the thoroughbred racing complex into portions of the proposed open space system. An inventory will be undertaken to identify race track elements that could be reused within the on-site open space system and/or have the potential for donation to local museums. (Refer to Section 3.95 of this chapter and Section 11.5 of Chapter 11, *Historic Resources*, for further details on potential mitigation related to historic resources.)

› The Proponent will continue to work with the BPDA and City of Revere on integrating civic/community space within the Master Plan Project buildings.

Public Realm Design

› High quality finish materials, furnishings, plantings, and lighting elements will be used throughout the public squares and open spaces. (Figures

› As a highly visible gateway to the Project Site, the design of the Belle Isle Square public plaza has been advanced based on schematic design studies undertaken in connection with design work relating to the Phase 1 Project (i.e., the first two office buildings proposed to be constructed in the event that the Project Site is selected through the Amazon HQ2 process) and advanced conceptual design studies for the residential buildings and proposed retail kiosks within the square.

› The Central Common is bordered on three sides by public streets. The western boundary is proposed to be a public promenade/open space overlook, which is part of the pedestrian network.

Advanced Open Space Plan

› The open space network has been deliberately designed around the themes of regional connectivity, active uses/recreation, and resiliency (based on greater understanding of potential on- and off-site impacts related to climate changes, as presented in Chapter 8, *Climate Change Resiliency*).

- A full range of active and passive activities will be supported by the proposed public open space network. For example, the open field proposed as part of the Central Common consists of approximately three acres of generally level grassed area so that it can allow for informal play, such as softball, soccer, frisbee, or volleyball (Refer to Section 3.9.2 for the proposed open spaces and programming.)
- Landscape design has evolved to provide a family of infrastructure consistent in design and legibility, but varied by neighborhood and purpose, laid out appropriately to the spacing between buildings.
- Green infrastructure elements are proposed to provide stormwater runoff treatment and retention, as well as create opportunities for rainwater harvesting and re-use. (Refer to Section 3.9.3 for a description of the green infrastructure elements.)
- Informed by the resiliency adaptation study conducted by the Proponent (presented in Chapter 8, *Climate Change Resiliency*), the Master Plan Project continues to advance a multi-functional open space plan that includes infiltration of first rainfall, retention of stormwater from impervious areas of development, control of tidal inundation, and restoration, improvement, interconnection, and innovative use of on-site natural resources. (Refer to Section 3.9.3 for a description of the open space resiliency measures.)
- Urban Forestry is discussed and illustrated; the intent is to subtly differentiate the four neighborhoods through choice of tree species and lower planting. (Refer to Section 3.9.4 for a description of the urban tree canopy plan.)
- The Proponent's intention is to develop the open space network in phases concurrently with the phasing of the building development so that approximately 25% open space is developed within each of the currently-contemplated development phases. (Refer to Section 3.9.6 for a description of the proposed open space phasing plan.)

3.3 Urban Context

As shown in Figure 3.1, the Project Site is uniquely positioned between the thriving neighborhoods of Orient Heights in East Boston and Beachmont in Revere, as well as being in close proximity to other neighborhoods of both East Boston and Revere. The Master Plan Project's variety of residential building typologies will be used to create a gradual transition from the single-family homes and duplexes of the surrounding neighborhoods to the mid-rise and high-rise residential buildings at the heart of the Project Site. The proposed conceptual site plan, as illustrated in Figure 3.2, also addresses edge conditions related to topography, land use and building massing and buildings will be designed to respond appropriately to the scale and character of the existing neighborhoods in the area.

A review of the transition in building context from existing Orient Heights to the proposed buildings of the Master Plan Project, including in response to comments received from BPDA staff and others, led to four significant changes and a refinement along this boundary, including:

1. A new neighborhood park for the Orient Heights neighborhood adjacent to and accessed from Waldemar Avenue in lieu of six townhouses previously proposed;
2. To the west of this neighborhood park and up to the BHA development, a row of town houses is proposed in lieu of multi-family buildings to make Waldemar Avenue a two-sided street in this area;
3. Near the Suffolk Downs MBTA Station, two residential buildings were pulled back away from the Orient Height neighborhood and additional townhomes were placed between these two buildings and the Orient Heights neighborhood;
4. A new denser landscape buffer was added behind the Waldemar Avenue abutters between Suffolk Downs MBTA Station and the new Active Linear Corridor, which also incorporates a new community path; and
5. The design team also further refined the design of the larger residential buildings behind the townhomes and along the Panhandle area of the Project Site, to include additional stepping in the building massing to further transition height into the Project Site.

Refer to Section 3.8.1 below for further details on the site design considerations for this important edge.

The Project Site is also situated in the corridor between two great urban beaches: Revere Beach and Constitution Beach. East of the Project Site, on the other side of the MBTA Blue Line tracks and Bennington Street, is the Belle Isle Marsh Reservation, which is an extraordinary natural open space resource for the Project Site and surrounding neighborhoods. As described further in Chapter 8, *Climate Change Resiliency*, the Project Site is also subject to potential risk of coastal flooding from projected sea level rise given its proximity to coastal areas, including Belle Isle Marsh.

One of the Project Site's greatest strengths is its two direct connections to two MBTA Blue Line stations: Suffolk Downs and Beachmont. Traveling by the Blue Line, the Project Site is approximately five minutes from Logan Airport and approximately 11 minutes from State Street Station, in the heart of Boston's financial district. The Blue Line also offers connections via the Silver Line to South Station and its commuter rail lines, and via the Orange Line to North Station and Back Bay Station and their respective commuter rail lines. Study of a future connection to the Red line has been announced by the MBTA. Given the Project Site's remarkable access to transit, it will be designed as a modern, innovative and transit-oriented community, rather than a traditional mixed-use downtown.

The Project Site is directly served by Route 1A, a major north/south state highway which provides direct connections southbound via the two Boston Harbor Tunnels to Interstate 93 (North-South Highway Corridor) and Interstate 90 (East-West Highway Corridor). In addition, Route 1A provides connections to Routes 16 and 60 westbound, and Route 1 and Revere Beach Parkway northbound.

Urban design challenges related to the Project Site include an oil tank farm to the west and the MBTA Blue Line tracks to the east, both of which effectively limit access to the Project Site to its northern edge at Revere Beach Parkway/Winthrop St and south west

corner at Route 1A. A circuitous connection can be made to Route 1A through the shopping area via existing Furlong Drive, but this is far from direct, congested, and connected only to the northbound leg of Route 1A (right in/right out).

3.4 Planning Principles and Design Goals

The following are key goals and objectives of the Master Plan Project:

- Create a vibrant mixed-use, walkable transit-oriented community.
- Provide a variety of housing types, including townhomes, apartments, condominiums, and senior housing to meet the needs of Boston and Revere residents at a variety of price points including affordable and market rate.
- Provide 25% of the site as publicly-accessible open space that preserves existing natural resources, and includes both active and passive spaces while providing for storm water retention and management and reducing urban heat island effects.
- Retain natural wetland features to the extent practical for continued use as storm water storage capacity.
- Activate the public realm with open space amenities and extensive ground floor retail aimed at serving the on-site users and complementing existing retail in the surrounding neighborhoods.
- Provide a comprehensive system of pedestrian and bicycle paths, including enhancements to Tomasello Drive on the Project Site, to encourage alternative modes of transit which discourages reliance on individual passenger vehicles.
- Enhance and expand job creation and economic opportunity by providing employment opportunities near new and existing residential areas.
- Leverage the proximity to public transit to limit traffic impacts and provide easy access to workplaces and entertainment venues in other Boston and Revere neighborhoods.
- Approach sustainability with site and building design that comply with the appropriate LEED rating systems, including LEED-ND and with district-wide and forward-thinking climate change resiliency strategies. (Refer to Chapter 4, *Sustainability/Green Building*, and Chapter 8, *Climate Change Resiliency*, for further details.)

3.5 Master Plan Framework

The Master Plan Project has been planned around the goals of porosity, connectivity, and accessibility for this currently closed and unconnected site. The conceptual design of the Master Plan Project is arranged around a strong open space and public realm framework that provides an opportunity to connect the East Boston and Revere neighborhoods adjacent to the Project Site with a continuous fabric of transit oriented commercial and residential development thoughtfully integrated with the open space framework.

3.5.1 Open Space Network

Approximately 40 acres of open space, or 25 percent of the Project Site, is designed to provide a contiguous network of open spaces that offer a diversity of experiences including ecological, environmental, active, passive, recreational and programmed uses. Refer to Figure 3.3 for an illustration of the extensive open space network. This equates to approximately 27 acres in Boston and 13 acres in Revere.[1] The Project Site and its public space will be porous, connected, and open to the public and the community. The publicly-accessible open space network also sets up a strong relationship and potential connectivity to surrounding regional assets, such as the East Boston Greenway, Constitution Beach, Revere Beach and potential future connections to the Chelsea River waterfront.

Complementing the open space network is a Main Street Retail Corridor that runs through the middle of the Project Site linking the Beachmont and Suffolk Downs MBTA Blue Line Stations and the existing retail uses to the west of Tomasello Drive. Along the Main Street Retail Corridor are a series of nodes that create opportunities for creation of public squares and plazas. These include Beachmont Square at the Beachmont MBTA Blue Line Station and Bell Isle Square at the Suffolk Downs MBTA Blue Line Station, both anchoring the Main Street with urban plazas and key transit connections. This integration of the Main Street Retail Corridor with the open space system forms the important Master Plan framework around which four distinct neighborhoods will be created, each offering a different urban experience.

3.5.2 Distinct Neighborhoods

Four distinct neighborhoods make up the Master Plan Project. These distinct neighborhoods are referred to herein as:

1. Belle Isle Square Neighborhood
2. Beachmont Square Neighborhood
3. Main Street Retail Corridor
4. The Panhandle (the land extending to Route 1A)

Refer to Figure 3.4 for the locations of these neighborhoods (as numbered above). These neighborhoods are distinguished by their proximity to the MBTA Stations, public squares, Main Street Retail Corridor, open space realm, and surrounding context. These neighborhoods aim to respond to the existing context of Orient Heights (Belle Isle Square Neighborhood), Winthrop Avenue and Beachmont (Beachmont Square Neighborhood) while also responding to the new framework of the on-site open space, the street networks, and the retail corridor (Main Street Retail Corridor). A series of pedestrian, bicycle and vehicular connections will link these on-site neighborhoods to the open space and retail districts as well as to Route 1A and Winthrop Avenue.

[1] Consists of usable public open space, including active and passive spaces, playgrounds, community paths, and bike paths, as well as active public plazas. Does not include streets, sidewalks, or natural resource areas. An additional approximately 8 acres of natural resource area provide for green buffers and habitat reserves.

Within this structure, a series of urban block clusters are set up to create a community environment where pedestrian walkways and open spaces create opportunities for interaction and play, as shown on Figure 3.5. This organization also provides for flexibility respecting development of individual blocks as they evolve through time, while still upholding overall urban design and master plan principals.

In the Belle Isle and Beachmont Neighborhoods, the blocks abutting existing residential neighborhoods are proposed to be developed for residential use as shown, and the sites away from residential boundaries and nearer the retail core to be developed for commercial use, with the overall mix of uses to create active mixed-use, transit-oriented recognizable neighborhood centers at the two planned MBTA station squares. The Panhandle (neighborhood 4) is proposed to be developed as predominantly multi-family residential with a hotel at the intersection of Tomasello Drive and Route 1A.

3.5.3 Urban Connections and Circulation

The creation of a vibrant public realm is at the core of the Master Plan Project. This is achieved through pedestrian-friendly and publicly accessible streetscapes, a diverse network of outdoor open spaces, including access to existing and new landscape amenities, active recreation and community programming, as well as a thriving mixed-use neighborhood with retail, food and beverage, civic, and service amenities. These new amenities are also well connected to existing off-site assets (as shown on Figure 3.6), such as Belle Isle Marsh, the existing retail at Furlong Drive, and existing retail centered around the Beachmont MBTA Blue Line station.

3.5.4 Adaptability of the Master Plan Project and Block Morphology

Built on the Master Plan Project's framework described above, the proposed land use plan shown in Figure 3.7 indicates a mixed-use district that encompasses a balanced mixture of commercial, residential, retail and hotel use. Within this overall plan, blocks have been sized so that residential and commercial use is interchangeable on any block. The retail and open space framework plans will provide the fixed elements that define the urban character of the Master Plan Project at street level.

Within this framework expressed as a fixed intent to develop open space and retail/hotel elements with blocks appropriately sized to accommodate either residential or commercial development, the Master Plan Project is set up to be highly flexible and adaptable to allow for changes in program and how the Project Site is built out over time. The Master Plan Project framework is centered around a robust urban structure of open spaces and a street network that creates a series of clusters of activity.

This organization allows for flexibility to develop a varying mix of uses while still upholding the overall urban design and Master Plan Project principles. To this end, the same overall plan can accommodate a variety of different mixes of uses, including a varied mix of uses (as discussed in Section 1.4.1 of Chapter 1, *Project Description and Alternatives*). Similarly, the overall height strategy remains the same while principles of shaping the building masses apply to all uses.

The Master Plan Project maintains a fine grain block structure while allowing for the development flexibility described above. Block sizes are generally in the range of 250 feet by 250 feet and are surrounded by either public streets or public open spaces.

Within this framework, a series of urban block clusters are set up to create a community environment where pedestrian walkways and open spaces create opportunities for interaction and play. This organization also provides for flexibility respecting development of individual blocks as they evolve through time, while still upholding overall urban design and master plan principals.

In the Belle Isle and Beachmont neighborhoods, the blocks abutting existing residential neighborhoods are proposed to be developed for residential use as shown, and the sites away from residential boundaries and nearer the retail core to be developed for commercial use, thus specifically creating active mixed-use, transit-oriented recognizable neighborhood centers at the two planned MBTA station squares. The Route 1A "Panhandle" Neighborhood will be developed as predominantly multi-family residential with a hotel at the intersection of Tomasello Drive and Route 1A.

3.5.5 Context Sensitive Development

Adjacent neighborhoods including Orient Heights, and Beachmont are structured around one, two, and three family dwellings. Along Waldemar Avenue abutting the southern edge of the Project Site, such dwelling houses exist towards the eastern half of the neighborhood whereas the western half towards Route 1A includes Boston Housing Authority (BHA) buildings, which are up to 6 stories in height. The Master Plan Project responds sensitively to surrounding context particularly to the southern edge abutting the Orient Heights neighborhood.

Height and Massing Strategy

The height and massing strategy for the Master Plan Project has been developed keeping in mind the scale of adjacent neighborhoods and transitions, to allow for access to sunlight to public spaces, creating appropriately scaled development and maximizing views for all buildings while creating privacy. Given the proximity of Logan Airport, the height strategy also responds to FAA height limitations. A proposed height zone diagram is provided in Figure 3.8 and further explanation of this strategy is included in Section 3.8 below.

Edge Treatments

The edges of the Master Plan Project respond to the context of adjacent development in the following ways. At Belle Isle Square, adjacent to the Suffolk Downs MBTA Blue Line Station, the massing opens up to create a public plaza with views and direct access to the Central Common and its tree canopy. Moving north along the MBTA tracks, the edge is developed with larger commercial buildings set back from the Project Site boundary (potentially the initial Amazon offices) with views over the Bell Isle Marsh. Refer to Figure 3.9 for a view perspective of the proposed Bell Isle Square.

At the Beachmont Blue Line MBTA station and along Winthrop Avenue an edge treatment similar to Belle Isle Square is employed where another open pedestrian plaza is surrounded by neighborhood-serving retail development leading to the new Main Street Retail District. To the south of Beachmont Square, this portion of the Project Site is adjacent to Washburn Avenue, which is a currently developed as a lower scaled single sided residential street. Here, the Master Plan Project incorporates a 30-foot landscaped buffer building setback zone and the proposed buildings behind this buffer have several height setbacks established by the approved Revere SDOD zoning, providing a scale transition between adjacent areas and the Project Site. Refer to Figure 2.1 for the building height zone diagram.

In light of the residential nature of nearby Orient Heights on the southern edge, residential uses are contemplated within the blocks immediately adjacent to the existing Waldemar Avenue neighborhood. A series of townhomes are proposed along the lower edge of Orient Heights to create a harmonious scale with a mid-rise transition between the existing and the new neighborhood. This transition has been studied in detail and revised considering various comments.

3.6 Proposed Uses

All four new neighborhoods within the Master Plan Project are intended to include a mix of uses with active uses at the ground floor and commercial and/or residential uses in the upper floors to ensure a dynamic mixed-use environment that is woven together in a cohesive fabric of new urban streets, walking paths, open spaces and bicycle connections.

3.6.1 Transit Oriented Squares

Two important transit-oriented squares called Belle Isle Square and Beachmont Square are proposed in proximity to the Suffolk Downs and Beachmont MBTA Blue Line Stations, respectively. The key goal of these urban squares is to create lively pedestrian-friendly access to the stations to encourage public transit usage to and from the Project Site. These squares will be provided with active retail uses and multi-modal transportation opportunities, including bicycle-sharing stations, connections to the shuttle loops, and integration with MBTA local bus routes. These squares are lined with pedestrian-serving retail and services and centered in mixed-use neighborhoods to provide 18 hours-per-day activation.

Belle Isle Square and Beachmont Square retail districts will be centered on the transit activities of the two stations and will feature pedestrian oriented plazas leading to the station entrances. The Main Street Neighborhood will be defined by continuous street-level retail along a tree-lined primary street that will extend into the mixed-use neighborhood. These nodes will connect with both the central common and the new Main Street Retail Corridor (described below). The Belle Isle Square, Beachmont Square, and Main Street districts will, when complete, create a continuous retail corridor that starts at one MBTA Blue Line Station, crosses the heart of the Master Plan Project and connects to the other MBTA Blue Line Station. It will connect the new neighborhoods

with existing neighborhoods while creating synergy between the commercial/residential mixed-use development and the retail areas and open space network. As noted there will be opportunities for participation by local merchants.

Belle Isle Square

Figure 3.10 presents the proposed site plan for and associated precedent images for Belle Isle Square. As shown in Figure 3.11 shows an access and circulation plan, a direct pedestrian and bicycle connection from the Suffolk Downs MBTA Blue Line Station into the Project Site will be establish a direct entrance to Belle Isle Square with retail active ground floor uses and mixed-use development above. This connection through the square leads directly to the large approximately 15-acre central common, inviting visitors to engage directly with it from the Suffolk Downs MBTA Blue Line Station. Refer to Figures 3.12a through 3.12d for sections of Belle Isle Square.

Like Beachmont Square, the design of the urban square will encourage opportunities for pedestrian interaction around the edges of the square while providing for direct connectivity for all modes of transportation including the MBTA buses, shuttles, bicycles, ride share pick-ups and connection to the MBTA Suffolk Downs Blue Line Station (Figure 3.11). Bicycle parking will be accommodated on the square and displays indicating real-time transit data will be provided. Figures 3.13a through 13.3c present renderings of Belle Isle Square.

Beachmont Square

Beachmont Square is located near the Beachmont MBTA Blue Line Station and adjacent to Winthrop Avenue in Revere, and will include a new urban plaza surrounded by retail, housing, and an innovation/incubator office building, as shown in Figures 3.14 and 3.15. The square will draw pedestrians from the MBTA stations to the Project Site through publicly-accessible open space and along the Main Street Retail District (described below). Through these links, direct and easy access is provided to both commercial and residential uses.

The design of Beachmont Square is inspired by the tradition of urban squares in and around Boston and Revere and will be an active and vibrant environment for a diversity of demographic groups to enjoy the public space, wait for the bus or train, or visit retail establishments. The design of the square will incorporate opportunities for pedestrians to sit along the edges of the square and walk in the square while also providing for direct connectivity of all modes of transportation including MBTA buses, shuttles, as shown in Figure 3.16), bicycles, ride share pick-ups and connection to the MBTA Blue Line. Bicycle parking will be accommodated in the square and displays indicating real-time transit data will be provided. Figure 3.17 presents renderings of Beachmont Square.

3.6.2 Main Street Retail Corridor and Active Ground floors

Belle Isle Square and Beachmont Square are both designed to be linked with a 'Main Retail Street' that straddles the length of the Project Site and provides an active and

lively environment to be enjoyed both by the owners, tenants and employees within the Project Site and visitors from the surrounding community. Refer to Figure 3.18 for the proposed retail plan.

The Proponent will look to attract existing local restaurants and businesses and cultivate an authentic retail feeling for the larger community which will not only serve on-site residents and workers, but also people from surrounding neighborhoods.

Figure 3.19 illustrates the proposed wide right-of-way provided for Main Street. This tree-lined street provides parking on both sides and segregated one-way bicycle lanes on each side of the street. Sidewalks are extended by building setbacks to provide 20-foot wide pedestrian zones that will allow outdoor merchandizing, outdoor food service, or additional planting. As development and leasing progresses, retail merchants will develop signage that will add to the visual activity of the street and facades. A standard will be set for street lighting which, along with tree species and size, will create consistency along the length of the street from station square to station square.

Refer to Figure 3.20 for a rendering of the Main Street Retail Corridor.

3.6.3 Retail Strategy

With a potential resident population of as many as 15,000, and a commercial tenant employee population of as many as 50,000 at full build-out, street-level retail is a core element of the Master Plan Project. Employees, residents, and visitors will assure demand throughout the day and over the weekend. The overall retail strategy for the Master Plan Project is to incorporate street-level retail and neighborhood amenity uses throughout the Project Site as the core element of the overall development. Up to approximately 500,000 SF of retail is proposed, which will create and include three distinct neighborhood retail districts. These planned districts, as described above, are:

1. Belle Isle Square (adjacent to the Suffolk Downs MBTA Blue Line Station;
2. Beachmont Square (adjacent to the Beachmont MBTA Blue Line Station; and
3. Main Street Retail Corridor (located in the heart of the Project Site).

The Master Plan Project's creative retail strategy (Figure 3.18) will focus on attracting a diversity of shops and restaurants that will spill out onto its urban streets, keeping the community active and engaged throughout the day. The retail space is planned to be located on the ground floor of mixed-use buildings in order to create a lively streetscape and a true live-work-shop-play environment. The retail program could include restaurants, coffee shops and cafes, as well as entertainment spaces, a grocery store and pharmacy, and convenient amenity stores and services such as banks, clothing stores, cleaners, hair and nail salons, bicycle shops, veterinary, pet store and other uses.

The Project Site is expected to attract a mixture of tenants, including existing local restaurants and businesses to cultivate a vibrant retail atmosphere for the community, which will not only serve on-site residents and users, but also surrounding neighborhoods and will augment demand for existing retail and restaurants in the surrounding neighborhoods. The Proponent is committing to providing 10% of the

retail space to local businesses in East Boston and Revere at favorable lease terms. The goal is to integrate the local business community into the Suffolk Downs redevelopment. In addition, if the Project Site is selected by Amazon as the future location of its second North American headquarters, for Amazon's location, Amazon will have the opportunity to include its retail stores and concepts within these on-site retail districts, providing outlets such as Amazon Go, Whole Foods, and Amazon Books.

The Master Plan Project will embrace Greater Boston's active and healthy lifestyle by also including fitness facilities and specialty gyms (i.e. rock climbing, cycling) in addition to the two on-site 1+-mile long publicly-accessible walking and biking loops that will link the open space network promoting unique opportunities for health and wellness. The design strives to create unique opportunities for neighborhood scale retail, including local and small businesses, as well as startups and incubators.

3.6.4 Residential

Up to 10,000 housing units of a variety of unit types and sizes are proposed as part of the Master Plan Project. Units will be designed to attract a wide variety of residents, from families to empty nesters, younger workers, including recent graduates, and multi-generational households. The residential buildings will be interspersed with the commercial buildings ensuring vibrancy throughout the Project Site and creating several new neighborhoods on the Project Site.

3.6.5 Commercial

The commercial component of the Master Plan Project is proposed to accommodate significant commercial uses, including, if applicable, Amazon's entire eight million square-foot HQ2 commercial office requirement (Program A). Commercial uses will be located on portions of the Project Site that include areas adjacent to the two existing MBTA Blue Line Stations, with such uses radiating through the Project Site along a network of new streets, neighborhood retail districts and open spaces.

Hotel

As part of the Master Plan Project a hotel program is proposed. This program is anticipated to include approximately 830 rooms at three proposed locations. These accommodations will support the office and residential uses for both business travelers and other visitors. The proposed hotel development parcels are strategically located at Beachmont Square with direct access to the MBTA Blue Line and Logan airport four stops away; at the north end of the Central Common with its intersections with the Main Street Retail Corridor; and at Route 1A with direct access to the regional highway network. The nearby innovative retail, restaurants, and entertainment planned as part of the Master Plan Project will appeal to visitors and provide ample entertainment during their stay.

3.6.6 Civic Spaces and Amenities

Key civic and public realm amenities will also be incorporated throughout the Master Plan Project, including the proposed public plazas at Belle Isle Square and Beachmont Square, a landscaped outdoor theatre, and several active and passive open space areas. In addition, street-level amenities will be encouraged, with local restaurants and on-site retail able to spill out onto adjacent sidewalks and open space areas.

The Master Plan Project will incorporate a wide variety of programmable spaces and civic amenities. Its public green open spaces and plazas will be designed to accommodate community events, such as farmers markets, music performances, environmental education programs, fitness classes and more. These programmed outdoor spaces will be further complemented by open fields for active recreation, dog runs and playgrounds for general use and enjoyment by families, young professionals, empty nesters and all the neighborhood's residents. Such spaces will offer opportunities for both active and passive recreation for all members of the community.

Particular attention will be paid to the design of buildings along the east side of the Main Street Retail Corridor, which also front onto the 15-acre Central Common. The facades of these buildings, as noted by one commenter, form the western edge of the Central Common open space, and as such will be designed as "front elevations" in keeping with their very public exposure and their importance in defining the public open space along with tree groves, the relation to green finger terminations, and community paths. Refer to Figure 3.21 for a rendering of the proposed civic node concept.

In addition, the Open Space plan provides a continuous community path "promenade" along this edge and six closely-spaced pedestrian and bicycle connections to the Main Street Retail Corridor District (two shared streets, two green fingers, and two direct sidewalk connections). This will ensure that the western edge of the Central Common will be very public in nature and interconnected with the larger open space system.

In addition to the generous public open space to be provided in the Master Plan Project, the Proponent is contemplating a modest meeting space for community use within the proposed Innovation Center and within the Belle Isle Square area.

The Proponent will work with the BPDA and the Revere Community Development Department to establish strong and lasting connections to surrounding existing public parks and open spaces, such as the Belle Isle Marsh and East Boston Greenway.

3.7 Urban Connections and Circulation

This section discusses the internal vehicular street network, pedestrian ways, facilities for cyclists, and the creation of memorable "landmarks" that aid in wayfinding for residents, tenants, employees, and visitors. Section, 3.5.1 above discusses the public open spaces proposed for the Master Plan Project. These two networks, circulation and open space, are deliberately and thoughtfully integrated with each other to create a vibrant, active, healthful, community and transit-oriented urban realm.

3.7.1 Access and Circulation

The layout of the development blocks and open spaces within the Master Plan Project has been designed to create a network of safe pedestrian and cycle routes through the Project Site. Pedestrian paths, as shown in Figure 3.22a, connect to both Suffolk Downs and Beachmont MBTA Blue Line stations, providing several recreational loops within the Project Site. For example, the multi-use trail through the Central Common connects via the green corridors to the north-south orientated Active Linear Corridor, which spans the Project Site from the boundary with Orient Heights north to Sales Creek. This roughly one-mile loop is paired with a second larger loop of approximately 1.5 miles, which extends from the Central Common to Tomasello Drive and back. These loops, as shown in Figure 3.22b, will be sign-posted to allow residents and office employees the chance to find and enjoy an approximately 20- to 45-minute walk with varying experience along the way.

Internal Roadway Network Design Approach

The Master Plan Project proposes a network of primary, secondary and tertiary vehicular streets designed to comply, both in Boston and Revere, with Boston's Complete Streets Guidelines. This network connects to "green fingers" that will be designed to act as part of the storm water strategy in addition to supporting the circulation and urban accessibility strategy as pedestrian-only active recreation zones, or the Active Linear Corridor. The following describes the internal roadway network elements. Figures 3.23a through 3.23m present cross-sections of these key internal connections.

- Primary access to the Master Plan Project is via Tomasello Drive, a two-way four lane arterial with a separate dedicated two-way cycle track and a frontage sidewalk on the developed "inner" side of the street; the opposite side of the street is an open space buffer against the oil tank farm. Tomasello Drive has no parking or building vehicular access, which is intended to allow arterial traffic to flow smoothly; it connects to the regional arterial system at Route 1A to the south and Revere Beach Parkway/Winthrop Street to the north. At two points along its length, where it crosses the Central Commons, it connects and provides access to the secondary street system. There are also four connections to the tertiary street network. At the northern end of Tomasello Drive a fifth lane is added for left turns onto Revere Beach Parkway, and a second sidewalk is provided in support of development on both sides of the street.
- Tomasello Drive has not been held in its original position and has been realigned and/or purposely shifted in several sections to improve the overall site layout plan while considering on-site wetlands. As noted above, Tomasello Drive best serves as the main arterial roadway through the Project Site and will be enhanced with sidewalks, a cycle track, and an added left turn lane at Winthrop Avenue to further enhance site access and circulation. Upon further study, it was concluded that no benefit accrued to the Master Plan Project from relocating this thoroughfare, and that its current configuration provides for first responder access to the adjacent tank farm, and serves to keep new development at a safe distance from that facility.

- The Main Street Retail Corridor and Parkway adjacent to the Central Common form the primary network of through streets with slower traffic and access to the lots and blocks via the secondary streets and service ways of the Master Plan Project. They serve as the primary means of entry into and out of the Project Site from the adjacent thoroughfares for vehicles and cyclists and allow for pedestrian connections to the central common, the Suffolk Downs and Beachmont MBTA Blue Line stations, and Sales Creek. Parking is provided for on these streets. The Parkway runs alongside the Central Common, generally from South to North; it is a primary landscape boulevard inspired by the Olmsted/DCR parkways found throughout Boston.
- The Parkway maintains a separated two-way cycle track, while Main Street has a bike lane on each side in the direction of traffic flow between parking and the sidewalk. The Parkway includes and embraces open space development while Main Street provides wider public sidewalks adjacent to continuous retail frontage by requiring building facades set back from the street ROW. The Main Street Retail Corridor continues north to Winthrop Street and the Beachmont station.
- The secondary street network consists of green fingers and neighborhood streets. Consistent with BTD guidelines these are generally two-lane two-way streets with bike lanes and parking. The green fingers provide a wide planted and landscaped open space on one side between the vehicular street and the sidewalk adjacent to the building – the open space serves as part of the storm water control system for retention and infiltration. Segregated bike lanes are provided on each side of the street. The neighborhood streets typically have parking on both sides and bicycle lanes on each side between the vehicle lanes and the parking.
- Service ways and service courts are provided where necessary and are designed to allow access for off-street parking and deliveries, as shown in Figure 3.25. These are not through-traffic streets, do not allow parking, and only allow motor vehicles for building access. Some do, however, provide an informal extension of the pedestrian and cycle networks.
- All streets function as accessory to the green infrastructure adding shaded tree canopy to reduce heat island effect, and providing storm water control through bioswales and storage/infiltration basins.
- All streets and ways are publicly accessible and are provided with features for the mobility impaired (crossing ramps and cane detectable warning areas); cross walks will be especially well-lighted to enhance pedestrian safety at night.
- An internal bus shuttle system consisting of two loops is proposed to provide connections to public transit (the two MBTA Blue Line Stations), as shown in Figure 3.24, for use by future residents, employees, and visitors of the Master Plan Project to reduce personal automobile use to access the Project Site.

Pedestrian Connections

Sidewalks are provided on all streets. The character and scale of sidewalks for pedestrians varies with street section and development or open space frontage – wider sidewalks are provided where there is higher foot traffic near the MBTA stations and

along the Main Street Retail Corridor. Minimum sidewalk width will conform to BTD's Complete Streets Guidelines.

There is a robust system of pedestrian connections and community paths throughout the site. The primary element of this system is the pedestrian-only Active Linear Corridor, which connects to the green spines and is designed as a series of active play and exercise areas accessible to pedestrians of all ages and abilities – it is a place of varied activities allowing both formal and informal recreation. The green spines will function to collect stormwater and utilize it to create lush green pedestrian-friendly routes within the Project Site.

Community paths will be laid out to provide physical accessibility for those using walkers, wheelchairs, strollers, and shopping carts. As with sidewalks on vehicular streets, all pedestrian ways and connections will be publicly accessible and provided with features for the mobility impaired (crossing ramps and cane detectable warning areas). Cross walks will be especially well-lighted to enhance pedestrian safety at night.

Refer to the completed BPDA Accessibility Checklist for the Master Plan Project in Appendix B.

Streetscape Design

As noted in the descriptions above, the street and pedestrian way systems meet BTD's Complete Streets Guidelines as follows:

- **Multimodal** – all vehicular streets and ways also safely and adequately provide for all other modes of movement, are well-connected to the regional highway network, the public transit system, and regional bikeways. Space will be provided for Bluebikes and secure attractive bike racks and hitching posts will be provided at destination open spaces, retail areas, MBTA station plazas, and along the active linear corridor.
- **Green** – streets and pedestrian ways will be provided with tree canopy, under-story planting and where appropriate ground cover, bioswales, permeable paving, and low-energy-demand lighting with no sky-directed luminance. Tree canopy species will be differentiated by neighborhood to add variety and legibility to the Master Plan Project street system. The Parkway, community paths, and green fingers, provide enhanced storm water retention and management.
- **Smart** – bike share, bike repair, and ride share designated pick-up/drop-off spots will be provided. Electronic signage will be provided within Belle Isle and Beachmont Squares showing the expected time of arrival of MBTA Blue Line trains and busses. Provisions will be made for parking and charging of electric vehicles. Where traffic signals are required they will be traffic and demand sensing and networked.

3.7.2 Bicycle Connections and Facilities

As noted above all vehicular streets will have bike lanes. As shown on Figure 3.27, there will be segregated two-way cycle tracks on primary streets and The Parkway, separated

one-way tracks on the secondary streets, and on-street bike lanes on tertiary streets. The community paths will be separate from the two-way cycle tracks.

All buildings will provide off-street indoor cycle storage in numbers proportionate to population in conformance with BTD and City of Revere guidance. The retail district, destination open spaces, the active linear corridor and the MBTA station squares will be provided with outdoor, secure bike racks and hitching posts. Simple robust bike repair stations providing a manual air pump, wrenches, and a bike vise will be provided at strategic locations. The Proponent will endeavor to attract a bicycle shop for the sale of bikes, parts and accessories, to the retail space.

3.7.3 Landmarks and Wayfinding

On a broad scale, long distance views of memorable architectural form, retail signage, landmarks and plazas aid in finding one's way around. Figure 3.28 indicates points and vistas where building design or permanent monuments can provide for enhanced wayfinding.

At the finer scale of secondary and neighborhood streets and ways, legible street signs, address numbers, neighborhood identity signage, and street-scaled monuments will aid in "mental-mapping" or imaging of the Master Plan Project. Artifacts from the racecourse such as the distance marker poles are anticipated to be refurbished and re-used at strategic points in the urban fabric and open space.

Mentioned above are two pedestrian-level wayfinding aids: a signage system for the pedestrian loops, and signage indicating, with real-time electronic readout, destination and expected time of arrival for buses and trains at nearby stations and stops. These signs will also include clear maps and directional arrows showing the direction to the MBTA stations and bus stops.

3.8 Master Plan Height and Massing

The height and massing strategy for the Master Plan Project has been developed keeping in mind the scale of adjacent neighborhoods and transitions, to allow for access to sunlight to public spaces, creating appropriately scaled development and maximizing views to all developments. While the overall height strategy is influenced by various factors, including FAA height limits, the massing of each building will be carefully crafted to achieve the above goals (Figure 2.1).

The Project Site has been categorized into a series of distinct neighborhoods that offer a varying character, including based on the arrangement of buildings, height, and massing, and which contemplate buffer and transition zones in certain areas adjacent to existing neighborhoods (Figure 3.8). The new Belle Isle Square neighborhood, which is adjacent to the existing Orient heights neighborhood, starts with a townhouse zone that is limited to 50' in height. After this transition zone, the adjacent Belle Isle Square neighborhood and adjacent residential buildings are limited to 125 feet height, a height limit that is based in part on its proximity to Logan airport. The land within the Project Site is beneath an approach to Logan Airport, which limits heights, particularly at the

southern end of the Project Site. Moving north, building heights are allowed to increase under FAA guidelines. This allows for the buildings in the middle portion of the Project Site and northern portion of the Project Site to be higher. However, in the areas along Winthrop Avenue and Washburn Avenue in Revere a series of building setbacks and height setbacks have been incorporated into the SDOD zoning, to bring down the scale of the buildings and to transition back into the Beachmont neighborhood. These two areas have been given consideration, resulting in changes, in response to comments.

3.8.1 Transition from Orient Heights

Since the Master Plan Project shares a border with the existing Orient Heights neighborhood, special care has been taken in the planning of this edge adjacent to Waldemar Avenue. As requested by the BDPA, an alternative design was developed, as outlined in project changes, as described in Section 3.3 above. Four major changes have been made to improve the transition between existing Orient Heights and the Master Plan Project. Evaluating topography, land use, building massing, and design to create a harmonious transition between the new and existing neighborhoods has resulted in an alternative approach that is further explained below. Refer to Figure 3.29 for a circulation plan for the area of the Master Plan Project adjacent to Orients Heights.

The first change is to Belle Isle Square itself. As shown inn Figures 3.30a, the previous square was simply defined by larger residential buildings and was the width of a street with the buildings closest to the Suffolk Downs MBTA Station close to the existing Orient Heights neighborhood. These buildings have now been pulled back and a wide landscape buffer with a community path and townhomes have been added in between the Belle Isle Square buildings and the adjacent Orient Heights neighborhood.

The second change is the addition of an approximately 0.6-acre publicly-accessible neighborhood park at the junction of Waldemar Avenue (shown in Figure 3.30b) and the Active Linear Corridor adjacent to the Orient Heights neighborhood (shown Figure 3.30c). While providing a new park that can be used by residents of the existing neighborhood, this will also be a natural gateway to the new neighborhoods of the Master Plan Project.

The third change is to add a row of townhomes on the Project Site along Waldemar Avenue west of the new neighborhood park and east of Crestway Road and west of the community open space. Today this stretch of Waldemar Avenue has residential development on its south side and the currently-existing Suffolk Downs surface parking lots on the north side. The addition of new townhomes which front on Waldemar Avenue aims to “complete the street” so that Waldemar Avenue has homes on both sides of the street. Behind the rear yards of these new town homes, there will also be a community path that will allow further buffer to the larger residential buildings set beyond the community path.

The fourth change was the re-massing of several residential buildings which sit behind the townhomes and community path and the residential buildings that are across from the BHA housing development. More of these buildings now include stepping elements towards the Orient Heights neighborhood to further transition height. Also, the higher

elements of these buildings have been more oriented north south to further mitigate impacts. Also, along the BHA housing development, given the taller BHA Housing and higher grade at Waldemar Avenue, the Master Plan Project proposes residential buildings with stepped down podiums that seek to better engage Waldemar Avenue and form a better transition with the BHA housing scale. Refer to Figures 3.31a through 3.31e for sections of the Orient Heights edge and Figures 3.32 through 3.36 show view perspectives.

3.8.2 Height and Massing in Revere

The City of Revere has approved new zoning for the Revere portion of the Project Site, pursuant to the SDOD zoning, which specifically defines the allowed heights for the Revere portion of the Project Site (Figure 2.1) The heights are within FAA height limits, and the limitations also provide for careful transition zones back to adjacent areas of Winthrop Avenue, Beachmont Square and Washburn Avenue (Figure 2.1). Included within the SDOD zoning are building setback areas both on Winthrop Avenue (20-foot building setback/zero height) and Washburn Avenue (30-foot building set back/zero height). Winthrop Avenue utilizes this space to provide a planting strip, two-way cycle track and a sidewalk.

Along Washburn Avenue, the 30-foot setback is utilized as a dense landscape buffer given the residential nature of Washburn Avenue. In addition to the building setbacks a series of height setbacks are incorporated to tier the buildings providing a further height transition to the existing adjacent areas of the Beachmont neighborhood. This setback and the stepped transition are intended to provide for light and air to the existing properties on the east side of Washburn and north side of Winthrop Avenue. In addition, the Beachmont Square open space area is incorporated at the intersection of Winthrop and Washburn providing a large public plaza with the adjacent low-rise Innovation Center further transitioning the scale of other portions of the Project Site as it approaches the Beachmont MBTA Blue Line Station.

3.9 Open Space and Landscaping

The Master Plan Project allows the opportunity for ecological planning and for the Proponent, the community and the cities of Boston and Revere to work together to find a balance between the natural and built environments. This opportunity will allow the creation of multi-functional open spaces that provide relaxing and restorative places to walk, run and recreate right outside one's front door while also providing urban habitats, mitigating climate change impacts and managing storm water. Access to the outdoors encourages community members to lead active and healthy lifestyles while also engaging them in their larger, natural environments.

Key open spaces within the development will include:

- An approximately 15-acre central common.
- A landscaped outdoor theatre.
- Public plazas.

- Passive and active recreational areas.
- Playgrounds, dog runs and several neighborhood-scale open spaces.

The new approximately 40-acre open space network will incorporate existing wetland features on the Project Site and will seek to provide connections via community paths to Revere Beach, Belle Isle Marsh, the East Boston Greenway and other nearby open spaces. The vibrant publicly-accessible open space, plazas, and recreation spaces provided in this new development will therefore attract and benefit not just on-site users, but also those from nearby neighborhoods and the wider community.

Furthermore, the Master Plan Project will be integrated into the local urban fabric through a robust bicycle network and walkable neighborhood streets. The Master Plan Project will include a welcoming and well-designed bicycle and pedestrian system to encourage sustainable modes of transportation, promote health and wellness and enhance social interactions and idea sharing within this one-of-a-kind mixed-use community. The Master Plan Project will also include Boston and Revere bike sharing stations, connecting cyclists to destinations within the community and beyond.

3.9.1 Regional Connectivity

The network of outdoor publicly accessible open spaces is configured to connect with regional assets and link to existing public corridors and open spaces. The proposed open space plan aims to connect to the neighboring natural assets of Revere Beach. Constitution Beach, the Outer Harbor, and Belle Isle Marsh via a system of community paths. Further, the publicly accessible open space is designed with future connections in mind, considering trails that link from the East Boston Greenway to Revere, and providing connections to proposed greenways along Bennington Street and over Route 1A to the Chelsea River waterfront.

The public realm encourages multi-modal transportation and easy connection to the broader city with the open space, pedestrian, and bicycle networks of the Master Plan Project linking to the MBTA Blue Line stations at Suffolk Downs and Beachmont. The entry connections from the MBTA Blue Line Stations through the public plazas proposed at Belle Isle and Beachmont Squares will be inviting and safe with a clear identity defined through area lighting, including LED pole lights, vegetation, paving and furnishings, such as bike racks and seating. Generous pedestrian zones will allow for easy flow into and out of the Project Site and will be designed to be ADA-compliant. Pedestrian zone paving materials are anticipated to include a mix of concrete, bituminous, and/or stone pavers. Signage will be integrated into the landscape, enhancing both the visual identity of these key entry points into the Project Site and the pedestrian wayfinding experience. Vegetation will be used to create clear visual access beyond the entry, and to provide shade and moments of rest and/or small gathering and meeting places.

As discussed in further detail in Section 6.8.3 of Chapter 6, *Transportation*, the Master Plan Project will also include bike share stations and connections to off-site planned bicycle accommodations connecting cyclists to destinations within the community and beyond.

3.9.2 Open Space Programming

As shown in Figure 3.37, the public realm is programmed to support a variety of activities that reflect the diversity of future users and to create equitable and accessible public spaces. Outdoor space for active use is scattered throughout the Project Site, including open fields for active recreation, exercise, and active play for all ages. Additionally, there are areas for passive use throughout the Project Site allowing for sitting, strolling, and relaxing while supporting local ecology. The diverse programming and activation strategies cater to the surrounding community, as well as the broader Cities of Boston and Revere, bringing spaces to life in different ways across all 12 months of the year. The public realm offerings are designed to be flexible to accommodate everyday uses and a changing array of events and activities, appealing to diverse populations and the needs for a variety of social interactions.

Active Recreation

- **Central Common –** the 15-acre Central Common, as shown in Figure 3.38, will host a variety of active uses. This includes a flexible approximately 2-acre open playing field able to accommodate active uses at the scale of full-size soccer field. (Figure 3.24). A promenade along its western edge is interspersed with orchard groves and located adjacent to outdoor eating areas and active retail frontages. Seasonal activities include summer picnic tables, outdoor exercise areas for yoga or free play, winter skating on the Horseshoe Pond and sledding. The Civic Node adjacent to the Horseshoe Pond provides a community gathering space and event area.
- **Active Linear Corridor** – spanning from Orient Heights across neighborhoods to the northern edge of Sales Creek, the Active Linear Corridor, as shown in Figure 3.39, integrates active play throughout the Project Site. This community space includes traditional children's playgrounds and jungle gyms, and spaces geared toward other ages such as climbing areas, and ping pong. Creative and flexible spaces encourage a variety of active appropriation with mounds and turf for a variety of play.
- **Small play spaces** – dispersed throughout the larger site are smaller pockets dedicated to active play. Areas along the Green Fingers and Sales Creek are tailored to encourage informal playful use of the space.
- **Waldemar Avenue Neighborhood Park** – A new neighborhood park has been created directly on Waldemar Avenue. This open space element will open to and be part of the Orient Heights neighborhood and the public for gathering and play. This public open space also sits directly adjacent to the Active Linear Corridor.

Civic Spaces

- **Landscaped Outdoor Theater** – this area provides a distinct public amenity with stepped seating that can accommodate a variety of events. As shown in Figure 3.40, this area can be used for casual gathering and for curated events with steps allowing for larger audiences to view programmed cultural performances, experience interactive art installations, and engage in other community events.

- **Civic Node** – a public plaza and open space gathering area will front on the Horseshoe Pond, creating a new civic node within the Central Common. The area provides an active connection between the bustling retail street across the Central Common to Belle Isle Square and the Suffolk Downs MBTA Blue Line station.
- **Belle Isle Square** – this community and retail public promenade serves to connect and activate the area between the Suffolk Downs MBTA Blue Line station and the Central Common. A pedestrian bridge acts as a gateway from the T Stop to the neighborhood, leading visitors and locals to the square with its food kiosks, restaurants, and community spaces.
- **Beachmont Square** – an open space linking the Beachmont MBTA Blue Line station with the retail center of the new development. The Square provides a community gathering space and is integrated with retail offerings in a mixed residential and innovation/commercial neighborhood.

Passive Recreation and/or Environmental Restoration/Benefit

- **Sales Creek and Horseshoe Pond** – these areas will be retained and enhanced to allow for greater public interface with these natural elements. As shown in Figure 3.41, trails along Sales Creek support passive strolls and paths around the Horseshoe Pond provide areas for overlooking the pond. The design protects the ecology and preserves its function as a wetland buffer.
- **Landscaped Outdoor Theater** – though this is primarily a civic space activated by community gathering and performances (as referenced above), the outdoor theater also provides space for passive appreciation of nature, with steps bringing residents and visitors closer to the stormwater basin.
- **Green Finger Promenades** – these linear open spaces cut across neighborhoods, as illustrated in Figure 3.42, will provide access to passive walking and biking trails and bringing people closer to green infrastructure that protects against flooding.
- **Mid-Block Passageways** – these cross-block passageways are designed as primarily pedestrian zones with occasional vehicular access for building services and events.

Public Space Needs Analysis

The Master Plan Project builds on Boston's legacy of iconic publicly accessible open spaces by providing a significant new open space network for the benefit of residents and other users of the new development and surrounding neighborhoods. Access to quality open space varies across Boston and Revere, and is low in the neighborhoods adjacent to the Project Site. As requested by the Boston Parks and Recreation Department in their comment letter on the EENF/EPNF (dated February 2, 2018), an open space needs analysis has been conducted. Within the adjacent East Boston neighborhood of Orient Heights there are currently only 1.31 acres of open space suitable for active recreation per 1,000 residents, which is far below the overall Boston city average of 3.24 acres per 1,000 residents. The Master Plan Project will introduce up to approximately 15,000 new residents to the area resulting in a ratio of 2.79 acres of usable open space for active and passive recreation per 1,000 residents. Including

inaccessible natural resource areas to remain/be enhanced, the open space ratio for the Project reaches 3.51 acres of open space per 1,000 residents. By providing more publicly-accessible open space in East Boston, the Masterplan Project will contribute towards the goals of *Imagine Boston 2030* to improve open space accessibility and towards the Trust for Public Land's campaign to ensure all residents live within a 10-minute walk of publicly accessible open space, a campaign that's supported by Mayor Walsh. Significantly, all the new open space proposed as part of the Master Plan Project will be constructed and maintained with private funds, ensuring that the new open spaces will not create additional burdens on limited municipal and state open space budgets.

The same standards for accessible, well-planned public open space will apply equally in the Revere portion of the Project Site as in Boston.

3.9.3 Green Infrastructure and Resiliency

Resiliency is a core component of the Master Plan Project's strength and success. Given the Project Site's proximity to wetlands and Boston Inner Harbor via both the Chelsea River estuary and Belle Isle Marsh, special attention has been paid to stormwater management as well as sea level rise (as addressed in further detail in Chapter 8, *Climate Change Resiliency*). Innovative landscape strategies will be used to collect and recycle rain water. Landscape features are also used to support connectivity and promote active and sustainable lifestyles. Similarly, sustainable architectural design strategies will be used to prepare buildings and public spaces for the possibility of rising waters.

Designed to Accommodate Flooding

The coastal inundation and storm water strategy on-site is a core aspect of the landscape approach. As shown in Figure 3.43, stormwater is collected throughout the Master Plan Project and within the Central Common and is utilized to help with irrigation needs within the central common and the interior streetscapes.

The Central Common incorporates existing low points within it, naturally taking on excess precipitation or coastal flooding water as needed. During storm events, the areas around Sales Creek and Horseshoe Pond can accommodate increased storm water, becoming temporarily flooded. Additionally, the outdoor theater is designed to accommodate storm water in addition to its function as social infrastructure (Figures 3.44a and 3.44b). The Green Fingers also play a role in the family of water infrastructure, providing rain water run-off storage during storm events. Protected wetland buffers along the eastern edge of the site and nearby to the Chelsea River provide storm water capacity that is hydrologically disconnected from the central common water system.

A robust tree canopy will be created within the Central Common and streetscapes throughout the Project Site, serving many functions including aiding in storm water management. Street trees play an important role in capturing rain as it falls and collecting runoff from streets, sidewalks, and other paved areas. Through storm water capture the trees divert water from the city's storm drainage system and reduce storm

drain overflows. As an agent of phytoremediation, trees help to cleanse water, soil, and sediments of contaminants. Street trees help to maintain groundwater levels, recharging storm water rather than directing runoff to pipes.

The network of open space, with several larger open spaces, a system of smaller open spaces, and planted areas along streets and walkways, allows for increased stormwater absorption. This green infrastructure reduces flooding risk and stress on the city's water systems and supports the social benefits of open space while integrating resilient solutions into the design.

Designed to Mitigate Increased Temperatures/Heat Island Effect

The open spaces throughout the Project Site, including the network of linear and smaller open spaces and existing natural features all serve to mitigate high temperatures. The urban canopy improves thermal comfort though shade and cools the air through transpiration. Vegetated and tree-covered areas are distributed across the site, to induce cooling effects throughout the project.

The impact of paving type on the heat island effect will be considered with public realm paving and sidewalks by specifying materials with less heat absorbing capacity. Materials will be selected with a minimum Solar Reflective Index to offset the effects of increasingly hot summers.

3.9.4 Urban Forest Strategy

As shown in Figure 3.45, a significant number of trees are proposed to create an "urban forest" as part of the Master Plan Project. These plantings will play a key role in placemaking, defining the character of the streets and public places. The street trees will help to define the four neighborhoods, with a distinct palette of trees proposed for each distinct area, i.e., Belle Isle District, Beachmont, the Main Street Retail Corridor, and the Panhandle. The neighborhood of Belle Isle reflects its proximity to Belle Isle Marsh by primarily featuring trees found in coastal marshes. In Beachmont distinctive trees will be selected to give the area a unique and identifiable character. There will be a differentiated palette of elegant blooming street trees along Main Street. To the west, the Pan Handle consists of street trees reflecting the character of the neighboring Orient Heights. Spanning across the neighborhoods is the Parkway defined by large and bold specimen trees lining the boulevard. Additionally, Tomasello Drive will contain trees associated with regional upland forests.

Open spaces contain an additional assortment of trees with the Central Common and Green Fingers containing a mix of upland and lowland tree species. A promenade of flowering trees follows the edge of the Central Common and features groves with adjacent picnic areas. Vibrant seasonal effects are positioned throughout the central common, active linear corridor, and other open spaces using a variety of flowering plants, or plant material with differing and changing leaf color to provide visual interest.

Plant materials have been chosen to include diversity and a range of qualities adaptive to changing climate conditions. These include coastally adapted and salt tolerant species, drought tolerant and water tolerant species, as well as species resistant to pest

damage. The majority of species are native and no species chosen are known aggressive invasives. The specific locations chosen for trees will be considered relative to their unique adaptive qualities.

Throughout the Master Plan Project street trees enhance the comfort and beauty of the streets and public spaces providing environmental, psychological, and social benefits helping to connect the community with nature and restore a sense of calm.

3.9.5 Historic Interpretation

The Proponent recognizes the historic nature of the racetrack facility at Suffolk Downs and its significance to Boston, Revere, and the region. The Master Plan Project is considering measures to incorporate elements of the history of the thoroughbred racing complex into portions of the proposed open space network, including:

- Identifying certain race track elements that could be reused within the on-site open space system and/or potential donation to local museums, such as the race track endpoint marker; horsehead flagpole bases and flagpoles; and starting gate, among other items.
- Creating an archive featuring photographs, documents, paintings, and other collected horse racing memorabilia.
- Establishing an interpretive exhibit in a select area of the open space system.

An inventory will be undertaken to identify race track elements that could be reused within the on-site open space system and/or potential donation to local museums. Refer to Section 11.5 of Chapter 11, *Historic Resources*, for further details on potential mitigation related to historic resources.

3.9.6 Open Space Phasing

Development of the publicly accessible open space will be coordinated with development of buildings within each phase, with open space to make up at least 25% of the total land area that has been redeveloped upon completion of each phase. This approach to development of the Master Plan Project is consistent with the SDOD that has been adopted for the Revere portion of the Project Site. Figure 3.46 presents the conceptual open space phasing plan, which is further detailed in Table 3-1 below.

Table 3-1 Description of Conceptual Open Space Plan by Phase

Development Phase	Open Space Element
Phase 1-B	Belle Isle Square public plaza Horseshoe Pond landscaped wetland enhancements • **Resiliency Benefit:** To provide enhanced flood protection, with increased stormwater absorption capacity. Public promenade connecting the Suffolk Downs T Stop and the Central Common New community path parallel to Waldemar Avenue First segment of a landscaped wetland buffer along the eastern boundary of the Project Site.
Phase 1-R	Beachmont Square public plaza New connection to the MBTA Beachmont Blue Line Station A Green Finger connecting to the Landscaped Outdoor Theater and Sales Creek A portion of the cycle track and landscape enhancements along Winthrop Avenue A portion of the wetland buffer along Washburn Avenue
Phase 2-B	Significant build-out of the Central Common • **Resiliency Benefit:** The Central Common sits at a low point within the masterplan and takes on excess water as needed. The landscaped wetland buffer also accommodates increased stormwater absorption capacity. Waldemar Avenue Neighborhood Park A portion of the Active Linear Corridor A segment of the Green Finger along Park Drive A portion of the wetland buffer along the eastern boundary of the site connecting Phases 1-B and 1-R
Phase 2-R	Outdoor Performance Theatre The portion of the Central Common along Sales Creek • **Resiliency Benefit:** Adds flood capacity with the addition of the sunken outdoor theater and low points within the Central Common that accommodate excess flooding. The landscaped wetland buffer provides enhanced flood protection, with increased stormwater absorption capacity.
Phase 3-B	Major portions of the two additional Green Fingers • **Resiliency Benefit:** Provide water storage during storm events. A segment of the Active Linear Corridor
Phase 3-R	Continuation of the Sales Creek enhancements, including pedestrian pathways and enhancements to vegetation.

Development Phase	Open Space Element
	• **Resiliency Benefit:** Sales Creek can take on excess precipitation or coastal flooding water as needed.
Phase 4-B	Enhancements to the wetland buffer along Tomasello Drive • **Resiliency Benefit:** The landscaped wetland buffer provides enhanced flood protection. Segments of the Green Fingers • **Resiliency Benefit:** Provide water storage during storm events.
Phase 4-R	The upper portion of the Active Linear Park Enhancements along a segment of Sales Creek • **Resiliency Benefit:** Basic flood resiliency measures common to all public realm elements are incorporated; however, no significant stormwater capacity is added in this phase.
Phase 5-B	Completion of wetland buffer enhancements along Tomasello Drive • **Resiliency Benefit:** The landscaped wetland buffer provides enhanced flood protection, with increased stormwater absorption capacity.

Note: Phasing of buildings and associated open space is subject to adjustment based on various factors, including market conditions. Streetscape improvements will be provided in all phases. In addition, flood resiliency measures will be incorporated within each open space addition.



Figure 3.1
Urban Context

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

Figure 3.2
Illustrative Site Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

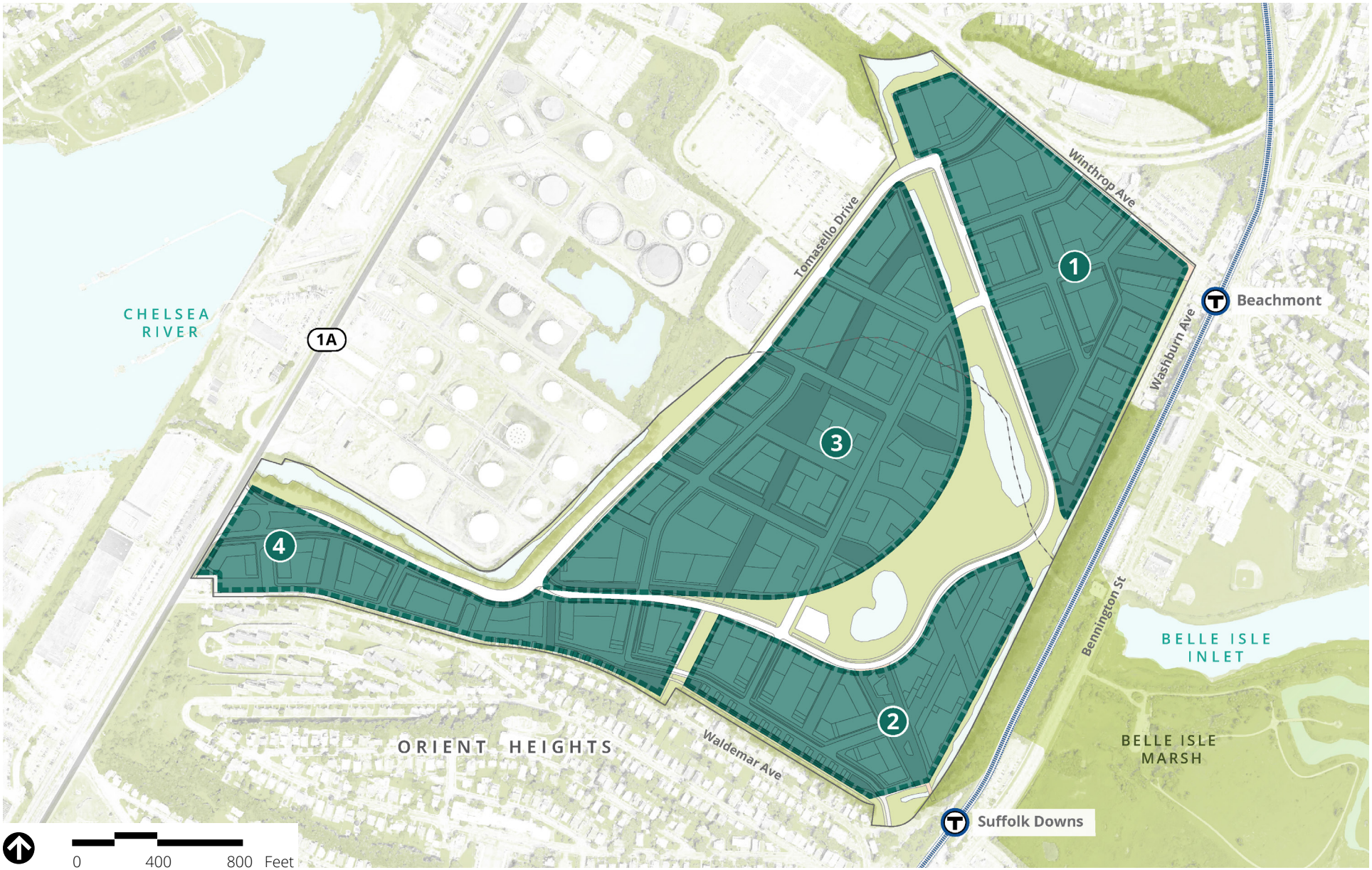


Source: cbt

Figure 3.3
Open Space Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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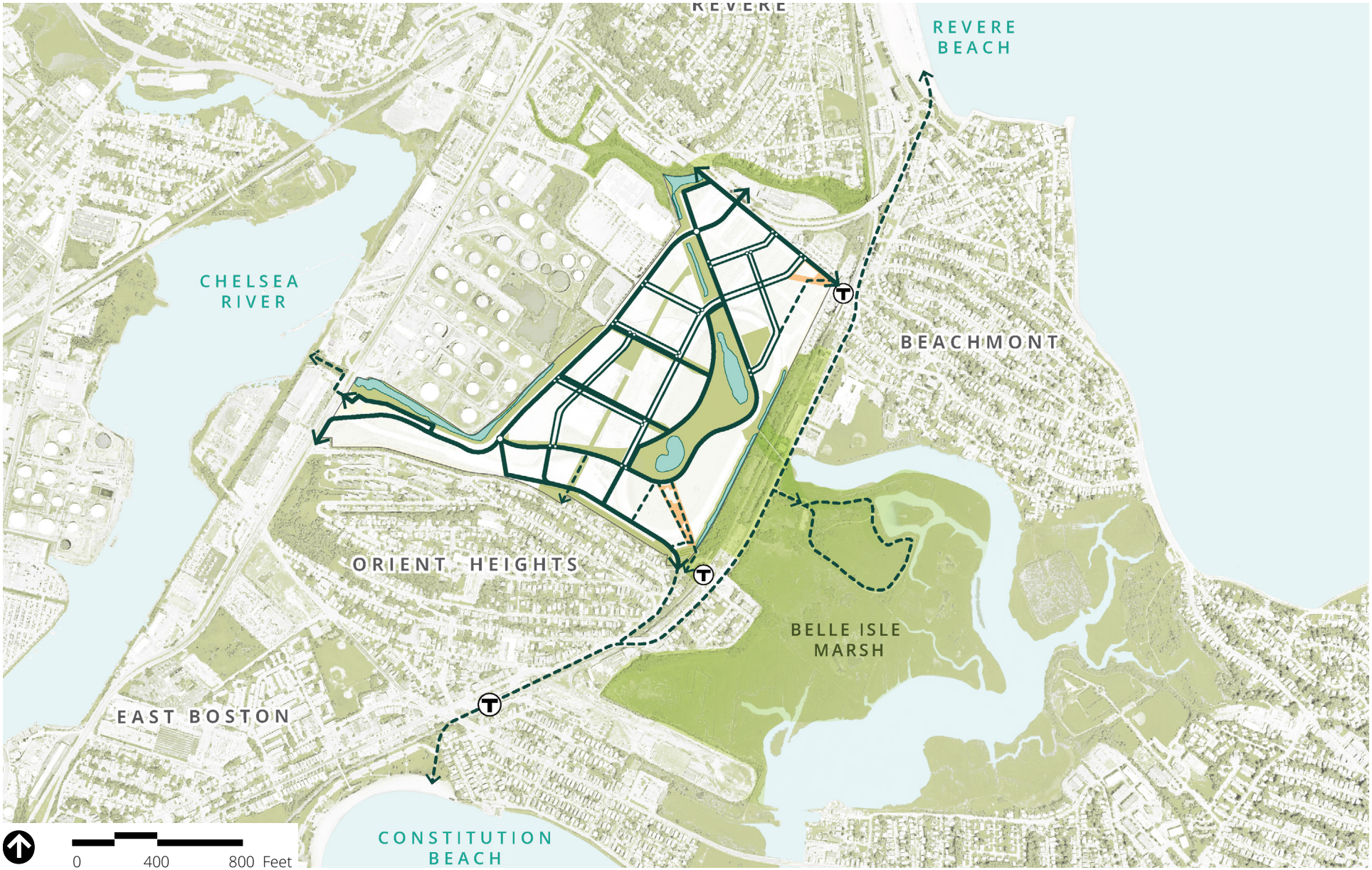
Source: cbt

1. Beachmont Square Neighborhood
2. Belle Isle Square Neighborhood
3. Main Street District Neighborhood
4. Panhandle Neighborhood

Figure 3.4
Distinct Neighborhoods

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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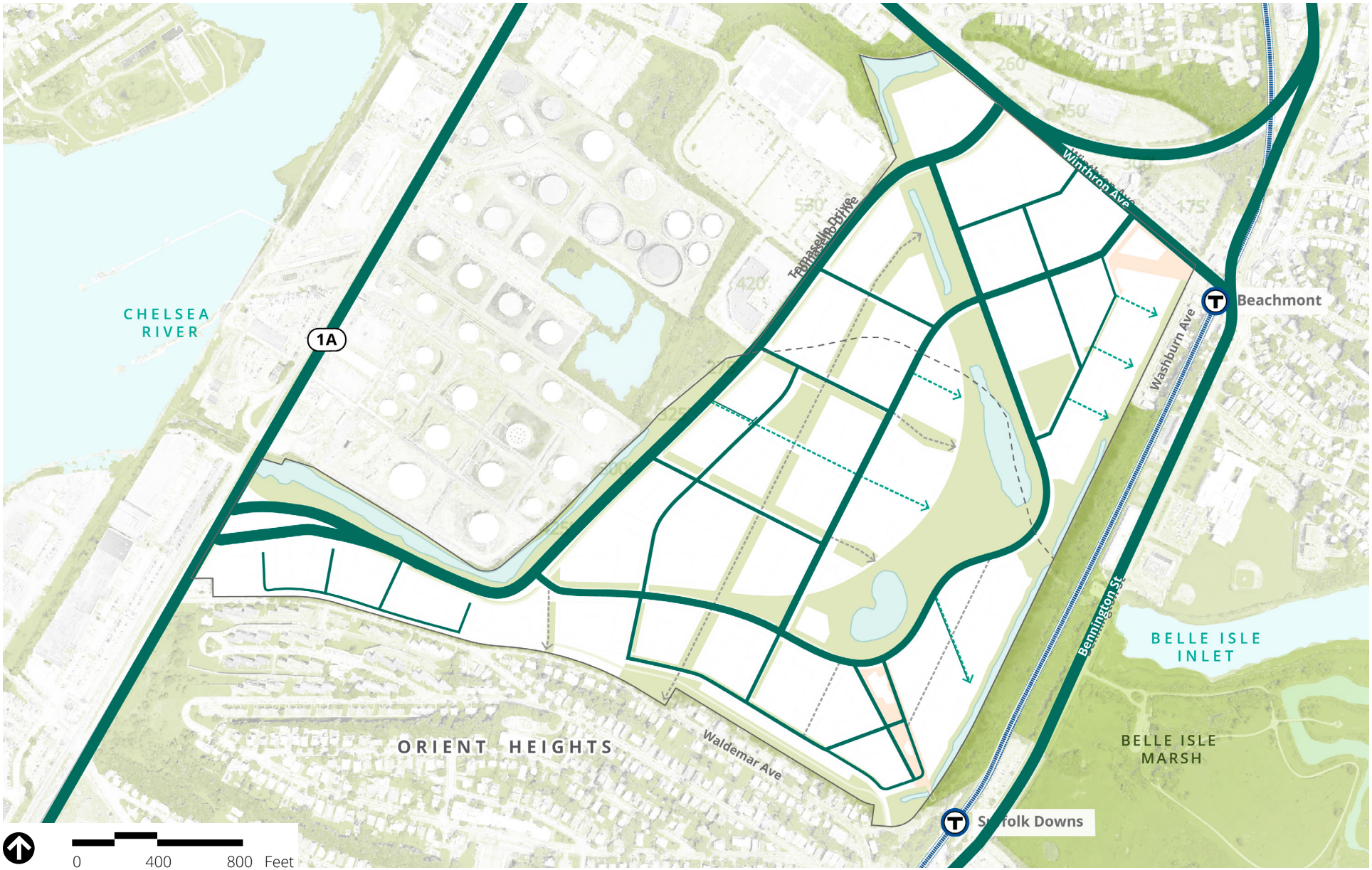
State Highway 1A
Revere Beach Parkway
Waldemar Ave

MBTA Blue Line Stations
Belle Isle Marsh
Potential Connection to Chelsea Creek Waterfront

Figure 3.5
Connections to existing Assets

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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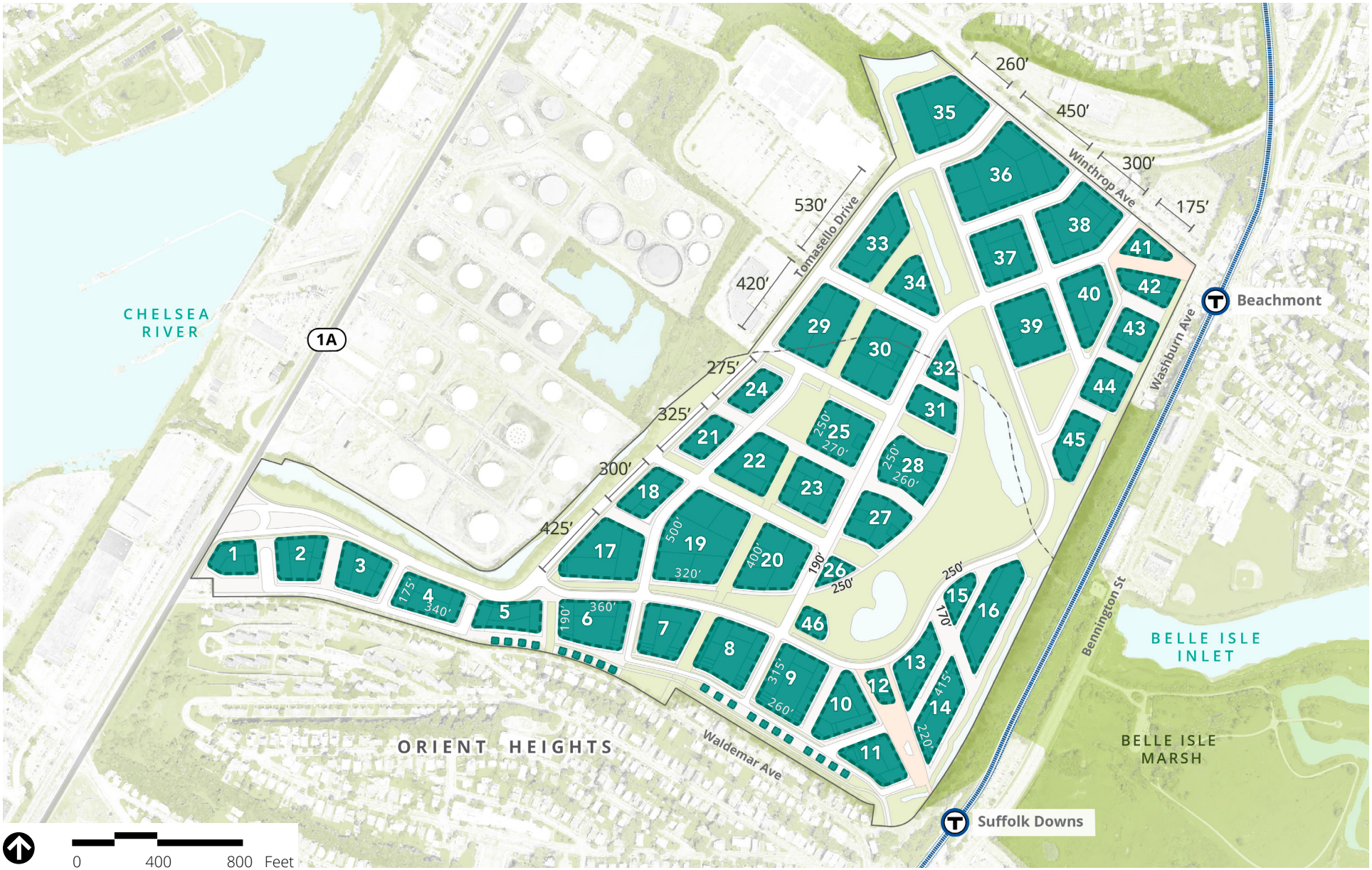
Source: cbt

Vehicular Thoroughfare
Primary Street
Secondary Street
Shared Street (Service)
Pedestrian Only Walkways

Figure 3.6
Street Hierarchy

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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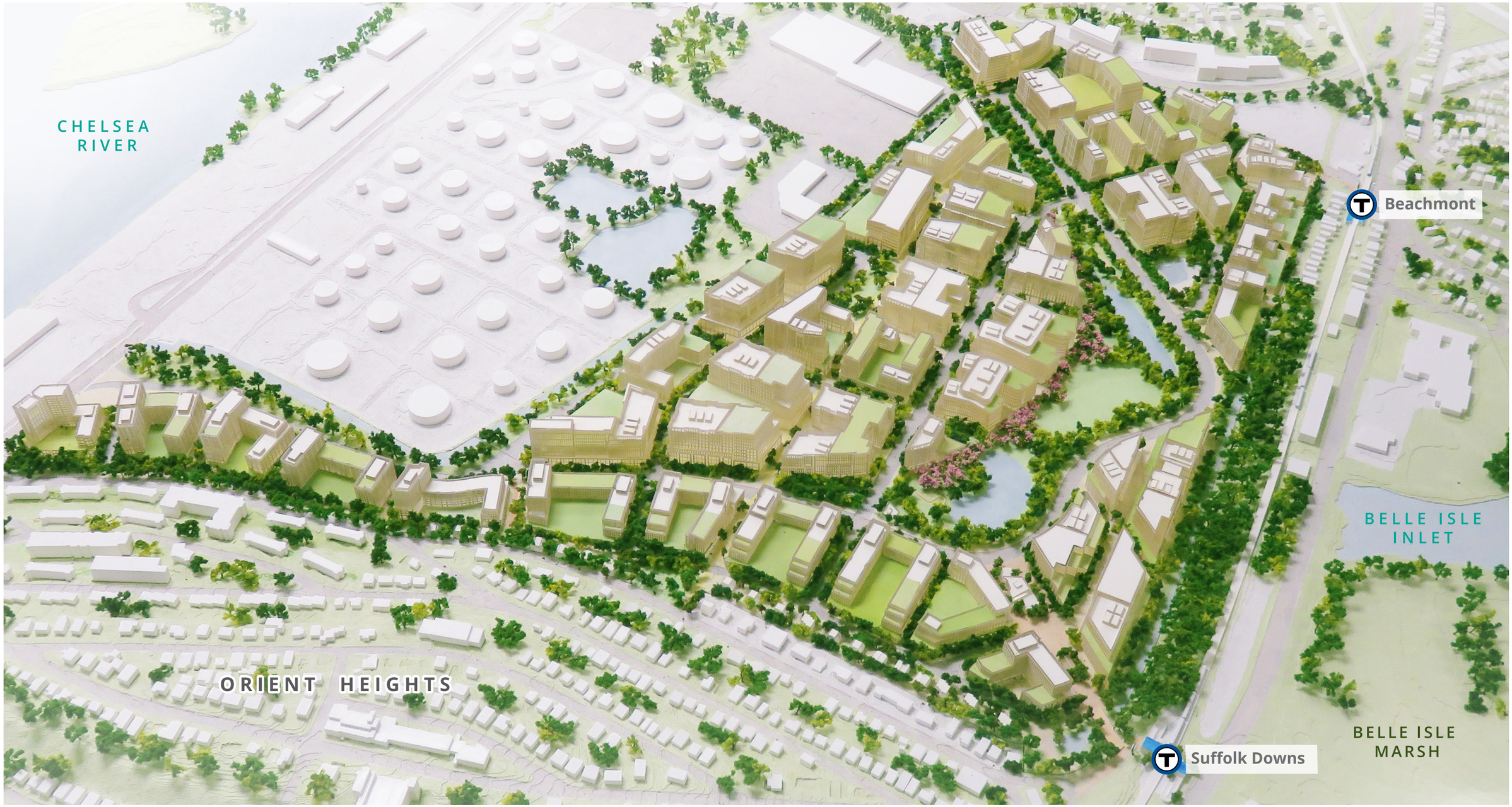


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XX Block number

Figure 3.7
Block Morphology

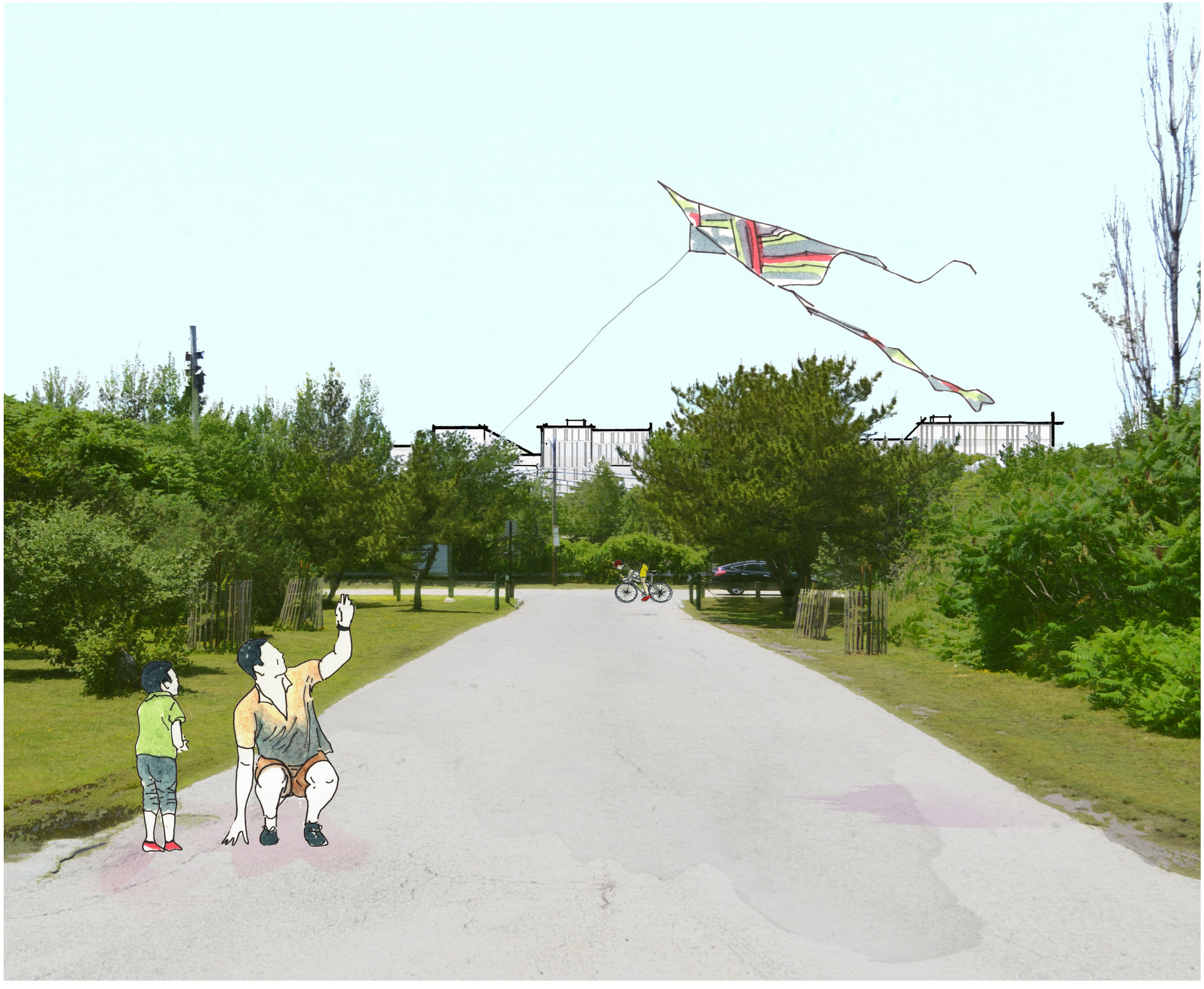
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

Figure 3.8
Building Massing Strategy

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

Belle Isle Marsh Reservation turn around
198-146 Bennington St, Revere, MA 02151



Source: cbt

Figure 3.9
Perspective from Belle Isle Marsh

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





75 Liberty Wharf, Boston, MA CREDIT: PATRICK AHEARN ARCHITECT LLC



Downtown Fort Worth CREDIT: BETH DREYER



Pitt Street Mall, Sydney CREDIT: TONY CARO ARCHITECTURE



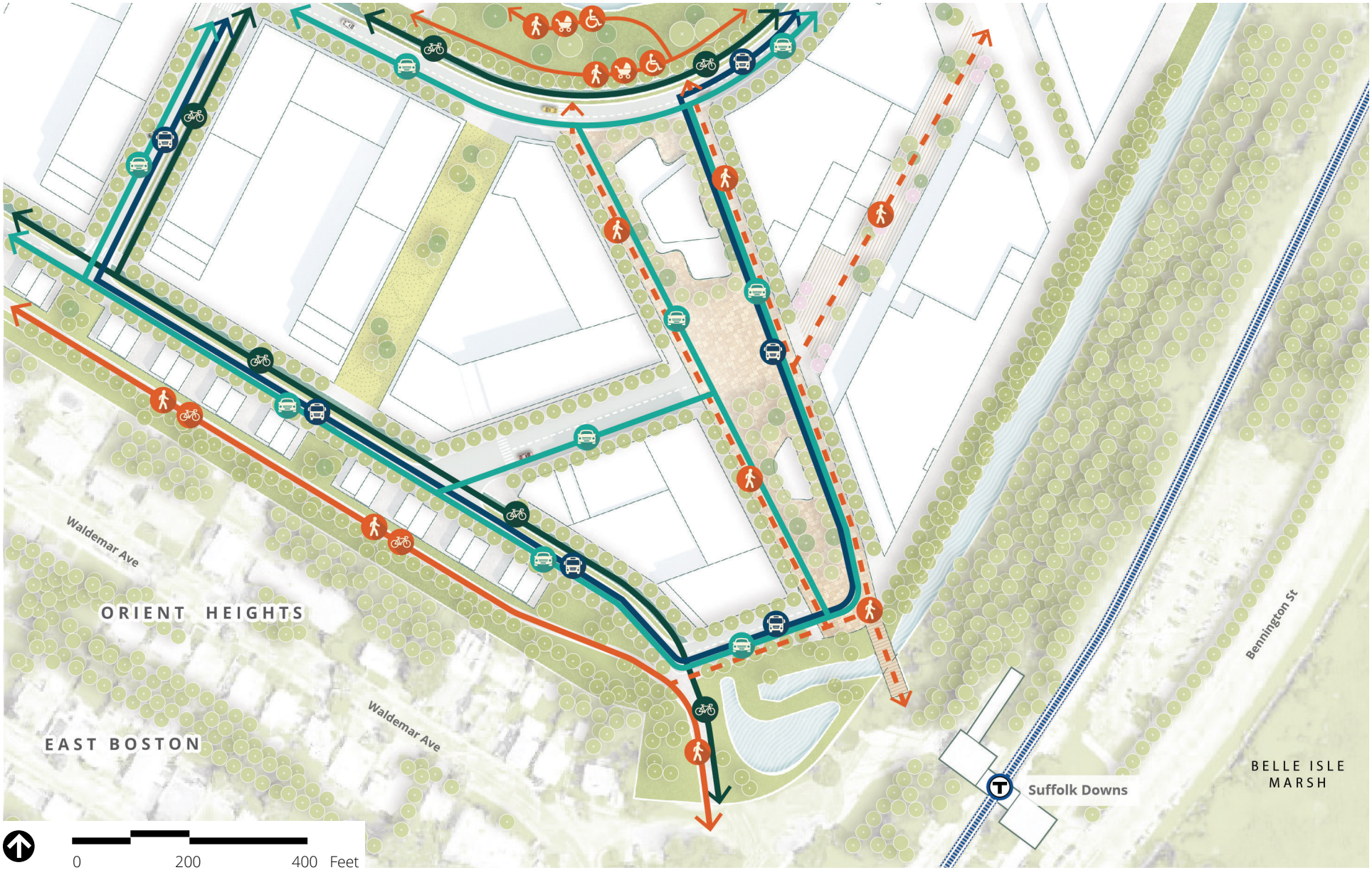
Assembly Row, Somerville CREDIT: STOSS

Source: cbt + Stoss Landscape Urbanism

Figure 3.10
Belle Isle Square Plan and Precedents

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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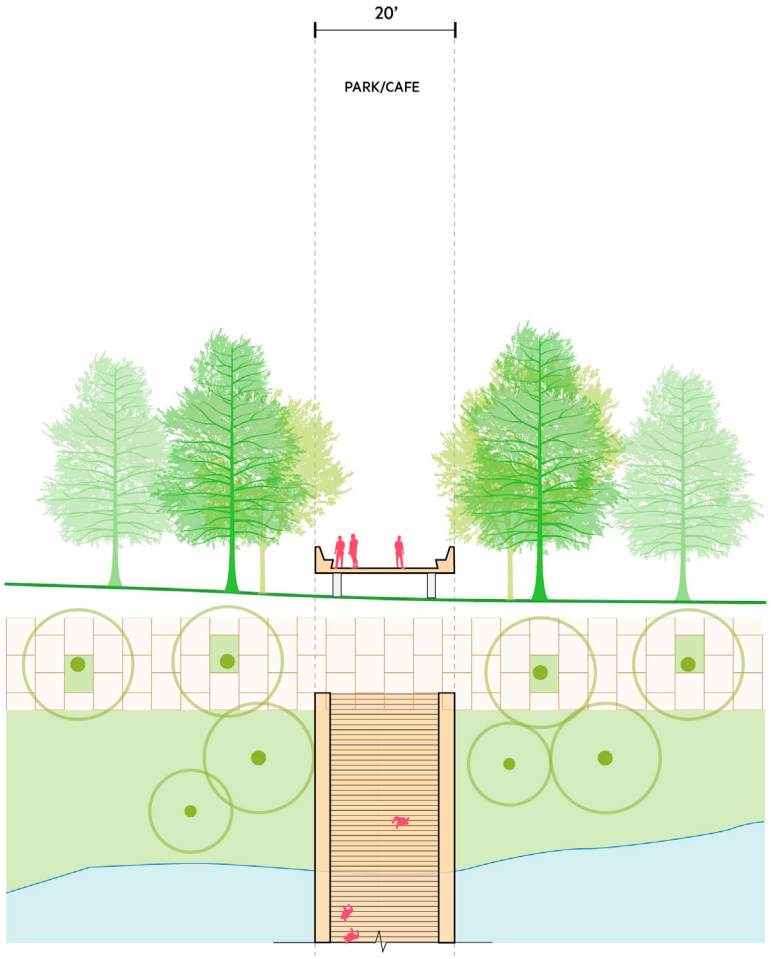
- Bike Circulation
- Vehicular Circulation
- Shuttle Circulation
- Community Paths
- Pedestrian Connection



Figure 3.11
Belle Isle Square Circulation Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





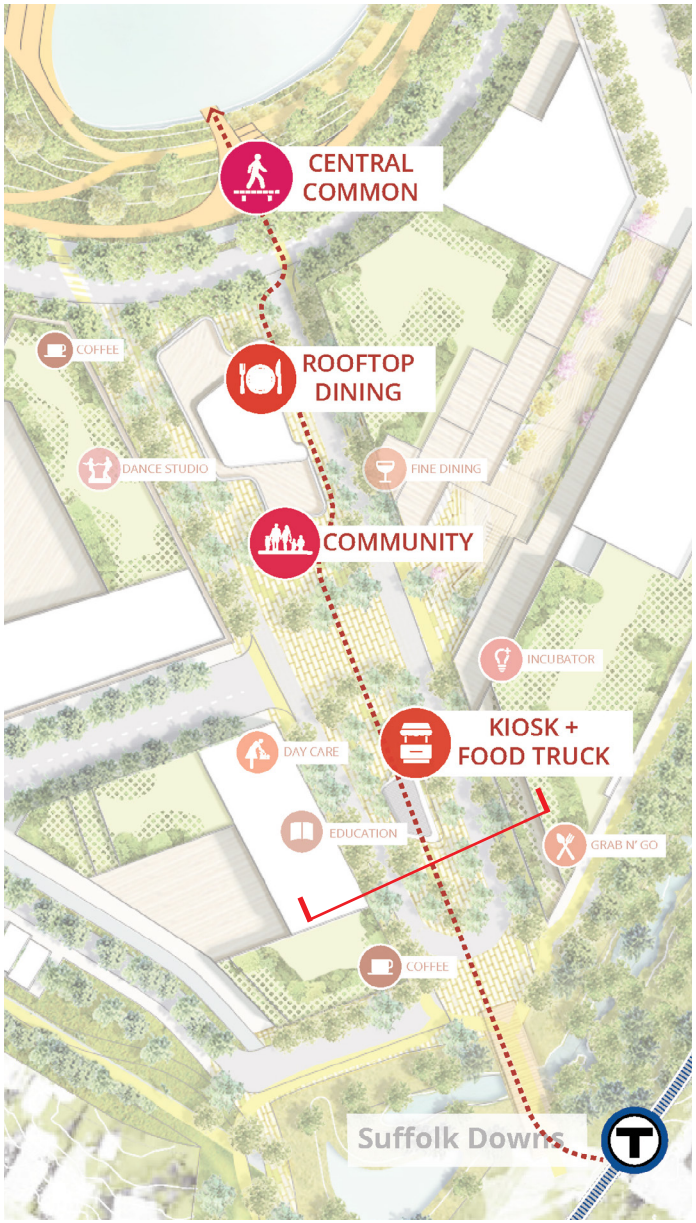
Source: cbt + Stoss Landscape Urbanism

0 100 200 Feet



Figure 3.12a
Belle Isle Square Section at New Pedestrian Bridge

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt + Stoss Landscape Urbanism

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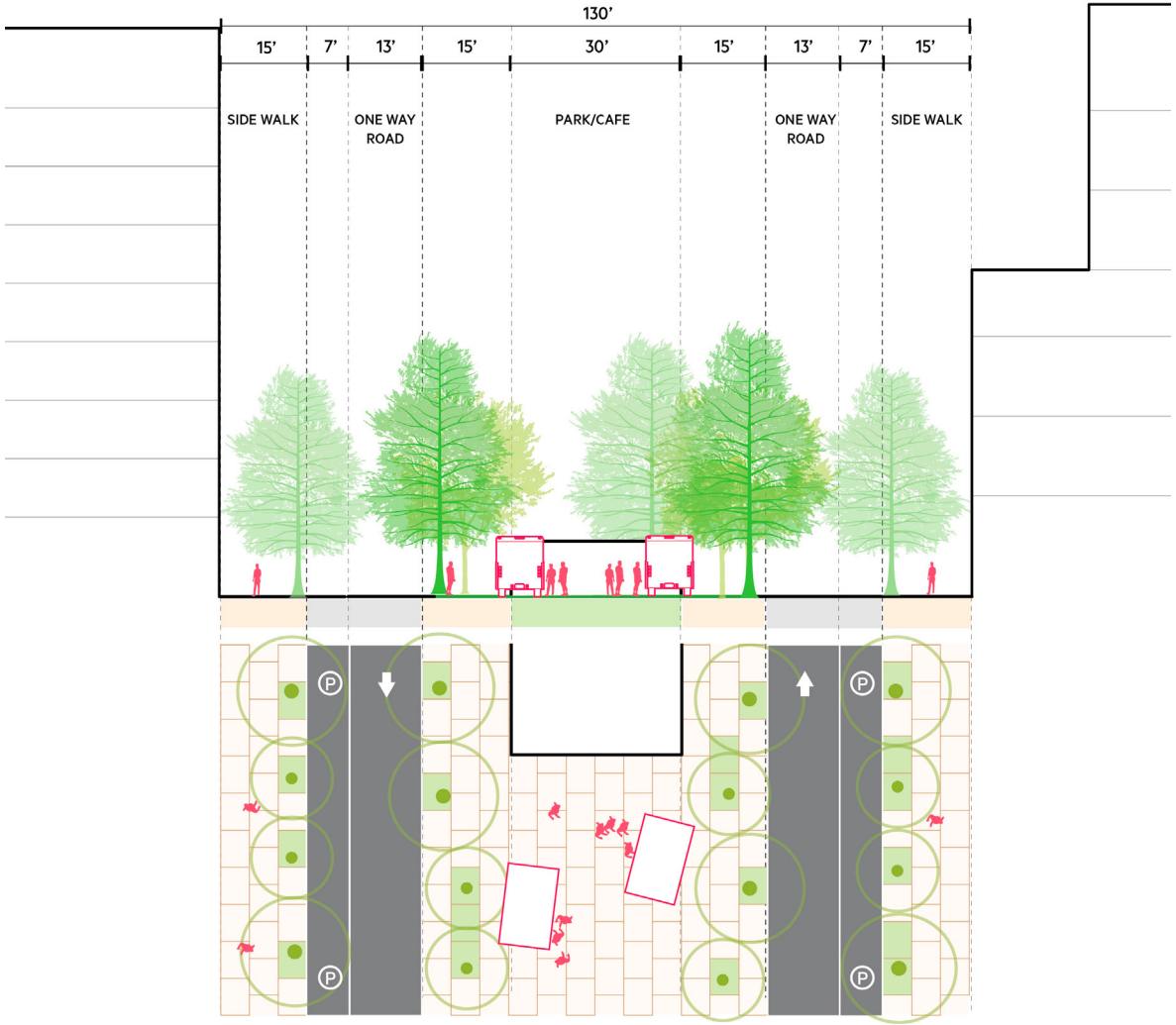
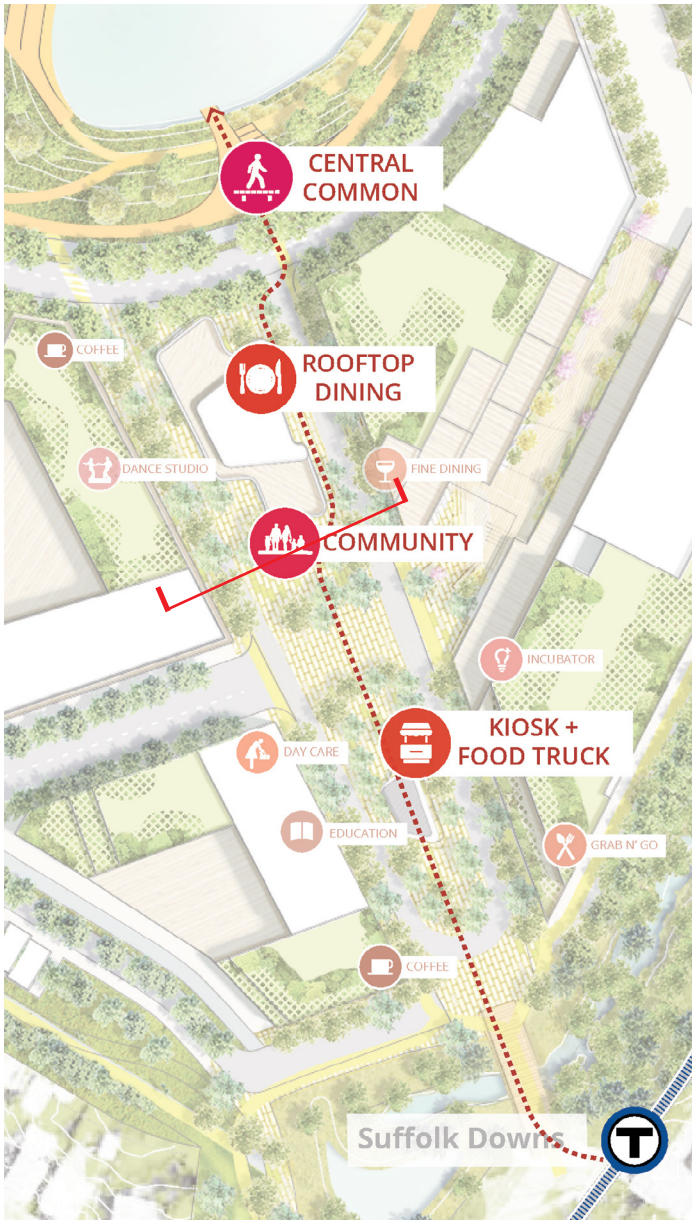
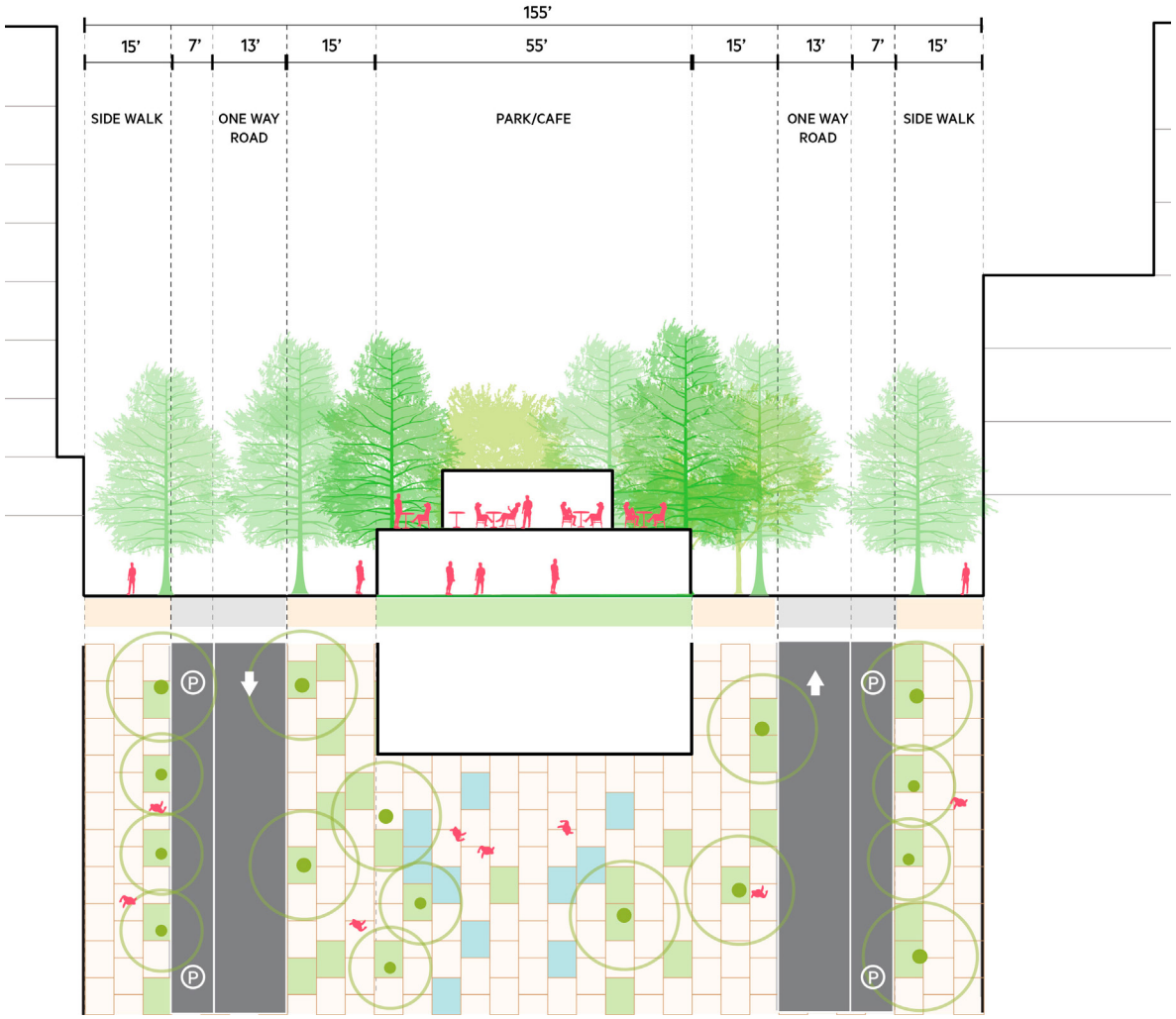




Figure 3.12b
Belle Isle Square Section at Pedestrian Plaza

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





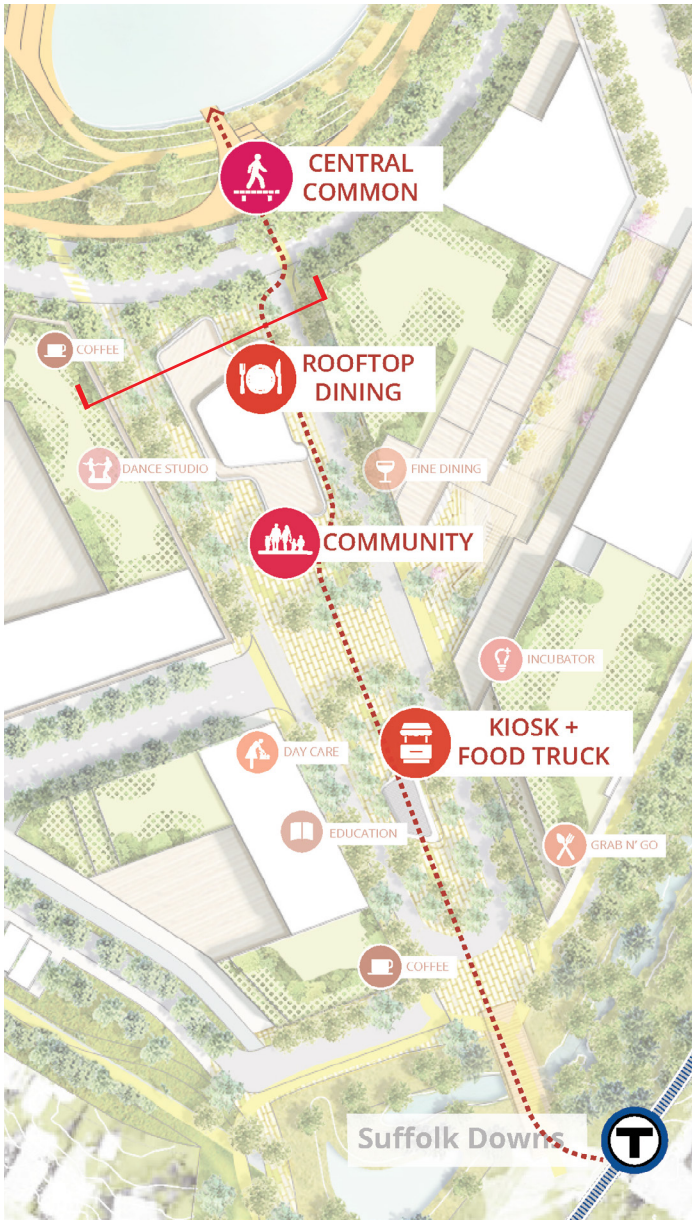
Source: cbt + Stoss Landscape Urbanism

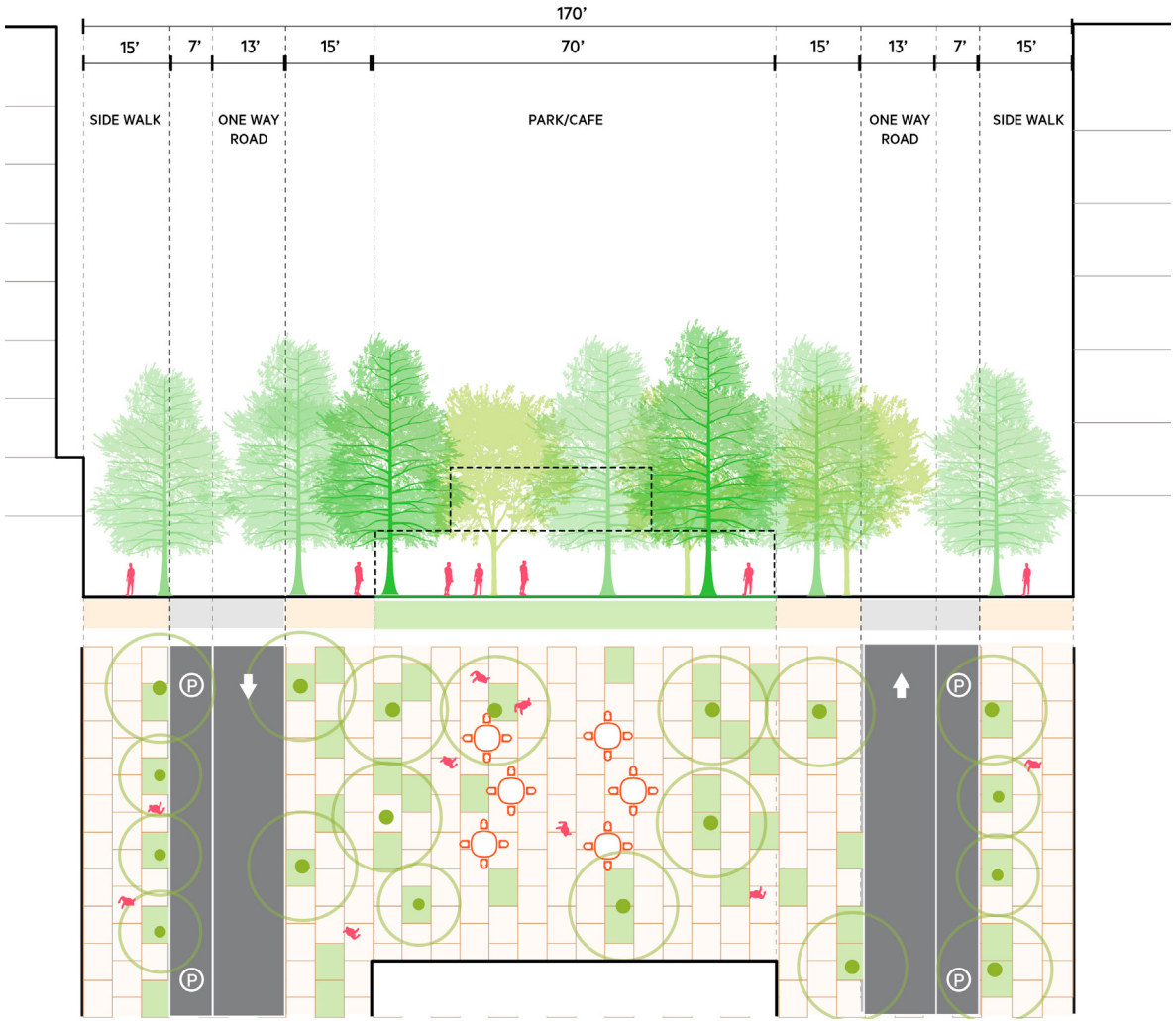
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Figure 3.12c
Belle Isle Square Section at Retail Pavillion

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt + Stoss Landscape Urbanism

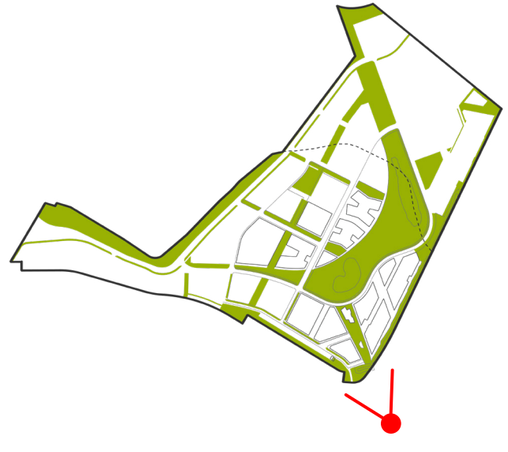
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Figure 3.12d
Belle Isle Square Section near Central Common Open Space

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.13a
Belle Isle Square Aerial Rendering

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.13b
Rendering from Suffolk Downs MBTA Blue Line Station
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.13c
Belle Isle Square Retail Plaza Rendering

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts







0 100 200 400 Feet

Source: cbt

Figure 3.14
Master Plan Design Changes from EENF/EPNF
Beachmont Square
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





District Hall, Seaport, Boston CREDIT: GATHER



Olympic Village Plaza, Vancouver CREDIT: STOSS



The Hangar, Kenmore, WA CREDIT: ANDREW POGUE

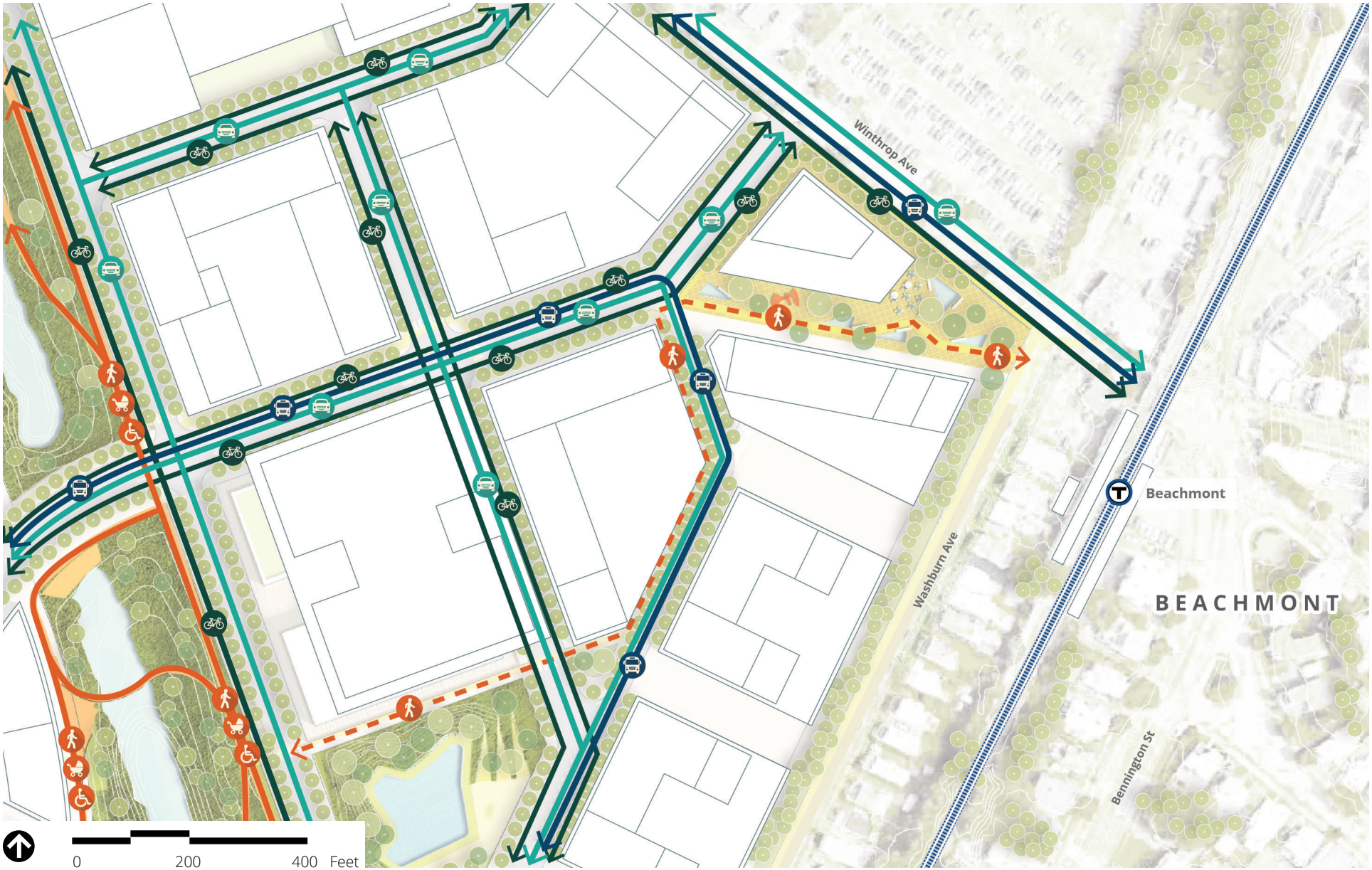


The Hangar, Kenmore, WA CREDIT: ANDREW POGUE

Source: cbt + Stoss Landscape Urbanism

Figure 3.15
Beachmont Square Plan and Precedents

U:\HYMSuffolkDownsMPFS\174001\04_Presentation\04_2018_Boston-Permitting_DPIR-Community\2018_09_DEIP-DPIR



Source: cbt

- Bike Circulation
- Vehicular Circulation
- Shuttle Circulation
- Community Paths
- Pedestrian Connection



3.16
Beachmont Square Circulation Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

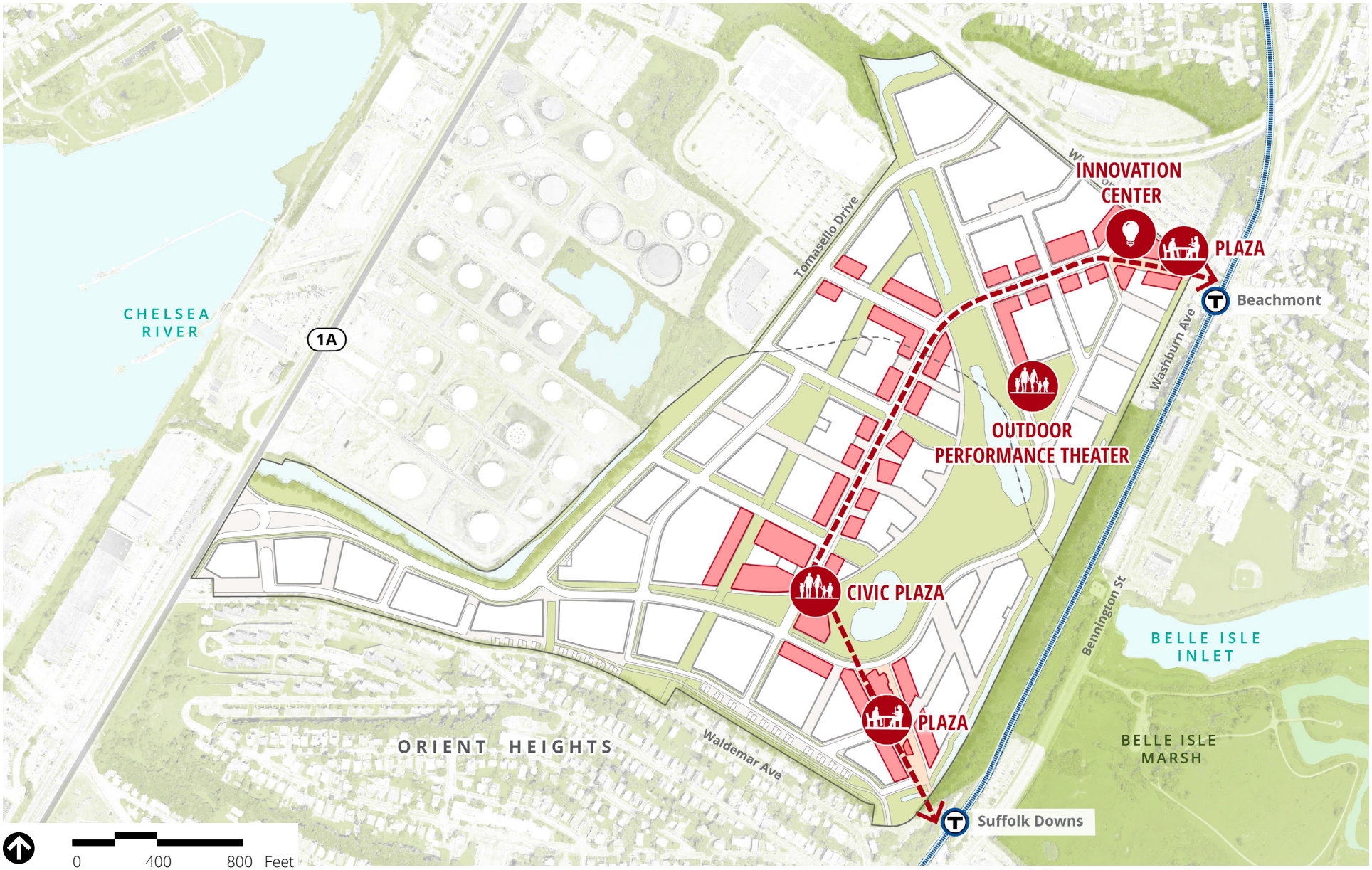


Source: cbt

Figure 3.17
Beachmont Square Retail Plaza Rendering

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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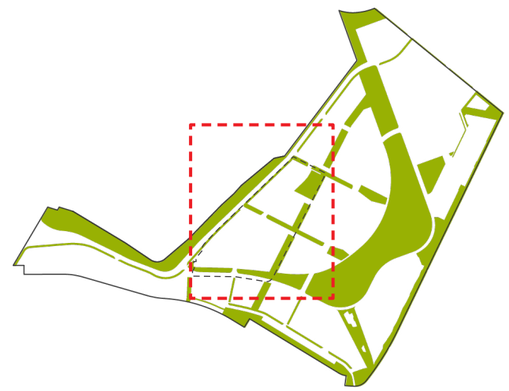
Source: cbt

Figure 3.18
Retail Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts









Source: cbt

Figure 3.19
Master Plan Design Changes from EENF/EPNF
New Street in Retail District Neighborhood
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.20
Main Street Retail Rendering

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.21
Civic Node Rendering

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

- Pedestrian Pathways
- Plaza
- Pedestrian Connections

Figure 3.22a
Access and Circulation - Pedestrian Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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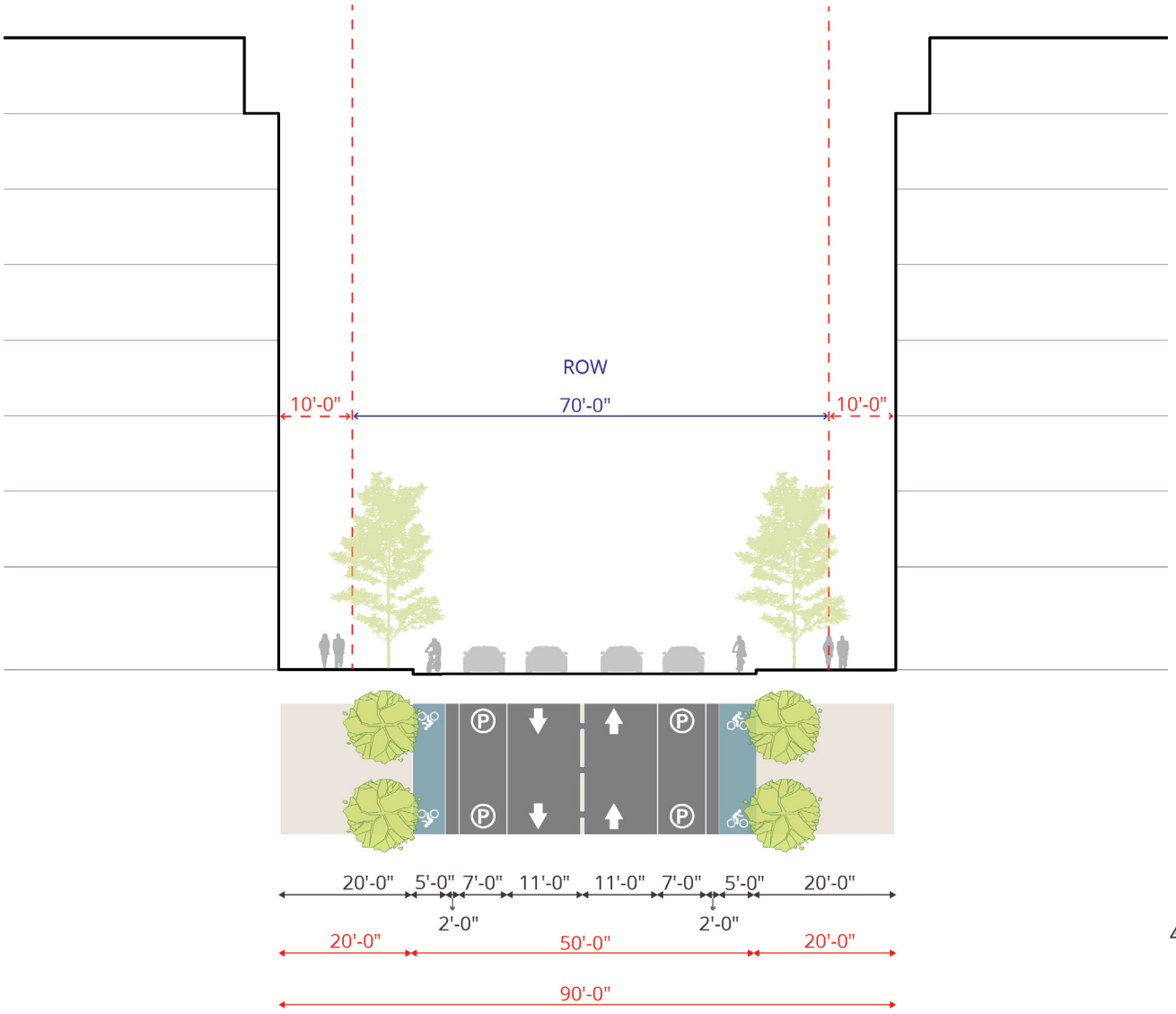


Source: cbt

- 1.0 mile loop
- 1.2 mile loop
- 1.4 mile loop

Figure 3.22b
Access and Circulation - Pedestrian Loops

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

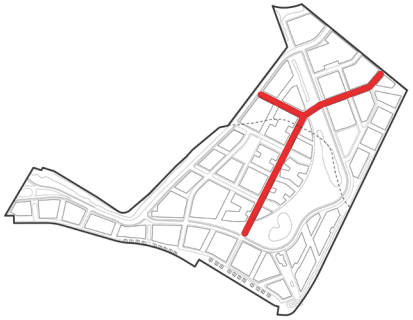
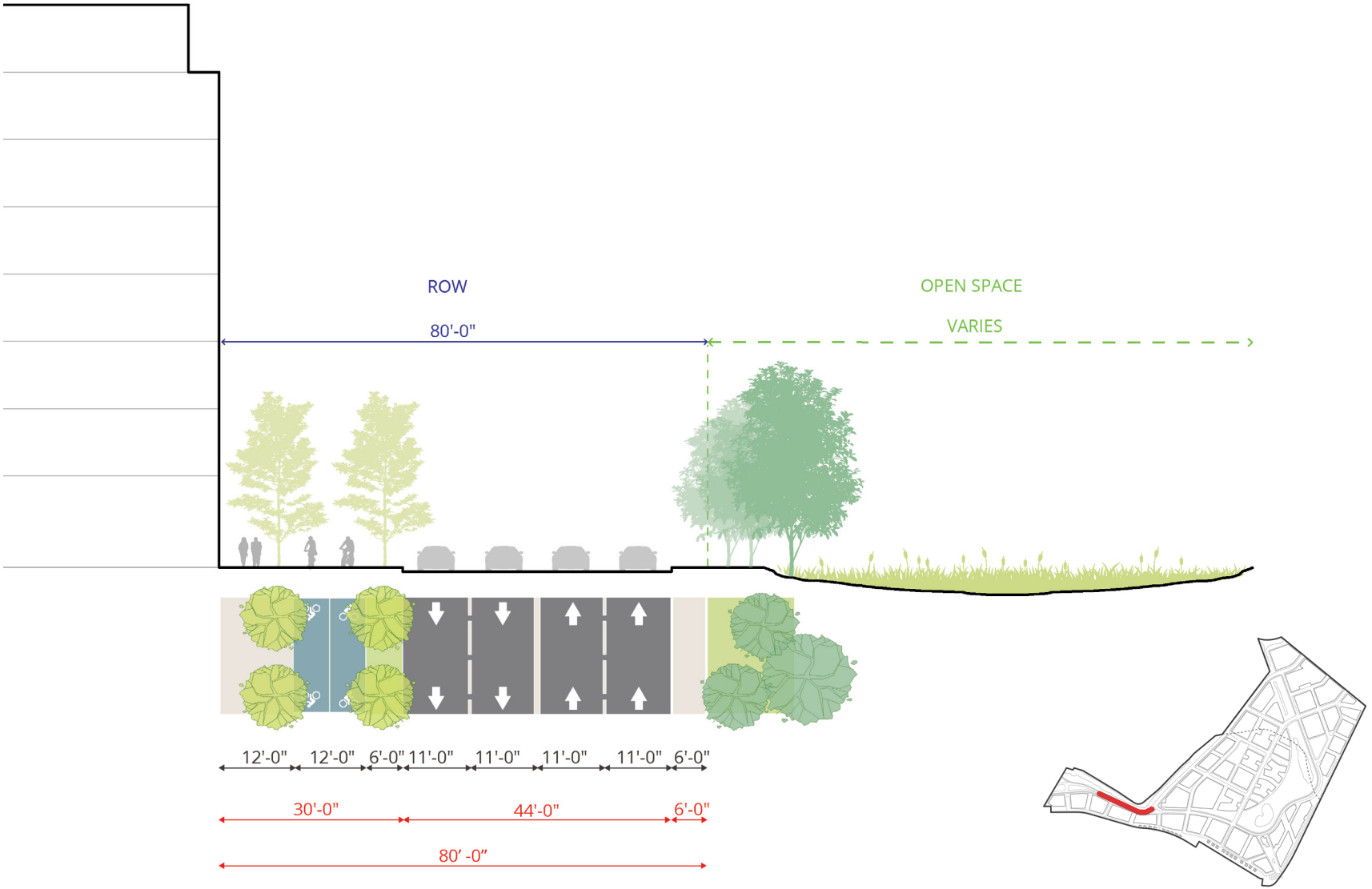


Figure 3.23a
Section - Main Street

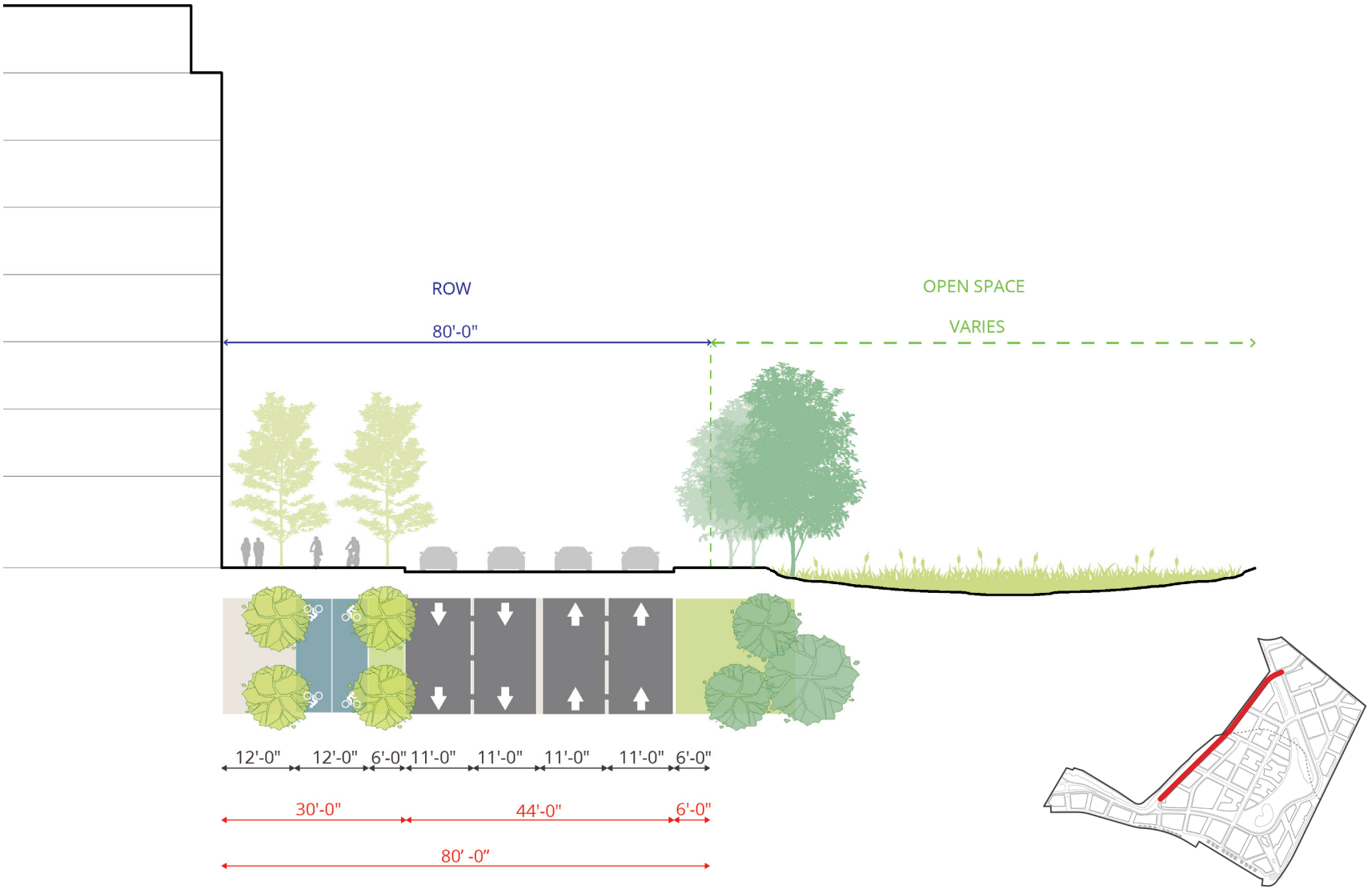
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

Figure 3.23b
Section - Tomasello Drive South

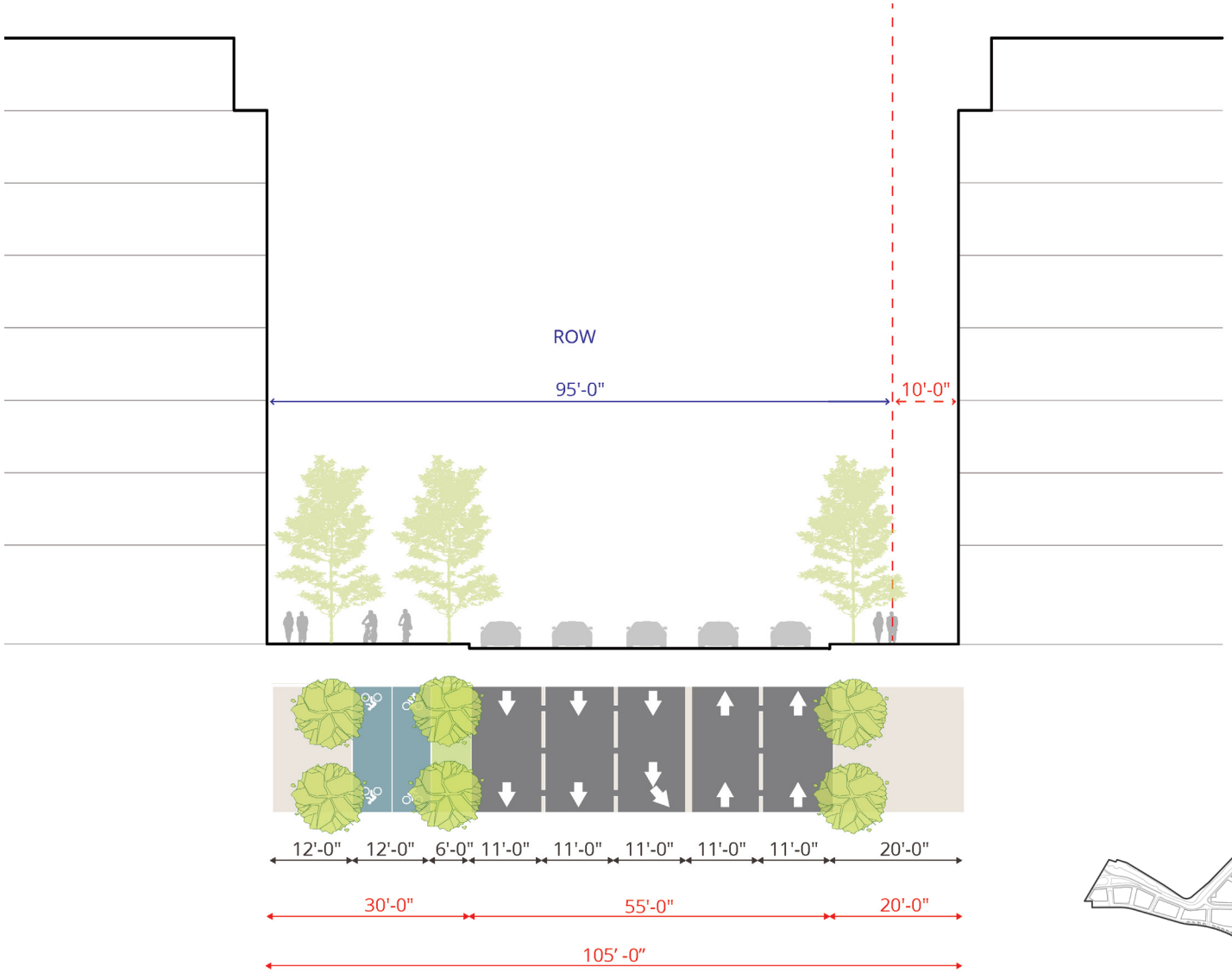
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

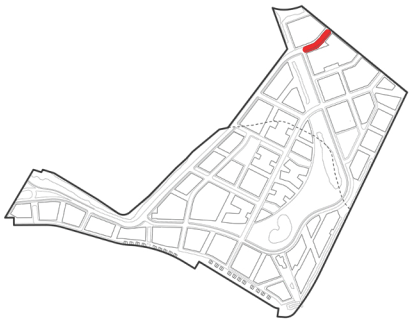


Source: cbt

Figure 3.23c
Section - Tomasello Drive at Retail District

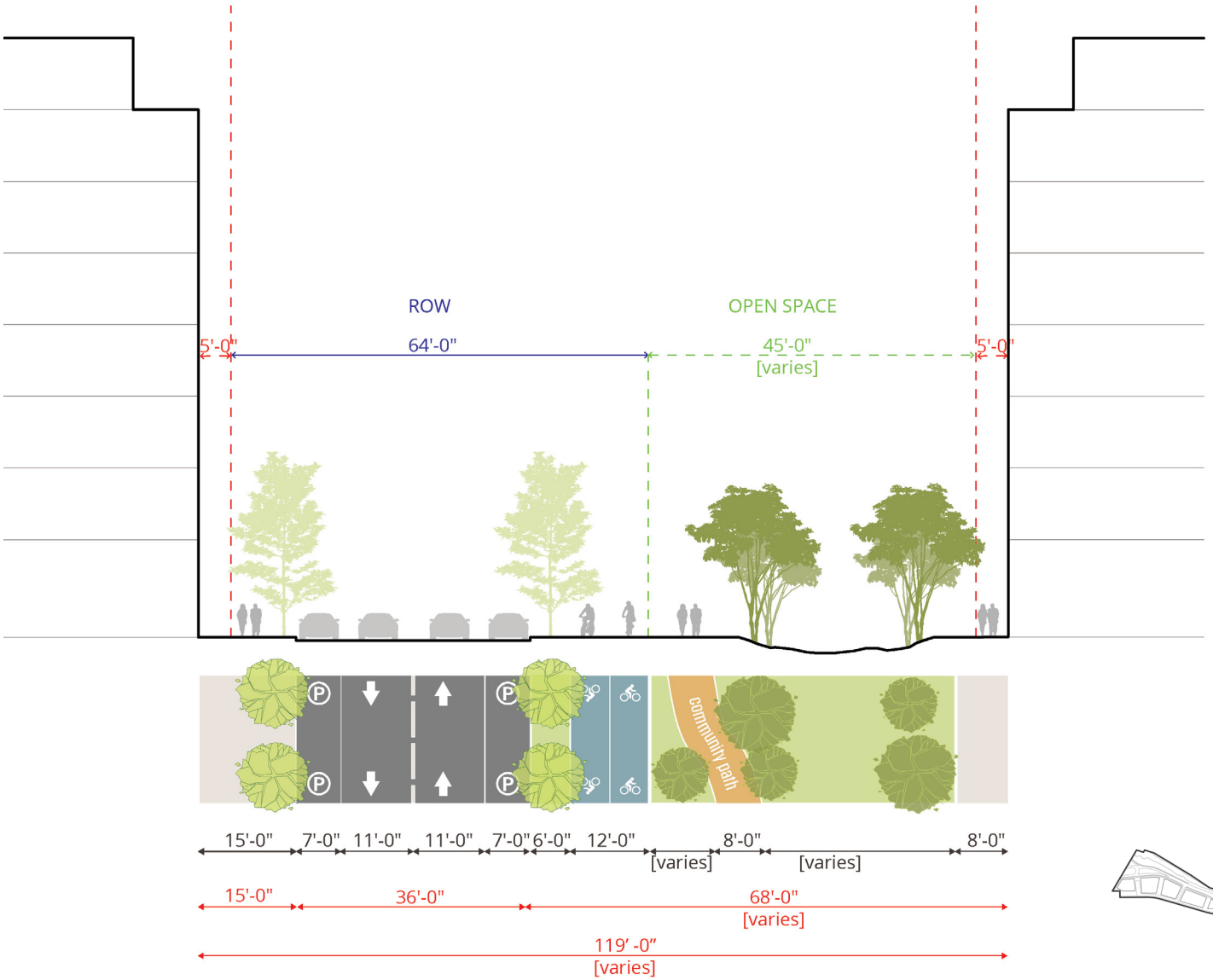
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

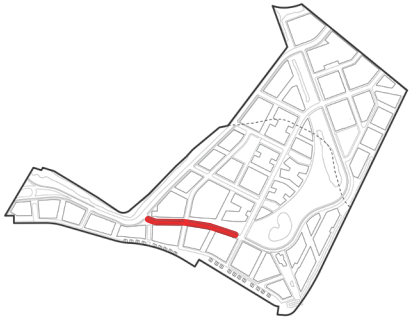




Source: cbt

Figure 3.23d
Section - Tomasello Drive near Winthrop Street Intersection
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.23e
Section - Parkway South

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

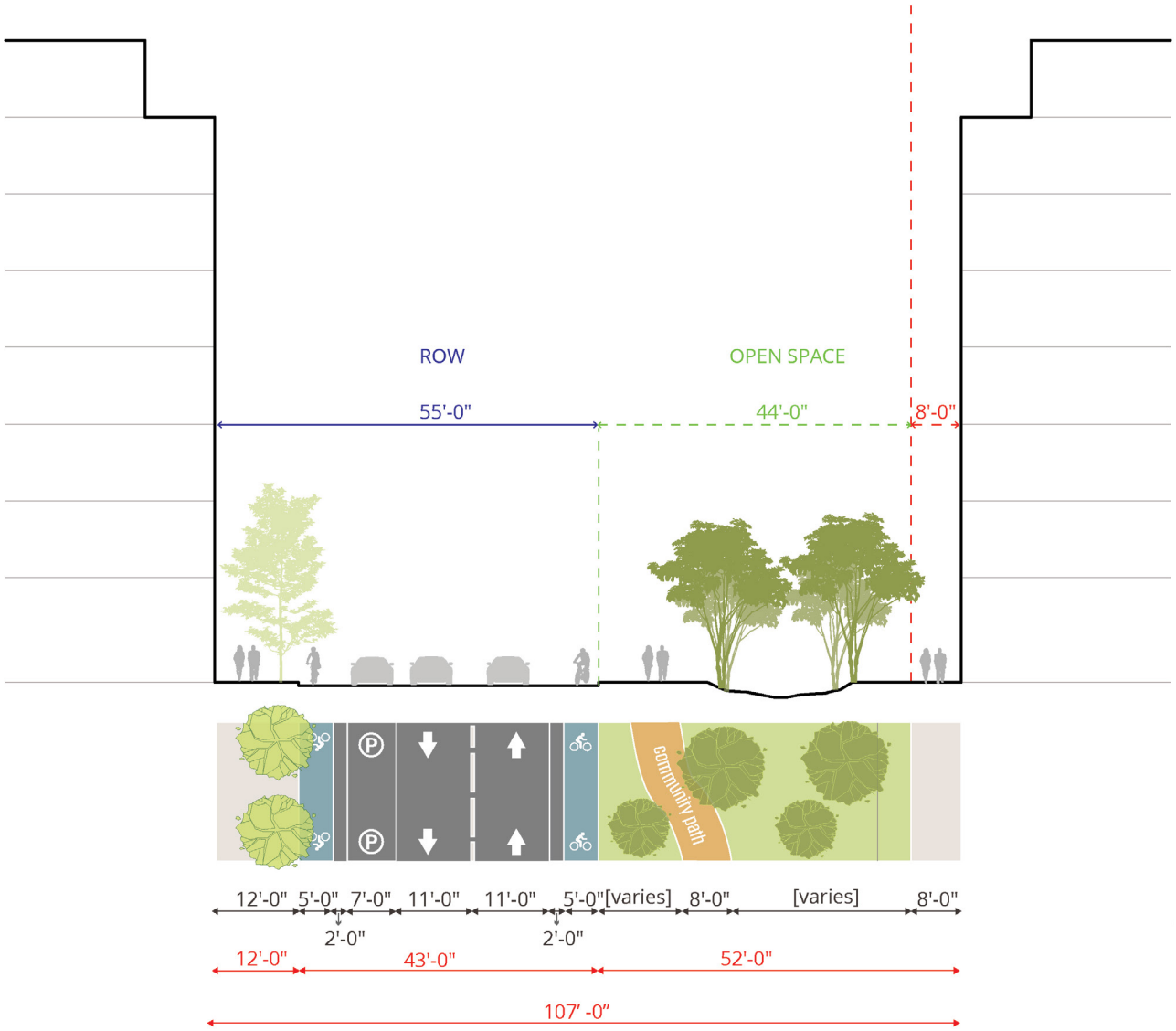




Source: cbt

Figure 3.23f
Section - Parkway Central

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

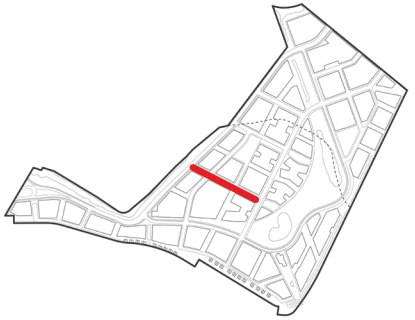
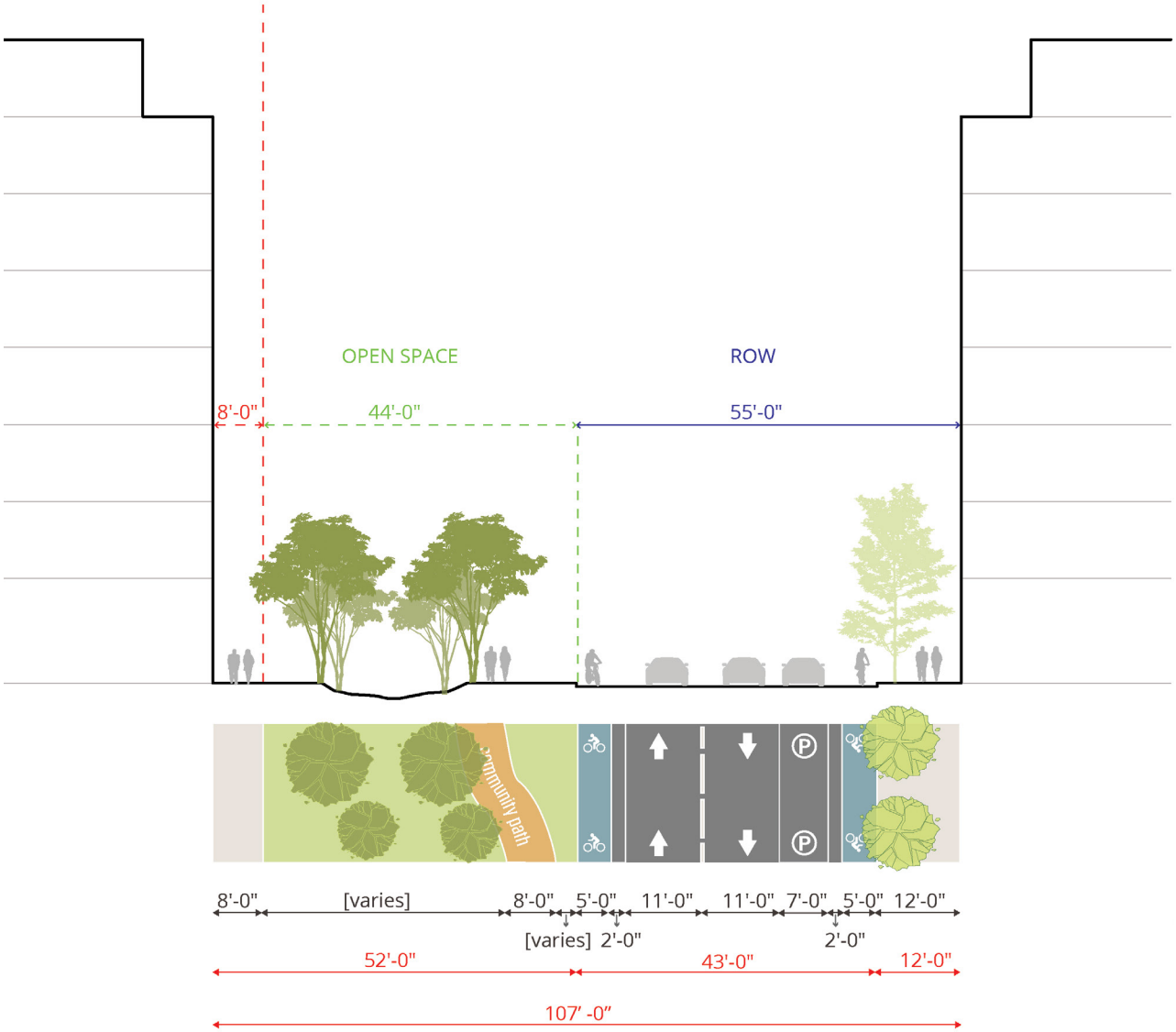


Figure 3.23g
Section - Green Finger

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

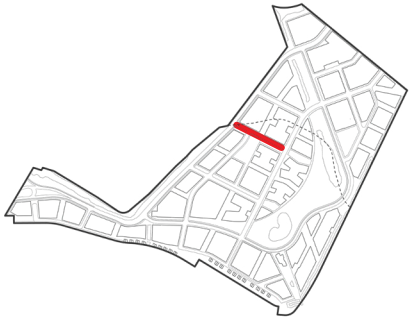
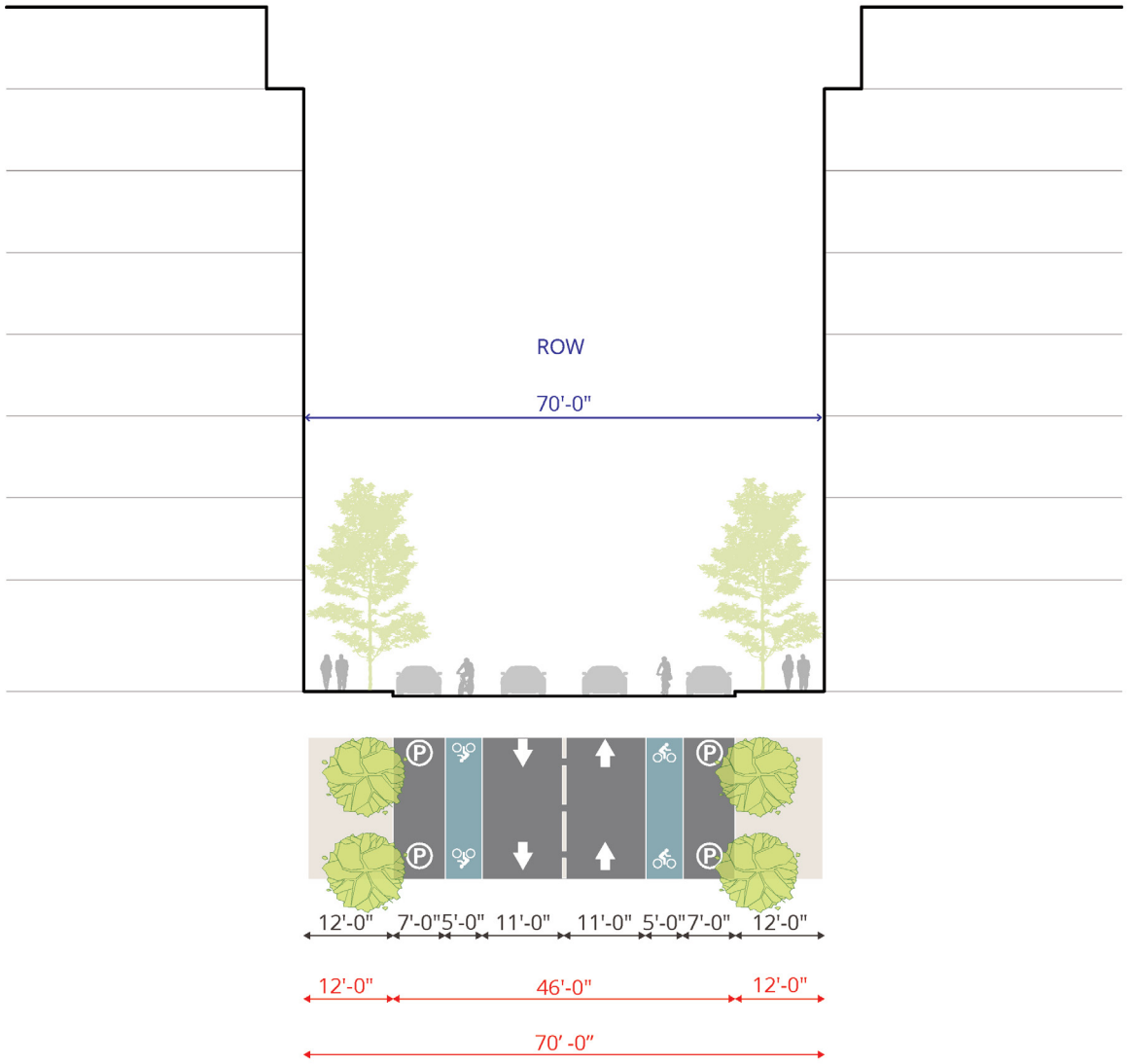


Figure 3.23h
Section - Green Finger

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

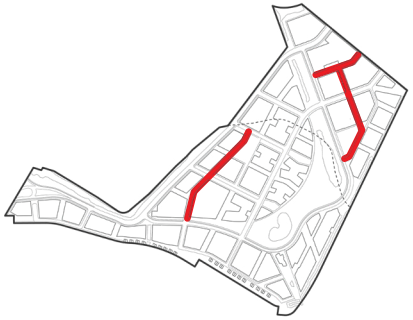
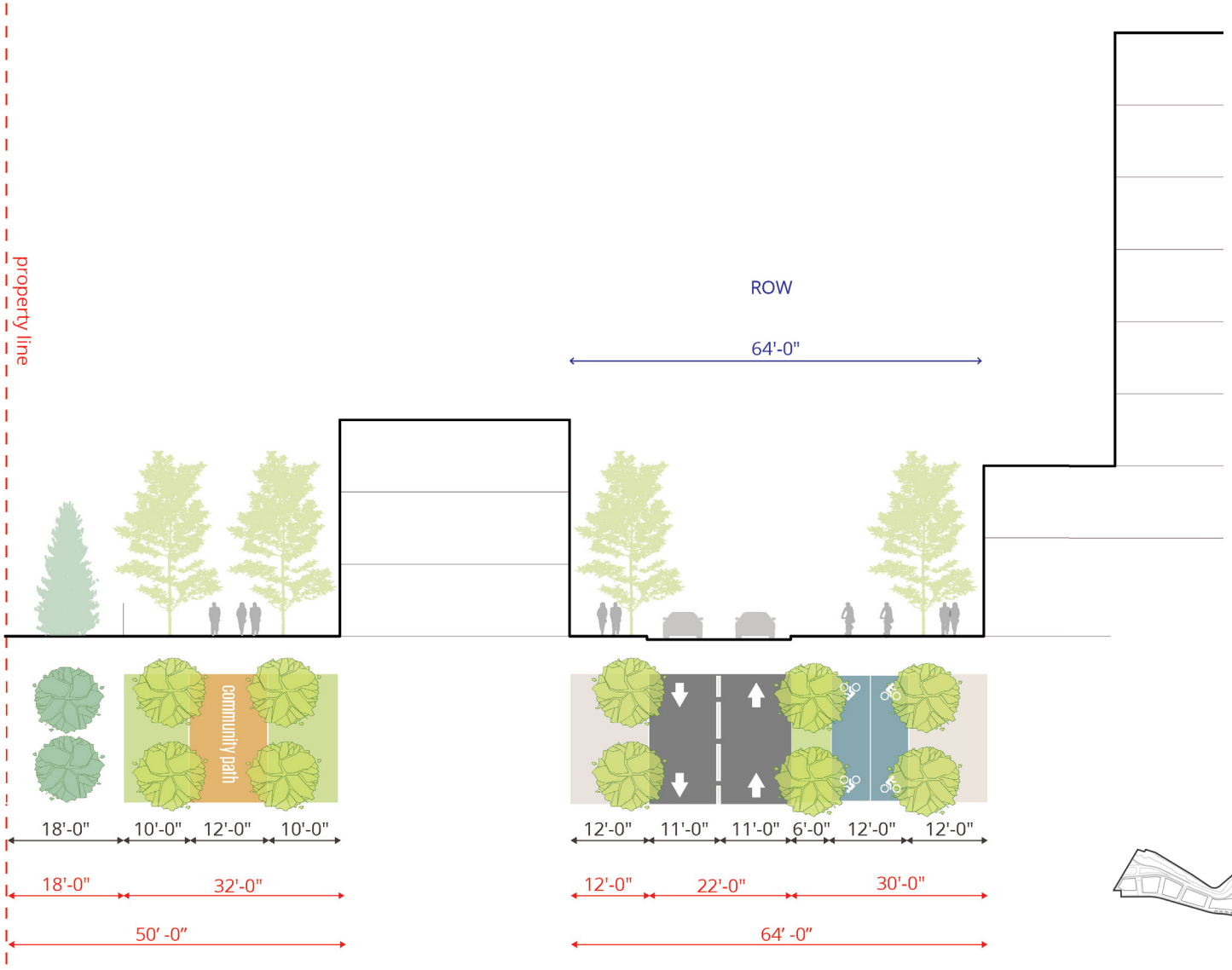


Figure 3.23i
Section - Neighborhood Streets with Cycle Lanes

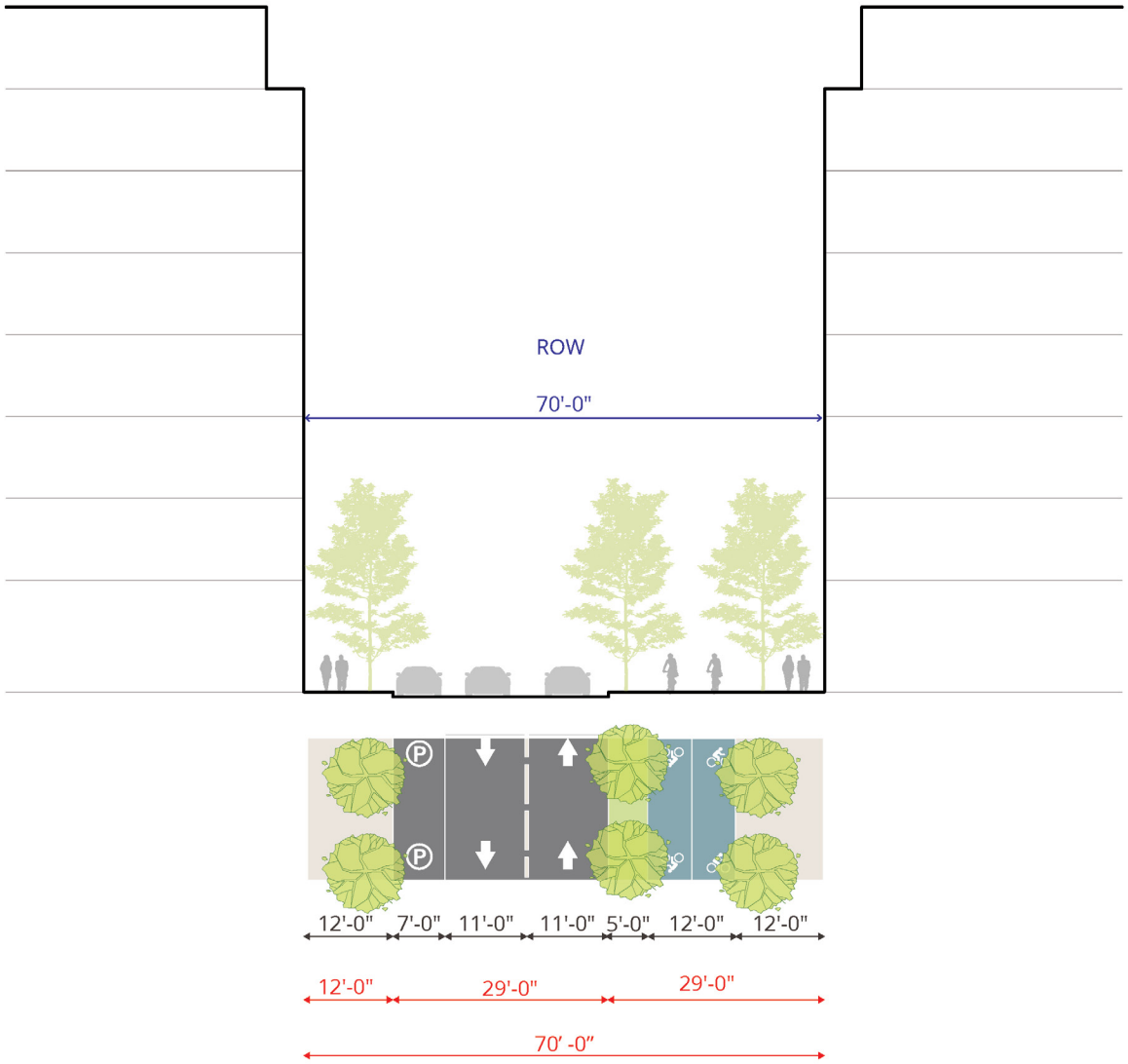
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.23j
Section - Neighborhood Street parallel to Orient Heights Community Path
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

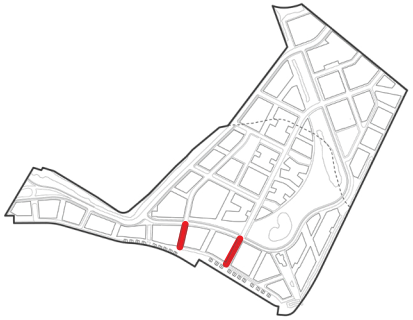
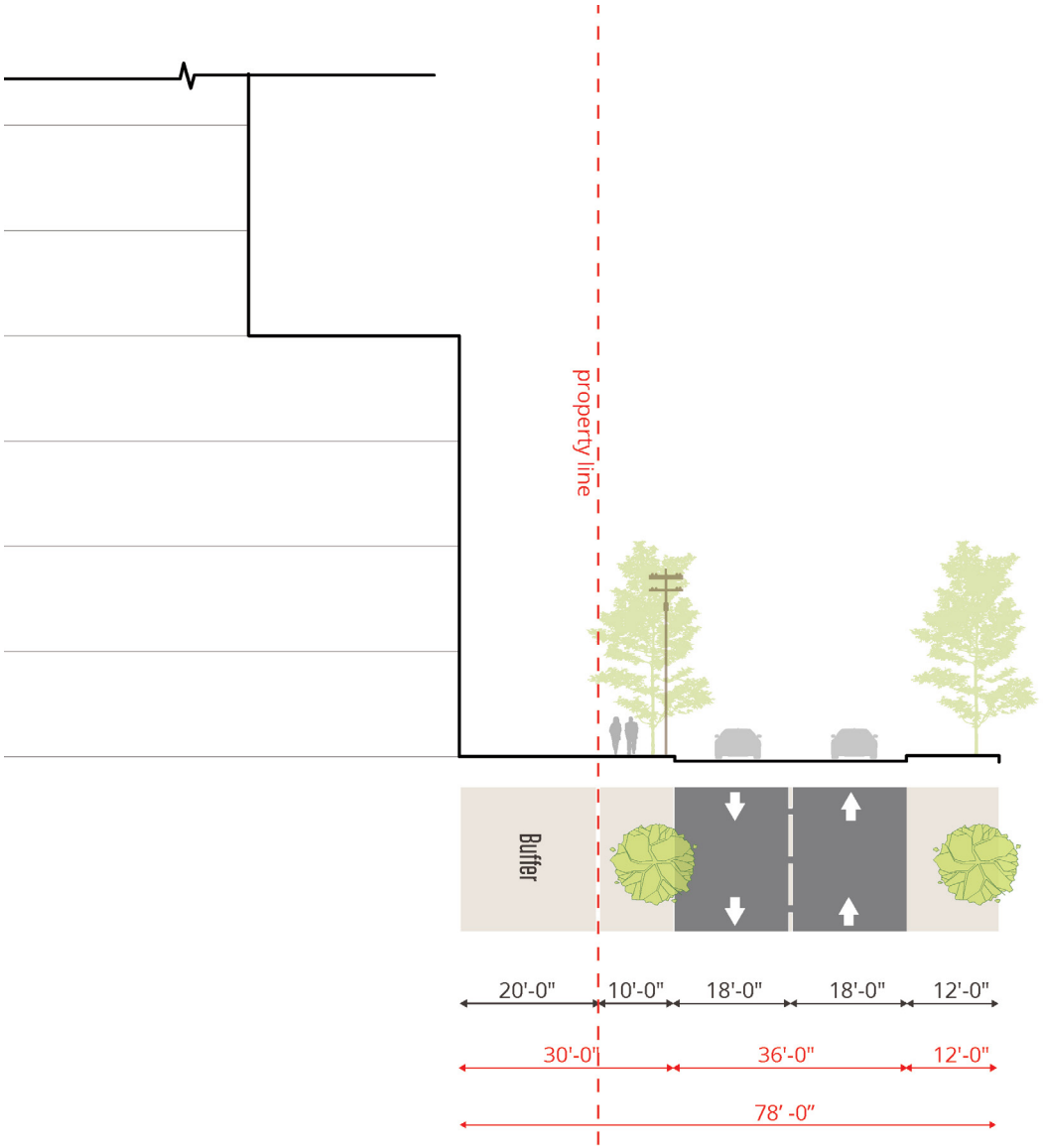


Figure 3.23k
Section - Neighborhood Streets with Cycle Track

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

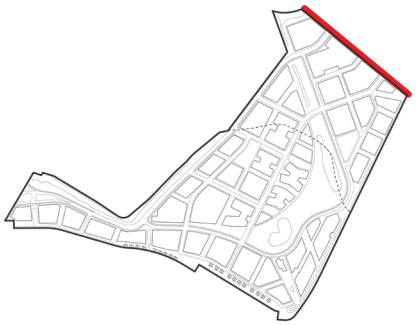
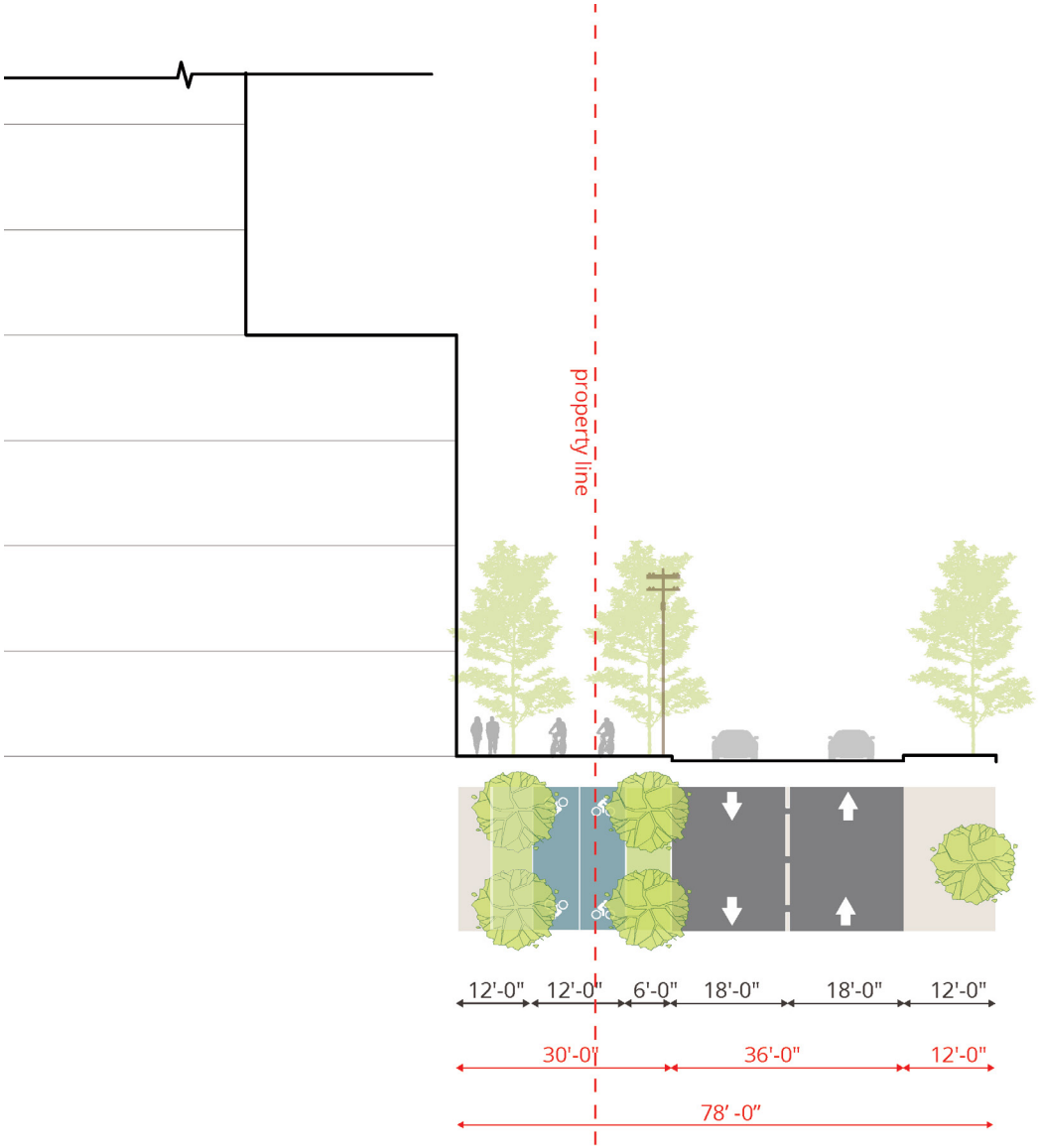


Figure 3.23l
Section - Winthrop Ave Existing

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Source: cbt

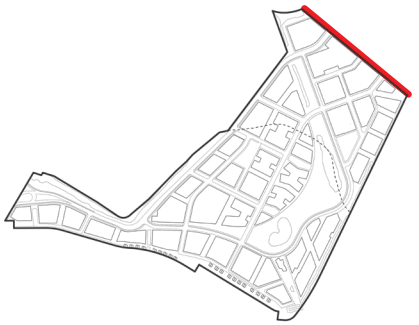


Figure 3.23m
Section - Winthrop Ave Proposed

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

Outer Loop Route
Inner Loop Route

Figure 3.24
Access and Circulation - Bus Shuttle

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

3.25
Service, Loading, and Parking Access Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

3.26
Proposed Lobby Locations

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

- Cycle Track
- Designated Bike Lane
- Shared Lane
- Potential Public Bike Share Location

Figure 3.27
Access and Circulation - Bike Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

Architectural Treatment of Buildings
Cohesive Edge along Central Common

3.28
Architectural Treatment and Wayfinding

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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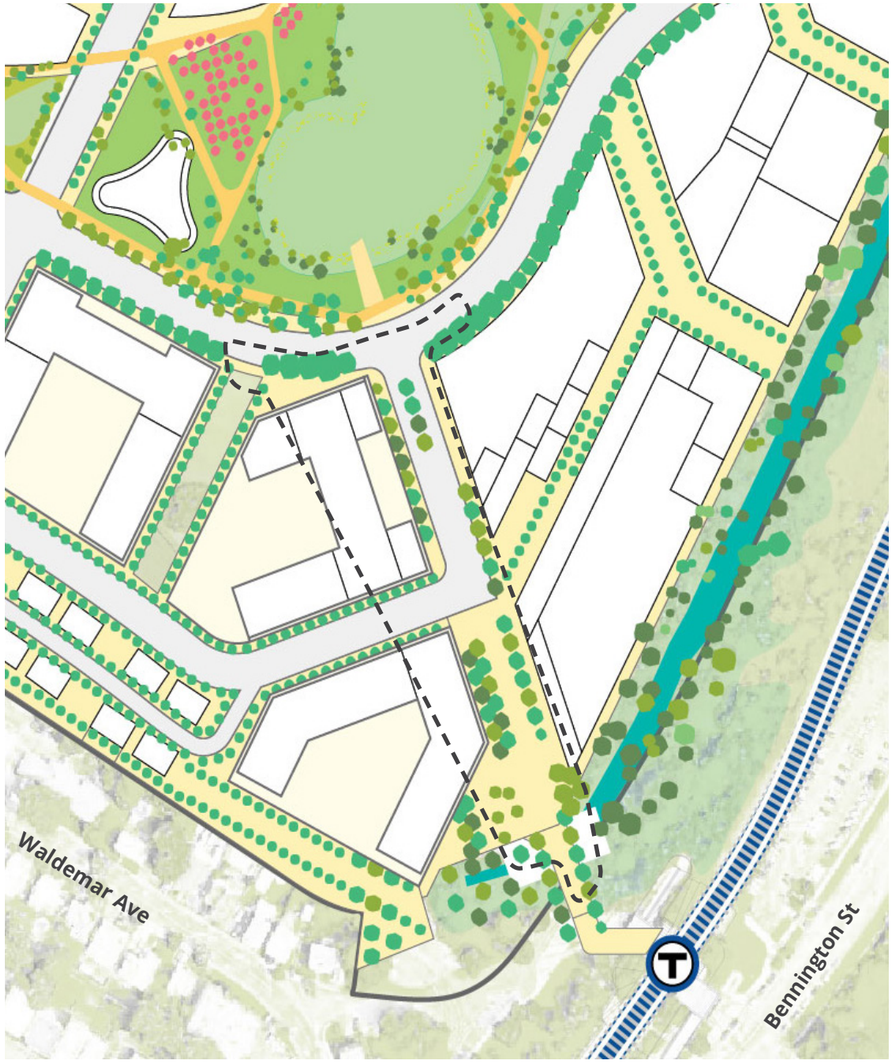
Source: cbt

- Bike Circulation
- Vehicular Circulation
- Shuttle Circulation
- Community Paths
- Pedestrian Connection



Figure 3.29
Orient Heights Circulation Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts







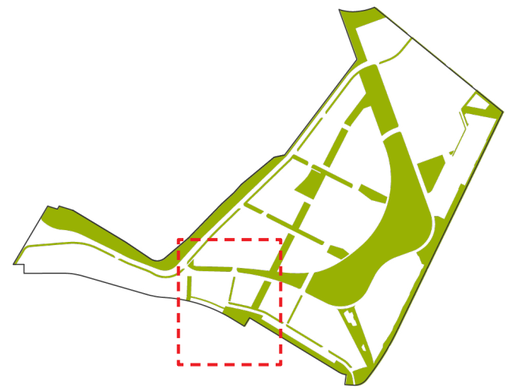
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Source: cbt

Figure 3.30a
Master Plan Design Changes from EENF/EPNF
Belle Isle Square
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



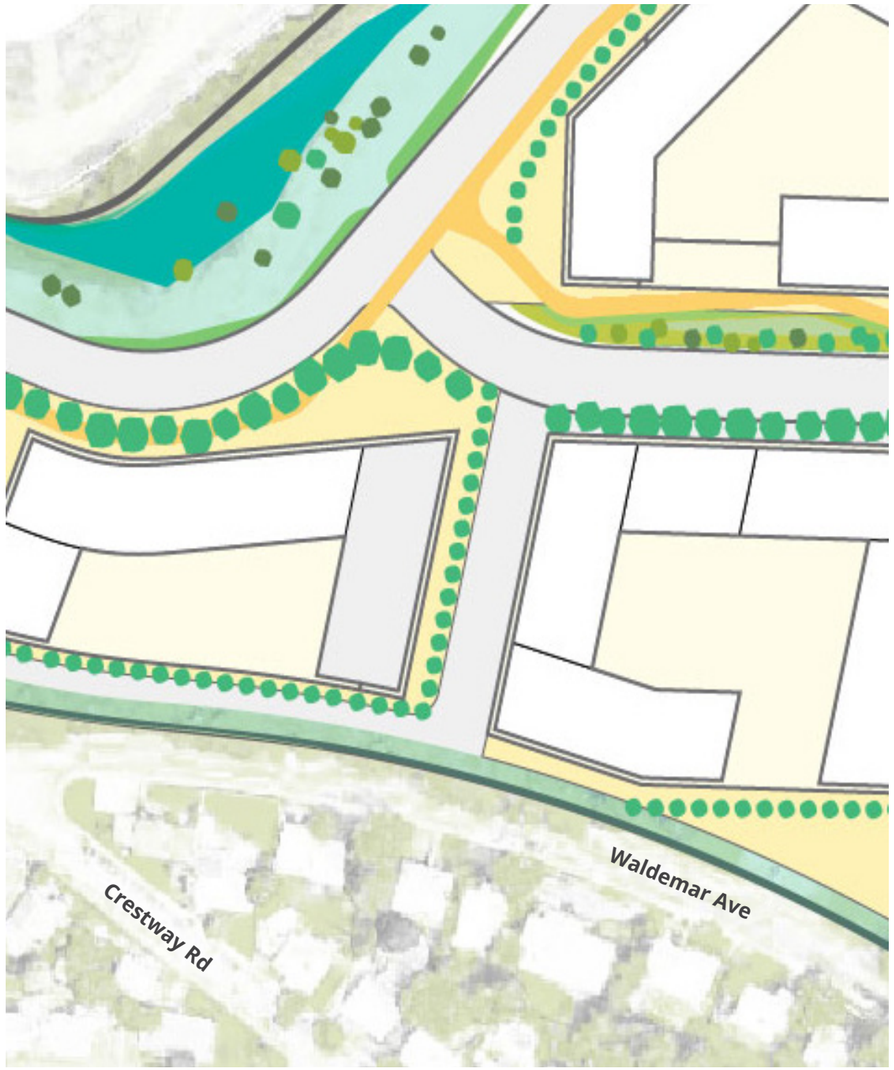




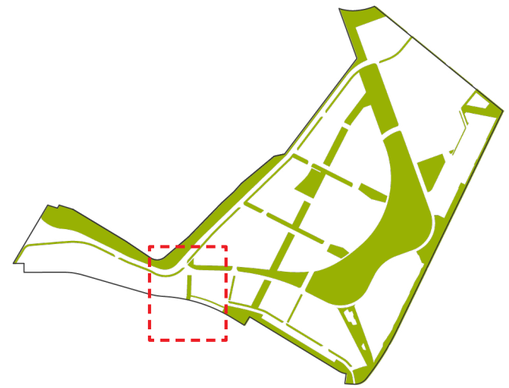
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Source: cbt

Figure 3.30b
Master Plan Design Changes from EENF/EPNF
New Townhouses and Community Path
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





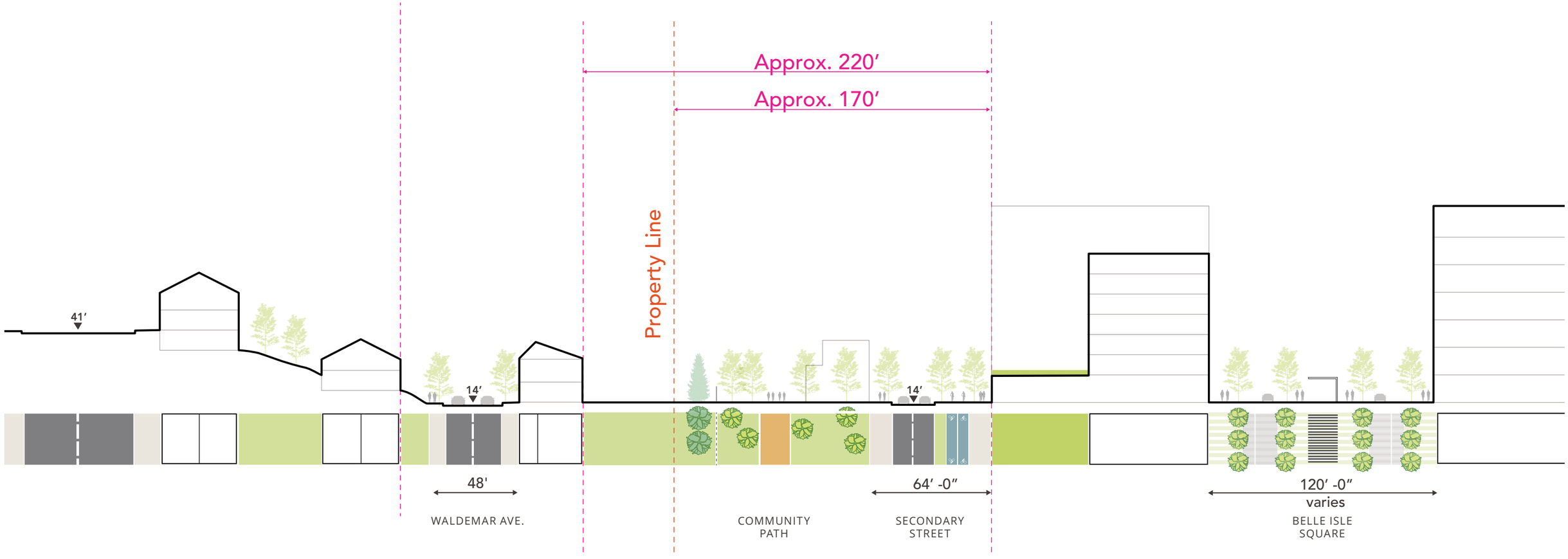


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Source: cbt

Figure 3.30c
Master Plan Design Changes from EENF/EPNF
Two-sided Waldemar Avenue
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



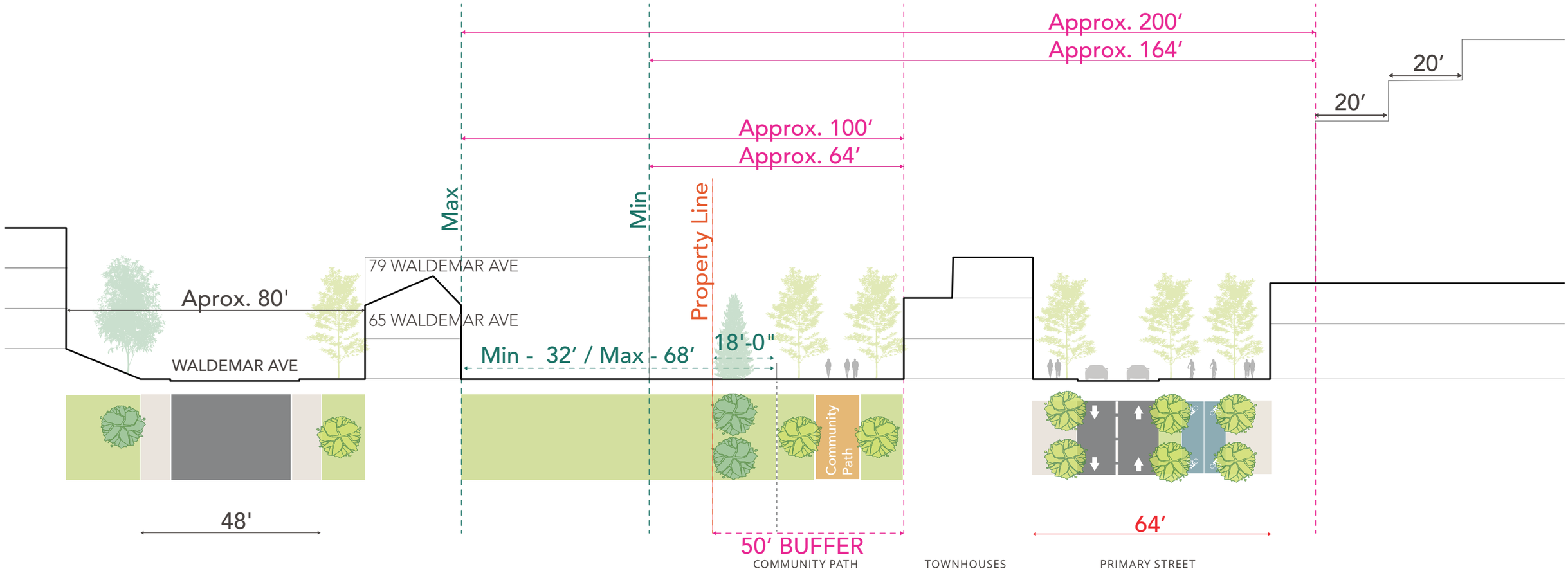


Source: cbt

Figure 3.31a
Orient Heights Section 3-1 at Belle Isle Square

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



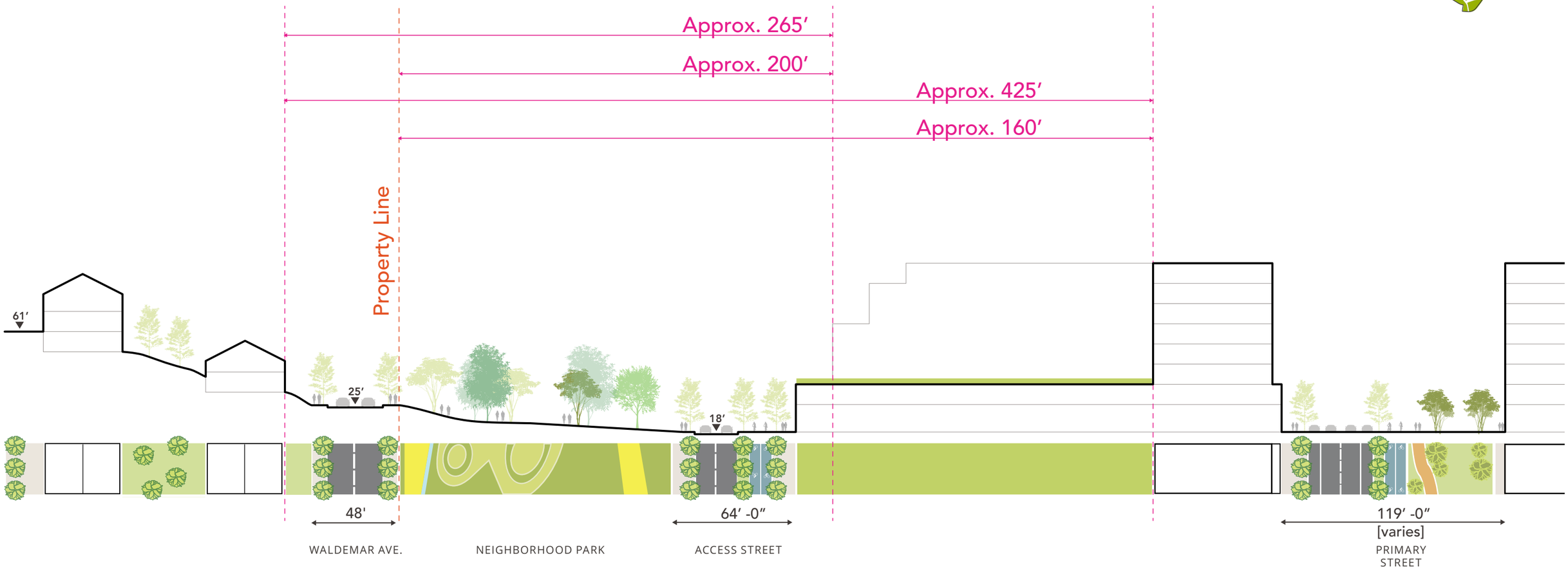


Source: cbt

Figure 3.31b
Orient Heights Section 3-2 at New Community Path

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



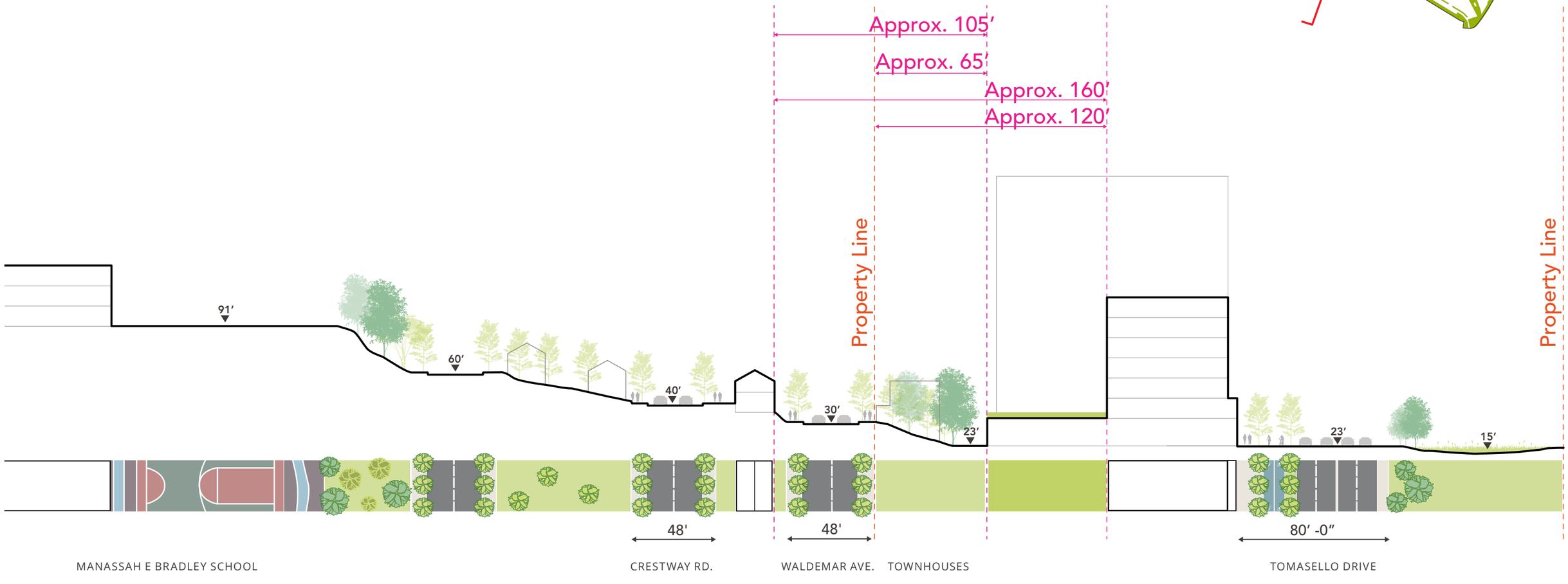


Source: cbt

Figure 3.31c
Orient Heights Section 3-3 at New Neighborhood Park

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

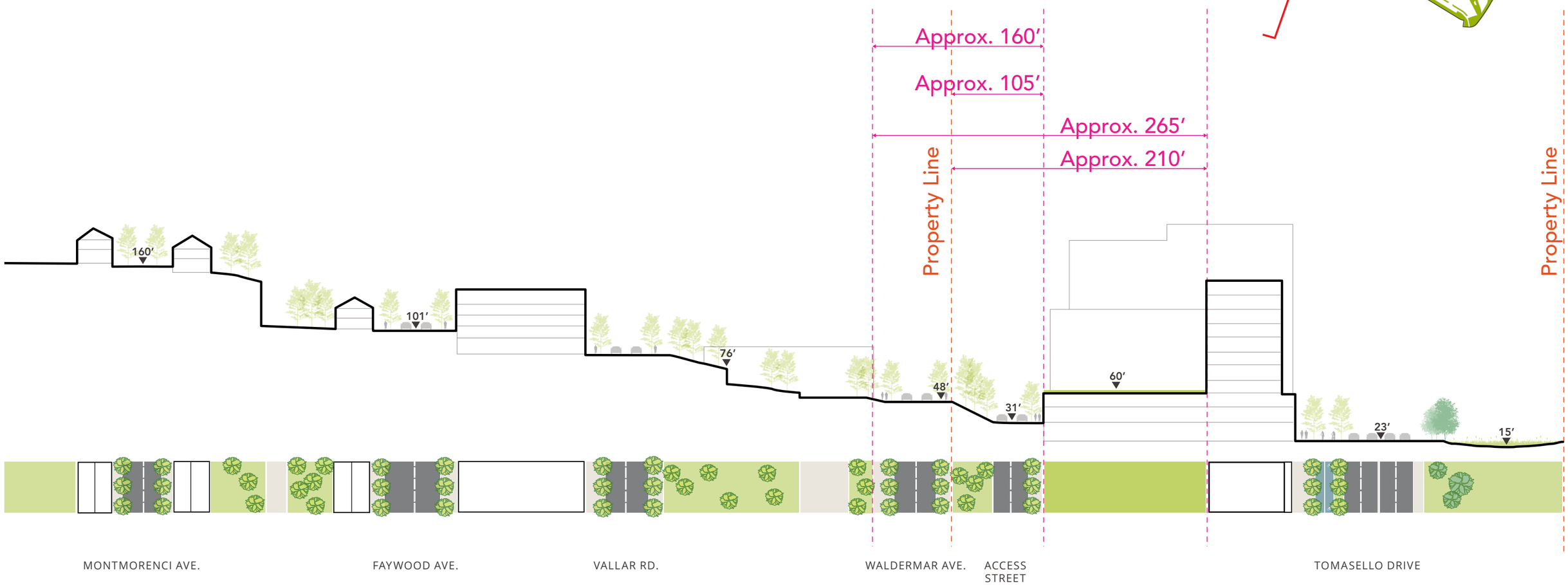




Source: cbt

Figure 3.31d
Orient Heights Section 3-4 at Waldemar and Crestview Avenues
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



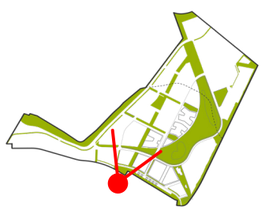


Source: cbt

Figure 3.31e
Orient Heights Section 3-5 at Panhandle District

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt

Figure 3.32
Neighborhood Park Rendering

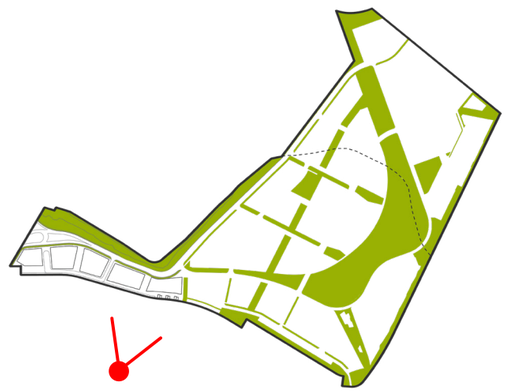
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

Beachview Rd, Orient Heights
92-48 Beachview Rd, Boston, MA 02128



Source: cbt

Figure 3.33
Perspective from Beachview Road

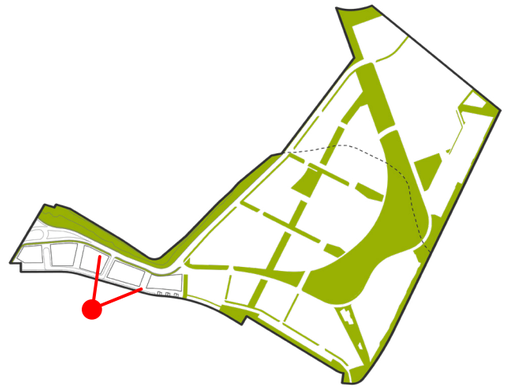
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

Faywood Ave, Orient Heights
115 Faywood Ave Boston, MA 02128



Source: cbt

Figure 3.34
Perspective from Faywood Ave and Crestway

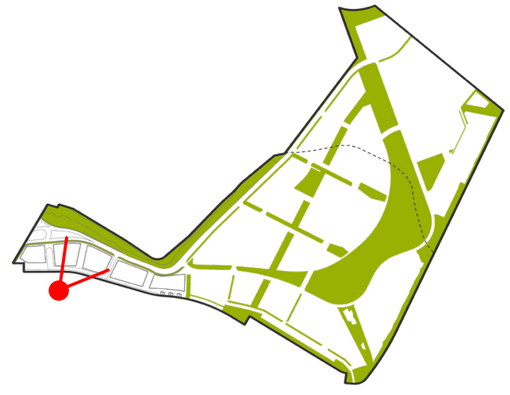
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

Terrace, Orient Heights
52-44 Vallar Rd, Boston, MA 02128



Source: cbt

Figure 3.35
Perspective from Villar Avenue

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Photo
07/19/18, CREDIT: CBT

Residential View Corridor, Orient Heights
44 Waldemar Avenue, Boston, MA 02151

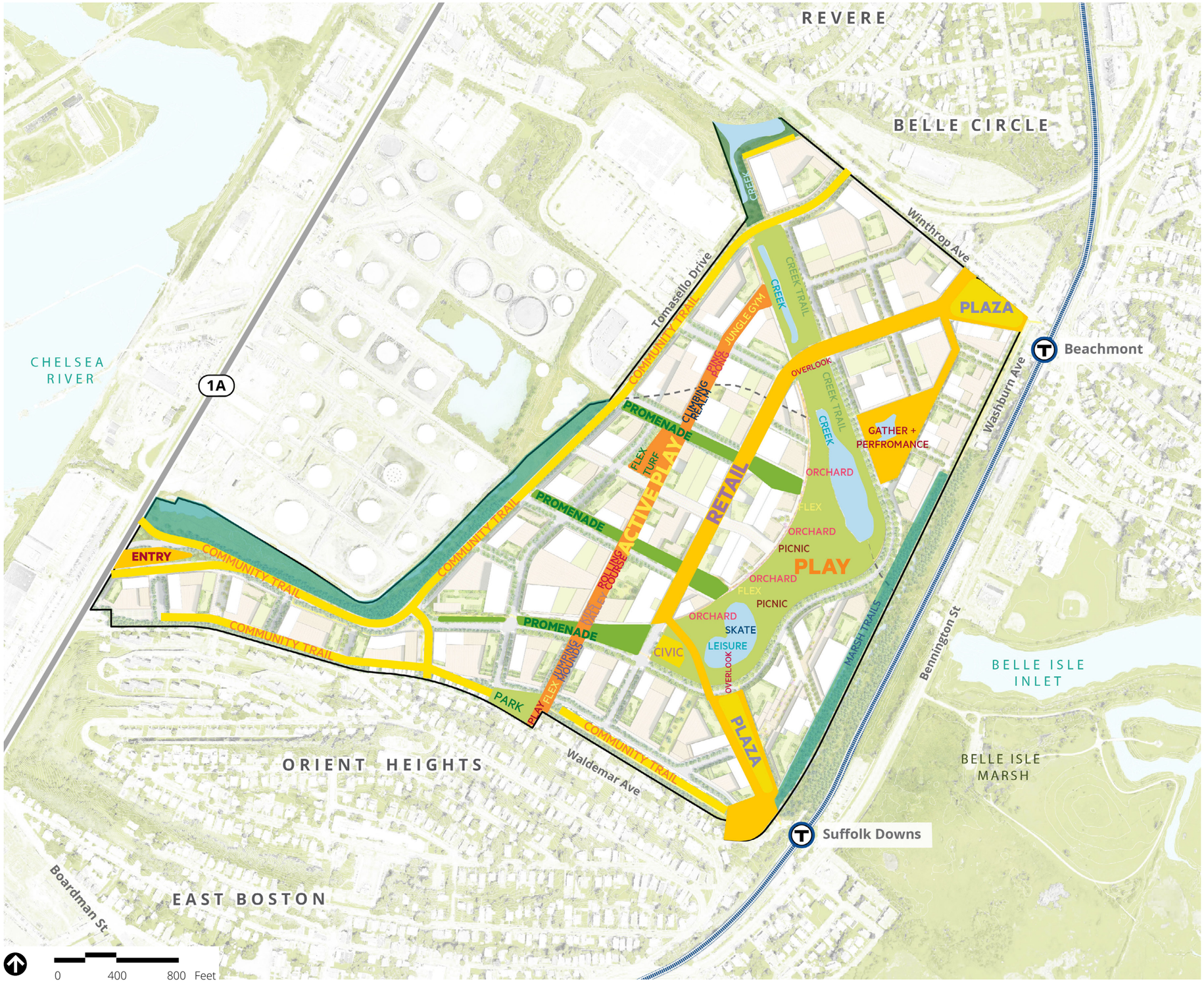


Source: cbt

Figure 3.36
Persepctive from 44 Waldemar Avenue

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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- Central Common and Parks
- Green Fingers
- Passive Trails
- Community Trails
- Active Linear Park
- Plaza and Promenade

Source: cbt + Stoss Landscape Urbanism

Figure 3.37
Program Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



HafenCity, Hamburg Germany CREDIT: MIRALLES TAGLIABUE



Circle Rules Football, Prospect Park Brooklyn New York CREDIT; CLUB WAKA



Ultimate Frisbee CREDIT: STOSS



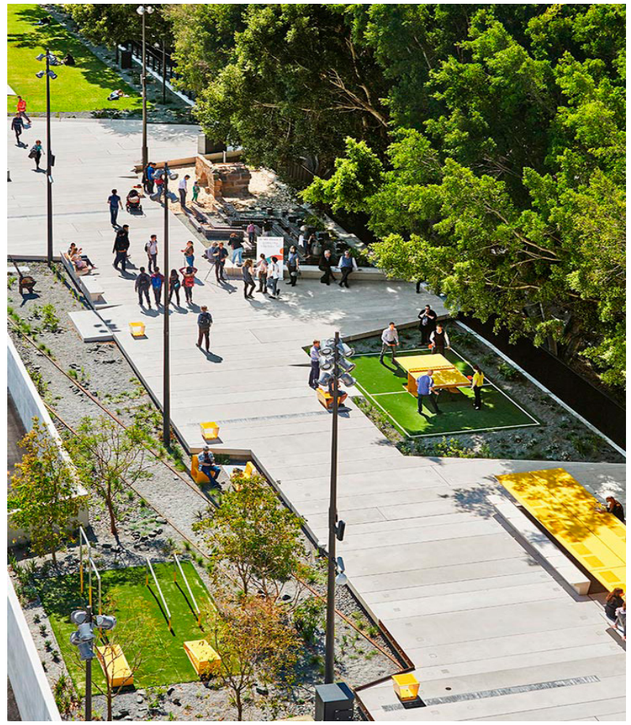
Source: cbt + Stoss Landscape Urbanism

Figure 3.38
Open Space Network - Central Common

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Buga 05 Playground, Munich Germany CREDIT: PLAYGROUND DTSA



The Goods Line, Sydney Australia CREDIT: ASPECT STUDIOS



East End, NSW Australia CREDIT: TAYLOR BRAMMER LANDSCAPE ARCHITECTS



The Goods Line, Sydney Australia CREDIT: ASPECT STUDIOS



Source: cbt + Stoss Landscape Urbanism

Figure 3.39
Open Space Network - Active Liner Park and Buffers

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Source: cbt + Stoss Landscape Urbanism

Figure 3.40
Outdoor Theater

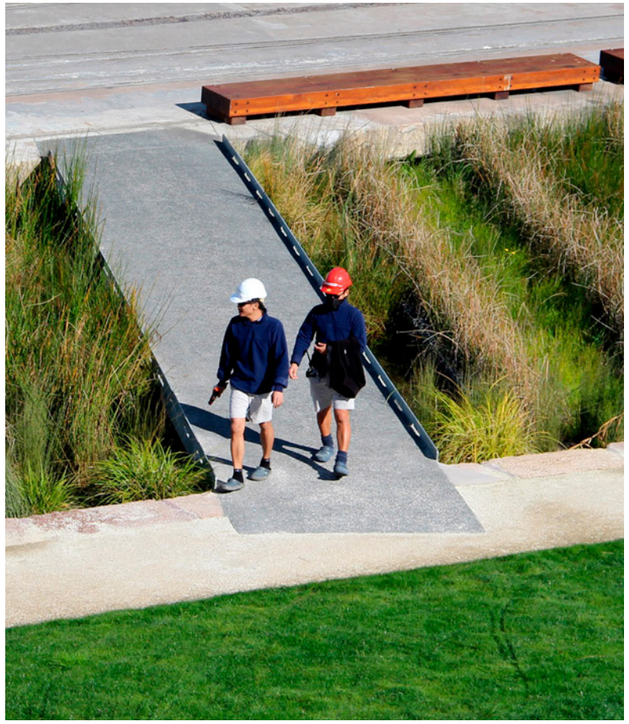
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Cloud Paradise Park, Chengdu China CREDIT: Z+T STUDIO



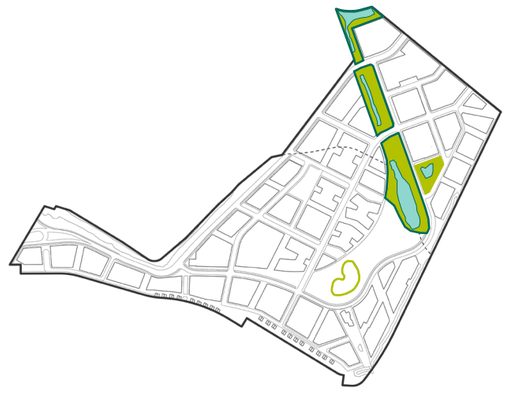
Minghu Wetland Park, Liupanshui City China CREDIT: TURENSCAPE



North Wharf Promenade, Auckland New Zealand
CREDIT: TAYLOR CULLITY LETHLEAN



Vandell Preserve, Cumberland Marsh, Virginia
CREDIT: THE NATURE CONSERVANCY



Source: cbt + Stoss Landscape Urbanism

Figure 3.41
Open Space Network - Sales Creek and Horshoe Pond

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Hunter's Point South, New York CREDIT: CANNONCORP ENGINEERING



Guthrie Green, Oklahoma CREDIT: SWA GROUP



21st Street, Pasa Robles California CREDIT: ARUP



Source: cbt + Stoss Landscape Urbanism

Figure 3.42
Open Space Network - Green Fingers

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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2 yr storm event
10 yr storm event
100 yr storm event

Source: cbt + Stoss Landscape Urbanism

Figure 3.43
Stormwater Management

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

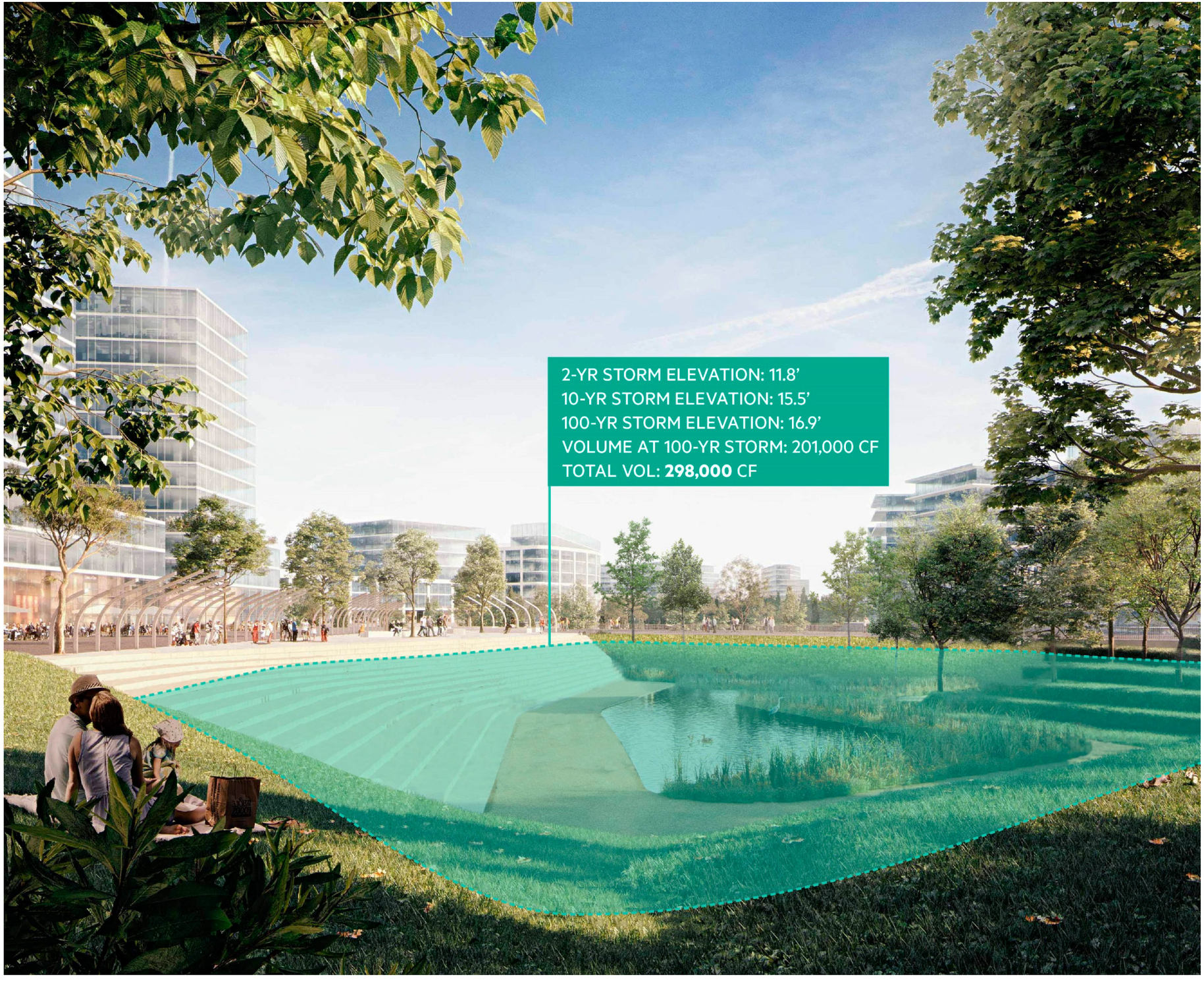




Source: cbt + Stoss Landscape Urbanism

Figure 3.44a
Outdoor Theater Stormwater Capture

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

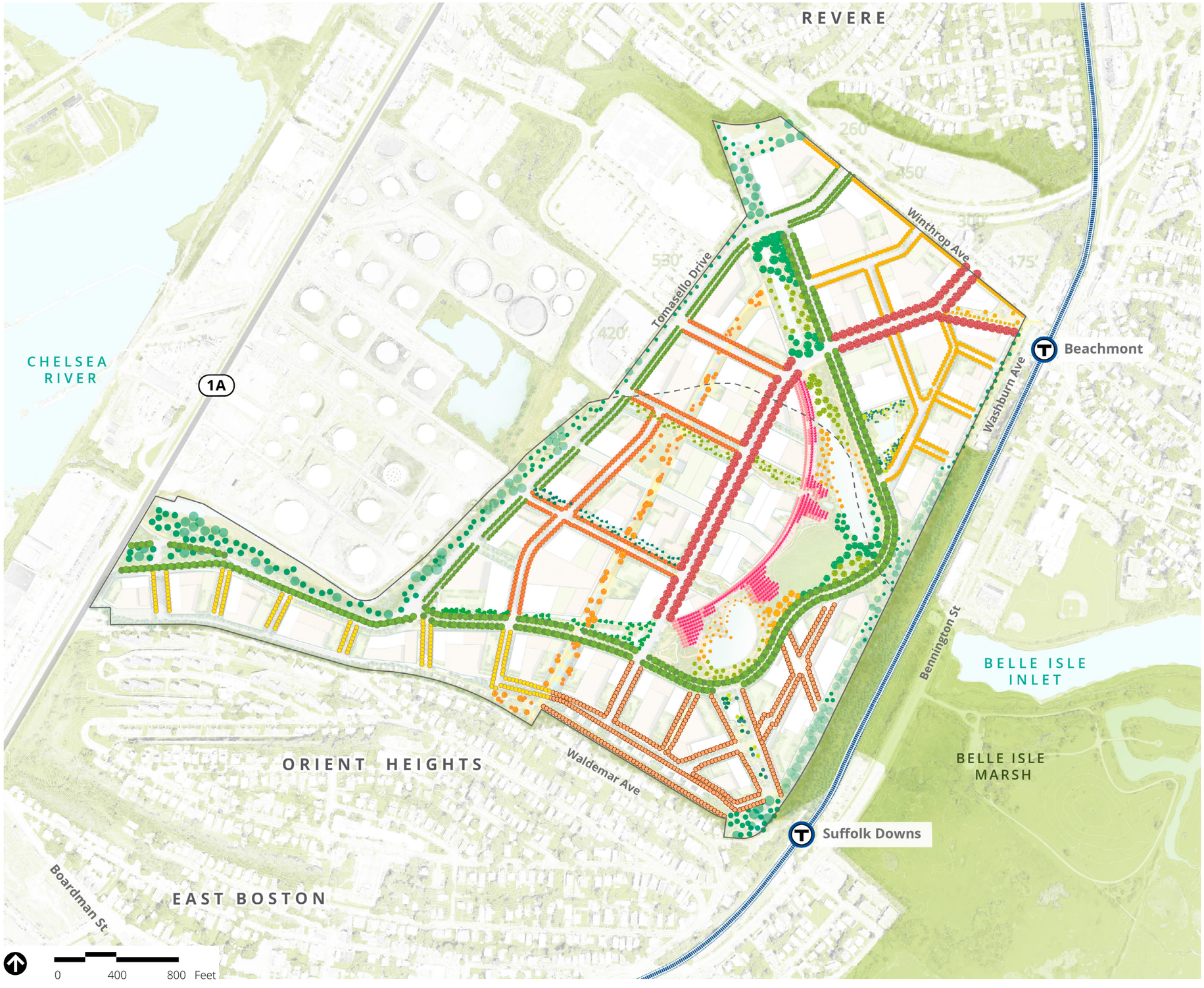




Source: cbt + Stoss Landscape Urbanism

Figure 3.44b
Outdoor Theater Stormwater Capture

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



- Orchard Tree
- Green Finger Tree
- Boulevard Tree
- Central Park Tree
- Beachmont Neighborhood
- Belle Isle Neighborhood
- Panhandle Neighborhood
- Tomasello Neighborhood
- Active Linear Park
- Main Street
- Plaza Tree

Source: cbt + Stoss Landscape Urbanism

Figure 3.45
Tree Planting and Urban Forest

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Source: cbt

Figure 3.46
Conceptual Open Space Phasing Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

4

Sustainability/Green Building

The following chapter describes the overall approach to sustainable design, construction, and operation for the Master Plan Project. Included is a detailed assessment of green building design, including analysis of compliance with the requirements of Article 37 of the Boston Code ("Article 37") relative to the City of Boston's Green Building policies and procedures.

As requested in the BPDA's Scoping Determination in response to the EENF/EPNF, this chapter includes information on the following topics:

- Green building design approach in compliance with applicable requirements, including Article 37 requirements;
- A long-term sustainability plan that includes incorporating energy efficiency strategies into building design, where feasible and reasonable, to contribute to the Commonwealth's goals of reducing carbon emissions and Boston's commitment to carbon neutrality by 2050, as well as energy efficiency goals applicable in Revere; and
- A discussion on the applicability of the LEED for Neighborhood Development Plan ("LEED-ND") rating system to the Master Plan Project conceptual plan and design.

Chapter 7, *Greenhouse Gas Assessment*, discusses how the conceptual design of the Master Plan Project and its building typologies include measures to reduce overall energy usage and associated stationary source GHG emissions in support of GHG reduction goals set by both the Commonwealth and both the cities of Boston and Revere, including a feasibility analysis of on-site clean/renewable energy sources.

4.1 Summary of Key Findings and Benefits

Given its scale, redevelopment of the Project Site presents a unique opportunity to incorporate sustainable design and climate change resiliency elements in a comprehensive manner from the early planning stages. Sustainability is a key theme for the Master Plan Project, including the Phase 1 Project as it proposes to redevelop an underutilized urban site, use land efficiently by increasing density in a mixed-use TOD and include facilities/systems internal to the Project Site that aim to discourage single-occupancy vehicles and promote low carbon modes of transportation.

The key findings related to sustainability include:

- The Master Plan Project will exceed requirements necessary to comply with Article 37 of the Boston Code, including through design of buildings to meet

LEEDv4 under the applicable green building rating system for the given building typology. The future buildings in Revere will be designed to the same LEED Standards as buildings in Boston.

- The Proponent has committed to having 50% of the buildings developed as part of the Master Plan Project satisfy requirements for a minimum LEED Gold level and 50% of the buildings satisfy requirements for a minimum LEED Silver level.
- The Master Plan Project will contribute to the City of Boston's goal for carbon neutrality by 2050 through a long-term sustainability plan is organized around three (3) major sources of GHG emissions: buildings, transportation, and waste, which are aligned with the City of Boston's reporting of its GHG emissions. As noted, the future buildings in Revere will be designed to the same LEED standards as buildings in Boston.
- The Master Plan Project is being designed to be consistent with the intent of many of the credits and strategies defined in the LEEDv4 for Neighborhood Development Plan rating system and, thus, is expected to result in a better more sustainable and well-connected neighborhood district.

4.2 Regulatory Context

The following sections provide an overview of the state and local regulatory context related to sustainability/green building design, energy efficiency and GHG emissions, and climate change resiliency.

4.2.1 Article 37 of Boston Zoning Code

Article 37 submittal requirements include completing a LEED scorecard to demonstrate that a project is being designed and constructed to achieve the level "certified" using the LEED building rating system most appropriate for the Project, without requiring the Proponent to register and/or certify the project through a third-party verification process, and following demonstration the project is designated as "LEED Certifiable" under Article 37. With the LEEDv4 rating system effective as of October 31, 2016, the BPDA requires initial Article 80-B, Large Project Review submissions to demonstrate LEED Certifiable status using LEEDv4.

The BPDA transmits completed LEED submissions to the Boston Interagency Green Building Committee ("IGBC"), which advises the BPDA on a proposed project's compliance with the provisions of Article 37. The IGBC consists of representatives of city agencies, including the BPDA, Boston Environmental Department, Boston Transportation Department, the Inspectional Services Department and the Mayor's Office.

Boston Green Building Credits

Appendix A of Article 37 lists Boston Green Building Credits, which are credits that may be included in the calculation toward achieving a LEED Certifiable project. These credits were developed by the City of Boston and are intended to address certain local issues

relevant to development within Boston. The credits include the following categories: Modern Grid, Historic Preservation, Groundwater Recharge, and Modern Mobility.

4.2.2 City of Boston's Carbon Neutral by 2050 Initiative

In June 2017, Mayor Walsh committed to efforts to become carbon neutral by 2050. The first step in Boston's commitment is Carbon Free Boston. The initiative includes working with Boston University's Institute for Sustainable Energy and the Green Ribbon Commission to analyze the options to achieve carbon neutrality by 2050 across four sectors: buildings; energy; transportation; and waste. Buildings currently account for 75% of the City of Boston's GHG emissions and, therefore, are key to achieving its commitment. In the fall of 2018, the City of Boston plans on issuing a report with recommendations for policies to meet the stated goals. As noted, the future buildings in Revere will be designed to the same LEED standards as buildings in Boston.

4.3 Master Plan Project Long-Term Sustainability Plan

Given the length of time for the full build of the Master Plan Project to be completed, a long-term sustainability plan has been developed that addresses performance and how the Master Plan Project will contribute to the City of Boston's goal for carbon neutrality by 2050. The proposed sustainability plan is organized around three (3) major sources of GHG emissions: buildings, transportation, and waste, which are aligned with the City of Boston's reporting of its GHG emissions. Per the City of Boston's 2015 GHG emission reporting, buildings represent 75% of Boston's GHG emissions, whereas transportation represents 24% and wastewater only 1%. As noted, future buildings in Revere will meet the same sustainability standards as buildings in Boston.

The proposed long-term sustainability plan identifies strategies and technologies that will be implemented early in the Master Plan Project, as well as ones that will be studied over time to determine feasibility. The approach recognizes that technology and systems that are not cost-effective and feasible today may be cost-effective in the near- to long-term future.

A key component to the long-term sustainability plan is to significantly reduce if not fully eliminate scope 1 emissions, i.e. on-site combustion from energy sources such as natural gas, diesel, biodiesel and/or gasoline, and transition these energy demands to electricity generated either on-site via renewables or imported from the electricity grid (i.e., scope 2 emissions). This electrification strategy is supported by the 2008 Global Warming Solutions Act requiring the electric grid reduce its GHG emissions by 80% by 2050.

Transportation

The Project Site is well connected to existing public transportation, with two (2) Blue line stations and multiple MBTA bus lines (refer to Chapter 6, *Transportation*). To

further reduce GHG emissions associated with transportation, the following strategies have been identified for the Master Plan Project:

- Provision of an on-site bus shuttle system with an inner and outer loop to better connect the Project Site with the Blue Line stations. The Proponent will explore the feasibility of providing an electric internal shuttle bus fleet to eliminate scope 1 emissions and reduce air quality emissions associated with the Project Site.
- The Proponent will also explore the possibility of establishing off-site shuttle routes as the Master Plan Project is built-out serving the following destinations:
  - South Station
  - Seaport District
  - North Station
  - Chelsea Station (Commuter Rail/Silver Line Station)

  These routes would further connect those who live, work, and play at the Project Site with the regional transportation network, with the intent to reduce personal automobile use to access the Project Site. In addition, the Proponent is working with MassDOT and the MBTA to explore further MBTA transit connections to the Master Plan Project, including Silver Line connections and/or additional MBTA bus routes.
- The Master Plan Project incorporates an extensive 5.5-mile network of cycle track and on street bike lanes, Hubway Stations and bikeshare to promote bicycle usage.

  Additionally, the Proponent is working to understand the opportunities for extending the East Boston Greenway to Revere Beach Park with a multi-use path to reduce automobile use.
- The Master Plan Project is implementing reduced parking ratios at the Project Site to discourage auto usage. Also, the Proponent will be evaluating parking ratios as each parcel is developed to reflect the changing demands for automobile use that is anticipated over time to be reduced.
- For the parking that will be provided in the near-term, the Proponent is committed to providing at least 2% of parking spaces with electric vehicle (EV) charging stations. The number of EV charging stations will be evaluated as each parcel is developed to reflect changes in automobile fleet, increasing the demand for charging stations with the intent of increasing the percentage of spaces as the market demands.
- The Proponent will explore providing EV charging stations at street parking locations in addition to spaces in parking garages. The street infrastructure will be planned to accommodate future charging stations.
- Currently the Proponent has been allowing the testing of autonomous vehicles within existing surface parking lots at the Project Site. Going forward the Proponent will explore possible future testing of autonomous vehicles on the Project Site as it is built out.

Waste

While a small proportion of GHG emissions, there are steps to take to contribute to the Commonwealth's waste ban, the City of Boston's Zero Waste Boston initiative, and Revere's waste reduction goals. The Master Plan Project will provide recycling storage and collection at each building for typical recyclables such as glass, plastics, paper, cardboard and metal. The Proponent will also explore additional strategies such as semi-annual E-waste collection and partnering with off-site compost partners.

Buildings

Buildings represent the largest portion (75%) of the City of Boston's and the City of Revere's GHG emissions. As such, reducing GHG emissions with buildings will be the most significant contributor to Carbon Free Boston and achieving similar goals in Revere. The following strategies have been identified to reduce GHG emissions in the long term, which focuses on demand reduction and electrification:

- **LEED Buildings.** All buildings in the Master Plan Project will exceed Article 37 compliance for green building design. The Proponent is committed to targeting 50% of the buildings to meet requirements for LEED Gold or better and 50% of the buildings to meet requirements for LEED Silver. Refer to Section 4.4 below for more information, and Figures 4.1 through 4.5 for the draft LEED checklists by building typology.
- **On-site Renewable Energy.** Solar PV analysis has been undertaken for the Master Plan Project. A simple payback analysis indicates paybacks of approximately 11.5 years depending on the building typology and size of PV system. Refer to Section 7.3.6 of Chapter 7, *Greenhouse Gas Assessment*, for an evaluation of on-site renewable energy opportunities.

  Given the changing incentive marketplace for solar PV and the length of time for the Master Plan Project to be completed, solar PV systems will continue to be assessed for their feasibility as the design for individual buildings move forward. Rooftop solar PV systems will also be assessed against the need for usable and/or green roof area as the design of individual buildings advances. Should future analyses show that rooftop solar PV is not feasible for a particular building, the building will be constructed to be solar-ready meaning: (1) the roof structure will be capable of supporting such a system; (2) a pathway for conduit routing is identified; and (3) space in the main switchgear will be provided for a future PV breaker. Additionally, the work completed for the Phase 1 Project as part of the EENF/EPNF demonstrated that solar thermal had a significantly longer payback period (22 years) than a solar PV system (10-12 years). As such, solar PV is a better use of valuable roof area and capital and will continue to be evaluated as individual building projects progress.
- **District Energy/Microgrid.** At the request of the BPDA, the Proponent is currently evaluating the potential of a district energy/microgrid system. Should a district

energy/microgrid system be developed as part of the Master Plan Project, it would have the potential to provide thermal energy to major portions of the Master Plan Project in a more energy efficient manner while also producing electricity to offset consumption from the electric grid and improve resiliency. In addition, on-site renewable energy, such as solar and geothermal will be explored as part of a potential district energy/microgrid system. Please see Section 7.3.6 of Chapter 7, *Greenhouse Gas Assessment*, for additional detail on the district energy/microgrid analysis.

- **Energy Storage.** In conjunction with the assessment of potential on-site renewable energy and a potential district energy/microgrid system, the Proponent will also evaluate the potential of on-site energy storage. While energy storage systems are in their infancy in terms of technology and market penetration, there are significant initiatives underway by the Massachusetts Clean Energy Center to pilot and demonstrate this technology in the near future. It is likely that application of this technology will accelerate in the next 5-10 years.

  Aside from energy demand management and cost savings, energy storage systems have the potential to enhance resilience of a building as well by providing dispatch-able electricity should there be a failure in electrical service. Again, given the length of time for the Master Plan Project to be completed, as the technology develops and individual buildings develop, energy storage systems will be evaluated for their feasibility.
- **Resilience.** Each building will further define resilience requirements as the design develops and respond to updated climate change information for storm surge/sea level rise, temperature (both extreme heat and cold) and precipitation as it becomes available. Requirements include defining shelter-in-place or rapid recovery scenarios for each building and developing appropriate strategies to provide electricity, heating, ventilation and cooling (as needed), water, sewer and network/data services.
- **Emerging Technologies & Building Practices.** As individual buildings are developed, the Proponent will evaluate emerging technologies & building practices including the potential of passive house design, efficient and low carbon HVAC systems, and cross laminated timber (CLT) systems. Additional detail on these types of new technologies are below.
  - *High Performance Passive House Residential* - There are five principles of a Passive house design; (1) air tight building envelope, (2 & 3) high thermal performance of walls, roof and windows, (4) thermal bridge free design and (4) ventilation with heat recovery. The Passive House Institute US (PHIUS) offers certification of buildings. The intent of a Passive House design is to achieve a very low energy building with a focus on the building envelope such that it could achieve very low energy use or even net zero energy use with the addition of a renewable energy system(s).

    The energy modeling explored a Passive House scenario for the mid-rise residential typology and resulted in considerable energy savings from the base case. Refer to Section 7.3.4 of Chapter 7, *Greenhouse Gas Assessment*, for

further discussion on Passive House. Passive House Residential buildings would contribute to very low energy performance for this building typology and mitigate new GHG emissions associated with new construction growth.

- *Efficient and Low-carbon HVAC systems* - As individual buildings develop and building system technology advances, the HVAC system selections are typically revisited from those initially identified in the early energy modeling based on conceptual design with the goal of improving energy efficiency and reducing scope 1 emissions from on-site combustion.
- *Cross Laminated Timber (CLT)* – The use of embodied carbon of materials, such as CLT, will be considered, where feasible for structural systems. CLT has been used in some limited applications recently in mid-rise construction but is particularly well-suited for low-rise buildings.

› **Utility Engagement and Incentives.** The Proponent is aware that the local electricity and natural gas service providers may potentially offer technical assistance and incentives for implementing energy efficiency measures. The Proponent has begun initial conversations with the utility companies to date as the Master Plan Project is still in very early stages of development and building designs are conceptual. Refer to Section 7.3.7 of Chapter 7, *Greenhouse Gas Assessment*, for a discussion on utility outreach and possible energy efficiency incentives.

It is recognized that the incentives and programs will change over the course of the build-out of the Master Plan Project and as such, engagement with service providers will be important to understand what is available at a given time for each development phase. The Proponent is committed to engaging the service providers as each development phase/building moves forward into design.

› **Carbon Offsets and Renewable Energy Procurement.** Offsets and off-site renewable energy procurement may be required to reach carbon neutrality by 2050. The strategies discussed above would significantly reduce the GHG emissions associated with the Master Plan Project, but would likely not achieve a 100% reduction on-site. As such, off site carbon-free electricity procurement and/or carbon offsets for remaining on-site scope 1 emissions would be explored to achieve carbon neutrality.

› **Health & Wellness.** Health and Wellness certification schemes have developed within the past five (5) years to focus on optimizing human outcomes as a complement to environmentally-focused certification schemes, such as LEED and Passive House.

Each building will consider achieving a health and wellness certification, such as the WELL Building Standard or Fitwel at the beginning of the design phase and assess its feasibility. Should certification not be pursued, individual health and wellness strategies may be implemented across air quality, materials health, fitness and active design, nourishment and comfort (i.e. thermal, acoustic, visual, olfactory and ergonomic).

4.4 Sustainability/Green Building Design Approach

Sustainability is a key theme for the Master Plan Project as it proposes to redevelop an underutilized urban site, reuse land efficiently by increasing density in a mixed-use TOD, and provide for infrastructure/systems internal to the Project Site that aim to discourage single-occupancy vehicles and promote low-carbon modes of transportation.

The Master Plan Project has developed a holistic approach to sustainability through strategies that address the Project Site, water efficiency, energy efficiency, materials, indoor environmental quality and resilience. The Master Plan Project intends to track sustainable features and demonstrate compliance with the LEEDv4 rating system, in accordance with Article 37. The Master Plan Project typologies, which are conceptual in design, are primarily LEED Certifiable to LEED Silver (50-59 points) or Gold certifiable (60-79 points) range of points. The Proponent will be targeting LEED Gold or better for at least 50% of the buildings and minimum LEED Silver for the remainder of the buildings. Specific LEED certifiable target levels will be determined as each building moves forward.

As part of the sustainable design approach, LEED for Neighborhood Development ("LEED-ND") has been assessed and is discussed in Section 4.5 below.

4.4.1 Master Plan Project Sustainable Design Strategies

This section demonstrates how the Master Plan Project will apply LEEDv4 ratings systems to each of the four (4) key building typologies, as follows:

- **Office:** LEED for Core & Shell Developments (LEED-CS), which represents 51% of total square footage and 19 buildings;
- **Multi-Family Residential:** LEED for New Construction and Major Renovations (LEED-NC), which represents 45% of total square footage and 23 buildings;
- **Hotel:** LEED-NC for Hospitality, which represents 3.5% of total square footage and 3 buildings; and
- **Retail Pavilions (standalone):** LEED for Retail, which represents 0.5% of total square footage and 3 buildings.

Refer to Figures 4.1 through 4.4 for updated draft LEED checklists by building typology and LEED rating system. Except for the standalone retail typology, all building types achieve a LEEDv4 certifiable Silver level at the conceptual master plan level. All checklists also indicate enough possible points to achieve the next highest level of certification, i.e. Gold certifiable for Office, Residential, and Hotel, and Silver certifiable for Retail. Each building typology in the Master Plan Project is pursuing a variety of credits and points across the eight (8) LEEDv4 credit categories, as well as the Boston Green Building Credits under Article 37, as discussed further below. As noted, future buildings in Revere will meet the same sustainability standards as buildings in Boston.

LEED Master Site Credit Approach [All Typologies]

The LEED Certifiable compliance approach for the Master Plan Project includes an overall LEED master site approach that identifies and addresses applicable site-wide credits across the proposed buildings. This approach is useful in streamlining LEED credit documentation for projects that include multiple new buildings with shared infrastructure, pedestrian-oriented circulation, and extensive open space. Under this approach, each future building would then automatically achieve the site-wide credits, as applicable to the building-specific rating system.

Integrative Process [All Typologies]

All building typologies of the Master Plan Project will work in an integrated manner to define sustainability and LEED goals for each individual building or set of buildings within a development phase. The Proponent has conducted early conceptual phase energy modeling across all building typologies, as well as three to five alternative design scenarios to establish energy goals and will develop a water budget. The initial approach is at least a 50% reduction in outdoor water use and 30-35% reduction in indoor water use depending on the building typology.

As the design for individual buildings move forward, the Proponent and its project team will continue to work in an integrated manner. Initially, the team will hold a series of sustainability focused workshops (typically three) through schematic design phase to define the project goals, identify strategies for further analysis, and integrate optimal strategies into the design should they prove cost effective. Typically, this includes additional analysis where building models are shared between the team members in addition to specification coordination. Additionally, a LEED consultant will be engaged for projects to lead the LEED evaluation process, monitor and track the goals established in the schematic design phase and enhance sustainable outcomes. Typically, this includes at least one design review in the design development and construction document phases of work as well as continued engagement with the project team members. The LEED consultant also coordinates specification language aligned with LEED prerequisite and credit criteria with the project team members as appropriate for the project. This coordination carries through to the Contractor to be engaged with the achievement of the project LEED and sustainability goals, related to construction activities.

Location and Transportation [All Typologies]

As described in Chapter 3, *Urban Design*, the Master Plan Project is a TOD that will seek to encourage low-carbon, non-automobile transportation by encouraging walking, biking, and utilizing public transit to access the Project Site. In general, the following strategies are applicable to all building typologies.

› Provide for dense, mixed-use development with a diverse range of retail options and services for key necessities located on previously developed land while retaining a significant amount of existing on-site open space area.

- Locate development within ¼-mile of the existing, dense residential neighborhoods of Orient Heights in East Boston and Beachmont in Revere as well as being close to numerous diverse uses recognized by LEED requirements. Achievement of points under this credit will vary by building depending on individual building construction in the overall Master Plan Project as site density and number of diverse uses will increase over time.
- The Project Site is located in an area served by public transportation, including two Blue Line Stations (Suffolk Downs and Beachmont), both of which are adjacent to the Project Site, with the vast majority of the Project Site within a ½-mile walk of these stations.

  Additionally, three bus lines (450, 459, and 119) are located within a ½-mile walk with stops on William McClellan Highway and servicing the Beachmont MBTA Station (119 route).
- As the Master Plan Project is built out, an internal bus shuttle system with an inner and outer loop is planned to better connect the site with the Blue Line stations. In addition, the Master Plan Project will be adding new shuttle routes to South Station, Seaport District, North Station and the Chelsea Station (Commuter Rail/Silver Line.) Achievement of points under this credit will vary by building depending on its construction in the overall Master Plan Project as transit frequency and provision will increase over time.
- Signage showing arrival times for buses will be installed and maintained at Beachmont Square and Belle Isle Square to encourage the use of public transit.
- The Master Plan Project intends on providing low-carbon transportation within the Project Site to enhance mobility internally, as well as encourage use of public transportation (through improved access to and implementation of Transportation Demand Management ("TDM") Plan) and minimize demand for on-site infrastructure for single occupancy automobiles through a shared parking approach.
- Incorporating bicycle facilities throughout the Project Site, including storage and changing facilities in individual Office, Residential, and Retail buildings, as required by LEED, and internal bike connections/lanes, and provide off-site connections, including identifying options for a pathway to connect the East Boston Greenway to Revere Beach with connections from the Project Site to this new extended East Boston Greenway.
- Incorporate five (5) Hubway Bike Stations, one adjacent to each of the Blue Line Stations and three within the interior of the larger site. In addition, dock less bike systems will also be evaluated for potential use at the Project Site to the extent permissible.
- Incorporate EV supply equipment in two percent of the parking spaces proposed within the building. These spaces will be clearly identified and reserved for plug-in EVs. Additionally, preferred parking will be designated for low-emitting/fuel-efficient vehicles.

Sustainable Sites

The Master Plan Project will be developed with Low Impact Development ("LID") principles and Best Management Practices ("BMPs"). The following strategies are applicable to all building typologies except where noted.

- Develop and implement an erosion and sedimentation control plan for all construction activities for the individual buildings and/or development phases.
- Incorporate green infrastructure strategies into the landscape plan to manage on-site stormwater and improve overall water quality.
- Utilize stormwater re-use strategies throughout the Project Site to reduce potable water demands on the municipal stormwater system.
- Create an approximately 40-acre publicly-accessible open space network within the Master Plan Project with active and passive recreation, as described more fully in Section 3.9 of Chapter 3, *Urban Design*.
- Reduce heat island effect through a combination of strategies, including an urban forest strategy and the use of hardscape materials with a low solar reflectance and high-albedo roofing materials. As described in Section 3.9.4 of Chapter 3, *Urban Design*, a robust tree canopy within the Central Common and at points along the Parkway, Active Linear Park, Green Fingers, and main roadways, as well as within other open space areas will be established to provide shade and complement the large amount of on-site open space. Further, green roof areas will be evaluated as the design of each building advances and compared against providing rooftop solar PV systems.
- Design site lighting to meet the up light and light trespass requirements for all applicable exterior luminaires to comply with all internally illuminated signage requirements.
- For the office, retail, and residential building typologies, develop and implement tenant design and construction guidelines to educate tenants on sustainable fit-out design strategies, and provide a guidance document describing the sustainable strategies in the base building design. (Note, one point may also be achieved as an ID credit for developing tenant guidelines for the multi-family residential buildings.) Refer to Section 7.3.5 of Chapter 7, *Greenhouse Gas Assessment,* for full details on guidelines.

Water Efficiency

The Master Plan project will be developed so that potable water will be used efficiently both outdoors and indoors. The following strategies are expected to be applicable to all building typologies except where noted.

- Reduce outdoor water use for landscape requirements by over 50 percent through the use of non-potable water for irrigation, selection of drought-tolerant plantings and water efficient irrigation systems (if provided).

- Reduce indoor potable water use through the use of low- and ultra-low flow water fixtures.
- Install water metering to sub-meter end uses.
- To reduce potable water demand portions of stormwater will be collected and reused for landscape irrigation.
- Where applicable and feasible, opportunities for rainwater harvesting for cooling tower make-up will be assessed for its cost-effectiveness.

Energy, Atmosphere & GHG Emissions

As demonstrated in Section 7.3.2 of Chapter 7, *Greenhouse Gas Assessment*, the Master Plan Project buildings will be designed to be energy efficient, thus, minimizing GHG emissions associated with building energy usage. Over the life of the Master Plan Project, the buildings will be operated and maintained in an efficient manner. The following strategies are expected to be applicable to all building typologies except where noted.

- Incorporate ECMs into building design to exceed the Stretch Energy Code.
- Select refrigerants that are non-ozone depleting and have low global warming potential.
- Evaluate passive design strategizes, such as building orientation.
- Consider incorporation of on-site renewable energy systems, such as rooftop solar PV on a building by building basis.
- Conduct outreach to energy utility companies to utilize energy efficiency incentive programs, where applicable and available.
- Implement enhanced commissioning activities, including building envelope commissioning and, potentially, monitoring-based commissioning as designs for individual buildings/projects develop.
- For the Office and Retail building typologies, explore the installation of metering for all base building energy sources and for future tenant spaces to enable metering energy consumption for all systems dedicated to their space. Residential buildings will implement unit level metering for electricity and water such that tenants receive bills and pay directly for their own consumption.

Materials and Resources [All Typologies]

Materials will be selected for their health and life cycle environmental impacts, as well as require recycling in operation and for construction activities. The following strategies are expected to be applicable to all building typologies.

- Aim to divert and/or recycle 75 percent of the applicable construction and demolition material, across four material streams.
- Select materials with high levels of recycled content, considered to be regional materials, and FSC-certified wood.

- Select materials with transparency declarations, such as health product declarations (HPDs), declare labels and/or cradle to cradle certification to enable the Proponent and its project team to make informed decisions about products.
- Select materials with Environmental Product Declarations (EPDs) to enable the Proponent and its project team to make informed decisions about products.

Indoor Environmental Quality [All Typologies]

Strategies to provide a healthy and comfortable indoor environment for all building typologies are expected to include:

- Install entryway systems and MERV 13 or higher filters, where feasible or appropriate, to minimize cross-contamination to enhance indoor air quality.
- Specify low-emitting materials that meet low-VOC content and general emissions testing requirements.
- Designing to thermal comfort standards per ASHRAE 55 and comfort controls where feasible.
- During construction, the construction manager will be required and responsible for developing and implementing an indoor air quality management plan during construction and pre-occupancy that meets SMACNA guidelines.
- Designing for daylight, views, and interior lighting and lighting controls to create visually comfortable spaces for most occupants.

Innovation & Design Process

As development phases move forward, the Proponent and its project team will explore Innovation & Design Process ("ID") credits. Likely applicable credits include implementation of tenant guidelines (for multi-family residential), green building education for future users, green cleaning policy and program, active design, and/or pest and waste management. The project team may also consider the application of LEED-ND credits, where applicable (discussed in Section 4.5 below). Additionally, a LEED AP BD+C accredited professional will be a part of the design team.

Regional Priority Credits

The Regional Priority Credits ("RPCs") applicable to the Master Plan Project include: Rainwater Management; Energy Performance (a minimum efficiency of 17%); Indoor Water Use Reduction; High Priority Site; and Renewable Energy (a minimum 3% of overall energy usage). The Master Plan Project may achieve the Rainwater Management RPC for all building typologies (dependent on detailed stormwater management calculations). Based on preliminary energy modeling, the Office and Residential typologies are likely to achieve the Energy Performance RPC.

Boston Green Building Credits

The Master Plan Project is exploring the achievement of three of the Boston Green Building Credits to support Article 37 compliance, as described below.

Modern Grid

Central Plant options have been explored for the Master Plan Project including co-generation and tri-generation. Refer to Section 7.3.6 of Chapter 7, *Greenhouse Gas Assessment*, for the evaluation of the applicability of district energy.

Groundwater Recharge

As discussed in Chapter 10, *Infrastructure*, opportunities for infiltration may be limited due to high groundwater and low permeability. However, Sales Creek appears to be the local groundwater discharge point, as well as the hydrogeologic divide on-site, which indicates that sufficient flow will be maintained to this system.

Modern Mobility

As discussed in Chapter 6, *Transportation,* the TDM strategies include meeting the prerequisites for transportation coordinator and association, sharing information on non-automotive options, and increasing bike storage and implementing appropriate parking ratios. The Proponent will continue to consider which high value and four basic strategies can be achieved as future buildings are realized.

4.5 LEED for Neighborhood Development Evaluation

The LEED-NDv4 rating system has been assessed for alignment with the Master Plan Project's proposed design. The LEED-NDv4 Development Plan has been used for this assessment, which is applicable for projects that are in any phase of planning up to 75% constructed. The following section is structured around the three (3) primary credit categories:

1. Smart location and linkage;
2. Neighborhood pattern and design; and
3. Green infrastructure and buildings.

The LEED-ND checklist is provided in Figure 4.5 indicates Gold level may be possible if 19 of 43 'maybe' points were achieved. The current checklist indicates 41 points which is a certified level. Overall, the Master Plan Project is aligned with the intent of LEED-ND, which will result in a more sustainable and well-connected neighborhood district.

4.5.1 Minimum Program Requirements

As currently planned, the Master Plan Project meets all three (3) minimum program requirements for LEED-NDv4 Development Plan:

› Must be in a permanent location on existing land.

- Must use a reasonable LEED boundary. The property line would be the anticipated LEED boundary.
- Must comply with project size requirements, i.e. contain at least two habitable buildings and be no larger than 1,500 acres. The Master Plan Project will have more than two buildings and is on the approximately 161-acre Project Site that includes portions of Boston and Revere.

4.5.2 Smart Location and Linkage

It is anticipated the Master Plan Project could meet all five (5) LEED-NDv4 Development Plan prerequisite requirements. The Master Plan Project is considered infill development on previously developed land that does not include critical facilities, such as a hospital, emergency operation center or fire/police station.

The Project Site has good public transportation access with two (2) blue line stations as well as multiple bus routes. It is also anticipated that as the Master Plan Project is developed, bus service will be brought into the Project Site and/or potentially additional routes. The Master Plan Project is also planned to meet Boston's complete streets program and will be designed for low-carbon multi-modal transportation, with an extensive bicycle network and bike share program(s) at multiple locations on the site.

The Master Plan Project is being designed for future climate and predicted sea level rise as portions of the Project Site are currently within the FEMA 100-year floodplain. As described in Chapter 8, *Climate Change Resiliency*, major portions of the Master Plan Project Site will be raised and re-graded targeting a design Finished Floor Elevation (FFE) aligned with BPDA recommendations to provide protection against storm surge and potential sea level rise impacts. Approximately 2 to 4 feet of fill is proposed to raise roadways and FFE for non-critical buildings to be at or above the forecasted 2070 base flood elevation for the highest emission scenario SLR projection, which has a 0.5% probability of being exceeded. Additionally, the approximately 40-acre open space network has been strategically designed to accommodate potential flooding impacts associated with predicted sea level rise to further protect the nearby buildings and areas outside the Project Site. Sales Creek is being preserved to serve as a critical component of the resilient open space network, and native, drought-tolerant and adapted plants and trees will be utilized to mitigate water demand and enhance habitat.

4.5.3 Neighborhood Pattern and Design

It is anticipated the Master Plan Project would meet the three (3) LEED-NDv4 Development Plan prerequisite requirements. The Master Plan is being designed to be a pedestrian-friendly, walkable neighborhood with active and passive recreation opportunities and an FAR of 2.4 across the Project Site.

Ground floor retail is planned to create activity 18/7/365 and intended to provide a range of services for the neighborhood. Street trees will be planted to provide shade

and an attractive streetscape. A mix of residential housing types are also planned from townhouses to work force housing, micro units to condominiums and senior housing to create a diverse neighborhood.

Transportation demand management strategies will be implemented to reduce personal automobile use as well as providing parking predominantly within the building footprint. No school is planned in the development, nor is any food production. There is potential for a farmers' market within the project and will be explored further as the project develops.

Extensive public outreach and meetings with the surrounding neighborhoods, residents and local organizations including frequent meeting with detailed presentations and interactive discussion in excess of City of Boston Article 80, City of Revere, and Commonwealth of Massachusetts requirements, have occurred to date and will continue to occur.

4.5.4 Green Infrastructure and Buildings

It is anticipated the Master Plan Project would meet all four (4) prerequisite requirements under LEED-NDv4 Development Plan, as these are indicated to be achieved as part of Article 37 for minimum building energy performance, indoor water use reduction and construction activity pollution prevention.

As part of compliance with Article 37, each building typology has been shown to be LEED-certifiable at varying levels of certification. For example, the Proponent has committed to delivering a LEED-CSv4 Gold level certifiable office buildings for the Phase 1 Project. The checklists indicate reduced potable water consumption for both outdoor and indoor water use and low impact development design elements as part of the rainwater management strategy.

In addition, the energy modeling completed to date has indicated each building typology would exceed the minimum energy code requirements at varying levels of reduction. Additionally, the feasibility of incorporating on-site renewable energy sources, including rooftop solar PV and district energy has been undertaken for the Master Plan Project. Refer to Chapter 7, *Greenhouse Gas Assessment*, for these studies.

Recycling facilities aligned with LEED prerequisite criteria will be provided at each building.

Heat island strategies for roof and non-roof areas are being explored for the Master Plan Project and include the use of light colored materials in appropriate location, provision of shade via trees and landscape design, as well as white membrane roof and green roof areas.

4.5.5 Innovation & Design Process

As design advances, the Master Plan Project will explore opportunities for Innovation & Design Process credits. Such credits could be specific to implementing:

- An integrative design process;
- Resilient site design;
- Bike sharing services with increased off-site connectivity; and/or
- Development of proposed credits aimed at tenant/operational sustainability measures.

4.5.6 Regional Priority Credits

Four (4) Regional priority credits are identified as potentially achievable by the current Master Plan Project design. These credits include: optimized building energy performance; transportation demand management; access to civic and public space; and housing types and affordability. As currently proposed, the Master Plan Project would not be able to achieve the other two (2) identified regional priority credits: building reuse; and brownfield redevelopment.

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LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: Suffolk Downs Redevelopment - OFFICE Typology
Date: 6/15/2018

Y	?	N			
1			Credit	Integrative Process	1

10	6	4		Location and Transportation	20
			Credit 1	LEED for Neighborhood Development Location	20
2			Credit 2	Sensitive Land Protection	2
		3	Credit 3	High Priority Site	3
3	3		Credit 4	Surrounding Density and Diverse Uses	6
3	3		Credit 5	Access to Quality Transit	6
1			Credit 6	Bicycle Facilities	1
		1	Credit 7	Reduced Parking Footprint	1
1			Credit 8	Green Vehicles	1

5	3	3		Sustainable Sites	11
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit 1	Site Assessment	1
		2	Credit 2	Site Development - Protect or Restore Habitat	2
	1		Credit 3	Open Space (30% Site Area incl. Bldg Footprint)	1
	2	1	Credit 4	Rainwater Management	3
2			Credit 5	Heat Island Reduction	2
1			Credit 6	Light Pollution Reduction	1
1			Credit 7	Tenant Design and Construction Guidelines	1

5	3	3		Water Efficiency	11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction (50% reduction or no irrigation system)	2
3		3	Credit 2	Indoor Water Use Reduction (3 pts = 35% reduction)	6
	2		Credit 3	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1

16	7	10		Energy and Atmosphere	33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5	1		Credit 1	Enhanced Commissioning	6
9	5	4	Credit 2	Optimize Energy Performance (9 pts = 19% energy cost savings)	18
1			Credit 3	Advanced Energy Metering	1
		2	Credit 4	Demand Response	2
	1	2	Credit 5	Renewable Energy Production	3
1			Credit 6	Enhanced Refrigerant Management	1
		2	Credit 7	Green Power and Carbon Offsets	2

4	3	7		Materials and Resources	14
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		6	Credit 1	Building Life-Cycle Impact Reduction	6
1	1		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1		1	Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit 5	Construction and Demolition Waste Management	2

6	2	2		Indoor Environmental Quality	10
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit 1	Enhanced Indoor Air Quality Strategies	2
2	1		Credit 2	Low-Emitting Materials	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
	1	2	Credit 4	Daylight	3
1			Credit 5	Quality Views	1

5	1	0		Innovation	6
4	1		Credit 1	Innovation	5
1			Credit 2	LEED Accredited Professional	1

1	1	2		Regional Priority	4
	1		Credit 1	Regional Priority: Rainwater Management (2 points)	1
1			Credit 2	Regional Priority: Energy Performance (8 pts = 17%)	1
		1	Credit 3	Regional Priority: Indoor Water Use Reduction (4 pts = 40% reduction)	1
		1	Credit 4	Regional Priority: High Priority Site or Renewable Energy (2 pts = 3%)	1

53	26	31	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Figure 4.1

Conceptual Master Plan LEED Scorecard
Office

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Suffolk Downs Redevelopment - RESIDENTIAL Typology
Date: 6/15/2018

Y	?	N			
1			Credit	Integrative Process	1

9	4	3	**Location and Transportation**		16
			Credit 1	LEED for Neighborhood Development Location	16
1			Credit 2	Sensitive Land Protection	1
		2	Credit 3	High Priority Site	2
3	2		Credit 4	Surrounding Density and Diverse Uses	5
3	2		Credit 5	Access to Quality Transit	5
1			Credit 6	Bicycle Facilities	1
		1	Credit 7	Reduced Parking Footprint	1
1			Credit 8	Green Vehicles	1

4	3	3	**Sustainable Sites**		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space (30% Site Area incl. Bldg Footprint)	1
	2	1	Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

4	4	3	**Water Efficiency**		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction (50% reduction or no irrigation system)	2
2	1	3	Credit	Indoor Water Use Reduction (1.1 gpf toilets + 1.8 gpm showers)	6
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

12	6	15	**Energy and Atmosphere**		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5	1		Credit	Enhanced Commissioning	6
6	4	8	Credit	Optimize Energy Performance (6 pts = 13% energy cost savings)	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
	1	2	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

4	3	6	**Materials and Resources**		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1		1	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit	Construction and Demolition Waste Management	2

11	4	1	**Indoor Environmental Quality**		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
2	1		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	1		Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
2	1		Credit	Daylight	3
1			Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

5	1	0	**Innovation**		6
4	1		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

0	2	2	**Regional Priority**		4
	1		Credit	Regional Priority: Rainwater Management (2 points)	1
	1		Credit	Regional Priority: Energy Performance (8 pts = 17%)	1
		1	Credit	Regional Priority: Indoor Water Use Reduction (4 pts = 40% reduction)	1
		1	Credit	Regional Priority: High Priority Site or Renewable Energy (2 pts = 3%)	1

50	27	33	**TOTALS**	Possible Points: 110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Figure 4.2

Conceptual Master Plan LEED Scorecard
Residential

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

LEED v4 for BD+C: Hospitality

Project Checklist

Project Name: Suffolk Downs Redevelopment - HOTEL Typology
Date: 6/15/2018

Y	?	N			
1			Credit	Integrative Process	1

8	5	3	Location and Transportation		16
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
3	2		Credit	Surrounding Density and Diverse Uses	5
3	2		Credit	Access to Quality Transit	5
	1		Credit	Bicycle Facilities	1
		1	Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

4	3	3	Sustainable Sites		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space (30% Site Area incl. Bldg Footprint)	1
	2	1	Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

6	3	2	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction (50% reduction)	2
3	1	2	Credit	Indoor Water Use Reduction (3 pts = 35% reduction)	6
1	1		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

11	5	17	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5		1	Credit	Enhanced Commissioning	6
5	5	8	Credit	Optimize Energy Performance (5 pts = 14% energy cost savings)	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
		3	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

5	2	6	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1		1	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management (50% or 75%)	2

11	4	1	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
2	1		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	1		Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
2	1		Credit	Daylight	3
1			Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

5	1	0	Innovation		6
4	1		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

0	2	2	Regional Priority		4
	1		Credit	Regional Priority: Rainwater Management (2 points)	1
	1		Credit	Regional Priority: Energy Performance (8 pts = 17%)	1
		1	Credit	Regional Priority: Indoor Water Use Reduction (4 pts = 40% reduction)	1
		1	Credit	Regional Priority: High Priority Site or Renewable Energy (2 pts = 3%)	1

51	25	34	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Figure 4.3

Conceptual Master Plan LEED Scorecard
Hotel

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: Suffolk Downs Redevelopment - RETAIL Typology
Date: June 2018

Y	?	N			
1			Credit	Integrative Process	1

13	3	4	Location and Transportation		20
			Credit 1	LEED for Neighborhood Development Location	20
2			Credit 2	Sensitive Land Protection	2
		3	Credit 3	High Priority Site	3
3	3		Credit 4	Surrounding Density and Diverse Uses	6
6			Credit 5	Access to Quality Transit	6
1			Credit 6	Bicycle Facilities	1
		1	Credit 7	Reduced Parking Footprint	1
1			Credit 8	Green Vehicles	1

5	3	3	Sustainable Sites		11
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit 1	Site Assessment	1
		2	Credit 2	Site Development - Protect or Restore Habitat	2
	1		Credit 3	Open Space (30% Site Area incl. Bldg Footprint)	1
	2	1	Credit 4	Rainwater Management	3
2			Credit 5	Heat Island Reduction	2
1			Credit 6	Light Pollution Reduction	1
1			Credit 7	Tenant Design and Construction Guidelines	1

4	2	5	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction (50% reduction or no irrigation system)	2
2	1	3	Credit 2	Indoor Water Use Reduction (2 pts = 30% reduction)	6
		2	Credit 3	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1

11	5	17	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5	1		Credit 1	Enhanced Commissioning	6
4	4	10	Credit	Optimize Energy Performance (4 pts = 12% energy cost savings)	18
1			Credit 3	Advanced Energy Metering	1
		2	Credit 4	Demand Response	2
		3	Credit 5	Renewable Energy Production	3
1			Credit 6	Enhanced Refrigerant Management	1

5	2	7	Materials and Resources		14
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		6	Credit 1	Building Life-Cycle Impact Reduction	6
1	1		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1		1	Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit 5	Construction and Demolition Waste Management	2

6	3	1	Indoor Environmental Quality		10
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit 1	Enhanced Indoor Air Quality Strategies	2
2	1		Credit 2	Low-Emitting Materials	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
	2	1	Credit 4	Daylight	3
1			Credit 5	Quality Views	1

5	1	0	Innovation		6
4	1		Credit 1	Innovation	5
1			Credit 2	LEED Accredited Professional	1

0	2	2	Regional Priority		4
	1		Credit 1	Regional Priority: Rainwater Management (2 points)	1
	1		Credit 2	Regional Priority: Energy Performance (8 pts = 17%)	1
		1	Credit 3	Regional Priority: Indoor Water Use Reduction (4 pts = 40% reduction)	1
		1	Credit 4	Regional Priority: High Priority Site or Renewable Energy (2 pts = 3%)	1

50	21	39	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Figure 4.4

Conceptual Master Plan LEED Scorecard
Retail

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name: Suffolk Downs Redevelopment
Date: JULY 2018

Yes	?	No				
11	**9**	**8**	**Smart Location & Linkage**			**28**
Y			Prereq	Smart Location - Yes + Option 3 Tranit Corridor	Required	
Y			Prereq	Imperiled Species and Ecological Communities	Required	
Y			Prereq	Wetland and Water Body Conservation	Required	
Y			Prereq	Agricultural Land Conservation	Required	
Y			Prereq	Floodplain Avoidance	Required	
5	2	3	Credit	Preferred Locations	10	
		2	Credit	Brownfield Remediation	2	
5	2		Credit	Access to Quality Transit	7	
1	1		Credit	Bicycle Facilities	2	
	1	2	Credit	Housing and Jobs Proximity	3	
	1		Credit	Steep Slope Protection	1	
		1	Credit	Site Design for Habitat or Wetland and Water Body Conservation	1	
	1		Credit	Restoration of Habitat or Wetlands and Water Bodies	1	
	1		Credit	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1	
16	**17**	**6**	**Neighborhood Pattern & Design**			**41**
Y			Prereq	Walkable Streets	Required	
Y			Prereq	Compact Development	Required	
Y			Prereq	Connected and Open Community	Required	
4			Credit	Walkable Streets	9	
5	1		Credit	Compact Development (FAR 2.4)	6	
2	2		Credit	Mixed-Use Neighborhoods	4	
2	2	3	Credit	Housing Types and Affordability	7	
	1		Credit	Reduced Parking Footprint	1	
	2		Credit	Connected and Open Community	2	
	1		Credit	Transit Facilities	1	
	2		Credit	Transportation Demand Management	2	
	1		Credit	Access to Civic & Public Space	1	
	1		Credit	Access to Recreation Facilities	1	
1			Credit	Visitability and Universal Design	1	
1	2		Credit	Community Outreach and Involvement	2	
	1	2	Credit	Local Food Production	1	
1	1		Credit	Tree-Lined and Shaded Streetscapes	2	
		1	Credit	Neighborhood Schools	1	

Yes	?	No				
11	**10**	**10**	**Green Infrastructure & Buildings**			**31**
Y			Prereq	Certified Green Building	Required	
Y			Prereq	Minimum Building Energy Performance	Required	
Y			Prereq	Indoor Water Use Reduction	Required	
Y			Prereq	Construction Activity Pollution Prevention	Required	
5			Credit	Certified Green Buildings (>50% is LEED certified)	5	
1	1		Credit	Optimize Building Energy Performance (1pt = 12% 2pts = 20%)	2	
		1	Credit	Indoor Water Use Reduction (40%)	1	
1	1		Credit	Outdoor Water Use Reduction (1pt =30% / 2pts = 50%)	2	
		1	Credit	Building Reuse	1	
		2	Credit	Historic Resource Preservation and Adaptive Reuse	2	
1			Credit	Minimized Site Disturbance	1	
1	1	2	Credit	Rainwater Management (2pts = 85th percentile + 1 bonus pt)	4	
	1		Credit	Heat Island Reduction	1	
		1	Credit	Solar Orientation	1	
	2	1	Credit	Renewable Energy Production	3	
	2		Credit	District Heating and Cooling	2	
	1		Credit	Infrastructure Energy Efficiency (15% savings pumps, street + traffic lights	1	
		2	Credit	Wastewater Management (25% reuse on site)	2	
1			Credit	Recycled and Reused Infrastructure (> 50%)	1	
1			Credit	Solid Waste Management	1	
	1		Credit	Light Pollution Reduction	1	
3	**3**	**0**	**Innovation & Design Process**			**6**
3	2		Credit	Innovation	5	
	1		Credit	LEED® Accredited Professional (LEED AP-ND)	1	
0	**4**	**0**	**Regional Priority Credits**			**4**
	1		Credit	Regional Priority Credit: Access to civic and public space (1pt)	1	
	1		Credit	Regional Priority Credit: TDM (1 pt)	1	
	1		Credit	Regional Priority Credit: Optimize energy performance (2pt)	1	
	1		Credit	Regional Priority Credit: Housing Types & Afforability (4 pts)	1	

41	**43**	**24**	**PROJECT TOTALS (Certification estimates)**	110

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

Figure 4.5

Conceptual Master Plan LEED Neighborhood Development Plan Scorecard

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

5

Wetlands and Waterways

This chapter examines the wetlands and waterways that are present on the Project Site and in the vicinity of anticipated off-site infrastructure improvements; analyzes potential benefits and impacts of the Master Plan Project related to wetlands and waterways; and discusses compliance with applicable local, state and federal wetlands and waterways regulations.

As requested in the EEA Secretary's Certificate on the EENF and in the BPDA Scoping Determination, this chapter includes information on the following topics:

- Description of the area and nature of all impacts that cannot be avoided including grading and construction-related disturbances and whether they will be temporary or permanent in nature.
- Description of how impacts to wetland resources have been avoided and minimized to the maximum extent practicable and identification of measures to mitigate impacts that are unavoidable.
- Demonstration that the Master Plan Project can be constructed consistent with the WPA Performance Standards.
- Discussion of whether there are opportunities to eradicate invasive species problems and consider the implementation of a long-term invasive species management program.
- Additional information on work and activity proposed in the ACEC.
- Analysis of how the Master Plan Project will address the Public Benefit Determination regulatory criteria.

5.1 Summary of Key Findings and Benefits

Material portions of the on-site wetland resource areas and associated buffer zones are presently disturbed and/or degraded by impervious areas (buildings and pavement), unvegetated areas (race track and fringe areas near roads, parking areas, and the horse barns), and invasive species (largely common reed, *Phragmites australis*).

The key objectives of the Master Plan Project related to wetlands and waterways include:

- Redevelop a previously developed and heavily disturbed site that was filled in the early 20th century for a then-proposed residential development but has been used instead as a thoroughbred horse racing facility since the 1930's.

- Preserve and enhance on-site resource areas and waterways, including daylighting a portion of Sales Creek and bank improvements along the Horseshoe Pond.
- Integrate natural resources into the 40-acre publicly accessible open space network as a positive asset of the Project Site that will enhance the open space and overall character of the development.
- Comply with applicable regulatory provisions for work within wetlands and waterways; work within these areas will be carefully planned to avoid and minimize impacts. Unavoidable impacts include filling of Land Subject to Coastal Storm Flowage to prevent and minimize future flooding across the overall development due to climate change and sea level rise, and minor impacts to other resource areas as outlined herein.
- Manage invasive species on-site.
- Incorporate native landscaping throughout the Project Site, and particularly within wetlands and buffer zones.
- Improve the environmental function of on-site resource areas, including restoration of certain currently disturbed or degraded areas closest to Bordering Vegetated Wetlands ("BVW") and Bank, and removing impervious area within Riverfront Area.
- Materially improve the overall quality of stormwater runoff from the Project Site, which currently has little to no stormwater pollution prevention measures, by mitigating peak runoff rates (the 100-year design storm), providing treatment for the first inch of rainfall to ensure that current on-site wetlands continue to maintain historic flows and functionality, and integrating stormwater management into the open space network. (Refer to Chapter 10, *Infrastructure,* for additional information.)
- Continue to evaluate impacts to wetland resource areas, including those resulting from off-site improvements related to traffic and/or infrastructure improvements, as design is advanced.

5.2 Regulatory Context

Due to the location of the Project Site, existing conditions, and proposed activities associated with the Master Plan Project, the redevelopment of the Project Site is subject to regulation, as described below. The Proponent has summarized compliance with applicable performance standards in Section 5.3.4, *Regulatory Compliance*, below and will further address these standards in individual permit applications.

5.2.1 Massachusetts Wetlands Protection Act

Wetland resource areas located on the Project Site, which are regulated as Areas Subject to Protection under the Massachusetts Wetlands Protection Act ("WPA")

(MGL Chapter 131 § 40 and associated regulations at 310 CMR 10.00) include the following:

- BVW
- Land Under Waterbodies and Waterways ("LUWW")
- Inland Bank ("Bank")
- Riverfront Area
- Land Subject to Coastal Storm Flowage ("LSCSF")

Additionally, there is a 100-foot jurisdictional buffer zone to Bank and BVW that is not considered a wetland resource area under the WPA. Revere also maintains a local 100-foot buffer zone from LSCSF under a municipal wetland ordinance. These jurisdictional areas are described below in Section 5.3.1, *On-Site Wetland Resource Areas*.

Work within wetland resource areas and associated buffer zones will require Orders of Conditions from the Boston and Revere Conservation Commissions, as applicable. The City of Boston has not enacted a local wetlands ordinance; therefore, the portions of the Master Plan Project that lie within the City of Boston are subject only to the WPA and its associated regulations. In addition to state requirements, wetland resource areas and buffer zones are addressed by the City of Revere Wetlands By-law and Title 16 of the Revere City Ordinances.

A preliminary evaluation of wetland resource areas at off-site infrastructure improvement areas, where known, has been undertaken. Refer to Section 5.4, *Off-Site Improvements*.

5.2.2 Outstanding Resource Waters

The Massachusetts Surface Water Quality Standards at 314 CMR 4.00 list Belle Isle Inlet, and its tributaries, as Class SA Outstanding Resource Waters, which are designated as an excellent habitat for fish, other aquatic life, and wildlife. The regulations further state the Class SA Outstanding Resource Waters shall have an excellent aesthetic value.

Sales Creek and the H-series intermittent stream parallel to the eastern straightaway (backstretch) of the race track along the eastern Project Site boundary are tributary to Belle Isle Inlet and are therefore Outstanding Resource Waters as well. The Bordering Vegetated Wetland associated with Sales Creek is also an Outstanding Resource Water.

Pursuant to 314 CMR 4.00 and the 401 Water Quality Certification regulations at 314 CMR 9.00, specific protective measures are required for work and discharges to Outstanding Resource Waters. Additionally, as discussed in more detail in Chapter 10, *Infrastructure*, the DEP Surface Water Discharge General Permit for Construction General Permits is applicable.

5.2.3 Areas of Critical Environmental Concern

Portions of the Project Site and potentially off-site infrastructure improvement areas lie within the Belle Isle Marsh portion of the Rumney Marshes Area of Critical Environmental Concern ("ACEC"), which was designated in 1988 in accordance with 301 CMR 12.00. The extent of the ACEC is coincident with the buffer zone of Sales Creek. An illustrative graphic of the ACEC is included as Figure 5.1, and the ACEC is also depicted on the 80-scale Schematic Grading, Drainage and Utilities Plan included in Appendix C. The portions of the Project Site lying within the ACEC have been historically altered and previously disturbed by existing uses on the Project Site. The Master Plan Project endeavors to enhance functionality and improve public access to this resource.

ACEC regulations are incorporated into other state regulatory programs. For instance, certain activities typically permittable under the WPA regulations, such as loss of BVW with replication, are not generally allowed in ACECs. Further protections of ACECs are outlined in the Chapter 91 and 401 Water Quality Certification regulations.

5.2.4 Massachusetts Public Waterfront Act (Chapter 91)

The entire Project Site is located within landlocked tidelands which are exempt from licensing requirements under the provisions of Chapter 91, Section 18(b) and 310 CMR 9.04(2). Historic tidelands on-site (i) are entirely separated by public ways from flowed tidelands by public ways that existed prior to January 1, 1984 and (ii) do not lie within 250 feet of the high-water mark. Therefore, pursuant to 310 CMR 9.02, the filled tidelands are categorized as landlocked tidelands that are not subject to Chapter 91 licensing requirements.

Under the provisions of Chapter 91, Section 18(b)(ii) and 301 CMR 13.00, a Public Benefits Determination from the EEA Secretary is required for all projects which require an EIR and are located on landlocked tidelands. Documentation to support such a determination is provided in Section 5.3.4, *Regulatory Compliance*.

Historic Chapter 91 licenses issued to the Belle Isle Reclamation District authorize installation of a tide gate and culvert conveying flow from the Project Site and other properties beneath Route 1A to Chelsea Creek. The tide gate and culvert are located on lands now owned by Massport and possibly others. Maintenance of these structures and associated channels may be necessary for the Master Plan Project resiliency strategy as outlined in Section 5.3.2, *On-Site Wetland Resource Area Impacts* herein; the Proponent will coordinate with Massport and others as applicable to evaluate the tide gate and culvert and perform any necessary maintenance or repairs and will work with DEP to obtain any necessary approvals under Chapter 91.

A preliminary evaluation of Chapter 91 jurisdiction has also been undertaken for additional off-site infrastructure improvement areas, where known. Refer to Table 5-3 in Section 5.4, *Off-Site Improvements*.

5.2.5 401 Water Quality Certification

The Proponent will coordinate with DEP as necessary to clarify the applicability of a 401 Water Quality Certification under 314 CMR 9.00 to work proposed within Waters of the U.S. within the Commonwealth as the design of such work is finalized. Waters of the U.S. within the Commonwealth on the Project Site include the waterbodies and waterways described herein, as well as the associated wetlands. Portions of work within these waters are intended to enhance existing resource areas. For example, the installation of emergent plantings within the Horseshoe Pond and removal of a portion of the Sales Creek culvert are proposed. A 401 Water Quality Certification may be required for such work should it meet the broad regulatory definitions of discharge of dredged or fill material, dredging, or dredged material disposal activities.

Additional work within Waters of the U.S. within the Commonwealth may include removal of sediment in the westerly BVW to convey stormwater to the culvert crossing beneath Route 1A, maintenance of the culvert itself, possible installation of an additional connecting culvert, as well as work down-gradient to reestablish the historic flow regime. This work would be undertaken in support of the Master Plan Project resiliency strategy; specifically, as a result of updated resiliency modeling and the goal to maintain the water level in Sales Creek during storm events. A 401 Water Quality Certification may be required for this work, although the Proponent is currently evaluating property ownership, permitting and other considerations, including whether this work is truly part of the Master Plan Project, or rather deferred maintenance.

5.2.6 Army Corps of Engineers Massachusetts General Permit

The specific extent of work within jurisdiction of the United States Army Corps of Engineers ("USACE") will be identified as the design of the Master Plan Project and associated is advanced. It is not anticipated that the Master Plan Project will impact jurisdictional areas such that an Individual Permit from the USACE would be required.

For the deck proposed on the southwestern shore of the Horseshoe Pond, structures are not regulated because it is an inland water; accordingly, the deck supports would not require USACE review. The work associated with the emergent plantings in the Horseshoe Pond, the daylighting of a portion of a culvert in Sales Creek, as well as the Route 1A culvert work described in Section 5.2.5, will be evaluated as the design is finalized as to whether it would trigger USACE jurisdiction.

5.3 Master Plan Project

The Master Plan Project represents a significant redevelopment of the Project Site, and as such, includes development within resource areas, primarily within LSCSF, and associated buffer zones, most of which are heavily disturbed or altered from previous/current on-site uses. From the outset, the Master Plan Project's design has

focused on incorporating, preserving, and enhancing wetlands and waterways on-site. Given the existing disturbed nature of on-site resource areas and buffer zones, the Master Plan Project's design restores, frames, and features certain areas closest to resource areas for residents', tenants', and the general public's enjoyment, as well as to improve the Project Site's overall ecology.

5.3.1 On-Site Wetland Resource Areas

A detailed description of existing wetlands conditions is available in Chapter 4 of the EENF/EPNF. Refer to Table 5-1 for a summary of on-site wetland resource areas. Updates to resource area descriptions since submission of the EENF/EPNF are included below under the *Updated Existing Conditions Information* section.

As previously stated, the on-site resource areas identified include Bank, BVW, Riverfront Area, and LSCSF. These resource areas were confirmed in ORAD issued by the Boston and Revere Conservation Commissions. LUWW is also present within the Horseshoe Pond and Sales Creek.

Wetland resource areas on the Project Site have been previously heavily disturbed, including by buildings, roads, paved and unpaved areas and other improvements, and no longer represent a natural ecological regime. For example, some of the resource areas are manmade (e.g. the Horseshoe Pond), while others have been ditched/channelized (Sales Creek and the H-series intermittent stream) for various reasons, including historic fill to create the Project Site. Vegetation, where existing, is dominated by invasive plant species and turf grass. Soils generally consist of urban fill.

The DCR Bennington Street pump station and tide gates prevent tidal input to Sales Creek to protect up-gradient areas in Revere that would otherwise be directly exposed to coastal flooding.

Refer to Figure 5.2 for an exhibit depicting existing wetland resource areas, which are also shown on the 80-scale Schematic Grading, Drainage and Utilities Plan included in Appendix C.

Table 5-1 Existing On-Site Wetland Resource Areas

Site Feature	Wetland Resource Area				Notes
	25-foot RFA	Bank	BVW	LUWW	
Sales Creek	✓	✓	✓	✓	Perennial stream flowing southeasterly across the Project Site, beginning at a culvert that carries Sales Creek under Winthrop Avenue, and proceeding behind the shopping plaza to the north toward a pair of culverts under Tomasello Drive. The creek daylights within a fenced area south of Tomasello Drive and west of the existing horse stables, then connects via culverts to the section within the race track infield to the south. Sales Creek exits the Project Site via a culvert from the infield under the race track towards Washburn Avenue.
H-Series Intermittent Stream		✓		✓	Unnamed intermittent stream extending parallel to the eastern straightaway of the race track along the eastern Project Site boundary.
Horseshoe Pond		✓		✓	Located within the southern portion of the race track infield. The level of the pond is regulated by a water control structure at the northern edge of the pond.
Westerly Bordering Vegetated Wetland			✓		BVW associated with an intermittent stream located to the north of the Route 1A Project Site entrance at Tomasello Drive. The BVW extends easterly along the Project Site boundary perpendicular to Route 1A, then proceeds northerly adjacent to the on-site parking areas and off-site berm associated with the adjacent oil tanks owned by Irving Oil Terminals Inc.

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Updated Existing Conditions Information

Since submission of the EENF/EPNF, additional delineation on the easterly side of the H-series intermittent stream was conducted to advance the design of a walkway and stormwater basin associated with the Phase 1 Project. The Bank of the stream was delineated at the first observable break in slope. LUWW is also present, within the stream. This supplemental delineation was approved in the Phase 1 Project Order of Conditions issued by the City of Boston on February 21, 2018 (DEP File No. 006-1568).

In addition, the Proponent has evaluated the location and diameter of Sales Creek culverts. Refer to Section 5.3.3, *Proposed Mitigation,* for discussion of the culverts' existing conditions and daylighting opportunities.

5.3.2 On-Site Wetland Resource Area Impacts

Unavoidable work within on-site resource areas consists primarily of fill within LSCSF, which is required to prepare the Project Site for climate change, improve resiliency, and prevent future flooding from sea-level rise. Much of this resource area contains existing impervious areas and is heavily disturbed. Limited work within other wetland resource areas is proposed, particularly related to public enjoyment of the Project Site and recreational amenities. Refer to the following pages regarding the additional work within resource areas. At present, the design of these features is conceptual; however, even at this conceptual stage, significant effort has been undertaken to minimize anticipated impacts to resource areas. The extent of work will continue to be refined as the design is advanced; however, it is anticipated that this work will not require a variance from the Massachusetts Wetlands Protection Act. Additional work within resource areas proposed to improve the site include daylighting of Sales Creek and invasive species management.

A narrative description of the types of work within wetland resource areas is included on the subsequent pages, and is followed by Table 5-2, which summarizes impacts. Additionally, the proposed work is depicted on the 80-scale Schematic Grading, Drainage and Utilities Plan provided in Appendix C. The following activities within resource areas have not been quantified as impacts; due to their benefit to the wetlands:

› Invasive species management, Horseshoe Pond bank improvements, and Sales Creek culvert daylighting are proposed as mitigation and are intended to improve the resource areas in which they are located. The extent of associated work will be quantified and documented in the applicable Boston and Revere Notice of Intent applications as the design of these improvements is advanced.

- Areas where existing vegetation will be retained and enhanced with native vegetation and where the clean soil cap is excluded are anticipated to restore Riverfront Area and not included in impact calculations.[1]

Additionally, pedestrian access to the Suffolk Downs MBTA Blue Line Station is not anticipated to be included as an impact, as the crossing is expected to meet the Massachusetts Stream Crossing Standards. However, for the purposes of this filing, resource area impacts have been noted as potential in the event that the crossing is unable to meet the Massachusetts Stream Crossing Standards.

Refer to Chapter 9, *Environmental Protection*, for an evaluation of shadowing of wetlands and waterways under the full build condition, which is not anticipated to result in negative effects to resource areas.

The following sections summarize the activities that will result in impacts to wetland resource areas and buffer zones:

Overall Development

Work within resource areas is primarily limited to LSCSF. Such work includes: earth moving and grading, including placement of a one- to three-foot thick clean soil cap as discussed below; raising of grades in areas for climate resiliency purposes; construction of buildings, utilities, and roadways; and creation of recreational amenities as also discussed below. Portions of this work are located within the 100-foot buffer zone to resource areas, which is generally heavily disturbed. The Master Plan Project is anticipated to have a negligible impact on the function of the coastal floodplain and adjacent properties are not anticipated to be affected.

The area of impact to LSCSF and associated volume of fill was calculated based upon the extent of floodplain taken from current FEMA information. However, the Proponent has conducted refined modeling in association with its resiliency analysis, which indicates that the elevation of the 100-year floodplain is lower than the elevation depicted by FEMA. Accordingly, the area of impact to LSCSF may be less than reported herein. The Proponent estimates that the Master Plan Project will result in approximately 2,350,000 square feet less impact to LSCSF using the revised floodplain boundary. Refer to Chapter 8, *Climate Change Resiliency,* for analysis of the Master Plan Project's impact on the coastal floodplain.

Sales Creek Stormwater Outfalls

The Proponent proposes a total of five stormwater outfalls to Sales Creek. Three of these outfalls are existing discharge points that will be increased in size from six-inch diameter pipes and one of those (Outfall C) will be shifted approximately 10 feet upgradient to accommodate the stormwater associated with the Master Plan Project and to distance the discharge point from Sales Creek. As indicated below, the two

[1] Other areas of the clean soil cap, where native plantings will also be undertaken but existing vegetation will not be maintained, have been conservatively calculated as an impact, although that work may in fact represent restoration.

new outfalls to Sales Creek are located outside of resource areas, except for LSCSF. The proposed outfalls are as follows:

- Outfall A (existing), permanent impact within the 25-foot Riverfront Area to Sales Creek
- Outfall B (existing), permanent impact within the 25-foot Riverfront Area to Sales Creek
- Outfall C (existing), permanent impact within BVW, Bank, and the 25-foot Riverfront Area to Sales Creek
- Outfall D (proposed), outside resource areas, except LSCSF
- Outfall E (proposed), outside resource areas, except LSCSF

Permanent Bank and BVW impacts are limited to upgrading and reuse of one existing outfall (Outfall C) that is presently located on Bank. Similarly, permanent RFA impacts are limited to upgrading and reuse of three existing outfalls presently located in RFA (Outfalls A, B and C). To the extent that wetland replication may be required, it will be detailed in the associated Notice(s) of Intent filing(s) for the stormwater outfalls.

The most recently constructed existing outfalls in this area were installed circa 2012 in association with the system to treat the industrial process wastewater associated with the Concentrated Animal Feeding Operation (which is being discontinued in connection with the development of the Master Plan Project). It is not practicable to relocate the existing outfall (Outfall C) upgradient outside of BVW and Bank due to the invert elevation required for the stormwater management system to function. However, the outfall will be shifted upgradient from its current location at the Sales Creek water line, which will improve the existing condition. Additionally, rip-rap aprons will be incorporated to dissipate velocity appropriately, which will better protect the wetland.

Resiliency Measures

In addition to the increased site elevation discussed in the *Overall Development* section above, the following resiliency measures will also be adopted. Based on updated resiliency modelling, the design of the stormwater management system for the Master Plan Project has been revised to avoid an increase in off-site flooding during future advanced storm events. Accordingly, an increased discharge to Chelsea Creek is proposed via an existing culvert that crosses from the Project Site beneath Route 1A. Based on recent field reconnaissance, this culvert is clogged with vegetation and accumulated sediment. The Proponent is evaluating options to maintain this culvert by removing the accumulated sediment upgradient and downgradient, or by installing a new box culvert connecting to the existing culvert.

The Proponent is also evaluating the ownership of off-site features associated with the existing water conveyance system from the Project Site to Chelsea Creek and whether the work may be conducted as deferred maintenance. Impacts to wetland

resource areas resulting from this work will be evaluated as the preferred design is advanced.

The Proponent is also evaluating installing a tide gate at Sales Creek along the eastern property line, either on-site or off-site. The purpose of the tide gate would be to provide additional resiliency for the Project Site as well as off-site upgradient areas.

Horseshoe Pond Improvements

An inlet is located on the southern bank of the Horseshoe Pond, and upgrades to this inlet in association with the proposed stormwater management system will result in impacts to Bank. In addition to the inlet improvements, the Proponent is evaluating the use of the Horseshoe Pond as a method to minimize the Project's use of potable water for irrigation. Should the Proponent elect to pursue the use of the Horseshoe Pond for irrigation water, withdrawal will be conducted in such a way so as not to significantly change the water level of the pond. Accordingly, the only impacts to resource areas anticipated as a result of this work are minimal impacts to the Bank of the Horseshoe Pond associated with the irrigation piping. This impact will be calculated should the Proponent elect to proceed with using the Horseshoe Pond for irrigation.

Additionally, emergent plantings and Bank improvements to the Horseshoe Pond will be undertaken as described in Section 5.3.3, *Proposed Mitigation*.

Clean Soil Cap

In association with creating publicly accessible open space, a one- to three-foot thick "clean cap" of soil with an underlying marker layer may be placed within pervious portions of the development area (i.e. softscape but not pervious pavement/paver areas) as a best management practice ("BMP") to prevent direct human contact with historic urban fill on-site.

As presently envisioned, impacts from the clean soil cap are primarily limited to softscape areas within LSCSF. The clean cap may also be placed within Riverfront Area in areas that will be accessible to the public, and particularly where landscape improvements and recreational amenities are proposed. The nature of the landscaping in the Riverfront Area will determine whether the clean soil cap represents an impact or restoration. For example, native plantings or plantings that function as pollinator habitat are anticipated to result in a net benefit to the Riverfront Area.

For the purposes of calculating impacts, areas where existing vegetation will be retained and enhanced with native vegetation and where the clean soil cap is excluded, are anticipated to restore Riverfront Area and are excluded from impact calculations. Other areas of the clean soil cap where native plantings will be undertaken but existing vegetation will not be maintained have on a preliminary basis been conservatively calculated as an impact, although that work may in fact represent restoration of the Riverfront Area.

The clean cap will generally extend up to the rocks bounding the Horseshoe Pond but is not anticipated to impact Bank.

Recreational Amenities and Landscaping

The recreational amenities and landscaping within and proximate to resource areas are anticipated to include:

- A deck along the Bank of the Horseshoe Pond
- Various trails and pedestrian paths throughout the Project Site, including a pedestrian bridge to the Suffolk Downs MBTA Blue Line Station across the H-series intermittent stream
- Landscaped areas

These features will create pleasant user experiences while minimizing encroachment into wetland resource areas. Refer to Chapter 3, *Urban Design,* for additional information and exhibits regarding the planned recreational amenities and landscaping.

A deck is proposed adjacent to the Horseshoe Pond to provide access to the pond for recreational opportunities such as ice skating or sailing model boats. The pile supports for the deck may be installed on Bank and/or LUWW to facilitate access to the frozen pond.

Various trails and pedestrian paths are proposed throughout the Project Site within LSCSF and buffer zones. To the extent practicable, they will be maintained outside of Riverfront Area. A crossing of the H-series intermittent stream is proposed to provide access to the Suffolk Downs MBTA Blue Line Station to the southeast of the Project Site. This work will comply with the Massachusetts Stream Crossing Standards unless unexpected constraints prevent such compliance, therefore the crossing is not anticipated to impact Bank or LUWW. In the unlikely event that the support posts are required in Bank or LUWW locations, the need for these and the associated impacts and mitigation will be detailed in the NOI filed with the Boston Conservation Commission.

Landscaped areas will be incorporated throughout the Project Site within LSCSF, Riverfront Area, and buffer zones. Although the landscaping is not fully designed, within Riverfront Area it is intended that the landscaping will include native species in order to enhance the area's ecological function. Along Sales Creek, the proposed landscaped areas, in conjunction with common reed management, will also provide improved visual access to Sales Creek. The landscaping design within Riverfront Area and buffer zones is anticipated to create both low meadow type areas conducive to public access, as well as higher growth (e.g. shrubby) native planting type areas to enhance the ecology of the area, and native species living fences to preclude access to softscape areas that will not be subject to the clean cap described above. It is anticipated that major portions of the proposed landscaping with native species will constitute restoration of disturbed or degraded areas, although certain areas are conservatively included as an impact for the purposes of this document as discussed

in the Clean Soil Cap section above. This characterization will be evaluated in conjunction with filing of future Notice(s) of Intent.

ACEC Enhancements and Impacts

The portions of the Project Site within the ACEC associated with the Rumney Marshes are generally heavily disturbed given the historic use of the Project Site. For instance, the ACEC includes portions of the race track infield, stables, paved areas and other disturbed areas, including areas populated by invasive species (refer to Figure 5.1 depicting the on-site boundaries of the ACEC). The ACEC is also depicted on the 80-scale Schematic Grading, Drainage and Utilities Plan. Work within the ACEC includes portions of the development (parks, open space, wetland restoration, stormwater system components, and in buffer zone areas more than 25 feet from BVW or Bank and outside the Riverfront Area, limited areas of roadways, utilities and buildings) as well as associated grading.

As discussed herein, the Master Plan Project will not adversely affect wetlands within the ACEC, namely those associated with Sales Creek, as it is being designed to avoid and minimize impacts to wetland resource areas to the extent practicable. For example, the Proponent is reusing existing crossings to Sales Creek and does not propose new crossings at this time.

The Master Plan Project will comply with regulatory provisions pertaining to ACECs as outlined in Section 5.3.4 herein. The Master Plan Project is anticipated to result in overall improvements to the functionality of the ACEC, including increasing the area of ACEC on-site due to anticipated culvert daylighting, and enhancing ecological function through native plantings and invasive species management, as described in Section 5.3.3, *Proposed Mitigation*. These improvements to Sales Creek may result in improvements to Belle Isle Marsh and the larger Rumney Marshes ACEC.

With regard to the off-site portions of the ACEC, impacts to Belle Isle Marsh are not proposed or anticipated as a result of the Master Plan Project. Native plantings and other riparian enhancements proposed on-site (as described in Section 5.3.3, *Proposed Mitigation*) will enhance the habitat for animal species using the marsh. As discussed further in Chapter 10, *Infrastructure*, the treatment of stormwater discharging to Sales Creek and ultimately Belle Isle Marsh will be substantially improved over existing conditions.

Avoidance and Minimizations of Impacts

The Master Plan Project was designed to conserve environmentally sensitive features. Impacts related to wetlands and waterways resulting from the Master Plan Project have been avoided and minimized to the extent practicable. For example: meeting Stream Crossing Standards for pedestrian access to the Suffolk Downs MBTA Blue Line Station; keeping roads and buildings outside of Riverfront Area; keeping roads and buildings a minimum of 25 feet away from the Horseshoe Pond; and reuse of existing stormwater outfall locations to the extent practicable. Additional discussion is provided below to address specific Master Plan Project

scoping document requests regarding avoidance and minimization of impacts and Master Plan Project alternatives.

In light of the size of the Project Site, as well as the Proponent's commitment to 25 percent open space (40 acres) and the nature of existing resource areas, impacts to resource areas and buffer zones have been avoided and minimized to the extent practicable as discussed herein. Although work is proposed within the 100-foot buffer zone to resource areas and LSCSF, as well as to a very limited extent within other resource areas themselves, work will comply with the applicable performance standards as described in Section 5.3.4, *Regulatory Compliance*.

The Proponent has evaluated multiple site plans relative to their impacts to wetland resource areas. As discussed in the EENF/EPNF, the 100-foot buffer zones to wetland resource areas are already highly disturbed; therefore, increasing setbacks would have a negligible benefit on the adjacent wetlands. Additionally, increasing setbacks to these wetland resource areas while maintaining the programmable space necessary for the Master Plan Project would diffuse the useable open space areas within the core of the Project Site and decrease the size of the 15-acre Central Common. A minimum setback distance of 25 feet is maintained for buildings and roadways, and improvements to the portion of the buffer zone closest to resource areas are proposed as summarized in Section 5.3.3, *Proposed Mitigation*. These active improvements proximate to and within Sales Creek will enhance the habitat corridor associated with the Creek for waterfowl, migratory birds, aquatic and other species.

Bridge spans over Sales Creek are not proposed as the existing culvert crossings are being reused in order to avoid impacts to resource areas. The Proponent proposes to daylight a portion of Sales Creek crossing the northwest section of the racetrack by cutting back the associated culvert. The full extent of daylighting will be finalized as the design advances. Refer to Section 5.3.3, *Proposed Mitigation,* for additional information regarding daylighting of a portion(s) of Sales Creek.

In addition to the avoidance and minimization of impacts to the resource areas outlined above, the Proponent has evaluated the extent of work proposed within LSCSF. The proposed fill within LSCSF is necessary to address Master Plan Project and City of Boston resiliency goals. Refer to Chapter 8, *Climate Change Resiliency*, for additional details.

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Table 5-2 On-Site Impacts to Wetland Resource Areas

Resource Area	Impacts: Total (Permanent)	Type of Work	Notes
Bank	90± sf (10± sf)	Sales Creek Stormwater Outfalls	Reconstruction/upgrades to existing outfalls as well as new outfalls. Includes both temporary and permanent impacts.
	<5± lf	Horseshoe Pond Inlet Improvements	
	TBD	Infrastructure for Use of Horseshoe Pond for Irrigation	TBD based on final deck design and irrigation system design if pond is used for irrigation
		Horseshoe Pond Deck Supports	
		Stream Crossing for MBTA Station Access	No impacts anticipated; potential impact noted in the unlikely event the pedestrian accessway cannot meet the Massachusetts stream crossing standards
		Route 1A Culvert and Channel Improvements	
Bordering Vegetated Wetland	1,010± sf (120± sf)	Sales Creek Stormwater Outfalls	Reconstruction/upgrades to existing outfalls as well as new outfalls. Includes both temporary and permanent impacts.
	TBD	Route 1A Culvert and Channel Improvements	Under evaluation
Land Under Waterbodies and Waterways	TBD	Horseshoe Pond Deck Supports	TBD based on final deck design
		Sales Creek Tide Gate[1]	Under evaluation
		Route 1A Culvert and Channel Improvements	Under evaluation
Riverfront Area	33,000± sf (32,000± sf)	Sales Creek Stormwater Outfalls	Reconstruction/upgrades to existing outfalls as well as new outfalls. Includes both temporary and permanent impacts
		Clean Soil Cap	Potential for restoration depending on associated planting
Land Subject to Coastal Storm Flowage	3,600,000± sf, 260,000± cy	Overall Development	Raising site for resiliency purposes; Impact area reduced to ±1,250,000 using anticipated revised extent of 100-year floodplain

1 Construction means and methods for the tide gate on Sales Creek have yet to be determined; temporary impacts to resource areas, such as LUWW, 25-Foot RFA, Bank and/or BVW resulting from construction will be calculated based on the final design.

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5.3.3 Proposed Mitigation

As an overarching goal, the Master Plan Project design has striven to improve the environmental function of on-site resource areas, including restoration of certain currently disturbed or degraded areas. For example, the portion of buffer zones closest to the resource areas (i.e. within 25 feet of BVW and Bank) will be improved as follows:

- Vegetated areas will be increased by approximately 19 percent overall within 25 feet of BVW and Bank (includes an approximately 24 percent increase in Boston and 11 percent increase in Revere)
- Impervious areas will be reduced by approximately 65 percent overall within 25 feet of BVW and Bank (including an approximately 62 percent reduction in Boston and 91 percent reduction in Revere). This calculation accounts for proposed pedestrian pathways; when these pathways are excluded from consideration the decrease in impervious areas is approximately 97 percent (98 percent in Boston and 91 percent in Revere)

Within Riverfront Area, impervious areas are anticipated to be eliminated, and vegetated areas will be expanded.

In addition to these enhancements, conceptual restoration and mitigation measures have been developed and will continue to be refined as the design of each development phase advances. The proposed restoration and mitigation components are described further below.

Invasive Species Management

The Proponent conducted an inventory of invasive species on-site, at several of the off-site traffic improvement areas outlined in Section 5.4, *Off-Site Improvements,* and at the DCR Bennington Street pump station in April 2018. Invasive plant species were observed within and/or adjacent to nearly all on-site jurisdictional wetland resource areas and non-jurisdictional channels and stormwater management areas. Common reed (*Phragmites australis*) is the most prevalent invasive plant species identified with large dense stands of the herbaceous grass creating a monoculture within several on-site and off-site wetland areas. Additional invasive plant species identified during reconnaissance include tree of heaven (*Ailanthus altissima*), bittersweet (*Celastrus orbiculatus*), knotweed (*Fallopia japonica*), glossy buckthorn (*Frangula alnus*), invasive honeysuckle (*Lonicera tatarica*), black locust (*Robinia pseudoacacia*), and multiflora rose (*Rosa multiflora*). Subsequently, in May 2018, garlic mustard (*Alliaria petiolata*) was observed just off-site proximate to the DCR Bennington Street pump station and is likely also present on-site. Refer to the complete invasive species inventory in Appendix C.

Regular manual management of the common reed will be conducted in and adjacent to on-site wetland resource areas. The Proponent will review a variety of management methods such as annual mowing, burning, excavating, covering with

black plastic, etc., to select the method(s) most appropriate for the Project Site context. Due to their location within an ORW and/or ACEC, it is not anticipated that herbicides will be used to address invasive species in areas associated with Sales Creek and the H-series intermittent stream. In other non-ORWs that are outside of the ACEC, herbicide is anticipated to be utilized as a control method. The Proponent will coordinate with the Boston and Revere Conservation Commissions, as applicable, and other stakeholders to develop an appropriate long-term invasive species management plan. In addition to helping reestablish native vegetation on-site, management of invasive species on the Project Site is anticipated to have some off-site benefit by reducing one source of invasive species to Belle Isle Marsh. However, the presence of invasive species, particularly common reed, on properties up-gradient of the Project Site will continue to spread invasive species to the Project Site as well as to Belle Isle Marsh.

Off-site traffic improvement areas with invasive species present in the general vicinity include:

- Winthrop Ave. (Route 145) at Tomasello Way & North Shore Road
- Route 1A at Tomasello Way
- Route 1A Southbound U-Turn (South of Boardman)
- Route 1/Route 16 Interchange

Management of invasive species associated with the off-site traffic improvements will be evaluated as the design of these improvements is finalized.

Landscape Plantings

Appropriate native plants will be incorporated into landscape areas within Riverfront Area and portions of the buffer zone closest to BVW and Bank. Such landscape enhancement areas are anticipated to include low meadow areas that will provide pollinator habitat, shrubby areas, and living fences that will provide cover and forage habitat. Species that will be considered include, for example, royal fern (*Osmunda regalis*), sweetscented joe pye weed (*Eupatorium purpureum*), rhodora (*Rhododendron canadense*), and various grasses.

Horseshoe Pond Bank Improvements

The Proponent proposes softening the edge of the Horseshoe Pond Bank by removing select rocks bounding the pond and providing emergent plantings along the shoreline. The ecological function of the Horseshoe Pond will be improved as a result of select removal of stones surrounding the Bank and replacing those stones with native vegetation and aquatic emergent vegetation. This work is anticipated to be conducted in a minimally intrusive manner.

Sales Creek Culverts and Daylighting

The location and diameter of Sales Creek culverts has been surveyed, as shown in detail on the 80-scale Schematic Grading, Drainage and Utilities Plan provided in

Appendix C. There are three existing twin 96-inch diameter fiberglass culverts that convey Sales Creek under Tomasello Drive, and under the northwestern and eastern portions of the race track. A structural evaluation of the capacity of these culverts to accommodate the site redevelopment was undertaken. This evaluation specifically included the proposed increase in height of fill over the culverts and construction of roadways that will subject the culverts to vehicular traffic loads. The evaluation found that the existing culverts can support the proposed redevelopment, although further on-site analysis will be undertaken to ensure that the culverts are in good condition and installed correctly. Additionally, the operation of heavy construction equipment over the culverts will be evaluated as the project proceeds. Any repairs to the existing culverts which are determined necessary will be detailed in the applicable Notice of Intent filed under the Wetlands Protection Act.

Even though the existing culverts can support the proposed development, it is anticipated that a portion of the culvert crossing the northwest side of the race track will be eliminated to daylight a section of Sales Creek and improve the Creek's ecological and flood storage functions.

As Sales Creek is daylighted in this area, additional Riverfront Area will be created on the Project Site. Furthermore, Bank and the associated buffer zone will also be created along the daylighted portion of Sales Creek. Because the ACEC is contiguous with buffer zone in this portion of the ACEC, additional ACEC would also be created on-site.

Since its installation in the early 1980s, the DCR pump station has provided critical flood protection for several Revere neighborhoods. Due to the age of the structure and the increasing impact of sea level rise, upgrades to the pump station will be necessary to continue to reduce flooding in the Sales Creek watershed. Potential modifications may include equipment upgrades to increase capacity, maintenance and operational improvements. Removal and/or major alteration to the physical DCR pump station itself is not proposed. Refer to Chapter 8, *Climate Change Resiliency*, for a discussion regarding the pump station as it relates to potential climate change resiliency measures.

Other Mitigation Measures

Stormwater Management Improvements

As discussed in Chapter 10, *Infrastructure*, a stormwater management system is proposed to mitigate the proposed impervious areas and will bring the property into full compliance with local and state stormwater management standards. The system will significantly improve the quality of stormwater runoff as compared to existing conditions. The stormwater system has also been designed with careful consideration of down-gradient resource areas to ensure that the hydrology of these areas is maintained. In addition, the Master Plan Project will ultimately terminate the existing Concentrated Animal Feeding Operation, which represents a potential pollutant source in the watershed.

Stakeholder Outreach

To date, the Proponent has met with the following key stakeholders regarding wetlands and waterways considerations, including resiliency:

- Boston Conservation Commission
- Revere Conservation Commission
- Friends of Belle Isle Marsh
- Massachusetts Department of Environmental Protection
- Department of Conservation and Recreation

The Proponent will continue to engage and work with key stakeholders as the Master Plan Project advances, to identify ecological improvements that the Master Plan can achieve.

5.3.4 Regulatory Compliance

The Master Plan Project has been designed to comply with the applicable regulations identified to date in Section 5.2, *Regulatory Context*, as described below. Refer to the EENF/EPNF for a detailed narrative addressing the Master Plan Project's consistency with CZM's enforceable program policies.

Massachusetts Wetlands Protection Act

Compliance with the performance standards as outlined herein, coupled with the improvements to the land most proximate to Bank and BVW and within Riverfront Area, will maintain and in some cases better serve (as compared to existing conditions) the interests of the Massachusetts Wetlands Protection Act and the Revere Wetlands Protection Ordinance, which interests include the protection of:

- Public or private water supply
- Groundwater
- Flood control
- Erosion control
- Storm damage prevention
- Water pollution
- Fisheries, shellfish, wildlife
- Recreation
- Aesthetics

Performance Standards

Applicable performance standards have been excerpted and addressed below in the context of the various aspects of proposed work.

Bank

The Master Plan Project meets the performance standards for Bank as outlined in 310 CMR 10.54(4) as follows:

"*(a) Where the presumption set forth in 310 CMR 10.54(3) is not overcome, any proposed work on a Bank shall not impair the following:*

1. *the physical stability of the Bank;"*

   It is not anticipated that the Master Plan Project will result in impacts to the physical stability of the Bank, as described below:

   - Plantings on the Horseshoe Pond Bank will generally be undertaken by minimally invasive techniques, and the deck supports will have a minimal footprint and be installed in accordance with standard practices.
   - The Bank impacts associated with stormwater outfalls are temporary in nature, except for the two existing outfalls that are presently located on Bank. Their upgrade/replacement and incorporation of rip-rap aprons will improve the stability of the Bank given the existing and proposed discharges at these locations.
   - To the extent that Sales Creek daylighting results in work on Bank, it will be undertaken to maintain/improve the Bank's physical stability.

2. *"the water carrying capacity of the existing channel within the Bank;"*

   While this standard is generally applicable to stream channels and not to ponds, proposed work is not anticipated to impact the water-carrying capacity of Bank. Specifically, the installation of supports associated with the Horseshoe Pond deck would not impact a significant area of Bank. Furthermore, the proposed work along Sales Creek, including stormwater outfalls and daylighting, will not negatively impact the water carrying capacity of the channel, and in the case of the latter, will increase the channel's water carrying capacity. Accordingly, this performance standard is met.

3. *"ground water and surface water quality;"*

   Ground and surface water quality will not be negatively impacted by the deck supports, plantings, or upgraded inlet and outlet on the Horseshoe Pond Bank, nor by the proposed daylighting of Sales Creek. Planting of the Horseshoe Pond Bank and the buffer zone to that Bank as well as to the Sales Creek Bank with native species will enhance ground water and surface water quality. Upgraded and new stormwater outfalls are proposed in conjunction with rip-rap aprons, which will similarly protect water quality, and the stormwater management system as a whole will improve the quality of stormwater runoff as compared to existing conditions.

4. *"the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries;"*

   The Bank to the Horseshoe Pond will be supplemented with emergent plantings, which will provide additional wildlife habitat. Daylighting of Sales Creek will create additional Bank area that will also increase overall habitat.

5. *"the capacity of the Bank to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 50 feet (whichever is less) of the length of the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. In the case of a bank of a river or an intermittent stream, the impact shall be measured on each side of the stream or river. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60."*

   Based on observations of the Project Site made to date, it is not anticipated that the Bank offers important wildlife habitat functions. More specifically, important habitat features identified by DEP's Wildlife Habitat Protection Guidance, such as existing nest trees, trees with cavities greater than 18-inches in diameter, and turtle nesting areas, have not been observed on the Project Site. Except for the minimal impact associated with the Horseshoe Pond deck supports and the inlet/outlet upgrades and Sales Creek upgrading of existing stormwater outfalls, the proposed work on Bank consists of enhancements/mitigation as described herein. Documentation regarding wildlife habitat will be included, if required, in future Notice of Intent filings as each phase of the project goes forward.

6. *"Work on a stream crossing shall be presumed to meet the performance standard set forth in 310 CMR 10.54(4)(a) provided the work is performed in compliance with the Massachusetts Stream Crossing Standards by consisting of a span or embedded culvert in which, at a minimum, the bottom of a span structure or the upper surface of an embedded culvert is above the elevation of the top of the bank, and the structure spans the channel width by a minimum of 1.2 times the bankfull width..."*

   The design of the proposed pedestrian access across the H-series intermittent stream to the Suffolk Downs MBTA Blue Line Station is intended to meet the DEP Stream Crossing Standards. In the unlikely event that the support posts are required in Bank locations, the need for these and the associated impacts and mitigation will be detailed in the NOI filed with the Boston Conservation Commission.

Bordering Vegetative Wetland

The Master Plan Project meets the performance standards for BVW as outlined in 310 CMR 10.55(4) as follows:

(a) Where the presumption set forth in 310 CMR 10.55(3) is not overcome, any proposed work in a Bordering Vegetated Wetland shall not destroy or otherwise impair any portion of said area.

Work within BVW is very limited and primarily related to stormwater discharges along Sales Creek (upgrading existing outfalls and creating new discharge points, including temporary construction impacts associated with the outfalls). The existing outfalls were installed circa 2012. Given this, and the limited nature and extent of work, it is not anticipated that the proposed outfall work will destroy or impair the wetland. In particular, the incorporation of velocity dissipating rip-rap aprons will improve the protection of the wetland and prevent potential sedimentation and erosion into the system.

Additional work within BVW is being undertaken as restoration/mitigation, and includes control of invasive species, particularly the common reed, as well as daylighting a portion of Sales Creek. Such work would result in improvements to the resource areas, and accordingly would not result in destruction or impairment of the wetland.

(b) Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5000 square feet of Bordering Vegetated Wetland when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost.

It is anticipated that on- and off-site Master Plan Project-related work will either remain below the applicable 5,000 square foot threshold or will qualify as a limited project. Although stormwater outlet work will occur in BVW as discussed herein, such work will not negatively impact the wetland, especially considering that outlets were previously authorized and installed in this wetland as recently as circa 2012. Additionally, the mitigation proposed will result in improvements to the wetland in the case of invasive species management and may also result in the creation of new wetland in the case of culvert removal.

(c) Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of a portion of Bordering Vegetated Wetland when:

1. *Said portion has a surface area less than 500 square feet.*
2. *Said portion extends in a distinct linear configuration ("finger-like") into adjacent uplands.*
3. *In the judgment of the issuing authority it is not reasonable to scale down, redesign or otherwise change the proposed work so that it could be completed without loss of said wetland.*

This performance standard is not applicable as there are not finger-like extensions of a BVW adjacent to uplands in the vicinity of proposed work areas on-site.

(d) Notwithstanding the provisions of 310 CMR 10.55(4)(a),(b) and (c), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59.

The Master Plan Project is not located within rare species habitat; accordingly, this performance standard is met.

(e) Any proposed work shall not destroy or otherwise impair any portion of a Bordering Vegetated Wetland that is within an Area of Critical Environmental Concern designated by the Secretary of Energy and Environmental Affairs under M.G.L. c. 21A, § 2(7) and 301 CMR 12.00: Areas of Critical Environmental Concern. 310 CMR 10.55(4)(e):

1. Supersedes the provisions of 310 CMR 10.55(4)(b) and (c).

2. Shall not apply if the presumption set forth at 310 CMR 10.55(3) is overcome.

3. Shall not apply to work proposed under 310 CMR 10.53(3)(l).

4. Shall not apply to maintenance of stormwater detention, retention, or sedimentation ponds, or to maintenance of stormwater energy dissipating structures, that have been constructed in accordance with a valid order of conditions.

Refer to (a) above for a discussion addressing that proposed work is not anticipated to result in destruction or impairment of BVW.

Land under Waterbodies and Waterways

The Master Plan Project meets the performance standards for LUWW as outlined in 310 CMR 10.56(4) as follows:

"*(a) Where the presumption set forth in 310 CMR 10.56(3) is not overcome, any proposed work within Land under Water Bodies and Waterways shall not impair the following:*

1. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks."

Proposed work is not anticipated to impact the water-carrying capacity of LUWW. Specifically, the installation of supports associated with the Horseshoe Pond deck would not displace a significant surface area of LUWW. Furthermore, the culvert daylighting will increase the water-carrying capacity of Sales Creek. Accordingly, this performance standard is met.

2. Ground and surface water quality.

The Horseshoe Pond deck supports will be installed in accordance with best practices, and erosion control measures (booms, etc.) will be utilized as necessary for both this work and the daylighting of a portion(s) of Sales Creek to ensure that ground and surface water quality is not negatively impacted.

3. *The capacity of said land to provide breeding habitat, escape cover and food for fisheries.*

   LUWW associated with the Horseshoe Pond may be supplemented with emergent plantings. Furthermore, a portion of Sales Creek is proposed to be daylighted. These improvements will provide additional wildlife habitat.

4. *"The capacity of said land to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures established under 310 CMR 10.60."*

   Based on observations of the Project Site made to date, it is not anticipated that the LUWW offers important habitat functions. More specifically, important habitat features identified by DEP's Wildlife Habitat Protection Guidance, such as existing nest trees, trees with cavities greater than 18-inches in diameter, and turtle nesting areas, have not been observed on the Project Site. Except for the minimal impact associated with the Horseshoe Pond deck supports, the proposed work within LUWW consists of enhancements/mitigation as described herein. Additional documentation regarding wildlife habitat will be included in future Notice of Intent filings as applicable.

5. *"Work on a stream crossing shall be presumed to meet the performance standard set forth in 310 CMR 10.56(4)(a) provided the work is performed in compliance with the Massachusetts Stream Crossing Standards by consisting of a span or embedded culvert in which, at a minimum, the bottom of a span structure or the upper surface of an embedded culvert is above the elevation of the top of the bank, and the structure spans the channel width by a minimum of 1.2 times the bankfull width."*

   The design of the proposed pedestrian access across the H-series intermittent stream to the Suffolk Downs MBTA Blue Line Station is intended to meet the DEP Stream Crossing Standards. In the unlikely event that the support posts are required in LUWW locations, the need for these and the associated impacts and mitigation will be detailed in the NOI filed with the Boston Conservation Commission.

Riverfront Area

The Master Plan Project meets the performance standards for Riverfront Area as outlined in 310 CMR 10.58(4) as follows.

(a) Protection of Other Resource Areas. The work shall meet the performance standards for all other resource areas within the riverfront area... When work in the riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of

the interests of M.G.L. c. 131, § 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within the riverfront area."

The Master Plan Project meets the performance standards for other resource areas as outlined herein.

(b) "Protection of Rare Species. No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 or 10.37, or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent."

The Master Plan Project is not located within rare species habitat and there are no vernal pools within the Project Site; accordingly, this performance standard is met.

(c) "Practicable and Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40."

Alternatives have been evaluated as the design has been progressed. As a result of these evaluations, the hardscapes associated with the Master Plan Project, such as the roadways, sidewalks, and buildings, have been maintained outside Riverfront Area. It is also anticipated that pedestrian pathways will be maintained outside Riverfront Area. Master Plan Project components within existing Riverfront Area are limited to other recreational amenities, such as landscape areas. Accordingly, the Master Plan Project has already minimized impacts in Riverfront Area. It is anticipated that the proposed aspects of work in existing Riverfront Area will result in an overall improvement to existing Riverfront Area through the removal of existing impervious areas, and installation of native plantings.

As noted herein, it is anticipated that a clean cap will be placed within portions of the Riverfront Area, particularly in areas of proposed landscaping. To the extent that this work can be undertaken to improve/restore the Riverfront Area, such as by native plantings, it would not be considered an impact.

(d) "No Significant Adverse Impact. The work, including proposed mitigation measures, must have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131, § 40 2. Within 25-foot riverfront areas, any proposed work shall cause no significant adverse impact by:

1. Limiting alteration to the maximum extent feasible, and at a minimum, preserving or establishing a corridor of undisturbed vegetation of a maximum feasible width. Replication and compensatory storage required to meet other resource area performance standards are allowed within this area; structural stormwater management measures shall be allowed only when there is no practicable alternative.
2. Alterations to Riverfront Area have been limited as described herein and include the elimination of pavement and buildings within Riverfront Area.

While the final landscaping plan has not yet been established, it is anticipated that enhancements to Riverfront Area will be made as a result of beneficial vegetation, such as native and pollinator plants.

3. Structural stormwater management measures are limited to those necessary to ensure the functionality of the system, and to the extent feasible, existing outfalls are being upgraded as described herein. To minimize the impacts on the hydrology of the Site, the post-developed stormwater management system has been designed to mimic the drainage patterns of the existing Site to the maximum extent practical. Currently, the Project Site predominately drains to Sales Creek. To continue this pattern and to avoid excessively filling the Site, three existing six-inch drainage outfalls are proposed to be enlarged within the Riverfront Area of Sales Creek, and one of these will also be shifted upgradient from the Creek. Sales Creek has steep embankments. To enable the stormwater BMPs to dewater, the outfalls have been schematically sited at the lower elevation of the embankments. Accordingly, it is not feasible to relocate these stormwater management facilities outside of the Riverfront Area.
4. Providing stormwater management according to standards established by the Department.

   Stormwater management is being provided in accordance with local and state requirements.
5. Preserving the capacity of the riverfront area to provide important wildlife habitat functions.

   The proposed mitigation measures detailed herein will not only preserve but also enhance the capacity of the Riverfront Area to provide habitat functions.
6. Proposed work shall not impair groundwater or surface water quality by incorporating erosion and sedimentation controls and other measures to attenuate nonpoint source pollution."

   Erosion and sedimentation control measures will be incorporated as necessary and described in more detail in future Notices of Intent.

Additionally, portions of the Master Plan Project may qualify as a redevelopment project for the purposes of 310 CMR 10.58(5), since portions of the Project Site are degraded. More specifically, approximately 1,400 square feet of existing impervious pavement and approximately 1,600 square feet of existing impervious buildings are located within the existing Riverfront Area. Designation as a redevelopment project will be more fully evaluated as appropriate during future Notice of Intent filings as the design is advanced.

ACEC

The Master Plan Project meets the general provisions related to ACECs as outlined in 310 CMR 10.24 (which includes reference to LSCSF) as follows:

"(5)(b) When any portion of a designated Area of Critical Environmental Concern is determined by the Issuing Authority to be significant to any of the interests of M.G.L. c. 131, § 40, any proposed project in or impacting that portion of the Area of Critical Environmental Concern shall have no adverse effect upon those interests..."

As discussed in Section 5.3.2 and elsewhere herein, the Master Plan Project will have no adverse effects on the Rumney Marshes ACEC and will meet the applicable requirements pursuant to the Massachusetts Wetlands Protection Act.

The foregoing discussion does not include potential improvements to the stormwater flow path to Chelsea Creek discussed herein, nor the potential tide gate at Sales Creek, as they are in the preliminary stages of evaluation, including property ownership and responsibility. If this work is undertaken as part of the Master Plan Project, the work will be detailed in the applicable Notice of Intent filed under the Massachusetts Wetlands Protection Act and will be completed in accordance with its requirements.

Massachusetts Public Waterfront Act (Chapter 91)

DEP determined in a June 23, 2000 letter that the Project Site is not subject to Chapter 91 jurisdiction as on-site tidelands are landlocked. DEP's determination was reaffirmed in its March 26, 2013 comment letter on the Caesar's Resort ENF. Refer to Appendix F of the EENF/EPNF for additional information.

Therefore, the only approval the Master Plan Project requires relating to Chapter 91 is a Public Benefits Determination, as described herein. Note that a Public Benefits Determination for the Phase 1 Project was issued by EEA on March 30, 2018.

Potential improvements to the stormwater flow path to Chelsea Creek discussed herein are in the preliminary stages of evaluation as discussed elsewhere herein and will be reviewed with DEP to determine the need for approval under Chapter 91.

Landlocked Tidelands

As discussed in the EENF/EPNF, portions of the Master Plan Project are located within landlocked tidelands that are entirely separated from flowed tidelands by public ways, including Route 1A, Revere Beach Parkway, Saratoga Street, and Bennington Street, and the Project Site is greater than 250 feet from the waterfront and will not impede public access. These landlocked tidelands are subject to the provisions of An Act Relative to Licensing Requirements for Certain Tidelands (Chapter 168 of the Massachusetts Acts of 2007). Section 3 of An Act Relative to Licensing Requirements for Certain Tidelands requires the Proponent to address the public's right to access, use and enjoy tidelands that are protected by Chapter 91, and identify measures to avoid, minimize, or mitigate any adverse impact on such rights set forth herein. Significant portions of the Project Site will be opened to public access, and the public will be encouraged to take advantage of the Project Site by the incorporation of recreational amenities. The environmental impacts associated with the Master Plan Project, as described herein, have been avoided and minimized, and will be mitigated as necessary.

Although the Project Site is not immediately adjacent to the shoreline, the Master Plan Project proposes to provide significant recreational opportunities, and incorporates the various wetlands and waterways, particularly Sales Creek and the Horseshoe Pond, as central features of the Project Site. The Master Plan Project will therefore not have an adverse impact on the public's right to tidelands as protected by Chapter 91. Refer to the following Public Benefits Determination for additional information.

As noted in the EENF/EPNF, the Master Plan Project is not located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations; accordingly, an explanation of the Master Plan Project's impact on groundwater levels, and identification and commitment to taking measures to avoid, minimize, or mitigate any adverse impact on groundwater levels, is not required.

Public Benefits Determination

The regulations at 301 CMR 13.00 require the Secretary to consider the following when making a Public Benefit Determination:

- Purpose and effect of the development.
- The impact on abutters and the surrounding community.
- Enhancement of the property.
- Benefits to the public trust rights in tidelands or other associated rights.
- Community activities on the development site.
- Environmental protection and preservation.
- Public health and safety.
- General welfare.

To assist with the Secretary's determination, the following sections describe how the Master Plan Project provides appropriate public benefits and is adequately protective of the public trust rights inherent in landlocked tidelands.

Refer to the Landlocked Tidelands section above for a discussion of avoidance, minimization, and mitigation of impacts to public rights in tidelands.

Purpose and Effect of the Development

The purpose of the Master Plan Project is to redevelop the existing underutilized Project Site from its former use as a horse racing facility into a dynamic, transit-oriented, mixed-use development. Redevelopment of the Project Site provides a unique opportunity to create additional housing, create a new 40-acre public open space system, spur economic development, and improve connections between several adjoining neighborhoods.

Impact on Abutters and Surrounding Community

The Master Plan Project will benefit abutters and the surrounding communities by transforming an underutilized urban site into a dynamic, transit-oriented, mixed-use

neighborhood anchored by a 40-acre, high-quality open space system that responds to the surrounding natural resources and that is directly served by mass transportation including the MBTA Blue Line. The conversion of the property will result in material increased tax revenue to the communities, as well as mitigation payments to the City of Boston's Affordable Housing Fund and Jobs Fund.

Construction of the Master Plan Project and associated improvements is expected to bring approximately 14,000 construction jobs and 25,000 to 50,000 permanent jobs to the region over the course of the 15 to 20-year construction period. Economic benefits will continue to accrue as the development progresses. The Master Plan Project will implement appropriate construction-period BMPs to reduce the impact from noise, air quality and traffic on abutters.

Additionally, an extensive 40-acre publicly accessible open space system, new street front retail opportunities, provision of new housing, including affordable housing, and new on-site and off-site pedestrian and bicycle connections, are proposed as part of the Master Plan Project.

The Master Plan Project will also result in alterations to on-site and off-site roadways to improve traffic flow through and around the Project Site, as discussed in Chapter 6, *Transportation*. Finally, the Master Plan Project will result in stormwater management improvements which will improve the quality of stormwater runoff within the Project Site and will bring the Project Site into compliance with applicable regulations, including the Massachusetts Stormwater Management Standards, as discussed in Chapter 10, *Infrastructure*.

Enhancement to Project Site

The Project Site currently contains an underutilized thoroughbred race track and appurtenant buildings and facilities, as well as Tomasello Drive and surface parking areas. Enhancements to the Project Site through the Master Plan Project include construction of a vibrant, transit-oriented, mixed-use development with significant recreational, open space and retail amenities, which will revitalize the Project Site. Additionally, natural habitats on site will be improved, as described herein. The proposed stormwater management system will significantly improve the quality of stormwater runoff as compared to existing conditions. In addition, the construction of new, permanent roadways and off-site transportation improvements will improve traffic safety. Various climate change resiliency measures as described in Chapter 8, *Climate Change Resiliency* and Chapter 10, *Infrastructure*, have also been incorporated into the conceptual design and will continue to be evaluated and incorporated as the design progresses. The Master Plan Project will also result in improved pedestrian access to the abutting MBTA Blue Line stations as part of the proposed transit-oriented development. New on-site and off-site pedestrian and bicycle connections are also proposed as part of the Master Plan Project, as described in Chapter 3, *Urban Design*.

Benefits to Public Trust Rights in Tidelands or Other Associated Rights

The Project Site is comprised of landlocked tidelands that are entirely separated from flowed tidelands by public ways, including Route 1A, Revere Beach Parkway, Saratoga Street, and Bennington Street, and the Project Site is greater than 250 feet from the waterfront and will not impede public access. The traditional public trust rights in tidelands, including the right to fish, fowl and navigate, have long been precluded at the Project Site by historic filling and subsequent development. However, the modern expression of these traditional public trust rights on filled land isolated from the existing water will be realized by improving public access to and enjoyment of the Project Site. Benefits include:

- New pedestrian and bicycle accommodations.
- A new publicly accessible open space network of approximately 40 acres.
- Incorporation of Horseshoe Pond and Sales Creek into open space system allowing public access along and close to these resources.
- Increased public access to the Project Site.
- Improved overall traffic circulation/safety via alterations to Tomasello Drive.
- Construction of a new access roadway network.
- New pedestrian and bicycle connections to adjacent off-site neighborhoods.
- Daylighting portions of the culverted Sales Creek expanding the stream and associated resource areas.

Community Activities on the Development Site

The Master Plan Project will provide new opportunities for community activity through the addition of new civic nodes, street front retail opportunities, and an expansive 40-acre publicly accessible open space network designed to reconnect East Boston and Revere. The open space system will include two new public plazas, located adjacent to the two existing MBTA Blue Line Stations, a new outdoor performance park and a new civic plaza that is part of the 15-acre Central Common. Refer to Chapter 3, *Urban Design*, for additional information on proposed community activities, or civic uses, proposed as part of the Master Plan Project.

Environmental Protection and Preservation

The Proponent is committed to redeveloping the Project Site in accordance with all applicable local, state and federal environmental protection regulations, and in a manner that will significantly increase resiliency to the effects of climate change. Table 1-3 in Chapter 1, *Project Description and Alternatives*, provides an updated list of the local, state and federal permits or approvals anticipated to be required. Chapter 12*, Summary of Mitigation/Draft Section 61 Findings,* provides a summary of measures to avoid, minimize and mitigate impacts from the proposed development.

Public Health and Safety, and General Welfare

The Master Plan Project will promote public health and safety through implementing a site design which provides safe and accessible facilities. Improvements include

additional open space, landscaping, accessible ramps and crosswalks, pedestrian and bicycle accommodations, and appropriate lighting to provide a safe, well-lit environment for residents and patrons.

As discussed in Chapter 4, *Sustainability/Green Building* and Chapter 8, *Climate Change Resiliency*, climate change and sea level rise have been fundamental considerations in the Master Plan Project design. Energy efficient buildings will minimize GHG emissions.

In addition, the proposed stormwater management system will result in increased treatment of runoff, resulting in improvements in the quality of the stormwater ultimately discharged to Belle Isle Marsh and the Boston Harbor, as described in Chapter 10, *Infrastructure*.

Finally, the Master Plan Project will improve general welfare within the surrounding community by increasing the productivity of an underutilized property; providing both construction-period and permanent jobs to regional residents; and offering improved tax revenue to the cities of Boston and Revere.

401 Water Quality Certification

As discussed in Section 5.2.5, *401 Water Quality Certification*, the portions of the Master Plan Project that may be subject to a 401 Water Quality Certification will be more specifically established as the nature of work subject to jurisdiction is finalized. In particular, the Sales Creek daylighting, as well as placement of emergent plantings and removal of select rocks on the slope of the Bank within the Horseshoe Pond, and work associated with the conveyance of stormwater from the Project Site to Chelsea Creek, will be evaluated based upon the extent and character of work proposed. Should these proposed Master Plan Project elements be subject to a 401 Water Quality Certification, the Proponent will address project-specific performance standards in the associated application. The Proponent has included draft Section 61 findings related to the 401 Water Quality Certification in Chapter 12, *Summary of Mitigation/Draft Section 61 Findings*.

Army Corps of Engineers

As discussed in Section 5.2.6, *Army Corps of Engineers Massachusetts General Permit*, the applicability of the Massachusetts General Permit will be more specifically established as the extent and categorization of work within Waters of the U.S. is finalized, similar to the 401 Water Quality Certification discussion above.

Massachusetts Surface Water Quality Standards

The Master Plan Project meets the antidegradation provisions contained within 314 CMR 4.04 in that the work will not result in discharges of pollutants to Outstanding Resource Waters, which include Sales Creek and the associated BVW, since the proposed stormwater management system will result in only treated stormwater leaving the outfalls along Sales Creek.

5.4 Off-Site Improvements

Other off-site improvement areas, including those for utility infrastructure and traffic, were evaluated based upon available desktop (e.g. MassGIS) information. Wetland resource areas within the general area of certain off-site traffic improvements identified earlier in the design process were reconnoitered in April 2018. As the design progresses, additional off-site improvement areas will be evaluated in more detail, including delineation of wetlands, to more specifically identify impacts. Refer to Table 5-3 for a list of observed resources near the off-site traffic improvement areas.

Off-site traffic improvements generally consist of major and minor intersection reconstruction, road widening, median breaks, and traffic signal upgrades. Refer to Chapter 6, *Transportation,* for a more detailed discussion of these improvements. Most of the proposed work occurs in previously paved areas within the public ROW. Accordingly, anticipated potential impacts resulting from the proposed off-site traffic improvements are minimal. The impact calculations outlined herein are preliminary, as they have been estimated from initial available conceptual plans, and the full suite of off-site traffic mitigation is not yet finalized. Refer to Table 5-3 below for a summary impacts resulting from off-site traffic improvement areas.

Potential impacts associated with off-site utility infrastructure improvements will be evaluated as the design of the Master Plan Project advances. It is not anticipated that off-site utility infrastructure improvements will result in impacts to resource areas, except for an interim condition sewer connection extending from Tomasello Drive on-site to an existing off-site sewer behind the Revere Fire Station. A maximum of approximately 1,000 square feet of resource area (including a combination of Bank, Bordering Vegetated Wetland, Land Under Waterbodies and Waterways, and Land Subject to Coastal Storm Flowage, as well as potentially Riverfront Area) may be temporarily impacted by jacking the sewer main under the wetland system. Refer to Chapter 10, *Infrastructure* for additional information regarding the proposed interim sewer connection.

As the proposed off-site improvements are reviewed by the appropriate agencies and plans are advanced, the Proponent will work to avoid and minimize impacts to resource areas to the extent practicable. Should impacts to resource areas be necessary, mitigation will be provided as required in accordance with applicable performance standards. Stormwater management will also be evaluated and addressed as the designs of the off-site improvements, particularly traffic, are advanced.

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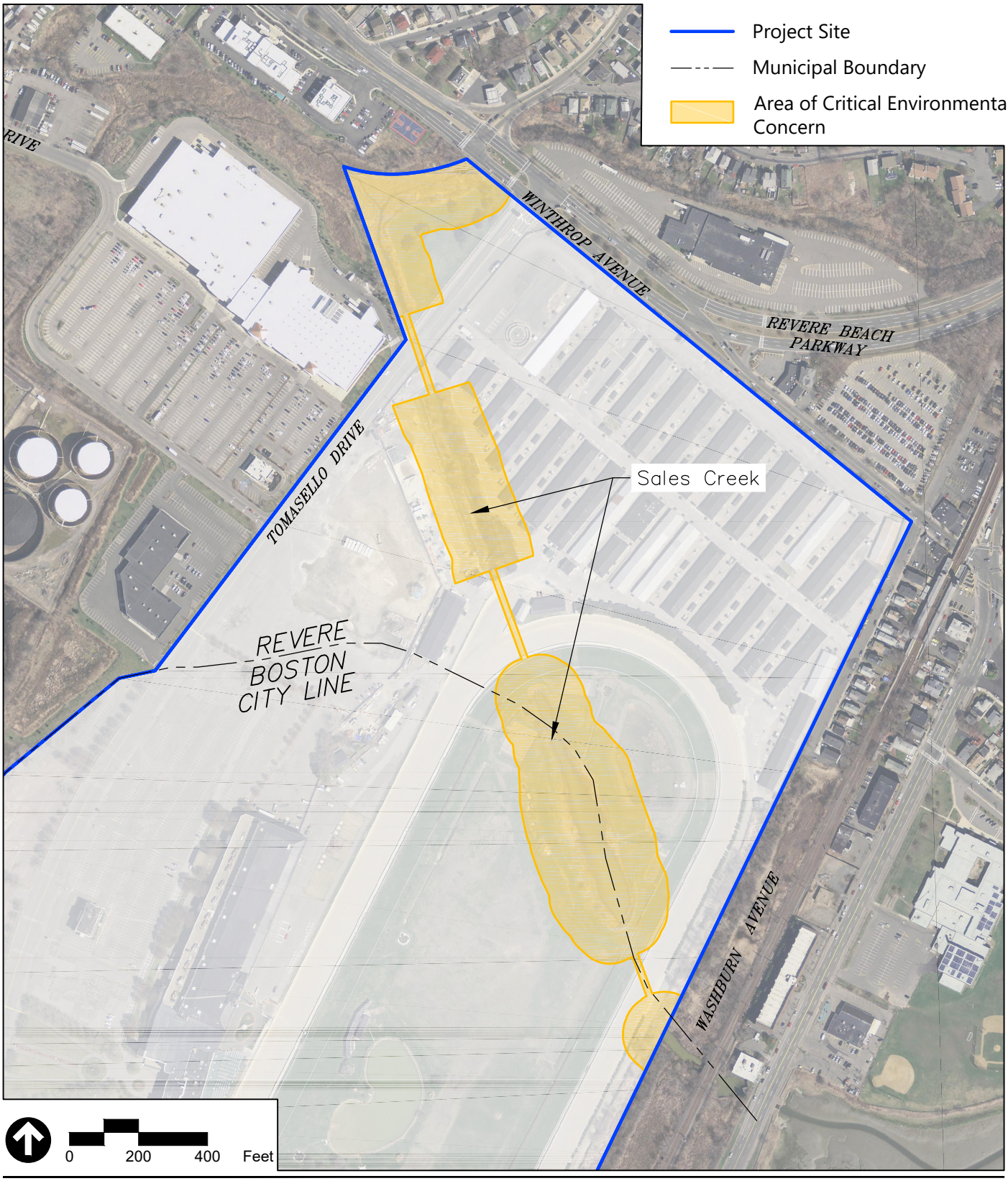
Table 5-3 Off-Site Traffic Improvement Impacts[1]

Location[2,3]	Salt Marsh	Bank	BVW	LUWW	RFA	LSCSF	DPA[4]	Filled Tidelands (not Landlocked)	ORW	ACEC
Route 1A Southbound at Curtis Street	-	-	-	-	-	-	77,000 sf	-	-	-
Neptune Road at Saratoga Street	-	-	-	-	-		18,000 sf	-	-	-
Neptune Road at Bremen Street										
Bennington Street at Neptune Road										
Neptune Road at Route 1A Northbound Off-Ramp										
Route 1A at Boardman Street	-	-	-	-	-	331,000 sf	668,000 sf	352,000 sf	-	-
Route 1A Northbound at Waldemar Avenue										
Route 1A at Tomasello Drive										
Route 1A at Southbound Jug Handle										
Route 1A at Furlong Drive										
Route 1A Southbound U-Turn (South of Boardman)										
Route 1A Southbound U-Turn (Between Waldemar and Boardman)										
Route 1A/Route 16 at Bell Circle	No impacts									
Revere Street at Route 60	No impacts									
Brown Circle (Roundabout)	No impacts									
Route 1/Route 16 Interchange	-	-	-	-	11,000 sf	210,000 sf	-	16,000 sf	-	-
Route 1A (North Shore Road) at Revere Street	-	-	-	-	-	1,000 sf	-	-	-	-
Winthrop Avenue (Route 145) at Revere Beach Parkway (Route 16)/Harris Street	No impacts									
Winthrop Ave. (Route 145) at North Shore Road	-	-	-	-	6,000 sf	205,000 sf	-	28,000 sf	-	53,000 sf
Winthrop Ave. (Route 145) at Tomasello Drive										
Winthrop Avenue at Revere Beach Parkway										
Bennington Street at Crescent Avenue										

Location[2,3]	Salt Marsh	Bank	BVW	LUWW	RFA	LSCSF	DPA[4]	Filled Tidelands (not Landlocked)	ORW	ACEC
Bennington Street at State Road/Winthrop Avenue										
Bennington Street at Saratoga Street	-	-	-	-	-	5,000 sf	-	500 sf	-	-

1 Resource area impacts are not additive across different resource areas.
2 Impacts for individual locations are grouped to cumulatively assess impacts of non-severable mitigation projects (i.e. the "Super Street Option" which proposes improvements to multiple intersections along the Route 1A Corridor). Refer to Chapter 6, *Transportation*, for additional detail.
3 Does not include traffic improvements limited to signal timing/phasing optimization, which do not typically result in ground disturbance. For the purposes of calculating impacts, it is assumed there will be no impacts to culverts under the roadways at the off-site traffic improvement areas.
4 DPA = Designated Port Area

In addition to the other off-site impacts discussed above, portions of the improvements to the stormwater flow path to Chelsea Creek are located off-site but are in the preliminary stages of evaluation as described herein, including with regard to property ownership and responsibility. Therefore, associated impacts/improvements have not yet been quantified.



Source:
Area of Critical Environmental Concern limits established based upon "Designation of Portions of the Cities of Boston, Lynn, and Revere, and the Towns of Saugus and Winthrop as the Rumney Marshes Area of Critical Environmental Concern with Supporting Findings" dated August 22, 1988.

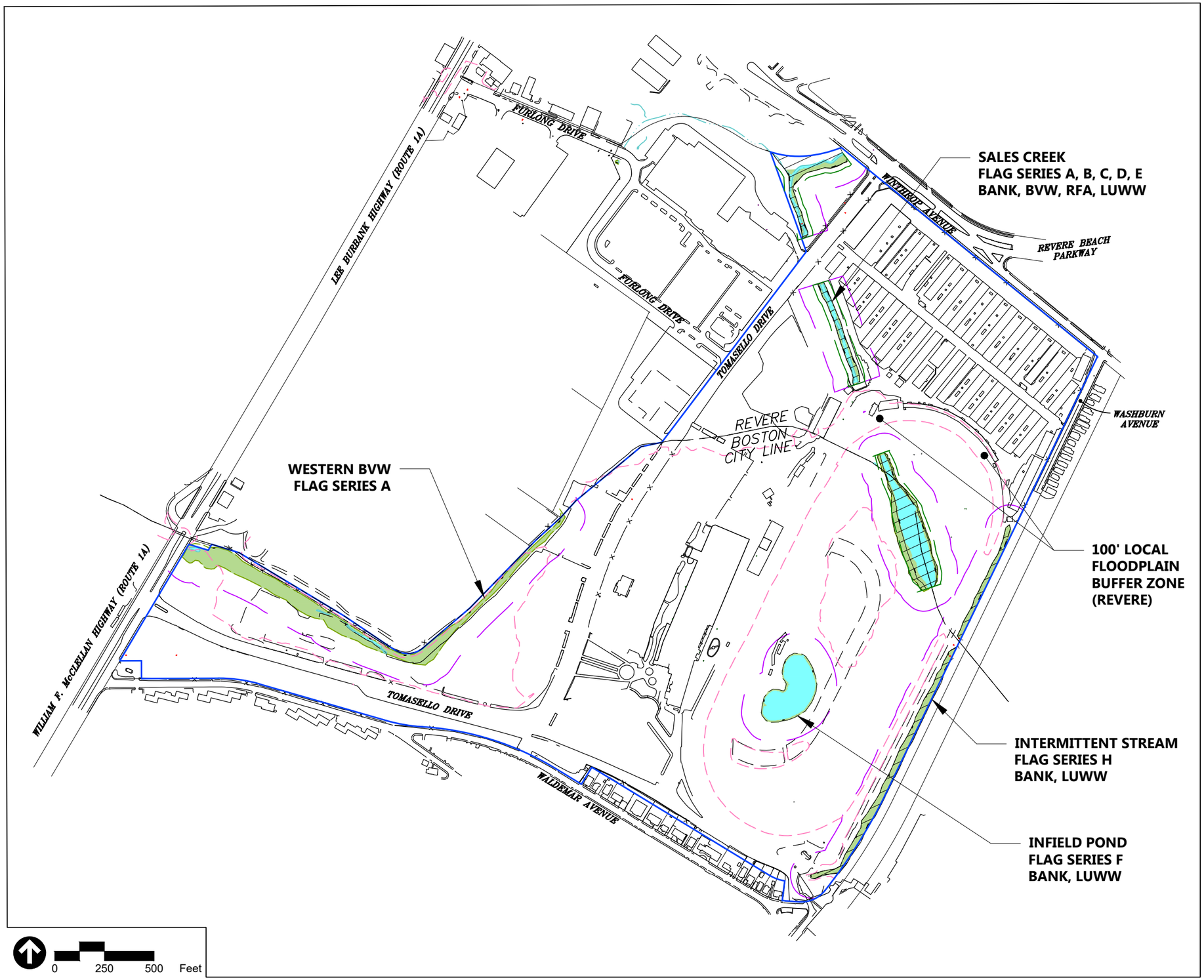
Digital orthophotograph, MassGIS 2014

Figure 5.1

Area of Critical Environmental Concern

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

Prepared by Beals and Thomas, Inc.



- Property Boundary
- Top of Bank/Mean Annual High Water
- Approximate Top of Bank/Mean Annual High Water
- Bordering Vegetated Wetland Boundary
- Approximate Boundary of Bordering Vegetated Wetland
- 100' Buffer Zone Boundary
- 25' Riverfront Area Boundary
- 100-year Floodplain (Land Subject to Coastal Storm Flowage) Boundary
- Edge of Water
- Municipal Boundary
- Bank or Bordering Vegetated Wetland
- Water Bodies/Waterways
- Outstanding Resource Waters

BVW	Bordering Vegetated Wetland
RFA	Riverfront Area
LUWW	Land Under Water Bodies and Waterways

Source:
Wetland Resource Areas confirmed by Orders of Resource Area Delineation issued by the Boston and Revere Conservation Commissions (MassDEP File No. 006-1546 dated September 20, 2017 and MassDEP File No. 061-0705 dated October 4, 2017, respectively).

The 100 year flood line is published by FEMA with a base flood elevation (BFE) determined. The BFE was established across the Project Site by determining the BFE on the surface created by the topographic survey.

Outstanding Resource Water limits established based upon 314 CMR 4.00 Massachusetts Surface Water Quality Standards.

Figure 5.2

On-Site Wetland Resource Areas

Suffolk Downs Redevelopment
Revere, Massachusetts

6

Transportation

6.1 Introduction

This section describes the multi-modal transportation characteristics of the Master Plan Project including evaluation of existing conditions and projected future conditions without and with the Master Plan Project (i.e., No-Build and Build conditions, respectively). A comprehensive program of transportation improvements and mitigation measures are identified to address existing, long-standing transportation infrastructure constraints, in addition to minimizing potential impacts of the Master Plan Project. The proposed improvements are evaluated as future Build with Improvements conditions.

In addition to physical multi-modal transportation infrastructure improvements, the comprehensive mitigation plan includes robust Traffic Demand Management (TDM) actions geared towards reducing single-occupant vehicle (SOV) travel and encouraging increased use of alternative transportation options. The Project's close proximity to multiple public transportation options (adjacent to the MBTA Blue Line Beachmont Station and Suffolk Downs Station) eight MBTA bus routes (Route 119, 120, 424, 434, 448, 449, 450, and 459), and Logan International Airport (approximately two miles from the Project), provides an excellent opportunity to employ and administer an aggressive TDM plan. Through ongoing collaborative efforts with MassDOT, the MBTA, Boston Transportation Department, BPDA, City of Revere and the Central Transportation Planning Staff (CTPS), an in-depth assessment of anticipated future travel choices has been included within the transportation analysis that considers highly effective shifts to non-auto mode choices. The Master Plan Project site offers a unique opportunity to utilize a diverse array of transportation choices that makes aggressive TDM initiatives more likely to be successful.

In connection with the Project, anticipated improvements to be made include:

- Major off-site roadway, traffic, and safety improvements throughout the study area, including the following locations:
  - Neptune Road at Saratoga Street
  - Neptune Road at Bremen Street
  - Bennington Street at Neptune Road
  - Bennington Street at Vienna Street
  - Neptune Road at Route 1A NB off-ramp
  - Route 1A Southbound at Curtis Street

- Boardman Street at Route 1A
- Route 1A at Suffolk Downs/Tomasello Drive
- Route 1A at Jughandle
- Route 1A at Furlong Drive
- Winthrop Avenue at Route 1A Southbound on-ramp
- Route 60 (American Legion Highway) at Bell Circle – North
- Route 1A (American Legion Highway)/Route 16 (Revere Beach Parkway) at Bell Circle – South
- Route 1A (VFW Parkway) at Bell Circle
- Beach Street at Bell Circle
- Revere Street at Route 60
- Brown Circle
- Copeland Circle
- Route 1/Route 16 Interchange
- Winthrop Avenue at Revere Beach Parkway/Harris Street
- Route 1A (North Shore Road) at Revere Street
- Winthrop Avenue at Site Driveway/Beachmont Parking Lot
- Winthrop Avenue at North Shore Road
- Winthrop Avenue at Suffolk Downs/Tomasello Drive
- Winthrop Avenue at Revere Beach Parkway
- Bennington Street at Saratoga Street
- Bennington Street at Crescent Avenue
- Bennington Street/State Road at Winthrop Avenue
- Route 60 at Sigourney Street
- Route 60 at Charger Street

› Extensive area bicycle and pedestrian improvements including:

- Development of an extensive on-site bicycle network that includes over 17,000 linear feet of on-street bike accommodations and over 13,000 linear feet of cycle tracks.
- Extensive pedestrian network that includes several community paths which extend through the 40-acre open space system
- Development of a cycle track along Winthrop Avenue
- Exploration and design of potential East Boston Greenway extension from Constitution Beach to Revere Beach
- Inclusion of an on-site shuttle system that will consist of an inner loop and an outer loop

- Regional shuttles that will connect the Project Site to South Station, the Seaport District, North Station and the Chelsea Commuter Rail/Silver Line Station
- New at-grade community path crossing of Route 1A to Chelsea Creek side

› Employment of a robust and proactive TDM Plan

The identified transportation mitigation and improvement plan includes an investment totaling over $50 million. The Proponent will continue to work closely with the local and state agencies to further refine this extensive mitigation plan with the goal of minimizing project impacts and providing substantial benefits to local and regional transportation infrastructure.

6.2 Summary of Key Findings and Project Benefits

Key findings of the transportation analysis presented in this Chapter 6.0 of the DEIR include the following:

1. The Project is uniquely served by MBTA transit access.

The Project Site is very well served by public transportation and benefits from adjacent MBTA Blue Line service as well as multiple MBTA local and commuter bus routes that operate within one-quarter mile of the Project Site.

Substantial new ridership and revenue on the MBTA system will be generated by the Project, largely via the Blue Line as a collector from the rest of the MBTA system. Overall, the Blue Line System has the capacity to handle the new passengers generated by the Project both in the peak and non-peak directions. However, the Project is expected to increase ridership demands during limited time periods above the MBTA benchmark for train capacity without overcrowding (i.e., the MBTA's stated "policy capacity levels") on the Blue Line in the Build Condition, primarily during off-peak periods when the MBTA's Policy[1] dictates a reduced acceptable maximum passenger load per car and when the schedule provides reduced service frequency. During peak periods, demand is anticipated to exceed policy capacity by approximately 100 inbound riders during the busiest 30-minute period of the AM Peak Period, equivalent to approximately 15 passengers per six-car train, in the 2038 Build (Expected TOD Parameters) Condition. The Project is also expected to increase ridership demands above policy capacity levels on the MBTA's Route 119 in the Build Condition. The Proponent will continue coordination with the MBTA to evaluate the project's impacts on the Blue Line and Route 119.

While use of Beachmont Station and Suffolk Downs Station (the least utilized of all MBTA Blue Line stations) will increase substantially as a result of the Project, the stations are projected to operate at acceptable passenger capacity conditions during times of peak demand. However, station improvements may be needed to bring station infrastructure into a state-of-good-repair and to comply with current codes,

[1] MBTA, *Service Delivery Policy, 2017 Update*, Approved January 23, 2017.

including codes related to fire/life safety and accessibility. The Proponent, as requested and in coordination with the MBTA, is in the process of conducting an engineering and architectural assessment of Suffolk Downs Station and Beachmont Station. The scope of the station assessments will evaluate the station infrastructure conditions and compliance with current codes. The station assessments will also identify anticipated Project impacts related to infrastructure conditions and code compliance under 2038 Build Conditions that may trigger the need for station upgrades. The Proponent will continue to work in coordination with the MBTA to complete the station assessment scope and identify any Project-related station impacts, with additional information regarding this work to be provided in the Project's FEIR.

2. Over $50 million in off-site improvements will address pre-existing local and regional roadway issues as well as potential Project impacts.

As part of the Project, the Proponent has committed to design and construct roadway improvements at 30 locations. In addition to mitigating potential Project-related traffic impacts, these improvements will address many pre-existing regional and local traffic and safety issues.

The transportation analysis confirms significant existing regional congestion in the Route 1A corridor and continuing north on Route 60 through Revere to Route 1, as well as difficulties on Route 60, exacerbated by lack of complete direct connections between Route 1 and Route 16 (Revere Beach Parkway). These conditions are projected to continue to deteriorate independent of the Master Plan Project in the absence of any specifically programmed and funded major transportation infrastructure improvements. No such improvements are currently programmed in the MassDOT's Transportation Improvement Plan (TIP).

As this chapter will discuss in detail, the off-site roadway improvements are based on what we believe to be a very conservative analysis of potential Project impacts. Therefore, the off-site roadway improvements are expected to perform even better than presented in the DEIR analysis. This is especially the case for the Route 1A improvements, where current "unserved" demand (due to existing congestion) in the Route 1A corridor has been included in the analysis of future Build with Improvements conditions.

Key improvements of regional significance include the following:

› **Route 1A infrastructure improvements from south of Boardman Street to Furlong Drive** – A solution known as the "Super Street" splits movements among various controlled points with two-phase signal control. This design recognizes the efficiency of two-phase signal operation (that is, addressing all traffic movements at the intersection in only two signal phases) and the ability to provide fewer through lanes to handle greater demand. It is based on a design approach advocated by the Federal Highway Administration (FHWA) several years ago in its Every Day Counts program, as well as promoting safer, more context-sensitive roadway design. It carries several names including

"displaced left turns" and "Michigan Lefts". Selection of this design concept was done in concert with MassDOT. These improvements will significantly improve safety and traffic capacity in the vicinity of the site, with reduced queuing and delays for both local and regional traffic as well as efficient site access for Project trips.

- **New ramp connections at the Route 1/Route 16 interchange**, consistent with the Lower North Shore Transportation Improvement Study, are intended to provide missing movements to an important regional highway access point. Under existing conditions, access from Route 1 southbound to Route 16 eastbound, from Route 16 westbound to Route 1 northbound, and from Route 1 NB to Route 16 EB are not provided. The proposed plan adds both of these important connections. The Route 1/Route 16 improvements and improvements at other strategic locations along the Revere Beach Parkway corridor including Route 16 Revere Beach Parkway at Route 145 are expected to relieve the Route 60 corridor through Revere, and to provide relief to current safety and congestion issues at the Route 16/Webster Avenue/Garfield Avenue intersection in Chelsea.
- **Significant improvements at Bell Circle** include widening approaches and departures, realignment of the State Road movement from the Route 16 corridor, recognition of operational improvements that have proven effective, recognition of pedestrian crossing needs, input from City of Revere officials and capacity needs. The intent is to minimize use of the "outer circle roadways" to serve turning traffic that is completing what would be a left turn maneuver or entering from lower volume roadways such as Beach Street.
- **Winthrop Avenue Corridor Improvements from Route 16/Harris Street to Revere Beach Parkway** include a new southbound left-turn movement on Route 16 at Winthrop Avenue/Harris Street to alleviate congestion at Bell Circle and on North Shore Road. A new median break will allow direct egress from the Fire Station onto Winthrop Avenue westbound. Other improvements include new traffic signals and geometric modifications to enhance capacity at North Shore Road, Tomasello Drive, and Revere Beach Parkway.
- **Improvements to Day Square** include measures at five intersections along the Neptune Road corridor to rationalize traffic operations, relieve congestion and reduce queuing on the off-ramp from Route 1A northbound.

By not only addressing anticipated impacts of the Master Plan project, but also addressing pre-existing traffic and safety problems, independent of the Master Plan Project, these regional improvements would realize benefits for regional and local traffic.

3. The combination of various land uses proposed as part of the Master Plan Project allows for a sensible approach to addressing parking spaces at the Project Site.

By complying with applicable local parking requirements, remaining consistent with market expectations, and considering and implementing appropriate shared parking

concepts, the Master Plan Project's parking program will satisfactorily minimize parking-related impacts while addressing the City of Revere's and BTD's parking requirements and guidelines.

The Master Plan Project anticipates approximately 557 on-street parking spaces that are intended to be utilized for shared uses, particularly for users of open space, retail customers, and visitors of office tenants and residents. On-street parking will be time-limited, to help manage parking space use, discourage longer-term on-street parking uses, including for on-site resident or employee parking, and support the shorter-term uses of retail and open space areas.

As each development phase advances, the Proponent will look for opportunities to reduce any unnecessary or underused parking at the Project Site through an ongoing analysis of on-site parking needs, and the successful implementation of TDM measures, in light of future dynamic changes to car ownership and use that are anticipated in light of new technologies that could further reduce and limit private automobile ownership (i.e. car sharing services and autonomous vehicle uses), and, in turn, parking needs.

During the construction phasing of the Master Plan Project, actual parking use will be monitored to avoid overbuilding of parking, and managed via shared parking. Parking demand may be accommodated, including for interim parking needs, via the use of existing surface parking lots.

4. Flexible, new shuttle systems will provide alternative transportation options for travel within the Project Site and to the Project Site from key connecting transportation hubs and regional destinations.

The Master Plan Project will include provision of privately operated, on-site shuttle circulator services to encourage alternative modes of transportation and reduce auto-dependency. A proposed inner loop and outer loop route, providing shuttle connections for internal trips made within the Project Site as well as connections from the Project Site to the MBTA Blue Line, are illustrated in Figure 3.24. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be finalized in the FEIR as the Project's development phasing is refined.

New shuttle connections between the Project Site and key transportation and land use nodes are also being explored by the Proponent. The Proponent is committing to establish new, privately operated shuttle services that would provide direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the Newburyport/Rockport Line), as well as to the Seaport District. Figure 6.1 illustrates these proposed Project Site connector shuttle routes. The Proponent also considered a potential shuttle connection to the northern branch of the Orange Line, however initial evaluations found that the shuttle travel time would be highly variable during peak periods due to roadway congestion and that an Orange Line to Blue Line connection would be more reliable and time competitive based on existing

conditions. The Proponent will continue to evaluate additional opportunities for shuttle connections to key land use and transportation nodes as planning progresses. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be finalized in the FEIR as coordination with the MBTA is advanced.

5. Robust Transportation Demand Management (TDM) plan will reduce single occupancy vehicle (SOV) travel and encourage and incentivize use of alternative modes for all users.

The Proponent is committed to implementing a robust TDM program, the primary objective of which is to reduce single occupancy vehicle (SOV) travel, thereby reducing parking demand, congestion, and associated environmental impacts from the project. Complementary to the reduction in vehicular impacts, the TDM plan also enhances mobility by alternative modes of travel by promoting walking, bicycling, ridesharing, and transit. The TDM plan is an integral component of the overall Project mitigation package, and, as described in Section 6.10, the TDM plan will be tailored to match the needs of employees, residents, and patrons.

The Proponent will prepare and implement the TDM plan in close coordination with other stakeholders including Massport, the MBTA, the City of Boston, and the City of Revere. In addition to policy and management strategies, the TDM plan will be supported by programmatic components and physical infrastructure elements, on- and off-site, for walking, bicycling and transit access. These include both enhanced pedestrian accommodations, extensive on-site bicycle accommodations, and connections to off-site bicycle accommodations. The Proponent has also committed to install Bluebikes (formerly Hubway) bike-share stations on the Project site. The proposed program is described in further detail in Section 6.10.

6.3 Analysis Process

While this Traffic Impact Assessment (TIA) generally follows and adheres to required MassDOT Guidelines[2], the development of site generated traffic volumes does not rely on the Institute of Transportation Engineers' Trip Generation (10th Edition) rates. In the Certificate on the EENF, the Secretary referred to comments and directives made by MassDOT, which recommended that the Proponent utilize the Central Transportation Planning Staff's (CTPS) Regional Travel Demand Model (the "Model") to estimate future traffic volumes. The Model, which incorporates a complex transportation system that covers much of Eastern Massachusetts as well as parts of Rhode Island and New Hampshire, incorporates housing, job opportunities, various transportation systems, commuting patterns and many more inputs as part of its assignment of trips to the transportation network. As requested, the Proponent has collaborated closely with MassDOT and CTPS to run the Model to analyze the future Master Plan conditions as a more accurate means to quantify Project tripmaking,

[2] *Transportation Impact Assessment (TIA) Guidelines*, Massachusetts Department of Transportation, March 13, 2014.

choice of mode by land use type, and assign those trips within the context of this more complex, comprehensive transportation system.

The Model has been employed specifically to determine future trip generation parameters for the Master Plan Project. These estimates were then utilized to assess both operational and safety impacts, identify future constraints and deficiencies, and determine appropriate mitigation actions and improvements to consider in connection with the Project. Based on a thorough review of the Model results, the Model is conservative in its estimation of transit share, overall trip generation, and internal trip capture. As such, all analyses presented in this TIA have been prepared two ways: (1) using CTPS/MassDOT parameters and (2) using an expected transit share that is more closely aligned with Go Boston 2030 as well as an anticipated internal capture rate that reflects the mixed-use nature of the site and the trip sharing that will occur in the future. Section 6.9 presents the results of both sets of analyses side by side to provide a comparison between the CTPS/MassDOT parameters and the transit share and internal capture rate that we expect to be achieved by the Master Plan Project. This methodology is discussed in detail in Section 6.8.2.

6.4 Project Description

This DEIR/DPIR analyzes the Master Plan Project through full build-out of the Project site. The Master Plan Project program is described in greater detail in Chapter 1, Project Description. The proposed Master Plan Project offers a dynamic mix of uses on the Project Site, encouraging commercial and innovation uses, diversity of residential uses, creative retail and business incubator/innovation space, as well as parks and community spaces. The Master Plan Project will be anchored at the two existing MBTA Blue Line Stations and then will radiate through the Project Site along a network of new streets, dedicated community path and cycle track, neighborhood retail districts and open spaces.

The Master Plan Project is a long-term development that will be implemented in phases over a period of 15 to 20 years. The Master Plan Project is, therefore, being conceived with an overall development program that provides a degree of flexibility to balance different residential and commercial uses as development proceeds. For planning purposes, the Master Plan Project was presented in the EENF/PNF with two programs, both having the same total floor area, but with different mixes of uses. The traffic analysis summarized in this DEIR focuses on a single development program with the following mix of uses:

- 8,000,000 sf of Office/R&D
- 7,150,000 sf (7,200 units) Residential
- 500,000 sf of Retail
- 550,000 sf of Hotel

Figure 1.1 shows the site location.

The Traffic Impact Assessment (TIA) included herein quantifies existing and projected future traffic conditions and identifies potential improvements within the study area. It is important to note that two program options were considered for master planning purposes. This DEIR/DPIR fully analyzes the potential environmental and community impacts, and presents mitigation measures and public benefits for the refined "pro-commercial" program, or Program A. The "pro-residential" program, or Program B, consists of less commercial office space (up to 5.25 MSF) and more residential space (up to 10.4 MSF, or approximately 10,000 units). Program A is generally more impactful as it relates to traffic generation and other impacts. Program B would have approximately 6 percent less traffic during the AM peak and approximately 10 percent less during the PM peak. In accordance with the Secretary's certificate and discussions with local and state governmental representatives, the following components have been added or modified since the initial EENF/PNF filing:

- Analysis for 11 additional study area intersections based on City of Revere, City of Boston, and MassDOT:
  - VFW Parkway at Beach Street
  - Ocean Avenue at Revere Street
  - Ocean Avenue at Beach Street
  - N. Shore Road at Beach Street
  - N. Shore Road at the Lynnway Ramps (2)
  - Bennington St at Swift St
  - Chelsea St at (Unnamed Road)
  - Bennington St at (Unnamed Road)
  - Chelsea St at Bennington St
  - Chelsea St at Prescott St
- Road Safety Audits at 17 locations.
- Modified future conditions analysis to incorporate CTPS Model data.
- Overall trip generation.
- Internal trip capture.
- Mode shares.
- Trip distribution.
- Updated No-Build and Build Conditions traffic volumes and capacity analysis to reflect Master Plan Project phasing and full study area.
- Updated Build with Mitigation Conditions traffic volumes and capacity analysis to reflect Master Plan Project phasing and full study area.

This chapter provides a summary of all the components of the TIA that were provided in the Expanded ENF, as well as detailed discussion of the additional/modified components listed above.

6.5 Study Area

The Master Plan Project study area presented in the EENF/PNF included 42 study area locations. Through discussions with MassDOT, City of Boston, and City of Revere, 11 additional locations were augmented to that initial area of study resulting in a total of 53 intersections being evaluated. The study area for the DEIR/DPIR has been expanded accordingly and now includes the following locations:

- Neptune Road at Saratoga Street
- Neptune Road at Bremen Street
- Bennington Street at Neptune Road
- Neptune Road at Route 1A NB off-ramp
- Route 1A Southbound at Curtis Street
- Boardman Street at Route 1A
- Route 1A Northbound at Waldemar Avenue
- Route 1A at Suffolk Downs/Tomasello Drive
- Route 1A at Jughandle
- Route 1A at Furlong Drive
- Winthrop Avenue at Route 1A Southbound on-ramp
- Route 60 (American Legion Highway) at Bell Circle – North
- Route 1A (American Legion Highway)/Route 16 (Revere Beach Parkway) at Bell Circle – South
- Route 1A (VFW Parkway) at Bell Circle
- Beach Street at Bell Circle
- Revere Street at Route 60
- Brown Circle
- Route 60 (Squire Road) at Charger Street
- Route 60 (Squire Road) at Sigourney Street/Mall Driveway
- Copeland Circle
- Route 16 at Garfield Avenue/Webster Avenue
- Route 1/Route 16 Interchange
- Winthrop Avenue at Revere Beach Parkway/Harris Street
- Butler Circle
- Route 1A (North Shore Road) at Wonderland MBTA Station
- Route 1A (North Shore Road) at Revere Street
- Winthrop Avenue at North Shore Road
- Winthrop Avenue at Suffolk Downs/Tomasello Drive
- Winthrop Avenue at Revere Beach Parkway
- Ocean Avenue at State Road/Revere Beach Parkway

- Eliot Circle
- Bennington Street at Saratoga Street
- Bennington Street at Crescent Avenue
- Bennington Street/State Road at Winthrop Avenue
- VFW Parkway at Beach Street
- Ocean Avenue at Revere Street
- Ocean Avenue at Beach Street
- North Shore Road at Beach Street
- North Shore Road at Lynnway Northbound and Southbound on/off-ramps
- Bennington Street at Swift Street
- Chelsea Street at Chelsea Street/Bennington Street Connector
- Bennington Street at Chelsea Street/Bennington Street Connector
- Chelsea Street at Bennington Street
- Chelsea Street at Prescott Street

MassDOT also required that conditions and operations in the Sumner, Callahan, and Ted Williams Tunnels be evaluated. Figure 6.2 illustrates study area intersections. The existing conditions evaluation consists of an inventory of the traffic control; roadway, driveway, and intersection geometry in the study area; the collection of daily and peak period traffic volumes; and a review of recent vehicular crash history.

6.6 Study Methodology

The transportation analysis in support of the Master Plan Project conforms to the MassDOT TIA Guidelines, the BTD's "Transportation Access Plans Guidelines", requirements of the City of Revere, and generally uses standard methodologies. As mentioned previously, the Institute of Transportation Engineers' Trip Generation (10th Edition) and local travel characteristics as defined in *Access Boston 2000-2010* were not utilized in support of this effort. Alternatively, and as specifically directed by MEPA and MassDOT, the Proponent utilized the CTPS Regional Travel Demand Model to estimate future traffic volumes.

The TIA has been conducted in two distinct stages. The first stage (Existing Conditions) involved a survey and compilation of existing transportation conditions within the study area (defined below) including:

- An inventory of the transportation infrastructure within the defined Master Plan Project study area, including its geometric and operational characteristics.
- Geometric and operational characteristics of study area roadways and intersections.
- Existing traffic control at study area intersections (i.e., traffic signalization, stop signs, one-way streets, etc.).

- Transportation characteristics of current weekday operations at the Project Site, including access, egress, parking for patrons and employees, and loading/service and shuttle bus activities.
- Area off-street and on-street parking supply.
- Pedestrian activity along study area roadways, and at study area intersections.
- Bicycle activity and accommodations.
- Public transportation options within the study area, including buses and the Blue Line.

In the second stage of the study (Evaluation of Long-Term Transportation Impacts), future transportation conditions were projected within the study area. The future No-Build condition includes an assessment of future transportation including background growth on area roadways and intersections, planned transportation infrastructure improvements, and growth related to other proposed projects within the study area (without consideration of the Master Plan Project). The future No-Build Condition takes into consideration many of the projects that are planned and/or under construction within the East Boston and Revere area including those listed in Section 6.8.1.2. The future Build Condition assesses the No-Build Condition plus estimated traffic generated by the Master Plan Project. The future Build with Mitigation assess the Build Condition plus proposed infrastructure improvements.

Roadway, pedestrian, and transit capacity for morning and evening peak commuter periods, including traffic counts in May 2017 and April 2018, were studied and are summarized for the following conditions:

- 2018 Existing Conditions
- 2028 No-Build Conditions
- 2028 Build Conditions without Mitigation (CTPS/MassDOT Parameters)
- 2028 Build Conditions with Mitigation (CTPS/MassDOT Parameters)
- 2028 Build Conditions with Mitigation (Expected TOD Parameters)
- 2038 No-Build Conditions
- 2038 Build Conditions with 2028 Mitigation (CTPS/MassDOT Parameters)
- 2038 Build Conditions with 2028 Mitigation (Expected TOD Parameters)
- 2038 Build Conditions with additional Mitigation (CTPS/MassDOT Parameters)

Specific travel demand forecasts for the Master Plan Project were assessed along with future transportation demands due to background traffic growth and traffic growth from other planned or approved projects within the study area. The years 2028 and 2038 were selected as the horizon years, as requested by MassDOT, for the purposes of quantifying and assessing future transportation impacts. The year 2028 satisfies MassDOT's request for a 10-year horizon and also serves as an interim build condition for the Project site. As described previously, the Master Plan Project will be built out over an approximately 15 to 20-year period. Based on estimated project development phasing and anticipated market conditions, the Project site is likely to be approximately 40 to 50 percent complete and occupied in 2028. It is anticipated

that a majority of the proposed transportation mitigation and improvement plan will be in place by 2028.

6.7 Existing Conditions

Evaluation of the transportation impacts associated with the Project requires a thorough understanding of the existing transportation system in the study area. A complete inventory and evaluation of the existing transportation system in the project study area was conducted. The analysis of existing transportation conditions is based on the existing roadway network, roadway/intersection geometry, traffic control, existing daily and peak hour traffic volumes, traffic safety conditions, and existing public transportation. Figures 6.3a-d present the existing intersection lane geometry and traffic control at each of the study area intersections and Figure 6.4 identifies study area roadway jurisdiction.

6.7.1 Existing Condition Traffic Volumes

Daily traffic volumes were collected along 11 key corridors in coordination with MassDOT over a seven day period in early May 2017 (Sunday through Saturday) using automatic traffic recorders (ATRs). These dates were selected as they represent typical days for traffic count purposes (non-holidays) while local schools are in session. The volumes are summarized in Table 6-1 and included in Appendix D

As shown in Table 6-1, approximately 57,800-60,900 vehicles travel along Route 1A (William F McClellan Highway). On a typical weekday, the weekday morning and evening peak hours account for approximately five and six percent of the weekday daily traffic flow, respectively. Traffic flow along Route 1A (William F McClellan Highway) is greater in the southbound direction for the weekday morning peak hours and approximately even in each direction during weekday evening peak hours.

Table 6-1 Existing Traffic Volume Summary

Location	Weekday ADT [a]	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		Volume	K Factor [b]	Dir. Dist. [c]	Volume	K Factor	Dir. Dist.
Route 1A (William F McClellan Highway), north of Waldemar Avenue	60,900	3,290	5.4%	63% SB	3,650	6.0%	56% NB
Route 1A (William F McClellan Highway), north of Tomasello Drive	57,800	3,035	5.3%	62% SB	3,340	5.8%	52% NB
Route 1A (William F McClellan Highway), between Jughandle Entrance and Exit	57,900	2,960	5.1%	63% SB	3,405	5.9%	54% NB
Tomasello Drive, east of Route 1A (William F McClellan Highway)	3,200	230	7.2%	81% WB	290	9.2%	93% EB
Tomasello Drive, south of Winthrop Avenue (Route 145)	11,600	405	3.5%	76% SB	1,025	8.9%	64% NB
Furlong Drive, west of Tomasello Drive	9,300	190	2.0%	62% WB	785	8.4%	51% EB
Winthrop Avenue (Route 145), west of Tomasello Drive	31,500	2,135	6.8%	54% WB	2,505	7.9%	56% EB
Winthrop Avenue (Route 145), east of Tomasello Drive	32,300	2,210	6.8%	58% WB	2,610	8.1%	61% EB
Bennington Street, south of Crescent Avenue	14,200	1,300	9.2%	84% SB	1,035	7.3%	57% NB
North Shore Road, north of Winthrop Avenue	9,700	730	7.5%	56% SB	750	7.7%	57% NB
Route 1, between Squire Road Ramps	67,600	4,880	7.2%	68% SB	4,245	6.3%	59% NB

Source Automatic traffic recorder counts conducted in May 2017
Note Peak hours do not necessarily coincide with the peak hours of turning movement counts.
a Average Daily Traffic volume expressed in vehicles per day.
b Represents the percent of daily traffic that occurs during the peak hour.
c Directional distribution of peak hour traffic.

Tomasello Drive, east of Route 1A (William F McClellan Highway) carries approximately 3,200 vehicles on a typical weekday with the weekday morning and evening peak hours accounting for approximately seven and nine percent of the weekday daily traffic flow, respectively. Tomasello Drive, south of Winthrop Avenue (Route 145), carries approximately 11,600 vehicles on a typical weekday with the weekday morning peak accounting for approximately 3.5 percent and weekday evening peak hour accounting for approximately 9 percent of the weekday daily traffic flow. The difference in daily traffic between the two Tomasello Drive locations can be attributed to the commercial development along Furlong Drive connecting to Tomasello Drive, approximately 800 feet south of Winthrop Avenue (Route 145). Traffic flow directionality along Tomasello Drive is dependent on the time of day. For the weekday morning peak hour, traffic flows primarily in the southbound direction, while for the weekday evening peak hour traffic flow is mainly in the northbound direction.

Winthrop Avenue (Route 145), east of Tomasello Drive, carries approximately 32,000 vehicles on a typical weekday with the weekday morning peak accounting for

approximately seven percent and weekday evening peak hour accounting for approximately eight percent of the weekday daily traffic flow. Traffic flow along Winthrop Avenue (Route 145) is generally evenly distributed in each direction during the weekday morning peak hours and is greater in the eastbound direction during the weekday evening peak hour, though the peak direction is based on time of day.

Concurrent with the ATR counts, turning movement counts (TMCs) were conducted in May 2017 for the original study area intersections and in April 2018 for the expanded study area during the weekday morning peak period from 6:30 AM to 9:30 AM and the weekday evening peak period from 3:30 PM to 6:30 PM. The TMC data indicates that, within the study area, the weekday morning peak hour occurs between 7:15 AM and 8:15 AM and the weekday evening peak hour occurs between 4:45 PM and 5:45 PM.

In addition to the daily traffic volumes and intersection peak hour TMCs, manual roadway segment counts were conducted along I-90 eastbound and westbound at various locations in the Ted Williams Tunnel in June 2018 during the weekday morning peak period from 6:30 AM to 9:30 AM and the weekday evening peak period from 3:30 PM to 6:30 PM. The roadway segment data indicates that, the I-90 eastbound weekday morning peak hour occurs between 8:30 AM and 9:30 AM and the weekday evening peak hour occurs between 5:00 PM and 6:00 PM. For I-90 westbound the weekday morning peak hour occurs between 6:45 AM and 7:45 AM and the weekday evening peak hour occurs between 4:15 PM and 5:15 PM.

Seasonal Variation

MassDOT weekday seasonal factors were reviewed to understand the seasonality of traffic count data collected in the month of May 2017 and April 2018. Data for seasonal variation of traffic volumes on urban arterials and collectors in Boston, Revere, and Chelsea, MA indicate that traffic counts in May and April are generally higher than the average month. Since the May and April count data were found to be higher than annual average conditions, no further seasonal adjustment factors were applied to the data. The MassDOT weekday seasonal factors are included in Appendix D.

Figures 6.5a-d and Figures 6.6a-d illustrate the resulting 2018 Existing Condition weekday morning and weekday evening intersection peak hour traffic volumes, respectively. Figures 6.7a-d illustrate the resulting 2018 Existing Condition weekday morning and evening peak hour traffic volumes for I-90 eastbound, I-90 westbound, I-90 westbound in East Boston, and Sumner Tunnel Exit, respectively.

It should also be noted that as part of the existing and future conditions capacity analysis, additional volume was included along the Route 1A corridor to account for unmet demand associated with queuing in the peak direction. Based on information provided in prior studies of this area, an additional 300 vehicles were added to Route 1A at Boardman Street southbound during the morning peak hour and 300 vehicles were added to the Route 1A at Boardman Street northbound during the weekday evening peak hour. This approach is consistent with comments made by

MassDOT on the prior TIAs that have been submitted in support of former development proposals for the Project Site.

6.7.2 Crash History

To identify motor vehicle crash trends in the study area, the most current crash data for the study area intersections were obtained from MassDOT for the five-year period from 2011 through 2015. A summary of the vehicular crash data is presented in Table 6-2 and included in Appendix D.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection on a daily basis. MassDOT average crash rates for District 6 (the MassDOT district designation for Boston) are 0.70 and 0.53 for signalized and unsignalized intersections, respectively, and District 4 (the MassDOT district designation for Revere and Chelsea) are 0.73 and 0.56 for signalized and unsignalized intersections, respectively. In other words, on average, 0.70 crashes occurred per million vehicles entering signalized intersections, and 0.53 crashes occurred per million vehicles entering unsignalized intersections throughout District 6. The same methodology applies to District 4 rates. The crash rate worksheets for the study area intersections are included in Appendix D.

Table 6-2 Intersection Vehicular Crash Summary (2011 – 2015)

	Neptune Road at Saratoga Street	Neptune Road at Bremen Street	Bennington Street at Neptune Road	Neptune Road at Route 1A NB off-ramp	Route 1A SB at Curtis Street	Boardman Street at Route 1A	Route 1A NB at Waldemar Avenue	Route 1A at Suffolk Downs/Tomasello Drive	Route 1A at Jughandle[a]	Route 1A at Furlong Drive	Winthrop Avenue At Route 1A SB On-Ramp
Signalized?	Yes	no	Yes	Yes	No	Yes	no	no	Yes	Yes	Yes
MassDOT District	6	6	6	6	6	6	6	6	6	4	4
MassDOT Average Crash Rate	0.70	0.53	0.70	0.70	0.53	0.70	0.53	0.53	n/a	0.73	0.73
Calculated Crash Rate	0.08	0.00	0.00	0.00	0.02	0.01	0.00	0.00	n/a	0.11	0.25
Exceeds Average?	No	No	No	No	No	No	No	No	n/a	No	No
Year											
2011	0	0	0	0	1	1	0	0	5	0	6
2012	2	0	0	0	0	0	0	0	5	1	1
2013	0	0	0	0	0	0	0	0	3	3	3
2014	0	0	0	0	0	0	0	0	4	3	5
2015	0	0	0	0	0	0	0	0	8	2	2
Total	2	0	0	0	1	1	0	0	25	9	17
Average	0.4	0.0	0.0	0.0	0.3	0.2	0.0	0.0	4.8	1.8	3.4
Collision Type											
Angle	1	0	0	0	0	0	0	0	6	4	5
Head-on	1	0	0	0	0	0	0	0	0	0	1
Rear-end	0	0	0	0	0	0	0	0	12	2	8
Rear-to-Rear	0	0	0	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0	0	0	0	0	0	0
Sideswipe, same direction	0	0	0	0	0	0	0	0	1	1	1
Single vehicle crash	0	0	0	0	1	1	0	0	6	2	2
Unknown/ Not Reported	0	0	0	0	0	0	0	0	0	0	0
Crash Severity											
Fatal injury	0	0	0	0	0	0	0	0	0	3	0
Non-fatal injury	1	0	0	0	1	0	0	0	9	5	8
Property damage only (none injured)	1	0	0	0	0	1	0	0	10	0	7
Not Reported/Unknown	0	0	0	0	0	0	0	0	6	1	2
Time of Day											
Weekday, 7:00 AM - 9:00 AM	1	0	0	0	0	0	0	0	0	1	1
Weekday, 4:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	1	1	2
Saturday, 11:00 AM - 2:00 PM	0	0	0	0	0	0	0	0	1	0	1
Weekday, other time	1	0	0	0	0	0	0	0	13	5	9
Weekend, other time	0	0	0	0	1	1	0	0	10	2	4
Pavement Conditions											
Dry	1	0	0	0	1	1	0	0	13	8	15
Wet	0	0	0	0	0	0	0	0	12	1	2
Snow	0	0	0	0	0	0	0	0	0	0	0
Ice	1	0	0	0	0	0	0	0	0	0	0
Slush	0	0	0	0	0	0	0	0	0	0	0
Unknown/Not reported/Other	0	0	0	0	0	0	0	0	0	0	0
Non Motorist (Bike, Pedestrian)	0	0	0	0	0	0	0	0	0	0	0

Source: MassDOT crash portal, accessed October 2017.

[a] "n/a" was entered into the Crash Rate rows for intersections that underwent Road Safety Audits as part of this study. The RSA Locations include all crashes within the road safety audit areas, which in some cases includes adjacent intersections. Since the total number of crashes is reflective of multiple intersections, crash rates were not calculated for these locations.

Table 6-2 Intersection Vehicular Crash Summary (2011 – 2015) (continued)

	Bell Circle[a]	Revere Street at Route 60[a]	Brown Circle[a]	Route 60 (Squire Road) at Charger Street	Route 60 (Squire Road) at Sigourney Street/Mall Driveway[a]	Copeland Circle[a]	Route 16 at Garfield Avenue/Webster Avenue[a]	Route 1 SB Off-Ramp at Route 16 WB	Route 1 SB On-Ramp at Route 16 WB	Route 1 NB On-Ramp at Route 16 EB	Route 1 NB Off-Ramp at Route 16 EB
Signalized?	yes	Yes	No	Yes	Yes	No	Yes	No	No	No	No
MassDOT District	4	4	4	4	4	4	4	4	4	4	4
MassDOT Average Crash Rate	n/a	n/a	n/a	0.73	n/a	n/a	n/a	0.56	0.56	0.56	0.56
Calculated Crash Rate	n/a	n/a	n/a	0.23	n/a	n/a	n/a	0.05	0.10	0.11	0.10
Exceeds Average?	n/a	n/a	n/a	No	n/a	n/a	n/a	No	No	No	No
Year											
2011	21	6	23	6	8	30	17	1	1	3	1
2012	12	3	21	0	10	25	16	0	2	1	1
2013	18	9	22	0	14	38	21	1	1	0	1
2014	25	9	27	6	9	35	28	1	1	1	1
2015	15	4	34	4	11	40	24	1	1	2	3
Total	91	31	127	16	52	168	106	4	1	3	7
Average	18.2	6.2	25.4	3.2	10.4	33.6	21.2	0.8	0.2	0.6	1.4
Collision Type											
Angle	44	11	46	8	17	12	28	0	0	0	0
Head-on	0	0	0	0	0	2	5	0	0	0	0
Rear-end	27	14	33	5	29	120	35	0	0	2	2
Rear-to-Rear	0	0	0	0	0	1	0	0	1	0	0
Sideswipe, opposite direction	1	0	2	1	0	1	3	0	0	0	0
Sideswipe, same direction	12	2	21	0	2	15	23	3	3	0	0
Single vehicle crash	5	4	23	0	4	16	12	1	2	5	5
Unknown/ Not Reported	2	0	2	2	0	1	0	0	0	0	0
Crash Severity											
Fatal injury	0	0	0	0	0	0	0	0	0	0	0
Non-fatal injury	38	10	57	8	24	64	37	1	3	3	2
Property damage only (none injured)	39	16	58	5	22	86	66	3	3	4	5
Unknown/ Not Reported	14	5	12	3	6	18	3	0	6	7	0
Time of Day											
Weekday, 7:00 AM - 9:00 AM	7	0	8	0	3	9	4	0	2	0	0
Weekday, 4:00 PM - 6:00 PM	6	2	14	1	2	15	10	1	1	0	0
Saturday, 11:00 AM - 2:00 PM	2	1	5	2	1	12	5	0	0	0	0
Weekday, other time	47	16	68	7	32	92	49	2	2	4	5
Weekend, other time	29	12	32	6	14	40	38	1	1	3	2
Pavement Conditions											
Dry	68	22	93	12	36	134	82	3	5	5	5
Wet	18	6	19	3	14	23	22	1	1	2	2
Snow	2	2	3	0	1	4	2	0	0	0	0
Ice	1	1	4	0	0	1	0	0	0	0	0
Slush	0	0	1	0	0	0	0	0	0	0	0
Unknown/Not reported/Other	2	0	7	1	1	6	0	0	0	0	0
Non Motorist (Bike, Pedestrian)	2	3	8	0	0	1	5	0	0	0	0

Source: MassDOT crash portal, accessed October 2017.

[a] "n/a" was entered into the Crash Rate rows for intersections that underwent Road Safety Audits as part of this study. The RSA Locations include all crashes within the road safety audit areas, which in some cases includes adjacent intersections. Since the total number of crashes is reflective of multiple intersections, crash rates were not calculated for these locations.

Table 6-2 Intersection Vehicular Crash Summary (2011 – 2015) (continued)

	Winthrop Avenue at Revere Beach Pkwy/Harris Street[a]	Butler Circle	Route 1A (North Shore Road) at Wonderland MBTA Station	Route 1A (North Shore Road) at Revere Street	Winthrop Avenue at North Shore Road[a]	Winthrop Avenue at Suffolk Downs/Tomasello Drive[a]	Winthrop Avenue at Revere Beach Parkway	Ocean Avenue at State Road/Revere Beach Pkwy	Eliot Circle	Bennington Street at Saratoga Street	Bennington Street at Crescent Avenue[a]
Signalized?	yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No
MassDOT District	4	4	4	4	4	4	4	4	4	6	4
MassDOT Average Crash Rate	n/a	n/a	0.73	0.73	n/a	n/a	0.53	0.53	n/a	0.70	n/a
Calculated Crash Rate	n/a	n/a	0.35	0.37	n/a	n/a	0.15	0.51	n/a	0.07	n/a
Exceeds Average?	n/a	n/a	No	No	n/a	n/a	No	No	n/a	No	n/a
Year											
2011	6	7	4	5	5	4	1	4	8	1	2
2012	8	2	5	1	3	5	1	1	7	1	1
2013	7	4	3	4	9	7	1	4	8	1	1
2014	7	3	6	6	13	6	1	2	5	0	0
2015	11	3	2	11	5	10	4	1	6	0	1
Total	39	19	20	27	35	32	8	12	34	3	5
Average	7.8	3.8	4.0	5.4	7.0	6.4	1.6	2.4	6.8	0.6	1.0
Collision Type											
Angle	14	6	4	4	19	18	2	6	9	1	3
Head-on	0	1	0	1	0	0	0	0	0	0	1
Rear-end	17	5	9	8	9	4	4	0	5	0	1
Rear-to-Rear	0	0	0	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0	0	0	0	1	1	0
Sideswipe, same direction	1	2	2	2	3	2	0	2	6	0	0
Single vehicle crash	6	5	4	12	4	8	2	4	13	1	0
Unknown/ Not Reported	0	0	1	0	0	0	0	0	0	0	0
Crash Severity											
Fatal injury	0	0	12	0	0	0	0	0	0	0	0
Non-fatal injury	17	9	0	9	6	15	2	2	6	1	3
Property damage only (none injured)	19	8	8	13	28	17	6	8	22	2	1
Unknown/ Not Reported	3	2	0	5	1	0	0	2	6	0	1
Time of Day											
Weekday, 7:00 AM - 9:00 AM	2	1	1	1	1	4	1	1	3	0	1
Weekday, 4:00 PM - 6:00 PM	5	1	7	1	3	6	0	2	3	0	1
Saturday, 11:00 AM - 2:00 PM	0	1	1	0	0	1	0	2	2	0	0
Weekday, other time	17	12	8	10	23	19	6	4	17	3	3
Weekend, other time		4	3	15	8	2	1	3	9	0	0
Pavement Conditions											
Dry	34	12	18	21	26	26	6	10	27	3	3
Wet	4	5	1	2	8	4	1	1	6	0	2
Snow	1	1	0	1	0	1	0	0	0	0	0
Ice	0	0	0	2	0	1	0	1	1	0	0
Slush	0	0	0	0	0	0	1	0	0	0	0
Unknown/ Not reported/Other	0	0	1	0	1	0	0	0	0	0	0
Non Motorist (Bike, Pedestrian)	1	1	1	1	2	4	0	1	1	0	0

Source: MassDOT crash portal, accessed October 2017.

[a] "n/a" was entered into the Crash Rate rows for intersections that underwent Road Safety Audits as part of this study. The RSA Locations include all crashes within the road safety audit areas, which in some cases includes adjacent intersections. Since the total number of crashes is reflective of multiple intersections, crash rates were not calculated for these locations.

Table 6-2 Intersection Vehicular Crash Summary (2011 – 2015) (continued)

	Bennington Street/State Road at Winthrop Avenue[a]	VFW Parkway at Beach Street[a]	Ocean Avenue at Revere Street	Ocean Avenue at Beach Street	North Shore Road at Beach Street	North Shore Road at Lynnway SB On/Off-Ramps	North Shore Road at Lynnway NB On/Off-Ramps	Bennington Street at Swift Street	Chelsea Street at Chelsea Street/ Bennington Street Connector	Bennington Street at Chelsea Street/ Bennington Street Connector	Chelsea Street at Bennington Street	Chelsea Street at Prescott Street
Signalized?	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes
MassDOT District	4	4	4	4	4	4	4	6	6	6	6	6
MassDOT Average Crash Rate	n/a	n/a	0.73	0.73	0.73	0.56	0.56	0.70	0.53	0.53	0.70	0.70
Calculated Crash Rate	n/a	n/a	0.66	1.06	0.49	0.21	1.59	0.00	0.00	0.00	0.00	0.00
Exceeds Average?	n/a	n/a	No	Yes	No	No	Yes	No	No	No	No	No
Year												
2011	4	4	2	1	3	0	3	0	0	0	0	0
2012	6	3	2	3	2	1	4	0	0	0	0	0
2013	6	6	1	4	2	1	4	0	0	0	0	0
2014	4	6	3	1	1	1	9	0	0	0	0	0
2015	1	4	2	8	2	1	5	0	0	0	0	0
Total	21	23	10	17	10	4	25	0	0	0	0	0
Average	4.2	4.6	2.0	3.4	2.0	0.8	5.0	0.0	0.0	0.0	0.0	0.0
Collision Type												
Angle	9	6	3	7	5	1	1	0	0	0	0	0
Head-on	1	1	0	2	1	0	0	0	0	0	0	0
Rear-end	3	8	0	2	1	0	19	0	0	0	0	0
Rear-to-Rear	0	0	0	0	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	0	1	0	2	1	0	0	0	0	0	0	0
Sideswipe, same direction	2	3	1	3	0	0	0	0	0	0	0	0
Single vehicle crash	5	4	6	1	2	3	4	0	0	0	0	0
Unknown/ Not Reported	1	0	0	0	0	0	1	0	0	0	0	0
Crash Severity												
Fatal injury	0	0	0	0	0	0	0	0	0	0	0	0
Non-fatal injury	12	11	3	5	6	2	10	0	0	0	0	0
Property damage only (none injured)	8	9	5	12	4	2	15	0	0	0	0	0
Unknown/ Not Reported	1	3	2	0	0	0	0	0	0	0	0	0
Time of Day												
Weekday, 7:00 AM - 9:00 AM	4	2	0	1	2	0	2	0	0	0	0	0
Weekday, 4:00 PM - 6:00 PM	2	1	1	4	0	0	3	0	0	0	0	0
Saturday, 11:00 AM - 2:00 PM	1	0	0	0	0	0	1	0	0	0	0	0
Weekday, other time	11	13	4	8	6	2	9	0	0	0	0	0
Weekend, other time	3	9	5	4	2	2	10	0	0	0	0	0
Pavement Conditions												
Dry	14	18	7	15	7	4	19	0	0	0	0	0
Wet	6	3	3	1	1	0	5	0	0	0	0	0
Snow	0	2	0	0	1	0	0	0	0	0	0	0
Ice	0	0	0	0	1	0	0	0	0	0	0	0
Slush	1	0	0	0	0	0	0	0	0	0	0	0
Unknown/Not reported/Other	0	0	0	1	0	0	1	0	0	0	0	0
Non Motorist (Bike, Pedestrian)	0	3	1	0	0	0	0	0	0	0	0	0

Source: MassDOT crash portal, accessed October 2017.

[a] "n/a" was entered into the Crash Rate rows for intersections that underwent Road Safety Audits as part of this study. The RSA Locations include all crashes within the road safety audit areas, which in some cases includes adjacent intersections. Since the total number of crashes is reflective of multiple intersections, crash rates were not calculated for these locations.

Most crashes at the study area intersections were identified to be angle and rear-end collisions resulting in non-fatal injuries or property damage only. No fatal crashes occurred at the study area intersections. Crashes involving non-motorists (bike, pedestrian) occurred at the following locations:

- Bell Circle (two crashes)
- Revere Street at Route 60 (three crashes)
- Brown Circle (eight crashes)
- Copeland Circle (one crash)
- Route 16 at Garfield Avenue/ Webster Avenue (five crashes)
- Winthrop Avenue at Revere Beach Parkway/ Harris Street (one crash)
- Butler Circle (one crash)
- Route 1A (North Shore Road) at Wonderland MBTA Station (one crash)
- Route 1A (North Shore Road) at Revere Street (one crash)
- Winthrop Avenue at North Shore Road (two crashes)
- Winthrop Avenue at Suffolk Downs/ Tomasello Drive (four crashes)
- Ocean Avenue at State Road/ Revere Beach Parkway (one crash)
- Eliot Circle (one crash)
- VFW Parkway at Beach Street (three crashes)
- Ocean Avenue at Revere Street (one crash)

Road Safety Audits

The Highway Safety Improvement Program (HSIP[3]) identifies crash clusters which are eligible for possible safety funding. Locations that are HSIP-eligible should be reviewed in detail through the Road Safety Audit (RSA) process. RSAs are performed to determine what the identifiable causes of the crashes are, and what correctable actions could take place to address those causes. MassDOT published a set of Road Safety Audit Guidelines[4] that streamlines the process of conducting an RSA. A copy of the guidelines is available in Appendix D. Based on a review of the MassDOT's HSIP database, the following HSIP clusters were identified within the study area:

- Bell Circle
- Beach Street at VFW Parkway
- Revere Street at Route 60
- Brown Circle
- Squire Road (Route 60) at Sigourney Street/Mall Driveway

[3] According to the MassDOT website, "an HSIP-eligible location is a crash cluster that ranks within the Top 5% of each Regional Planning Agency, based on a combination of factors including crash incidence and severity (Using the Equivalent Property Damage Only (EPDO) index where Property Damage Only crashes = 1 Point; Injury crashes = 5 Points; Fatal crashes = 10 points)."

[4] Road Safety Audit Guidelines; Massachusetts Department of Transportation; 2015.

- Copeland Circle
- Route 16 at Garfield Avenue/Webster Avenue
- Winthrop Avenue at Revere Beach Parkway/Harris Street
- Winthrop Avenue at North Shore Road
- Winthrop Avenue at Tomasello Avenue
- Bennington Street at Crescent Avenue
- Bennington Street/State Road at Winthrop Avenue
- Route 1A at Route 1A U-turn (Jughandle)

Detailed crash reports were obtained from the City of Revere, City of Chelsea, and the Massachusetts State Police. The crash reports were summarized as part of the preparation of this DEIR/DPIR. Attempts were made to obtain detailed crash reports from the Boston Police Department for intersections in the City of Boston. The BPD did provide access to their updated database, but the data contained therein did not provide enough detail to accurately summarize the crash history at the study area intersections in Boston. The Proponent will continue its follow-up on the additional crash data from the City of Boston.

Based on a review of these reports and input from MassDOT, it was determined by MassDOT that with the exception of Winthrop Avenue at Revere Beach Parkway/ Harris Street, RSAs are required at all of the HSIP locations listed above. The intersection of Winthrop Avenue at Revere Beach Parkway/ Harris Street was upgraded and reconstructed in 2016 as part of the Winthrop Avenue Bridge reconstruction project. Due to the timing of the upgrades at the intersection, crashes that occurred post-construction during this short duration are considered insufficient to reflect the potential safety issues at this location. As a result, an RSA was not required for this specific location.

The Proponent worked with MassDOT, the City of Revere, and the City of Chelsea, to arrange the RSAs. The Road Safety Audits were conducted on June 14, June 26, July 2 and August 14, 2018. The Road Safety Audits identified existing safety issues as well as potential safety enhancements at all of the locations listed above. A comprehensive list of short-term, mid-term, and long-term safety enhancements is provided for each RSA location. As design of required traffic mitigation is advanced the RSAs will be referenced and utilized. Copies of the final RSA reports are included in Appendix D.

6.7.3 Public Transportation

The Project Site is very well served by public transportation and benefits from adjacent MBTA Blue Line service as well as multiple MBTA local and commuter bus routes that operate within one-quarter mile of the Project Site. These services are illustrated in Figure 6.8, and their service and operational characteristics are described in further detail in the following sections.

The purpose of the MBTA's Service Delivery Policy (the Policy)[5] is to "set how the MBTA evaluates service quality and allocates transit service to meet the needs of the Massachusetts Bay region," which is consistent with the MBTA's enabling legislation and other external mandates. Vehicle load standards, as detailed in the Policy, define the passenger capacity conditions that are acceptable for passenger comfort by mode and time period. The absolute maximum number of passengers that can fit onto a transit vehicle (also referred to by the MBTA as "crush capacity") is greater than the vehicle load standards dictated by the MBTA's Policy. In order to analyze transit demand in relation to capacity provided for each transit service, maximum passenger loads were compared to policy capacity and to crush capacity for each 30-minute time period of the day.[6] A discussion of existing passenger loads as compared to vehicle capacities is provided below for each of the MBTA transit services operating proximate to the Master Plan Project.

Existing Transit Services

MBTA Blue Line Rapid Transit Service

The MBTA's Blue Line rapid transit service operates between Wonderland Station in Revere and Bowdoin Station in Boston. The Blue Line connects with the Orange Line at State Street Station, the Green Line at Government Center Station, and ferry service at Aquarium Station. The MBTA Blue Line also provides service to Boston Logan International Airport via Airport Station, which is served by a free terminal shuttle operated by Massport. The Blue Line does not directly connect to the MBTA's Red Line service, but Blue Line riders can transfer to the MBTA's Orange Line or Green Line and travel for one additional stop to transfer to the Red Line.

On weekdays, Blue Line service operates from 5:13 a.m. to 1:21 a.m.[7] During the peak periods, trains operate every 4.5 minutes.[8] During weekday off-peak periods, trains are scheduled to run every nine minutes.[9]

The total Blue Line fleet consists of 94 cars, which are proactively maintained by the MBTA's reliability-centered maintenance program. The Blue Line is the MBTA's most reliable rapid transit service.[10] During peak service, 72 cars (12 six-car trainsets) are utilized, with additional trainsets kept in reserve.[11]

Blue Line service is operated with six-car trainsets, with each car having a seated capacity of 35 passengers.[12] The "crush" capacity of each Blue Line trainset is 870

5 MBTA. *Service Delivery Policy, 2017 Update.* Approved January 23, 2017.

6 The methodology used to analyze transit demand as compared to capacity provided was developed in coordination with the MBTA. The analysis considers vehicle load standards as outlined in Appendix B of the *Service Delivery Policy, 2017 Update,* and evaluates demand and capacity for each 30-minute time period of the service day.

7 MBTA. Blue Line Schedule. Accessed from www.mbta.com/schedules/Blue/line.

8 MBTA. DGM Remarks. Presentation to Fiscal & Management Control Board. October 30, 2017.

9 MBTA. Rapid Transit Schedule. Effective June 24, 2018 – September 1, 2018.

10 MBTA. Reliability Performance Dashboard. Accessed from www.mbtabackontrack.com/performance on September 10, 2018.

11 MBTA. MBTA State of the System: Blue Line Heavy Rail. Presentation to Fiscal & Management Control Board. August 8, 2016.

12 MBTA. *Service Delivery Policy, 2017 Update.* Approved January 23, 2017.

passengers.[13] Utilizing the vehicle load standard dictated by the MBTA's Policy, the policy capacity of each Blue Line trainset during the peak periods is 516 passengers.[14] Based on the 4.5-minute headways operated during the peak, the existing Blue Line policy capacity during the busiest 30-minute period of service is approximately 3,440 passengers.

Ridership demand on the Blue Line is greatest during the weekday rush hours, with the highest Blue Line Inbound demand occurring between 8:00 a.m. and 8:30 a.m. during the AM Peak, and the highest Blue Line Outbound demand occurring between 5:00 p.m. and 5:30 p.m. during the PM Peak.[15] The maximum load point on the Blue Line is located between Maverick and Aquarium Stations in the peak directions during the peak periods.

The temporal distribution of demand at the Blue Line's maximum load point (typically occurring between Maverick and Aquarium Stations) on an average weekday is illustrated in Figure 6.9 for the inbound and outbound directions. While the Blue Line operates within its policy capacity during the peak periods, existing passenger volumes slightly exceed policy capacity just before and just after the peak periods. This exceedance is due to the reduction in policy capacity provided outside of the peak period, which is a result of MBTA's Policy dictating a reduced acceptable maximum passenger load per car during off-peak times as well as reduced service frequency provided. As illustrated in Figure 6.9, there is ample reserve capacity on the Blue Line to accommodate ridership growth through the maximum load point.

The Project Site is served by the Blue Line via two stations: Suffolk Downs Station and Beachmont Station. On a typical weekday in Fall 2016, approximately 75,270 passengers boarded the Blue Line, with approximately 850 passengers boarding at Suffolk Downs and 3,250 passengers boarding at Beachmont.[16] Currently, Suffolk Downs is the least utilized of all the Blue Line stations. Figure 6.10a and Figure 6.10b illustrate inbound and outbound platform activity (passenger boardings plus passenger alightings) at Suffolk Downs Station and Beachmont Station, respectively, for an average weekday.

MBTA Bus Services

The MBTA bus routes operating in the vicinity of the Project Site are described below. The buses operating on the routes serving the Project Site are operated out of the Lynn Garage, where the vehicles are stored and maintained. The buses serving these routes have a seated capacity of 39 passengers and, utilizing the vehicle load standard dictated by MBTA Policy, have a policy capacity equal to 55

[13] MBTA. *Ridership and Service Statistics, Fourteenth Edition.* 2014.

[14] MBTA. *Service Delivery Policy, 2017 Update.* Approved January 23, 2017.

[15] MBTA. Blue Line Ridership Data. Fall 2016.

[16] MBTA. Blue Line Ridership Data. Fall 2016.

passengers during the peak periods and equal to 48 passengers during off-peak periods.[17] The "crush" capacity of each bus is 75 passengers.[18]

- **Route 119** provides daily local bus service between Beachmont Station and the Northgate Shopping Center. On weekdays, Route 119 operates from 5:00 a.m. to 10:45 p.m.[19] During weekday peak periods, bus service on this route operates approximately every 40 minutes. During weekday off-peak periods, bus service on this route operates approximately every 60 to 70 minutes.[20]

  The route operates along the northern end of the Project Site, with the nearest stops at Tomasello Drive, at 560 Winthrop Avenue, and at Winthrop Avenue @ Beachmont Station when operating inbound, from Northgate Shopping Center towards the MBTA Blue Line's Beachmont Station. When Route 119 buses are operating outbound, from Beachmont Station toward Northgate Shopping Center, the nearest stops to the Project Site are at Winthrop Avenue @ Beachmont Station, at 209 Revere Beach Parkway, and at Tomasello Drive. The Proponent constructed the new bus stop and turnaround on Tomasello Drive, serving the Stop & Shop and surrounding retail, which entered service on the Route 119 on September 2, 2018.

  On a typical weekday in Fall 2017, there were approximately 1,460 combined passenger boardings and alightings on the Inbound Route 119. At the 560 Winthrop Avenue stop, there were an average of approximately five passenger boardings and 20 passengers alightings traveling inbound on a typical weekday. At the Winthrop Avenue @ Beachmont Station stop, there were an average of 147 passenger boardings and 347 passenger alightings traveling inbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an inbound trip occurs departing the stop at Revere Beach Parkway Opposite North Shore.[21]

  On a typical weekday in Fall 2017, there were approximately 860 combined passenger boardings and alightings on the Outbound Route 119. At the Winthrop Avenue @ Beachmont Station stop, there were an average of approximately 170 passenger boardings traveling outbound on a typical weekday. At the 209 Revere Beach Parkway stop, there were an average of approximately five passenger boardings and one passenger alighting traveling outbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an outbound trip occurs departing the stop at Revere Beach Parkway @ Campbell Avenue. [22]

17 MBTA. Service Delivery Policy, 2017 Update. Approved January 23, 2017.

18 MBTA. Ridership and Service Statistics, Fourteenth Edition. 2014.

19 MBTA. Route 119 Bus Schedule. Accessed from www.mbta.com/schedules/119/line.

20 MBTA. Route 119 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

21 MBTA. Route 119 Ridership Data. Fall 2017.

22 MBTA. Route 119 Ridership Data. Fall 2017.

The temporal distribution of demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.11a.[23] Both the inbound and outbound routes fall within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

- **Route 120** operates on the southern side of the Project Site in the Orient Heights neighborhood. The route provides daily local bus service between the MBTA Blue Line's Orient Heights Station and Maverick Station. On weekdays, Route 120 operates from 5:25 am to 1:15 a.m.[24] Service on this route currently operates approximately every 20 to 25 minutes during peak hours and midday and approximately every 60 minutes during the evening.[25]

  On a typical weekday in Fall 2017, there were approximately 2,630 combined passenger boardings and alightings on the Inbound Route 120. While the maximum passenger load location varies by trip, the highest maximum passenger load on an inbound trip occurs departing the stop at Bennington Street @ Curtis Street.[26]

  On a typical weekday in Fall 2017, there were approximately 2,720 combined passenger boardings and alightings on the Outbound Route 120. While the maximum passenger load location varies by trip, the highest maximum passenger load on an outbound trip occurs departing the stop at Bennington Street @ Porter Street.[27]

  The temporal distribution of demand at the Route 120's maximum load points throughout the day is illustrated in Figure 6.11b.[28] Both the inbound and outbound routes typically fall within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions, with several exceptions during and near the peak periods. In the inbound direction, the morning peak trips that depart Orient Heights at 7:00 a.m. and 7:25 a.m. exceed passenger loading guidelines, based on an estimated maximum load of approximately 63 passengers on each trip. The inbound trip departing Orient Heights at 6:25 p.m., where there is an estimated maximum load of approximately 49 passengers occurring just after the conclusion of the PM Peak, also slightly exceeds passenger loading guidelines for off-peak periods. In the outbound direction, the morning trip departing Maverick Station at 6:25 a.m. slightly exceeds passenger loading guidelines for

[23] Peak loads and peak load points for June 2018 schedules for the Route 119 were extrapolated based on existing ridership trends observed in the Fall 2017 dataset. No significant changes in ridership on a daily or period basis were assumed for the schedule change despite the reduction from 23 to 21 total roundtrips. Passenger loading and load points are anticipated to follow existing distribution trends.

[24] MBTA. Route 120 Bus Schedule. Accessed from www.mbta.com/schedules/120/line.

[25] MBTA. Route 120 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

[26] MBTA. Route 120 Ridership Data. Fall 2017.

[27] MBTA. Route 120 Ridership Data. Fall 2017.

[28] Peak loads and peak load points for June 2018 schedules for the Route 120 were extrapolated based on existing ridership trends observed in the Fall 2017 dataset. No significant changes in ridership on a daily or period basis were assumed for the schedule change despite the reduction from 47 to 40 total roundtrips. Passenger loading and load points are anticipated to follow existing distribution trends.

off-peak periods, based on an estimated maximum load of approximately 51 passengers. The outbound trip departing Maverick Station at approximately 5:39 p.m. during the PM Peak also exceeds passenger loading guidelines, based on an estimated maximum load of approximately 63 passengers. The remainder of the scheduled trips conform to MBTA policy requirements.

- **Route 424** provides weekday commuter bus service between Salem Depot and Wonderland Station in the inbound direction, and between Haymarket Station and Salem Depot in the outbound direction. Route 424 operates by the Project Site via Route 1A in the outbound direction, but currently does not stop in the vicinity of the Project Site. On weekdays, Route 424 operates from 5:51 a.m. to 8:37 a.m. in the inbound direction and from 4:00 p.m. and 6:35 p.m. in the outbound direction.[29] Bus service operates approximately every 30 minutes during the route's span of service.[30]

  On a typical weekday in Fall 2017, there were approximately 330 combined passenger boardings and alightings on the Inbound Route 424. The Inbound Route 424 reaches its maximum passenger load departing the American Legion Highway @ Revere Street stop.[31]

  On a typical weekday in Fall 2017, there were approximately 180 combined passenger boardings and alightings on the Outbound Route 424. While the maximum passenger load location varies by trip, the highest maximum passenger load on an outbound trip occurs between Brown Circle Rotary and Salem Turnpike.[32]

  The temporal distribution of demand at the Route 424's maximum load points throughout the day is illustrated in Figure 6.11c. The route falls within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

- **Route 434** provides weekday commuter bus service between Peabody Square and Haymarket Station. The route operates by the Project Site via Route 1A, but currently does not stop in the vicinity of the Project Site. On weekdays, Route 434 provides one round trip between Peabody and Haymarket in the peak periods, operating from 6:45 a.m. to 8:00 a.m. in the inbound direction and from 5:20 p.m. and 6:30 p.m. in the outbound direction.[33]

  On a typical weekday in Fall 2017, there were approximately 45 combined passenger boardings and alightings on the Inbound Route 434. The Inbound Route 434 typically reaches its maximum passenger load departing the stop at Western Avenue @ MBTA Lynn Garage.[34]

[29] MBTA. Route 424 Bus Schedule. Accessed from www.mbta.com/schedules/424/line.

[30] MBTA. Route 424 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

[31] MBTA. Route 424 Ridership Data. Fall 2017.

[32] MBTA. Route 424 Ridership Data. Fall 2017.

[33] MBTA. Route 434 Bus Schedule. Accessed from www.mbta.com/schedules/434/line.

[34] MBTA. Route 434 Ridership Data. Fall 2017.

On a typical weekday in Fall 2017, there were approximately 40 combined passenger boardings and alightings on the Outbound Route 434. The Outbound Route 434 typically reaches its maximum passenger load departing the stop at Brown Circle Rotary. [35]

The temporal distribution of demand at the Route 434's maximum load points throughout the day is illustrated in Figure 6.11d. The route falls within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

› **Routes 448 and 449** provide weekday commuter bus service between Marblehead and the Downtown Crossing area. Routes 448 and 449 operate by the Project Site via Route 1A, and currently stop in the vicinity of the Project Site in the outbound direction only on one trip for each route per day. Inbound buses on the Routes 448 and 449 depart Marblehead approximately every half hour between 6:00 a.m. and 8:00 a.m., for a total of two daily trips on the Route 448 and three daily trips on the Route 449.[36] Traveling outbound, passengers have one AM peak option for each route between 7:15 a.m. and 7:45 a.m., with the remainder of service on the two routes operating every 30 to 40 minutes between 4:45 p.m. and 6:25 p.m.; there are a total of three outbound trips offered on each route.[37]

On a typical weekday in Fall 2017, there were approximately 140 combined passenger boardings and alightings on the Inbound Route 448, and approximately 190 combined passenger boardings and alightings on the Inbound Route 449. The Inbound Route 448 and 449 typically reach a maximum passenger load departing the Broad Street @ Silsbee Street stop.[38]

On a typical weekday in Fall 2017, there were approximately 160 combined passenger boardings and alightings on the Outbound Route 448, and approximately 140 combined passenger boardings and alightings on the Outbound Route 449. The maximum passenger load on the Outbound Routes 448 and Route 449 typically occurs departing the Wonderland Station stop.[39]

The temporal distribution of demand at the Route 448 and Route 449 maximum load points throughout the day is illustrated in Figure 6.11e and Figure 6.11f, respectively. Both routes fall within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

› **Route 450** provides service between Salem Depot and Haymarket Station, with some trips originating or terminating north of Haymarket Station. On

35 MBTA. Route 434 Ridership Data. Fall 2017.

36 MBTA. Route 448/449 Bus Schedule. Accessed from www.mbta.com/schedules.

37 MBTA. Route 448/449 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

38 MBTA. Route 448 and 449 Ridership Data. Fall 2017.

39 MBTA. Route 448 and 449 Ridership Data. Fall 2017.

weekdays, Route 450 operates from 4:50 a.m. to 12:20 a.m.[40] During weekday peak periods, bus service on this route operates approximately every 30 minutes. During weekday off-peak periods, bus service on this route operates approximately every 60 to 90 minutes.[41]

The route stops in the vicinity of the Project Site, on Route 1A/McClellan Highway/Lee Burbank Highway. When Route 450 buses are operating inbound, the nearest stop to the Project Site is located at McClellan Highway Opposite Suffolk Downs. When Route 450 buses are operating outbound, the nearest stop to the Project Site is located at Burbank Highway @ Suffolk Downs.

On a typical weekday in Fall 2017, there were approximately 1,380 combined passenger boardings and alightings on the Inbound Route 450. At the McClellan Highway Opposite Suffolk Downs stop closest to the Project Site, there were no passenger boardings and an average of approximately two passenger alightings traveling inbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an inbound trip occurs departing the American Legion Highway @ Hutchinson Street stop.[42]

On a typical weekday in Fall 2017, there were approximately 1,570 combined passenger boardings and alightings on the Outbound Route 450. At the Burbank Highway @ Suffolk Downs stop closest to the Project Site, there were no passenger boardings and an average of less than one passenger alighting traveling outbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an outbound trip occurs departing the Western Avenue @ Fays Avenue stop.[43]

The temporal distribution of demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.11g. The route falls within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

› **Route 459** provides weekday service between Salem Depot and the Downtown Crossing area. Route 459 operates from 5:50 a.m. to 8:27 p.m.[44] During weekday peak and off-peak periods, bus service on this route operates approximately every 70 minutes.[45]

The route stops on Route 1A/McClellan Highway/Lee Burbank Highway in the vicinity of the Project site. In the inbound direction, the nearest stop to the Project Site is located at McClellan Highway Opposite Suffolk Downs. In the

40 MBTA. Route 450 Bus Schedule. Accessed from www.mbta.com/schedules/450/line.

41 MBTA. Route 450 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

42 MBTA. Route 450 Ridership Data. Fall 2017.

43 MBTA. Route 450 Ridership Data. Fall 2017.

44 MBTA. Route 424 Bus Schedule. Accessed from www.mbta.com/schedules/424/line.

45 MBTA. Route 459 Bus Schedule. Effective June 24, 2018 – September 1, 2018.

outbound direction, the nearest stop to the Project Site is located at Burbank Highway @ Suffolk Downs.

On a typical weekday in Fall 2017, there were approximately 980 combined passenger boardings and alightings on the Inbound Route 459. At the McClellan Highway Opposite Suffolk Downs stop closest to the Project Site, there were no boardings and an average of less than one passenger alighting traveling inbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an inbound trip occurs departing the Broadway @ Ward Street stop.[46]

On a typical weekday in Fall 2017, there were approximately 840 combined passenger boardings and alightings on the Outbound Route 459. At the Burbank Highway @ Suffolk Downs stop closest to the Project Site, there were no passenger boardings or alightings traveling outbound on a typical weekday. While the maximum passenger load location varies by trip, the highest maximum passenger load on an outbound trip occurs departing the Union Street @ West Green Street stop.[47]

The temporal distribution of demand at the Route 459's maximum load points throughout the day is illustrated in Figure 6.11h. The route falls within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy under existing conditions. There are no trips in either direction that currently exceed policy capacity.

MBTA Commuter Rail

While the Project Site is not directly served by commuter rail service, there are several possible options for connecting to the existing commuter rail network. Transit riders can access the Project Site via North Station, the terminal for MBTA's North Side commuter rail service, with two possible rapid transit route options. Passengers can take the Orange Line from North Station to State Street Station and transfer to the Blue Line, or can take the Green Line to Government Center Station and transfer to the Blue Line.

Commuter rail riders traveling via South Station, the terminal for MBTA's South Side commuter rail service, also have existing rapid transit access to the Project Site via the Silver Line 3-Chelsea service with a subsequent transfer to the Blue Line. The Silver Line3 bus rapid transit (BRT) route provides a connection between South Station and Airport Station, where passengers can transfer to the Blue Line.

The Proponent is committing to the provision of new shuttle connections that would provide direct, one-seat ride transit service between the Project Site and the commuter rail network. New shuttle connections would include routes with direct connections to the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the

[46] MBTA. Route 459 Ridership Data. Fall 2017.

[47] MBTA. Route 459 Ridership Data. Fall 2017.

Newburyport/Rockport Line). Additional information on these proposed shuttle connections is provided in Section 6.8.

6.7.4 Pedestrian and Bicycle Accommodations

Within the vicinity of the Project Site, sidewalks are provided along both sides of Route 1A and Winthrop Avenue. Sidewalks are provided along the west side of Tomasello Drive from Winthrop Avenue until the shopping plaza. Crosswalks are provided at the intersection of Winthrop Avenue and Tomasello Drive. The sidewalk along Winthrop Avenue provides access to the residential area, bus stops, and MBTA's Beachmont Station to the north of the Project Site. East of the Project Site, sidewalks are provided on both sides of Bennington Street, next to MBTA's Suffolk Downs Station. South of Suffolk Downs Station, sidewalks connect southward on Walley Street, though these are either discontinuous or in poor repair, providing limited pedestrian access toward Bennington Street and points south.

The Project Site and nearby vicinity lack bicycle accommodations. Approximately 0.5 mile south of the Project Site, an east-west bicycle lane is provided along Saratoga Street. Further south, the East Boston Greenway (an off-street, shared-use pathway) terminates at Constitution Beach. Approximately 0.4 miles to the north of the Project Site, a shared use path is provided adjacent to Revere Beach Reservation. Some shared use pedestrian and bicycle paths are also available within Belle Isle Marsh, east of the Project Site. Existing bicycle and pedestrian accommodations are discussed in further detail in Section 6.8.2.

6.8 Future Conditions

The analysis of future conditions considered the following:

- Inclusion of traffic associated with other planned development identified in and around the study area.
- Calculation of Master Plan trip generation estimates based on the CTPS Model.
- Calculation of Master Plan trip generation estimates using a higher transit share and internal capture rate expected to be achieved.
- Distribution and assignment of all development-generated traffic onto study area intersections based on the CTPS Model, with consideration of current travel patterns, previous studies of the area, data provided by for other projects, and anticipated travel behavior changes that can be quantified and substantiated.
- Assessment of 2028 No-Build Condition, 2028 Build Condition, 2038 No-Build Condition, and 2038 Build Condition traffic based on capacity analyses, reported levels of service, and queuing output for the study area intersections. All analyses were completed for the CTPS Model results as well as the expected higher TOD transit share and internal capture rate.
- Development of a comprehensive array of mitigation strategies and improvement actions which will help to lessen and minimize project impacts,

provide improvement to the area's transportation infrastructure, and serve as public benefits.

Each of these components of the future conditions analysis is described in detail in the following sections.

6.8.1 2028 No-Build Condition

The future 2028 No-Build Condition was developed to determine and evaluate baseline future transportation conditions in the traffic study area without consideration of the Master Plan Project. The No-Build Condition provides insight into future traffic conditions resulting from regional growth, traffic generated by specific planned projects, and planned roadway improvements that are expected to affect the study area roadway network.

To determine future roadway operations, traffic volumes in the study area were projected from the 2018 Existing Condition to 2028 and 2038 to reflect both 10-year and 20-year planning horizons in accordance with the MEPA Certificate and the MassDOT Transportation Impact Assessment (TIA) Guidelines.[48]

Traffic volumes on the roadway network under future conditions without the Project (No-Build) are assumed to include all existing traffic, any new traffic attributable to regional and area background traffic growth, and incremental traffic growth related to any specific nearby development projects expected to be completed by the 2038 horizon year. Roadway improvements proposed within the boundaries of the study area by others were also considered and incorporated where appropriate, although planned roadway improvements are currently limited in the area. The anticipated traffic volumes from the Master Plan Project were added to the No-Build traffic volumes to reflect future Build conditions.

Regional Traffic Growth

In order to account for general background growth of area traffic, an annualized growth rate is typically developed and applied to the existing condition peak hour traffic volumes to account for future traffic growth in the study area. Historic count data were reviewed to establish an appropriate rate at which traffic volume is anticipated to grow. VHB reviewed data from MassDOT Permanent Count Station #8087 (Route 1A north of Tomasello Drive). VHB also conducted comparisons between the 2012 traffic counts conducted for the former Mohegan Sun project and the 2017 traffic counts conducted for the Master Plan Project. The MassDOT data and the count comparisons showed that overall traffic growth is either level or decreasing areas along most major roadways within the study area. However, to conservatively account for development growth potential in this area, a growth rate of 0.5-percent per year was applied to the existing traffic volumes. This growth rate is consistent with the anticipated growth identified in the area and used by other

[48] *Transportation Impact Assessment (TIA) Guidelines*, Massachusetts Department of Transportation, March 13, 2014.

area projects that are either being planned or have been recently reviewed and approved.

Planned/Approved Developments

In addition to the applied regional background growth rate, traffic projections for 45 specific and applicable area projects were incorporated into the development of the 2028 and 2038 No-Build Conditions, as applicable. This list was determined after discussion with the Cities of Boston and Revere, as well as MassDOT. In total, the list of projects below includes approximately 2,690 residential units, 552 hotel rooms, and 200,000 sf of commercial space. The two studied No-Build Conditions include the following development projects[49]:

Revere Projects:

- La Quinta Hotel consisting of 100 rooms
- Revere Beach Hotel consisting of 175 room and an 80-seat hotel restaurant
- 205 Revere Beach Parkway (Former Shaw's Plaza) consisting of 310 residential units and 150 hotel rooms with a hotel restaurant
- 71 Revere Street consisting of 53 residential units
- 90 Ocean Avenue consisting of 60 residential units
- Ocean 650 (Waterfront Square/Ocean Avenue) consisting of 230 residential units
- Hampton Inn Hotel (Route 1A) consisting of 37 rooms/150ksf
- Mill Creek (60 Ocean Avenue) consisting of 95 residential units
- Mill Creek (20 Revere Beach Boulevard) consisting of 115 residential units
- Waterfront Square/Parcel H (Waterfront Square/Ocean Avenue) consisting of 320 residential units
- Waterfront Square/Parcel H (Waterfront Square/Ocean Avenue) consisting of 150 rooms/ 200ksf
- Caruso Self Storage (Charger Street) consisting of 129,000 sf of self-storage units
- Beach Club/Beach House (526 Revere Beach Boulevard) consisting of 234 residential units
- Waterfront Square/Parcel H (Waterfront Square/Ocean Avenue) consisting of 175 residential units
- Plaza Garabaldi (Revere Beach Parkway) consisting of car wash and store
- A waterfront hotel and restaurant (49 Revere Beach Boulevard) consisting of 175 room
- Mixed Use Development (320 Revere Beach Boulevard) consisting of 145 units

[49] All background projects are expected to be completed and fully occupied by 2028 and are included in both the 2028 and 2038 No-Build Conditions

- Ward Street consisting of 230 residential units
- Dehon Street #1 consisting of 8 residential units
- Dehon Street #2 consisting of 6 residential units
- 14 Yeamans Street consisting of 30 residential units
- Mottolla Post (Garapolo Way) consisting of 15ksf
- 35 unit mixed-use residential development
- 1064 North Shore Road consisting of 13 residential units
- 450 American Legion Highway consisting of 24 residential units
- 439 Revere Beach Boulevard consisting of 34 residential units
- Rising Sun Project (Shirley Avenue) consisting of 30 residential units
- Washington 770 (770 Washington Avenue) consisting of 20 residential units

East Boston Projects:

- 75-85 Liverpool Street consisting of 22 residential units and ground floor commercial space
- 944-946 Saratoga Street consisting of 42 residential units
- 9 Chelsea Street consisting of funeral home and commercial retail spaces, approximately 25,848 square feet
- 175 McClellan Highway consisting of approximately 300 residential units, 2,000 square feet of ground floor commercial space
- 135 Bremen Street consisting of 94 residential units and 8,300 square feet of commercial space
- 175 Orleans Street consisting of 127-room boutique hotel, approximately 71,450 square feet
- 301-303 Border Street consisting of 64 residential until and ground floor commercial space
- 125 Sumner Street consisting of 52 residential units, retail space, and community gathering areas
- 99 Sumner Street consisting of approximately 119 residential units and 7,200 square feet of shared work space
- 10-16 Everett Street consisting of 19 residential units
- 187-191, and 211 Condor Street consisting of 23 residential units
- 1181 Bennington Street consisting of 44 residential units
- 202 Maverick Street consisting of 23 residential units
- 319-327 Chelsea Street consisting of 38 residential units and commercial space
- 917 Bennington Street consisting of 42 residential units
- 151 Liverpool Street consisting of 36 condominium units
- 114 Orleans Street consisting of 23 condominium units

Refer to Figure 6.12a-d for the No-Build background Project trip network.

Future Roadway Conditions

In assessing future traffic conditions, proposed roadway improvements within the study area that are proposed by others were also considered, although there are only two planned improvement areas currently in the study area. Based on information available from MassDOT, one public roadway improvement project was identified within the study area at Copeland Circle. This project is a resurfacing and restriping project geared towards providing clearer lane designations, eliminating certain weave maneuvers, and improving overall circulation and operations. This will be completed as a maintenance project sometime in 2019.

In addition, there are improvements proposed as part of the 205 Revere Beach Parkway project along Winthrop Avenue. These improvements include:

- A new signalized driveway to form the southbound leg of the Winthrop Avenue/Revere Beach Parkway intersection.
- Elimination of the existing right-in/right-out driveway located to the east of Winthrop Avenue.
- Elimination of the existing entrance-only curb-cut located to the east of Tomasello Drive.
- Conversion of the exit-only driveway located at the Tomasello Drive signalized intersection to a right-in/right-out driveway.
- Provision of an exclusive left-turn lane into the Project Site at the signalized intersection with Winthrop Avenue/Revere Beach Parkway.
- Signal timing and phasing improvements at the signalized intersections
- Traffic signal coordination.
- A crosswalk across Revere Beach parkway and providing pedestrian signal actuation.

The improvements listed above have been incorporated into the 2028 No-Build and Build Condition analyses.

2028 No-Build Traffic Volumes

The 2028 No-Build Condition traffic volume networks were developed by applying a 0.5-percent annual background growth rate over the 10-year study horizon to the 2018 Existing Condition traffic volume networks and incorporating the traffic volumes associated with the other planned developments described above in one of the following ways:

1. Estimated traffic impacts available from submitted studies or environmental permitting documents.
2. Performed a trip generation, trip distribution and/or trip assignment analysis.
3. Project already included in background regional traffic growth.
4. Project already included in existing traffic counts.

5. Project is too small or remote from the Project study area to have any meaningful effect.

Figures 6.13a-d and Figures 6.14a-d shows the resulting 2028 No-Build Conditions peak hour traffic volume networks for the weekday morning and weekday evening peak hours, respectively.

2028 No-Build Public Transportation

As requested by MEPA and MassDOT, the Proponent utilized the CTPS Regional Travel Demand Model to estimate future transit volumes. The Model comprehensively incorporates demographic and transportation network conditions occurring across the larger regional network. The CTPS Model considered a 2040 horizon year, which incorporates population and employment forecasts reflecting land use changes, demographic forecasts, and future transportation network conditions. The Model assumes the implementation of transportation projects that are programmed in the Boston Region Metropolitan Planning Organization's Long-Range Transportation Plan (LRTP), *Charting Progress to 2040,* which was amended in August 2016.

In order to estimate the growth in background transit ridership between the 2018 Existing Condition and the future 2028 No-Build Condition, CTPS Model projections for daily ridership growth by specific transit line were used to calculate average annual growth rates. The calculated average annual growth rates were then applied to existing ridership data provided by the MBTA. For some transit lines, the CTPS Model anticipates no growth, or in some instances negative growth, between the Modeled 2016 Base Year and the 2040 Horizon Year, which may be explained by various regional factors, including diversions to other transit services (such as the recently-opened Silver Line 3-Chelsea service), diversions to other available transportation modes, and/or changes in trip patterns resulting from projected demographic and land use changes. As a means to support a conservative transit impact analysis, a minimum average annual growth rate of 0.1 percent for background growth was applied to all transit services analyzed, as summarized in Table 6-3.

Table 6-3 Transit No-Build Average Annual Background Growth Rate Assumptions

MBTA Transit Line	CTPS Model Projected Average Annual Growth [a]	Assumed Average Annual Growth for Analysis
Blue Line	<0%	0.1%
Route 119	1.1%	1.1%
Route 120	1.7%	1.7%
Route 424	0%	0.1%
Route 434	0.1%	0.1%
Route 448	<0%	0.1%

MBTA Transit Line	CTPS Model Projected Average Annual Growth [a]	Assumed Average Annual Growth for Analysis
Route 449	<0%	0.1%
Route 450	<0%	0.1%
Route 459	0.1%	0.1%

a Represents projected average annual growth in typical weekday ridership for a given transit line, based on CTPS Model results for a 2016 Base Year and a 2040 Horizon Year.

Future transit operational assumptions, such as service schedules, to be used for capacity analysis purposes were established in coordination with the MBTA. While the MBTA is currently in the process of evaluating potential long-term transit service improvements through initiatives such as *Focus 40*, a 25-year investment plan to position the MBTA to meet the needs of the Greater Boston region in 2040, and the *Better Bus Project*, a short-term study evaluating service changes and improvements by 2020, there are no current plans to modify the schedules for the MBTA Blue Line or the study area bus lines (Routes 119, 120, 424, 434, 448, 449, 450, and 459). As such, existing conditions schedules as of Summer 2018, as described in Section 6.7.3, were assumed for purposes of all horizon year transit capacity analyses.

6.8.2 Build Condition

The future Build Condition analyses were developed in order to evaluate future transportation conditions in the study area with the Master Plan Project in place. Similar to the No-Build Condition, 2028 and 2038 were studied to reflect 10-year and 20-year planning horizons in accordance with the MEPA Certificate and the MassDOT Transportation Impact Assessment (TIA) Guidelines.[50]

Trip Generation, Mode Share, and Trip Distribution Methodology

In November 2017, the Proponent submitted an Expanded Environmental Notification Form / Project Notification Form (EENF/PNF) for the Master Plan Project. This EENF/PNF filing looked at the proposed full development of the Project Site, based on a development program involving approximately 16,500,000 square feet of mixed uses, including residential, office/R&D, retail and hotel. In that EENF/PNF, a series of transportation parameters were identified including a Traffic Impact Assessment procedure using the Institute of Transportation Engineers (ITE) Trip Generation Manual to estimate the number of vehicle trips generated by the proposed development, definition of a preliminary estimate of transit use and mode share, internal capture rates, and the directional distribution of vehicular trips. This, along with a proposed list of study area intersections, was intended to support an informed formulation and decision on the methodology and aspects of the full project Transportation scope.

[50] *Transportation Impact Assessment (TIA) Guidelines*, Massachusetts Department of Transportation, March 13, 2014.

In the Secretary's certificate issued in response to the EENF/PNF filing, which identified the scope for this DEIR, it was suggested that the Proponent consider using the Central Transportation Planning Staff's (CTPS) Regional Transportation Model to refine assumptions made in the EENF/PNF. The CTPS Model, which incorporates the multi-modal transportation infrastructure of much of Eastern Massachusetts as well as parts of Rhode Island and New Hampshire, recognizes housing, job opportunities, commuting patterns and many more inputs as part of its assignment of trips to the transportation network, and therefore, is viewed as an appropriate reference tool to evaluate certain proposed development project and support refinement of some of certain base assumptions. As requested, the Proponent did engage MassDOT and CTPS to utilize the CTPS Regional Model to determine the trip generating characteristics of the Master Plan Project's proposed site development program and to run and analyze potential impacts of the development planned as part of the Master Plan Project in concert with the Proponent's transportation team. Several areas, including the projected internal capture of trips, the projected mode share between transit use, vehicle use, walk and biking, the directional distribution of those generated trips, and the total number of trips generated by the Master Plan Project were identified as important elements for use of the CTPS Model.

At the request of MassDOT, the study team utilized many methodological aspects of the CTPS Model output, even in areas that varied from some of the assumptions on directional distribution and resulting mode share that were initially detailed in the EENF/PNF filing. For example, an initial transit use rate of 48 percent was assumed for the build condition in the EENF. This initial assumption was based on many factors, including:

- City of Boston goals for transit use and a very limited proposed master plan parking supply (e.g. 0.5 spaces per residential unit, 1.0 spaces per 1000 sf of office).
- Home to work data that suggests transit use to and from East Boston on the order of 50 percent.
- The Project has direct access to two (2) MBTA Blue Line stations and is in walking distance to multiple MBTA bus routes.
- Ample MBTA Blue Line capacity for the reverse commute condition associated with the proposed office use.
- An ability to have a higher internal capture rate due to the mixed-use nature of the site, particularly of the proposed retail uses which are anticipated to include a substantial proportion of neighborhood based retail.
- The intention to run shuttles between the site and major transportation nodes and destinations such as North Station, South Station, the new Chelsea Station and the Seaport District.

After working with CTPS staff and running the CTPS Model, the following key items were modified per the direction of CTPS staff:

- Transit share has been decreased from 48 percent, presented in the EENF/PNF, to approximately 25 percent during peak periods and 20 percent on a daily basis based on the CTPS Model. This assumption is very conservative and transit ridership has the potential to exceed this rate given its mixed-use nature and direct connectivity to the MBTA Blue Line stations. In addition to the CTPS Model Parameters, a parallel analysis was run based on more typical mixed-use TOD parameters where transit share of approximately 39 percent was used during peaks. The transit ridership will continue to be evaluated through a long-term traffic and transit ridership monitoring program, that is discussed in more detail in Section 6.9 Also, the Proponent is incorporating the following supplemental transportation mode options that should encourage and increase transit mode share as the site is developed and density increases.
  - On-site Shuttle System (Inner & Outer Loop) for internal tripmaking and connections to both the Blue Line stations and area MBTA Bus routes.
  - Shuttle to South Station
  - Shuttle to North Station
  - Shuttle to Seaport District
  - Shuttle to Chelsea Silver Line/Commuter Rail Station
  - Extensive on-site bicycle network including cycle tracks and bicycle lanes with off-site connections
- Internal Capture Rate has been changed from 11 percent in the EENF/PNF to 24 percent to be more consistent with the CTPS Model. The internal capture rate is being changed per CTPS Model assumptions given the limitations of the ITE methodology and the fact that the ITE data does not contain mixed-use sites that are comparable to the proposed Project. The 24 percent Internal capture has been set by MassDOT/CTPS based on discussions about the Model. This rate continues to be less than expected given the wide mix in land uses, the size of the analysis zone, and similar analysis zones. One major component of this review was the type of retail uses proposed on the site. There will be no stand-alone shopping area as would be expected from the shopping center definition in the ITE data and even within the CTPS Model. The 500,000 square feet of on-site retail is targeted more towards neighborhood retail, which will generate more internal trips from the new residents and employees of the site, rather than being a regional destination that would generate external tripmaking. Given the mixed-use nature of the site, it is expected that more trips will be isolated within the site or to the adjacent Target/Stop & Shop shopping center without using the regional highway system. Therefore, we are also running a 2038 scenario with 29% internal capture to better represent the potential higher internal capture of this site and the associated neighborhood-based retail.
- Person Trips increased from approximately 122,000 in the EENF/PNF to approximately 180,000 to be consistent with the CTPS Model. The CTPS Model is very conservative in its estimation of overall person trips, particularly because of how much higher the projection is compared to ITE rates which is what the

original 122,000 trips were based upon. It should be noted that the ITE projections for the office land use in the EENF/PNF were filtered by the available Northeast/Mid-Atlantic region attributes to reflect a more urban environment, which would inherently include more transit riders and walkers/bikers within the base data set. In addition, different assumptions for vehicle occupancy rates between the CTPS Model and the ITE projections also contributes to the variance in the overall person trip estimates. Although we do not believe the mixed-use development will generate this many trips, we are utilizing the higher CTPS trip rates in both sets of analysis (CTPS/MassDOT Parameters and the Expected TOD Parameters). The Proponent will conduct annual traffic monitoring and will be able to report back on actual number of trips created by the project.

- The directional distribution of vehicle trips has been shifted to be aligned with the CTPS Model output. The CTPS Model, given its more detailed database, showed varying trip distribution patterns to and from the site compared to the initial projections prepared as part of the EENF/PNF. After reviewing with CTPS, the traffic analysis completed has incorporated this revised trip distribution pattern for the site. This directional distribution is used both sets of analysis (CTPS/MassDOT Parameters and the Expected TOD Parameters).

As mentioned previously, the Model is very conservative in its estimation of transit share, overall trip generation, and internal trip capture. As such, all analyses presented in this TIA have been prepared two ways: (1) using CTPS/MassDOT parameters and (2) using an expected transit share that is more closely aligned with Go Boston 2030 as well as an anticipated internal capture rate that reflects the mixed-use nature of the site and the trip sharing that will occur in the future. The higher transit mode share and internal capture parameters are more typical of mixed-use TOD projects such as Suffolk Downs. Section 6.9 presents the results of both sets of analyses side by side to provide a comparison between the CTPS/MassDOT parameters and the transit share and internal capture rate that we expect to be achieved by the Master Plan Project. The expected rates for 2028 and 2038 are summarized in Table 6-4 and are compared to the assumptions provided in the EENF and the final CTPS results.

Table 6-4 Internal Capture and Peak Period Transit Share Comparison

	EENF	CTPS/MassDOT Parameters for 2028/2038	Expected for 2028	Expected for 2038
Transit Mode Share	48%	25%	31%	39%
Internal Capture Rate	13%	24%	25%	29%

As shown in Table 6-4, the expected transit share for 2028 is 31 percent and the expected internal capture rate is 25 percent. Because the Master Plan Project is only expected to be approximately 42 percent complete in 2028, not all of the transportation infrastructure will be in place to provide the desired connectivity to all the different areas of the site. In addition, the synergy between the different land

uses is expected to evolve over time as the site is built out. As the Master Plan nears completion and all the transportation infrastructure is in place on site, the connectivity for vehicles, bicycles, and pedestrian will yield substantially higher rates for transit usage and internal capture. Ultimately, a 39 percent transit share and a 29 percent internal capture we used for 2038.

The increase in the internal capture rate is simply a recognition of the type of retail uses proposed for the site versus the basic assumption in the Model. The 500,000 square feet of retail proposed is store front, spread throughout the site and intended to service the residents and office workers on the site. It is not intended as a 500,000 square foot shopping center, complete with standard shopping center parking rates. Note that the big box retail and grocery uses are just outside the Traffic Analysis Zone on Furlong Drive and can be accessed without exiting to the primary access/egress corridors of Route 1A or Winthrop Ave/Revere Beach Parkway. While there will be some external draw to the retail uses, the Project Team believes that up to 60% of the 35,000 retail related trips will be internal capture trips. This retail internal capture rate, raises the internal capture rate raises the full site internal capture rate to 29 percent. The 2028 internal capture rate of 25 percent recognizes the lack of an overall critical mass and the layout and separation of the development areas in Boston and Revere in the initial stages of the development.

The expected transit share of 39 percent for the site is a very attainable transit mode share for the site. It is well below the current home to work trips of 50 percent in East Boston and also below the 44 percent transit mode share target established by the BPDA in the Go Boston 2030 plan. Also, this proposed 39 percent transit mode share is consistent with other transit-oriented development sites that are directly served by subway lines. Given the overall availability and use of transit facilities, metro area traffic congestion and the level of development outside of the City core, we have looked to the Washington DC Metropolitan area for comparable Transit Oriented Development transit share.

Within the DC Metro area, we have looked to a series of TOD locations that are at what we would consider the mature state. One location we identified is Crystal City in Arlington County, Virginia. The area, served by a single station on the DC Metro system includes approximately 5M sf of office and 2,000 residential units with supporting retail and multiple hotels. It is contained in a single Traffic Analysis Zone (TAZ) in the Washington DC Council of Governments Transportation Model. It is immediately east of a major highway corridor and in close proximity to Ronald Reagan Washington National Airport (DCA). The transit share for Crystal City, is approximately 35 percent with the limits of the TAZ extending to one-half mile from the Metro Station. Note that the Model indicates a 36 percent transit share for DCA. There are other examples of similar rates in the DC Metro area including a series of development areas around five Metro station on the system's Orange Line extending from Rosslyn to Balston. Within the 12 TAZs in the development area, the total population is approximately 43,000 with an employment base of 58,000. The transit share in Rosslyn indicates an "origin" rate as high as 42 percent and

"destination" rates of 47 percent to 68 percent. Seven of the Zones have destination rates in excess of 43 percent.

For comparison purposes, Table 6-5 summarizes the percent share for all modes based on CTPS/MassDOT rates, expected for 2028, expected for 2038, and Go Boston 2030 goals. Master Plan Project targets could actually be higher than those reported in Table 6-5 and be more aligned with the goals set forth in Go Boston 2030.

Table 6-5 Peak Period Mode Share Summary*

	CTPS/MassDOT Parameters for 2028/2038	Expected for 2028	Expected for 2038	Go Boston 2030
Public Transit	25%	31%	39%	44%
Walk	3%	3%	3%	20%
Bike	7%	7%	7%	8%
Carpool + HOV	21%	19%	16%	5%
Drive Alone	45%	40%	35%	20%
Other/Work from Home	N/A	N/A	N/A	3%

N/A The CTPS Model does not quantify other/work from home.

Based on the CTPS/MassDOT mode shares and 2038 Expected mode shares presented in Table 6-5, a comparison of the overall trip generation for the Master Plan Project is summarized in Table 6-6.

Table 6-6 Master Plan Adjusted Project Trips

		CTPS/MassDOT Parameters			Expected TOD Parameters		
		Vehicle	**Transit**	**Walk/Bike**	**Vehicle**	**Transit**	**Walk/Bike**
Daily	In	38,405	12,500	7,298	32,638	15,270	6,766
	Out	38,405	12,500	7,297	32,638	15,270	6,766
	Total	76,810	25,000	14,595	65,276	30,540	13,532
AM	In	3,853	1,832	540	2,810	2,582	501
	Out	1,086	902	152	802	1,271	143
	Total	4,939	2,734	692	3,612	3,853	644
PM	In	2,015	1,053	393	1,505	1,583	367
	Out	3,975	1,717	775	2,937	2,581	716
	Total	5,990	2,770	1,168	4,442	4,164	1,083

As shown in the table, using the CTPS/MassDOT Parameters, the Master Plan Project is expected to generate 4,939 vehicle trips (3,853 entering/1,086 exiting) during the weekday morning peak hour and 5,990 vehicle trips (2,015 entering/3,975 exiting) during the weekday evening peak hour. The Master Plan Project is expected to generate 2,734 transit trips (1,832 entering/902 exiting) during the weekday morning peak hour and 2,770 transit trips (1,053 entering/1,717 exiting) during the weekday evening peak hour.

Also shown in the table, using the Expected TOD Parameters, the Master Plan Project is expected to generate 3,612 vehicle trips (2,810 entering/802 exiting) during the weekday morning peak hour and 4,442 vehicle trips (1,505 entering/2,937 exiting) during the weekday evening peak hour. The Master Plan Project is expected to generate 3,853 transit trips (2,582 entering/1,271 exiting) during the weekday morning peak hour and 4,164 transit trips (1,583 entering/2,581 exiting) during the weekday evening peak hour

In addition, as discussed in the EENF/EPNF, it is important to note that two program options were considered for master planning purposes. This DEIR/DPIR fully analyzes the potential environmental and community impacts, and presents mitigation measures and public benefits for the refined "pro-commercial" program, or Program A. The "pro-residential" program, or Program B, consists of less commercial office space (up to 5.25 MSF) and more residential space (up to 10.4 MSF, or approximately 10,000 units). Program A is generally more impactful as it relates to traffic generation and other impacts. Program B would have approximately 6 percent less traffic during the AM peak and approximately 10 percent less during the PM peak. Therefore, this DEIR/DPIR presents conservative impact analyses and mitigation plans that will allow for future flexibility based on analysis of the most impactful scenario with respect to each potential impact.

Trip Distribution

The project trip distribution was reassessed based on the results of the CTPS Model. While a traditional TIA would include different arrival/departure patterns for the different land uses, the Model yielded aggregate trip distributions for the entire site broken down by peak period.

The trip distribution modeling step determines the origin and destination of all the trips in the Model. The Model uses a gravity model, which is based on the idea that size and separation determine the attractiveness of respective destinations. For a work trip, the implied separation is typically the travel time and costs from home to potential work destinations, while size is defined as the number of employees at the destination end of the trip. For the project site, the origins of the work trips is based on location of population, other employment locations and how close the site is to populations compared to other employment locations. A similar methodology is used for all the site's land uses.

Some manual adjustments needed to be made for specific travel routes based on proposed roadway mitigation and anticipated site access patterns. But overall, the trip distribution patterns reflect the results of the Model. The project trip distribution patterns are summarized in Tables 6-7 and illustrated in Figures 6.15a-d and Figures 6.16a-d. These trip distribution patterns were utilized in both the CTPS/MassDOT Parameters analysis and the Expected TOD Parameters analysis.

Table 6-7 Vehicular Trip Distribution

Direction (To/From)	Travel Route	Weekday AM Percent from Route	Weekday PM Percent from Route
North	Route 60	20%	14%
North	North Shore Road	5%	4%
North	Revere Beach Parkway	6%	11%
South	Route 1A	21%	31%
East	Winthrop Ave (Route 145)	8%	6%
East	Route 16	7%	4%
West	Winthrop Ave (Route 145)	4%	9%
West	Route 16	29%	21%
Total	All Routes	100%	100%

2028 Build Condition Traffic Volumes

As previously discussed, the Master Plan Project is expected to be built-out over a period of 15 to 20 years. In accordance with the MEPA Certificate, 10- and 20-year horizon years are being analyzed as part of the TIA. The Proponent has undertaken extensive planning in relation to the project phasing, which allowed for provision of an accurate estimate of anticipated project impacts at the 2028 horizon year. Based on anticipated project phasing, the 2028 Build Condition assumes that

approximately 42 percent of the Master Plan Project square footage is built and fully occupied. Accordingly, the total Master Plan trip generation summarized in Table 6-6 has been prorated to 42 percent to evaluate impacts in 2028. The 2028 vehicular trip generation is summarized in Table 6-8.

Table 6-8 2028 Adjusted Project Vehicle Trips

		CTPS/MassDOT Parameters		Expected TOD Parameters	
		Master Plan Project Trips	**2028 Project Trips**	**Master Plan Project Trips**	**2028 Project Trips**
Daily	In	38,405	16,130	32,638	15,309
	Out	38,405	16,130	32,638	15,309
	Total	76,810	32,260	65,276	30,619
AM	In	3,853	1,618	2,810	1,442
	Out	1,086	456	802	408
	Total	4,939	2,074	3,612	1,850
PM	In	2,015	846	1,505	761
	Out	3,975	1,670	2,937	1,496
	Total	5,990	2,516	4,442	2,257

As shown in the table based on CTPS/MassDOT Parameters, in 2028 the Project is expected to generate 2,074 vehicle trips (1,618 entering/456 exiting) during the weekday morning peak hour and 2,516 vehicle trips (846 entering/1,670 exiting) during the weekday evening peak hour. The 2028 Build Condition traffic volume networks are illustrated in Figures 6.17a-b, Figures 6.18a-d and 2028 Project Trips are included in Appendix D.

Also shown in the table based on Expected TOD Parameters, in 2028 the Project is expected to generate 1,850 vehicle trips (1,442 entering/408 exiting) during the weekday morning peak hour and 2,257 vehicle trips (761 entering/1,496 exiting) during the weekday evening peak hour.

Proposed Site Access and Circulation

The Proponent is committed to providing a comprehensive, effective and intuitive transportation solution in connection with the Master Plan Project. The Project site plan has been formulated to incorporate the following key goals:

- To support safe and efficient traffic flow in the district.
- To integrate with the surrounding multi-modal transportation system, including the provision of an extensive off-site transportation mitigation and improvement plan.
- To create a vibrant, active, healthful, community and transit-oriented urban realm.

Specific guidance regarding key planning principles and implementation for the following essential transportation infrastructure components are discussed below.

Internal Roadway Network Design Approach

The Master Plan Project proposes a network of primary, secondary and tertiary vehicular streets designed, both in Boston and Revere, to the standards of Boston's Complete Streets Guidelines. As shown previously in Figures 3.14b, 3.14c, and 3.14d, the layout of the development blocks and open spaces within the Master Plan Project has been designed to create a network of safe roadways, pedestrian and bicycle routes through the Project Site. This network connects to "green fingers" that will be designed to act as part of the storm water strategy in addition to supporting the circulation and urban accessibility strategy as pedestrian-only active recreation zones, or the Active Linear Corridor. The following describes the internal roadway network elements.

- Primary access to the Master Plan Project is via Tomasello Drive, a two-way four lane arterial with a separate dedicated two-way cycle track and a frontage sidewalk on the developed "inner" side of the street; the opposite side of the street is an open space buffer against the oil tank farm. Tomasello Drive has no parking or building vehicular access, which is intended to allow arterial traffic to flow smoothly; it connects to the regional arterial system at Route 1A to the south and Revere Beach Parkway/Winthrop Street to the north. At two points along its length, it connects to the Parkway Ring Road, which provides key access throughout the site and to the Central Common. There are also four connections to the tertiary street network. At the northern end of Tomasello Drive a fifth lane is added for left turns onto Revere Beach Parkway, and a second sidewalk is provided in support of development on both sides of the street.
- The Proponent and its design team have considered if the existing configuration and alignment of Tomasello Drive best serves the Master Plan Project. As noted above, Tomasello Drive best serves as the main arterial roadway through the Project Site and will be enhanced with sidewalks, a cycle track, and an added left turn lane at Winthrop Avenue to further enhance site access and circulation. Upon further study, it was concluded that no benefit accrued to the Master Plan Project from relocating this thoroughfare, and that its current configuration provides for first responder access to the adjacent tank farm, and serves to keep new development at a safe distance from that facility.
- The Main Street Retail Corridor and Parkway adjacent to the Central Common form the primary network of through streets with slower traffic and access to the lots and blocks via the secondary streets and service ways of the Master Plan Project. They serve as the primary means of entry into and out of the Project Site from the adjacent thoroughfares for vehicles and cyclists and allow for pedestrian connections to the central common, the Suffolk Downs and Beachmont MBTA Blue Line stations, and Sales Creek. Parking is provided for on these streets. The Parkway runs alongside the Central Common, generally from South to North; it is a primary landscape boulevard inspired by the Olmsted/DCR parkways found throughout Boston.

- The Parkway maintains a separated two-way cycle track, while Main Street has a bike lane on each side in the direction of traffic flow between parking and the sidewalk. The Parkway includes and embraces open space development while Main Street provides wider public sidewalks adjacent to continuous retail frontage by requiring building facades set back from the street ROW. The Main Street Retail Corridor continues north to Winthrop Street and the Beachmont station.
- The secondary street network consists of green fingers and neighborhood streets illustrated previously by Figures 3.15h, 3.15i, and 3.15j. Consistent with BTD Guidelines, these are generally two-lane two-way streets with bike lanes and parking. The green fingers provide a wide planted and landscaped open space on one side between the vehicular street and the sidewalk adjacent to the building – the open space serves as part of the storm water control system for retention and infiltration. Separated bike lanes are provided on each side of the street. The neighborhood streets typically have parking on both sides and bicycle lanes on each side between the vehicle lanes and the parking.
- Service ways and service courts are provided where necessary and are designed to allow access for off-street parking and deliveries. These are not through-traffic streets, do not allow parking, and only allow motor vehicles for building access. Some do, however, provide an informal extension of the pedestrian and cycle networks.
- All streets function as accessory to the green infrastructure adding shaded tree canopy to reduce heat island effect, and providing storm water control through bioswales and storage/infiltration basins.
- All streets and ways are publicly accessible and are provided with features for the mobility impaired (crossing ramps and cane detectable warning areas); cross walks will be especially well-lighted to enhance pedestrian safety at night.

Pedestrian Connections

Sidewalks are to be provided on all streets (see Figures 3.15a through 3.15l). The character and scale of sidewalks for pedestrians varies with street section and development or open space frontage – wider sidewalks are provided where higher foot traffic is anticipated near the MBTA stations and along the Main Street Retail Corridor. Minimum sidewalk widths will be maintained elsewhere that conforms to BTD's Complete Streets Guidelines.

There is a robust system of pedestrian connections and community paths throughout the site. The primary element of this system is the pedestrian-only Active Linear Corridor, which connects to the green spines and is designed as a series of active play and exercise areas accessible to pedestrians of all ages and abilities – it is a place of varied activities allowing both formal and informal recreation.

Community paths will be laid out to provide physical accessibility for those using walkers, wheelchairs, strollers, and shopping carts. As with sidewalks on vehicular

streets, all pedestrian ways and connections will be publicly accessible and provided with features for the mobility impaired (crossing ramps and cane detectable warning areas). Cross walks will be especially well-lighted to enhance pedestrian safety at night.

Refer to the completed BPDA Accessibility Checklist for the Master Plan Project in Appendix B.

Streetscape Design

As noted in the descriptions above, the street and pedestrian way systems meet BTD's Complete Streets Guidelines as follows:

- **Multimodal** – all vehicular streets and ways also safely and adequately provide for other modes of movement, are well-connected to the regional highway network, the public transit system, and regional bikeways. Space will be provided for Bluebikes and secure attractive bike racks and hitching posts will be provided at destination open spaces, retail areas, MBTA station plazas, and along the active linear corridor.
- **Green** – streets and pedestrian ways will be provided with tree canopy, under-story planting and where appropriate ground cover, bioswales, permeable paving, and low-energy-demand lighting with no sky-directed luminance. Tree canopy species will be differentiated by neighborhood to add variety and legibility to the Master Plan Project street system. The Parkway, community paths, and green fingers, provide enhanced storm water retention and management.
- **Smart** – bike share, bike repair, and ride share designated pick-up/drop-off spots will be provided. Electronic signage will be provided within Belle Isle and Beachmont Squares showing the expected time of arrival of MBTA Blue Line trains and busses. Provisions will be made for parking and charging of electric vehicles. Where traffic signals are required they will be traffic and demand sensing and networked.

Bicycle Connections and Facilities

As noted above, most vehicular streets within the site plan will be designed to include bike lane provisions. There will be separated two-way cycle tracks on primary streets and The Parkway, separated one-way tracks on the secondary streets, and on-street bike lanes on tertiary streets. The community paths will be separate from the two-way cycle tracks.

All buildings will provide off-street indoor bicycle storage and on-street short-term bike racks that comply with respective City of Boston and City of Revere Guidelines. The retail district, destination open spaces, the active linear corridor and the MBTA station squares will also be provided with outdoor, secure bike racks and hitching posts. Simple robust bike repair stations providing a manual air pump, wrenches, and a bike vise will be provided at strategic locations. The Proponent will endeavor to attract a bicycle shop for the sale of bikes, parts and accessories, to the retail

space. The Proponent is also committed to supporting the planning and installation of public bike share stations in connection with the Project.

Shuttle Bus Services

An internal bus shuttle system consisting of two loops is proposed to provide direct connections to public transit (the two MBTA Blue Line Stations), as shown previously in Figure 3.24 for use by future residents, employees, and visitors of the Master Plan Project to reduce personal automobile use to access the Project Site.

Loading and Servicing

Loading and service facilities will be fitted to support each building that is proposed within the Master Plan Project. Key design principals of the loading and service plan for the Project include:

- Separate loading activities from other activities: Loading activities and truck routes will be formulated to limit overlap with off-site local streets, including pedestrian and bicycle connectivity along those respective corridors.
- Avoid impeding traffic: Truck turns needed to access/egress proposed loading dock bays will be designed to be accommodated off-street and not impede vehicular flows on adjacent roadways to the greatest extent feasible.
- Provide direct connections: Access and egress by trucks will be concentrated to those primary corridors providing direct access to Route 1A and Winthrop Avenue.

2028 Build Condition Public Transportation

As mentioned previously, the 2028 Build Condition is estimated to generate approximately 42 percent of the total anticipated Master Plan Project trip generation, proportionate to the approximate Master Plan Project square footage that will be implemented by the 2028 horizon year.

Project-generated transit ridership was developed based on the CTPS Model results and post-Model adjustments described previously in Section 6.8.2. This approach resulted in the estimation of total transit trips for each time period defined in the CTPS Model. Table 6-9 summarizes the CTPS Model time period definitions. The CTPS Model results were also used to calculate the proportion of transit trips into the Project site versus transit trips out of the Project site for each time period.

Table 6-9 CTPS Model Time Period Definitions

Time Period	CTPS Model Definition
AM Peak	6:00 AM – 9:00 AM
Midday	9:00 AM – 3:00 PM
PM Peak	3:00 PM – 6:00 PM
Night	6:00 PM – 6:00 PM

Source: CTPS.

The CTPS Model results determined that, of the transit services that operate proximate to the Project Site (illustrated in Figure 6.8), the Master Plan Project would generate increased daily ridership on the Blue Line, MBTA Bus Route 119, and MBTA Bus Route 450. Based on the geographic location of the proposed 2028 Build Condition development, which is planned to occur outside of a typical one-quarter mile walk shed for Route 450 bus service, the ridership generated by the 2028 Build Condition to this specific route was reassigned between the Blue Line and the Route 119 only. Trips were assigned to either the Blue Line or the Route 119 proportionate to the CTPS Model results for daily ridership growth between the No-Build and Build Conditions for these specific transit services.

In addition, the Project Proponent is committing to establish new, supporting shuttle services to encourage transit mode share to and from the site, which were not incorporated into the CTPS Model, including direct site shuttles that would connect to key transit and land use hubs such as North Station, South Station, Chelsea Station, and the Seaport District. Based on comparable areas in East Cambridge and the South Boston Waterfront, which include a similar level of development of office space and residential units as the proposed site, and shuttle connections similar to those proposed as part of the Project, a 2 percent shuttle mode share was assumed for Project trips occurring during the AM Peak and PM Peak periods.[51]

The detailed geographic distribution of trips for each transit service was also informed by the CTPS Model, in order to project how many trips to and from the site would be in the inbound and outbound directions within each time period. By identifying the distributions that could pass through the peak load point for each transit line, these projections were used to inform the analysis of peak passenger demands versus capacity on each impacted transit line. For example, trips originating at the Site and taking the Blue Line Outbound to their final destination would not add passenger load to the Blue Line's critical peak load point (typically known to occur between Maverick and Aquarium stations). However, trips originating at the Site and taking the Blue Line Inbound, as well as trips destined for the Site via the Blue Line Outbound, would both contribute additional passenger demands to the Blue Line's identified critical peak load.

The detailed geographic distributions additionally informed the projections for inbound and outbound platform activity (boardings and alightings) at the two Blue Line stations serving the site. In order to estimate the split in Project-generated demand for Suffolk Downs Station versus Beachmont Station, the ratio of development square footage located closest to each station was used. Based on the anticipated 2028 program, approximately 54 percent of the development will be most proximate and best served by Suffolk Downs Station and 46 percent of the development will be most proximate and best served by Beachmont Station. This

[51] Per the South Boston Waterfront Sustainable Transportation Plan, shuttle trips represent approximately 2 percent of existing South Boston Waterfront peak period mode share.

percentage split was used as a proxy for the split in ridership demand generated by the Project for each station.

The projected Build Condition transit ridership was temporally distributed to 30-minute increments throughout the entire service day based on existing ridership data provided by the MBTA. Existing line-specific ridership trends were used to establish the distribution of Project-generated demand within each time period to more detailed 30-minute increments. In order to establish projections for platform activity (boardings and alightings) at Suffolk Downs Station and Beachmont Station, existing platform activity trends at these two stations were used to establish a combined platform activity distribution curve for Project-generated trips.

Per coordination with the MBTA on analysis assumptions, existing conditions schedules as of Summer 2018, as described in Section 6.7.3, were assumed for purposes of all horizon year transit capacity analyses. As specifically scoped by MEPA and the MBTA, the Build Condition analysis additionally considers potential enhanced Blue Line peak capacity. Utilizing the existing Blue Line vehicle fleet, potential enhanced capacity is assumed to achieve peak service of a train every 4.0 minutes, based on information presented by the MBTA to the Fiscal & Management Control Board in November 2017.[52] The MBTA is planning to conduct a forthcoming signal upgrade study for the Blue Line, which will assess Blue Line performance and infrastructure conditions as well as identify potential targeted upgrades and improvements.

Proposed Parking

The estimated parking requirements for the Master Plan Project presented herein are based on a combination of industry/market expectations, local zoning requirements and/or goals for reduced parking, and shared parking concepts. This combined approach results in the creation of a reasonable parking supply that supports the anticipated tenant and market-driven parking demands, yet minimizes the number of spaces provided on-site and the associated construction costs and environmental impacts (i.e., single occupancy vehicle trips and associated air emissions). In addition, by allowing the flexibility to utilize shared parking, the ability to allocate the parking supply among various users, fewer spaces are needed than what a single-use allocation of spaces would require.

The Master Plan Project proposes supplying approximately 15,250 parking spaces on multiple parcels the majority of which will be provided in structured garages with a limited allocation of on-street parking (primarily to support street-front retail uses and open space visitors), subject to reduction based on actual parking demand during the build-out of the Project. Without accounting for shared parking opportunities, the parking requirement (based on City of Revere zoning guidelines and acceptable City of Boston ratios based on BTD/BPDA parking guidelines) is approximately 15,775 spaces.

[52] MBTA. Integrated Fleet and Facilities Plan. Presentation to Fiscal & Management Control Board. November 20, 2017.

The mixed-use nature of the Master Plan Project, including the Project Site's proximity to two MBTA Blue Line stations (Beachmont and Suffolk Downs), provides the opportunity to support a sustainable, multi-modal development that requires fewer off-street parking spaces than those required for "traditional" quasi-urban or suburban developments. A reduced parking provision is representative of an urbanized, highly-effective TOD and aligns with the Master Plan Project's anticipated future mode share characteristics. Furthermore, car ownership has been in decline, particularly in neighborhoods that are directly served by subway, transit, and non-motorized transportation modes. Recent increases in the use of car sharing services and the prospect of widespread autonomous vehicle use in the future will likely bolster this ongoing trend of reduced auto ownership in urbans areas, and in turn, reduce localized parking needs.

Proposed Parking Supply

The combination of various land uses proposed as part of the Master Plan Project (office, residential, hotel, retail/restaurant) allows for a sensible approach to minimizing the number of parking spaces at the Project Site. By determining market expectations, incorporating the local parking supply requirements, and considering shared parking concepts, the Master Plan Project's total parking program of approximately 15,250 spaces, including on-street parking, which, overall, satisfactorily meets the City of Revere's parking requirements and BTD's parking guidelines.

On-Street Parking

The 557 on-street parking spaces are intended for shared uses, particularly for retail customers, visitors to the Open Space network and visitors of office tenants and residents. On-street parking will be time-limited to discourage resident or employee parking and support the shorter-term uses of retail and open space areas.

Proposed Parking - Boston

For the City of Boston portion of the site the Proponent is proposing the following maximum parking ratios which ratios are based on similar TOD sites situated in urban contexts similar to the Suffolk Downs site. These TODs possess a similar scale, mix of land uses, and geographic characteristics as the Master Plan Project, and these developments intend to maximize all reasonable opportunity to share parking between uses. These parking ratios are lower than what typically would be proposed for a comparable project that did not have excellent access to public transportation.

- Office: 1.0 spaces per 1,000 SF
- Lab: 1.0 spaces per 1,000 SF
- Residential: 0.5 to 1 space per unit
- Hotel: 0.5 spaces per room
- Retail: 0.5 spaces per 1,000 SF

The Proponent has committed to monitor parking demand over the build-out of the Project with the goal of reducing the number of parking spaces in future phases, as warranted.

The City of Boston, in a formal comment letter on the EENF/EPNF (dated February 21, 2018), requested that specific lower parking ratios be considered to "minimize single occupancy vehicle use as a means to reducing vehicular trips while maximizing more sustainable modes, including transit, walking, bicycling, and ride-sharing." These parking ratios include:

- Office, Lab: 0.5 spaces per 1,000 SF
- Residential: 0.75 spaces per unit
- Retail: 0.5 spaces per 1,000 SF

The Project does meet the recommendation for retail and will seek to have an average of .75 spaces per unit for the residential space but is requesting flexibility of a range of .5 spaces to 1.0 space per unit per building with an overall Project target maximum of .75 spaces per residential unit. However, for the Office and Lab uses attaining such an aggressive (lower) parking ratio of 0.5 spaces per 1,000 SF would be difficult, especially at the early phases of the build out of the Master Plan Project. The Proponent believes the proposed parking ratios 1.0 space per 1,000 square feet, will be necessary and is appropriate for the proposed office and lab buildings. The Proponent will be utilizing shared parking concepts to reduce the actual number of parking spaces built and will closely monitor parking demand with the goal of reducing further the number of parking spaces in future construction phases, as warranted.

Proposed Parking - City of Revere

The City of Revere's Suffolk Downs Overlay District approved on March 27, 2018, requires the following minimum parking ratios:

- Office: 1.0 spaces per 1,000 SF
- Lab or Research: 1.0 spaces per 1,000 SF
- Residential: 1.0 spaces per studio or one-bedroom dwelling unit; 1.5 spaces per two-bedroom dwelling unit; and 2.0 spaces per three- (or more) bedroom dwelling units.
- Hotel: 0.5 spaces per room
- Retail: 1.0 spaces per 500 SF (2.0 spaces per 1,000 SF)
- Restaurant: 1.0 spaces per every 8 seats

Based on the current development program in Revere, the required parking supply, per the SDOD minimum parking requirements, is approximately 6,620 spaces, which the Project will meet as currently proposed. The Proponent will also monitor parking demand in the City of Revere with the same goal of reducing the number of parking spaces in future construction phases, as warranted.

Shared Parking Concept

Shared parking is the use of a parking space to serve two or more individual land uses within a development without conflict. The ability of a parking space to be shared is the result of two conditions:

1. Variations in the accumulation of vehicles by hour, by day, or by the season.
2. Relationships between and among the various land uses in visiting multiple land uses on the same automobile trip.

For example, office users (employees) typically require parking during the day's business hours, while residents mostly require parking during the evening and overnight hours. In other words, the peak parking demand for each user occurs at a different time of day. By examining temporal variations of parking spaces by user, the overall number of spaces needed to be built can be reduced and more closely meet actual parking demand patterns.

The concept of shared parking in a mixed-use development has been prevalent for decades. It is a fundamental and practical approach to address parking supply within land-constrained parcels. Minimizing parking supply construction through a shared approach leads to vibrant residential, retail, and restaurant developments and works in combination with office and other commercial uses as well.

Parking, in general, is one of the key components to any site development plan. In many cases, parking can consume as much as 50 percent or more of the building and land area with a specific development. An oversupply of parking can lead to excess stormwater and drainage impacts and unnecessarily high expenses, while an undersupply can lead to the intrusion of parked vehicles into neighborhoods or adjoining properties, excessive vehicle circulation, and unhappy users.

The key goal to shared parking is simple: to find a balance between providing adequate parking to support a development and minimizing the negative aspects of excessive land impacts and resources that can otherwise be devoted to non-parking issues.

Shared Demand Analysis

By examining temporal variations of parking spaces by user, the overall number of spaces needed is expected to be 14,794 at a peak demand point, or 456 spaces lower than the proposed parking supply of 15,250 (including on-street parking spaces) (Table 6-10). The peak parking demand is anticipated at a midday period (roughly equivalent to 2 pm), when office/commercial parking is expected to be fully occupied and residential demand and hotel demand are at most 70 percent. (The temporal variation factors used are from the methodology outlined in *Shared Parking*, Second Edition.[53])

[53] Washington, D.C.: ULI-The Urban Land Institute and the International Council of Shopping Centers, 2005.

The combination of shared parking spaces among land uses and the provision of on-street parking yields a supply that accommodates the anticipated vehicle parking demand.

Parking Management Strategies

As each development phase advances, the Proponent will look for opportunities to reduce the parking supply at the Project Site through an ongoing analysis of tenant needs, the successful implementation of TDM measures, and future dynamic changes to car ownership and use that are anticipated in light of new technologies that could further reduce and limit private automobile ownership (i.e. car sharing services and autonomous vehicle uses), and, in turn, parking needs. The Proponent recognizes that parking trends are evolving and changing and expects that the parking demand needs for private vehicles will diminish over the useful life of this Project.

During the build-out of the Master Plan Project, parking usage will be monitored to avoid overbuilding of parking, and managed via shared parking and unbundling of spaces (not tying spaces directly to specific units or offices) to properly support mixed-use buildings and areas.

During construction and build out, parking demand may be accommodated via the use of existing surface parking lots for interim parking needs.

Table 6-10 Expected Shared Parking Demand at Peak Hour

Land Use – User Group	Peak Hour Adjustment (2 PM)	Parking Demand
Office/R&D – Employee	100%	7,933
Office/R&D – Visitor	100%	1,193
Residential – Occupants	70%	4,234
Residential – Guests	70%	557
Hotel – Guest/Visitor	60%	307
Hotel – Employee	100%	88
Retail – Visitor/Customer	95%	296
Retail – Employee	100%	186
Parking Space Demand		**14,794**
Parking Space Supply		**15,250**
Difference (Available Spaces)		**456**

6.8.3 Bicycle and Pedestrian Accommodations Evaluation

bicycle and pedestrian connectivity within the site and to adjacent land uses will be a significant focus of the permitting process, and comments received from key stakeholders indicate the importance of providing continuous sidewalks and bicycle accommodations between the Project Site and the two MBTA Blue Line Stations

(Suffolk Downs Station and Beachmont Station). The Secretary's Certificate noted that the DEIR should:

- Demonstrate a clear commitment to promotion of pedestrian access throughout the project site and the ability to accommodate bicycle uses.
- Elaborate on the construction timing of proposed pedestrian and bicycle amenities, including but not limited to the proposed pedestrian plaza near the Suffolk Downs MBTA station.
- Provide an inventory of pedestrian and bicycle facilities in the study area and bicycle network in the vicinity of the project.
- Identify measures for improving deficient pedestrian and bicycle facilities in the area and expanding or adding new pedestrian/bicycle routes.
- Consider connecting the site to the East Boston Greenway, the Belle Isle Marsh trail network and Chelsea Creek.

With the exception of construction timing (addressed in the Open Space phasing discussion in Section 3.9.3 of Chapter 3, Urban Design), this section will address these directives.

As requested in the BPDA Scoping Determination, specifically the Planning and Urban Design Comments memo dated February 21, 2018 on the EENF/EPNF, this section provides also provides information on the following topics:

- The Boston Bike Network Plan recommended in the Go Boston 2030 Action Plan.
- A detailed plan of sidewalks, pedestrian plans and bicycle plans throughout the project, including dimensions, including how the internal network will be separated from automobile traffic.
- Detail on how internal bicycle and pedestrian paths will be connected to the regional network.
- The character and quality of pedestrian and bicycle connections to T stations, particularly connecting to Belle Isle Marsh without having to access the paid zone of Suffolk Downs Station.
- A description of the approach to bicycle parking both in the public realm and individual buildings, as well as the character and quantity of bicycle parking near all MBTA stations.
- A map of local and regional bicycle and pedestrian systems, including a plan for how the project will connect to these, with particular emphasis on connecting to the East Boston Greenway, Belle Isle Marsh, and ways to integrate the bicycle and pedestrian network into the neighborhoods of East Boston and Revere.

This section includes a review of existing bicycle and pedestrian accommodations, relevant local planning documents related to the expansion of bicycle/pedestrian facilities, and an examination of proposed and studied bicycle/pedestrian connections and facilities both within and outside of the Project Site.

Existing Bicycle and Pedestrian Accommodations

Since the creation of the thoroughbred race course in the mid-1930s, the Project Site has been inaccessible to non-motorized public passage and access has been limited to vehicular traffic on Tomasello Drive. Areas adjacent to Tomasello Drive are primarily surface parking lots.

Existing On-Site Bicycle and Pedestrian Accommodations

There are currently no bicycle accommodations, including bike paths, bike lanes, bike parking, or public bike share stations within the Project Site. Some pedestrian paths exist between Tomasello Drive and the vast surface parking lots and the clubhouse and grandstand, as well as around the perimeter of the grandstand. A broken and disused pedestrian path is situated adjacent to Tomasello Drive, to the west of the clubhouse and grandstand. A pedestrian connection links the southern end of the racetrack to the MBTA Suffolk Downs Blue Line Station, however this is not a sidewalk or designated pedestrian path. It is a roadway with little motorized traffic, accessible from Walley Street near the MBTA Station by means of a break in the perimeter fence.

Existing Off-Site Bicycle Accommodations

One of the Project Site's greatest strengths is its adjacency to the MBTA Blue Line; however, the MBTA subway tracks to the east, as well as the oil tank farm to the west, limit bicycle and pedestrian connections to the Project Site.

Limited bicycle facilities exist around Project Site, as identified on Figure 6.19. Approximately 0.4 miles to the north of the Project Site, a shared-use path runs adjacent to Revere Beach State Reservation, parallel to Revere Beach Boulevard. This path continues approximately 2.6 miles northward along the length of Revere Beach. To the south of the Project Site, the East Boston Greenway shared-use path runs north-south linking Constitution Beach State Reservation, Logan Airport, and points further south in East Boston. It continues approximately 2.25 miles south to Piers Park. Also, to the south of the Project Site, bicycle lanes exist along Saratoga Street near the MBTA Orient Heights Blue Line Station. This bicycle lane continues eastward on Saratoga Street to the Winthrop town line and westward to the Ford Street intersection. East of Barnes Avenue. It consists of an eastbound bicycle lane and westbound shared lane (due to lack of available street width and the presence of on-street parking on Saratoga Street).

To the east of the Project Site, a series of paths exist within the Belle Isle Marsh State Reservation from the Belle Isle Marsh parking area. There is no dedicated bicycle or pedestrian accommodation that connects Bennington Street to the reservation parking area and path access.

To the west of the Project Site, Route 1A does not accommodate bicycles.

Existing Bicycle Parking and Bicycle Share Stations

Off-site, two bicycle racks are located near the entrance to Beachmont School in Revere. To the northwest of the Project Site, limited bicycle parking is provided for employees and customers at the existing shopping area at Furlong Drive.

Off-site bicycle parking (in some cases covered) exists at the MBTA Blue Line Stations in the vicinity of the Project Site, including Orient Heights, Suffolk Downs and Beachmont Stations. A covered bicycle parking area with inverted u-style racks and space for twelve bicycles is provided at the MBTA Suffolk Downs Blue Line Station on the west side of the tracks (on Walley Street) adjacent to the Project Site. On the eastern, Bennington Street side of Suffolk Downs Blue Line Station, uncovered bicycle parking is provided for seven bicycles using wave-style racks. Wave-style racks to not meet BTD-standards for bicycle parking. At Beachmont Blue Line Station, bicycle parking is covered by the existing bridge structure to either side of the station entrance off Winthrop Avenue and consists entirely of wave-style racks. Further east and south of the Project Site, sporadic individual post and ring-style bicycle racks are located along the Bennington Street corridor near Orient Heights Station.

Constitution Beach has at least eight existing bicycle parking spaces with inverted u-style, half located centrally near the main beach parking lot and the other half to the southern end of the site near some tennis courts.

A Bluebikes (formerly known as Hubway) public bike share station is located adjacent to the MBTA Orient Heights Blue Line Station on the northeast corner of the Bennington Street/Saratoga Street intersection. This is currently the northernmost Bluebikes station in East Boston and the closest to the Project Site. Bluebikes are not currently available in Revere, but the city recently implemented the "ofo" dockless public bike share program, which can be rented using a smart phone application and uses smart lock technology.

Existing Off-Site Pedestrian Accommodations

Existing off-site pedestrian accommodations are shown in Table 6-11. This list refers to pedestrian accommodations in the immediate vicinity of the Project Site and does not include accommodations in surrounding neighborhoods.

Table 6-11 Summary of Existing Pedestrian Facilities in the Project Area

Pedestrian Accommodation	Description
Winthrop Avenue Sidewalks (north of Project Site)	East-west sidewalks on both sides of Winthrop Avenue east of the intersection with Revere Beach Parkway and continuing easterly for the length of the Project Site, to the MBTA Beachmont Blue Line Station, bus stops along Winthrop Ave, Donnelly Square and beyond.
Revere Beach Parkway Sidewalks (north of Project Site)	East-west sidewalks on both sides of Revere Beach Parkway west of the intersection with Winthrop Avenue and continuing westerly to Route 1A and beyond. A north side sidewalk east of the Winthrop Avenue intersection connects to Ocean Avenue / State Road intersection – this sidewalk is in poor condition in places and no crosswalk exists where it meets the intersection at Ocean Ave and State Rd.
Tomasello Drive Sidewalk (west of the Project Site)	North-south sidewalk on the west side of Tomasello Drive from Revere Beach Parkway to the Shops at Suffolk Downs. Signalized crosswalks are provided at the intersection of Tomasello Drive / Revere Beach Parkway.
Route 1A Sidewalks (west of the Project Site)	North-south sidewalks on both sides of Route 1A at the Project Site western border, continuing well north and south of the Project Site. These sidewalks are in places poorly defined and in poor condition, particularly adjacent to industrial land uses northwest of the Project Site. An unsignalized crosswalk for Revere Beach Parkway exists just east of the intersection with Winthrop Ave. This crosswalk has no pedestrian curb ramps.
Waldemar Avenue Sidewalks (south of the Project Site)	Continuous east-west sidewalk along the south side of Waldemar Avenue between Route 1A and Walley St. A sidewalk on north side of Waldemar Ave begins to the east of Project Site property at approximately 97 Waldemar Avenue, but no north-side sidewalk exists abutting the Project Site. The Project Site has an informal pedestrian connection to Waldemar Ave via a break in the perimeter fence.
Walley Street Sidewalks (south of the Project Site)	North-south sidewalk on the east side of Walley adjacent to MBTA Suffolk Downs Blue Line Station. Continuous sidewalks on both sides from Waldemar Avenue intersection south to Bennington Street. Sidewalk gaps exist on both sides of Walley Avenue near the MBTA Suffolk Downs Blue Line Station, limiting access from the station to Bennington Street.
MBTA Blue Line Station Interior Pedestrian Access (southeast of Project Site)	The station includes steps/ramps and a bridge over the rail tracks to boarding platforms in either direction. A section of the ramps and bridge is accessible outside the paid fare zone, providing access between the Project Site and Bennington Street.

Table 6-11 Summary of Existing Pedestrian Facilities in the Project Area (continued)

Pedestrian Accommodation	Description
Bennington Street Sidewalks (east/southeast of the Project Site)	North-south sidewalks exist on both sides of Bennington Street in from Winthrop Avenue to points south, including Belle Isle Marsh Reserve, MBTA Suffolk Downs and Orient Heights Blue Line Stations and the Orient Heights neighborhood.
State Road Sidewalks (northeast of the Project Site)	North-south sidewalks exist on both sides of State Road in from Winthrop Avenue north to the Eliot Circle Rotary.
DCR Access to Chelsea River (west of the Project Site)	East-west sidewalk public access route to Chelsea River from the east side of Route 1A.
Belle Isle Marsh Shared-Use Paths (east of the Project Site)	Wide, shared-use paths within Belle Isle Marsh Reserve.
Belle Isle Marsh Unpaved Paths (east of the Project Site)	A series of unpaved paths and boardwalks within Belle Isle Marsh Reserve.

Review of Relevant Local Plans

The Proponent and project team have thoroughly reviewed relevant local plans pertaining to the provision of bicycle and pedestrian infrastructure at the Project Site and Project Area. The following sections summarize these plans. The key themes from these plans relevant to the Project Site and Project Area include:

- Establishing direct bicycle connectivity to destinations such as workplaces, schools, parks, and public transportation.
- Comfortable and safe bicycle paths, lanes, and shared streets that appeal to new and existing riders.
- Future primary bicycle routes on Boardman Street and the Chelsea River Path, including into the City of Revere.
- Future bicycle accommodation along Bennington Street north of Saratoga Street.
- Parts of Bennington Street designated for future "Neighborhood Complete Streets Corridor."
- MBTA Orient Heights and Suffolk Downs Blue Line Stations designated as future "mobility microHUBs."
- Ensuring that the Suffolk Downs redevelopment site includes recreational space.

Boston Bike Network Plan (2013)

The *Boston Bike Network Plan* defines two main types of bicycle routes. *Primary Routes* connect neighborhood centers, regional multi-use paths, transit hubs, major employment centers and institutional destinations. *Secondary Routes* stretch into neighborhoods and provide access to local businesses and neighborhood centers.

For the Project Area, the 30-Year Vision Map[54] shows Primary Routes are shown along Saratoga Street (adjacent to Orient Heights Station; this is an existing bike lane), Boardman Street (the extension of Saratoga to the west and southern edge of Orient Heights Neighborhood) and Chelsea River Path (a future public path along the waterfront). See Figure 6.20. The proposed Boardman Street and Chelsea River Path elements are not part of the 5-Year Action Plan, which would apply as of 2018.

Imagery of the full buildout of future bicycle facilities by 2046 shows both Boardman Street and the Chelsea River Path realized, as well as bicycle accommodations on Bennington Street north of Saratoga Street to the City of Revere border, and another path connecting Constitution Beach to Belle Isle Marsh along the waterfront.[55]

Go Boston 2030 Vision and Action Plan (2017)

Go Boston is the transportation plan for the City of Boston. It envisions transportation options for the 5, 10 and 15 years into the future.

Go Boston defines Bennington Street as an early action project for a "Neighborhood Complete Streets Corridor." The map for Local Projects and Policies indicates that this designation applies for Bennington Street from Saratoga Street southward. For these corridors, the plan states that "the City will install enhancements along several neighborhood connectors that improve travel safety, accommodate people biking, and make walking more comfortable."[56]

Go Boston also indicates that Suffolk Downs and Orient Heights Stations are designated as future locations of mobility microHUBs, described as follows:

> *Using clearly-branded kiosks or nodes with real-time interactive information displays about transit schedules and shared vehicle availability, people can connect quickly between bus and train service, a Hubway station, secure bike parking, carshare vehicles, ridehailing pick-up spots, and electric vehicle charging stations at every microHUB. Coupled with free Wi-Fi and intuitive wayfinding, these nodes become reliable ways to start, continue, or complete a multimodal journey. Placemaking strategies including plazas or parklets, sidewalk amenities, information signs, shelters, and works of art at each of these hubs will make them places that are worth stopping in when you have the time or if you have to wait.*[57]

[54] City of Boston. 2013. *Boston Bike Network Plan*. P. 5. URL: https://www.cityofboston.gov/images_documents/Boston%20Bike%20Network%20Plan%2C%20Fall%202013_FINAL_tcm3-40525.pdf.

[55] Ibid., P. 17.

[56] City of Boston. 2017. Go Boston 2030 Vision and Action Plan. P. 160. URL: https://www.boston.gov/sites/default/files/go_boston_2030_-_full_report_to_download.pdf.

[57] Ibid., P. 146.

The Go Boston Plan defines "Better Bike Corridors:" streets that are to be rebuilt with protected and low-stress bicycling facilities. There are none of these in the Study Area.

The Plan defines the "Green Links Network" as an effort to "connect people in every neighborhood to Boston's greenway network by installing new paths, new bike facilities, and safer road crossings."[58] The Green Links map identifies the East Boston Greenway and show a link to Belle Isle Marsh by an indirect path that skirts around the eastern side of the MBTA maintenance facility northeast of Orient Heights Station. This is marked on the Green Links map as a "project in progress," meaning that it is included as part of plans and projects being advanced by the city, Massachusetts Department of Conservation and Recreation (DCR), greenway groups and others.[59]

City of Revere Open Space and Recreation Plan, 2010-2017

This plan was prepared for the City of Revere by the Metropolitan Area Planning Council. The plan's purpose was to provide Revere with a blueprint to ensure that current and future Revere residents have opportunities for recreation and access to open space.

The plan includes several goals objectives related to generating more opportunities for active transportation in Revere. It also identified the need for the development of additional multi-use trails in Revere, an action item that was not accomplished from the previous plan. The plan specifically references converting the abandoned CSC railroad right-of-way into a multi-use path – this follows the eastern short of the Chelsea River through East Boston and Revere and is also identified in the Boston Bike Network Plan.[60] The plan also calls for coordination with the redevelopment of Suffolk Downs to ensure that the plan includes recreational space.[61]

Proposed On-Site Bicycle and Pedestrian Improvements

The Proponent has put forth an extensive program for bicycle and pedestrian improvements for the Project Site. This section details these proposed facilities, as well as links and connections off-site to support bicycling and walking to and from the Project Site.

Bicycle and Pedestrian Network

Section 3.7.2 of Chapter 3, *Urban Design*, describes the proposed on-site bicycle network plan (shown in Figures 3.28), which consists of a hierarchy of bicycle accommodations from dedicated cycle tracks along major access roads (e.g.,

58 Ibid., P. 170.

59 Ibid., P. 171.

60 City of Revere. 2010. *City of Revere Open Space and Recreation Plan (2010-2017)*. P. 71. URL: http://www.mapc.org/wp-content/uploads/2017/11/Revere-Open-Space-and-Recreation-Plan-November-2010.pdf.

61 Ibid., 79

Tomasello Drive, Winthrop Avenue), striped bicycle lanes along the lower volume neighborhood streets, and shared lane areas through pedestrian plazas.

Sidewalks are provided on all streets (as shown in Figures 3.23a and 3.23b). The character and scale of sidewalks for pedestrians varies with street section and development or open space frontage – wider sidewalks are provided where higher foot traffic is expected within the Transit Oriented Squares and along the Main Street Retail Corridor. The pedestrian plazas within the Transit Oriented Squares (Beachmont Square and Belle Isle Square) are planned for commercial and retail activity while also providing critical direct pedestrian and bicycle connections to public transit at MBTA Beachmont and Suffolk Downs Blue Line Stations. In addition to the plazas, other pedestrian facilities with the urban design program consist of sidewalks and pedestrian pathways that permeate the Project Site. Refer to Figures 3.11 and 3.16 for the proposed circulation plans for Belle Isle Square and Beachmont Square, respectively.

Bicycle Parking

The proposed on-site bicycle parking has been estimated using the Boston Transportation Department's (BTD) Bicycle Parking Guidelines. The BTD guidelines outline the amount of bicycle parking required for various land uses, including residential, office/commercial/industrial, retail, institutional and mixed-uses. The guidelines segment parking into secure/covered, or "long-term", bicycle parking, and on-site/outdoor, or "short-term" spaces. Appropriate styles of bicycle parking and placement considerations are also described in the guidelines.

Table 6-12 shows the BTD requirements for bicycle parking for the Master Plan Project.

Table 6-12: BTD Bicycle Parking Requirements

Land Use Type	Long-Term Bicycle Parking	Short-term Bicycle Parking
Multi-Unit Residential	1 per unit	0.2 per unit
Office, Commercial and Industrial (including Hotel)	0.3 per 1,000 square feet of development	2.5% of estimated daily building users
Retail	0.3 per 1,000 square feet of development	1 per 5,000 square feet of development
Institutional	0.5 per 1,000 square feet of development	5.0% of estimated daily building users

Source: Boston Transportation Department. 2010. *Off-Street Bicycle Parking Guidelines*. URL: https://www.boston.gov/sites/default/files/document-file-07-2017/policy_-_bike_parking_guidelines_final_v3.pdf.

Application of the BTD's current guidelines resulted in the proposed provision of approximately 6,143 long-term parking bicycle parking spaces and 1,653 short-term spaces for the Boston development parcels.

The City of Revere does not have bicycle parking guidelines. The Proponent will work with the City of Revere to develop the appropriate amount of long- and short-term bicycle storage to ensure that bicycles are a key element of the Project Site's sustainable transportation mix in Revere.

Public Bike Share Facilities

Bluebikes public bike share docking stations (formerly called Hubway) are proposed to be added throughout the Boston portion of Project Site, which is a provision of the BTD Bicycle Parking Guidelines. Station placement will require more rigorous review, but general principles apply. Stations should have easy access and good visibility. They must be operationally feasible if solar power is used, and to allow regular maintenance or rebalancing of bicycles. They should be situated in safe locations with respect to roads and should complement pedestrian features. Table 6-13 shows BTD requirements for public bike share stations.

Table 6-13: BTD Public Bike Share Station Requirements

Land Use Type	Public Bike Share Station Requirements
Multi-Unit Residential	1 station for any building with 100 or more units. May be waived if another station is within 200 yards.
Office, Commercial and Industrial (including Hotel)	1 station for any development with 100 or more planned worker occupancy or per 50,000 square feet of development. May be waived if another station is within 200 yards.
Retail	1 station for any development over 50,000 square feet. May be waived if another station is within 200 yards.
Institutional	1 station campus-wide or 1 per 50,000 square feet of development.

Source: Ibid.

As shown on Figure 3.28, five (5) Bluebikes stations will be considered for Belle Isle Square, on the Main Street corridor and at the southern end of Tomasello Drive in the Boston portion of the Project Site, and at the Main Street/Parkway intersection and Beachmont Square in Revere. Although Bluebikes do not currently operate in Revere, the Proponent is willing to include these in the Revere portions of the Project Site pending further discussion with the City of Revere and Bluebikes.

The 'ofo' dockless bike share program currently used in Revere would also be considered for the Master Plan Project. The Proponent would work with the City of Revere to expand the dockless bike share program to the Project Site.

Proposed Off-Site Bicycle Connections and Accommodations

Proposed improvements to bicycle and pedestrian accessibility included here refer to connectivity outside the Project Site. Figure 6.19 summarizes the potential future

facilities to be considered in conjunction with the Master Plan Project. These accommodations are described below.

Pedestrian Crossing at Belle Isle Marsh

A pedestrian crossing of Bennington Street is proposed at the entrance to Belle Isle Marsh Reservation. This pedestrian crossing would help dissuade crossing at between designated crosswalks in the long stretch of Bennington between Leverett Avenue and Everard Avenue. This crossing would include high-visibility pavement markings, pedestrian warning signs, and may be supplemented with warning beacons such as a rectangular rapid flashing beacon to increase yielding behavior by motor vehicles. Use of curb extensions in the current parking lanes could decrease the curb-to-curb crossing distance, and implementation alongside a road diet (as discussed in the Bennington/State Path Study) could further decrease distance.

Future Crossing of Route 1A at Tomasello Drive and Access to Chelsea Creek

A future bicycle and pedestrian crossing is proposed at the western site access at Route 1A and Tomasello Drive. This crossing would be situated at or near the existing Suffolk Downs site access, would then connect to the existing sidewalk on the western side of Route 1A and allow future connection to the Chelsea River waterfront.

Note that this connection is intended to link to a future Chelsea River Path envisaged as a Primary Route in the Boston Bicycle Network Plan.

Shared Lane Bike Markings Next to Beachmont Station

Shared lane bicycle markings are proposed on Winthrop Avenue between Washburn Avenue and Bennington/State Road. These are considered interim measures until additional width can be made available on Washburn Avenue in this area. This would require the reconstruction of the existing MBTA Blue Line rail bridge and relocation or redevelopment of the properties on the south side of Winthrop Avenue. In an ideal scenario, the proposed two-way separated bike lane proposed with the Project Open Space Plan along the southern side of Winthrop Avenue could be continued across Washburn Avenue, to the Beachmont MBTA Station and to Bennington Street.

Walley Street Bicycle Accommodations

Walley Street connects the southeastern corner of the Project Site and the western side of MBTA Suffolk Downs Blue Line Station to Bennington Street. The Proponent understands that the City of Boston and Boston Planning and Development Agency are planning bicycle accommodations on Walley Street. The Proponent will work with them to develop the bicycle connection from the proposed on-site facilities to their plans on Walley Street.

Adjacent Sidewalk Connectivity

This study identified sidewalk gaps adjacent to the Project Site on Walley Street and Waldemar Avenue. As construction would occur upon the edge of the Project Site, the Proponent would work with the City of Boston to make sure that on-site pedestrian accommodations connect into existing pedestrian facilities on these two streets.

ADA-Compliant Pedestrian Crossing of Revere Beach Parkway

An upgraded crossing is proposed for a pedestrian crossing near the Winthrop Avenue and Revere Beach Parkway intersection, including ADA-compliant curb ramps and high visibility pavement markings and signs.

Community Path Connecting Constitution Beach and Revere Beach Study

Figures 6.21a-c show a conceptual plan for bicycle/pedestrian connection to connect Constitution Beach to Revere Beach along a combination of Barnes Avenue, Saratoga Street, Bennington Street and State Road (from south to north). The concept for this is corridor is a shared-use community path, available for both pedestrians and bicyclists with a wide range of abilities. It would serve as a key community asset to access three state reserves, three transit stations and a neighborhood school, as well as commercial areas along the corridor.

This path would nominally be situated within a 20-foot-wide corridor, though the width of the shared bicycle and pedestrian facility would vary depending on site constraints. Along the Bennington-State Road corridor, the path would be situated on the southern/eastern side of the street. The path is intended to be vertically differentiated from the roadway and protected behind a curb. It would include high visibility pavement markings at street crossings and bicyclists would be instructed to use pedestrian crossing signals at signalized intersections. Sections of the path are described in detail below.

Barnes Avenue, Saratoga Street and Orient Heights Station

Barnes Avenue would connect to Constitution Beach and the East Boston Greenway. Due to the narrow width of the street (~35 feet), advisory bike lanes are considered as opposed to a shared-use path to maintain parking and workable two-way access to the Constitution Beach entrance. An advisory bike lane is a bicycle facility that can be implemented where there is too little space for traditional bike lanes. They are viewed and function as bike lanes.

Barnes Avenue would connect to an existing pedestrian crossing of Saratoga Street. This provides access to the northbound side of MBTA Orient Heights Blue Line Station. The pathway would utilize an existing wide sidewalk along the northern side of Saratoga Street, then turn the corner onto Bennington Street. The path would cross the vehicular entrance to the western side of Orient Heights Station and again continue on the sidewalk. Bennington's existing travel and parking lanes

adjacent to Orient Heights Station would remain as they exist today. See Figure 6.22.

Bennington Street: Ashley Street to Suffolk Downs Station

North of Ashley Street, Bennington does not need four lanes to operate effectively until the Winthrop intersection in Revere. It is a relatively low volume roadway (~11,000 vehicles per day, as recorded south of Crescent Street in Revere), yet it has four travel lanes its whole length. The Proponent is confident that Bennington Street can operate acceptably with potential lane reduction.

Bennington can be reduced from four to three lanes, in what is known as a "road diet." This would occur north of Ashley Street. The configuration of the road would be parking alongside a travel lane in each direction, and a center turning lane. The reduced width (from 60 to 49 feet) would allow for the curb line to be extended out from the southern/eastern side of the road to accommodate the community path. This presumes the elimination of the median on Bennington Street north of Ashley Street, movement of storm drainage structures and utilities, and redistribution of the roadway space on the bridge over the Blue Line tracks to just east of Walley Street. Existing parking, sidewalks and street trees would be retained. See Figure 6.23.

Bennington Street Adjacent to Belle Isle Marsh and north to Everard Ave

North of Suffolk Downs Station, Bennington Street passes Belle Isle Marsh State Reserve. The roadway in this section is 60 feet wide, with relatively little curbside parking due to the lack of adjacent land uses. The road diet would continue northward in this section, and the additional space on the Belle Isle Marsh side would allow for a generous community path alongside landscaping or trees to either side of the path. See Figure 6.24.

A connecting path could link the Bennington Street Community Path to the existing internal paths at Belle Isle Marsh. This would allow pedestrians and bicyclists to reach the marsh areas without having to walk or ride on the site access drive to the parking lot. The addition of the pedestrian crossing as discussed earlier in this section would provide a crossing of Bennington Avenue at the Belle Isle Marsh entrance and would connect to this spur.

The road diet would continue northward to Everard Avenue in Revere. Bennington would include parking on both sides, travel lanes in both directions and a center turning lane. Near Everard Avenue, a taper zone would be needed as the two approaching lanes from the north merge into one southbound lane.

Bennington Street: Everard Avenue to Winthrop Avenue

North of Everard Avenue, more travel lanes are required to accommodate the busy Winthrop Avenue intersection. This section would see parking on the west side of the street and two travel lanes in each direction. No parking would exist on the east

side of the street, and the curb line would extend into the roadway to accommodate a wide community path.

Where Crescent Avenue meets Bennington Street, the northernmost section of that roadway would be closed, and motorists would make their right and left turns from the same section of roadway. This would help traffic operations at the Winthrop intersection and decrease the number of crossing points for the community path. At Winthrop Avenue, bicyclists would be directed to use the pedestrian crossings to continue on the community path, or to cross toward Beachmont Station. See Figure 6.25.

State Road: Winthrop Avenue to Endicott Avenue

At Winthrop Avenue, State Road would consist of two southbound lanes (a right turn lane and a through/left turn lane), a median island, and one northbound travel lane. The curb line would again extend into the roadway to accommodate the community path. Parking would not be allowed at the northwest corner of the intersection.

From Atlantic to Endicott Avenue, State Road would consist of a travel lane in each direction and parking lanes on both sides of the street. As with Bennington, the Proponent is confident that State Road can operate acceptably with potential lane reduction. Southbound parking would need to be curtailed near Atlantic to make way for the right turn lane at Winthrop Avenue. This section of State Road has an inconsistent width, and at Atlantic Avenue the width is inadequate to sustain a center turn lane as well as the community path. This block of State Road can therefore have a wide community path and generous landscaping. The existing street trees and sidewalk would remain. See Figure 6.25.

State Road: Endicott Avenue to Eliot Circle

North of Endicott Avenue, State Road splits into a separate northbound and southbound alignment. The northbound roadway would carry the community path toward Revere Beach, alongside a parking lane and single northbound travel lane. For the southbound State Road alignment, a taper zone would be needed north of Endicott Avenue to reduce the roadway from two to one lane southbound at Endicott.

North of the merge with Revere Beach Parkway, the community path would occupy the right-most lane of the road; thus, the northbound lanes continuing from the Revere Beach Parkway merge to Eliot Circle would be reduced from three to two. Again, the Proponent is confident that this section of roadway can operate acceptably with this potential lane reduction. No parking would be available on State Road. Existing sidewalks and street trees would remain.

At Eliot Circle, the curb would extend out to accommodate a wide shared use path with buffer zone. This would not affect the performance of the rotary or the ability of larger vehicles to accomplish turning movements. Curb ramps would be widened

and/or upgraded in several areas and high visibility markings and signage would notify motor vehicles of the path crossing at Winthrop Parkway. See Figure 6.26.

6.9 2028 Transportation Capacity Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analyses were conducted with respect to the 2018 Existing Condition and projected 2028 and 2038 No-Build and Build Conditions. These analyses are included in Appendix D. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed on them. Calculated levels of service classify roadway operating conditions.

6.9.1 Level-Of-Service Criteria

LOS Criteria for Signalized and Unsignalized Intersection

Level of service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level-of-service at intersections is a function of average vehicle control delay and has different ranges for signalized and unsignalized intersections. Therefore, a minor increase in vehicle delay may result in a change in LOS if the intersection is operating close to the upper range for a particular LOS designation. Table 6-14 summarizes the level-of-service criteria for signalized and unsignalized intersections.

Table 6-14 Level of Service Criteria

LOS	Signalized Intersection Control Delay (sec/veh)	Unsignalized Intersection Control Delay (sec/veh)
A	≤10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: 2000 Highway Capacity Manual (HCM 2000).

For both signalized and unsignalized intersections, the evaluation criteria used to analyze study area intersections are based on the 2000 Highway Capacity Manual (HCM).[62] For unsignalized intersections, the analysis assumes that traffic on the main streets is not affected by traffic on the side streets. Therefore, the LOS is only determined for left-turns from the main street and all movements from the minor street. It should be noted that the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters such as high critical gaps. Actual field observations indicate that drivers on minor streets generally accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The net effect of these procedural limitations of the analysis software is the over-estimation of calculated delays at unsignalized intersections. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

Analyses for roundabouts in the study area are conducted using SIDRA Intersection analysis software[63]. The evaluation criteria used for the analysis are based on the 2010 Highway Capacity Manual (HCM)[64]. Specifically, roundabout analyses were conducted for Brown Circle and Butler Circle located in the City of Revere.

LOS Criteria for Roundabouts

The HCM defines the capacity of a facility as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." For roundabouts, the general principle for the capacity of an approach considers the inverse relationship between capacity of the approach and conflicting internal flow. Conflicting flow is the circulating flow that

[62] Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2000.

[63] SIDRA Version 7.0.9.6902

[64] Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2010.

passes directly in front of the individual approach. Sidra Intersection software was used to model control delay and LOS operations at the study area traffic circles.

Table 6-15 Roundabout Level of Service Criteria

LOS	Roundabout Control Delay (sec/veh)
A	0 – 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

Source: Highway Capacity Manual (HCM 2010).

Overall traffic circle, as well as individual approach LOS and delay, are reported for the weekday morning and evening peak hours in Table 6-15, respectively. Sidra reports are included in Appendix D.

LOS Criteria for Merge, Diverge, and Weave Sections

The analysis of weaving operations at exit ramps is based on procedures presented in the HCM. A weaving movement is defined as the interaction between the crossings of two or more traffic streams traveling in the same direction without the aid of traffic control devices. The measure of effectiveness to determine the LOS is based on many parameters, including density and the speed of both the weaving and non-weaving vehicles. The higher the speeds and lower the density, the better the operations of the weaving segment.

The analysis of merge operations at ramps is based on procedures presented in HCM Chapter 25, Ramps and Ramp Junctions. The procedure focuses on the interaction between freeway mainline through-traffic and traffic merging from or diverging to ramps. The analysis takes into account geometric and operational factors such as the length and taper of the acceleration/deceleration lanes, free-flow vehicle speed along the freeway and on the ramps themselves, and the number of vehicles in the right-most (or left-most for left exits) two lanes of the freeway. It should be noted that limitations in the HCM merge analysis methodology define the mainline as a freeway with a minimum input free flow speed of 55 miles/hour. This limitation affects the presented study area merge analyses as stated.

The focus of the analysis is at the ramp junction with the mainline where entering vehicles attempt to find gaps in the adjacent traffic stream. The action of this merging traffic creates vehicle turbulence along the mainline that can affect freeway operations. According to the HCM, the influence area for both of these movements is approximately 1,500 feet before the diverge areas and beyond the

merge areas (including acceleration and deceleration lanes). Table 6-16 summarizes the HCM criteria for LOS and densities for merge and diverge analyses.

Table 6-16 Level of Service Criteria for Merge/Weave Segments

LOS	Level of Service Density Range (pc/ph/pl)*
A	< 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35
F	Demand exceeds capacity

Source: Highway Capacity Manual (HCM 2010).
* Passenger cars per hour per lane

Merge, Diverge and Weave analysis HCS output is provided in Appendix D.

6.9.2 2028 Intersection Capacity Analysis

Intersection capacity analyses were conducted at all intersections in the study area. Tables 6-17 and 6-18 summarize the capacity analyses for signalized intersections, and unsignalized intersections, respectively, for the 2018 Existing, 2028 No-Build, and 2028 Build Conditions.

Table 6-17 Signalized Intersection Capacity Analysis

		2018 Existing Condition			2028 No-Build Condition			2028 Build Condition w/o Mitigation		
Location	**Movement**	**v/c [a]**	**Del [b]**	**LOS [c]**	**v/c**	**Del**	**LOS**	**v/c**	**Del**	**LOS**
Route 1 A at Boardman Street										
	Weekday Morning	1.41	197	F	2.28	599	F	2.40	579	F
	Weekday Evening	1.64	156	F	2.27	329	F	2.48	372	F
Route 1A at Jughandle										
	Weekday Morning	0.75	10	A	0.88	13	B	1.16	111	F
	Weekday Evening	0.79	12	B	0.91	22	C	1.07	95	F
Route 1A On-Ramp at Route 145										
	Weekday Morning	0.60	6	A	0.67	6	A	0.79	9	A
	Weekday Evening	0.65	7	A	0.72	7	A	0.78	9	A
Route 16 at Winthrop Avenue/Route 145/Harris Street										
	Weekday Morning	1.07	91	F	1.20	131	F	1.36	159	F
	Weekday Evening	1.18	94	F	1.27	116	F	1.53	209	F
Route 145/Winthrop Avenue at North Shore Road										
	Weekday Morning	0.70	35	D	0.73	41	D	0.92	117	F
	Weekday Evening	0.70	90	F	0.80	137	F	0.97	179	F
Tomasello Dr/Shaws Driveway at Winthrop Avenue/Route 145										
	Weekday Morning	0.66	76	E	0.69	98	F	0.98	132	F
	Weekday Evening	0.89	74	E	0.92	92	F	1.28	168	F
Revere Beach Parkway at Winthrop Avenue										
	Weekday Morning	0.39	12	B	0.70	33	C	0.78	56	E
	Weekday Evening	0.57	13	B	0.75	20	B	0.88	25	C
Eliot Circle – Revere Beach Parkway/Ocean Avenue & State Road										
	Weekday Morning	0.44	16	B	0.49	17	B	0.53	18	B
	Weekday Evening	0.59	10	B	0.60	11	B	0.74	11	B
Bell Circle – Route 60 at Circle (North)										
	Weekday Morning	0.86	31	C	0.95	31	C	1.21	70	E
	Weekday Evening	0.91	31	C	1.01	36	D	1.19	54	D
Bell Circle – Route 60, Route 1A, Route 16 at Circle (South)										
	Weekday Morning	0.96	34	C	1.08	43	D	1.22	60	E
	Weekday Evening	1.25	70	E	1.39	86	F	1.54	128	F
Bell Circle – VFW Parkway at Circle (East)										
	Weekday Morning	0.53	77	E	0.65	79	E	0.64	77	E
	Weekday Evening	0.71	51	D	0.80	51	D	0.87	60	E
Bell Circle – Beach at Circle (West)										
	Weekday Morning	0.49	1	A	0.53	1	A	0.56	1	A
	Weekday Evening	0.47	1	A	0.50	1	A	0.58	1	A

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-17 Signalized Intersection Capacity Analysis (continued)

		2018 Existing Condition			2028 No-Build Condition			2028 Build Condition w/o Mitigation		
Location	**Movement**	**v/c [a]**	**Del [b]**	**LOS [c]**	**v/c**	**Del**	**LOS**	**v/c**	**Del**	**LOS**
Webster Avenue at Garfield Avenue/Route 16										
	Weekday Morning	0.94	66	E	1.06	78	E	1.19	94	F
	Weekday Evening	1.43	140	F	1.52	151	F	1.60	154	F
Route 60 (Squire Road) at Charger Street										
	Weekday Morning	0.62	23	C	0.70	24	C	0.75	25	C
	Weekday Evening	0.87	42	D	0.96	45	D	1.03	47	D
Route 60 (Squire Road) at Sigourney Street										
	Weekday Morning	0.73	19	B	0.81	20	B	0.87	20	C
	Weekday Evening	1.03	45	D	1.10	50	D	1.20	73	E
North Shore Road/Route 1A at MBTA Driveway										
	Weekday Morning	0.66	23	C	0.65	22	C	0.67	22	C
	Weekday Evening	0.64	22	C	0.66	20	C	0.68	20	C
North Shore Road/Route 1A Revere Street										
	Weekday Morning	1.05	71	E	1.16	120	F	1.17	139	F
	Weekday Evening	1.16	53	D	1.29	93	F	1.43	134	F
Route 60 at Revere Street										
	Weekday Morning	0.94	84	F	1.30	185	F	1.61	254	F
	Weekday Evening	1.17	116	F	1.61	258	F	1.66	283	F
VFW Parkway at Beach Street										
	Weekday Morning	0.63	18	B	0.64	18	B	0.68	21	C
	Weekday Evening	0.76	23	C	0.77	23	C	0.77	23	C
Ocean Avenue at Beach Street										
	Weekday Morning	0.58	14	B	0.58	12	B	0.60	12	B
	Weekday Evening	0.43	11	B	0.52	13	B	0.52	13	B
North Shore Road at Beach Street										
	Weekday Morning	0.41	17	B	0.40	17	B	0.43	18	B
	Weekday Evening	0.50	19	B	0.62	27	C	0.62	27	C
Bennington Street at Saratoga Street										
	Weekday Morning	1.00	135	F	1.00	120	F	1.03	130	F
	Weekday Evening	1.03	108	F	1.02	108	F	1.03	108	F
Bennington Street/State Road at Winthrop Avenue										
	Weekday Morning	1.03	152	F	1.00	160	F	1.32	225	F
	Weekday Evening	0.67	44	D	0.74	53	D	0.82	65	E
Bennington Street at Swift Street										
	Weekday Morning	0.69	20	B	0.70	35	C	0.71	34	C
	Weekday Evening	0.75	61	E	0.78	88	F	0.78	88	F
Bennington Street at Neptune Road										
	Weekday Morning	0.83	47	D	0.93	65	E	0.95	69	E
	Weekday Evening	0.73	38	D	0.79	43	D	0.78	42	D
Route 1A Off-Ramp at Vienna Street/Neptune Road										
	Weekday Morning	0.33	72	E	0.35	82	F	0.35	83	F
	Weekday Evening	0.42	59	E	0.45	62	E	0.45	62	E
Chelsea Street at Bennington Street										
	Weekday Morning	0.98	179	F	1.16	257	F	1.18	269	F
	Weekday Evening	0.96	55	D	1.18	108	F	1.18	108	F
Chelsea Street at Prescott Street										
	Weekday Morning	0.38	18	B	0.46	20	B	0.46	20	C
	Weekday Evening	0.53	25	C	0.58	25	C	2.13	539	F

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-18 Unsignalized Intersection Capacity Analysis

		2018 Existing Condition					2028 No-Build Condition					2028 Build Condition w/o Mitigation				
Location	**Movement**	**D [a]**	**v/c[b]**	**Del [c]**	**LOS [d]**	**95 Q[e]**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Saratoga Street at Neptune Road																
Weekday Morning	EB L/T	340	n/a	6	A	n/a	365	0.18	6	A	16	380	0.18	5	A	16
	WB T/R	210	n/a	<1	C	n/a	230	0.15	<1	A	0	230	0.15	<1	A	0
	NB L/T/R	90	n/a	27	D	n/a	95	0.43	31	D	50	95	0.44	32	D	52
	SB L/T/R	440	n/a	22	C	n/a	465	0.71	21	C	147	470	0.72	22	C	152
Weekday Evening	EB L/T	360	0.24	7	A	n/a	370	0.24	7	A	23	370	0.24	7	A	23
	WB T/R	275	0.18	<1	C	n/a	265	0.17	<1	A	0	265	0.17	<1	A	0
	NB L/T/R	210	1.30	221	F	n/a	225	1.30	217	F	343	245	1.44	272	F	406
	SB L/T/R	350	Err	Err	F	n/a	370	Err	Err	F	Err	385	Err	Err	F	Err
Bremen Street at Neptune Road																
Weekday Morning	SB L/T/R	170	0.46	19	C	59	180	0.43	19	C	52	180	0.44	19	C	54
Weekday Evening	SB L/T/R	135	0.41	21	C	49	140	0.41	21	C	49	140	0.41	21	C	49
Route 1A at Curtis Street																
Weekday Morning	EB R	435	5.68	Err	F	1156	455	5.48	Err	F	Err	455	6.26	Err	F	Err
Weekday Evening	EB R	395	1.63	327	F	491	415	1.91	459	F	803	415	2.55	754	F	966
Route 1A at Waldemar Avenue																
Weekday Morning	WB R	130	0.21	11	B	23	140	0.19	10	B	17	140	0.23	12	B	22
Weekday Evening	WB R	100	0.29	17	C	30	105	0.27	17	C	27	120	0.31	18	C	33
Route 1A at Tomasello Drive																
Weekday Morning	WB L	205	4.00	Err	F	Err	215	7.39	Err	F	Err	215	1118.01	Err	F	Err
	WB R	10	0.03	14	B	3	15	0.05	16	C	4	175	0.72	47	E	120
	SB L	0	0.00	<1	A	0	0	N/A	N/A	N/A	N/A	230	0.78	44	E	132
Weekday Evening	WB L	5	0.86	829	F	47	5	6.63	Err	F	Err	5	364.00	Err	F	Err
	WB R	5	0.03	23	C	3	5	0.03	31	D	3	360	3.41	Err	F	Err
	SB L	20	0.02	21	C	2	20	0.03	29	D	2	80	0.60	72	F	74
Route 1A at Furlong Street																
Weekday Morning	WB R	40	0.47	<1	C	10	40	0.13	18	C	11	120	0.62	47	E	88
Weekday Evening	WB R	105	0.60	44	E	121	110	0.74	74	F	115	510	4.88	Err	F	Err
Bennington Street at Crescent Avenue																
Weekday Morning	WB L	170	0.87	74	F	172	190	0.97	93	F	210	190	1.03	121	F	230
	WB R	280	0.48	15	B	62	300	0.47	15	B	62	375	0.62	19	C	103
Weekday Evening	WB L	50	0.21	21	C	19	60	0.26	25	C	28	60	0.28	26	D	27
	WB R	120	0.22	12	B	20	130	0.23	12	B	22	165	0.29	13	B	30
Eliot Circle – Revere Beach Boulevard at Winthrop Parkway																
Weekday Morning	EB L	315	1.88	498	F	411	330	1.10	157	F	233	350	1.24	209	F	276
	EB R	340	0.41	11	B	51	375	0.38	11	B	46	395	0.40	11	B	50
	NB L/T	400	0.35	7	A	41	575	0.30	7	A	31	590	0.31	7	A	33
Weekday Evening	EB L	740	1.70	366	F	510	795	1.88	449	F	765	1030	2.59	764	F	1185
	EB R	650	0.69	16	C	136	725	0.73	17	C	172	790	0.80	20	C	223
	NB L/T	255	0.35		A	15	535	0.22	6	A	21	550	0.23	6	A	22

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet

Table 6-18 Unsignalized Intersection Capacity Analysis

		2018 Existing Condition					2028 No-Build Condition					2028 Build Condition w/o Mitigation				
Location	**Movement**	**D [a]**	**v/c [b]**	**Del [c]**	**LOS [d]**	**95 Q [e]**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Ocean Avenue at Revere Street																
Weekday Morning	EB R	205	0.12	<1	A	n/a	300	0.19	<1	A	0	375	0.24	<1	A	0
	WB L/T	1355	.26	9	A	n/a	1470	1.06	61	F	686	1480	1.14	90	F	856
	NB L	30	.41	31	D	n/a	145	Err	Err	F	Err	160	Err	Err	F	Err
Weekday Evening	EB R	180	n/a	9	A	n/a	330	0.21	<1	A	0	415	0.27	<1	A	0
	WB L/T	490	n/a	12	B	n/a	540	0.31	9	A	33	670	0.35	10	A	39
	NB L	80	n/a	10	A	n/a	180	0.98	108	F	208	180	1.29	228	F	294
North Shore Road at Lynnway NB Off Ramp																
Weekday Morning	EB L	5	0.04	9	A	3	5	0.05	9	A	4	5	0.06	9	A	4
Weekday Evening	EB L	10	0.04	10	B	2	20	0.06	11	B	5	20	0.08	11	B	6
North Shore Road at Lynnway SB Ramps																
Weekday Morning	EB L	30	0.65	15	B	127	35	0.72	17	C	161	35	0.72	17	C	161
Weekday Evening	EB L	50	0.24	12	B	23	65	0.26	13	B	26	65	0.31	14	B	33
Chelsea Street at Unnamed Road (Day Square)																
Weekday Morning	EB L	10	0.05	21	C	4	10	0.06	25	C	4	10	0.06	25	D	5
	EB R	20	0.04	11	B	3	20	0.04	12	B	3	20	0.04	12	B	3
	WB L	250	0.76	41	E	149	300	1.06	106	F	307	305	1.10	119	F	330
	WB T/R	160	0.21	11	B	19	170	0.23	11	B	22	170	0.23	11	B	22
Weekday Evening	EB L	15	0.08	24	C	6	15	0.08	26	D	7	15	0.09	27	D	7
	EB R	15	0.02	10	A	2	15	0.02	10	A	2	15	0.02	10	A	2
	WB L	195	0.57	26	D	85	225	0.68	34	D	120	235	0.73	38	E	137
	WB T/R	185	0.31	13	B	32	195	0.32	13	B	35	195	0.33	13	B	36
Bennington Street at Unnamed Road (Day Square)																
Weekday Morning	WB T/R	85	0.23	16	C	22	90	0.27	18	C	27	90	0.27	19	C	27
Weekday Evening	WB T/R	80	0.24	18	C	23	85	0.26	19	C	26	85	0.27	20	C	27
Winthrop Avenue at Beachmont Station Parking Driveway																
Weekday Morning	EB L/T	615	0.12	3	A	9	640	0.13	3	A	11	650	0.15	4	A	13
	WB T/R	375	0.33	<1	A	0	520	0.35	<1	A	0	665	0.00	<1	A	0
	SB L/R	5	0.02	11	B	1	5	0.01	11	B	1	5	0.01	13	B	1
Weekday Evening	EB L/T	580	0.00	<1	A	0	605	0.00	1	A	0	640	0.01	1	A	0
	WB T/R	490	0.29	<1	A	0	505	0.32	<1	A	0	555	0.00	<1	A	0
	SB L/R	120	0.34	16	C	41	125	0.30	16	C	30	125	0.36	20	C	41

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet

2018 Existing Conditions

Intersections in urban areas are typically considered to be operating acceptably if the intersection is LOS D or better. While the majority of the intersections within the study area operate above this threshold, there are 12 signalized study intersections currently operating at LOS E or F during the weekday morning and/or weekday evening peak hours, as listed below.

- Route 1A at Boardman Street
- Revere Beach Parkway (Route 16) at Winthrop Avenue (Route 145) and Harris Street
- Winthrop Avenue (Route 145) at N. Shore Road – evening peak only
- Winthrop Avenue (Route 145) at Tomasello Drive
- Route 60 at Bell Circle – evening peak only
- Route 1A (VFW Highway) at Bell Circle -morning peak only
- Webster Avenue at Garfield Avenue/Route 16
- N. Shore Road (Route 1A) at Revere Street – morning peak only
- Route 60 at Revere Street
- Bennington Street at Saratoga Street
- Bennington Street and State Road at Winthrop Avenue – morning peak only
- Bennington Street at Swift Street – evening peak only
- Route 1A Off-Ramp at Vienna Street and Neptune Road
- Chelsea Street at Bennington Street – morning peak only

During the existing weekday morning and weekday evening peak hour conditions, the current eastbound right-turn movement from Curtis Street onto Route 1A southbound is operating at LOS F. The right turn movement receives minimal acceptable gaps in the approximately 3,000 vehicles traveling southbound, increasing delay and queuing. During the existing weekday morning and weekday evening peak hour conditions, the current left-turn movement from Tomasello Drive onto Route 1A southbound is operating at LOS F. Currently, there is faded, non-standard, improperly-located signage that restricts this left-turn movement. However, vehicles currently make this maneuver. Additional unsignalized intersections with critical movements operating at LOS E or F during the weekday morning and/or weekday evening peak hours, are listed below

- Saratoga Street at Neptune Road – evening peak only
- Furlong Street – evening peak only
- Bennington Street and Crescent Avenue – morning peak only
- Revere Beach Boulevard at Winthrop Parkway at Eliot Circle
- Chelsea at Unnamed Road (Day Square) – morning peak only

2028 No-Build and Build Conditions

Under Future No-Build and Build conditions, the signalized and unsignalized intersection listed above will continue to operate with excessive delays and queuing. Under Future No-Build and Build Conditions several additional intersections degrade below the acceptable thresholds during the weekday morning and/or weekday evening peak hours, as listed below.

Signalized

- Winthrop Avenue (Route 145) at N. Shore Road – Build Condition, morning peak
- Revere Beach Parkway (Route 16) at Winthrop Avenue (Route 145) – Build Condition, morning peak
- Route 60 at Bell Circle – Build Condition, morning peak only
- Route 1A (VFW Highway) at Bell Circle - Build Condition, evening peak only
- N. Shore Road (Route 1A) at Revere Street – No-Build and Build Condition, evening peak only
- Bennington Street and State Road at Winthrop Avenue – Build Condition, evening peak only
- Chelsea Street at Bennington Street – No-Build and Build Conditions – evening peak
- Chelsea Street at Prescott Street –Build Conditions – evening peak

Unsignalized

- Winthrop Avenue (Route 145) at N. Shore Road – Build Condition, morning peak
- Chelsea at Unnamed Road (Day Square) – Build Condition, evening peak

6.9.3 Merge/Diverge/Weave Analysis

Tables 6-19 and 6-20 summarize the capacity analyses for the merge, diverge, and weave segments, for the 2018 Existing, 2028 No-Build, and 2028 Build Conditions.

2018 Existing Conditions

During the existing weekday morning and weekday evening peak hour conditions, all merge and diverge approaches within Copeland Circle operate at LOS C or better. During the existing weekday morning and weekday evening peak hour conditions, all weave segments within Copeland Circle operate at LOS C or better. During the existing weekday morning and weekday evening peak hour conditions, almost all merge and diverge approaches at Route 1 and Route 16 interchange operate at LOS C or better.

Table 6-19 Merge/Diverge Junction Capacity Analysis

		2018 Existing Conditions		2028 No-Build Conditions		2028 Build Conditions w/o Mitigation	
Roadway Segment	**Direction**	**D [a]**	**LOS [b]**	**D**	**LOS**	**D**	**LOS**
Route 1 Southbound at Route 16 Westbound							
Weekday Morning	On Ramp	21.9	C	23.6	C	24.0	C
	Off Ramp	12.3	B	14.8	B	15.3	B
Weekday Evening	On Ramp	19.8	B	21.3	C	22.8	C
	Off Ramp	11.6	B	14.1	B	16.7	B
Route 1 Northbound at Route 16 Eastbound							
Weekday Morning	On Ramp	11.6	B	12.0	B	13.6	B
	Off Ramp	11.2	B	15.2	B	16.5	B
Weekday Evening	On Ramp	18.8	B	18.7	B	19.5	B
	Off Ramp	12.9	B	17.6	B	18.0	B
Squire Road at Copeland Circle (adjacent ramps downstream)							
Weekday Morning	On Ramp	17.1	B	19.2	B	19.6	B
Weekday Evening	On Ramp	18.8	B	21.1	C	22.8	C
Squire Road at Copeland Circle (adjacent ramps upstream)							
Weekday Morning	On Ramp	17.1	B	19.2	B	19.6	B
Weekday Evening	On Ramp	18.8	B	21.1	C	22.8	C
Copeland Circle to Route 1 Northbound (adjacent ramps downstream)							
Weekday Morning	Off Ramp	19.4	B	21.9	C	22.3	C
Weekday Evening	Off Ramp	21.1	C	24.1	C	26.0	C
Copeland Circle to Route 1 Northbound (adjacent ramps upstream)							
Weekday Morning	Off Ramp	19.4	B	21.9	C	22.3	C
Weekday Evening	Off Ramp	21.1	C	24.1	C	26.0	C

a. Density, passenger cars per mile per lane
b. Level-of-service.

Table 6-20 Weave Segment Capacity Analysis

Roadway Segment	2018 Existing Conditions			2028 No-Build Conditions			2028 Build Conditions w/o Mitigation		
	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]
Copeland Circle between Route 1 Northbound Off-Ramp and Squire Road Southbound On-Ramp "Rte 1 NB Off Ramp to Squire"									
Weekday Morning	10.6	B	0.534	10.8	B	0.549	13.2	B	0.706
Weekday Evening	14.4	B	0.668	16.7	B	0.774	17.3	B	0.808
Copeland Circle between Route 1 Southbound Off-Ramp and Squire Road Northbound On-Ramp "Rte 1 SB Off Ramp to Squire NB"									
Weekday Morning	15.1	B	0.509	14.4	B	0.505	18.1	B	0.634
Weekday Evening	18.3	B	0.674	21.6	C	0.799	22.8	C	0.838
Copeland Circle between Squire Road Southbound On-Ramp and Route 1 Southbound Off-Ramp "Squire SB to Rte 1 SB On Ramp"									
Weekday Morning	16.0	B	0.444	15.5	B	0.433	18.3	B	0.499
Weekday Evening	13.2	B	0.403	14.3	B	0.409	14.9	B	0.424

a. Density, passenger cars per mile per lane.
b. Level-of-service.
c. Volume to capacity ratio.

2028 No-Build and Build Conditions

Under Future No-Build and Build conditions, the merge, diverge, and weave segments at both Copeland Circle and Route 1 at Route 16 were determined continue to operate LOS C or better.

6.9.4 Traffic Circle (Roundabout) Analysis

Table 6-21 summarize the capacity analyses for the merge, diverge, and weave segments, for the 2018 Existing, 2028 No-Build, and 2028 Build Conditions.

2018 Existing Conditions

During the existing morning and evening peak hour conditions the majority of approaches to Brown Circle (Route 60/Route 107) operate at LOS F. Route 60, in particular, is a heavily travelled roadway for commuters both locally and regionally as it connects Route 1 to the north at Copeland Circle. During the existing morning and evening peak hour conditions, the recently redesigned Butler Circle approaches operates at LOS D or better. The LOS at Butler Circle is primarily controlled by the minor North Shore Road northbound approach.

Table 6-21 Roundabout Capacity Analysis

		2018 Existing Conditions				2028 No-Build Conditions				2028 Build Conditions w/o Mitigation			
Location	**Movement**	**v/c [a]**	**Del [b]**	**LOS [c]**	**95 Q [d]**	**v/c**	**Del**	**LOS**	**95 Q**	**v/c [a]**	**Del [b]**	**LOS [c]**	**95 Q [d]**
Brown Circle													
Weekday	NB L/T/R	0.89	63	E	137	0.94	87	F	178	0.95	89	F	184
Morning	WB L/T/R	0.98	70	F	391	>1.20	305	F	3,091	>1.20	355	F	3,632
	WB R	0.98	72	F	399	>1.20	304	F	3,195	>1.20	354	F	3,758
	SB L/T/R	>1.20	>120	F	10,702	>1.20	1,453	F	12,625	>1.20	1,545	F	13,429
	SB R	0.60	21	C	60	0.66	24	C	72	0.69	26	C	77
	EB L/T	0.85	34	C	182	1.00	76	F	532	>1.20	281	F	3,235
	EB T/R	0.85	34	C	175	1.00	75	F	522	>1.20	280	F	3,317
Weekday	NB L/T/R	>1.20	>120	F	3,044	>1.20	584	F	3,278	>1.20	585	F	3,280
Evening	WB L/T/R	>1.20	>120	F	3,459	>1.20	595	F	6,064	>1.20	772	F	7,902
	WB R	>1.20	>120	F	3,341	>1.20	595	F	6,290	>1.20	772	F	8,200
	SB L/T/R	>1.20	>120	F	5,336	>1.20	872	F	7,495	>1.20	895	F	7,693
	SB R	0.43	15	B	35	0.50	17	B	44	0.50	17	B	45
	EB L/T	1.15	>120	F	1,846	>1.20	329	F	3,784	>1.20	389	F	4,500
	EB T/R	1.15	>120	F	1,885	>1.20	329	F	3,884	>1.20	388	F	4,621
Butler/Wonderland Circle													
Weekday	NB L/T	0.33	10	B	24	0.33	11	B	24	0.36	11	B	27
Morning	SB R	0.96	45	D	716	0.99	60	E	1,707	1.11	130	F	4,578
	SB T	0.31	6	A	27	0.33	7	A	28	0.36	7	A	33
	EB L	0.47	10	B	46	0.52	12	B	56	0.53	12	B	59
	EB L/R	0.47	10	B	44	0.52	11	B	53	0.53	12	B	56
Weekday	NB L/T	0.69	27	C	73	0.78	37	D	93	0.95	75	F	214
Evening	SB R	0.73	16	B	138	0.78	18	B	169	0.79	19	B	183
	SB T	0.24	6	A	19	0.26	6	A	20	0.26	6	A	21
	EB L	0.66	15	B	100	0.72	17	B	126	0.72	18	B	128
	EB L/R	0.66	15	B	95	0.72	17	B	120	0.72	18	B	121

SIDRA INTERSECTION 7.0 – Delay and v/c (HCM 2010), Roundabout Capacity Model: US HCM 2010

a. Volume to capacity ratio.

b. Average total delay, in seconds per vehicle.

c. Level-of-service.

d. 95th percentile queue, in feet.

- LOS F will result if v/c >1 irrespective of lane delay value (degree or saturation) per lane

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2028 No-Build and Build Conditions

Under Future No-Build and Build conditions, Brown Circle will continue to operate with excessive delays for all approaches. Under Future No-Build and Build conditions at Butler Circle the majority of approaches will continue to operate at LOS D or better, with the exception of the southbound right-turn which degrades to LOS E or F, respectively, during the morning peak hour condition and the northbound approach under the Build Condition during the evening peak hour.

6.9.5 Public Transportation Analysis

The public transportation analysis identifies the Master Plan Project's impacts to the MBTA transit system, including an analysis of maximum passenger demands versus capacities for individual transit lines as well as a station-level capacity analysis for Suffolk Downs Station and Beachmont Station.

Vehicle load standards detailed in the MBTA's Policy[65] define the passenger capacity conditions that are acceptable for passenger comfort by mode and time period. The absolute maximum number of passengers that can fit onto a transit vehicle (also referred to by the MBTA as "crush capacity") is greater than the vehicle load standards dictated by the MBTA's Policy. In order to analyze transit demand in relation to capacity provided for each transit service, maximum passenger loads were compared to both policy capacity and to crush capacity for each 30-minute time period of the day.[66]

In order to evaluate the capacity of a station to accommodate ridership growth, projected pedestrian flows through key station elements, including platforms, circulation elements, and faregates were analyzed according to industry standard methodologies and assumptions provided in the *Transit Capacity and Quality of Service Manual (TCQSM)*.[67] The *TCQSM* approach considers pedestrian levels of service (LOS) in the evaluation of active station pedestrian spaces such as platforms and pedestrian circulation areas. LOS thresholds range from A to F, with LOS A representing an unimpeded condition and LOS F representing an undesirable condition in which pedestrian movement is severely constrained. LOS C or better is typically considered a preferred design standard for station elements, with short-term periods of LOS D considered acceptable.[68] The *TCQSM* also provides nominal capacities for escalators and faregates, which were evaluated against the peak demands projected for these elements. Consistent with guidance in the *TCQSM*, the station analysis conservatively assumed maximum pedestrian flows based on a

65 MBTA. *Service Delivery Policy, 2017 Update.* Approved January 23, 2017.

66 The methodology used to analyze transit demand as compared to capacity provided was developed in coordination with the MBTA. The analysis considers vehicle load standards as outlined in Appendix B of the *Service Delivery Policy, 2017 Update,* and evaluates demand and capacity for each 30-minute time period of the service day.

67 Transportation Research Board of the National Academies. Transit Cooperative Research Program, *Transit Capacity and Quality of Service Manual, Third Edition*, TCRP Report 165, 2013.

68 Transportation Research Board of the National Academies. Transit Cooperative Research Program, *Transit Capacity and Quality of Service Manual, Third Edition*, TCRP Report 165, 2013.

scenario where a service disruption during the peak of the peak period results in one dropped Blue Line trip. It is important to note that the pedestrian LOS experienced during typical conditions would be better than the more conservative LOS projected for conditions during a Blue Line service disruption.

The results of the public transportation analysis for 2028 Conditions are provided in the following sections. (A discussion of existing transit demand as compared to capacity is provided in Section 6.7.3 for each of the MBTA transit services operating proximate to the Project.)

2028 No-Build and Build Conditions

MBTA Blue Line Rapid Transit Service

New ridership and revenue on the MBTA system will be generated by the Project, largely via the Blue Line as a collector from the rest of the MBTA system. To analyze the Blue Line's demand and capacity for the 2028 No-Build Condition, the projected passenger loading volumes at the maximum load point (typically occurring between Aquarium and Maverick Stations) were studied, consistent with the existing conditions maximum load point analysis presented in Section 6.7.3. Under the 2028 No-Build Condition, the Blue Line is projected to operate within its policy capacity during the weekday peaks, as illustrated in Figure 6.27a. Similar to existing conditions, 2028 No-Build passenger volumes are projected to exceed policy capacity just before and just after the peak periods, when service is less frequent and when the MBTA's Policy dictates reduced maximum passenger loading levels as compared to during the peak.

In the 2028 Build Condition (CTPS/MassDOT Parameters), the Blue Line is projected to continue to operate within its policy capacity during the weekday peaks, as illustrated in Figure 6.27b. Similar to the 2028 No-Build Condition, passenger volumes are projected to exceed policy capacity but remain well within crush capacity just before and just after the peak periods. At the maximum load point on the Blue Line Inbound, total demand is projected to exceed policy capacity during four 30-minute periods of the day; three of these 30-minute periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. With the exception of a single off-peak 30-minute period (10:00 a.m. to 10:30 a.m.), the Project is not projected to cause the MBTA Blue Line Inbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. During the 10:00 a.m. to 10:30 a.m. period, the Project is anticipated to result in a policy capacity exceedance of approximately 45 passengers through the maximum load point, equivalent to approximately 14 passengers per six-car train. In instances when total inbound demands in the 2028 Build Condition exceed policy capacity, demands are projected to be up to approximately 725 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 560 passengers in the No-Build Condition.

At the maximum load point on the Blue Line Outbound in the 2028 Build Condition (CTPS/MassDOT Parameters), total demand is projected to exceed policy capacity during two 30-minute periods of the day; both of these periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. Therefore, the Project is not projected to cause the MBTA Blue Line Outbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. In instances when total outbound demands in the 2028 Build Condition exceed policy capacity, demands are projected to be up to approximately 285 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 220 passengers in the No-Build Condition.

In the 2028 Build Condition (Expected TOD Parameters), a 31 percent peak transit share is expected, as compared to a 25 percent peak transit share assumed per the CTPS/MassDOT Parameters. Despite the increased peak period ridership as compared to the more conservative CTPS/MassDOT Parameters, the Blue Line is still projected to operate within its policy capacity during the weekday peaks under 2028 Build Conditions (Expected TOD Parameters), as illustrated in Figure 6.27c. During off-peak periods, similar to the 2028 No-Build Condition and the 2028 Build Condition (CTPS/MassDOT Parameters), passenger volumes in the 2028 Build Condition (Expected TOD Parameters) are projected to exceed policy capacity just before and just after the peak periods, but remain well below crush capacity. At the maximum load point on the Blue Line Inbound, total demand is projected to exceed policy capacity during four 30-minute periods of the day; three of these 30-minute periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. With the exception of a single off-peak 30-minute period (10:00 a.m. to 10:30 a.m.), the Project is not projected to cause the MBTA Blue Line Inbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. During the 10:00 a.m. to 10:30 a.m. period, the Project is anticipated to result in a policy capacity exceedance of approximately 45 passengers through the maximum load point, equivalent to approximately 14 passengers per six-car train. In instances when total inbound demands in the 2028 Build Condition exceed policy capacity, demands are projected to be up to approximately 725 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 560 passengers in the No-Build Condition.

At the maximum load point on the Blue Line Outbound in the 2028 Build Condition (Expected TOD Parameters), total demand is projected to exceed policy capacity during two 30-minute periods of the day but remain well under crush capacity; both of these periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. Therefore, the Project is not projected to cause the MBTA Blue Line Outbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. In instances when total outbound demands in the 2028 Build Condition exceed policy capacity, demands are projected to be up to approximately 285 passengers greater than

policy capacity in a given 30-minute period, compared to exceedances of up to approximately 220 passengers in the No-Build Condition.

MBTA Blue Line Station Capacity

The following sections present the analysis of the Project's impact on platform activity and station demand as compared to capacity at Suffolk Downs Station and Beachmont Station.

Figures 6.28a and 6.28b illustrate the projected 2028 No-Build platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. Under the 2028 No-Build Condition, daily platform activity at these stations is projected to increase by approximately 1.2 percent as compared to existing conditions. This increase in platform activity is well within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

Figures 6.28c and 6.28d illustrate the projected 2028 Build (CTPS/MassDOT Parameters) platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. Although daily platform activity is projected to notably increase as compared to 2028 No-Build Conditions, the projected platform activity is well within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

Figures 6.28e and 6.28f illustrate the projected 2028 Build (Expected TOD Parameters) platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. Although daily platform activity is projected to notably increase as compared to 2028 No-Build Conditions, the projected platform activity is still well within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

The results of the station capacity analysis, which evaluated peak passenger demands through critical station constraints, found that both of the Blue Line stations serving the Project Site have sufficient capacity to accommodate peak demands in the 2028 No-Build Condition and 2028 Build Conditions. The capacity analysis conservatively assumed a service disruption of one dropped train trip during the peak period, which would result in a nine-minute gap in Blue Line service. It is important to note that the pedestrian LOS experienced during typical peak conditions (with Blue Line service every 4.5 minutes) would be better than the more conservative LOS projected for conditions during a service disruption. Capacity analysis results by station element are presented in Tables 6-22 and 6-23 for Suffolk Downs Station and Beachmont Station, respectively.

Table 6-22 Suffolk Downs Station Capacity Analysis Summary – 2028 Conditions

Station Element	2028 No-Build Capacity to Accommodate Peak Demand[a]	2028 Build (CTPS/MassDOT Parameters) Capacity to Accommodate Peak Demand[a]	2028 Build (Expected TOD Parameters) Capacity to Accommodate Peak Demand[a]
Inbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Outbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Stair (To/From Inbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Stair (To/From Outbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Ramp	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Paid Area Walkway (on Bridge)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Faregates	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)

a Based on as-built station plans provided by the MBTA and element capacities analyzed per the standard station capacity assumptions and methodologies documented in the *TCQSM*. Analysis assumes demand based on a service disruption of one dropped train trip during the peak period (resulting in a nine-minute gap in Blue Line service).

Table 6-23 Beachmont Station Capacity Analysis Summary – 2028 Conditions

Station Element	2028 No-Build Capacity to Accommodate Peak Demand[a]	2028 Build (CTPS/MassDOT Parameters) Capacity to Accommodate Peak Demand[a]	2028 Build (Expected TOD Parameters) Capacity to Accommodate Peak Demand[a]
Inbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Outbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Stair (To/From Inbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Stair (To/From Outbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Escalator (To/From Inbound Platform)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)
Escalator (To/From Outbound Platform)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)
Faregates	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)

a Based on as-built station plans provided by the MBTA and element capacities analyzed per the standard station capacity assumptions and methodologies documented in the *TCQSM*. Analysis assumes demand based on a service disruption of one dropped train trip during the peak period (resulting in a nine-minute gap in Blue Line service).

MBTA Bus Services

The analysis of 2028 No-Build and Build passenger loading conditions projected for each study area bus route are presented below. The Project is expected to increase ridership demands on MBTA's Route 119 in the 2028 Build Conditions. The Project is not projected to result in any increased ridership on other bus routes by 2028,

and therefore there are no incremental impacts to these other bus routes as compared to the 2028 No-Build Condition.

› **Route 119**

The temporal distribution of projected 2028 No-Build demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.29a. Several early morning and morning peak trips on the Route 119 Inbound are projected to approach or slightly exceed policy capacity but are still well below crush capacity. All outbound trips are projected to fall within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy.

The temporal distribution of projected 2028 Build (CTPS/MassDOT Parameters) demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.29b. On the Route 119 Inbound, total demand is projected to slightly exceed policy capacity during two early morning and two morning peak trips; both early morning trips are projected to slightly exceed policy capacity without the Project in the 2028 No-Build Condition. In instances when total demands exceed policy capacity, demands are projected to be between one and seven passengers greater than policy capacity per trip, and well below the crush capacity for a bus, compared to exceedances of up to three passengers above policy capacity per trip in the No-Build Condition. All outbound trips are projected to comply with recommended policy capacity thresholds as outlined by the MBTA Service Delivery Policy.

The temporal distribution of projected 2028 Build (Expected TOD Parameters) demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.29c. On the Route 119 Inbound, total demand is projected to slightly exceed policy capacity during two early morning and three morning peak trips; both early morning trips are projected to slightly exceed policy capacity without the Project in the 2028 No-Build Condition. In instances when total demands exceed policy capacity, demands are projected to be between one and eight passengers greater than policy capacity per trip, and well below the crush capacity for a bus, compared to exceedances of up to three passengers above policy capacity per trip in the No-Build Condition. All outbound trips are projected to comply with recommended policy capacity thresholds as outlined by the MBTA Service Delivery Policy.

› **Route 120**

The temporal distribution of projected 2028 No-Build demand at the Route 120's maximum load points throughout the day is illustrated in Figure 6.30. Average passenger volumes at the peak load point are projected to exceed policy capacity in the morning and evening peaks, and/or just before and after peak service, in both the inbound and outbound directions. Some AM Peak inbound trips and PM Peak outbound trips are projected to approach crush capacity in the 2028 No-Build Condition. The Project is not projected to result in any increased ridership on the Route 120.

› **Route 424**

The temporal distribution of projected 2028 No-Build demand at the Route 424's maximum load points throughout the day is illustrated in Figure 6.31. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2028 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 424.

› **Route 434**

The temporal distribution of projected 2028 No-Build demand at the Route 434's maximum load points throughout the day is illustrated in Figure 6.32. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2028 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 434.

› **Routes 448 and 449**

The temporal distribution of projected 2028 No-Build demand at the Route 448 and Route 449 maximum load points throughout the day is illustrated in Figure 6.33 and Figure 6.34, respectively. Similar to existing conditions, both routes are projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2028 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 448 or the Route 449.

› **Route 450**

The temporal distribution of projected 2028 No-Build demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.35. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2028 No-Build Condition. The Project is not projected to result in any increased ridership on the Route 450 in the 2028 horizon year.

› **Route 459**

The temporal distribution of projected 2028 No-Build demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.36. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2028 No-Build Condition. The Project is not projected to result in any increased ridership on the Route 459.

6.10 2028 Horizon Year Mitigation

As part of the Master Plan Project, extensive, major off-site roadway, traffic, and safety improvements are proposed throughout the study area. The following section discusses the details of all conceptual mitigation plans within the study area. These improvements will be implemented in phases related to the build out of the Master Plan Project and are all assumed to be complete by 2028. The Proponent will work with MassDOT, DCR, BTD, and the City of Revere to develop the details of the mitigation phasing. Further details will be provided in the FEIR. The mitigation program includes following locations:

Winthrop Avenue at Route 16 (Revere Beach Parkway)/Harris Street

This intersection was recently reconstructed by MassDOT in 2015-2016, which included replacement of the bridge over the MBTA tracks and several other improvements that had been previously proposed as part of the other projects under consideration at the time. As part of the Master Plan Project mitigation, the Proponent is proposing additional measures that will provide a benefit for local and regional traffic in this area:

- Install two southbound left-turn lanes on the Route 16 from Route 1A south and Bell Circle to allow vehicles to access Winthrop Avenue eastbound.
- Install a second exclusive right turn lane on Route 16 on the northbound approach.
- Change two-way Harris Street to one-way away from Winthrop Avenue to Sewall Street. This is intended to protect the neighborhood area from cut-through traffic now bypassing Bell Circle that will be served by the above left turn addition.
- Optimize traffic signal timing and phasing plan.

The provision of a southbound left-turn lanes on Route 16 will allow traffic from the north to exit Bell Circle sooner and access Winthrop Avenue/Revere Beach Parkway without having to travel through the neighborhoods. Providing this alternate route should reduce congestion at several locations in this area. These improvements are illustrated in Figure 6.37.

Revere Beach Parkway/Winthrop Avenue Corridor from Campbell Avenue to Northeast of the Winthrop Avenue Split.

This corridor work extends from the Revere Fire Station through North Shore Road, Tomasello Drive and the Winthrop Avenue Split at 205 Revere Beach Parkway. The proposed plans are illustrated in Figure 6.38. Beginning at the westerly end of the corridor, a short distance of the existing median in front of the Revere Fire Station will be removed at the request of the City. The break and associated traffic signal control (considering options for hybrid control of the eastbound movement only versus a full fire pre-empt signal in order to protect the Campbell Avenue approach to westbound Revere Beach Parkway) will allow direct access from the Station to

Revere Beach Parkway westbound. The current access to Revere Beach Parkway westbound is via a right turn from the Station and a U-turn at North Shore Road.

The eastbound left-turn lane from Revere Beach Parkway to North Shore Road will also be lengthened given observed and calculated left turn storage issues that impact capacity and operation of the left most through lane resulting in a lane imbalance on the approach to North Shore Road. Note that the widening to accommodate the lengthening will be completed on the westbound side of the Parkway between North Shore Road and Campbell Avenue within the existing right-of-way.

At **North Shore Road**, in addition to the eastbound left turn lane, proposed improvements include the relocation of the existing North Shore Road median and elimination of a delta island in the northeast quadrant to provide a second left-turn lane from North Shore Road to Revere Beach Parkway eastbound. The right-turn lane will continue to operate under yield sign control, and the pedestrian crossing on the west side of the intersection will be maintained. With the elimination of the Northeast quadrant delta island a proposed reduction in the corner radius is also proposed.

Tomasello Drive will be relocated easterly approximately 185 feet and serve as the primary exit point from the site to Revere Beach Parkway. The relocation is seen as critical to operation of the corridor given vehicle storage requirements and intersection spacing. Tomasello Drive will continue as a five-lane corridor with two entering (southbound) lanes and three exiting lanes (a left, a left/right, and a fright). The existing median break serving Tomasello Drive will be closed and replaced by a reduced width median break at the new location. Note that the driveway opposite Tomasello Drive serving 205 Revere Beach Parkway will be modified to a right-in/right-out only alignment. With the relocation of the corridor closer to the Winthrop Avenue intersection, comes the need for replacement of vehicle storage in the left turn lane. Two left turn lanes will be provided westbound on Revere Beach Parkway from the Winthrop Avenue Split to Tomasello Drive. This results in a five-lane westbound cross section in the current design (three through lanes and the double left) that are not necessarily needed for capacity but for lane balance. We will work with the DCR to look at opportunities to reduce this section to four lanes and provide a wider median as the design progresses. Eastbound the corridor is maintained at the existing three lane width with two through lanes and an exclusive right turn lane to Tomasello. As site volumes increase with development we have also identified the potential need for a second right turn lane to the Tomasello Drive. This turn lane would begin at the current curb cut for Tomasello Drive and extend to the new corridor. The pedestrian crossing of Revere Beach Parkway would be on the east side of the intersection and operate concurrently with the Tomasello left turn exit.

Modifications are proposed to the on-going construction at **Revere Beach Parkway and Winthrop Avenue.** The modifications will build off of the plans proposed to provide access to 205 Revere Beach Parkway. However, given the timing of approvals and the needs associated with 205 RBP access and egress, the

modifications will follow completion of the current project by approximately one year. The basic modifications will include changes in the proposed pedestrian crossing points (move from west side of the 205 RBP driveway to the east side) and extend the left turn storage lane to the 205 RBP driveway to allow maximization of the westbound storage to Tomasello Drive. The plan also includes median modifications but maintains the curb bump-out on the eastbound approach to an exclusive right turn lane to Winthrop Avenue. (two through lanes will be maintained continuing on Revere Beach Parkway eastbound to northeastbound. The two left turn lanes from Winthrop Avenue westbound will be maintained as will the three westbound lanes on Revere Beach Parkway. In addition, as discussed in Chapter 3, included within the SDOD zoning are building setback areas on Winthrop Avenue (20-foot building setback/zero height). Winthrop Avenue utilizes this space to provide a planting strip, two-way cycle track and a sidewalk from Washburn Avenue to North Shore Road.

Winthrop Avenue Corridor - Revere Beach Parkway to Bennington Street including a Site Driveway and MBTA Beachmont Parking Lot

As mentioned previously, the proposed site access plan includes a restriping of the Winthrop Avenue corridor to three lanes (generally one through lane per direction with dedicated left and right turn lanes at various points). The proposed layout is shown on Figure 6.39. The three-lane section is dictated by conditions at the easterly end of the corridor - the MBTA Blue Line overpass at Beachmont Station and at the westerly end at the intersection of Winthrop Avenue at Revere Beach Parkway. A new signalized intersection is proposed at a site driveway approximately 400 feet west of Washburn Avenue. As part of this plan, the existing MBTA Parking Lot Driveway would be relocated approximately 150 feet to the west to form the southbound leg of the new intersection. Winthrop Avenue would be restriped within the existing pavement width to provide an exclusive left-turn lane and a through/right-turn lane on the eastbound and westbound approaches. The northbound and southbound approaches would also provide an exclusive left-turn lane and a shared through/right-turn lane. Pedestrian crossings will also be provided.

Donnelly Square (Bennington Street/State Road at Winthrop Avenue and Bennington Street at Crescent Avenue)

This signal-controlled intersection is adjacent to the MBTA Beachmont Station. The base improvement assumed for this site includes a signal upgrade using concurrent or overlapping pedestrian crossings where possible, extension of the Bennington Street median to the south to better control the prohibited left turn movement to a retail parking lot, and realignment of the Crescent Street approach to better manage the Bennington Street approach to Winthrop Avenue. Currently movement out of Crescent Street approaches the Bennington Street left turn lane to Winthrop Avenue in a manner that restricts movement in the through lane and has a tendency to focus more on traffic coming from the left (Bennington Street northbound) rather than potential pedestrian movement along the sidewalk to the

right. The design of the northbound corridor recognizes the potential for the Constitution Beach to Revere Beach connection as a community path with approximately 20 feet reserved for the sidewalk and path area. Specific components include the following:

- Design and implementation of an optimal traffic signal timing and phasing plan, including split phasing, for the weekday morning, weekday evening, and Saturday midday peak periods.
- Redesign of the intersection to channelize traffic flow on the intersection approaches.
- At Winthrop Avenue eastbound approach to Bennington Street provide a two-lane approach (exclusive right and through/left. Also, provide a new bus turn-out just west of Washburn Avenue.
- Provide a bus turnout westbound at the southeast corner of the MBTA parking lot.
- Construction of permanent pedestrian crosswalks with new ADA accessible ramps at all crosswalks within the Donnelly Square area.
- Installation new pavement markings within the Donnelly Square area.
- Installation of an emergency vehicle preemption system.

Figure 6.40 illustrates the proposed improvements. Approval will be required from MassDOT and the City of Revere, and recognition of the MBTA as a stakeholder will be required.

Route 1A Corridor ("Super Street Option")

- Route 1A at Boardman Street
- Route 1A at Suffolk Downs/Tomasello Drive
- Route 1A at Jughandle
- Route 1A at Furlong Drive

The "Super Street Option", illustrated in Figures 6.41a-c splits movements among various controlled points with two-phase signal control. This design recognizes the efficiency of two-phase signal operation (that is, addressing all traffic movements at the intersection in only two signal phases) and the ability to move more vehicles through a corridor. It is based on a design approach advocated by the Federal Highway Administration (FHWA) several years ago in its Every Day Counts program, as well as promoting safer, more context-sensitive roadway design. It carries several names including "displaced left turns" and "Michigan Lefts".

Selection of this design concept was done in concert with MassDOT. A long-standing design option for the area dates back to the mid-1990s when the North Shore Transportation Study developed a series of concept designs for multiple locations in the area, carrying forward with the concept of an urban expressway. The super street alternative, initially developed for the corridor several years ago, treats the corridor as an urban arterial, limiting land impacts associated with the

construction of an overpass alternative, and simply not shifting an operational problem from Boardman Street to the next signal-controlled intersection to the north.

The concept has undergone changes as the design has been developed with the introduction of a new north to south U-turn opportunity, the exploration of concepts allowing for direct left turns from the east side of Boardman Street, enhanced pedestrian crossing opportunities, provisions of bus turnouts near Tomasello Drive, consideration of other two-phase operation alternatives and designs for all users. The latter review included a series of alternatives for a community path, a separated bicycle facility, and an on-road bicycle area/partial width shoulder. The selected alternative in this case was the on-road provision allowing a five-foot shoulder through the 8,000-foot length of the super street alignment where the project limits would meet shoulders varying between 6 and 8 feet in width, which meets MassDOT's requirements for on-road bicycle accommodations. Primary restrictions in pursuing the other alternatives were severe right-of-way limitations along the entire corridor, right of way/existing conditions limitations north of the Boston/Revere Line require the shoulder use as the only option, and connectivity issues to the south prevented carrying the Community Path and separated bike facility as far as Curtis Street. In addition, MassDOT noted the importance of providing shoulders on an arterial like Route 1A to allow for of servicing disabled vehicles, accommodating emergency vehicles, and to facilitate evacuations. It is also important to note that there could be future opportunity for expanded bicycle facilities in the north/south direction along Route 1A through either the redevelopment of the industrial and warehouse properties on the west side of Route 1A or potentially along the existing railway right of way that runs along Chelsea Creek. Separately the Proponent and the consultant team have explored the feasibility of extending the East Boston Greenway from Constitution Beach to Revere Beach (See Section 6.8.3) which would be a more important north/south bicycle connection.

The basic design provides three lanes in each direction on Route 1A with the majority of improvements confined to within the existing State Highway Layout and most within the existing outside curb lines. From south to north, the overall plan begins in the area of the Marriott Courtyard. Northbound, the first signal-controlled point is at a U-turn lane developed for southbound (SB) to northbound (NB) U-turns. There is no southbound signal for through movement, only for the U-turn movement. The next controlled point is at Boardman Street where both northbound and southbound traffic on Route 1A will be stopped to allow movements from Boardman Street westbound (lefts and rights) and from Boardman Street eastbound (rights only). The next controlled point will be on Route 1A NB at a new U-turn lane for SB to NB reversal between Boardman Street and Waldemar Avenue. Here, southbound through traffic on Route 1A will not be stopped. Only the northbound through movement and the southbound to northbound U-turn will be subject to signal control. The next controlled point will be the Tomasello Drive intersection. Direct left turn from Route 1A SB to Tomasello Drive will not be permitted. Only left and right turns from Tomasello Drive will be

allowed. The existing Jug Handle signal just north of Tomasello will be retained but its signal will be interconnected with the upgraded and new signals along the corridor. The final controlled point will be the Furlong Drive intersection where left and right turn movement out Furlong will be permitted with no left turns from Route 1A SB permitted. This will be accomplished with a proposed break in the existing median on Route 1A and the addition of a new traffic signal. The super street concept will end at the existing Route 1A overpass entrance and exit ramps. The third lane northbound will become an exit only to Revere Beach Parkway/Winthrop Avenue (Route 145) The entrance from Route 145 to Route 1A SB will become an add-lane condition eliminating the current merge near Railroad Avenue.

At Boardman Street, three lanes would be provided both northbound and southbound. Direct left turns from Route 1A southbound to Boardman Street would be prohibited and that traffic instead would proceed further south on Route 1A to a signal-controlled left exit into a signal-controlled U-turn to access the northbound lanes of Route 1A and Boardman Street. Only right turns are provided from Boardman Street eastbound. The demand to the east side of Boardman Street and that to Route 1A northbound will be permitted to reverse direction via the signal-controlled U-turn lane south of Boardman Street. Direct left turns from Route 1A NB to Boardman Street west would also be prohibited. Those vehicles would be rerouted to Tomasello Drive where the NB to SB reversal will be permitted. The permitted movement across Route 1A flow will be the movement from Boardman Street westbound lanes. These lanes will be realigned in order to create a separation between the Boardman Street movement from the west allowing vehicles to be stored during the eastbound green phase. A pedestrian crossing of Route 1A will be maintained.

The U-turn lane between Waldemar Avenue and Boardman Street is intended to serve the left turn demand southbound on Route 1A to Tomasello Drive and also will serve as a direct access point for the Waldemar Avenue neighborhood, a movement now provided via a U-turn at Boardman Street.

At Tomasello Drive, a signal would be installed to allow vehicles traveling on Route 1A northbound to reverse direction by means of a jughandle-style layout, providing for the replacement movement for the northbound left turn and U-turn currently permitted at Boardman Street, and for the movement from Waldemar Avenue. This signal would also allow vehicles exiting Tomasello Drive from Suffolk Downs to make a left-turn onto Route 1A southbound. Three through lanes would be provided on Route 1A in the northbound direction together with a fourth northbound right-turn lane is also provided that will serve as access to a bus-pull-off and bus queue jump lane). Three through lanes will be provided southbound. The Tomasello Drive approach would consist of two left-turn lanes and two right-turn lanes. The two-phase operation at this location would include Route 1A northbound and southbound during phase 1 and Tomasello Drive as phase 2. A new pedestrian crossing would be incorporated on the northerly side of the exiting corridor intersection which will also allow for a future connection to Chelsea Creek.

The Route 1A/Jughandle intersection will continue to operate as a two-phase signal, but three lanes on the northbound and southbound Route 1A approaches would be provided.

Furlong Drive would be modified to provide three northbound and three southbound through lanes. No left-turns into Furlong Drive would be allowed at this location. The Route 1A southbound traffic would proceed to the Jughandle signal where they can reverse direction and access Furlong Drive via the right-turn lane. Two lanes (a right turn lane and a shared left/right-turn lane) will be provided on the Furlong Drive approach.

Route 1A Corridor Land Needs

Based on the proposed layout of the super street option summarized above, certain land beyond the existing State Highway Layout will be required to construct the improvements. The extent and nature of these land impacts (i.e. sidewalk easements, slope easements, acquisitions, etc.) will be identified when an updated survey of the corridor has been completed. In addition, discussions will need to be held with MassDOT Highway Division Layout Section regarding rights of way and further refinements will need to be made to the plans in coordination with MassDOT Highway Design engineers. Further details on land needs will be provided in the FEIR.

Bell Circle (aka Mahoney Circle)

Significant improvements are proposed for Bell Circle. These include widening approaches and departures, realignment of the State Road movement from the Route 16 corridor, recognition of operational improvements that have proven effective, recognition of pedestrian crossing needs, input from City of Revere officials and capacity needs associated with the project. The intent is to minimize use of the "outer circle roadways" to serve turning traffic that is completing what would be a left turn maneuver or entering from lower volume roadways such as Beach Street. The overall plan, illustrated in Figures 6.42a-b includes:

- Providing a three-lane approach on the northbound Route 1A to the Circle.
- Realigning the connecting corridor between Route 16 EB and WB to the Circle to allow direct access to Route 60 NB, eliminating the current movement through the Circle and the associated right turn to Route 60 NB at VFW Highway (Route 1A NB and SB).
- Provide direct access from the connecting corridor from Route 16 EB and WB to Route 1A NB (currently posted as the right turn on red after stop movement and Route 1A NB approach movement. This movement will be physically separated from other movements through the Circle with pedestrian crossing control indicated with a hybrid signal or rectangular flashing beacon.
- Introduction of a direct left turn from Route 1A SB, (VFW Parkway) to the three lane Route 60/Route 1A SB movement, eliminating the need for that traffic to circulate around the Circle.

- Widen Route 60 to a three-lane cross section between Harris Street (north of the Circle) through the Circle to the ramps to Route 16 and 145. The third lane will become an exit only to at the ramp with two southbound through lanes continuing on Route 1A.
- Add signal control to the Beach Street (eastbound approach) to the Circle.
- Control/channelize the movement from Everett Street to the Circle. While allowing full access in to Everett Street, all movement from Everett Street will leave the corridor in a channelized lane forcing a right turn to Route 60 NB only. Vehicles will be permitted to complete a NB to SB U-turn at a new signal-controlled U-turn lane at Harris Street.
- Provide a new signalized pedestrian crossing at the Harris Street U-turn signal. The crossing location is consistent with the northerly boundary of the Rumney Marsh Academy, affording the opportunity to cross Route 60 without travelling directly to Bell Circle.
- Modify pedestrian crossing routes throughout the area, including elimination of the crossing within the Circle.

Route 1A Southbound at Curtis Street

Improvements at this location include realigning Route 1A southbound to formalize an exit to the Bennington Street and Curtis Street areas. Improvements consist of providing two continuous lanes for the southbound through movement, creating an island within the current paved area and providing stop control at the ramp/Curtis Street intersection. Movement from Curtis Street to Route 1A south will continue to be in an add-lane condition. These improvements are illustrated in Figure 6.43.

Route 1/Route 16 Interchange and Route 16 at Garfield/Webster Street

The proposed improvements at the Route 1/Route 16 interchange are intended to provide key missing movements to an important regional highway access point. Under existing conditions, access from Route 1 southbound to Route 16 eastbound, from Route 16 westbound to Route 1 northbound, and from Route 1 NB to Route 16 EB are not provided. A redundant ramp access from Route 16 westbound to Route 1 southbound is provided less than 1,500 feet from the existing interchange, or approximately 600 feet west of Webster Avenue, (a braided ramp system) from a left lane exit from Route 16WB.

We view the most critical ramp addition to be the Route 1A SB to Route 16 EB movement. Currently the movement is completed via the right exit from Route 1 South to a U-turn at Garfield/Webster. The left turn lane is short and represents a capacity issue not only manifested in green time issues but also through material lane blockages on Route 16EB.

The proposed improvements maintain the existing Route 16 WB to Route 1 SB loop ramp. The existing median between the ramps would be replaced with a concrete barrier and the loop ramp slightly narrowed to allow the development of a two-

lane off-ramp extending approximately 600 feet from the intersection without relocating the outside curb lines and resulting in no slope of wetland impacts. No additional through traffic is added to the Garfield/Webster intersection. Left turn access from the ramp is signal controlled at Route 16 where a short median break will be provided. The total lane storage provided for the left turn movement is approximately 750 feet including the two-lane left turn movement at the intersection. This storage is more than sufficient for the projected turn volume that is not expected to exceed 500 vehicles per hour. The right turn movement is not signal controlled and is treated as the existing add-lane (but realigned) at its intersection with Route 16WB.

The on-ramp from Route 16 westbound to Route 1 northbound would be developed with a second Route 16 median break on the easterly side of Route 1 supported by a 300- to 400-foot left turn lane. The left turn movement to Route 1 northbound would be signal-controlled and would tie into the existing eastbound to northbound loop ramp through an open infield area.

The interchange work would also include optimization of the Route 16/Webster Avenue/Garfield Avenue intersection signal timing, and pavement area reduction where acceleration lanes are no longer required. The plan would provide an important safety improvement by virtue of the significant reduction in the existing dangerous weave and U-turn movements at this location. All work would be confined to the current right of way limits. The proposed improvements are illustrated in Figure 6.44.

Day Square

Day Square includes the following five intersections:

- Neptune Road at Saratoga Street
- Neptune Road at Bremen Street
- Bennington Street at Neptune Road
- Bennington Street at Vienna Street
- Neptune Road at Route 1A NB off-ramp

Several improvements are proposed with this area including:

- Closure of westbound Neptune Road between the Route 1A northbound off-ramp and Bennington Street.
- Rerouting the demand associated with this closed movement to Vienna Street where a new signal, extending to a modified pedestrian crossing to Wood Island Station, would be installed. From Vienna Street the replacement movement from Neptune Road to Route 1A SB would be via an existing left turn lane and the movements to Bennington Street south and Neptune Road west would become a through movement and right turn respectively.
- Establish Bremen Street north of Neptune Road as one-way northbound (currently two-way).

- Restrict direct access from Saratoga Street to Neptune Road westbound.
- Provide a "mini-roundabout" (20' diameter and mountable) for yield control on all approaches to the Chelsea Street/Neptune Road/Saratoga Street intersection allowing direction reversal for movements on Neptune Road.

The proposed improvements address MassDOT concerns about overhead clearances and eliminate a signal phase, allowing additional time to be allocated for the left turn movements from Bennington Street to Route 1A. It should also be noted that the Project is not expected to send a high percentage of traffic down Bennington Street. As such, these are more regional improvements that are not driven by site-generated traffic. The proposed improvements are illustrated in Figure 6.45

Revere Street at Route 60

Improvements at this location include restriping the eastbound and westbound approaches on Revere Street to provide an exclusive left-turn lane and a shared through/right-turn lane. Given the proximity of Tuttle Street to the traffic signal, "Do Not Block Intersection" signage and striping is proposed on this approach. Improvements also include designing and implementing and optimal traffic signal timing and phasing plan, corner radius reductions where possible, and constructing pedestrian improvements including new crosswalks and ADA accessible ramps.

The existing EB bicycle lane will be modified to a "share lane" with the stripping area that will extend approximately 150 feet per direction on Revere Street. Parking will also be prohibited within this zone.

The major improvement to intersection operations is associated with what is expected to be a 90% reduction in the left turn demand from Route 60 SB to Revere Street. Part of this intersection improvement includes the restoration of a closed median break at the Breed Street intersection and introduction of a signal controlled left turn movement to Breed Street. Note that movement from Breed Street will be limited to the current right turn only. The primary benefits are anticipated during the evening peak period. (See following.)

Breed Street at Route 60

In conjunction with the improvements at Revere Street at Route 60, a break in the median is proposed and a new traffic signal would be installed to accommodate southbound left turns onto Breed Street. The Route 60 southbound approach would provide two through lanes and an exclusive left-turn lane. The Route 60 northbound approach would provide two through lanes. The Breed Street westbound approach would provide a channelized right-turn lane and left turns would be restricted. This new traffic signal and left-turn lane would result in a substantial reduction in southbound left turns at the intersection of Route 60 and Revere Street which will improve operations. These improvements are illustrated in Figure 6.46.

Brown Circle

Improvements at this location include designing and implementing a comprehensive upgrade of the signs and pavement markings approaching and within Brown Circle, designing and implementing channelization and signalization improvements including new pavement and directional markings and channelization islands at the Route 107 northbound approach, extending islands and installing new islands to facilitate safer traffic flow, and installing ADA accessible ramps and associated sidewalk and median improvements. Plans for sign and markings will be developed in a manner consistent with the soon to be released MassDOT guidance document for roundabouts and traffic circles. These improvements are illustrated in Figure 6.47.

Route 1A (North Shore Road) at Revere Street

Improvements at this location include designing and implementing and optimal traffic signal timing and phasing plan, constructing pedestrian improvements including new crosswalks and ADA accessible ramps, and installing an emergency vehicle preemption system. In addition, the exclusive southbound left-turn lane lengthened through a combination of shoulder width reduction, replacement of the existing guardrail median with a concrete barrier median and minor widening (one to two feet per side). The lengthening will limit blockage of the existing left most through lane, improving lane balance on the southbound approach. These improvements are illustrated in Figure 6.48.

Bennington Street at Saratoga Street

Improvements at this location include installing a traffic island in the southwest quadrant, redirecting crosswalks for the Bennington Street and Saratoga Street crossings, providing a compliant curb ramp for the Bennington Street cross in the southeast quadrant, changing lane uses on the northbound Bennington Street approach (one right only and one through left), removing/relocating the median on the northerly leg of Bennington Street to allow a three lane southbound approach (two through and one left) and one through lane northbound, and modifying signal phasing. These improvements are illustrated in Figure 6.49.

As previously described, the proposed mitigation includes restricting or allowing several turning movements that differ from existing conditions affecting project trip travel patterns throughout the study area. The project trip distribution patterns and project trips were updated to reflect these changes. The project trip distributions patterns are illustrated in Figure 6.50a-h. The project generated trips networks for CTPS/MassDOT Parameters and Expected TOD Parameters are located in Appendix D The 2028 Build with Mitigation Condition (CTPS/MassDOT Parameters) traffic volume networks are illustrated in Figures 6.51a-d and Figures 6.52a-d. The 2028 Build Condition with Mitigation Condition (Expected TOD Parameters) traffic volume networks are illustrated in Figures 6.53a-b, and Figures 6.54a-d.

Route 60 at Sigourney Street and Charger Street

At the request of MassDOT District 4, the Proponent will review/restore the time-based coordination system with GPS time clock backup and update the signal coordination plans for the two-intersection system.

In regard to all the capacity-enhancing mitigation measures summarized above that the Proponent is committing to, it is important to note that these improvements not only minimize project impacts, but also accommodate the substantial amount of background traffic that has been assumed as part of this study. As discussed previously, the assessment of future conditions traffic volumes includes an aggregate of over 3,000,000 square feet of development in this area unrelated to the Master Plan Project. It should be noted that, with the exception of the improvements associated with 205 Revere Beach Parkway, no major mitigation measures are proposed.

Bicycle and Pedestrian Improvements

In addition to the extensive offsite traffic mitigation program, the Master Plan Project also includes substantial enhancements for bicycles and pedestrians both onsite and offsite to improve local and regional connections.

- Development of an extensive on-site bicycle network that includes over 17,000 linear feet of on-street bike accommodations and over 13,000 linear feet of cycle tracks.
- Extensive pedestrian network that includes several community paths which extend through the 40-acre open space system.
- Development of a two-way cycle track along Winthrop Avenue from Washburn Avenue to North Shore Road.
- Exploration and design of East Boston Greenway extension from Constitution Beach to Revere Beach.
- New at-grade community path crossing of Route 1A at Tomasello Drive to Chelsea Creek side.
- New at-grade pedestrian crossing of Route 1A at Furlong Drive to Chelsea Creek side.
- Community path connection to potential Walley Street bicycle facilities which lead back to Bonito Square and East Boston Greenway.
- Addition of new Bluebikes Stations (formerly Hubway) at the Project site and the Proponent will work with dockless bike companies to allow access to the site.

In addition, Go Boston 2030 is planning for a bikeshare network expansion to increase the number of bikes and stations to reach more Bostonians. According to Go Boston 2030, "by the end of 2022, Boston aims to grow its part of the system by 137 new stations, for a total of 268 stations in the city. The growth includes additional stations within the busiest areas of the system and broader access in all densely-populated neighborhoods." The Proponent will continue to work with the

City of Boston, City of Revere, MassDOT and DCR to refine infrastructure plans and plans for external pedestrian and bicycle connections.

Transportation Demand Management (TDM) Program

The Master Plan Project will benefit from excellent access to MBTA subway (Blue Line) and bus service as well as strong pedestrian and bicycle networks. This will provide a firm foundation for the implementation of TDM strategies to maximize use of non-auto modes and reduce single occupant vehicle (SOV) travel. The TDM Plan for the Master Plan Project will be fully explored and documented in the next DEIR/DPIR filing.

In addition to MassRIDES, it is anticipated that the TDM Plan for the Master Plan Project will take advantage of membership in a local Transportation Management Association (TMA) which already facilitates proactive and comprehensive TDM initiatives in the area.

Consistent with the City of Boston's goals to reduce auto-dependency, the Proponent will proactively incorporate TDM measures to encourage alternative modes of transportation. TDM measures are most often directed at commuter travel, which is the purpose of the majority of the trips destined to the Project Site. The following discusses an array of TDM measures that will be implemented as part of the Master Plan Project.

- Provide secure bicycle storage for building tenants and their employees and visitors in accordance with the City of Boston Bicycle Guidelines.
- Bike racks will be provided at select, highly-visible locations within the Project Site. The racks will be securely mounted and feature current designs to properly secure bikes of all kinds.
- Addition of Bluebikes Stations on site. Demand for Bluebikes will be monitored over time and the number of stations/bikes will be adjusted accordingly;
- Multiple parking spaces for a car-sharing service will be provided, such as ZipCar®, within the new garages.
- Parking spaces on-site will be equipped to support EV charging stations and will be provided within the new garage.
- Preferential parking for alternative-fueled vehicles will be provided.
- Office and retail tenants will be encouraged to provide employer subsidies to employees who purchase monthly or multiple trip transit passes.
- Office and retail tenants will be encouraged to provide a guaranteed ride home program, in conjunction with MassRIDES, to eliminate an often-cited deterrent to carpool and vanpool participation.
- Potential office and retail tenants will be encouraged to offer direct deposit payment for monthly transit passes to employees.
- An on-site Transportation Coordinator will be designated to oversee parking and loading operations as well as to promote alternative transportation measures. The person assigned to this role will coordinate with office and retail

tenants to help promote a reduced reliance on single-occupant motor-vehicle travel to the Project Site. To that end, the TDM measures identified in the following sections will be implemented under the direction and supervision of this person. The duties of the transportation coordinator may include, but not be limited to:

- Acting as a liaison with office and retail employers and MassRIDES.
- Assisting office and retail employees and residents with ride matching and transportation planning.
- Disseminating information on alternate modes of transportation and developing transportation related marketing and education materials, including a website. This includes posting relevant public transit information potentially at an outdoor kiosk. This would include, but is not limited to, providing transit information such as maps and schedules to new residents and tenants in an orientation package.
- Developing and maintaining information pertaining to pedestrian and cycling access to and from the Project Site.
- Encouraging tenants to provide on-site transit pass sales to employees.

6.10.1 2028 Mitigation Capacity Analysis

Tables 6-24 through 6-28 summarize the capacity analyses for all of the above-mentioned mitigated intersections, for the 2028 No-Build, 2028 Build Conditions without Mitigation, and 2028 Build Conditions with Mitigation.

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Table 6-24 Signalized Intersection Capacity Analysis

Location	Movement	2028 No-Build Conditions v/c [a]	Del [b]	LOS [c]	2028 Build Conditions – CTPS/MassDOT Parameters v/c	Del	LOS	2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters v/c	Del	LOS	2028 Build Conditions with Mitigation – Expected TOD Parameters v/c	Del	LOS
Route 1 A at Boardman Street													
	Weekday Morning	2.28	599	F	2.40	579	F	0.95	15	B	0.94	15	B
	Weekday Evening	2.27	329	F	2.48	372	F	0.99	22	C	0.98	20	C
Route 1 A at Boardman Street - West													
	Weekday Morning	Not an Intersection Under This Condition			Not an Intersection Under This Condition			0.95	51	D	0.94	49	D
	Weekday Evening							0.87	7	A	0.86	7	A
Route 1A at Southern U-Turn													
	Weekday Morning	Not an Intersection Under This Condition			Not an Intersection Under This Condition			0.81	4	A	0.81	4	A
	Weekday Evening							0.96	19	B	0.95	18	B
Route 1A at Northern U-Turn													
	Weekday Morning	Not an Intersection Under This Condition			Not an Intersection Under This Condition			0.73	9	A	0.73	8	A
	Weekday Evening							0.85	3	A	0.84	3	A
Route 1A at Tomasello Drive													
	Weekday Morning	Not Signalized Under This Condition			Not Signalized Under This Condition			0.79	11	B	0.78	11	B
	Weekday Evening							0.88	10	B	0.87	9	A
Route 1A at Jughandle													
	Weekday Morning	0.88	13	B	1.16	111	F	0.72	11	B	0.70	10	B
	Weekday Evening	0.91	22	C	1.07	95	F	0.65	8	A	0.64	8	A
Route 1A at Furlong St													
	Weekday Morning	Not Signalized Under This Condition			Not Signalized Under This Condition			0.71	8	A	0.69	7	A
	Weekday Evening							0.81	15	B	0.79	13	B
Route 1A On-Ramp at Route 145													
	Weekday Morning	0.67	6	A	0.79	9	A	0.83	10	A	0.81	9	A
	Weekday Evening	0.72	7	A	0.78	9	A	0.79	7	A	0.79	7	A
Route 16 at Winthrop Avenue/Route 145/Harris Street													
	Weekday Morning	1.20	131	F	1.36	159	F	0.95	50	D	0.93	46	D
	Weekday Evening	1.27	116	F	1.53	209	F	1.12	78	E	1.10	72	E
Route 145/Winthrop Avenue at North Shore Road													
	Weekday Morning	0.73	41	D	0.92	117	F	0.72	20	C	0.71	24	C
	Weekday Evening	0.80	137	F	0.97	179	F	0.79	45	D	0.77	38	D
Tomasello Dr at Winthrop Avenue/Route 145													
	Weekday Morning	0.69	98	F	0.98	132	F	0.84	27	C	0.80	26	C
	Weekday Evening	0.92	92	F	1.27	165	F	1.03	50	D	1.00	44	D
Winthrop Avenue at Beachmont Lot and Site Driveway													
	Weekday Morning	Not Signalized Under This Condition			Not Signalized Under This Condition			0.65	34	C	0.66	37	D
	Weekday Evening							0.70	10	A	0.69	10	A
Revere Beach Parkway at Winthrop Avenue													
	Weekday Morning	1.00	160	F	0.78	56	E	0.59	65	E	0.57	54	D
	Weekday Evening	0.74	53	D	0.88	25	C	0.76	39	D	0.75	39	D
Eliot Circle – Revere Beach Parkway/Ocean Avenue & State Road													
	Weekday Morning	0.49	17	B	0.53	18	B	0.53	18	B	0.52	18	B
	Weekday Evening	0.60	11	B	0.74	11	B	0.67	12	B	0.66	12	B
Bell Circle – Route 60 at Circle (North)													
	Weekday Morning	0.95	31	C	1.21	70	E	0.83	23	C	0.81	23	C
	Weekday Evening	1.01	36	D	1.19	54	D	1.02	26	C	1.00	26	C
Bell Circle – Route 60, Route 1A, Route 16 at Circle (South)													
	Weekday Morning	1.08	43	D	1.22	60	E	0.85	29	C	0.84	29	C
	Weekday Evening	1.39	86	F	1.54	128	F	1.10	70	E	1.09	67	E

a Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-24 Signalized Intersection Capacity Analysis (continued)

Location	Movement	2028 No-Build Conditions v/c [a]	Del [b]	LOS [c]	2028 Build Conditions – CTPS/MassDOT Parameters v/c	Del	LOS	2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters v/c	Del	LOS	2028 Build Conditions with Mitigation – Expected TOD Parameters v/c	Del	LOS
Bell Circle – VFW Parkway at Circle (East)													
	Weekday Morning	0.65	79	E	0.64	77	E	0.57	21	C	0.57	21	C
	Weekday Evening	0.80	51	D	0.87	60	E	0.84	23	C	0.84	23	C
Bell Circle – Beach at Circle (West)													
	Weekday Morning	0.53	1	A	0.56	1	A	0.41	22	C	0.41	22	C
	Weekday Evening	0.50	1	A	0.58	1	A	0.55	24	C	0.55	24	C
Webster Avenue at Garfield Avenue/Route 16													
	Weekday Morning	1.06	78	E	1.19	94	F	1.03	87	F	1.03	85	F
	Weekday Evening	1.52	151	F	1.60	154	F	1.10	113	F	1.10	111	F
Route 16/Revere Beach Parkway at Route 1 Southbound Off-Ramp													
	Weekday Morning	Not Signalized Under This Condition			Not Signalized Under This Condition			0.92	25	C	0.92	25	C
	Weekday Evening							0.83	17	B	0.83	17	B
Route 16/Revere Beach Parkway at Route 1 Northbound													
	Weekday Morning	Not Signalized Under This Condition			Not Signalized Under This Condition			0.76	12	B	0.76	12	B
	Weekday Evening							0.80	12	B	0.78	12	B
Route 60 (Squire Road) at Charger Street													
	Weekday Morning	0.70	24	C	0.75	25	C	0.74	25	C	0.73	25	C
	Weekday Evening	0.96	45	D	1.03	47	D	1.03	47	D	1.02	47	D
Route 60 (Squire Road) at Sigourney Street													
	Weekday Morning	0.81	20	B	0.87	20	C	0.85	20	C	0.85	20	C
	Weekday Evening	1.10	50	D	1.20	73	E	1.20	73	E	1.18	69	E
North Shore Road/Route 1A at MBTA Driveway													
	Weekday Morning	0.65	22	C	0.68	22	C	0.68	22	C	0.68	22	C
	Weekday Evening	0.66	20	C	0.67	20	C	0.67	20	B	0.67	20	B
North Shore Road/Route 1A at Revere Street													
	Weekday Morning	1.16	120	F	1.17	139	F	1.17	130	F	1.17	127	F
	Weekday Evening	1.29	93	F	1.43	134	F	1.48	144	F	1.47	141	F
Route 60 at Revere Street													
	Weekday Morning	1.30	185	F	1.61	254	F	1.09	127	F	1.07	120	F
	Weekday Evening	1.61	258	F	1.66	283	F	1.07	86	F	1.06	83	F
Route 60 at Breed Street													
	Weekday Morning	Not an Intersection Under This Condition			Not an Intersection Under This Condition			0.59	10	A	0.59	10	A
	Weekday Evening			0.81	9	A	0.80	9	A				
VFW Parkway at Beach Street													
	Weekday Morning	0.64	18	B	0.68	21	C	0.68	21	C	0.68	20	C
	Weekday Evening	0.77	23	C	0.77	23	C	0.77	23	C	0.77	23	C
Ocean Avenue at Beach Street													
	Weekday Morning	0.58	12	B	0.60	12	B	0.60	12	B	0.60	12	B
	Weekday Evening	0.52	13	B	0.52	13	B	0.52	13	B	0.51	12	B
North Shore Road at Beach Street													
	Weekday Morning	0.40	17	B	0.43	18	B	0.43	18	B	0.42	18	B
	Weekday Evening	0.62	27	C	0.62	27	C	0.62	27	C	0.61	26	C
Bennington Street at Saratoga Street													
	Weekday Morning	1.00	120	F	1.03	130	F	0.84	59	E	0.84	58	E
	Weekday Evening	1.02	108	F	1.03	108	F	0.92	69	E	0.92	69	E
Bennington Street/State Road at Winthrop Avenue													
	Weekday Morning	1.00	160	F	1.32	225	F	0.96	123	F	0.95	121	F
	Weekday Evening	0.74	53	D	0.82	65	E	0.77	50	D	0.77	50	D
Bennington Street at Swift Street													
	Weekday Morning	0.70	35	C	0.71	34	C	0.57	12	B	0.57	12	B
	Weekday Evening	0.78	88	F	0.78	88	F	0.70	14	B	0.68	14	B

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-24 Signalized Intersection Capacity Analysis (continued)

Location	Movement	2028 No-Build Conditions			2028 Build Conditions – CTPS/MassDOT Parameters			2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters			2028 Build Conditions with Mitigation – Expected TOD Parameters		
		v/c [a]	Del [b]	LOS [c]	v/c	v/c [a]	Del [b]	LOS [c]	v/c	v/c [a]	Del [b]	LOS [c]	v/c
Bennington Street at Neptune Road													
	Weekday Morning	0.93	65	E	0.95	69	E	0.92	58	E	0.92	58	E
	Weekday Evening	0.79	43	D	0.78	42	D	0.64	42	D	0.63	42	D
Route 1A Off-Ramp at Vienna Street/Neptune Road													
	Weekday Morning	0.35	82	F	0.35	83	F	0.34	46	D	0.34	45	D
	Weekday Evening	0.45	62	E	0.45	62	E	0.75	25	C	0.56	36	D
Bennington Street at Vienna Street													
	Weekday Morning	Not an Intersection Under This Condition			Not an Intersection Under This Condition			0.81	25	C	0.81	25	C
	Weekday Evening			0.75	25	C	0.75	25	C	E	1.18	55	E
Chelsea Street at Bennington Street													
	Weekday Morning	1.16	257	F	1.18	269	F	1.18	269	F	1.18	269	F
	Weekday Evening	1.18	108	F	1.18	108	F	1.18	108	F	1.17	105	F
Chelsea Street at Prescott Street													
	Weekday Morning	0.46	20	B	0.46	20	C	0.46	20	C	0.46	20	C
	Weekday Evening	0.56	24	C	0.58	25	C	0.58	25	C	0.58	25	C

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-25 Unsignalized Intersection Capacity Analysis

		2028 No-Build Conditions					2028 Build Conditions – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – Expected TOD Parameters				
Location	**Movement**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Saratoga Street at Neptune Road																					
Weekday Morning	EB L/T	365	0.18	6	A	16	380	0.18	5	A	16	Roundabout Under this Condition					Roundabout Under this Condition				
	WB T/R	230	0.15	<1	A	0	230	0.15	<1	A	0										
	NB L/T/R	95	0.43	31	D	50	95	0.44	32	D	52										
	SB L/T/R	465	0.71	21	C	147	470	0.72	22	C	152										
Weekday Evening	EB L/T	370	0.24	7	A	23	370	0.24	7	A	23										
	WB T/R	265	0.17	<1	A	0	265	0.17	<1	A	0										
	NB L/T/R	225	1.30	217	F	343	245	1.44	272	F	406										
	SB L/T/R	370	Err	Err	F	Err	385	Err	Err	F	Err										
Bremen Street at Neptune Road																					
Weekday Morning	SB L/T/R	180	0.43	19	C	52	180	0.44	19	C	54	Not Analyzed Under This Condition					Not Analyzed Under This Condition				
Weekday Evening	SB L/T/R	140	0.41	21	C	49	140	0.41	21	C	49										
Route 1A at Curtis Street																					
Weekday Morning	EB R	455	5.48	Err	F	Err	455	6.26	Err	F	Err	455	1.03	79	F	365	455	1.03	79	F	365
Weekday Evening	EB R	415	1.91	459	F	803	415	2.55	754	F	966	415	0.73	155	C	155	415	0.73	25	C	155
Route 1A at Waldemar Avenue																					
Weekday Morning	WB R	140	0.19	10	B	17	140	0.23	12	B	22	140	0.19	10	B	17	140	0.18	10	B	17
Weekday Evening	WB R	105	0.27	17	C	27	120	0.31	18	C	33	120	0.59	42	E	83	120	0.59	43	E	84
Route 1A at Tomasello Drive																					
Weekday Morning	WB L	215	7.39	Err	F	Err	215	1118.01	Err	F	Err	Signalized Under This Condition					Signalized Under This Condition				
	WB R	15	0.05	16	C	4	175	0.72	47	E	120										
	SB L	N.A.	N.A.	N.A.	N.A.	N.A.	230	0.78	44	E	132										
Weekday Evening	WB L	5	6.63	Err	F	Err	5	364.00	Err	F	Err										
	WB R	5	0.03	31	D	3	360	3.41	Err	F	Err										
	SB L	20	0.03	29	D	2	80	0.60	72	F	74										
Route 1A at Furlong Street																					
Weekday Morning	WB R	40	0.13	18	C	11	120	0.62	47	E	88	Signalized Under This Condition					Signalized Under This Condition				
Weekday Evening	WB R	110	0.74	74	F	115	510	4.88	Err	F	Err										
Winthrop Avenue at Beachmont Station Parking Driveway																					
Weekday Morning	EB L/T	640	0.13	3	A	11	650	0.15	4	A	13	Signalized Under This Condition					Signalized Under This Condition				
	WB T/R	520	0.35	<1	A	0	665	0.00	<1	A	0										
	SB L/R	5	0.01	11	B	1	5	0.01	13	B	1										
Weekday Evening	EB L/T	605	0.00	1	A	0	640	0.01	1	A	0										
	WB T/R	505	0.32	<1	A	0	555	0.00	<1	A	0										
	SB L/R	125	0.30	16	C	30	125	0.36	20	C	41										

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

Table 6-25 Unsignalized Intersection Capacity Analysis (continued)

		2028 No-Build Conditions					2028 Build Conditions – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – Expected TOD Parameters				
Location	**Movement**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Bennington Street at Crescent Avenue																					
Weekday Morning	WB L	190	0.97	93	F	210	190	1.03	121	F	230	190	1.03	121	F	230	190	1.03	121	F	230
	WB R	300	0.47	15	B	62	375	0.62	19	C	103	380	0.62	19	C	106	370	0.6	18	C	100
Weekday Evening	WB L	60	0.26	25	C	28	60	0.28	26	D	27	60	0.27	26	D	27	60	0.27	26	D	27
	WB R	130	0.23	12	B	22	165	0.29	13	B	30	165	0.29	13	B	30	160	0.28	13	B	29
Eliot Circle – Revere Beach Boulevard at Winthrop Parkway																					
Weekday Morning	EB L	330	1.10	157	F	233	350	1.24	209	F	276	350	1.28	225	F	285	345	1.22	203	F	270
	EB R	375	0.38	11	B	46	395	0.40	11	B	50	395	0.40	11	B	50	390	0.40	11	B	49
	NB L/T	575	0.30	7	A	31	590	0.31	7	A	33	610	0.31	7	A	33	590	0.31	7	A	33
Weekday Evening	EB L	795	1.88	449	F	765	1030	2.59	764	F	1185	895	2.20	591	F	950	885	2.18	580	F	934
	EB R	725	0.73	17	C	172	790	0.80	20	C	223	790	0.80	20	C	223	780	0.79	20	C	214
	NB L/T	535	0.22	6	A	21	550	0.23	6	A	22	545	0.23	6	A	22	545	0.23	6	A	22
Ocean Avenue at Revere Street																					
Weekday Morning	EB R	300	0.19	<1	A	0	375	0.24	<1	A	0	380	0.24	<1	A	0	370	0.24	<1	A	0
	WB L&T	1470	1.06	61	F	686	1480	1.14	90	F	856	1480	1.14	91	F	867	1475	1.13	87	F	843
	NB L	145	Err	Err	F	Err	160	Err	Err	F	Err	160	Err	Err	F	Err	155	Err	Err	F	Err
Weekday Evening	EB R	330	0.21	<1	A	0	415	0.27	<1	A	0	415	0.27	<1	A	0	390	0.25	<1	A	0
	WB L&T	540	0.31	9	A	33	670	0.35	10	A	39	605	0.35	10	A	39	595	0.33	10	A	37
	NB L	180	0.98	108	F	208	180	1.29	228	F	294	260	1.69	384	F	495	255	1.58	336	F	460
North Shore Road at Lynnway NB Off Ramp																					
Weekday Morning	EB L	5	0.05	9	A	4	5	0.06	9	A	4	5	0.05	9	A	4	5	0.05	9	A	4
Weekday Evening	EB L	20	0.06	11	B	5	20	0.08	11	B	6	20	0.07	11	B	6	20	0.07	11	B	6
North Shore Road at Lynnway SB Ramps																					
Weekday Morning	EB L	35	0.72	17	C	161	35	0.72	17	C	161	35	0.72	17	C	161	35	0.72	17	C	161
Weekday Evening	EB L	65	0.26	13	B	26	65	0.31	14	B	33	65	0.28	14	B	29	65	0.28	13	B	28

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

Table 6-25 Unsignalized Intersection Capacity Analysis (continued)

		2028 No-Build Conditions					2028 Build Conditions – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters					2028 Build Conditions with Mitigation – Expected TOD Parameters				
Location	**Movement**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Chelsea Street at Unnamed Road (Day Square)																					
Weekday Morning	EB L	10	0.06	25	C	4	10	0.06	25	D	5	10	0.06	25	D	5	10	0.06	25	C	5
	EB R	20	0.04	12	B	3	20	0.04	12	B	3	20	0.04	12	B	3	20	0.04	12	B	3
	WB L	300	1.06	106	F	307	305	1.10	119	F	330	300	1.08	113	F	317	305	1.09	116	F	325
	WB T/R	170	0.23	11	B	22	170	0.23	11	B	22	170	0.23	11	B	22	170	0.23	11	B	22
Weekday Evening	EB L	15	0.08	26	D	7	15	0.09	27	D	7	15	0.09	27	D	7	15	0.09	27	D	7
	EB R	15	0.02	10	A	2	15	0.02	10	A	2	15	0.02	10	A	2	15	0.02	10	A	2
	WB L	225	0.68	34	D	120	235	0.73	38	E	137	235	0.73	38	E	137	235	0.73	38	E	137
	WB T/R	195	0.32	13	B	35	195	0.33	13	B	36	195	0.33	13	B	36	195	0.33	13	B	36
Bennington Street at Unnamed Road (Day Square)																					
Weekday Morning	WB T/R	90	0.27	18	C	27	90	0.27	19	C	27	90	0.27	19	C	27	90	0.27	19	A	27
Weekday Evening	WB T/R	85	0.26	19	C	26	85	0.27	20	C	27	85	0.27	20	C	27	85	0.27	20	C	27

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

Table 6-26 Roundabout Capacity Analysis

Location	Movement	2028 No-Build Conditions				2028 Build Conditions – CTPS/MassDOT Parameters				2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters				2028 Build Conditions with Mitigation – Expected TOD Parameters			
		v/c	Del	LOS	95 Q	v/c [a]	Del [b]	LOS [c]	95 Q [d]	v/c [a]	Del [b]	LOS [c]	95 Q [d]	v/c [a]	Del [b]	LOS [c]	95 Q [d]
Brown Circle																	
Weekday Morning	NB L/T/R	0.94	87	F	178	0.95	89	F	184	0.95	89	F	184	0.95	88	F	183
	WB L/T/R	>1.20	305	F	3,091	>1.20	355	F	3,632	>1.20	355	F	3,632	>1.20	351	F	3,597
	WB R	>1.20	304	F	3,195	>1.20	354	F	3,758	>1.20	354	F	3,758	>1.20	350	F	3,721
	SB L/T/R	>1.20	1,453	F	12,625	>1.20	1,545	F	13,429	>1.20	1,553	F	13,493	>1.20	1,547	F	13,444
	SB R	0.66	24	C	72	0.69	26	C	77	0.69	26	C	78	0.69	26	C	78
	EB L/T	1.00	76	F	532	>1.20	281	F	3,235	1.20	214	F	2,388	1.17	195	F	2,151
	EB T/R	1.00	75	F	522	>1.20	280	F	3,317	1.20	213	F	2,444	1.17	195	F	2,199
Weekday Evening	NB L/T/R	>1.20	584	F	3,278	>1.20	585	F	3,280	>1.20	585	F	3,280	>1.20	585	F	3,284
	WB L/T/R	>1.20	595	F	6,064	>1.20	772	F	7,902	>1.20	772	F	7,902	>1.20	757	F	7,743
	WB R	>1.20	595	F	6,290	>1.20	772	F	8,200	>1.20	772	F	8,200	>1.20	756	F	8,034
	SB L/T/R	>1.20	872	F	7,495	>1.20	895	F	7,693	>1.20	895	F	7,693	>1.20	888	F	7,628
	SB R	0.50	17	B	44	0.50	17	B	45	0.50	17	B	45	0.50	17	B	44
	EB L/T	>1.20	329	F	3,784	>1.20	389	F	4,500	>1.20	389	F	4,500	>1.20	386	F	4,466
	EB T/R	>1.20	329	F	3,884	>1.20	388	F	4,621	>1.20	388	F	4,621	>1.20	385	F	4,587
Butler/Wonderland Circle																	
Weekday Morning	NB L/T	0.33	11	B	24	0.36	11	B	27	0.38	12	B	30	0.38	12	B	30
	SB R	0.99	60	E	1,707	1.11	130	F	4,578	1.11	137	F	4,712	1.10	125	F	4,457
	SB T	0.33	7	A	28	0.36	7	A	33	0.37	7	A	33	0.36	7	A	33
	EB L	0.52	12	B	56	0.53	12	B	59	0.53	12	B	59	0.53	12	B	59
	EB L/R	0.52	11	B	53	0.53	12	B	56	0.53	12	B	56	0.53	12	B	56
Weekday Evening	NB L/T	0.78	37	D	93	0.95	75	F	214	0.97	84	F	259	0.95	75	F	214
	SB R	0.78	18	B	169	0.79	19	B	183	0.82	21	C	212	0.82	21	C	207
	SB T	0.26	6	A	20	0.26	6	A	21	0.27	6	A	22	0.27	6	A	21
	EB L	0.72	17	B	126	0.72	18	B	128	0.73	18	B	130	0.73	18	B	130
	EB L/R	0.72	17	B	120	0.72	18	B	121	0.73	18	B	123	0.73	18	B	123
Saratoga Street at Neptune Road																	
Weekday Morning	NB L/T/R	Unsignalized Under this Condition				Unsignalized Under this Condition				0.50	7	A	94	0.50	7	A	92
	WB L/T/R									0.77	10	A	263	0.77	10	A	262
	SB L/T/R									0.65	10	B	163	0.64	10	A	156
Weekday Evening	NB L/T/R									0.69	10	A	184	0.69	10	A	184
	WB L/T/R									0.76	10	A	250	0.77	10	A	36
	SB L/T/R									0.44	6	A	81	0.44	6	A	81

SIDRA INTERSECTION 7.0 – Delay and v/c (HCM 2010), Roundabout Capacity Model: US HCM 2010

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.
d. 95th percentile queue, in feet.
- LOS F will result if v/c >1 irrespective of lane delay value (degree or saturation) per lane.

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2028 Mitigation Condition

Proposed intersection improvements were analyzed under the 2028 Mitigation Condition. Several of the intersection operations improved to LOS D or better during the weekday morning and/or weekday evening peak hours, as listed below.

Signalized

- Route 1A at Boardman Street
- Route 1A at Tomasello Drive
- Route 1A at Jughandle
- Route 16 at Winthrop Avenue/Harris Street – morning peak only
- Winthrop Avenue (Route 145) at N. Shore Road – evening peak only
- Winthrop Avenue (Route 145) at Tomasello Drive
- Route 60 at Bell Circle
- Route 60/Route 1A/Route 16 at Bell Circle – morning peak only
- Route 1A (VFW Highway) at Bell Circle
- Bennington Street/State Road at Winthrop Avenue – evening peak only
- Bennington Street at Swift Street – evening peak only
- Route 1A Off-Ramp at Vienna Street and Neptune Road

Unsignalized

- Route 1A at Curtis – evening peak hour

Additionally, several intersection operations improved from 2028 No-Build Condition to 2028 Build Condition with mitigation during the weekday morning and/or weekday evening peak hours, as listed below.

Signalized

- Revere Beach Parkway at Winthrop Avenue – morning peak hour
- N. Shore Road (Route 1A) at MBTA Driveway – evening peak hour
- Bennington Street at Saratoga Street
- Bennington Street at Neptune Road

The remaining intersections remain approximately similar to the 2028 No-Build and/or 2028 Build Conditions analysis results.

Table 6-27 Merge/Diverge Junction Capacity Analysis

		2028 No-Build Conditions		2028 Build Conditions – CTPS/MassDOT Parameters		2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters		2028 Build Conditions with Mitigation – Expected TOD Parameters	
Roadway Segment	**Direction**	**D**	**LOS**	**D**	**LOS**	**D**	**LOS**	**D**	**LOS**
Route 1 Southbound at Route 16 Westbound									
Weekday Morning	On Ramp	23.6	C	24.0	C	Signalized Under This Condition		Signalized Under This Condition	
	Off Ramp	14.8	B	15.3	B				
Weekday Evening	On Ramp	21.3	C	22.8	C				
	Off Ramp	14.1	B	16.7	B				
Route 1 Northbound at Route 16 Eastbound									
Weekday Morning	On Ramp	12.0	B	13.6	B	14.4	B	14.1	B
	Off Ramp	15.2	B	16.5	B	17.0	B	16.8	B
Weekday Evening	On Ramp	18.7	B	19.5	B	19.5	B	19.5	B
	Off Ramp	17.6	B	18.0	B	17.4	B	17.3	B
Squire Road at Copeland Circle (adjacent ramps downstream)									
Weekday Morning	On Ramp	19.2	B	19.6	B	19.6	B	19.6	B
Weekday Evening	On Ramp	21.1	C	22.8	C	22.8	C	22.6	C
Squire Road at Copeland Circle (adjacent ramps upstream)									
Weekday Morning	On Ramp	19.2	B	19.6	B	19.6	B	19.6	B
Weekday Evening	On Ramp	21.1	C	22.8	C	22.8	C	22.6	C
Copeland Circle to Route 1 Northbound (adjacent ramps downstream)									
Weekday Morning	Off Ramp	21.9	C	22.3	C	20.5	C	20.5	C
Weekday Evening	Off Ramp	24.1	C	26.0	C	24.2	C	24.1	C
Copeland Circle to Route 1 Northbound (adjacent ramps upstream)									
Weekday Morning	Off Ramp	21.9	C	22.3	C	20.5	C	20.5	C
Weekday Evening	Off Ramp	24.1	C	26.0	C	24.2	C	24.1	C

a. Density, passenger cars per mile per lane.
b. Level-of-service.

Table 6-28 Weave Segment Capacity Analysis

Roadway Segment	2028 No-Build Conditions			2028 Build Conditions – CTPS/MassDOT Parameters			2028 Build Conditions with Mitigation – CTPS/MassDOT Parameters			2028 Build Conditions with Mitigation – Expected TOD Parameters		
	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]
Copeland Circle between Route 1 Northbound Off-Ramp and Squire Road Southbound On-Ramp "Rte 1 NB Off Ramp to Squire"												
Weekday Morning	10.8	B	0.549	13.2	B	0.706	19.0	B	0.710	18.6	B	0.696
Weekday Evening	16.7	B	0.774	17.3	B	0.808	26.1	C	0.873	26.1	C	0.871
Copeland Circle between Route 1 Southbound Off-Ramp and Squire Road Northbound On-Ramp "Rte 1 SB Off Ramp to Squire NB"												
Weekday Morning	14.4	B	0.505	18.1	B	0.634	26.2	C	0.676	25.7	C	0.665
Weekday Evening	21.6	C	0.799	22.8	C	0.838	34.5	D	0.889	34.4	D	0.887
Copeland Circle between Squire Road Southbound On-Ramp and Route 1 Southbound Off-Ramp "Squire SB to Rte 1 SB On Ramp"												
Weekday Morning	15.5	B	0.433	18.3	B	0.499	27.6	C	0.729	27.1	C	0.719
Weekday Evening	14.3	B	0.409	14.9	B	0.424	22.9	C	0.636	22.8	C	0.635

a. Density, passenger cars per mile per lane.
b. Level-of-service.
c. Volume to capacity ratio.

2028 Mitigation Condition – Merge, Diverge, and Weave Analysis

Under the 2028 Mitigation Condition, the merge, diverge, and weave segments at both Copeland Circle and Route 1 at Route 16 continue to operate at acceptable thresholds of LOS D or better.

2028 Mitigation Condition – Traffic Circle (Roundabout) Analysis

Under 2028 Mitigation Condition, Brown Circle will continue to operate with excessive delays for all approaches. Under 2028 Mitigation Condition at Butler Circle the majority of approaches will continue to operate at LOS D or better, with the expectations of the southbound right-turn operating at LOS F, during the morning peak hour condition and the northbound approach operating at LOS F during the evening peak hour.

2028 Mitigation Condition – MBTA Bus Delay Analysis

The potential impacts and benefits to MBTA bus operations resulting from the traffic generated by the Project and the extensive roadway improvements proposed as part of the Project's mitigation package (detailed in Section 6.10) were assessed for 2028 Conditions. Table 6-29 identifies the MBTA bus routes that operate through study-affected intersections, including routes that directly serve the Project Site as well as routes that do not directly serve the Project Site but operate through one or more of the study area intersections (e.g. Route 117). By applying the peak hour delays developed from the intersection capacity analysis (summarized in Section 6.10.1, with detailed delay outputs by intersection movement provided in Appendix D), the traffic delay impacts were estimated for each MBTA bus route that

traverses any of the study area intersections[69]. The projected cumulative average delay per trip that a bus would experience at these intersections in the 2028 No-Build Condition, as well as the incremental delay impacts for each 2028 Build Condition, is summarized in Table 6-30 for the morning and evening peak hours.

As expected, in general, bus routes are projected to experience an increase in delay in the 2028 Build without Mitigation Condition as compared to the 2028 No-Build Condition. These projected delay increases range from negligible additional delay to cumulative delay increases of up to approximately 4.6 minutes, depending on the route and direction. As compared to the 2028 No-Build Condition, most bus routes would experience reductions in delay in the 2028 Build with Mitigation Conditions due to proposed roadway improvements, with only a few routes projected to experience marginal increases in delay of less than one minute. The projected benefits of reduced delay in the 2028 Build with Mitigation Conditions range from modest delay reductions to delay reductions of up to approximately 3.7 minutes, depending on the route and direction.

[69] The assessment of traffic delay impacts to MBTA bus operations considered study area intersections (signalized, unsignalized, and roundabout intersections) only, and does not reflect potential increases or decreases in delay resulting from roadway segments (link delay) or from intersections located outside of the Project study area.

Table 6-29 Summary of Study Area Intersections Impacting MBTA Bus Routes

Type of Intersection	Location	Impacted MBTA Bus Routes[b]
Signalized	Bennington Street at Neptune Road	112 IB, 112 OB, 120 IB, 120 OB, 121 IB, 121 OB
Signalized	Route 1A NB Off-Ramp and Vienna Street at Neptune Road	n/a
Signalized	Route 1A at Boardman Street	120 OB, 434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A at Boardman Street (West)[a]	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A at Tomasello Dr	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A at the Jughandle	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A at Furlong St	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A On-Ramp at Winthrop Avenue (Route 145)	119 IB, 119 OB
Signalized	American Legion Highway (Route 60) at Revere Street	116 IB, 116 OB, 411 OB, 424W IB, 424 OB, 426W IB, 434 IB, 434 OB, 450 IB, 450 OB, 455 IB, 455 OB, 459 IB, 459 OB
Signalized	Squire Road (Route 60) at Charger Street	119 OB, 411 IB, 411 OB, 426W IB
Signalized	Squire Road (Route 60) at Sigourney Street	119 OB, 411 IB, 411 OB, 426W IB
Signalized	Revere Beach Parkway (Route 16) at Webster Avenue and Garfield Avenue	n/a
Signalized	Revere Beach Parkway (Route 16) at Winthrop Avenue (Route 145) and Harris Street	119 IB, 119 OB
Signalized	N. Shore Road (Route 1A) at Wonderland MBTA Lot and Driveway	110 IB, 110 OB, 116 IB, 116 OB, 117 IB, 117 OB, 411 OB, 448 IB, 448 OB, 449 IB, 449 OB
Signalized	N. Shore Road (Route 1A) at Revere Street	116 IB, 116 OB, 411 OB
Signalized	Winthrop Avenue (Route 145) at N. Shore Road	119 IB, 119 OB
Signalized	Winthrop Avenue (Route 145) at Tomasello Driveway	119 IB, 119 OB
Signalized	Bennington Street at Saratoga Street	120 IB, 120 OB
Signalized	Bennington Street and State Road at Winthrop Avenue	119 IB
Signalized	Revere Beach Parkway at Winthrop Avenue	119 IB, 119 OB
Signalized	VFW Parkway at Beach Street	110 IB, 110 OB, 117 IB, 117 OB, 411 IB, 424W IB, 426W IB, 448 IB, 448 OB, 449 IB, 449 OB, 455 IB, 455 OB
Signalized	Ocean Avenue at Revere Street	n/a
Signalized	Ocean Avenue at Beach Street	n/a
Signalized	North Shore Road at Beach Street	110 IB, 110 OB, 117 IB, 117 OB
Signalized	Bennington Street at Swift Street	120 IB, 120 OB
Signalized	Chelsea Street at Bennington Street	120 IB, 120 OB
Signalized	Chelsea Street at Prescott Street	120 IB, 120 OB
Signalized	Winthrop Avenue at Beachmont Lot and Site Driveway	n/a

a Indicates a new or modified intersection applicable in the Build with Mitigation Conditions.
b "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

Table 6-29 Summary of Study Area Intersections Impacting MBTA Bus Routes (Continued)

Type of Intersection	Location	Impacted MBTA Bus Routes[b]
Signalized	Route 60 at Breed Street	n/a
Signalized	Route 1A at Southern U-Turn [a]	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Route 1A at Northern U-Turn [a]	434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 459 IB, 459 OB
Signalized	Bennington Street at Vienna Street [a]	n/a
Signalized	Bell Circle – Route 60 at Circle (North)	110 IB, 117 IB, 411 IB, 424W IB, 424 OB, 426W IB, 434 IB, 434 OB, 448 IB, 449 IB, 450 IB, 450 OB, 455 IB, 455 OB, 459 IB, 459 OB
Signalized	Bell Circle – Route 60, Route 1A, Route 16 at Circle (South)	110 OB, 117 OB, 424W IB, 424 OB, 426W IB, 434 IB, 434 OB, 448 IB, 448 OB, 449 IB, 449 OB, 450 IB, 450 OB, 455 IB, 459 IB, 459 OB
Signalized	Bell Circle – VFW Parkway at Circle (East)	110 IB, 110 OB, 117 IB, 117 OB, 411 IB, 424W IB, 426W IB, 448 IB, 448 OB, 449 IB, 449 OB, 455 IB, 455 OB
Signalized	Bell Circle – Beach Street at Circle (West)	110 OB, 117 OB, 424W IB, 426W IB, 448 IB, 449 IB, 455 IB
Signalized	Eliot Circle – Revere Beach Parkway/Ocean Avenue & State Road	n/a
Unsignalized	Saratoga Street at Neptune Road	112 IB
Unsignalized	Bremen Street at Neptune Road	112 IB
Unsignalized	Route 1A SB at Curtis Street	n/a
Unsignalized	Route 1A at Waldemar Avenue [Waldemar Ave at Route 1A]	n/a
Unsignalized	Route 1A at Tomasello Drive	n/a
Unsignalized	Route 1A at Furlong Street [Furlong Street at Route 1A]	n/a
Unsignalized	Bennington Street at Crescent Avenue	n/a
Unsignalized	Eliot Circle – Revere Beach Boulevard at Winthrop Parkway	n/a
Unsignalized	Ocean Avenue at Revere Street	n/a
Unsignalized	North Shore Road at Lynnway NB Off Ramp	n/a
Unsignalized	North Shore Road at Lynnway SB Ramps	n/a
Unsignalized	Chelsea Street at Unnamed Road (Day Square)	112 OB, 121 IB
Unsignalized	Bennington Street at Unnamed Road (Day Square)	112 OB, 121 IB
Unsignalized	Winthrop Avenue at Beachmont Station Parking Driveway	n/a
Roundabout	Brown Circle (Route 107 at Route 60)	424W IB, 424 OB, 426W IB, 434 IB, 434 OB, 450 IB, 450 OB, 455 IB, 455 OB, 459 IB, 459 OB
Roundabout	Butler / Wonderland Circle (Route 1A at North Shore Road)	110 IB, 110 OB, 116 OB, 411 OB, 426W IB, 448 IB, 448 OB, 449 IB, 449 OB, 455 IB, 455 OB

a Indicates a new or modified intersection applicable in the Build with Mitigation Conditions.
b "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

Table 6-30 Intersection Delay Impacts (In Seconds) to MBTA Bus Routes – 2028 Conditions

MBTA Bus Route	Route Direction[a]	Traffic Peak Hour	2028 No-Build Total Delay[b]	2028 Build (CTPS/MassDOT Parameters) without Mitigation Delay Increase from No-Build[c]	2028 Build (CTPS/MassDOT Parameters) with Mitigation Delay Increase from No-Build[c]	2028 Build (Expected TOD Parameters) with Mitigation Delay Increase from No-Build[c]
Route 110	IB	Morning	244	17	-40	-40
		Evening	321	108	-15	-17
	OB	Morning	219	2	-74	-76
		Evening	181	27	57	48
Route 112	IB	Morning	164	5	-13	-14
		Evening	181	5	-28	-28
	OB	Morning	41	0	-11	-11
		Evening	50	1	-17	-17
Route 116	IB	Morning	270	0	-32	-33
		Evening	291	0	-36	-36
	OB	Morning	239	14	-4	-8
		Evening	251	0	-53	-53
Route 117	IB	Morning	237	17	-40	-40
		Evening	315	108	-15	-17
	OB	Morning	208	2	-75	-77
		Evening	144	-11	10	10
Route 119	IB	Morning	289	53	-91	-98
		Evening	384	17	-144	-160
	OB	Morning	362	60	-222	-222
		Evening	315	26	-28	-52
Route 120	IB	Morning	298	1	-7	-7
		Evening	295	0	8	8
	OB	Morning	340	9	-50	-61
		Evening	393	1	8	6
Route 121	IB	Morning	109	15	-38	-38
		Evening	102	1	-24	-24
	OB	Morning	114	4	5	5
		Evening	40	5	-7	-7
Route 411	IB	Morning	N/A	N/A	N/A	N/A
		Evening	279	107	-16	-18
	OB	Morning	N/A	N/A	N/A	N/A
		Evening	266	1	-52	-52
Route 424	IB	Morning	360	83	-62	-72
		Evening	N/A	N/A	N/A	N/A
	OB	Morning	N/A	N/A	N/A	N/A
		Evening	217	82	32	22

a "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

b Represents the cumulative average total delay per trip (in seconds) to MBTA bus routes, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement.

c Represents the change in cumulative average total delay per trip (in seconds) to MBTA bus routes between the Build Condition as compared to the No-Build Condition, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement. Negative values represent reductions in delay projected for the Build Condition as compared to the No-Build Condition.

Table 6-30 Intersection Delay Impacts (In Seconds) to MBTA Bus Routes – 2028 Conditions (Continued)

MBTA Bus Route	Route Direction[a]	Traffic Peak Hour	2028 No-Build Total Delay[b]	2028 Build (CTPS/MassDOT Parameters) without Mitigation Delay Increase from No-Build[c]	2028 Build (CTPS/MassDOT Parameters) with Mitigation Delay Increase from No-Build[c]	2028 Build (Expected TOD Parameters) with Mitigation Delay Increase from No-Build[c]
Route 426W	IB	Morning	394	90	-58	-68
		Evening	N/A	N/A	N/A	N/A
	OB	Morning	N/A	N/A	N/A	N/A
		Evening	N/A	N/A	N/A	N/A
Route 434	IB	Morning	336	273	9	-3
		Evening	234	123	0	-3
	OB	Morning	236	23	49	27
		Evening	337	82	-2	-20
Route 448	IB	Morning	402	182	10	6
		Evening	58	116	-22	-24
	OB	Morning	329	16	-101	-122
		Evening	409	24	-59	-79
Route 449	IB	Morning	402	182	10	6
		Evening	58	116	-22	-24
	OB	Morning	329	16	-101	-122
		Evening	409	24	-59	-79
Route 450	IB	Morning	336	273	9	-3
		Evening	234	123	0	-3
	OB	Morning	236	23	49	27
		Evening	337	82	-2	-20
Route 455	IB	Morning	351	81	-63	-72
		Evening	296	28	34	24
	OB	Morning	324	63	10	10
		Evening	283	68	17	12
Route 459	IB	Morning	336	273	9	0
		Evening	234	123	0	-3
	OB	Morning	236	23	49	28
		Evening	337	82	-2	-20

a "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

b Represents the cumulative average total delay per trip (in seconds) to MBTA bus routes, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement.

c Represents the change in cumulative average total delay per trip (in seconds) to MBTA bus routes between the Build Condition as compared to the No-Build Condition, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement. Negative values represent reductions in delay projected for the Build Condition as compared to the No-Build Condition.

6.10.2 2028 Transit Mitigation

MBTA Blue Line Rapid Transit Service

New ridership and revenue on the MBTA system will be generated by the Project, largely via the Blue Line as a collector from the rest of the MBTA system. Based on the transit capacity analysis presented in Section 6.9.5, the Project is expected to increase ridership demands above policy capacity levels on the Blue Line in the 2028 Build Condition during off-peak periods when the MBTA's Policy[70] dictates a reduced acceptable maximum passenger load per car and when the schedule provides reduced service frequency. All trips projected to exceed policy capacity occur outside of the peak period, and all projected passenger loading levels are well below the crush capacity of the Blue Line. At the maximum load point on the Blue Line Inbound, total demand is projected to exceed policy capacity during four 30-minute periods of the day in the 2028 Build Conditions; three of these 30-minute periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. These policy capacity exceedances are projected to total up to approximately 725 passengers in a given 30-minute period in the Build Condition, compared to exceedances of up to approximately 560 passengers in the No-Build Condition. With the exception of a single off-peak 30-minute period (10:00 a.m. to 10:30 a.m.), the Project is not projected to cause the MBTA Blue Line Inbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. During the 10:00 a.m. to 10:30 a.m. period, the Project is anticipated to result in a policy capacity exceedance of approximately 45 passengers through the maximum load point, equivalent to approximately 14 passengers per six-car train.

At the maximum load point on the Blue Line Outbound, total demand is projected to exceed policy capacity during two 30-minute periods of the day in the 2028 Build Conditions but remain well below crush capacity; both of these 30-minute periods are projected to exceed policy capacity without the Project in the 2028 No-Build Condition. Therefore, the Project is not projected to cause the MBTA Blue Line Outbound to exceed additional policy capacity thresholds beyond those periods otherwise exceeded under 2028 No-Build Conditions. Blue Line Outbound policy capacity exceedances are projected to total up to approximately 285 passengers in a given 30-minute period in the Build Condition, compared to exceedances of up to approximately 220 passengers in a given 30-minute period in the No-Build Condition. The Proponent will work with the MBTA to evaluate and monitor these 10-year horizon demands over the course of the Project.

MBTA Blue Line Stations

The Proponent, as requested and in coordination with the MBTA, is in the process of conducting an engineering and architectural assessment of Suffolk Downs Station and Beachmont Station. The scope of the station assessments will evaluate

[70] MBTA, *Service Delivery Policy, 2017 Update*, Approved January 23, 2017.

the station infrastructure conditions and compliance with current codes, including codes related to fire/life safety and accessibility. The station assessments will also identify anticipated Project impacts related to infrastructure conditions and code compliance in the 2028 Build Condition that may trigger the need for station upgrades. The Proponent will continue to work in coordination with the MBTA to complete the station assessment scope and identify any Project-related station impacts, with additional information regarding this work to be provided in the Project's FEIR.

MBTA Bus Routes

New ridership and revenue on the MBTA's Route 119 will be generated by the Project. Based on the transit capacity analysis presented in Section 6.9.5, the Project is expected to slightly increase ridership demands on the MBTA's Route 119 in the 2028 Build Condition, with total demands projected to minorly exceed policy capacity on several trips in the inbound direction but remain well below crush capacity. Up to four early morning and morning peak period trips on the Route 119 Inbound are projected to slightly exceed policy capacity in the 2028 Build (CTPS/MassDOT Parameters) Condition, and up to five early morning and morning peak period trips on the Route 119 Inbound are projected to slightly exceed policy capacity in the 2028 Build (Expected TOD Parameters) Condition. In instances when total demands exceed policy capacity, demands are projected to be between one and eight passengers greater than policy capacity per trip, and well below the crush capacity for a bus, compared to exceedances of up to three passengers above policy capacity per trip in the No-Build Condition. The Proponent will work with the MBTA to evaluate and monitor these 10-year horizon demands over the course of the Project.

MBTA Bus Stops

Opportunities to improve MBTA bus stops in the Project area, including on the Route 1A and Winthrop Avenue corridors, were explored by the Proponent in coordination with MassDOT and the MBTA. Through these coordination efforts, opportunities to incorporate bus pull-outs on Route 1A at Tomasello Drive were identified and incorporated into the proposed Route 1A Corridor "Super Street" design, detailed in Section 6.10. The proposed bus pull-outs would allow inbound and outbound buses traveling via Route 1A to exit the travel lane completely, into a dedicated bus pull-out lane adjacent to the sidewalk, providing safety benefits while buses are stopped to pick-up and drop-off passengers.

Additionally, the Proponent has completed construction of a new Route 119 bus stop and turnaround on Tomasello Drive, serving the Stop & Shop and surrounding retail, which entered service on September 2, 2018. The Proponent will continue to work with the MBTA to relocate this stop and add additional on-site bus stops as needed as the Project is developed.

MBTA Bus Support Facilities

The Proponent has discussed potential impacts to bus support facilities (related to vehicle maintenance and layover needs) with the MBTA. The MBTA is currently assessing and planning for maintenance facility needs and future plans on a systemwide level. Based on the projected transit demands resulting from the Project, the MBTA and Proponent do not anticipate any Project-related impacts to bus support facilities, but this will continue to be monitored and evaluated as the Project gets built out.

New Shuttle Services

The Project will include provision of privately operated, on-site shuttle circulator services to encourage alternative modes of transportation and reduce auto-dependency. A proposed inner loop and outer loop route, providing shuttle connections for internal trips made within the Project Site as well as connections from the Project Site to the MBTA Blue Line, are illustrated in Figure 3.24. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be further developed in the FEIR as the Project's development phasing is refined.

New shuttle connections between the Project Site and key transportation and land use nodes are also being explored by the Proponent. The Proponent is committing to establish new, privately operated shuttle services that would provide direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the Newburyport/Rockport Line), as well as to the Seaport District. Figure 6.1 illustrates these proposed Project Site connector shuttle routes. The Proponent also considered a potential shuttle connection to the northern branch of the Orange Line, however initial evaluations found that the shuttle travel time would be highly variable during peak periods due to roadway congestion and that an Orange Line to Blue Line connection would be more reliable and time competitive based on existing conditions. The Proponent will continue to evaluate additional opportunities for shuttle connections to key land use and transportation nodes as planning progresses. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be finalized in the FEIR as coordination with the MBTA is advanced.

6.10.3 Transportation Monitoring Program

As requested in the Secretary's Certificate and in MassDOT's comment letter, the Proponent will commit to conducting a detailed transportation monitoring program for the site as it is built out. The primary goal of this monitoring program is to evaluate assumptions made in the DEIR, specifically related to trip generation, trip distribution, and mode shares. In addition, the monitoring program will allow the Proponent to evaluate the adequacy of the proposed mitigation measures as well as the participation rate and effectiveness of the TDM program. The Proponent

will work with MassDOT regarding the timeframe and frequency of the monitoring program as well as the study area intersections that need to be included.

6.11 2038 Future Conditions

6.11.1 2038 No-Build Traffic Volumes

To evaluate 2038 No-Build Conditions, the historic growth rate of 0.5 percent per year was applied to the 2018 Existing traffic volumes for 20 years. The 2038 No-Build Condition also includes 42 percent of the Master Plan Project site-generated traffic volumes. In addition to the future traffic volumes, the 2038 No-Build Condition includes all the mitigation measures proposed in 2028 and all associated trip distribution adjustments. The 2038 No-Build traffic volume networks are illustrated in Figures 6.55a-d and Figures 6.56a-d.

6.11.2 2038 No-Build Public Transportation

The estimation of growth in background transit ridership between existing conditions and the future 2038 No-Build conditions was conducted using the same methodology and assumptions as described in Section 6.8.1 for future 2028 No-Build conditions. Calculated average annual growth rates based on results from the CTPS Regional Travel Demand Model were applied to existing ridership data provided by the MBTA. Similar to the 2028 No-Build analysis, a minimum average annual growth rate of 0.1 percent for background growth was applied to all transit services analyzed for a conservative analysis, as summarized in Table 6-3, even for transit lines that were projected to have no growth or negative growth in the CTPS Model. Also similar to the 2028 No-Build analysis and as determined through coordination with MBTA, existing conditions schedules as of Summer 2018 were assumed for purposes of the 2038 No-Build transit capacity analyses.

6.11.3 2038 Build Conditions Traffic Volumes

To evaluate 2038 Build Conditions, the historic growth rate of 0.5 percent per year was applied to the 2018 Existing traffic volumes for 20 years. The 2038 Build Condition assumes 100 percent of the Master Plan Project site-generated traffic volumes (see Appendix D for trip network). The 2038 Build traffic volume networks are illustrated in Figures 6.57a-h and Figures 6.58a-h.

6.11.4 2038 Build Public Transportation

The estimation of Project-generated transit ridership for the future 2038 Build Conditions was conducted using the same overall methodology as described in Section 6.8.2 for the future 2028 Build Conditions. By 2038, 100 percent of the Master Plan Project is anticipated to be implemented, corresponding to 100 percent of the total Project trip generation impacts.

The CTPS Model results found that, of the transit services that operate proximate to the Project Site (illustrated in Figure 6.8), the Master Plan Project would result in increased daily ridership on the Blue Line, MBTA Bus Route 119, and MBTA Bus Route 450. Trips were assigned to either the Blue Line, Route 119, or Route 450 proportionate to the CTPS Model results for daily ridership growth between the No-Build and Build Conditions for these specific transit services.

Similar to the 2028 Build Condition, a 2 percent shuttle mode share was assumed for Project trips occurring during the AM Peak and PM Peak periods to reflect new shuttle services to be provided by the Project Proponent, including direct site shuttles to/from North Station, South Station, Chelsea Station, and the Seaport District.

Similar to the 2028 Build Condition, the detailed geographic distribution of trips for each transit service was also informed by the CTPS Model, in order to project how many trips to and from the site would be in the inbound and outbound directions within each time period. In order to estimate the split in Project-generated demand for Suffolk Downs Station versus Beachmont Station, the ratio of development square footage located closest to each station was used. Based on the anticipated 2038 program, approximately 56 percent of the development will be most proximate and best served by Suffolk Downs Station and 44 percent of the development will be most proximate and best served by Beachmont Station. This percentage split was used as a proxy for the split in ridership demand generated by the Project for each station.

The projected Build Condition transit ridership was also temporally distributed to 30-minute increments based on existing ridership data provided by the MBTA, as described for the 2028 Build Condition in Section 6.8.2.

Per coordination with the MBTA on analysis assumptions, existing conditions schedules as of Summer 2018, as described in Section 6.7.3, were assumed for purposes of all horizon year transit capacity analyses. As specifically scoped by MEPA and the MBTA, the Build analysis additionally considers potential enhanced Blue Line peak capacity. Utilizing the existing Blue Line vehicle fleet, potential enhanced capacity is assumed to achieve peak service of a train every 4.0 minutes, based on information presented by the MBTA to the Fiscal & Management Control Board in November 2017.[71] The MBTA is planning to conduct a forthcoming signal upgrade study for the Blue Line, which will assess Blue Line performance and infrastructure conditions as well as identify potential targeted upgrades and improvements.

[71] MBTA. Integrated Fleet and Facilities Plan. Presentation to Fiscal & Management Control Board. November 20, 2017.

6.12 2038 Transportation Capacity Analysis

6.12.1 Intersection Capacity Analysis

Intersection capacity analyses were conducted at all intersections in the study area. Tables 6-31 and 6-32 summarize the capacity analyses for signalized intersections, unsignalized intersections, and the two roundabouts, respectively, for the 2028 Build Conditions with Mitigation, 2038 No-Build, and 2038 Build.

Table 6-31 Signalized Intersection Capacity Analysis

Location	Movement	2038 No-Build Conditions v/c [a]	Del [b]	LOS [c]	2038 Build Conditions – CTPS MassDOT Parameters v/c	Del	LOS	2038 Build Conditions – Expected TOD Parameters v/c	Del	LOS
Route 1 A at Boardman Street										
	Weekday Morning	0.99	21	C	1.05	36	D	1.02	29	C
	Weekday Evening	1.03	29	C	1.13	55	E	1.08	43	D
Route 1 A at Boardman Street - West										
	Weekday Morning	0.98	62	E	1.08	79	E	1.04	71	E
	Weekday Evening	0.91	8	A	1.06	27	C	0.99	14	B
Route 1A at Southern U-Turn										
	Weekday Morning	0.85	4	A	0.90	6	A	0.88	5	A
	Weekday Evening	1.00	25	C	1.08	43	D	1.04	35	C
Route 1A at Northern U-Turn										
	Weekday Morning	0.76	10	A	0.98	27	C	0.83	17	B
	Weekday Evening	0.89	4	A	1.03	23	C	0.97	9	A
Route 1A at Tomasello Drive										
	Weekday Morning	0.82	12	B	1.06	45	D	0.94	19	B
	Weekday Evening	0.92	11	B	1.14	68	E	1.04	42	D
Route 1A at Jughandle										
	Weekday Morning	0.75	10	A	0.95	16	B	0.86	12	B
	Weekday Evening	0.68	8	A	0.75	10	B	0.72	9	A
Route 1A at Furlong St										
	Weekday Morning	0.73	8	A	0.94	21	C	0.84	12	B
	Weekday Evening	0.84	16	B	1.10	77	E	1.00	45	D
Route 1A On-Ramp at Route 145										
	Weekday Morning	0.86	10	B	1.11	74	E	0.99	30	C
	Weekday Evening	0.83	8	A	0.94	13	B	0.89	9	A
Route 16 at Winthrop Avenue/Route 145/Harris Street										
	Weekday Morning	1.00	57	E	1.39	158	F	1.20	104	F
	Weekday Evening	1.19	95	F	1.45	187	F	1.33	142	F
Route 145/Winthrop Avenue at North Shore Road										
	Weekday Morning	0.75	26	C	0.96	41	D	0.87	32	C
	Weekday Evening	0.82	52	D	1.09	172	F	0.97	115	F
Tomasello Dr at Winthrop Avenue/Route 145										
	Weekday Morning	0.86	28	C	1.54	127	F	1.18	58	E
	Weekday Evening	1.07	54	D	1.43	187	F	1.27	119	F
Winthrop Avenue at Beachmont Lot and Site Driveway										
	Weekday Morning	0.55	23	C	1.00	61	E	0.98	49	D
	Weekday Evening	0.71	10	B	0.99	48	D	0.87	20	B
Revere Beach Parkway at Winthrop Avenue										
	Weekday Morning	0.60	62	E	0.71	62	E	0.67	80	E
	Weekday Evening	0.80	40	D	0.97	53	D	0.89	44	D
Eliot Circle – Revere Beach Parkway/Ocean Avenue & State Road										
	Weekday Morning	0.56	18	B	0.61	19	B	0.59	19	B
	Weekday Evening	0.70	12	B	0.79	13	B	0.75	13	B
Bell Circle – Route 60 at Circle (North)										
	Weekday Morning	0.87	24	C	1.04	55	E	0.96	34	C
	Weekday Evening	1.06	29	C	1.29	80	E	1.14	41	D
Bell Circle – Route 60, Route 1A, Route 16 at Circle (South)										
	Weekday Morning	0.88	32	C	0.98	38	D	0.93	34	C
	Weekday Evening	1.17	82	F	1.33	140	F	1.24	102	F

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-31 Signalized Intersection Capacity Analysis (Continued)

		2038 No-Build Conditions			2038 Build Conditions – CTPS MassDOT Parameters			2038 Build Conditions – Expected TOD Parameters		
Location	**Movement**	**v/c [a]**	**Del [b]**	**LOS [c]**	**v/c**	**Del**	**LOS**	**v/c**	**Del**	**LOS**
Bell Circle – VFW Parkway at Circle (East)										
	Weekday Morning	0.60	23	C	0.61	25	C	0.61	24	C
	Weekday Evening	0.90	26	C	0.94	77	E	0.92	44	D
Bell Circle – Beach at Circle (West)										
	Weekday Morning	0.43	22	C	0.44	22	C	0.44	22	C
	Weekday Evening	0.58	25	C	0.73	21	C	0.66	23	C
Webster Avenue at Garfield Avenue/Route 16										
	Weekday Morning	1.08	104	F	1.15	142	F	1.11	123	F
	Weekday Evening	1.16	134	F	1.23	177	F	1.18	157	F
Route 16/Revere Beach Parkway at Route 1 Southbound Off-Ramp										
	Weekday Morning	0.94	28	C	0.89	29	C	0.98	34	C
	Weekday Evening	0.85	18	B	0.97	28	C	0.92	22	C
Route 16/Revere Beach Parkway at Route 1 Northbound										
	Weekday Morning	0.75	11	B	0.83	13	B	0.81	12	B
	Weekday Evening	0.71	12	B	0.98	18	B	0.90	14	B
Route 60 (Squire Road) at Charger Street										
	Weekday Morning	0.77	26	C	0.87	29	C	0.81	27	C
	Weekday Evening	1.08	52	D	1.18	63	E	1.13	56	E
Route 60 (Squire Road) at Sigourney Street										
	Weekday Morning	0.90	24	C	0.96	28	C	0.93	26	C
	Weekday Evening	1.28	88	F	1.45	131	F	1.38	112	F
North Shore Road/Route 1A at MBTA Driveway										
	Weekday Morning	0.71	23	C	0.76	23	C	0.74	23	C
	Weekday Evening	0.71	21	C	0.75	21	C	0.73	21	C
North Shore Road/Route 1A at Revere Street										
	Weekday Morning	1.25	145	F	1.32	182	F	1.27	163	F
	Weekday Evening	1.55	162	F	1.82	232	F	1.68	196	F
Route 60 at Revere Street										
	Weekday Morning	0.92	79	E	1.13	155	F	1.03	118	F
	Weekday Evening	0.91	86	F	1.14	108	F	1.08	84	F
Route 60 at Breed Street										
	Weekday Morning	0.58	10	A	0.68	10	B	0.67	10	B
	Weekday Evening	0.82	9	A	0.95	19	B	0.91	14	B
VFW Parkway at Beach Street										
	Weekday Morning	0.70	21	C	0.74	26	C	0.72	23	C
	Weekday Evening	0.81	26	C	0.81	26	C	0.81	26	C
Ocean Avenue at Beach Street										
	Weekday Morning	0.65	14	B	0.68	15	B	0.67	14	B
	Weekday Evening	0.52	13	B	0.57	15	B	0.55	14	B
North Shore Road at Beach Street										
	Weekday Morning	0.45	18	B	0.50	19	B	0.47	19	B
	Weekday Evening	0.67	34	C	0.81	75	E	0.74	52	D
Bennington Street at Saratoga Street										
	Weekday Morning	0.90	63	E	0.97	75	E	0.93	67	E
	Weekday Evening	0.96	78	E	0.99	83	F	0.98	82	F
Bennington Street/State Road at Winthrop Avenue										
	Weekday Morning	1.03	151	F	1.30	206	F	1.16	176	F
	Weekday Evening	0.80	56	E	0.90	75	E	0.86	67	E
Bennington Street at Swift Street										
	Weekday Morning	0.61	13	B	0.61	13	B	0.61	13	B
	Weekday Evening	0.75	15	B	0.78	17	B	0.77	16	B

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-31 Signalized Intersection Capacity Analysis (Continued)

Location	Movement	2038 No-Build Conditions			2038 Build Conditions – CTPS MassDOT Parameters			2038 Build Conditions – Expected TOD Parameters		
		v/c [a]	Del [b]	LOS [c]	v/c	Del	LOS	v/c	Del	LOS
Bennington Street at Neptune Road										
	Weekday Morning	0.97	64	E	0.98	64	E	0.97	64	E
	Weekday Evening	0.67	46	D	0.69	50	D	0.68	48	D
Route 1A Off-Ramp at Vienna Street/Neptune Road										
	Weekday Morning	0.36	49	D	0.39	71	E	0.38	59	E
	Weekday Evening	0.59	39	D	0.59	39	D	0.59	39	D
Bennington Street at Vienna Street										
	Weekday Morning	0.85	27	C	0.87	32	C	0.86	27	C
	Weekday Evening	0.79	27	C	0.81	29	C	0.80	27	C
Chelsea Street at Bennington Street										
	Weekday Morning	1.24	296	F	1.26	308	F	1.26	304	F
	Weekday Evening	1.23	124	F	1.30	149	F	1.27	138	F
Chelsea Street at Prescott Street										
	Weekday Morning	0.48	21	C	0.48	21	C	0.48	21	C
	Weekday Evening	0.62	27	C	0.66	29	C	0.64	28	C

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.

Table 6-32 Unsignalized Intersection Capacity Analysis

		2038 No-Build Conditions					2038 Build Conditions – CTPS MassDOT Parameters					2038 Build Conditions – Expected TOD Parameters				
Location	**Movement**	**D [a]**	**v/c[b]**	**Del [c]**	**LOS [d]**	**95 Q[e]**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Route 1A at Curtis Street																
Weekday Morning	EB R	480	1.12	108	F	447	480	1.12	108	F	447	480	1.09	96	F	421
Weekday Evening	EB R	440	0.79	29	D	189	440	0.79	29	D	189	440	0.79	29	D	189
Route 1A at Waldemar Avenue																
Weekday Morning	WB R	145	0.20	11	B	18	145	0.33	16	C	35	145	0.24	12	B	24
Weekday Evening	WB R	125	0.57	39	E	80	150	0.59	36	E	88	140	0.58	36	E	83
Bennington Street at Crescent Avenue																
Weekday Morning	WB L	200	0.55	25	C	80	200	0.64	33	D	105	200	0.60	28	D	92
	WB R	400	0.66	20	C	122	515	0.89	40	E	270	450	0.78	27	D	184
Weekday Evening	WB L	65	0.32	29	D	33	65	0.35	32	D	37	65	0.34	31	D	35
	WB R	170	0.31	14	B	33	220	0.41	15	C	49	200	0.37	15	B	42
Eliot Circle – Revere Beach Boulevard at Winthrop Parkway																
Weekday Morning	EB L	365	1.42	285	F	326	390	1.68	398	F	394	380	1.57	352	F	367
	EB R	415	0.42	11	B	54	440	0.45	11	B	60	425	0.44	11	B	56
	NB L/T	620	0.32	7	A	335	645	0.34	7	A	38	635	0.33	7	A	37
Weekday Evening	EB L	940	2.49	720	F	1067	1080	2.97	937	F	1321	1015	2.74	834	F	1202
	EB R	825	0.83	22	C	257	915	0.92	32	D	372	875	0.88	27	D	315
	NB L/T	570	0.24	6	A	23	580	0.24	6	A	24	575	0.24	6	A	23

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

Table 6-32 Unsignalized Intersection Capacity Analysis

		2038 No-Build Conditions					2038 Build Conditions – CTPS MassDOT Parameters					2038 Build Conditions – Expected TOD Parameters				
Location	**Movement**	**D [a]**	**v/c[b]**	**Del [c]**	**LOS [d]**	**95 Q[e]**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Ocean Avenue at Revere Street																
Weekday Morning	EB R	310	0.25	<1	A	0	505	0.32	<1	A	0	450	0.29	<1	A	0
	WB L/T	1550	1.21	118	F	1055	1560	1.35	177	F	1347	1555	1.28	148	F	1207
	NB L	160	Err	Err	F	Err	180	Err	Err	F	Err	170	Err	Err	F	Err
Weekday Evening	EB R	405	0.26	<1	A	0	500	0.32	<1	A	0	460	0.29	<1	A	0
	WB L/T	620	0.35	10	A	40	700	0.40	11	B	48	665	0.38	10	B	44
	NB L	265	1.80	435	F	529	380	3.17	Err	F	Err	330	2.51	751	F	783
North Shore Road at Lynnway NB Off Ramp																
Weekday Morning	EB L	10	0.05	9	A	4	10	0.05	9	A	4	10	0.05	9	A	4
Weekday Evening	EB L	20	0.08	11	B	6	20	0.08	12	B	7	20	0.08	12	B	6
North Shore Road at Lynnway SB Ramps																
Weekday Morning	EB L	40	0.76	19	C	190	40	0.76	19	C	190	40	0.76	19	C	190
Weekday Evening	EB L	65	0.30	14	B	32	65	0.34	15	B	38	65	0.32	14	B	35
Chelsea Street at Unnamed Road (Day Square)																
Weekday Morning	EB L	10	0.06	27	D	5	10	0.07	28	D	5	10	0.06	28	D	5
	EB R	20	0.04	12	B	3	20	0.04	12	B	3	20	0.04	12	B	3
	WB L	315	1.19	153	F	382	320	1.25	175	F	413	320	1.23	170	F	407
	WB T/R	180	0.26	12	B	26	180	0.26	12	B	26	180	0.26	12	B	26
Weekday Evening	EB L	15	0.09	28	D	8	15	0.10	29	D	8	15	0.09	29	D	8
	EB R	15	0.02	10	A	2	15	0.02	10	A	2	15	0.02	10	A	2
	WB L	240	0.75	40	E	145	265	0.82	49	E	180	260	0.80	46	E	171
	WB T/R	205	0.33	13	B	36	205	0.32	12	B	34	205	0.32	13	B	34
Bennington Street at Unnamed Road (Day Square)																
Weekday Morning	WB T/R	90	0.28	19	C	28	90	0.28	20	C	29	90	0.28	20	C	29
Weekday Evening	WB T/R	90	0.30	21	C	31	90	0.32	22	C	34	90	0.31	22	C	33

a. Demand
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

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2038 No-Build and Build Condition

Based on Table 6-31 and 6-32, from 2038 No-Build to 2038 Build Condition (CTPS MassDOT Parameters) several intersection operations degrade to LOS E or F during the weekday morning and/or weekday evening peak hours, as listed below.

Signalized

- Route 1A at Boardman Street-East – evening peak hour
- Route 1A at Tomasello Drive – evening peak hour
- Route 1A at Furlong – evening peak hour
- Route 1A On-Ramp at Route at Winthrop Avenue (Route 145) – morning peak hour
- Winthrop Avenue (Route 145) at N. Shore Road – evening peak hour
- Winthrop Avenue (Route 145) at Tomasello Drive
- Winthrop Avenue at Beachmont Lot/Site Driveway – morning peak hour
- Route 60 at Bell Circle – evening peak only
- Route 1A (VFW Highway) at Bell Circle - evening peak only
- Route 60 (Squire Road) at Charger Street – evening peak hour
- N. Shore Road at Beach Street – evening peak hour
- Route 1A Off-Ramp at Vienna Street and Neptune Road – morning peak hour

Unsignalized

- Route 1A at Waldemar Avenue – evening peak hour
- Bennington Street at Crescent Avenue-westbound right-turn – morning peak hour

Another important result to note is that while several intersections may degrade from LOS E to F between 2038 No-Build to 2038 Build Conditions (CTPS/MassDOT Parameters), the following intersections show improved operations under 2038 Build Conditions with Mitigation (CTPS/MassDOT Parameters) as compared to 2018 Existing Condition and 2028 No-Build Condition (see Table 6-17)

- Route 1A at Boardman Street-East
- Route 1A at Boardman Street-West
- Route 1A at Tomasello Drive
- Route 1A at Furlong
- Winthrop Avenue (Route 145) at N. Shore Road – morning peak hour
- Winthrop Avenue (Route 145) at Tomasello Drive
- Route 1A (VFW Highway) at Bell Circle - evening peak only
- Route 60 at Revere Street
- Bennington Street at Saratoga Street

› Bennington Street at Neptune Road

› Route 1A Off-Ramp at Vienna Street and Neptune Road

Comparatively, only the following intersections degrade to LOS E or F under 2038 Build Conditions (Expected TOD Parameters):

› Winthrop Avenue (Route 145) at N. Shore Road – evening peak hour

› Winthrop Avenue (Route 145) at Tomasello Drive

› Route 1A Off-Ramp at Vienna Street and Neptune Road – morning peak hour

It is important to note that with the exception of the three intersections listed above, all of the remaining intersections that are part of the mitigation program show improved operations under 2038 Build Conditions with Mitigation (Expected TOD Parameters) as compared to 2018 Existing Condition and 2028 No-Build Condition (see Table 6-17). These results demonstrate that even with the increased traffic volumes from background growth and project generated trips the project's proposed mitigation would provide 20-year roadway capacity operational benefits.

6.12.2 Merge/Diverge/Weave Analysis

Tables 6-33 and 6-34 summarize the capacity analyses for signalized intersections, unsignalized intersections, and the two roundabouts, respectively, for the 2028 Build Conditions with Mitigation, 2038 No-Build, and 2038 Build.

2038 No-Build and Build Condition

From the 2038 No-Build to the 2038 Build Condition, the merge, diverge, and weave segments at both Copeland Circle and Route 1 at Route 16 continue to operate at acceptable thresholds of LOS D or better expect for the following weave segments:

› Copeland Circle between Route 1 Southbound Off-Ramp and Squire Road Northbound On-Ramp "Rte 1 SB Off Ramp to Squire NB".

Table 6-33 Merge/Diverge Junction Capacity Analysis

Roadway Segment	Direction	2038 No-Build Conditions		2038 Build Conditions – CTPS MassDOT Parameters		2038 Build Conditions – Expected TOD Parameters	
		D [a]	LOS [b]	D	LOS	D	LOS
Route 1 Southbound at Route 16 Westbound							
Weekday Morning	On Ramp	Not Signalized Under This Condition			Not Signalized Under This Condition		
	Off Ramp						
Weekday Evening	On Ramp	Not Signalized Under This Condition			Not Signalized Under This Condition		
	Off Ramp						
Route 1 Northbound at Route 16 Eastbound							
Weekday Morning	On Ramp	12.4	B	18.0	B	16.5	B
	Off Ramp	15.2	B	20.6	C	19.2	B
Weekday Evening	On Ramp	19.5	B	21.4	C	20.9	C
	Off Ramp	17.6	B	18.6	B	18.3	B
Squire Road at Copeland Circle (adjacent ramps downstream)							
Weekday Morning	On Ramp	20.0	B	20.9	C	20.7	C
Weekday Evening	On Ramp	22.0	C	25.9	C	25.0	C
Squire Road at Copeland Circle (adjacent ramps upstream)							
Weekday Morning	On Ramp	20.0	B	20.9	C	20.7	C
Weekday Evening	On Ramp	22.0	C	25.9	C	25.0	C
Copeland Circle to Route 1 Northbound (adjacent ramps downstream)							
Weekday Morning	Off Ramp	21.0	C	22.0	C	21.8	C
Weekday Evening	Off Ramp	23.3	C	27.8	C	26.8	C
Copeland Circle to Route 1 Northbound (adjacent ramps upstream)							
Weekday Morning	Off Ramp	21.0	C	22.0	C	21.8	C
Weekday Evening	Off Ramp	23.3	C	27.8	C	26.8	C

a. Density, passenger cars per mile per lane
b. Level-of-service.

Table 6-34 Weave Segment Capacity Analysis

Roadway Segment	2038 No-Build Conditions			2038 Build Conditions – CTPS MassDOT Parameters			2038 Build Conditions – Expected TOD Parameters		
	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]	D [a]	LOS [b]	v/c [c]
Copeland Circle between Route 1 Northbound Off-Ramp and Squire Road Southbound On-Ramp "Rte 1 NB Off Ramp to Squire"									
Weekday Morning	17.0	B	0.621	23.7	C	0.903	21.8	C	0.824
Weekday Evening	26.7	C	0.881	28.8	D	0.961	28.2	D	0.940
Copeland Circle between Route 1 Southbound Off-Ramp and Squire Road Northbound On-Ramp "Rte 1 SB Off Ramp to Squire NB"									
Weekday Morning	23.3	C	0.608	38.5	E	0.934	30.9	D	0.777
Weekday Evening	34.7	D	0.890	39.1	E	0.982	38.0	E	0.960
Copeland Circle between Squire Road Southbound On-Ramp and Route 1 Southbound Off-Ramp "Squire SB to Rte 1 SB On Ramp"									
Weekday Morning	25.2	C	0.683	39.3	E	0.962	32.1	D	0.823
Weekday Evening	23.2	C	0.645	25.6	C	0.700	24.9	C	0.684

a. Density, passenger cars per mile per lane.
b. Level-of-service.
c. Volume to capacity ratio.

6.12.3 Traffic Circle (Roundabout) Analysis

Tables 6-35 summarize the capacity analyses for signalized intersections, unsignalized intersections, and the two roundabouts, respectively, for the 2028 Build Conditions with Mitigation, 2038 No-Build, and 2038 Build.

2038 No-Build and Build Condition

From the 2038 No-Build to the 2038 Build Condition, Brown Circle will continue to operate with excessive delays for all approaches. Under 2028 Mitigation Condition at Butler Circle the majority of approaches will continue to operate at LOS D or better, with the expectations of the southbound right-turn operating at LOS F, during the morning peak hour condition and the northbound approach operating at LOS during the evening peak hour

Table 6-35 Roundabout Capacity Analysis

		2038 No-Build Conditions				2038 Build Conditions – CTPS MassDOT Parameters				2038 Build Conditions – Expected TOD Parameters			
Location	**Movement**	**v/c [a]**	**Del [b]**	**LOS [c]**	**95 Q [d]**	**v/c**	**Del**	**LOS**	**95 Q**	**v/c [a]**	**Del [b]**	**LOS [c]**	**95 Q [d]**
Brown Circle													
Weekday	NB L/T/R	1.01	118	F	332	1.01	119	F	335	1.01	119	F	336
Morning	WB L/T/R	>1.20	376	F	3,805	>1.20	492	F	5,032	>1.20	461	F	4,704
	WB R	>1.20	375	F	3,942	>1.20	491	F	5,217	>1.20	460	F	4,876
	SB L/T/R	>1.20	1,567	F	13,621	>1.20	1,802	F	15,663	>1.20	1,740	F	15,125
	SB R	0.69	26	C	79	0.76	32	C	97	0.74	30	C	92
	EB L/T	1.04	102	F	885	>1.20	488	F	5,780	>1.20	380	F	4,469
	EB T/R	1.04	101	F	888	>1.20	487	F	5,939	>1.20	380	F	4,588
Weekday	NB L/T/R	>1.20	652	F	3,681	>1.20	655	F	3,689	>1.20	654	F	3,688
Evening	WB L/T/R	>1.20	662	F	6,748	>1.20	1,091	F	11,190	>1.20	978	F	10,023
	WB R	>1.20	661	F	7,001	>1.20	1,090	F	11,617	>1.20	977	F	10,404
	SB L/T/R	>1.20	956	F	8,227	>1.20	1,018	F	8,759	>1.20	996	F	8,563
	SB R	0.52	18	B	47	0.54	18	B	50	0.53	18	B	49
	EB L/T	>1.20	379	F	4,380	>1.20	525	F	6,133	>1.20	495	F	5,772
	EB T/R	>1.20	378	F	4,498	>1.20	525	F	6,304	>1.20	494	F	5,932
Butler/ Wonderland Circle													
Weekday	NB L/T	0.39	12	B	30	0.44	13	B	37	0.44	13	B	36
Morning	SB R	1.05	89	F	3,645	>1.20	322	F	8,288	>1.20	251	F	6,947
	SB T	0.34	7	A	31	0.44	8	A	45	0.41	8	A	40
	EB L	0.55	12	B	63	0.60	15	B	72	0.58	14	B	69
	EB L/R	0.55	12	B	60	0.60	14	B	69	0.58	14	B	66
Weekday	NB L/T	0.89	58	E	140	>1.20	306	F	2,018	1.17	213	F	1,288
Evening	SB R	0.82	21	C	212	0.91	34	C	396	0.89	29	C	328
	SB T	0.27	6	A	21	0.30	6	A	25	0.29	6	A	24
	EB L	0.76	20	C	151	0.78	22	C	160	0.78	21	C	158
	EB L/R	0.76	20	B	144	0.78	22	C	153	0.78	21	C	150
Saratoga Street at Neptune Road													
Weekday Morning	NB L/T/R	0.54	8	A	108	0.56	8	A	117	0.55	8	A	112
	WB L/T/R	0.82	12	B	327	0.84	13	B	356	0.83	12	B	338
	SB L/T/R	0.70	12	B	194	0.75	14	B	231	0.77	13	B	212
Weekday Evening	NB L/T/R	0.74	11	B	223	0.77	12	B	251	0.76	12	B	239
	WB L/T/R	0.83	13	B	336	0.86	15	B	389	0.85	14	B	366
	SB L/T/R	0.48	6	A	90	0.48	6	A	90	0.78	6	A	90

SIDRA INTERSECTION 7.0 – Delay and v/c (HCM 2010), Roundabout Capacity Model: US HCM 2010

a. Volume to capacity ratio.

b. Average total delay, in seconds per vehicle.

c. Level-of-service.

d. 95th percentile queue, in feet.

- LOS F will result if v/c >1 irrespective of lane delay value (degree or saturation) per lane.

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6.12.4 Public Transportation Analysis

The public transportation analysis identifies the Project's impacts to the MBTA transit system, including an analysis of maximum passenger demands versus capacities for individual transit lines as well as a station-level capacity analysis for Suffolk Downs Station and Beachmont Station.

Vehicle load standards detailed in the MBTA's Policy[72] define the passenger capacity conditions that are acceptable for passenger comfort by mode and time period. The absolute maximum number of passengers that can fit onto a transit vehicle (also referred to by the MBTA as "crush capacity") is greater than the vehicle load standards dictated by the MBTA's Policy. In order to analyze transit demand in relation to capacity provided for each transit service, maximum passenger loads were compared to policy capacity and to crush capacity for each 30-minute time period of the day.[73]

In order to evaluate the capacity of a station to accommodate ridership growth, projected pedestrian flows through key station elements, including platforms, circulation elements, and faregates were analyzed according to industry standard methodologies and assumptions provided in the *TCQSM*.[74] The *TCQSM* approach considers pedestrian LOS in the evaluation of active station pedestrian spaces such as platforms and pedestrian circulation areas. LOS thresholds range from A to F, with LOS A representing an unimpeded condition and LOS F representing an undesirable condition in which pedestrian movement is severely constrained. LOS C or better is typically considered a preferred design standard for station elements, with short-term periods of LOS D considered acceptable. [75] The *TCQSM* also provides nominal capacities for escalators and faregates, which were evaluated against the peak demands projected for these elements. Consistent with guidance in the *TCQSM*, the station analysis conservatively assumed maximum pedestrian flows based on a scenario where a service disruption during the peak of the peak period results in one dropped Blue Line trip. It is important to note that the pedestrian LOS experienced during typical conditions would be better than the more conservative LOS projected for conditions during a Blue Line service disruption.

The results of the public transportation analysis for 2038 Conditions are provided in the following sections.

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72 MBTA. *Service Delivery Policy, 2017 Update.* Approved January 23, 2017.

73 The methodology used to analyze transit demand as compared to capacity provided was developed in coordination with the MBTA. The analysis considers vehicle load standards as outlined in Appendix B of the *Service Delivery Policy, 2017 Update,* and evaluates demand and capacity for each 30-minute time period of the service day.

74 Transportation Research Board of the National Academies. Transit Cooperative Research Program, *Transit Capacity and Quality of Service Manual, Third Edition*, TCRP Report 165, 2013.

75 Transportation Research Board of the National Academies. Transit Cooperative Research Program, *Transit Capacity and Quality of Service Manual, Third Edition*, TCRP Report 165, 2013.

2038 No-Build and Build Conditions

MBTA Blue Line Rapid Transit Service

Substantial new ridership and revenue on the MBTA system will be generated by the Project, largely via the Blue Line as a collector from the rest of the MBTA system. In the 2038 No-Build Condition, the Blue Line is projected to operate within its policy capacity during the weekday peaks, as illustrated in Figure 6.59a. Similar to existing conditions and the 2028 No-Build Condition, passenger volumes are projected to exceed policy capacity just before and just after the peak periods, when service is less frequent and when the MBTA's Policy dictates reduced maximum passenger loading levels as compared to during the peak. However, passenger volumes are projected to remain well below crush capacity.

In the 2038 Build (CTPS/MassDOT Parameters) Condition, the Blue Line is projected to operate within its policy capacity during the weekday peaks, as illustrated in Figure 6.59b. In the 2038 (Expected TOD Parameters) Build Condition, a 31 percent peak transit share is anticipated, as compared to a 25 percent peak transit share assumed per the CTPS/MassDOT Parameters. Despite the higher transit ridership assumed in the 2038 Build (Expected TOD Parameters) Condition, the Blue Line is still projected to generally operate within its policy capacity during the weekday peaks, as illustrated in Figure 6.59c. All periods projected to exceed policy capacity have loading levels well below the Blue Line's crush capacity and occur outside of the peak period, with the exception of a modest exceedance of policy capacity on the Blue Line Inbound that would occur during the AM Peak between 8:00 a.m. and 8:30 a.m. in the 2038 Build (Expected TOD Parameters) Condition. In the 2038 Build (Expected TOD Parameters) Condition, peak demand is anticipated to exceed policy capacity by approximately 100 inbound riders during this 30-minute period, equivalent to approximately 15 passengers per six-car train. This demand is well within the limits of the Blue Line's potential enhanced AM Peak capacity, assumed to be able to achieve peak service of a train every 4.0 minutes based on information presented by the MBTA to the Fiscal & Management Control Board in November 2017.[76] Furthermore, it is important to note that this modest exceedance of AM Peak policy capacity projected on the Blue Line in the 2038 Build (Expected TOD Parameters) Condition represents a loading exceedance that is much lower than policy capacity exceedances currently experienced on the MBTA Red Line during the AM Peak.[77]

As previously mentioned, the Project's impacts to Blue Line loading would primarily occur during off-peak periods, when the schedule provides reduced service frequency and maximum acceptable passenger loads per the MBTA's policy are less than passenger loads considered acceptable during peak periods. At the maximum load point on the Blue Line Inbound, total demand is projected to exceed policy capacity during six 30-minute periods of the day in the 2038 Build (CTPS/MassDOT Parameters) Condition, and during seven 30-minute periods in the 2038 Build

[76] MBTA. Integrated Fleet and Facilities Plan. Presentation to Fiscal & Management Control Board. November 20, 2017.

[77] MBTA. MBTA State of the Service: Red Line Heavy Rail. Presentation to Fiscal & Management Control Board. January 25, 2015.

(Expected TOD Parameters) Condition; three of these 30-minute periods are projected to exceed policy capacity without the Project in the 2038 No-Build Condition. During off-peak periods where the Project would cause the MBTA Blue Line Inbound to exceed policy capacity (beyond those periods otherwise exceeded under 2038 No-Build Conditions), the Project would result in a policy capacity exceedance of approximately 60 to 225 inbound passengers per 30-minute period, equivalent to approximately 18 to 68 passengers per six-car train. In instances when total inbound demands in the 2038 Build Conditions exceed policy capacity, demands are projected to be up to approximately 975 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 575 passengers above policy capacity in the No-Build Condition.

At the maximum load point on the Blue Line Outbound, total demand is projected to exceed policy capacity during four 30-minute periods of the day in the 2038 Build Conditions; two of these 30-minute periods are projected to exceed policy capacity without the Project in the 2038 No-Build Condition. During off-peak periods where the Project would cause the MBTA Blue Line Outbound to exceed policy capacity (beyond those periods otherwise exceeded under 2038 No-Build Conditions), the Project would result in a policy capacity exceedance of approximately 75 to 175 outbound passengers per 30-minute period, equivalent to approximately 23 to 53 passengers per six-car train. In instances when total outbound demands in the 2038 Build Conditions exceed policy capacity, demands are projected to be up to approximately 390 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 230 passengers above policy capacity in the No-Build Condition. This off-peak demand, projected to occur over a 20-year horizon as the Project gets built out, is well within the Blue Line's existing peak capacity.

MBTA Blue Line Station Capacity

The following sections present the analysis of the Project's impact on platform activity and station demand as compared to capacity at Suffolk Downs Station and Beachmont Station.

Figures 6.60a and 6.60b illustrate the projected 2038 No-Build platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. In the 2038 No-Build Condition, daily platform activity at these stations is projected to increase by approximately 2.2 percent as compared to existing conditions. This increase in platform activity is well within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

Figures 6.60c and 6.60d illustrate the projected 2038 Build (CTPS/MassDOT Parameters) platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. Although daily platform activity is projected to notably increase as compared to the 2038 No-Build Condition, the projected platform activity is well within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

Figures 6.60e and 6.60f illustrate the projected 2038 Build (Expected TOD Parameters) platform activity at Suffolk Downs Station and Beachmont Station, respectively, during an average weekday. Although daily platform activity is projected to notably increase as compared to the 2038 No-Build Condition, the projected platform activity is within the capacity that can be accommodated by both the existing Suffolk Downs and Beachmont stations.

The results of the station capacity analysis, which evaluated peak passenger demands through critical station constraints, found that both of the Blue Line stations serving the Project Site have sufficient capacity to accommodate peak demands in the 2038 No-Build and 2038 Build Conditions. The capacity analysis conservatively assumed a service disruption of one dropped train trip during the peak period, which would result in a nine-minute gap in Blue Line service. It is important to note that the pedestrian LOS experienced during typical peak conditions (with Blue Line service every 4.5 minutes) would be better than the more conservative LOS projected for conditions during a service disruption. Capacity analysis results by station element are presented in Tables 6-36 and 6-37 for Suffolk Downs Station and Beachmont Station, respectively. At both stations, based on CTPS/MassDOT Parameters, the platforms and key circulation elements are projected to operate at a preferred LOS C or better during the peaks. With the higher transit ridership assumed based on Expected TOD Parameters Conditions, at Suffolk Downs Station, the outbound platform is projected to operate at an acceptable LOS D should a service disruption occur during the peak of the peak; the platform is projected to operate at a preferred LOS C or better under typical operating conditions. Should a service disruption of a dropped trip occur, a passenger would only experience a minimally acceptable LOS D for no more than 4.5 minutes on average (half of the service disruption period). All other Suffolk Downs Station circulation elements are projected to operate at a preferred LOS C or better during the peak in 2038 Build (Expected TOD Parameters) Conditions. At Beachmont Station, the platforms and key circulation elements are projected to operate at a preferred LOS C or better during periods of peak demand.

Table 6-36 Suffolk Downs Station Capacity Analysis Summary – 2038 Conditions

Station Element	2038 No-Build Capacity to Accommodate Peak Demand[a]	2038 Build (CTPS/MassDOT Parameters) Capacity to Accommodate Peak Demand[a]	2038 Build (Expected TOD Parameters) Capacity to Accommodate Peak Demand[a]
Inbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS C)
Outbound Platform	Yes (LOS A)	Yes (LOS C)	Yes (LOS D)
Stair (To/From Inbound Platform)	Yes (LOS A)	Yes (LOS B)	Yes (LOS B)
Stair (To/From Outbound Platform)	Yes (LOS A)	Yes (LOS B)	Yes (LOS B)
Ramp	Yes (LOS A)	Yes (LOS C)	Yes (LOS C)
Paid Area Walkway (on Bridge)	Yes (LOS A)	Yes (LOS C)	Yes (LOS C)
Faregates	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)

a Based on as-built station plans provided by the MBTA and element capacities analyzed per the standard station capacity assumptions and methodologies documented in the *TCQSM*. Analysis assumes demand based on a service disruption of one dropped train trip during the peak period (resulting in a nine-minute gap in Blue Line service).

Table 6-37 Beachmont Station Capacity Analysis Summary – 2038 Conditions

Station Element	2038 No-Build Capacity to Accommodate Peak Demand[a]	2038 Build (CTPS/MassDOT Parameters) Capacity to Accommodate Peak Demand[a]	2038 Build (Expected TOD Parameters) Capacity to Accommodate Peak Demand[a]
Inbound Platform	Yes (LOS A)	Yes (LOS A)	Yes (LOS B)
Outbound Platform	Yes (LOS A)	Yes (LOS C)	Yes (LOS C)
Stair (To/From Inbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Stair (To/From Outbound Platform)	Yes (LOS A)	Yes (LOS A)	Yes (LOS A)
Escalator (To/From Inbound Platform)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)
Escalator (To/From Outbound Platform)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)
Faregates	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)	Yes (Demand < Throughput Capacity)

a Based on as-built station plans provided by the MBTA and element capacities analyzed per the standard station capacity assumptions and methodologies documented in the *TCQSM*. Analysis assumes demand based on a service disruption of one dropped train trip during the peak period (resulting in a nine-minute gap in Blue Line service).

MBTA Bus Services

The analysis of 2038 No-Build and Build passenger loading conditions projected for each study area bus route are presented below. The Project is expected to increase ridership demands on MBTA's Route 119 and Route 450 in the 2038 Build Conditions. The Project is not projected to result in any increased ridership on other bus routes, and therefore there are no incremental impacts to these other bus routes as compared to the 2038 No-Build Condition.

› **Route 119**

The temporal distribution of projected 2038 No-Build demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.61a. Several early morning and morning peak trips on the Route 119 Inbound are projected to exceed policy capacity. All outbound trips are projected to fall within recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy.

The temporal distribution of projected 2038 Build (CTPS/MassDOT Parameters) demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.61b. On the Route 119 Inbound, total demand is projected to exceed policy capacity during two early morning and three morning peak trips; all five of these trips are projected to exceed policy capacity without the Project in the 2038 No-Build Condition. In instances when

total inbound demands in the 2038 Build (CTPS/MassDOT Parameters) Condition exceed policy capacity, demands are projected to be up to 20 passengers greater than policy capacity but still under crush capacity per trip, compared to exceedances of up to nine passengers above policy capacity per trip in the No-Build Condition. All outbound trips are projected to comply with recommended policy capacity thresholds as outlined by the MBTA Service Delivery Policy.

The temporal distribution of projected 2038 Build (Expected TOD Parameters) demand at the Route 119's maximum load points throughout the day is illustrated in Figure 6.61c. Five early morning and morning peak inbound trips and three evening peak outbound trips are projected to exceed policy capacity in the 2038 Build (Expected TOD Parameters) Condition, with one morning peak inbound trip projected to slightly exceed crush capacity by two passengers; all five of the inbound trips are also projected to exceed policy capacity without the Project in the 2038 No-Build Condition. In instances when total inbound demands in the 2038 Build (Expected TOD Parameters) Condition exceed policy capacity, demands are projected to be up to 25 passengers greater than policy capacity, compared to exceedances of up to nine passengers above policy capacity per trip in the No-Build Condition. In instances when total outbound demands in the 2038 Build (Expected TOD Parameters) Condition exceed policy capacity, peak demands are projected to be between four and five passengers greater than policy capacity per trip, and well below the crush capacity for a bus.

› **Route 120**

The temporal distribution of projected 2038 No-Build demand at the Route 120's maximum load points throughout the day is illustrated in Figure 6.62. Average passenger volumes at the peak load point are projected to exceed policy capacity in the morning and evening peaks, and/or just before and after peak service, in both the inbound and outbound directions. Some AM Peak inbound trips and PM Peak outbound trips are projected to exceed crush capacity in the 2038 No-Build Condition. The Project is not projected to result in any increased ridership on the Route 120.

› **Route 424**

The temporal distribution of projected 2038 No-Build demand at the Route 424's maximum load points throughout the day is illustrated in Figure 6.63. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2038 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 424.

› **Route 434**

The temporal distribution of projected 2038 No-Build demand at the Route 434's maximum load points throughout the day is illustrated in Figure 6.64. Similar to existing conditions, the route is projected to achieve recommended

passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2038 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 434.

- **Routes 448 and 449**

  The temporal distribution of projected 2038 No-Build demand at the Route 448 and Route 449 maximum load points throughout the day is illustrated in Figure 6.65 and Figure 6.66, respectively. Similar to existing conditions, both routes are projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy in the 2038 No-Build Condition. There are no trips in either direction projected to exceed policy capacity. The Project is not projected to result in any increased ridership on the Route 448 or the Route 449.

- **Route 450**

  The temporal distribution of projected 2038 No-Build demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.67a. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2038 No-Build Condition.

  The temporal distribution of projected 2038 Build (CTPS/MassDOT Parameters) demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.67b. Similar to the No-Build Condition, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2038 Build (CTPS/MassDOT Parameters) Condition. The temporal distribution of projected 2038 Build (Expected TOD Parameters) demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.67c. Similar to the No-Build Condition, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2038 Build (Expected TOD Parameters) Condition.

- **Route 459**

  The temporal distribution of projected 2038 No-Build demand at the Route 450's maximum load points throughout the day is illustrated in Figure 6.68. Similar to existing conditions, the route is projected to achieve recommended passenger loading thresholds as outlined by the MBTA Service Delivery Policy, with no trips in either direction projected to exceed policy capacity in the 2038 No-Build Condition. The Project is not projected to result in any increased ridership on the Route 459.

MBTA Bus Delay Analysis

The potential impacts and benefits to MBTA bus operations resulting from the traffic generated by the Project and the extensive roadway improvements proposed as part of the Project's mitigation package (detailed in Section 6.10) were assessed for 2038 Conditions. By applying the peak hour delays developed from the intersection capacity analysis (summarized in Section 6.12.1, with detailed delay outputs by intersection movement provided in Appendix D), the traffic delay impacts were estimated for each MBTA bus route that traverses any of the study area intersections[78]. (Refer to Table 6-29 for a list of MBTA bus routes that operate through each study area intersection). The projected cumulative average delay per trip that a bus would experience at these intersections in the 2038 No-Build Condition, as well as the incremental delay impacts for each 2038 Build Condition, is summarized in Table 6-38 for the morning and evening peak hours.

In the 2038 Build Conditions, study area bus routes are projected to experience increases in delay as compared to the 2038 No-Build Condition. As compared to the 2038 No-Build Condition, projected delay impacts range from negligible increases in delay to up to approximately 6.5 minutes of additional cumulative delay in the 2038 Build (CTPS/MassDOT Parameters) Condition, depending on the route and direction. In the 2038 Build (Expected TOD Parameters) Condition, increases in delay are projected to range from negligible levels to up to approximately 3.0 minutes as compared to the 2038 No-Build Condition, depending on the route and direction.

It is important to note that, as discussed throughout this chapter, the projections for 2038 Build (MassDOT/CTPS Parameters) traffic volumes are expected to be highly conservative and may overstate future volumes and associated intersection delays in the study area. As such, the Proponent will be implementing a robust and detailed transportation monitoring program to evaluate these 20-year horizon conditions over the course of the Project and identify impacts as the Project is implemented. Additionally, it is important to reiterate that two program options were considered for master planning purposes. This DEIR/DPIR fully analyzes the potential impacts and presents mitigation measures for the "pro-commercial" program, or Program A. The "pro-residential" program, or Program B, consists of less commercial office space (up to 5.25 MSF) and more residential space (up to 10.4 MSF, or approximately 10,000 units). Program A is generally more impactful as it relates to traffic generation. Program B would have approximately 6 percent less traffic during the AM peak and approximately 10 percent less during the PM peak, which would result in reduced delay impacts to MBTA bus operations as compared to Program A. Therefore, this DEIR/DPIR presents a conservative impact analysis.

[78] The assessment of traffic delay impacts to MBTA bus operations considered study area intersections (signalized, unsignalized, and roundabout intersections) only, and does not reflect potential increases or decreases in delay resulting from roadway segments (link delay) or from intersections located outside of the Project study area.

Table 6-38 Intersection Delay Impacts (In Seconds) to MBTA Bus Routes – 2038 Conditions

MBTA Bus Route	Route Direction[a]	Traffic Peak Hour	2038 No-Build Total Delay[b]	2038 Build (CTPS/MassDOT Parameters) with 2028 Mitigation Delay Increase from No-Build[c]	2038 Build (Expected TOD Parameters) with 2028 Mitigation Delay Increase from No-Build[c]
Route 110	IB	Morning	227	5	1
		Evening	321	90	60
	OB	Morning	149	11	4
		Evening	223	63	57
Route 112	IB	Morning	157	30	1
		Evening	153	0	0
	OB	Morning	31	1	1
		Evening	34	0	0
Route 116	IB	Morning	262	7	5
		Evening	220	57	57
	OB	Morning	247	9	8
		Evening	177	39	39
Route 117	IB	Morning	220	4	0
		Evening	315	90	60
	OB	Morning	137	10	3
		Evening	165	1	-5
Route 119	IB	Morning	214	178	72
		Evening	274	38	20
	OB	Morning	147	23	13
		Evening	314	118	101
Route 120	IB	Morning	296	-1	-1
		Evening	317	0	-1
	OB	Morning	285	16	5
		Evening	426	43	23
Route 121	IB	Morning	72	2	1
		Evening	79	0	1
	OB	Morning	120	0	0
		Evening	33	0	0
Route 411	IB	Morning	N/A	N/A	N/A
		Evening	277	87	57
	OB	Morning	N/A	N/A	N/A
		Evening	195	41	39
Route 424	IB	Morning	317	96	57
		Evening	N/A	N/A	N/A
	OB	Morning	N/A	N/A	N/A
		Evening	318	149	47

a "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

b Represents the cumulative average total delay per trip (in seconds) to MBTA bus routes, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement.

c Represents the change in cumulative average total delay per trip (in seconds) to MBTA bus routes between the Build Condition as compared to the No-Build Condition, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement. Negative values represent reductions in delay projected for the Build Condition as compared to the No-Build Condition.

Table 6-38 Intersection Delay Impacts (In Seconds) to MBTA Bus Routes – 2038 Conditions (Continued)

MBTA Bus Route	Route Direction[a]	Traffic Peak Hour	2038 No-Build Total Delay[b]	2038 Build (CTPS/MassDOT Parameters) with 2028 Mitigation Delay Increase from No-Build[c]	2038 Build (Expected TOD Parameters) with 2028 Mitigation Delay Increase from No-Build[c]
Route 426W	IB	Morning	357	107	62
		Evening	N/A	N/A	N/A
	OB	Morning	N/A	N/A	N/A
		Evening	N/A	N/A	N/A
Route 434	IB	Morning	395	168	98
		Evening	258	50	-2
	OB	Morning	277	144	48
		Evening	434	387	164
Route 448	IB	Morning	428	121	78
		Evening	40	59	20
	OB	Morning	223	120	37
		Evening	376	302	181
Route 449	IB	Morning	428	121	78
		Evening	40	59	20
	OB	Morning	223	120	37
		Evening	376	302	181
Route 450	IB	Morning	395	168	98
		Evening	258	50	-2
	OB	Morning	277	144	48
		Evening	434	387	164
Route 455	IB	Morning	308	91	56
		Evening	327	50	37
	OB	Morning	307	37	32
		Evening	368	121	63
Route 459	IB	Morning	395	168	98
		Evening	258	50	-2
	OB	Morning	277	144	48
		Evening	434	387	164

a "IB" indicates the Inbound route direction. "OB" indicates the Outbound route direction.

b Represents the cumulative average total delay per trip (in seconds) to MBTA bus routes, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement.

c Represents the change in cumulative average total delay per trip (in seconds) to MBTA bus routes between the Build Condition as compared to the No-Build Condition, based on the traffic capacity analysis for all study area intersections (signalized, unsignalized, and roundabout intersections). Analysis assumes a maximum delay of 120 seconds for any given intersection movement. Negative values represent reductions in delay projected for the Build Condition as compared to the No-Build Condition.

6.13 2038 Horizon Year Mitigation

6.13.1 2038 Potential Traffic Mitigation

Based on the results of the 2038 Build conditions analyses (using CTPS/MassDOT rates), there are certain locations within the study area that could require additional improvements beyond what is proposed for the 2028 horizon year. However, as discussed throughout this chapter, the projections for 2038 traffic volumes are expected to be highly conservative and may overstate future volumes in the study area. As such, the implementation of a robust and detailed transportation monitoring program becomes even more important. Through the monitoring program, the Proponent will be able to identify actual vehicular traffic generation as well as transit ridership, which we expect to be more in line with the Expected TOD Parameters.

Two intersections in particular that may need additional improvements are:

- Winthrop Avenue at Route 16/Harris Street
- Winthrop Avenue at Tomasello Drive

Figures 6.37 and 6.38 contain notes regarding potential future mitigation that could be implemented to improve 2038 conditions. However, due to the conservative nature of the future projections, the Proponent will work with MassDOT, BTD, DCR, and the City of Revere to determine if additional mitigation is necessary and to develop strategies to address these potential impacts. This will be discussed in the FEIR. It is important to reiterate that two program options were considered for master planning purposes. This DEIR/DPIR fully analyzes the potential impacts and presents mitigation measures for the "pro-commercial" program, or Program A. The "pro-residential" program, or Program B, consists of less commercial office space (up to 5.25 MSF) and more residential space (up to 10.4 MSF, or approximately 10,000 units). Program A is generally more impactful as it relates to traffic generation. Program B would have approximately 6 percent less traffic during the AM peak and approximately 10 percent less during the PM peak. Therefore, this DEIR/DPIR presents conservative impact analyses and mitigation plans.

The traffic monitoring program will include a comparison to the projections made in this document and capacity analysis results at key intersections. The Proponent will work with MassDOT regarding the timeframe and frequency of the monitoring program as well as the study area intersections to be included.

6.13.2 2038 Transit Mitigation

MBTA Blue Line Rapid Transit Service

Substantial new ridership and revenue on the MBTA system will be generated by the Project, largely via the Blue Line as a collector from the rest of the MBTA system. Based on the transit capacity analysis presented in Section 6.12.4, the Project is expected to increase ridership demands above policy capacity levels on

the Blue Line in the 2038 Build Condition, primarily during off-peak periods when the MBTA's Policy[79] dictates a reduced acceptable maximum passenger load per car and when the schedule provides reduced service frequency. All periods projected to exceed policy capacity have loading levels well below the Blue Line's crush capacity and occur outside of the peak period, with the exception of a modest exceedance of policy capacity on the Blue Line Inbound that would occur during the AM Peak between 8:00 a.m. and 8:30 a.m. in the 2038 Build (Expected TOD Parameters) Condition. In the 2038 Build (Expected TOD Parameters) Condition, peak demand is anticipated to exceed policy capacity by approximately 100 inbound riders during this 30-minute period, equivalent to approximately 15 passengers per six-car train. This demand is well within the limits of the Blue Line's potential enhanced AM Peak capacity, assumed to be able to achieve peak service of a train every 4.0 minutes based on information presented by the MBTA to the Fiscal & Management Control Board in November 2017.[80] Furthermore, it is important to note that this modest exceedance of AM Peak policy capacity projected on the Blue Line in the 2038 Build (Expected TOD Parameters) Condition represents a loading exceedance that is much lower than policy capacity exceedances currently experienced on the MBTA Red Line during the AM Peak.[81]

As previously mentioned, the Project's impacts to Blue Line loading would primarily occur during off-peak periods, when the schedule provides reduced service frequency and maximum acceptable passenger loads per the MBTA's policy are less than passenger loads considered acceptable during peak periods. At the maximum load point on the Blue Line Inbound, total demand is projected to exceed policy capacity during six 30-minute periods of the day in the 2038 Build (CTPS/MassDOT Parameters) Condition, and during seven 30-minute periods in the 2038 Build (Expected TOD Parameters) Condition; three of these 30-minute periods are projected to exceed policy capacity without the Project in the 2038 No-Build Condition. During off-peak periods where the Project would cause the MBTA Blue Line Inbound to exceed policy capacity (beyond those periods otherwise exceeded under 2038 No-Build Conditions), the Project would result in a policy capacity exceedance of approximately 60 to 225 inbound passengers per 30-minute period, equivalent to approximately 18 to 68 passengers per six-car train. In instances when total inbound demands in the 2038 Build Conditions exceed policy capacity, demands are projected to be up to approximately 975 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 575 passengers above policy capacity in the No-Build Condition.

At the maximum load point on the Blue Line Outbound, total demand is projected to exceed policy capacity during four 30-minute periods of the day in the 2038 Build Conditions; two of these 30-minute periods are projected to exceed policy capacity without the Project in the 2038 No-Build Condition. During off-peak periods where the Project would cause the MBTA Blue Line Outbound to exceed

[79] MBTA, *Service Delivery Policy, 2017 Update*, Approved January 23, 2017.

[80] MBTA. Integrated Fleet and Facilities Plan. Presentation to Fiscal & Management Control Board. November 20, 2017.

[81] MBTA. MBTA State of the Service: Red Line Heavy Rail. Presentation to Fiscal & Management Control Board. January 25, 2015.

policy capacity (beyond those periods otherwise exceeded under 2038 No-Build Conditions), the Project would result in a policy capacity exceedance of approximately 75 to 175 outbound passengers per 30-minute period, equivalent to approximately 23 to 53 passengers per six-car train. In instances when total outbound demands in the 2038 Build Conditions exceed policy capacity, demands are projected to be up to approximately 390 passengers greater than policy capacity in a given 30-minute period, compared to exceedances of up to approximately 230 passengers above policy capacity in the No-Build Condition. This off-peak demand, projected to occur over a 20-year horizon as the Project gets built out, is well within the Blue Line's existing peak capacity. The Proponent will work with the MBTA to evaluate and monitor these 20-year horizon demands over the course of the Project.

MBTA Blue Line Stations

The Proponent, as requested and in coordination with the MBTA, is in the process of conducting an engineering and architectural assessment of Suffolk Downs Station and Beachmont Station. The scope of the station assessments will evaluate the station infrastructure conditions and compliance with current codes, including codes related to fire/life safety and accessibility. The station assessments will also identify anticipated Project impacts related to infrastructure conditions and code compliance under 2038 Build Conditions that may trigger the need for station upgrades. The Proponent will continue to work in coordination with the MBTA to complete the station assessment scope and identify any Project-related station impacts, with additional information regarding this work to be provided in the Project's FEIR.

MBTA Bus Routes

New ridership and revenue on the MBTA's Route 119 will be generated by the Project. Based on the transit capacity analysis presented in Section 6.12.4, the Project is expected to increase ridership demands above policy capacity levels on the MBTA's Route 119 in the 2038 Build Condition. Five early morning and morning peak period trips on the Route 119 Inbound are projected to exceed policy capacity in the 2038 Build (CTPS/MassDOT Parameters) Condition; all five of these trips are also projected to exceed policy capacity without the Project in the 2038 No-Build Condition. In instances when total inbound demands in the 2038 Build (CTPS/MassDOT Parameters) Condition exceed policy capacity, demands are projected to be up to 20 passengers greater than policy capacity but still under crush capacity per trip, compared to exceedances of up to nine passengers above policy capacity per trip in the No-Build Condition. Five early morning and morning peak inbound trips and three evening peak outbound trips are projected to exceed policy capacity in the 2038 Build (Expected TOD Parameters) Condition, with one morning peak inbound trip projected to slightly exceed crush capacity by two passengers; all five of the inbound trips are also projected to exceed policy capacity without the Project in the 2038 No-Build Condition. In instances when total inbound demands in the 2038 Build (Expected TOD Parameters) Condition exceed

policy capacity, demands are projected to be up to 25 passengers greater than policy capacity, compared to exceedances of up to nine passengers above policy capacity per trip in the No-Build Condition. In instances when total outbound demands in the 2038 Build (Expected TOD Parameters) Condition exceed policy capacity, demands are projected to be between four and five passengers greater than policy capacity per trip, and well below the crush capacity for a bus. The Proponent will work with the MBTA to evaluate and monitor these 20-year horizon demands over the course of the Project.

MBTA Bus Stops

Opportunities to improve MBTA bus stops in the Project area, including on the Route 1A and Winthrop Avenue corridors, were explored by the Proponent in coordination with MassDOT and the MBTA. Through these coordination efforts, opportunities to incorporate bus pull-outs on Route 1A at Tomasello Drive were identified and incorporated into the proposed Route 1A Corridor "Super Street" design, detailed in Section 6.10. The proposed bus pull-outs would allow inbound and outbound buses traveling via Route 1A to exit the travel lane completely, into a dedicated bus pull-out lane adjacent to the sidewalk, providing safety benefits while buses are stopped to pick-up and drop-off passengers.

Additionally, the Proponent has completed construction of a new Route 119 bus stop and turnaround on Tomasello Drive, serving the Stop & Shop and surrounding retail, which entered service on September 2, 2018. The Proponent will continue to work with the MBTA to relocate this stop and add additional on-site bus stops as needed as the Project is developed.

MBTA Bus Support Facilities

The Proponent has discussed potential impacts to bus support facilities (related to vehicle maintenance and layover needs) with the MBTA. The MBTA is currently assessing and planning for maintenance facility needs and future plans on a systemwide level. Based on the projected transit demands resulting from the Project, the MBTA and Proponent do not anticipate any Project-related impacts to bus support facilities, but this will continue to be monitored and evaluated as the Project gets built out.

New Shuttle Services

The Project will include provision of privately operated, on-site shuttle circulator services to encourage alternative modes of transportation and reduce auto-dependency. A proposed inner loop and outer loop route, providing shuttle connections for internal trips made within the Project Site as well as connections from the Project Site to the MBTA Blue Line, are illustrated in Figure 3.24. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be finalized in the FEIR as the Project's development phasing is refined.

New shuttle connections between the Project Site and key transportation and land use nodes are also being explored by the Proponent. The Proponent is committing to establish new, privately operated shuttle services that would provide direct transit connections between the Project Site and the commuter rail at North Station, South Station, and Chelsea Station (the closest commuter rail station to the Project Site, serving the Newburyport/Rockport Line), as well as to the Seaport District. Figure 6.1 illustrates these proposed Project Site connector shuttle routes. The Proponent also considered a potential shuttle connection to the northern branch of the Orange Line, however initial evaluations found that the shuttle travel time would be highly variable during peak periods due to roadway congestion and that an Orange Line to Blue Line connection would be more reliable and time competitive based on existing conditions. The Proponent will continue to evaluate additional opportunities for shuttle connections to key land use and transportation nodes as planning progresses. Refinements and modifications to the proposed routes and the anticipated timing of route implementation will be finalized in the FEIR as coordination with the MBTA is advanced.

6.14 Future Planning

6.14.1 Revere Waterfront District Traffic Study

The City of Revere is currently in the process of completing a planning study for the Waterfront area. The original scope of this study primarily included key intersections along Ocean Avenue and Revere Beach Boulevard from Eliot Circle up to Oak Island Street. Intersections within this area that overlap with the Master Plan Project study area include:

- Ocean Avenue at Revere Street
- Beach Street at North Shore Road
- Beach Street at Ocean Avenue
- Butler Circle
- Eliot Circle

The study has been expanded to include additional intersections that overlap with the Master Plan Project study area:

- North Shore Road/Lynnway Interchange
- Route 60 at Revere Street
- Winthrop Avenue Corridor from North Shore Road to Bennington Street
- Donnelly Square

The study, which is being conducted by Vanasse & Associated, Inc. (VAI) includes recommendations for improvements throughout the study area. The Proponent and VHB attended a meeting with the City of Revere and VAI, where VAI presented conceptual improvements for Eliot Circle and other locations within the study area. VHB and VAI were in general agreement that the options being evaluated had

some significant benefits to traffic operations and safety in this area. The City of Revere is currently in the process of reviewing the recommended improvements, but a preferred alternative has not been chosen to date. The Proponent will continue to coordinate with the City on the status of the study and will incorporate the study findings into the FEIR.

6.14.2 Harbor Tunnel Evaluation

Based on MassDOT comments, the MEPA Scope includes a review of the Ted Williams Tunnel, east and west, and the Sumner and Callahan Tunnels. Much of the data needed for this review was collected from HOC cameras in June 2018. The primary focus of this section is the Ted Williams Tunnel Westbound, where we believe significant improvements may be achieved. The Eastbound Tunnel, the Sumner Tunnel and the Callahan Tunnel follow.

Ted Williams Tunnel Westbound

The Westbound tunnel does experience considerable delay during the morning and evening peak periods., but the two-lane corridor operates under the ultimate 3800 vehicle per hour capacity of the facility (3270 vph and 2470 vph during the morning and evening peaks respectively.) Three potential sources that lead to the underutilized capacity have been identified. The first is the four-lane to two-lane merge on the east side between the I-90 EB/Airport ramps interchange; the second is the operation of the I-93 and South Boston off-ramp, where demand exceeds the capacity of a one lane off-ramp by approximately 25%. (The morning peak period exiting volume totals 2400 vph versus a presumed capacity of 1900 vph.) The third is the relatively low demand for continued movement in the I-90 Westbound corridor. There have also been operational issues identified with the South Boston off-ramp (traffic signal control at the intersection of Congress Street, B Street and the off-ramp during the morning peak hour) and then congestion associated with the ramps to I-93 during the evening peak period.

Recognizing the first item, the four-lane to two lane merge, a potential improvement would be to create a three lane to two lane condition. This could be achieved in a manner similar to the on-going work in the Sumner Tunnel portal area where a gate system allows control over lanes on the approaches. Following the morning peak period on the I-90WB approach reduce the I-90WB movement to a single lane and permit two lanes from the Airport. Continue the two-lane preference from the Airport until 12AM or 1AM and then restore the I-90EB corridor to two lanes with the airport movement controlled to a single lane. We do understand the potential issues with reducing the I-90 movement to anything less than two lanes. During the two-lane movement from the Airport, one of the Airport on-ramp movements becomes an add-lane condition and the second lane becomes a merge condition over approximately 1500 feet. The 4 to 2 condition results in all movement from the airport (generally a higher demand than on I-90WB) to merge once in the I-90 corridor.

The second condition suggests the need for a two-lane off-ramp to the South Boston/I-93 ramp. To achieve a two-lane exit requires understanding and acceptance of several conditions that would be considered below standards:

- The first is the 25-foot width at the exit gore. Given the flat approach angle and the current ramp use this appears to be manageable with the use of 11-foot lanes, a two-foot offset adjacent to the gore area and one foot on the right side.
- The second is the point at which the first exit lane is developed. Under existing conditions, the two-lane section is maintained into the boat section. A 300-foot taper is used from the two-lane section to three lanes with the third lane width achieved 400 feet from the exit gore. In a two-lane exit condition, the South Boston exit lane would begin within the cut and cover tunnel section as early as possible after the immersed tube tunnel section. Within the latter, the cross section is based upon two 12-foot lanes with one-foot offsets. In the cut and cover tunnel section the cross section adds a 10-foot right side shoulder and the one-foot left side offset increases to four feet. Through a combination of reducing the left side offset (maintain the one-foot left side offset in the tunnel or increasing it to two feet through much of the cut and cover tunnel section), the South Boston exit lane could be developed once the barrier to barrier width is 38 to 40 feet in width. The I-93 lane, the second exit lane, could be developed once the barrier to barrier width is 52 feet. Note that the barrier along the northerly wall is currently 3.5 feet in width. During the design of the South Boston interchange project, the barrier width was modified to 1.5 feet approximately 125 from the exit gore. Replacing the existing barrier with the 1.5-foot barrier allows the 52-foot cross section to be achieved approximately 700 feet from the gore or at the beginning of the taper to the single lane exit today.
- The third relates to signing in the constrained tunnel alignment including limited height.

The benefits associated with the two-lane off-ramp are considerable. During the morning peak, operations of the existing ramp are controlled by the capacity of the traffic signal at Congress and B Street. While we believe there is an opportunity to increase the capacity of the ramp at the signal from approximately 1100 vehicles per hour to 1300 - 1400 vph with phasing changes, we expect the demand to continue to increase and the added exit lane allows an additional 1500 to 2000 feet of storage without impacting the continuing through movement on I-90 and access to the I-93 ramp. During the evening peak, the added I-93 lane will provide additional storage and the added lane to South Boston will have greater accessibility. The two-lane exit will also provide an improved lane balance exiting the tunnel.

Ted Williams Tunnel Eastbound

Total peak hour demand was found to be 3800 and 3950 vehicles per hour, consistent with what would be expected given the two-lane capacity of the facility.

Grades at the east end of the Tunnel (+4%) were found to have limited impact on the carrying capacity as the horizontal alignment from the two-lane tunnel to four-lane cross-section (two lanes continuing on I-90E and two lanes to Logan Airport) provided lane use alternatives at the point at which capacity impacts would normally be identified. The eastbound Tunnel flow was improved after a previous review (approximately 3600 vehicles per hour) identified potential gains associated with the management and consolidation of various ramp movements from South Boston, the HOV lane and the HOC emergency lane. The pavement marking plan combined the South Boston on-ramp, the HOV facility and the HOC Emergency Access corridor to a single lane, reducing the "turbulence" associated with multiple merge points as eastbound traffic approaches the tunnel portal. It also removed some of the reduced vehicle delay and easy access advantage associated with being the last vehicle to enter the system.

With at-capacity operation, observed queuing has increased, and is expected to continue to increase, as demand increases. Recognizing future growth in the Seaport District, primarily associated with office and commercial uses, one potential and relatively minor change is to remove the yield condition now in place for the MassPort Haul Road/movement from D Street to the South Boston on-ramp to I-90EB, changing it to a yield condition on the approach from the South Boston By-Pass Road, the seemingly lower volume movement from the right side. One of the benefactors of this change would be the Silver Line movement to I-90EB. However, the Silver Line would see even greater benefit with the use of the HOC/State Police Ramp, the final ramp into the I-90EB corridor and therefore experiencing the least amount of delay. This suggestion is notwithstanding much discussion over the years concerning speed differential, ramp geometry, merge conditions, and as these may be valid points at various times of the day, it is based upon the low speed conditions and congestion generally experienced between 3PM and 7PM on weekdays.

Future changes in the use of the I-93 HOV lane and even the South Boston By-Pass Road that would allow general traffic demand to increase in these two corridors, should be done with caution and the understanding that, with capacity of the eastbound tunnel near or at its maximum, each vehicle added to the HOV lane will add a vehicle to the queue in an upstream approach corridor (the South Boston on ramp, the I-93NB or ramp or the I-90EB corridor), and that each vehicle added to the South Boston on-ramp will add to the queue in the I-90EB corridor or the I-93NB ramp.

Sumner Tunnel

The Sumner Tunnel, northerly portal area continues under construction associated with toll plaza removal. Various studies were completed in 2016 and 2017, including assembly of a design group to develop an updated concept leading to the current direction for the former plaza that is now under construction. Since toll plaza removal, there has been a significant increase in the use of City roadways to access the Sumner Tunnel that has been accompanied by a decrease in the use of

the Route 1A corridor. The general question is to what level future demand will return to the Route 1A corridor.

The project under construction is based on the relatively high flow from the City street network during the morning peak and the higher movement from the Airport with a comparatively low demand from City streets during the afternoon/evening peaks. During the morning and early afternoon periods, a gate system in the Route 1A corridor will restrict flow from the Route 1A corridor to a single lane and permit the City street network to enter the Sumner Tunnel as an add-lane condition. During the afternoon and evening peaks, extending into the late evening, a two-lane flow will be permitted from the Route 1A corridor with the City Street network required to merge with the right lane movement from Route 1A.

Data available from June 2018, collected on the Boston side of the Sumner Tunnel, suggests a demand during the morning peak hour totaling 2400 vehicles per hour, well below the potential tunnel operating capacity of 3600 to 3800 vehicles per hour assuming an equal distribution of demand entering the tunnel and no restrictions on the exiting side. During the evening peak, the counted volume exiting the Tunnel totaled approximately 2550 vehicles. On the Boston side, demand from the Tunnel is split to two exits, one to Storrow Drive and the other to I-93NB and Government Center. Over the three-hour morning count period, 53 percent used the I-93/Government Center ramp and 47 percent used the Storrow Drive ramp, with a balanced movement between each of the ramps during the three-hour late afternoon/evening count period.

While operating well below the potential capacity of the tunnel, there is a degree of congestion present that slows tunnel speeds and leads to back-ups on both the City street network and in the Route1A corridor. Further observations from both the 2017 concept plan development process and in 2018, identified the primary source of congestion and delay was the movement to the Storrow Drive ramp. Demand to this ramp merges with the I-93NB movement to Storrow Drive as an add-lane (also experiencing delay). . The primary congestion point on this ramp is the single lane movement to Storrow Drive westbound (forcing the eventual reduction of the combined I-93NB and Sumner Tunnel movement to a single lane) that merges with the same movement from I-93SB and the Tobin Bridge that is also in a single lane. Each feed the two lane Leverett Circle underpass that enters the Storrow Drive westbound corridor, which sees an added right-side lane from Route 28 and the City street network from Nashua Street. This three-lane section then splits to a two-lane left exit to Charles Circle and the Longfellow Bridge with the two right lanes continuing on Storrow Drive WB. All vehicles from the I-93NB and Sumner Tunnel not destined to Charles Circle are required to merge with the movement from I-93SB and the Tobin Bridge to vacate the left lane which is an exit only to Charles/Longfellow. Generally, this area can be linked to the poor operation of the ramps from I-93 SB/Tobin and I-93NB/Sumner. One modest improvement to the Storrow westbound corridor that could lead to substantial improvement to both ramp systems would be a change in the Charles/Longfellow

to a single lane off, with a third lane added to Storrow westbound in the footprint of the second off-ramp lane. With the change, the left lane must exit condition would be eliminated, allowing with the three-lane to two merge requirement to extend westerly. The movement to Charles/Longfellow would be changed to a left exit. The merge is still viewed as a requirement given the need for an add-lane condition from the left lane entrance from the Charles/Longfellow on ramp to Storrow Drive WB. That on ramp movement should also be reduced from a two-lane condition to a single lane condition.

Callahan Tunnel

No operational issues were identified with the Callahan Tunnel which, based on historical count data, has peak hourly flows of approximately 1500 and 2500 vph during the morning and evening peak hours, respectively. Demand is metered by traffic signal control in the Government Center area from Boston surface streets and served by a single lane from a two lane I-93SB off-ramp.

Additional Project Demand to Tunnels

During the 2038 Design Year, Morning Peak Hour condition, at which point the site will be fully developed and occupied, we anticipate the addition of approximately 200 vehicles to the Tunnel system, spread between the Williams WB and Sumner corridors during the morning peak. These will primarily be from residential uses on the site. The flow to the site using the Williams Eastbound and Callahan corridors is expected to total approximately 450 vehicles. These will primarily be trips associated with the office uses. We believe that the addition of this level of added trips will have little impact on the Tunnel operations, even with the current constraints associated with the above morning peak conditions in the Williams and Sumner tunnels. (Note that there are no operational constraints eastbound in either the eastbound Williams or Callahan corridors during the morning peak.

During the afternoon peak, the projected movement from the site to the Tunnel system is approximately 450 vehicles (primarily from office uses), again spread between the Williams Westbound and Sumner corridors. Again, Tunnel operations are not expected to be significantly impacted with the addition of this demand, which represents between five and six percent of the system capacity. Movement to the site from the Tunnel system is expected to total approximately 325 vehicles, spread between the Williams EB and Callahan corridors. No impact is anticipated in the Callahan corridor given current operations. Demand associated with the site using the Williams EB corridor will be added to current queues on the four approaches and Tunnel including the surface street movements to the South Boston on-ramp. The extent of queuing will be more significant on the I-90 EB and I-93 NB approaches and less pronounced on the South Boston and I-93 HOV lanes given their points of entrance to the system.

6.14.3 Red Line-Blue Line Connector

A Red Line-Blue Line Connector would link the only two lines that do not currently intersect in the MBTA's rail rapid transit system. Currently, transit riders traveling

between the Red Line and Blue Line must transfer using the MBTA's Green Line or Orange Line, or alternatively transfer on street level via an approximately one-quarter mile walk between stations in Downtown Boston. Prior proposals to connect the two lines envisioned an extension of the Blue Line from its current terminus at Bowdoin Station to Charles/MGH Station, and MassDOT is currently conducting a high-level reassessment of such a connection.[82] Other connector proposals cited in the MBTA's draft Focus40 Plan[83] include a potential extension of the Blue Line to the Longwood Medical Area with a Red Line connection at Park Street Station, as well a potential nearer-term proposal to create a direct pedestrian connection between the Blue Line at State Street Station and the Red Line at Downtown Crossing Station. While there are several potential alternative proposals for the Red Line-Blue Line Connector, the project is not currently programmed.

A Red Line-Blue Line Connector would enhance transit access and connectivity between the Project Site and academic institutions, major employers, healthcare providers, and residential neighborhoods served by the Red Line. For certain trip origins/destinations, the project would allow riders to make transfers more effectively between the Red and Blue Lines, thereby reducing congestion on other downtown transit lines, and could also reduce transit travel times, depending on the proposed design for the connection. For example, an extension of the Blue Line to Charles/MGH Station would have potential to reduce the total number of transfers and reduce transit travel times for trips between the Project Site and Red Line stations in Cambridge; however, trips between the Project Site and southern destinations on the Red Line would still be most quickly served by a walk or Orange Line transfer between Downtown Crossing Station and State Street Station. As compared to existing transfer options, a potential Blue Line extension to Park Street Station would provide an attractive alternative for trips made between the Project Site and both northern and southern locations on the Red Line.

Based on results from the CTPS Model, which assumed existing Red Line to Blue Line transfer options, approximately 30 percent of all trips made between the Project Site and areas served by the Red Line would be made by transit. With implementation of a potential Red Line-Blue Line Connector, the transit mode share for trips between the Project Site and areas served by the Red Line would be expected to increase, particularly for trips that would benefit from travel time savings with a more direct connection. Projected transit mode shares from zones with similar connectivity to the Project Site, such as locations served by the Orange Line, can be used to estimate the potential transit share that could be expected from a Red Line-Blue Line Connector. The CTPS Model results project that approximately 50 percent of all trips made between the Project Site and areas served by the Orange Line south of State Street Station would be made by transit, representing a reasonable proxy for transit mode share that could be anticipated

[82] MBTA. Draft Focus40 Plan. Accessed from www.mbtafocus40.com.

[83] MBTA. Draft Focus40 Plan. Accessed from www.mbtafocus40.com.

for Project trips to/from the Red Line with a proposed Red Line-Blue Line Connector.

While the potential Red Line-Blue Line Connector project is not incorporated or necessitated as part of the proposed Project, the Proponent recognizes the benefits that this project would achieve regarding improved transit connectivity and increased transit mode share and is supportive of continued consideration of proposed Red Line-Blue Line Connector options.

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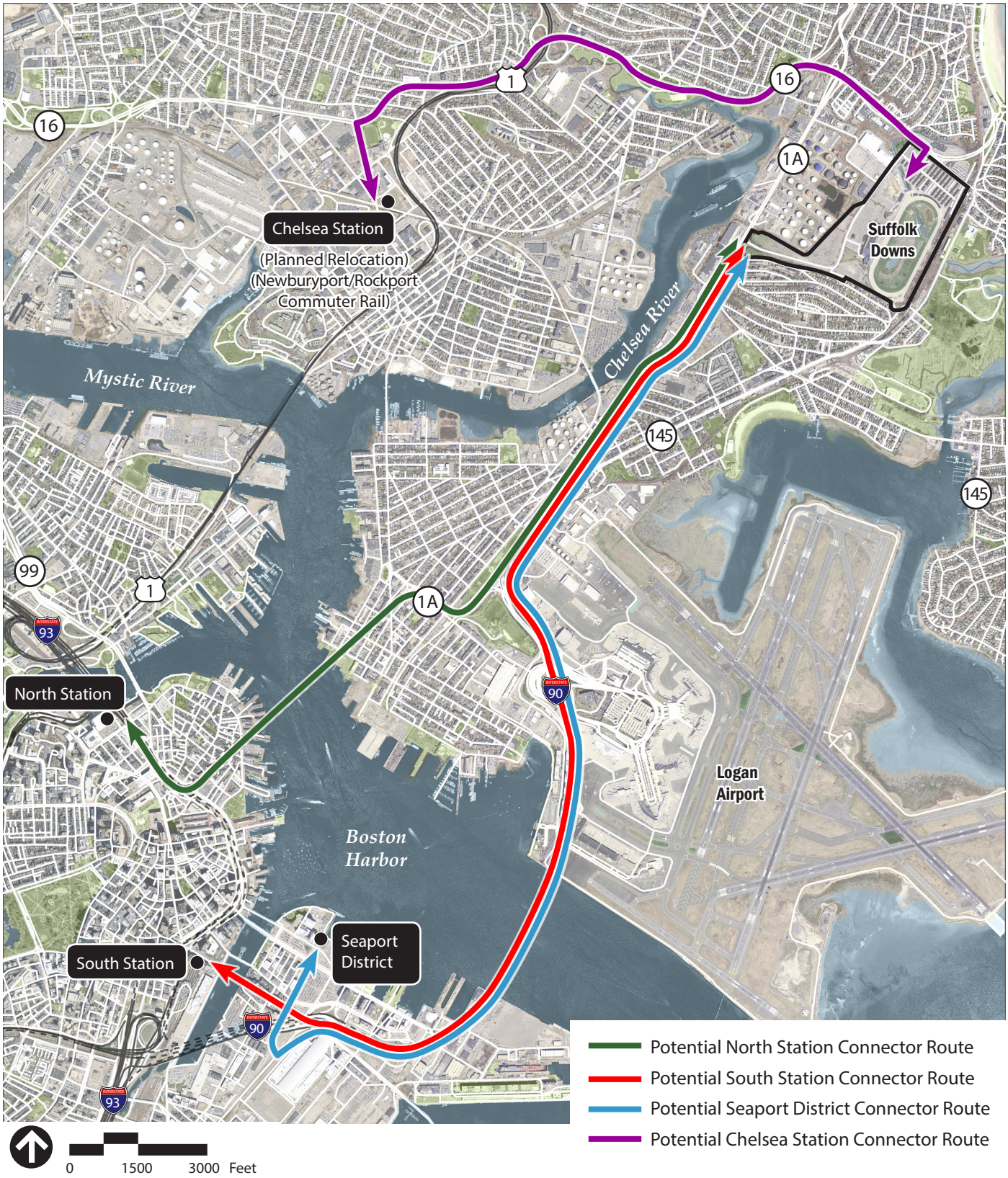


Figure 6.1

Potential Site Connector Shuttle Routes

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Boston & Revere, Massachusetts



Source: MassGIS

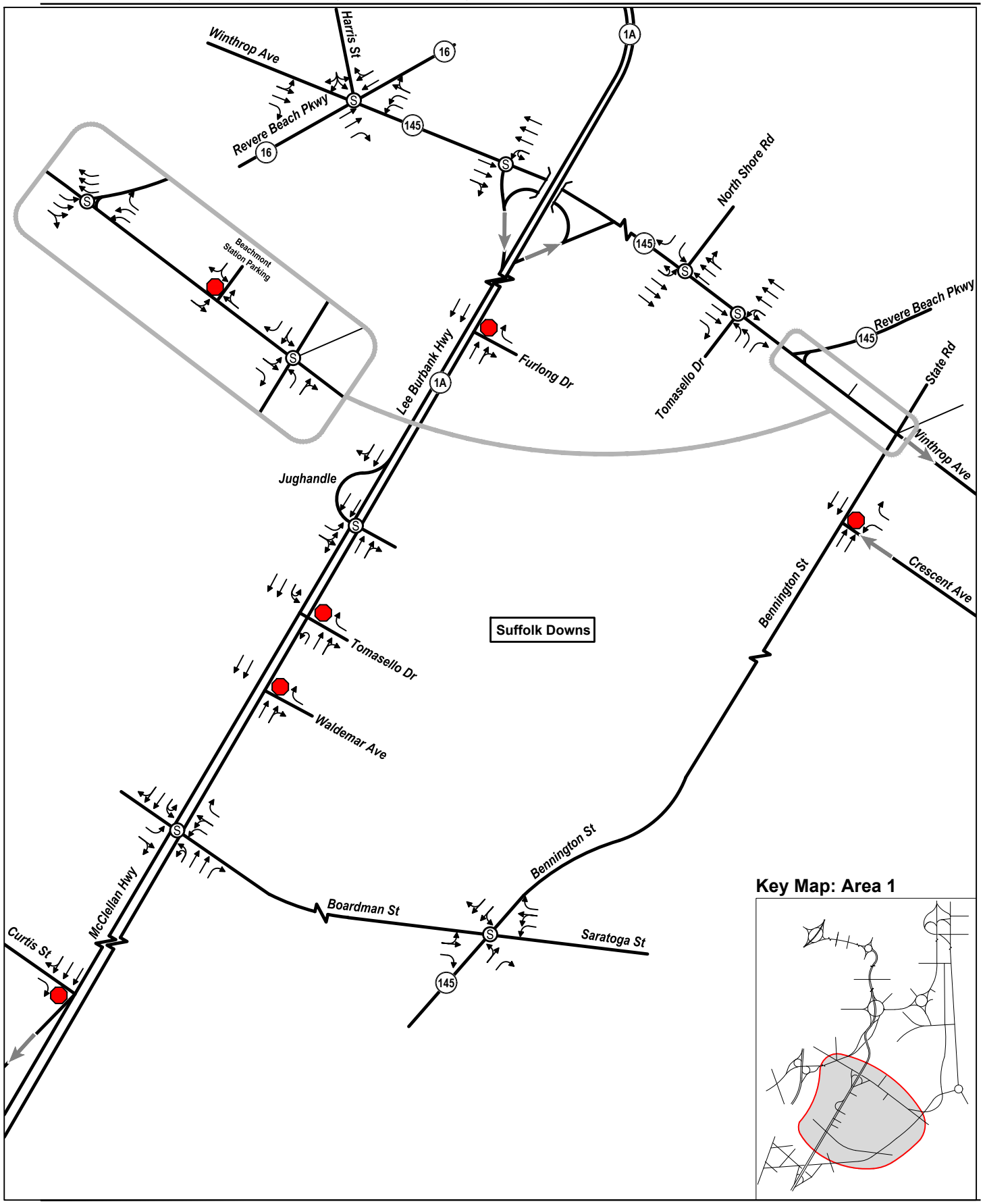
● Study Area Intersections

Figure 6.2

Study Area Intersections

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Boston & Revere, Massachusetts

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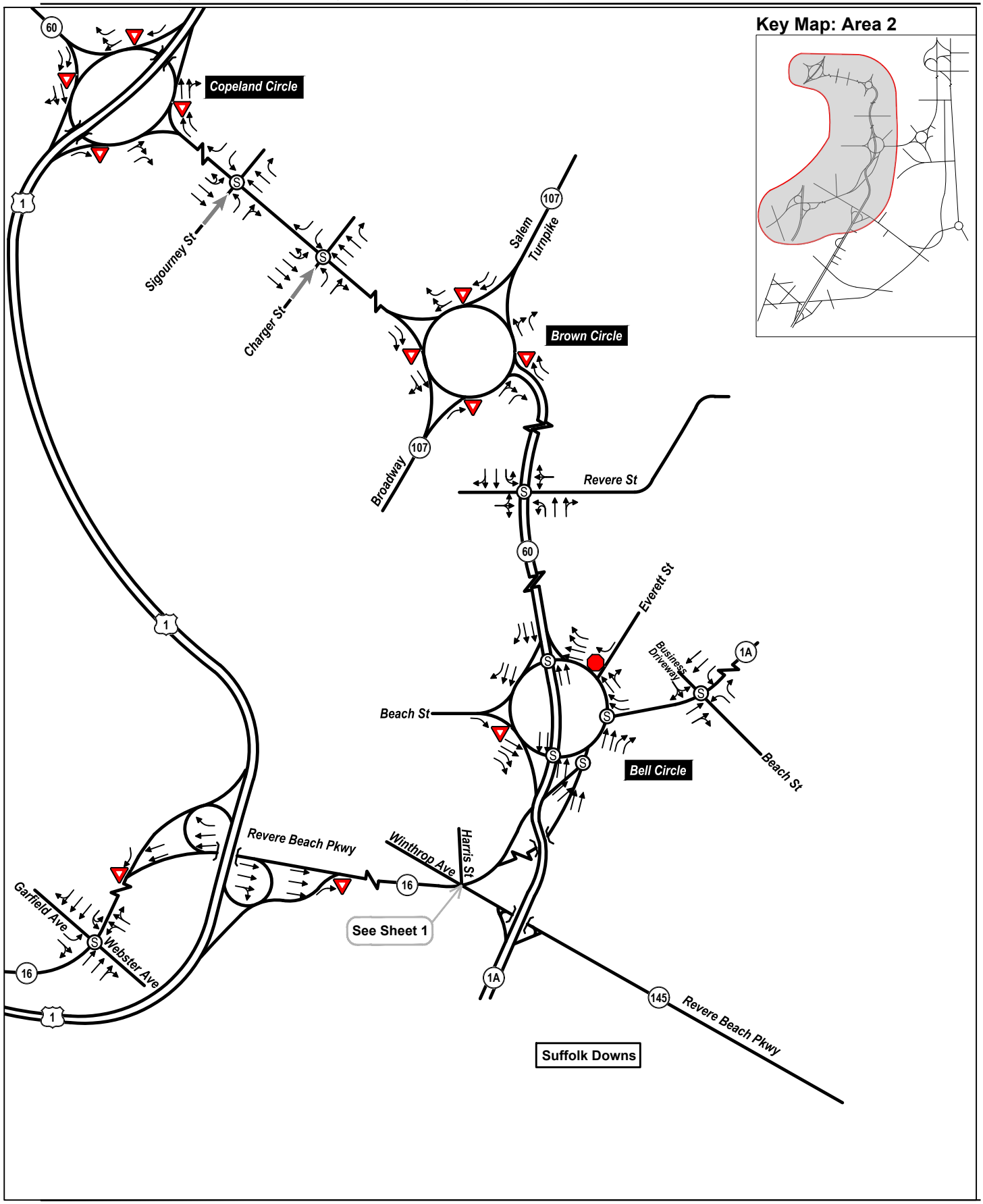
Stop Controlled Intersection

Yield Controlled Intersection

Figure 6.3a
Existing Conditions
Lane Geometry and Traffic Control

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Ⓢ Signalized Intersection

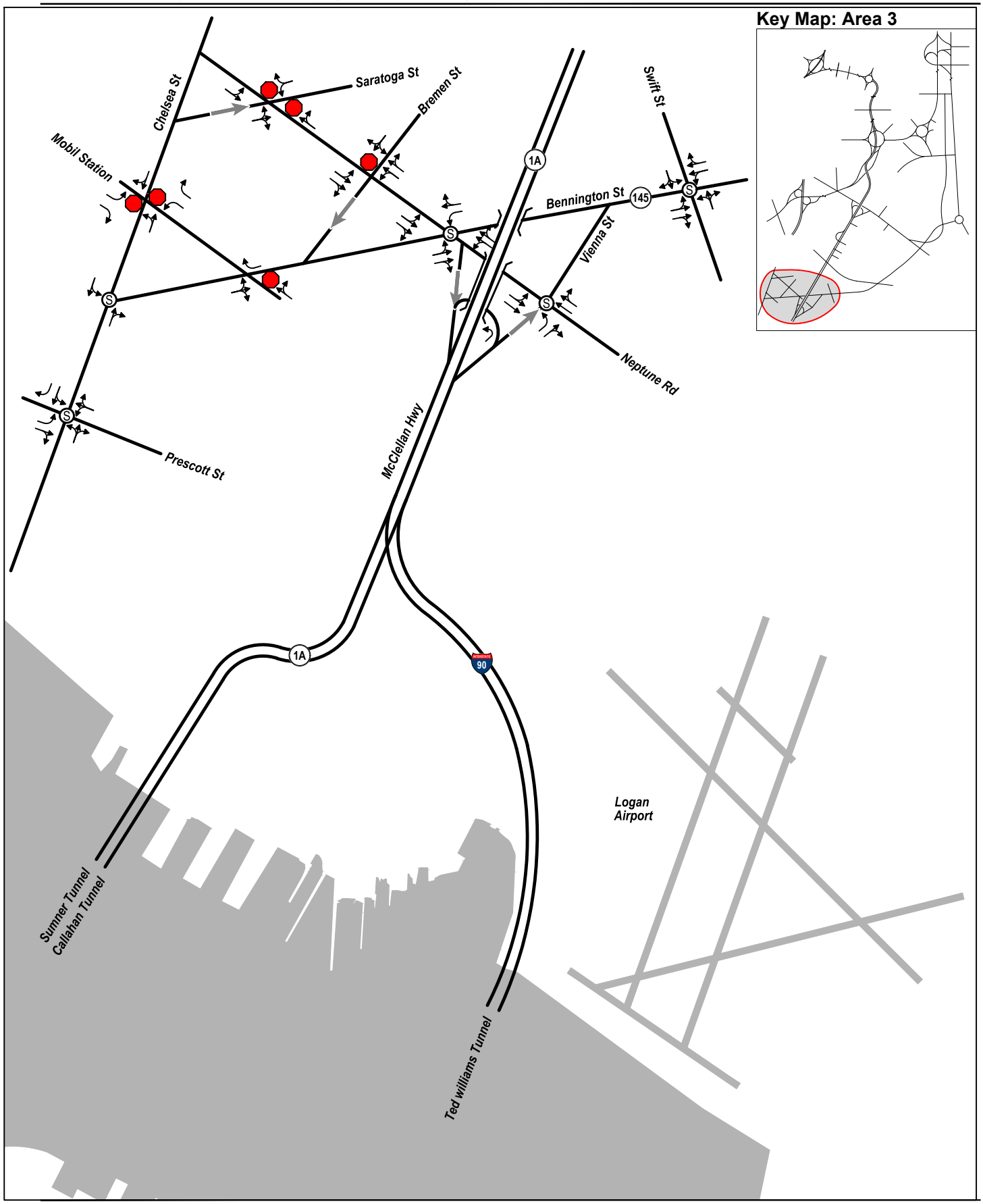
Stop Controlled Intersection

Yield Controlled Intersection

Figure 6.3b
Existing Conditions
Lane Geometry and Traffic Control

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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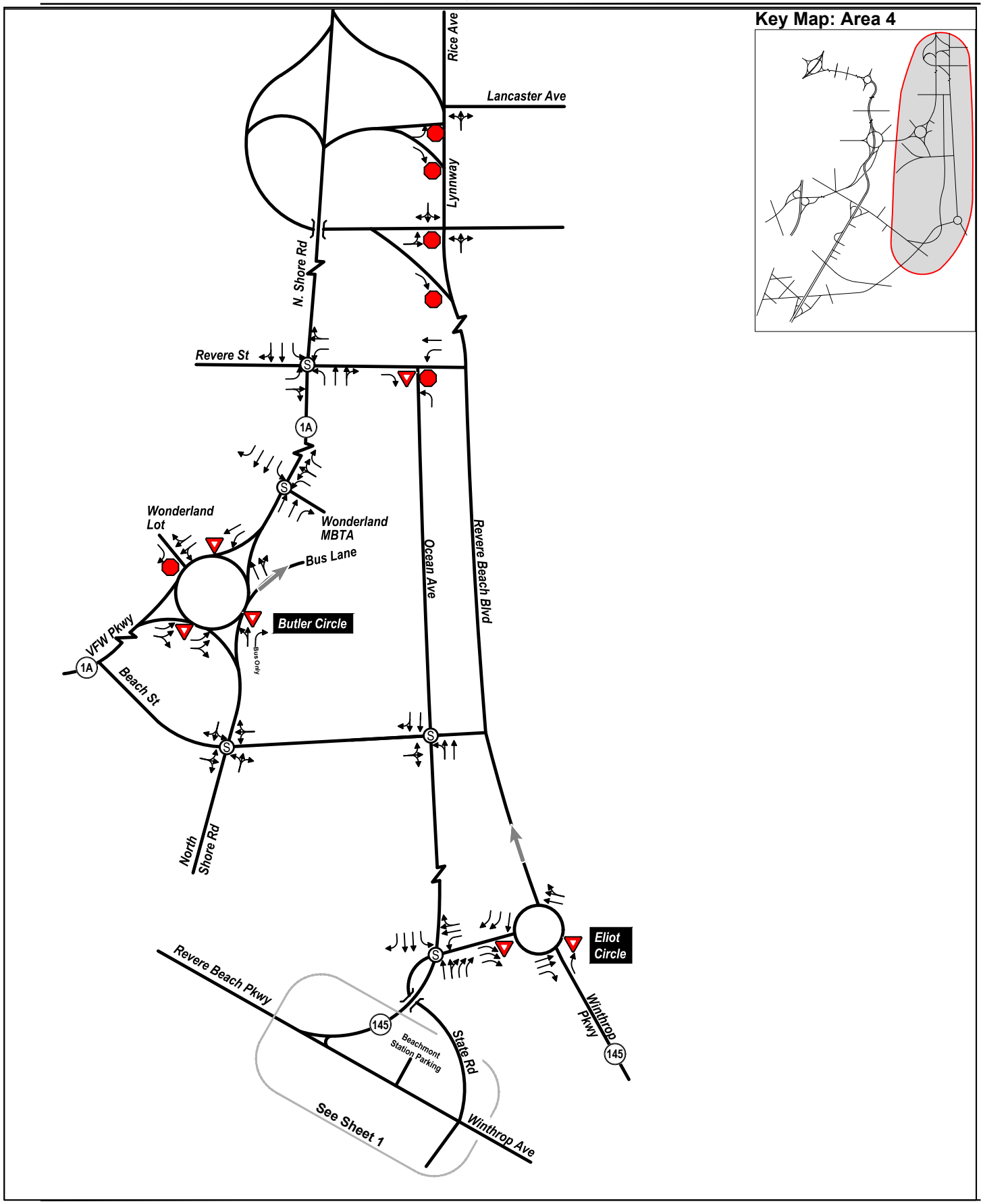
Ⓢ Signalized Intersection

Stop Controlled Intersection

Yield Controlled Intersection

Figure 6.3c
Existing Conditions
Lane Geometry and Traffic Control

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Boston & Revere, Massachusetts



Ⓢ Signalized Intersection

Stop Controlled Intersection

Yield Controlled Intersection

Figure 6.3d
Existing Conditions
Lane Geometry and Traffic Control

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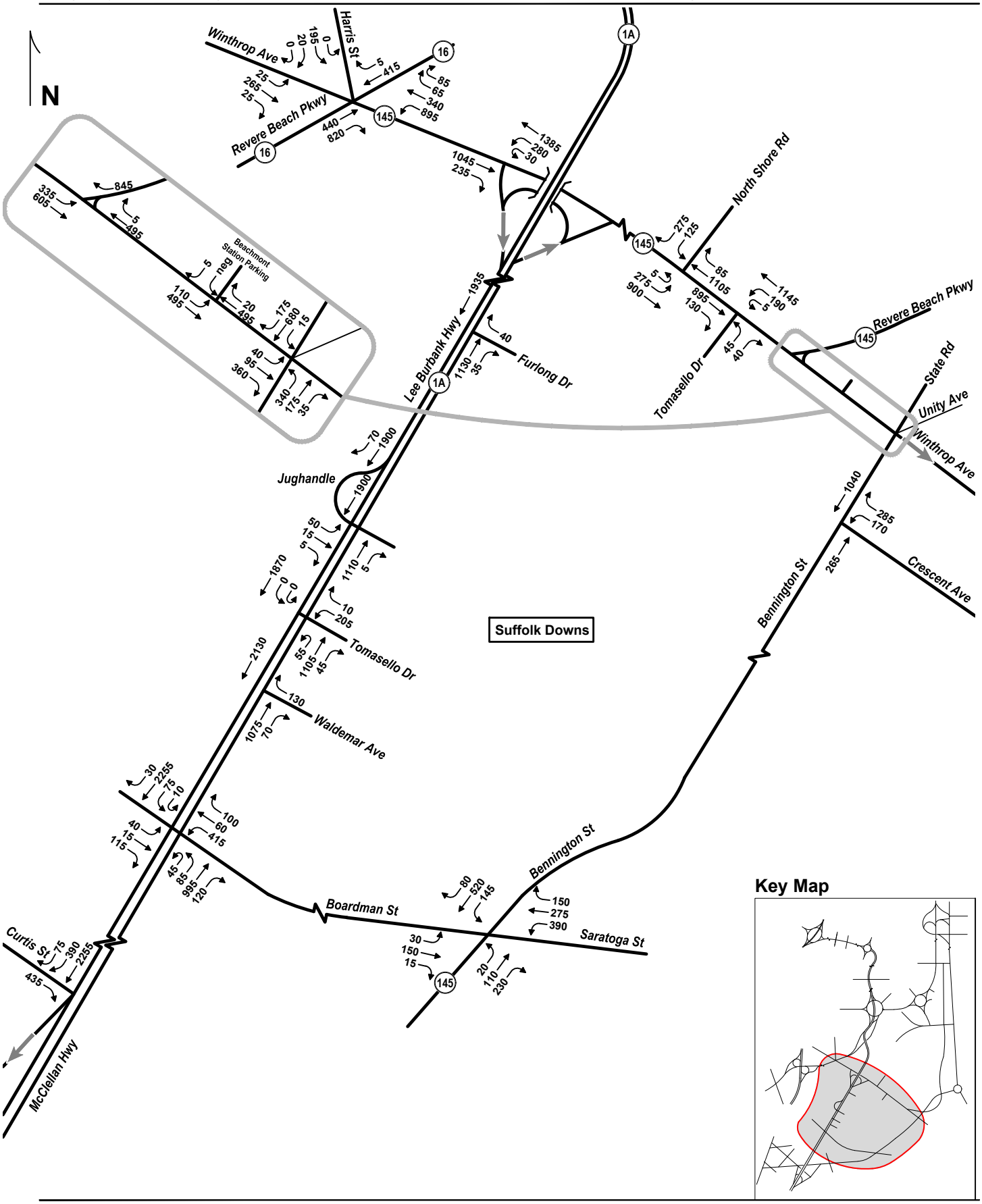
Source: MassGIS

Figure 6.4

Roadway Jurisdiction

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Boston & Revere, Massachusetts

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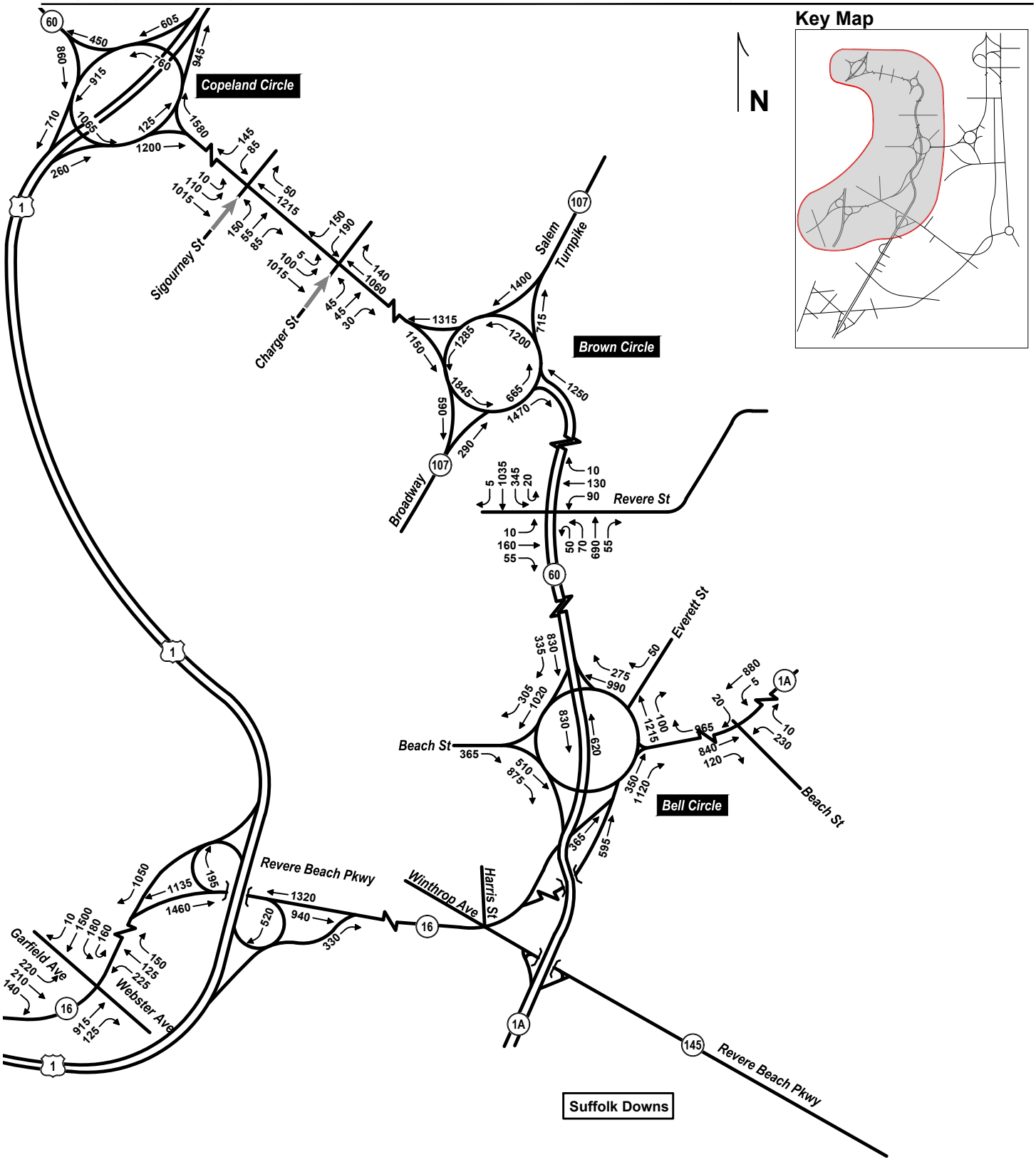


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Figure 6.5a
Morning Peak Hour
Existing Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

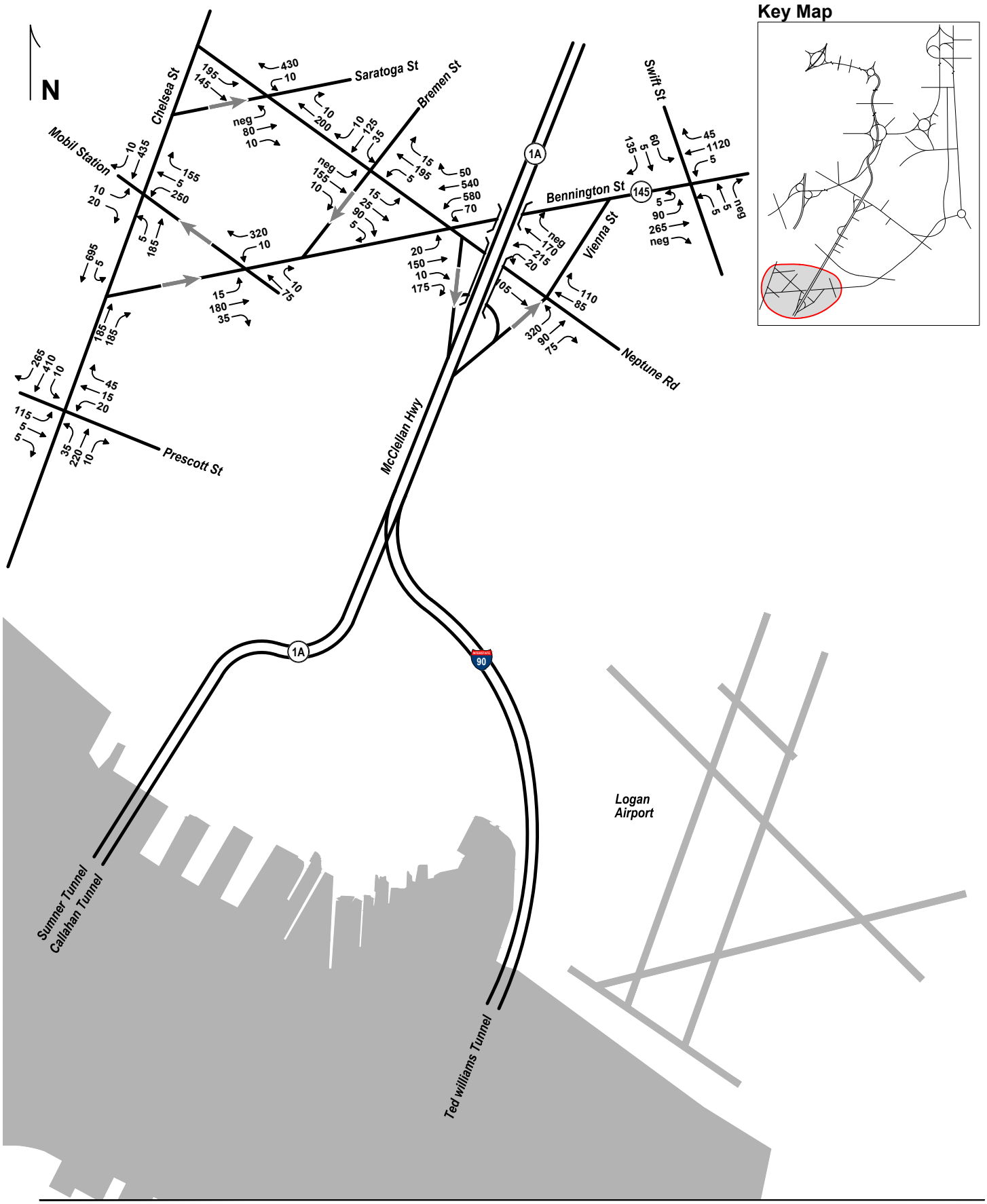
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Figure 6.5b
Morning Peak Hour
Existing Condition Vehicle Volume Network

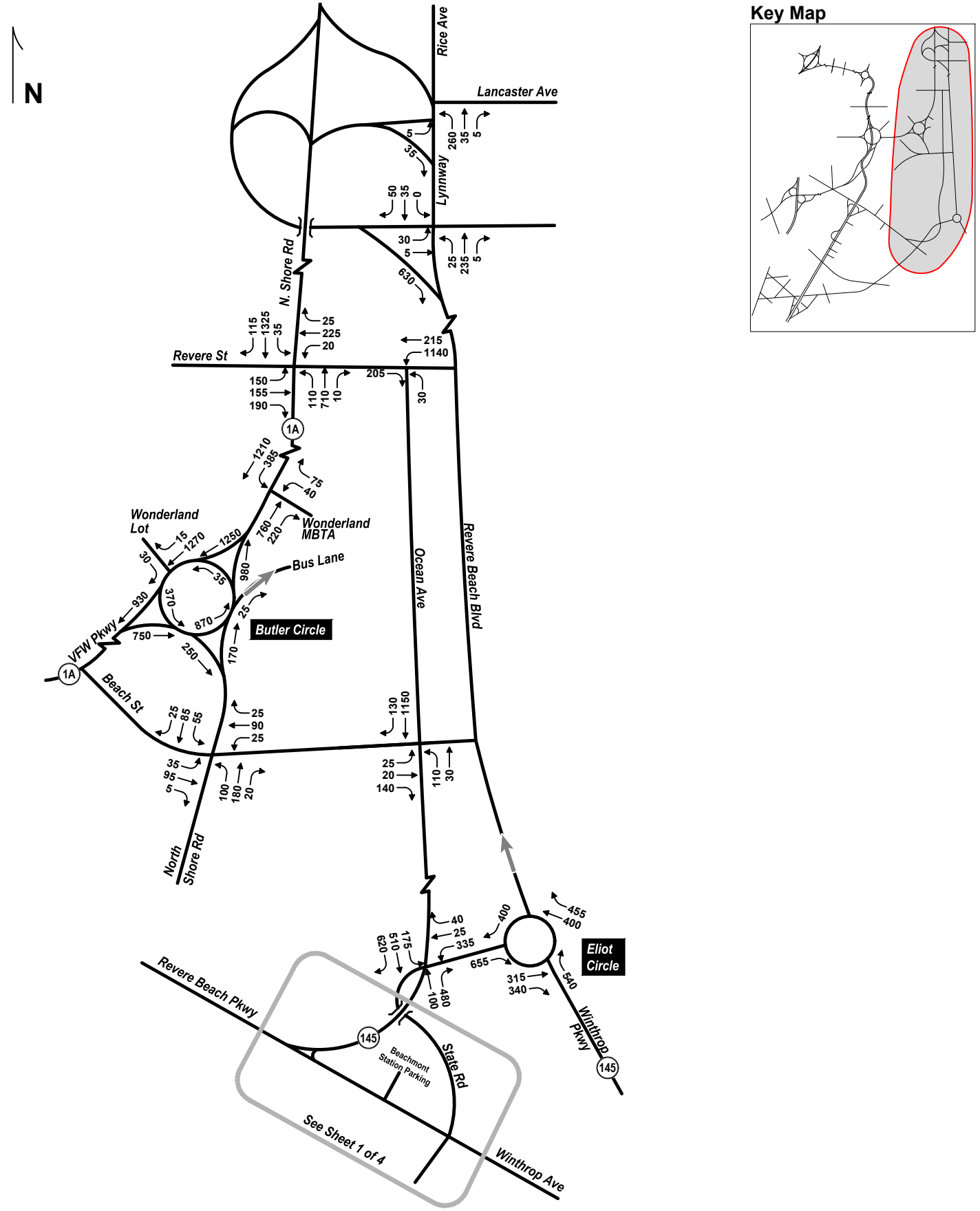
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.5c
Morning Peak Hour
Existing Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

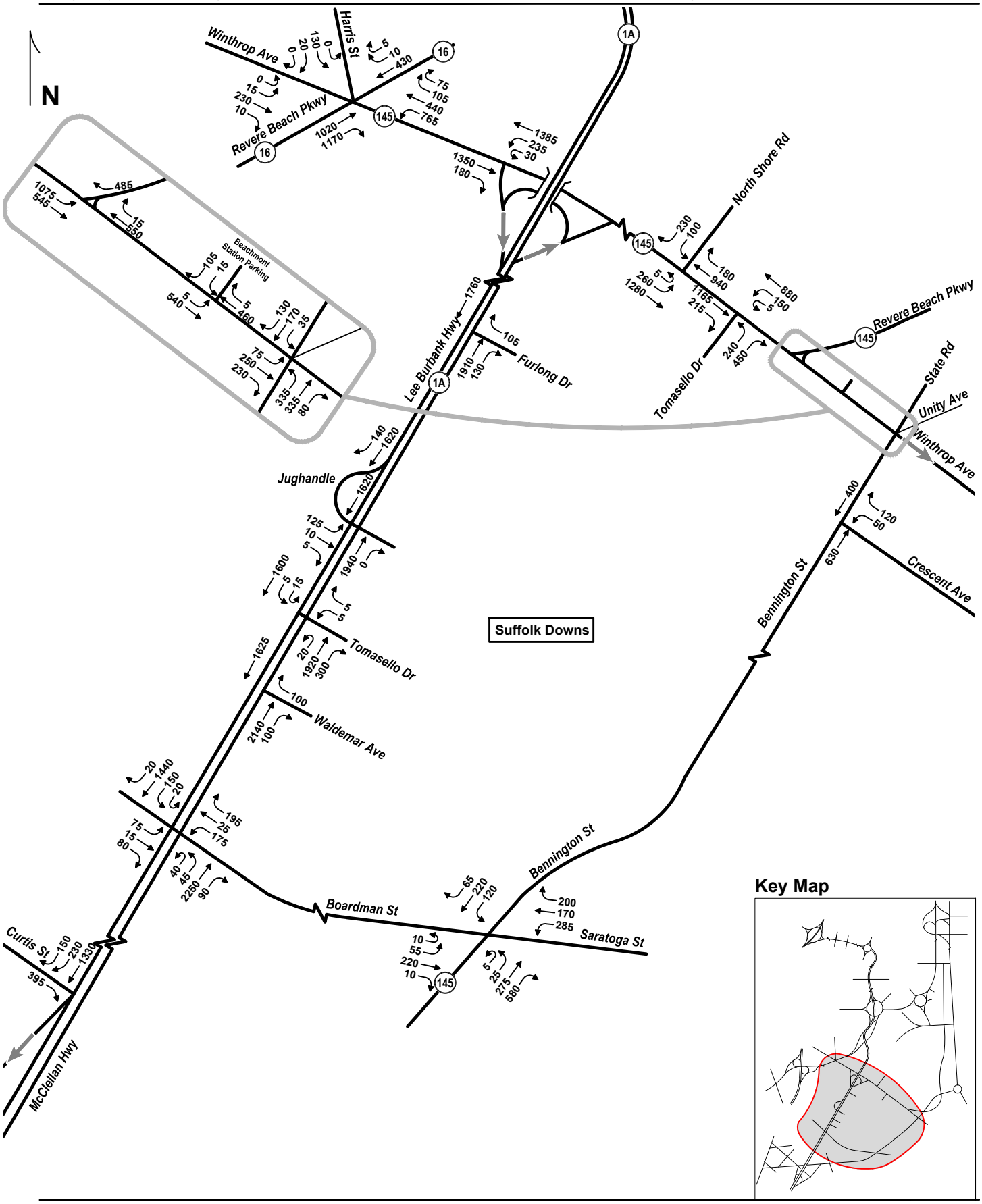


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Figure 6.5d
Morning Peak Hour
Existing Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

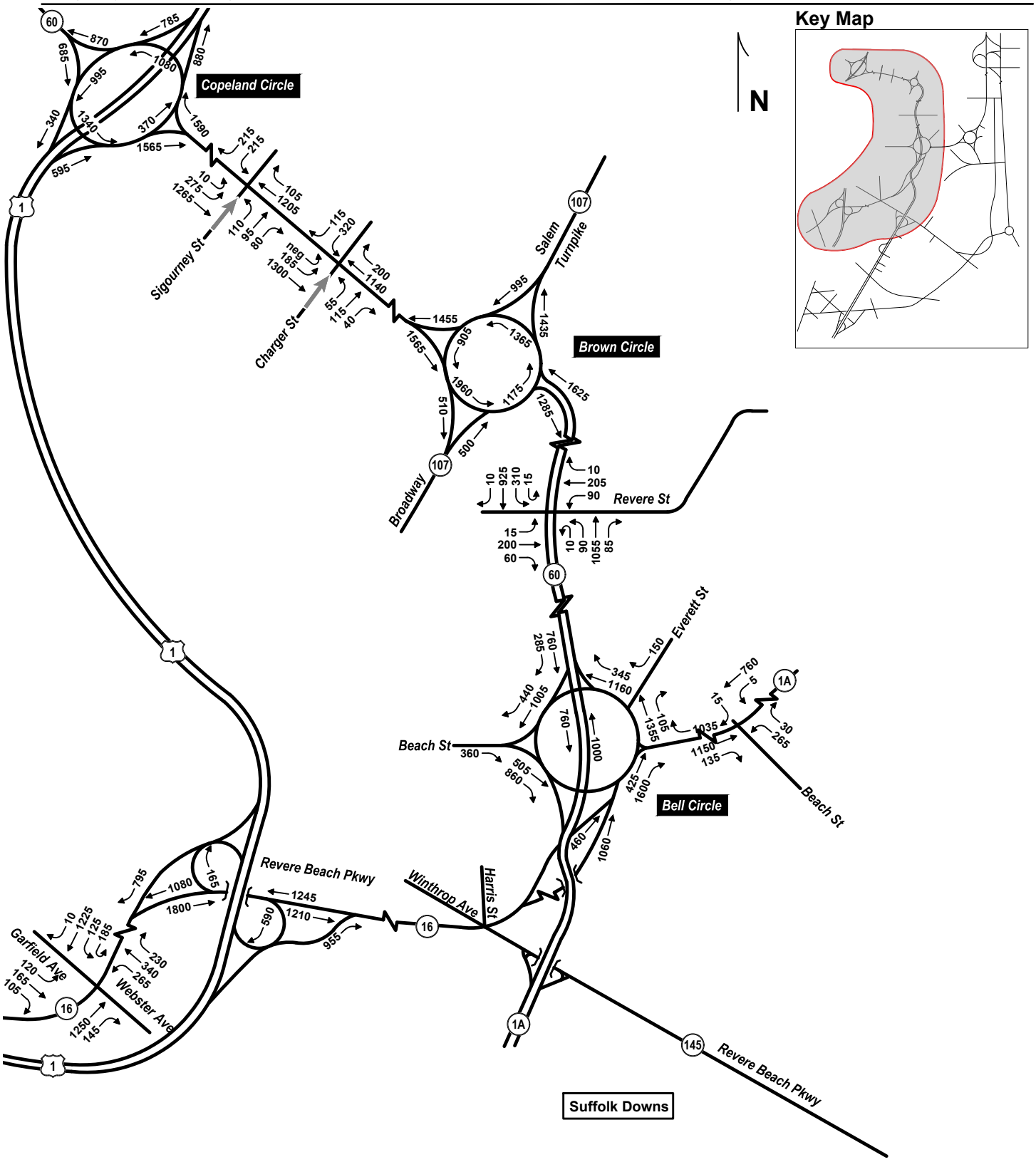
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Figure 6.6a
Evening Peak Hour
Existing Condition Vehicle Volume Network

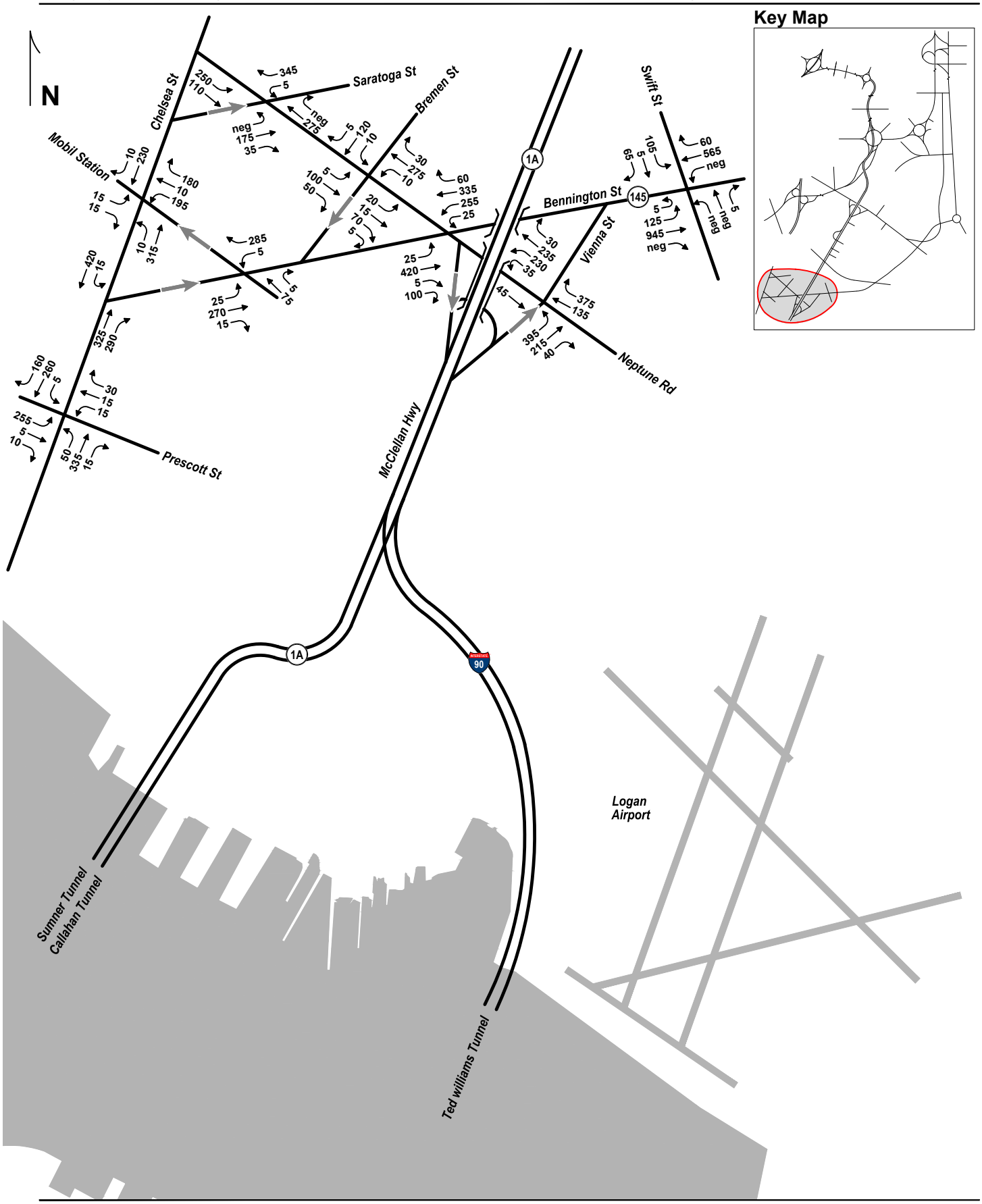
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.6b
Evening Peak Hour
Existing Condition Vehicle Volume Network

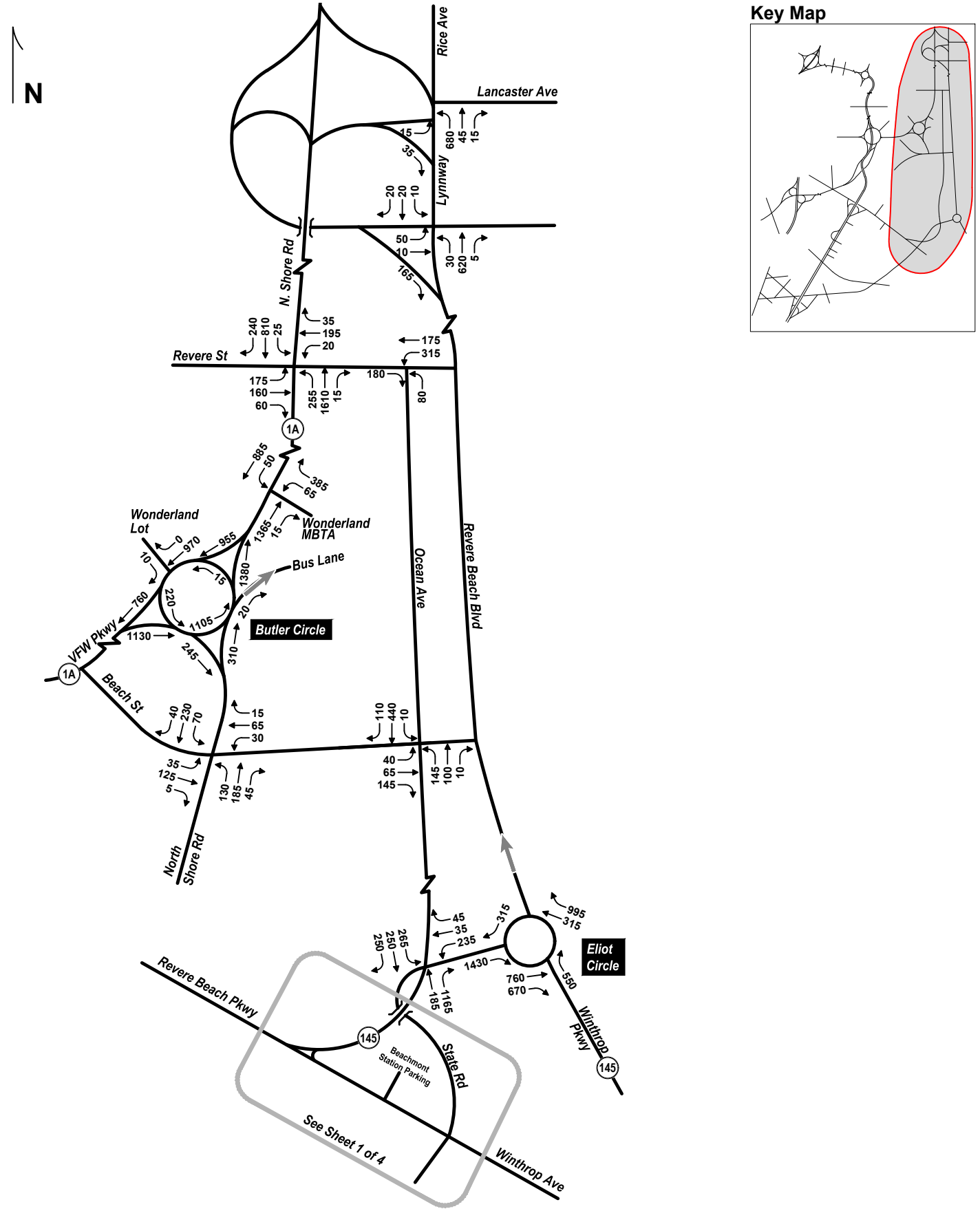
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.6c
Evening Peak Hour
Existing Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.6d
Evening Peak Hour
Existing Condition Vehicle Volume Network

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Boston & Revere, Massachusetts

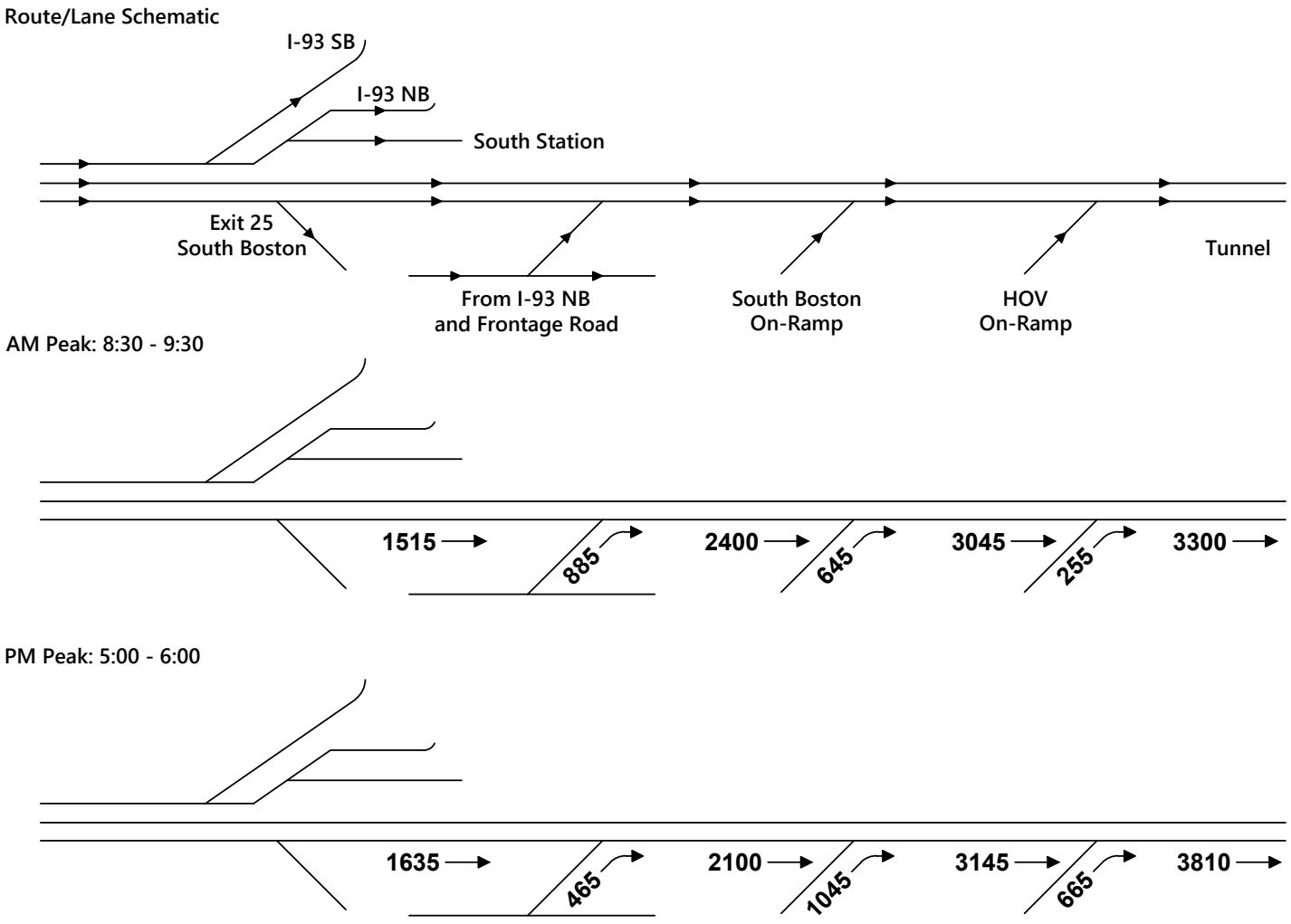


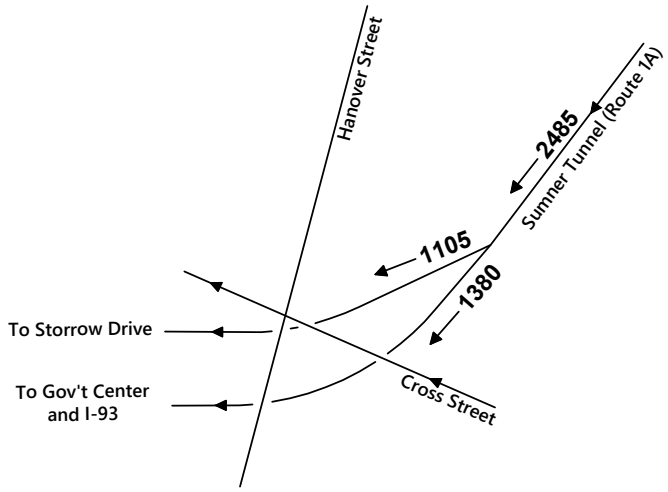
Figure 6.7a

I-90 Eastbound in South Boston

Existing Condition Vehicle Volume Diagram

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

AM Peak: 6:45 - 7:45



PM Peak: 3:30 - 4:30

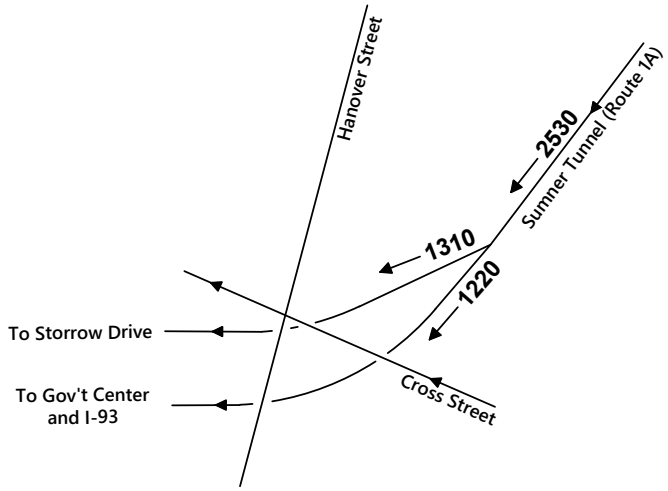


Figure 6.7b

Sumner Tunnel in Downtown Boston 2018
Existing Condition Vehicle Volume Diagram

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

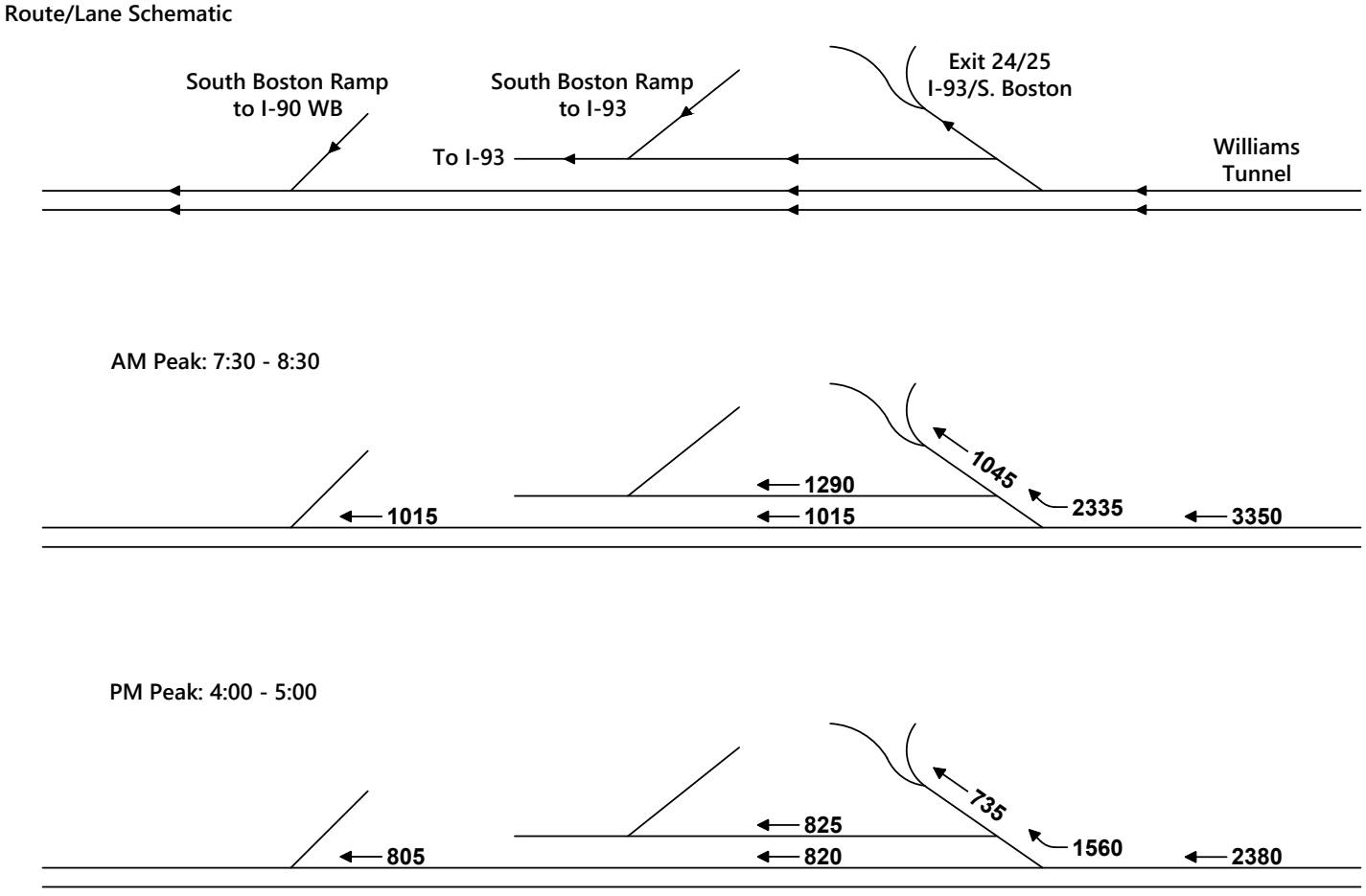
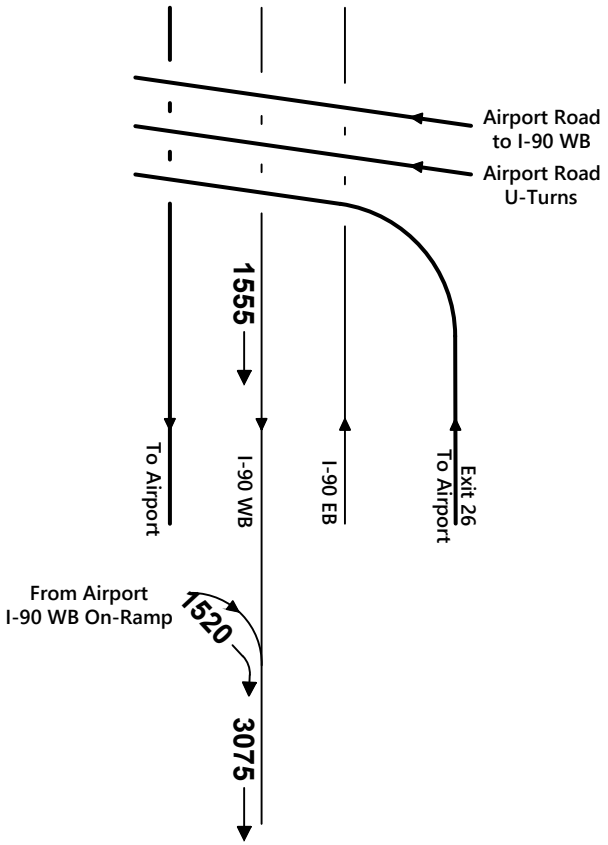


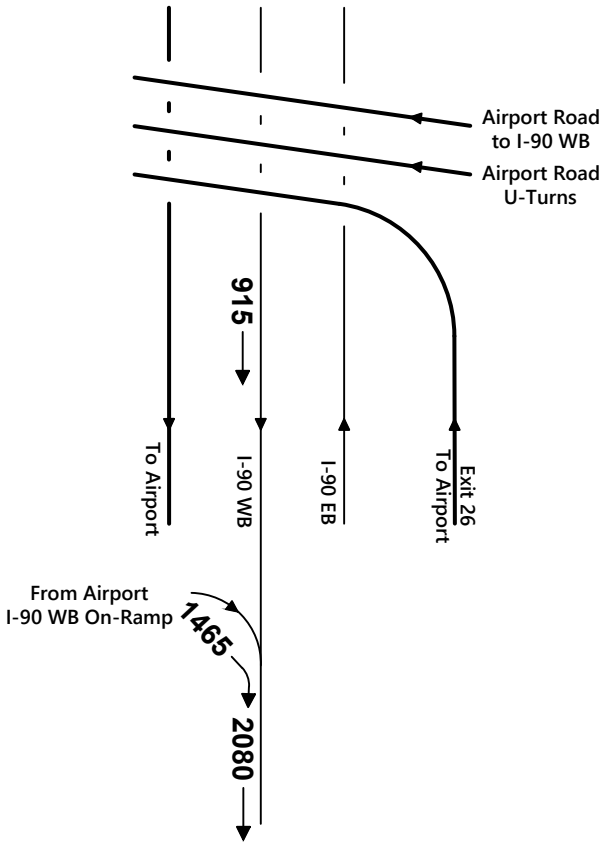
Figure 6.7c

I-90 Westbound in South Boston
Existing Condition Vehicle Volume Diagrams

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



AM Peak: 6:45 - 7:45

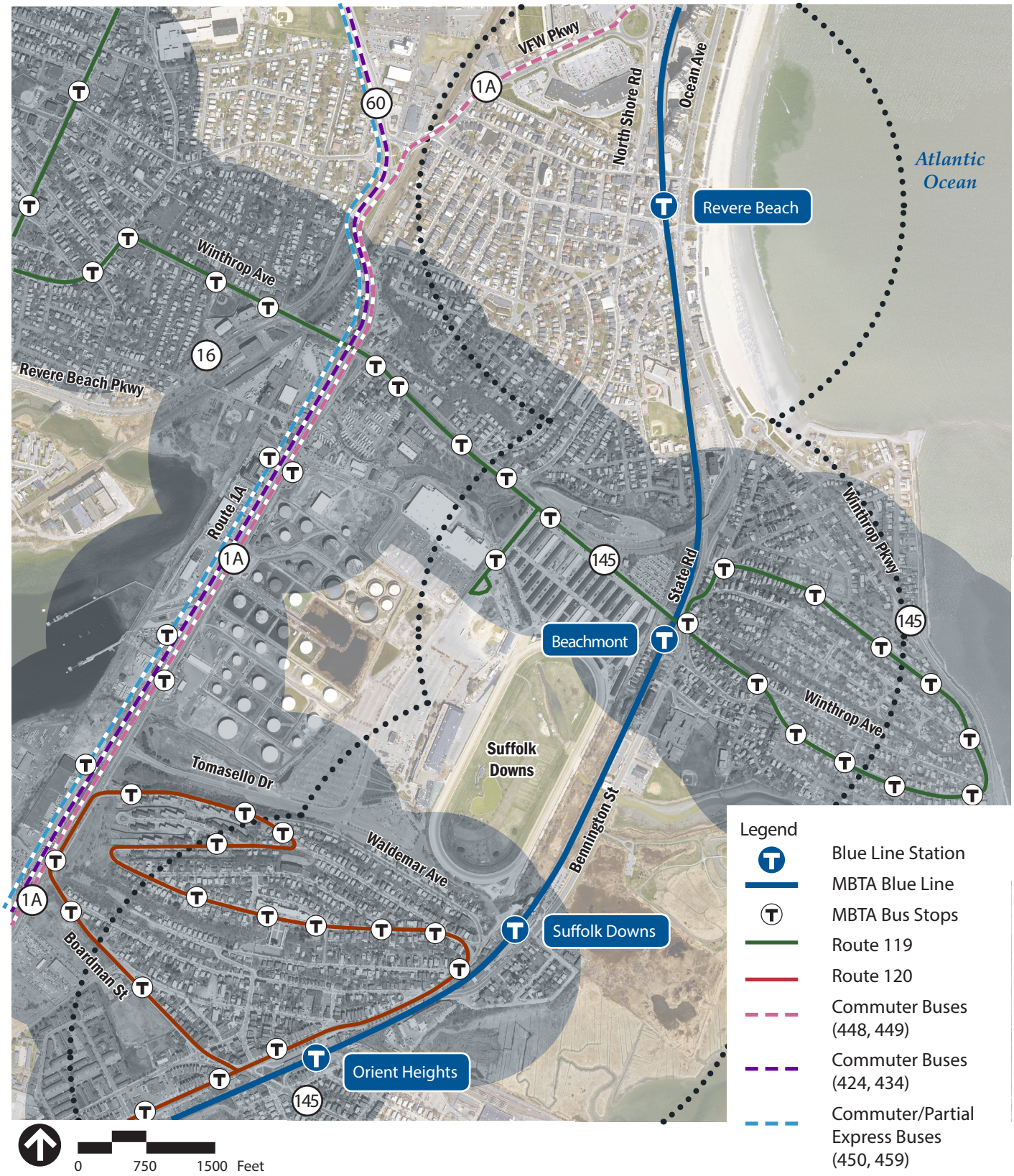


PM Peak: 3:30 - 4:30

Figure 6.7d

I-90 Westbound On-Ramp in East Boston
Existing Condition Vehicle Volume Diagrams

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

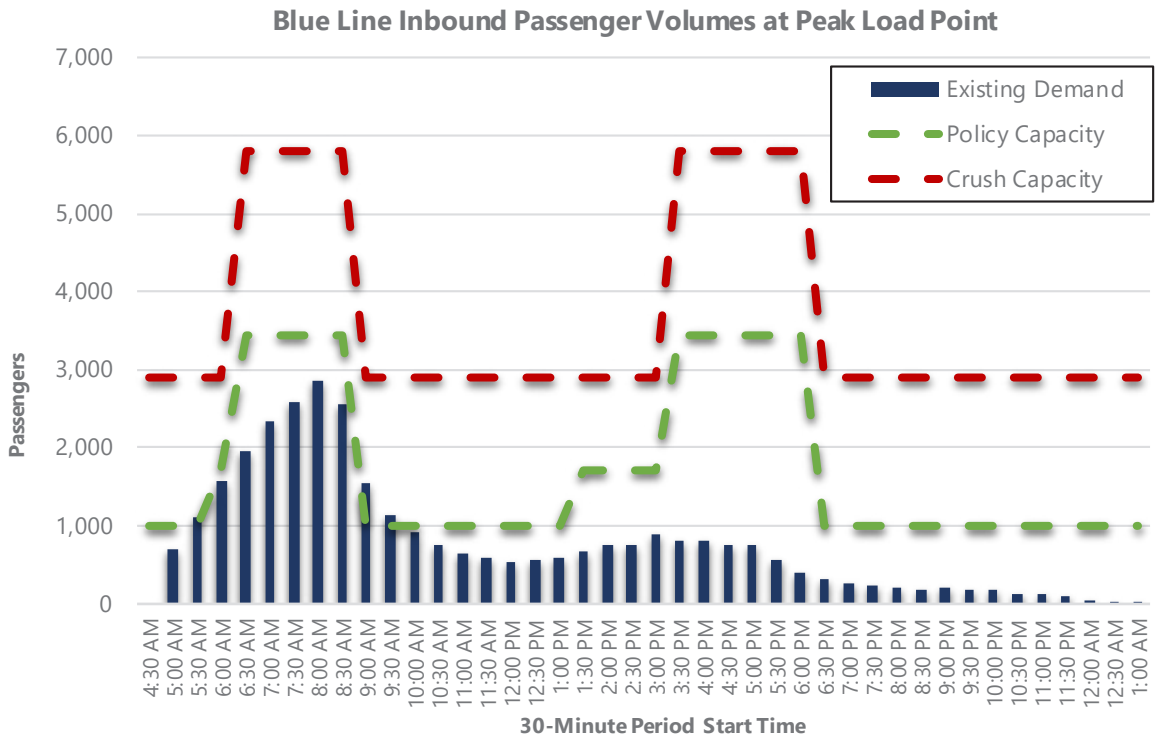


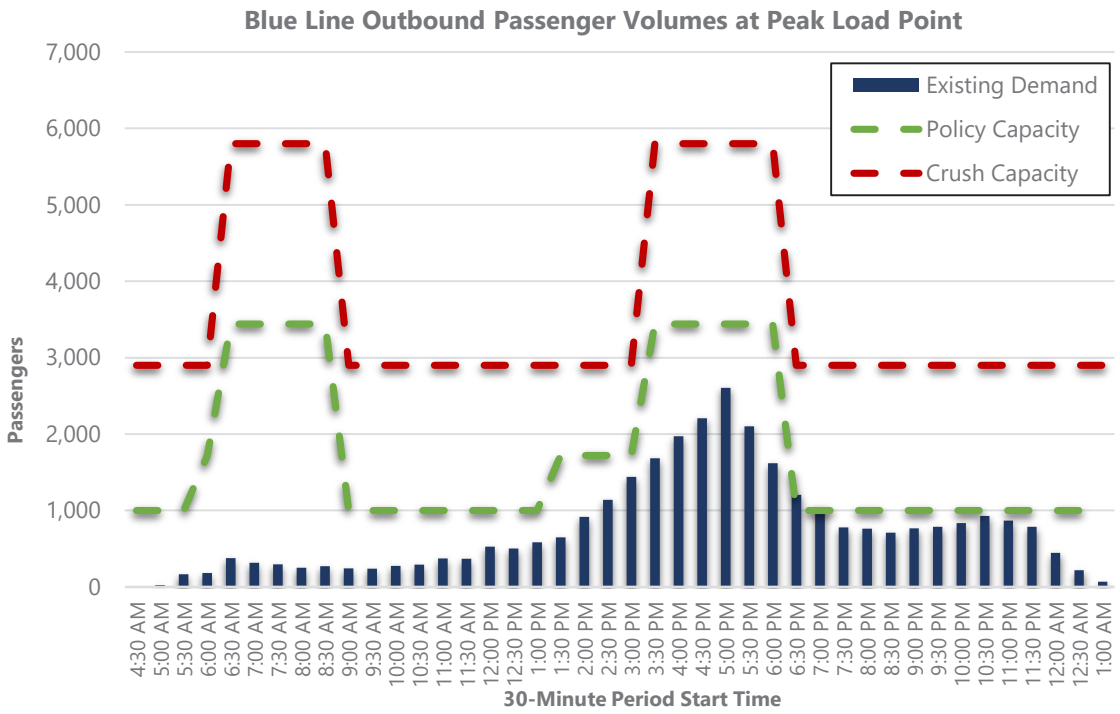
Source: MassGIS.
denotes 1/4-mile radius around MBTA Bus Stops
denotes 1/2-mile radius around MBTA Blue Line Stations

Figure 6.8

Existing Public Transportation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



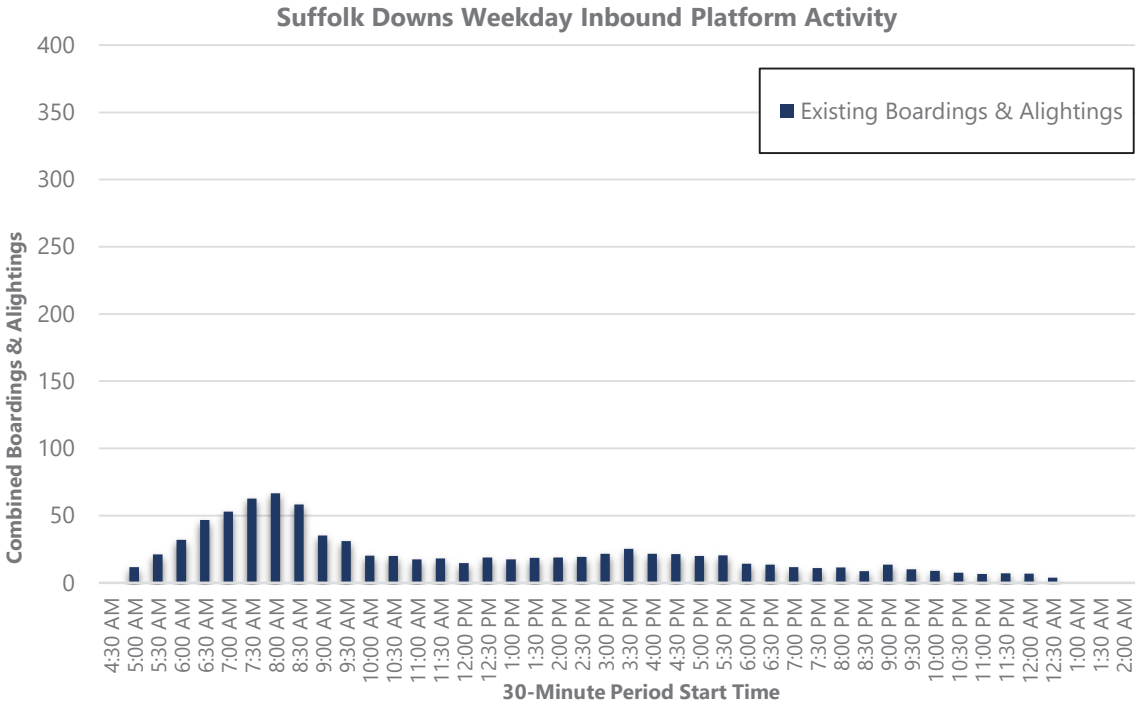


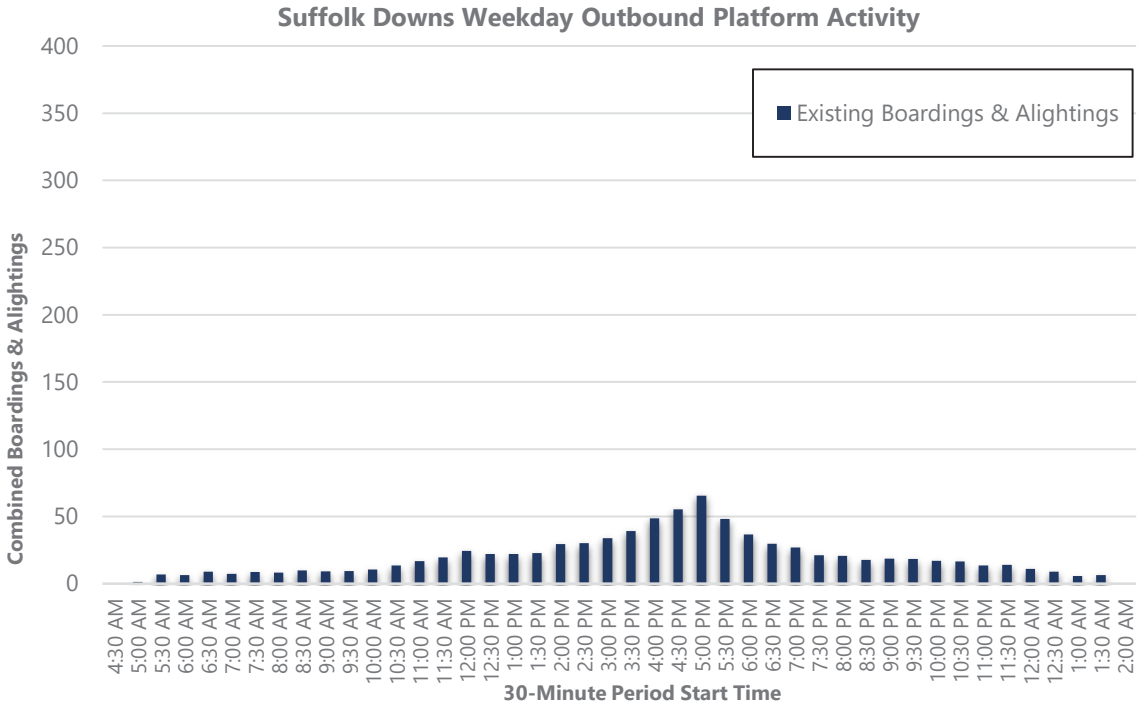
Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

Figure 6.9

Existing Conditions
Blue Line Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



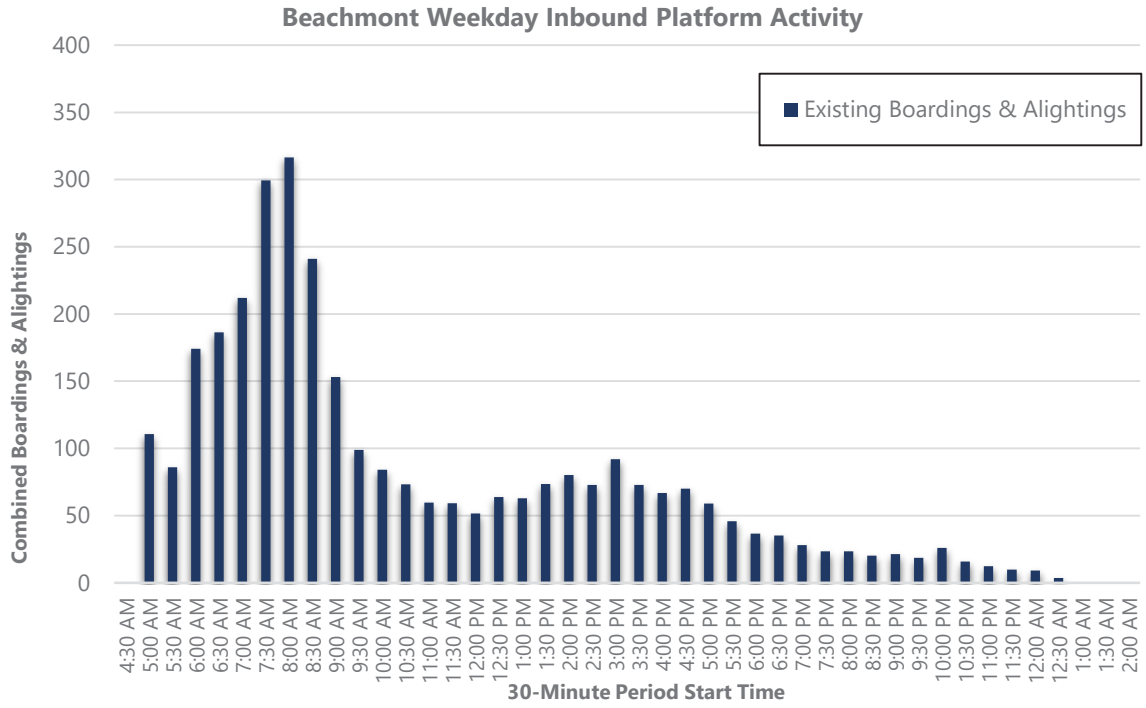


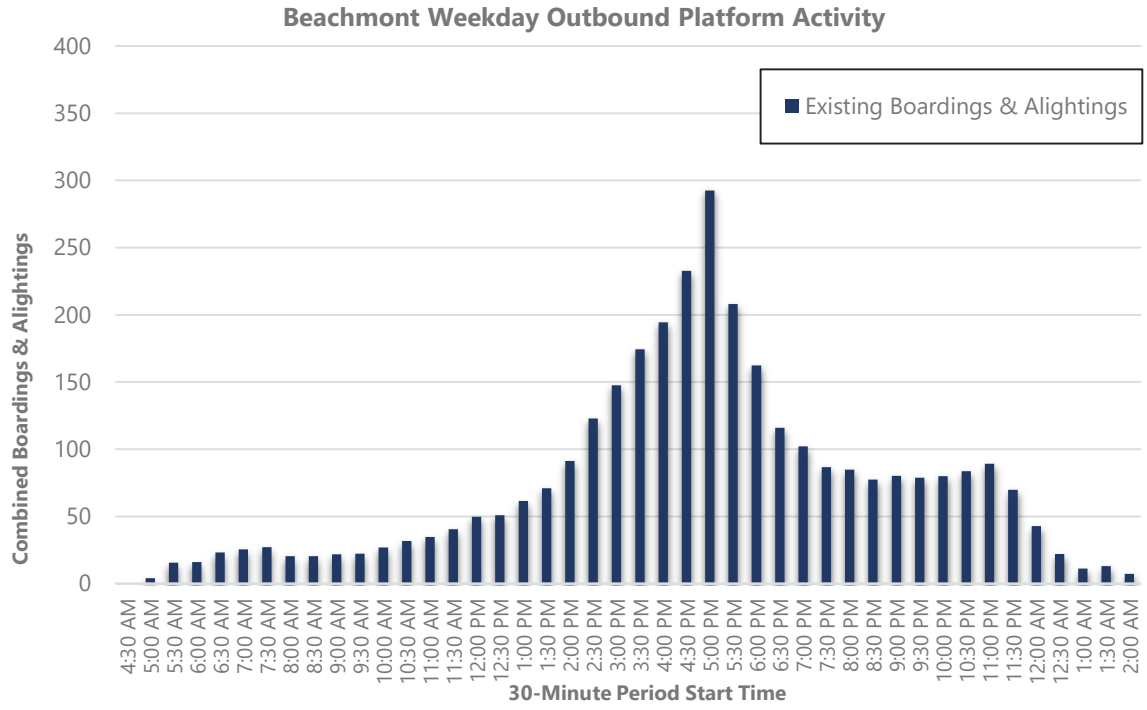
Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

Figure 6.10a

Existing Conditions
Suffolk Downs Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



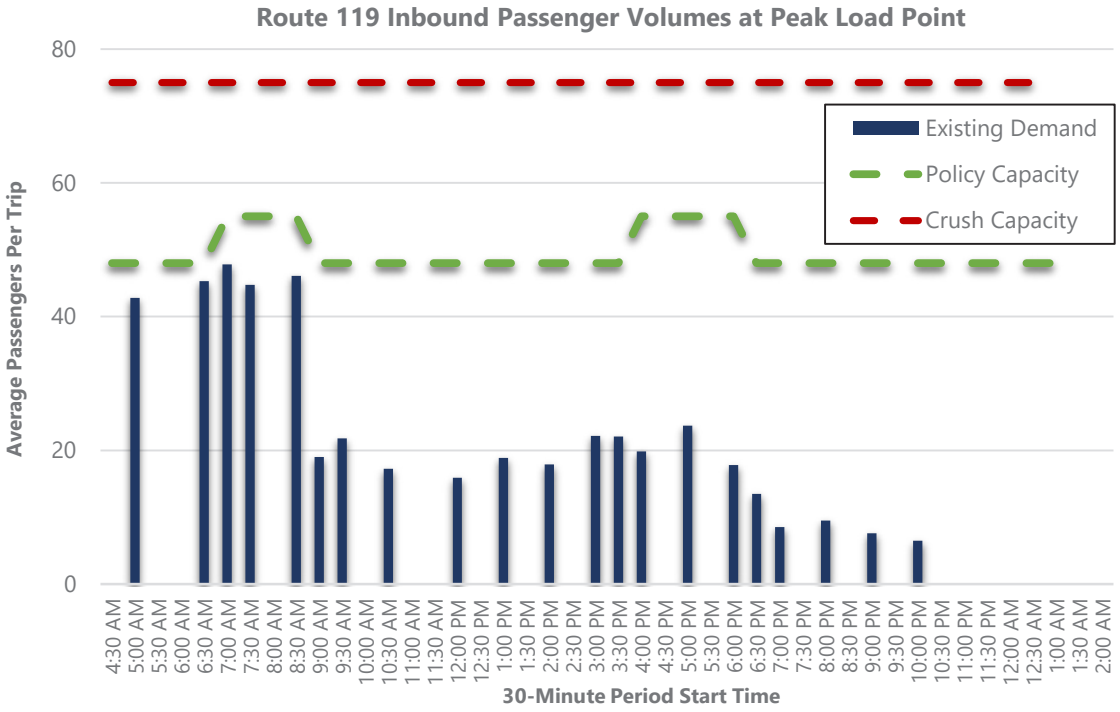


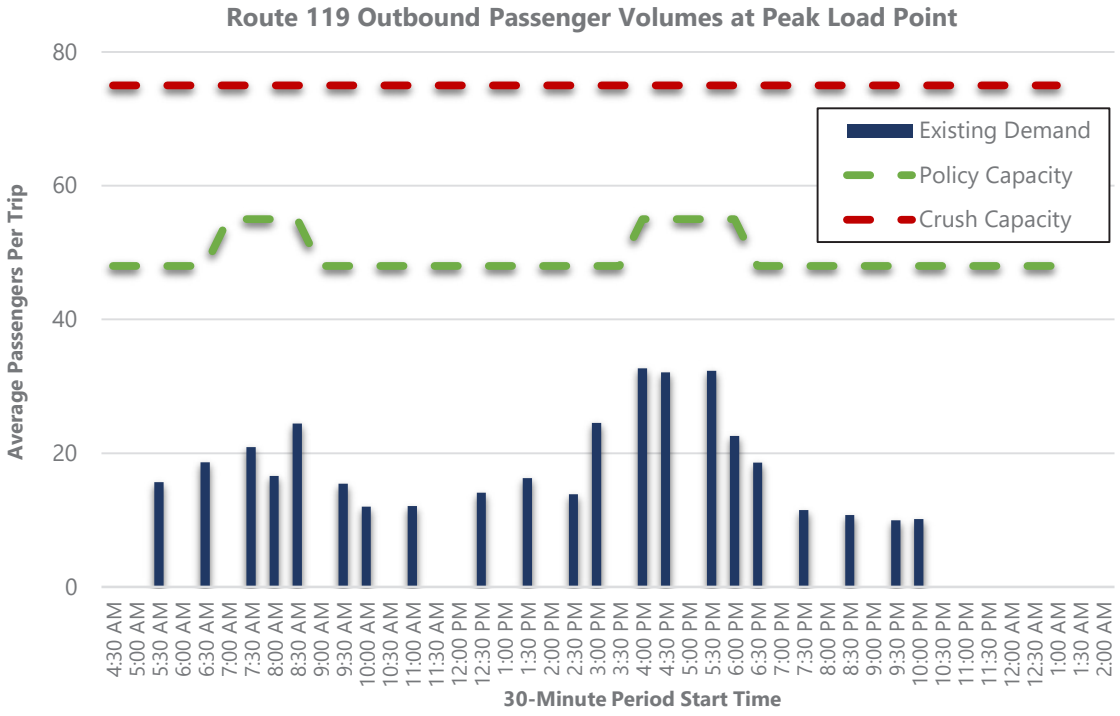
Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

Figure 6.10b

Existing Conditions
Beachmont Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





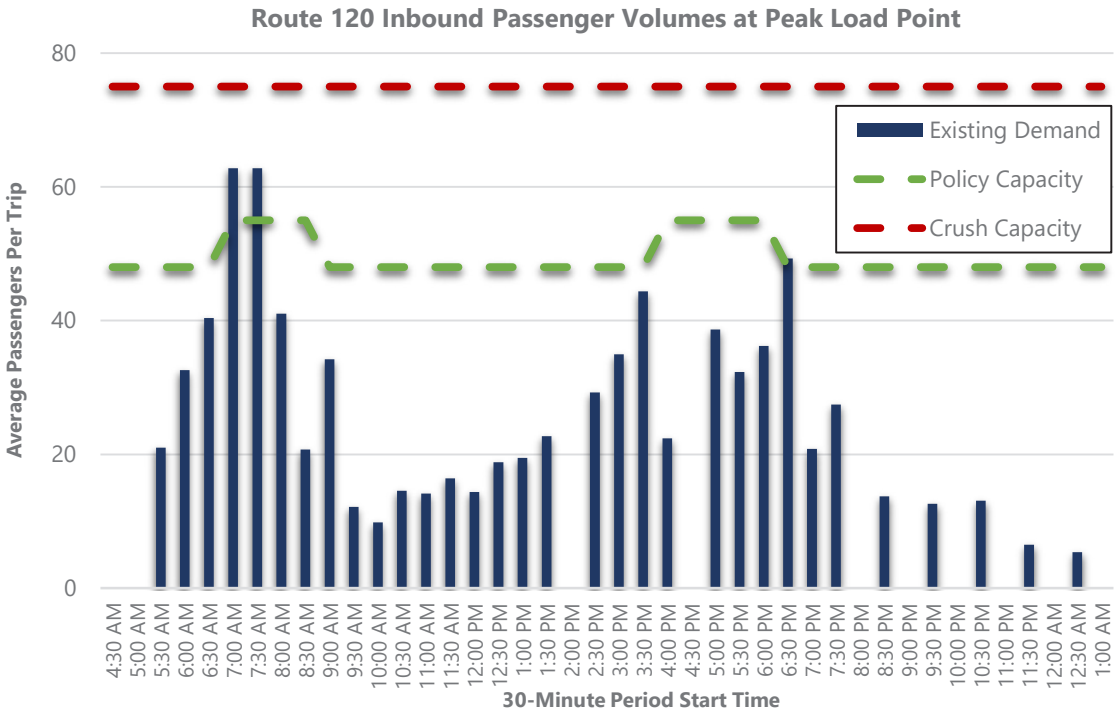
Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

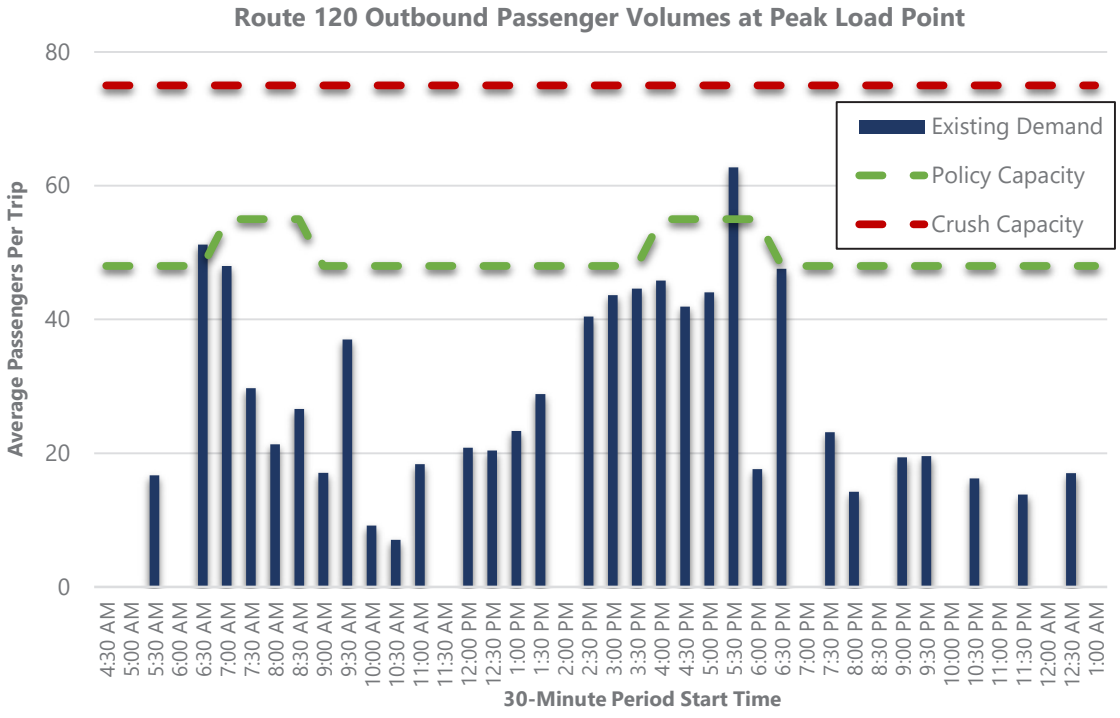
Note: Passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.11a

Existing Conditions
MBTA Route 119 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





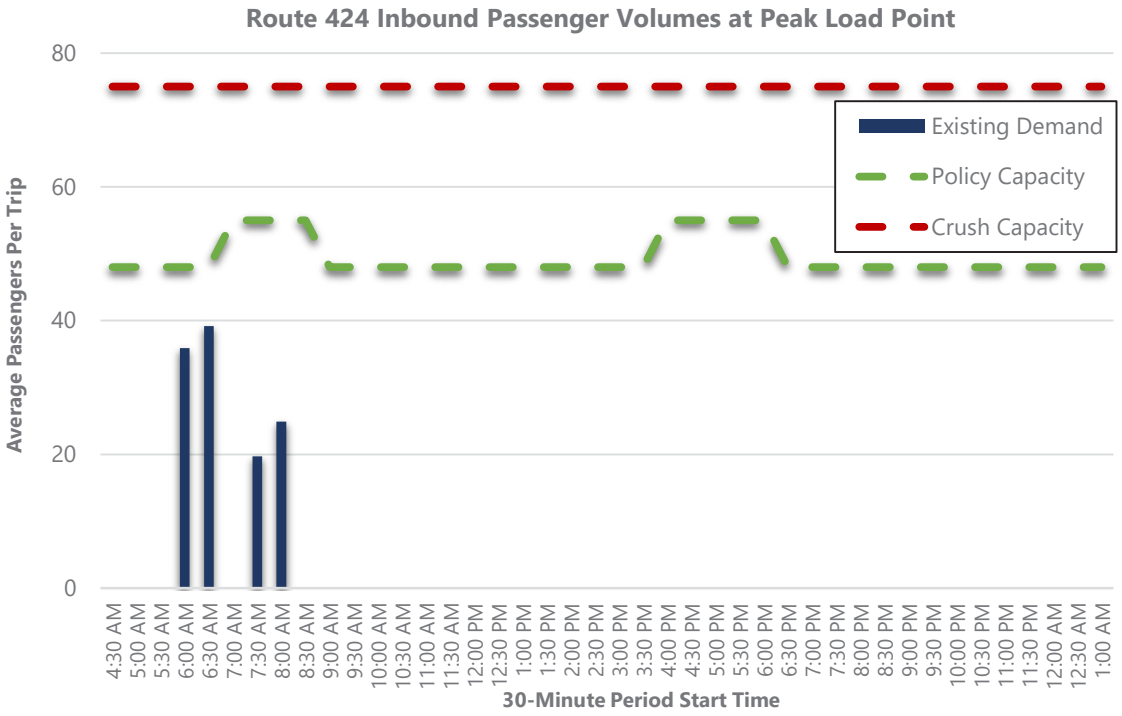
Data Source: MBTA, Route 120 Ridership Data, Fall 2017.

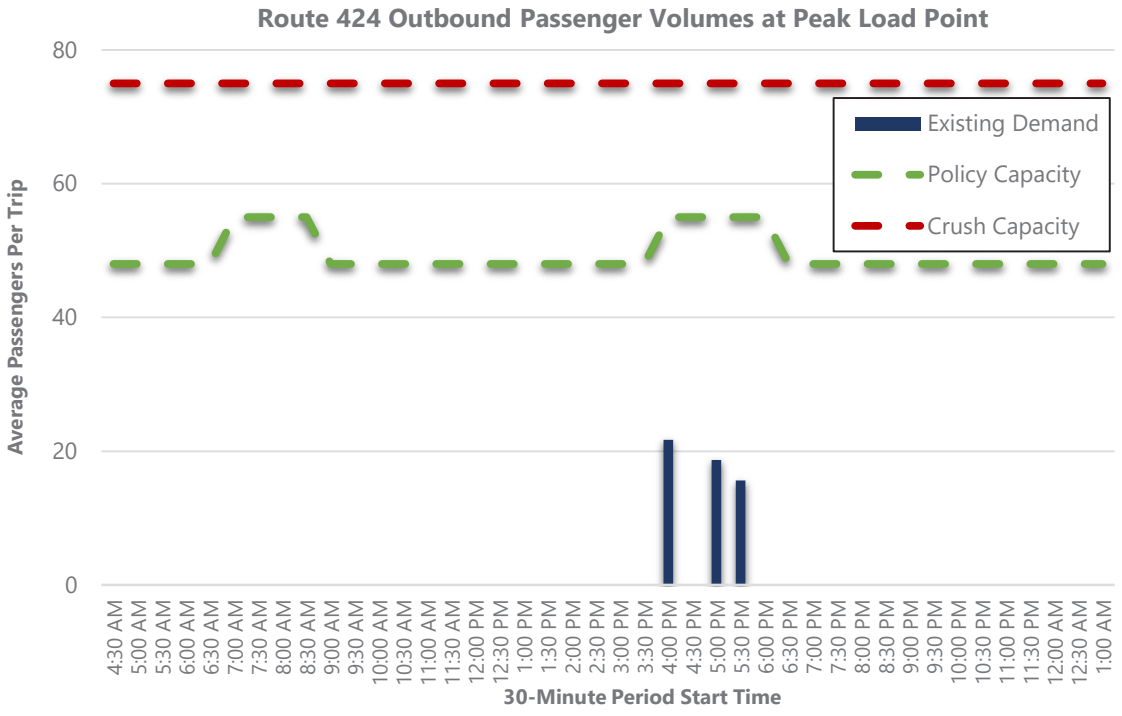
Note: Passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.11b

Existing Conditions
MBTA Route 120 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



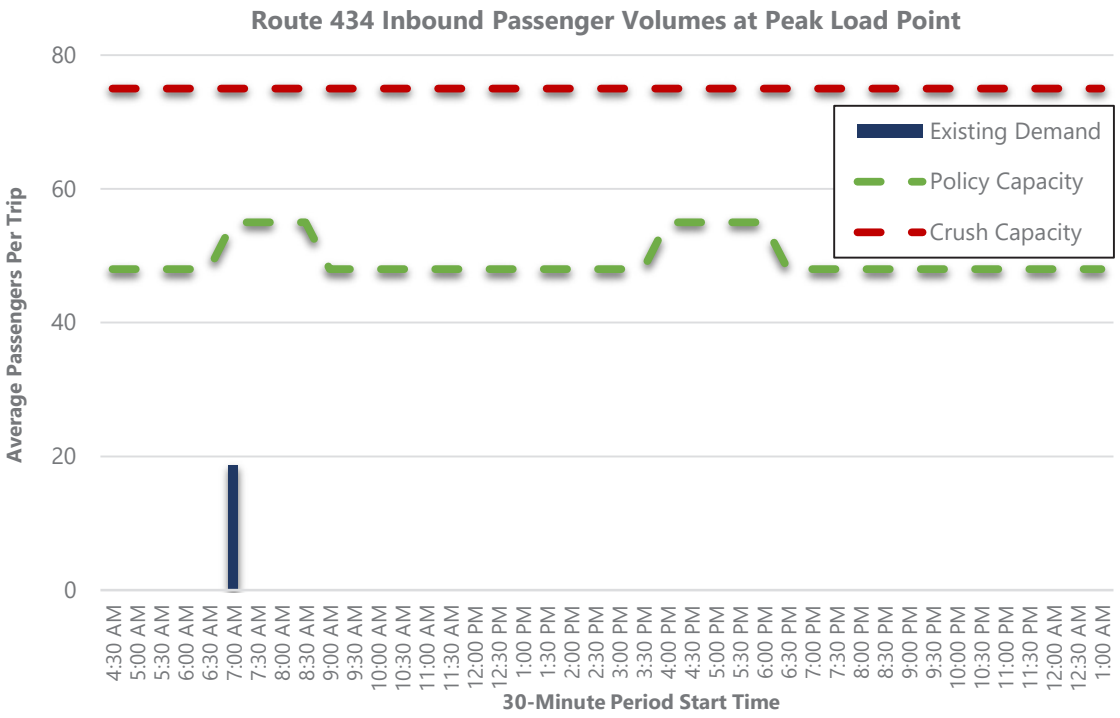


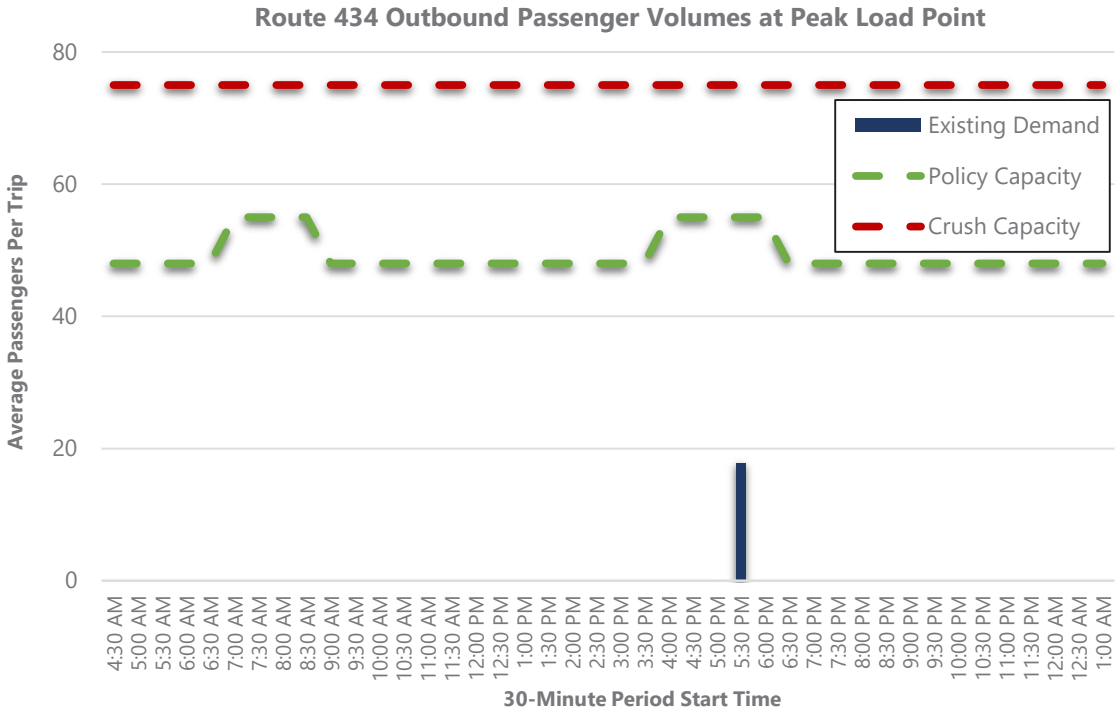
Data Source: MBTA, Route 424 Ridership Data, Fall 2017.

Figure 6.11c

Existing Conditions
MBTA Route 424 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



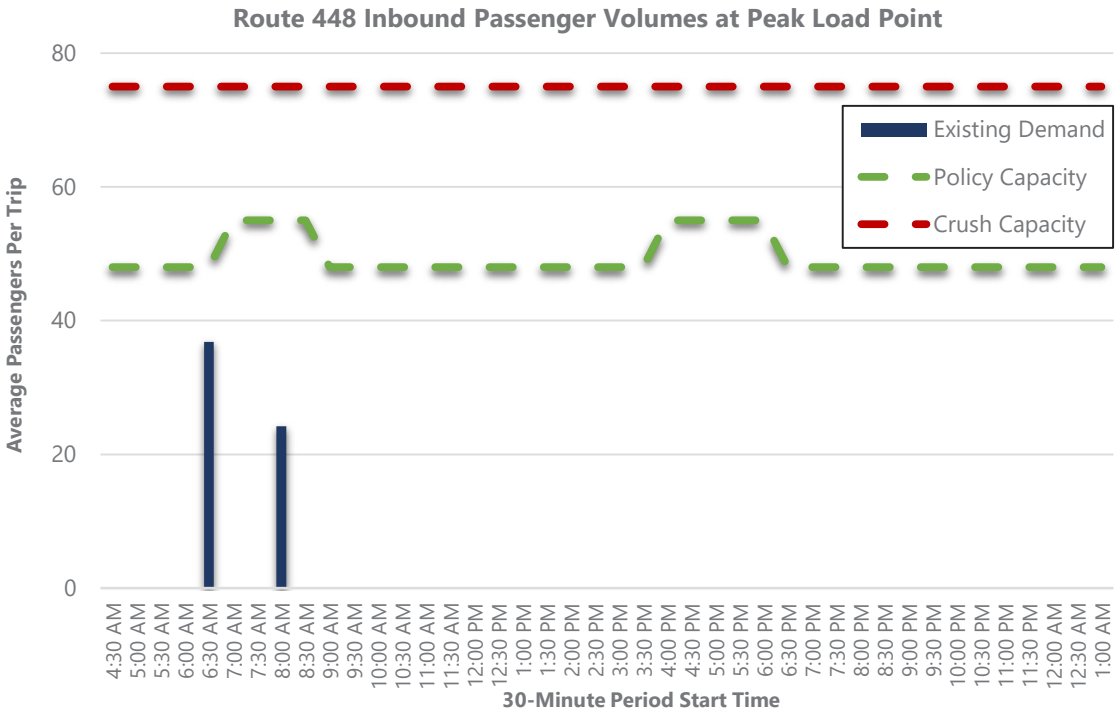


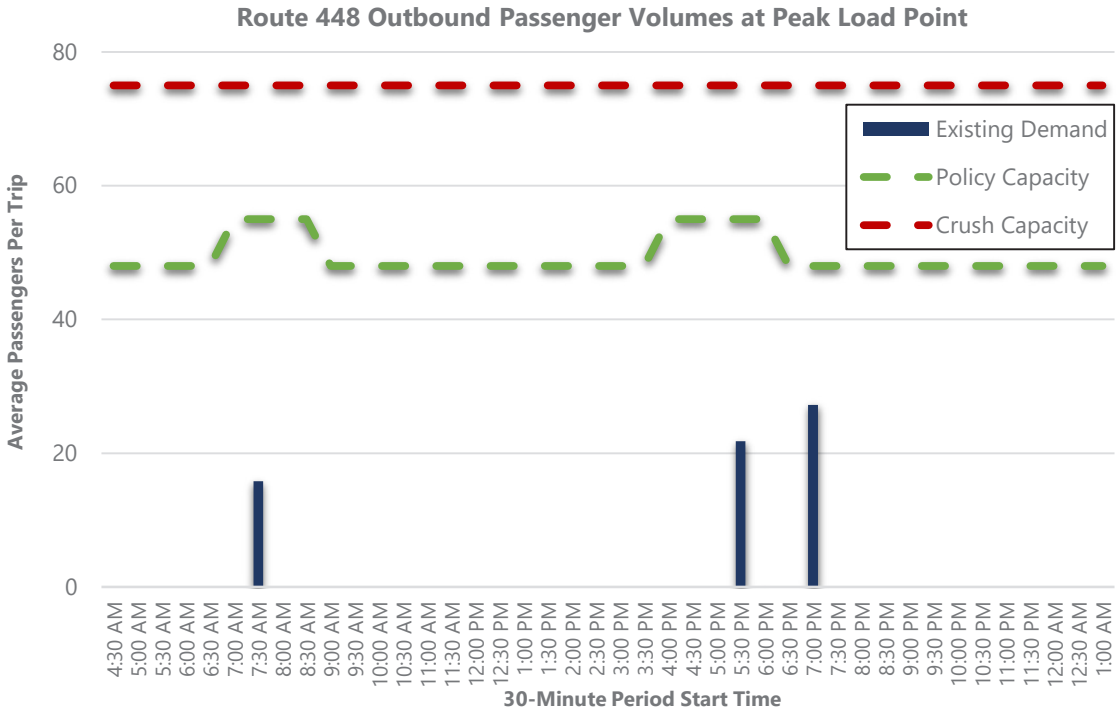
Data Source: MBTA, Route 434 Ridership Data, Fall 2017.

Figure 6.11d

Existing Conditions
MBTA Route 434 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



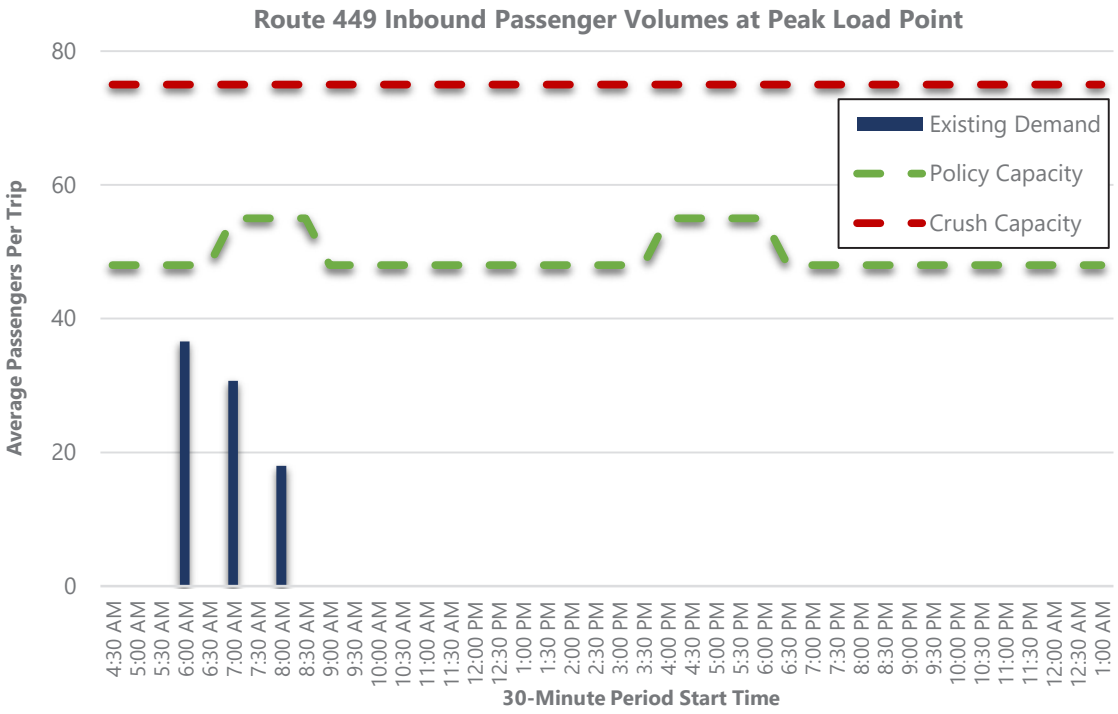


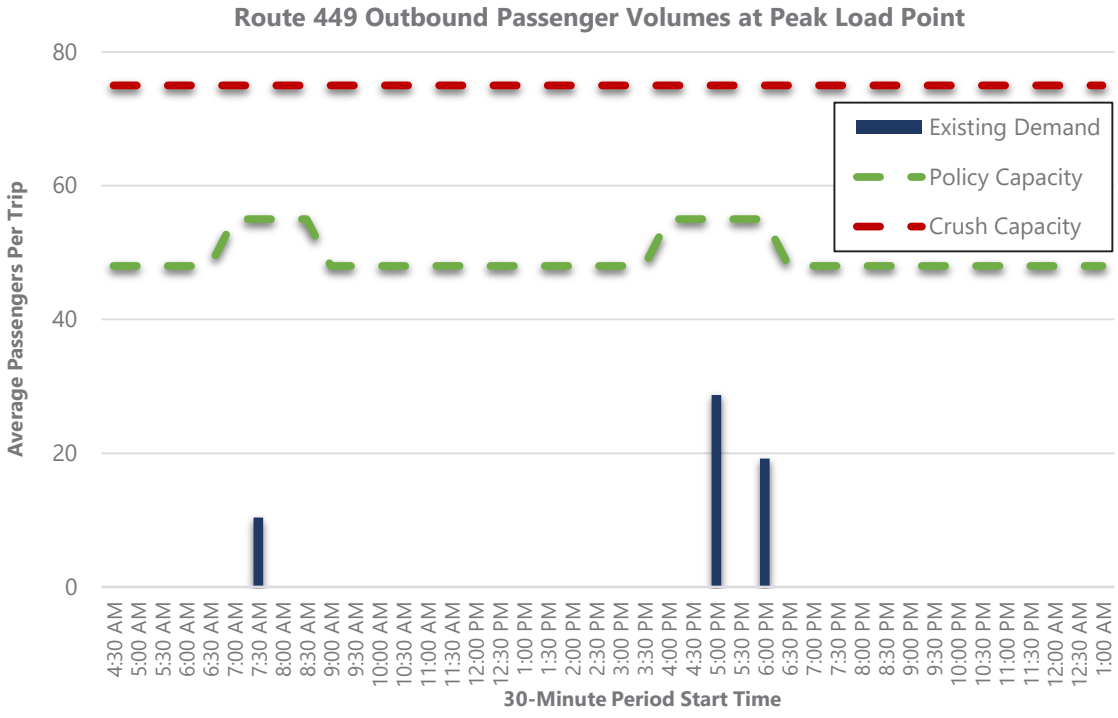
Data Source: MBTA, Route 448 Ridership Data, Fall 2017.

Figure 6.11e

Existing Conditions
MBTA Route 448 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



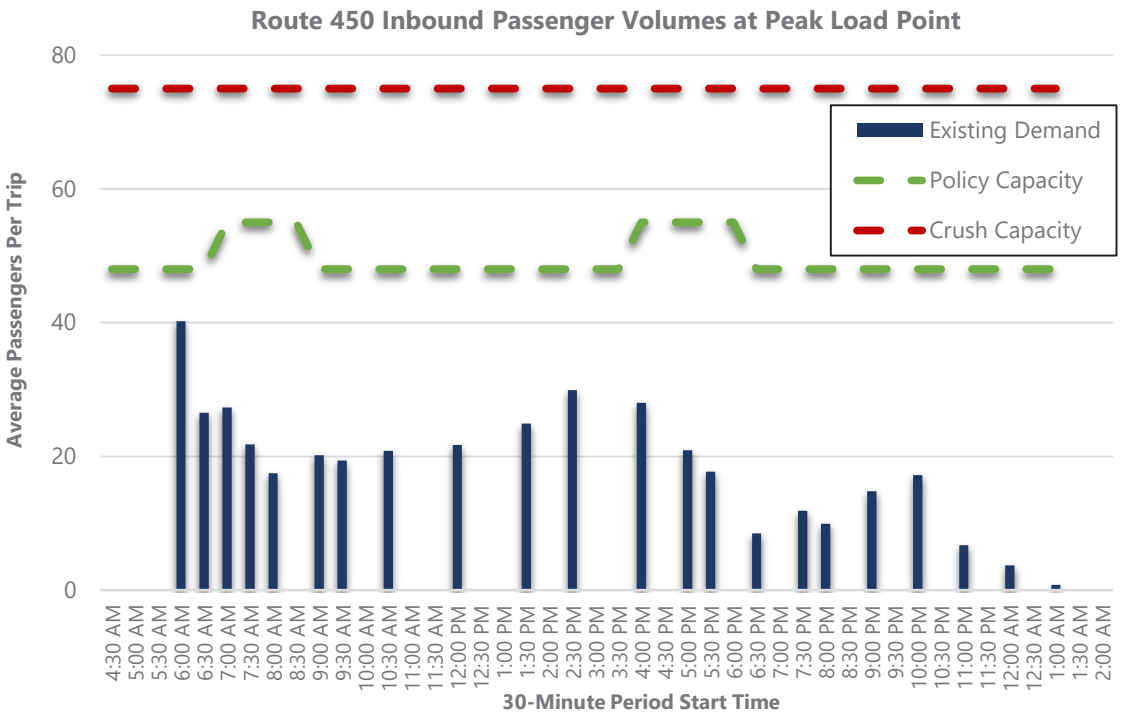


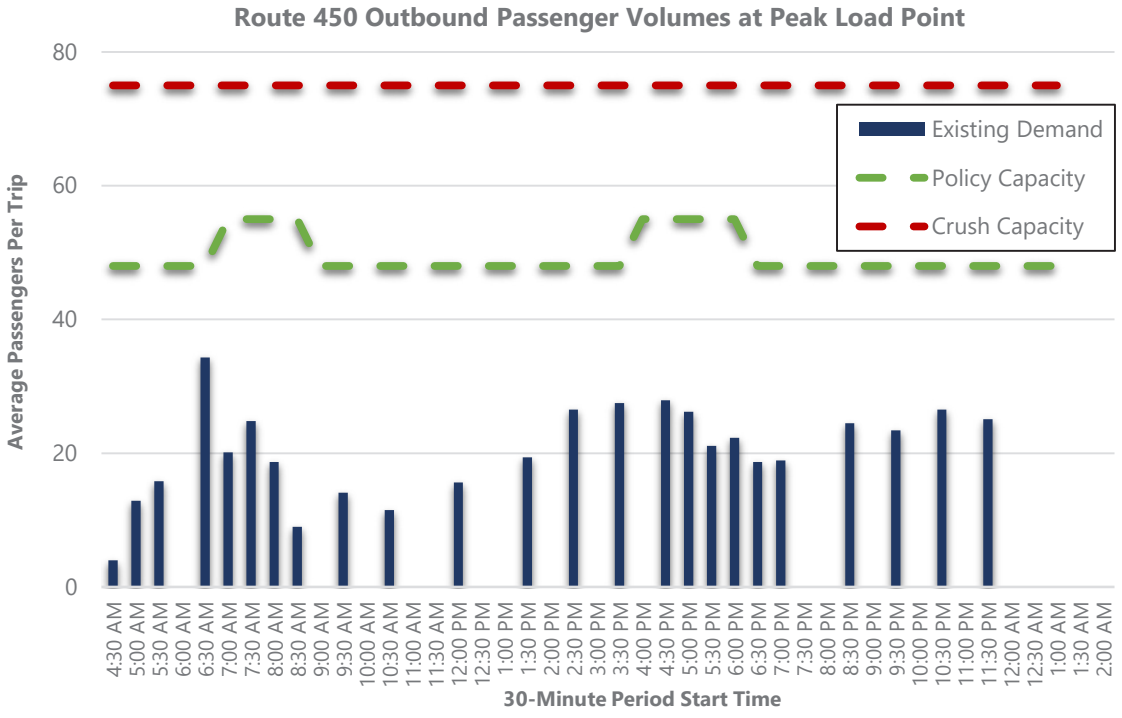
Data Source: MBTA, Route 449 Ridership Data, Fall 2017.

Figure 6.11f

Existing Conditions
MBTA Route 449 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



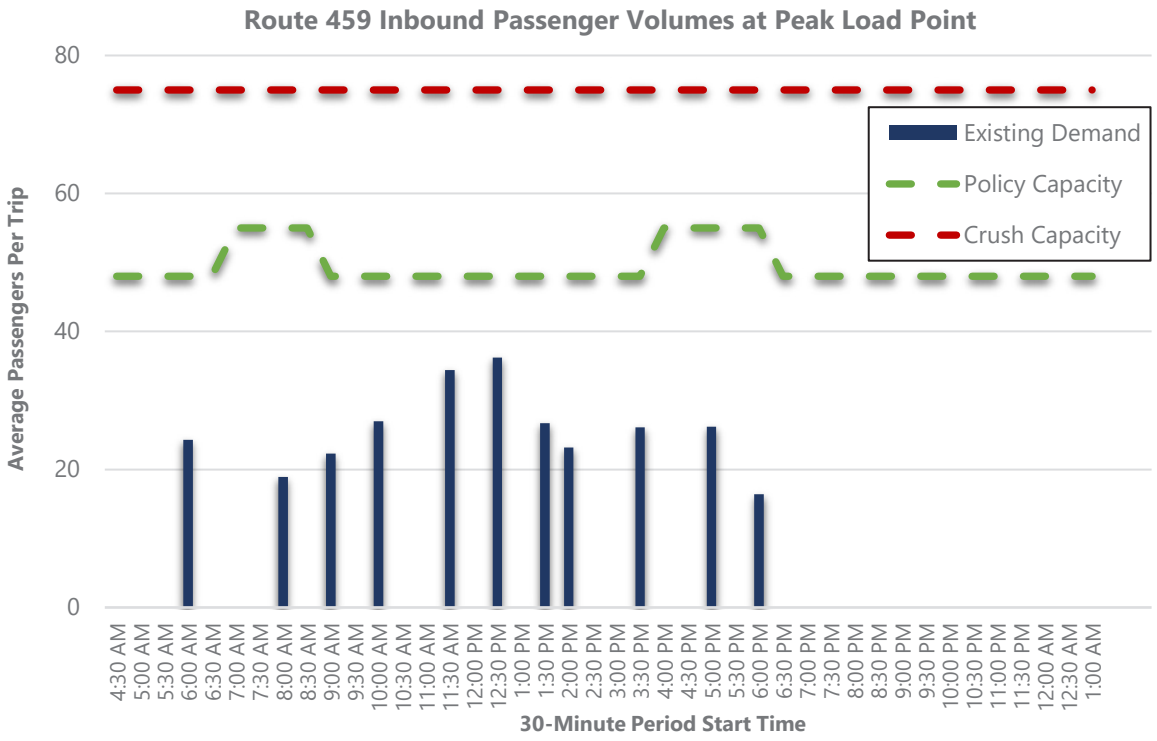


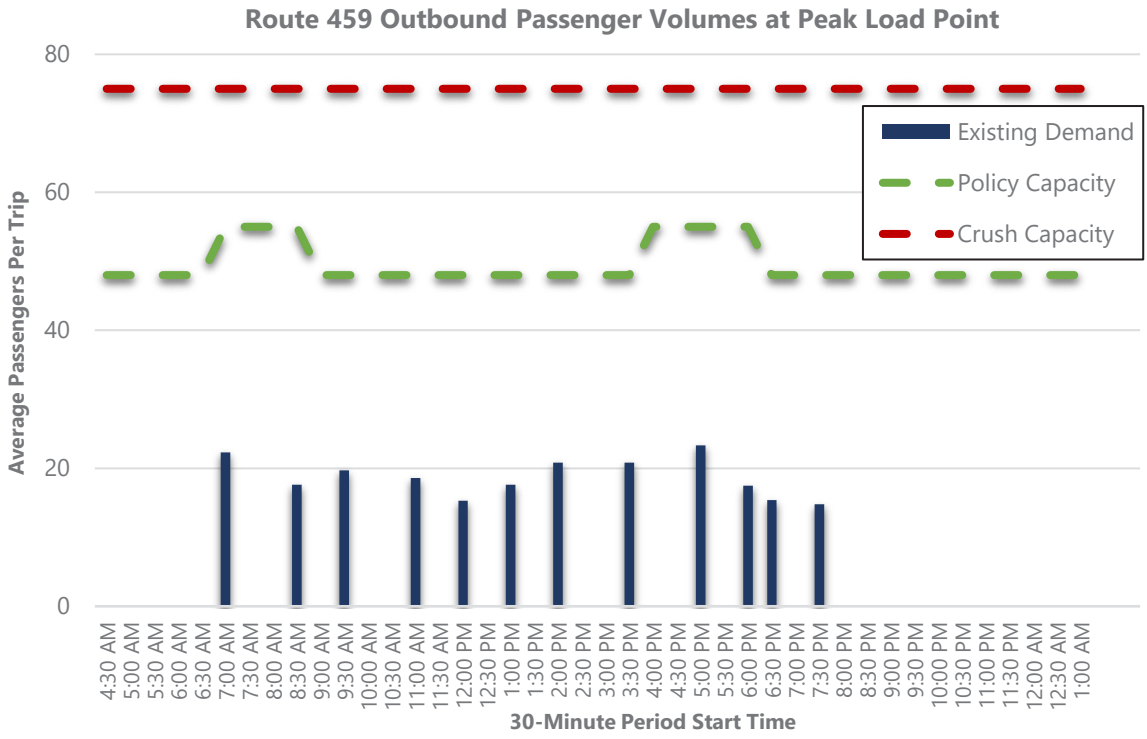
Data Source: MBTA, Route 450 Ridership Data, Fall 2017.

Figure 6.11g

Existing Conditions
MBTA Route 450 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



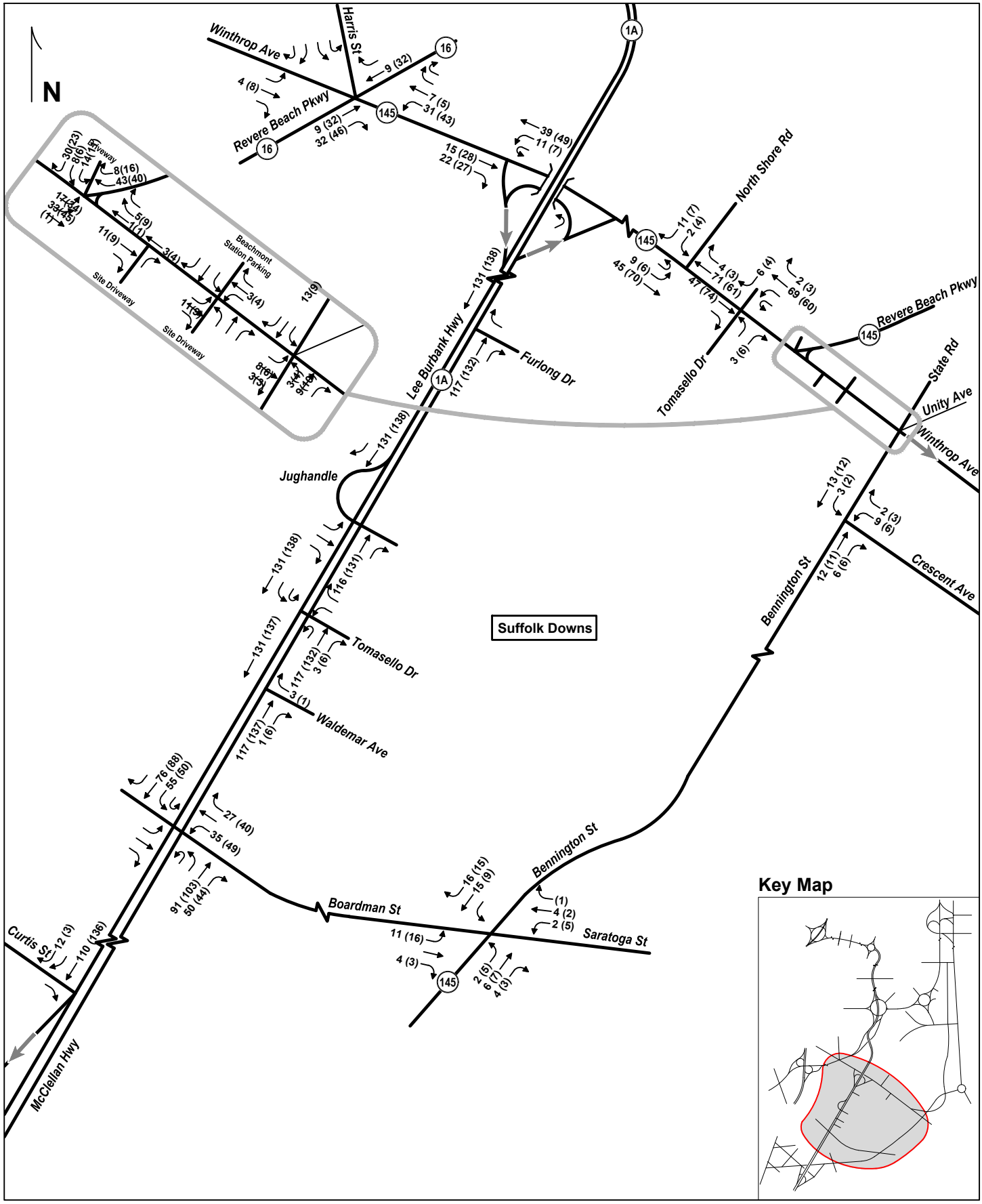


Data Source: MBTA, Route 459 Ridership Data, Fall 2017.

Figure 6.11h

Existing Conditions
MBTA Route 459 Passenger Volumes at Peak Load Point

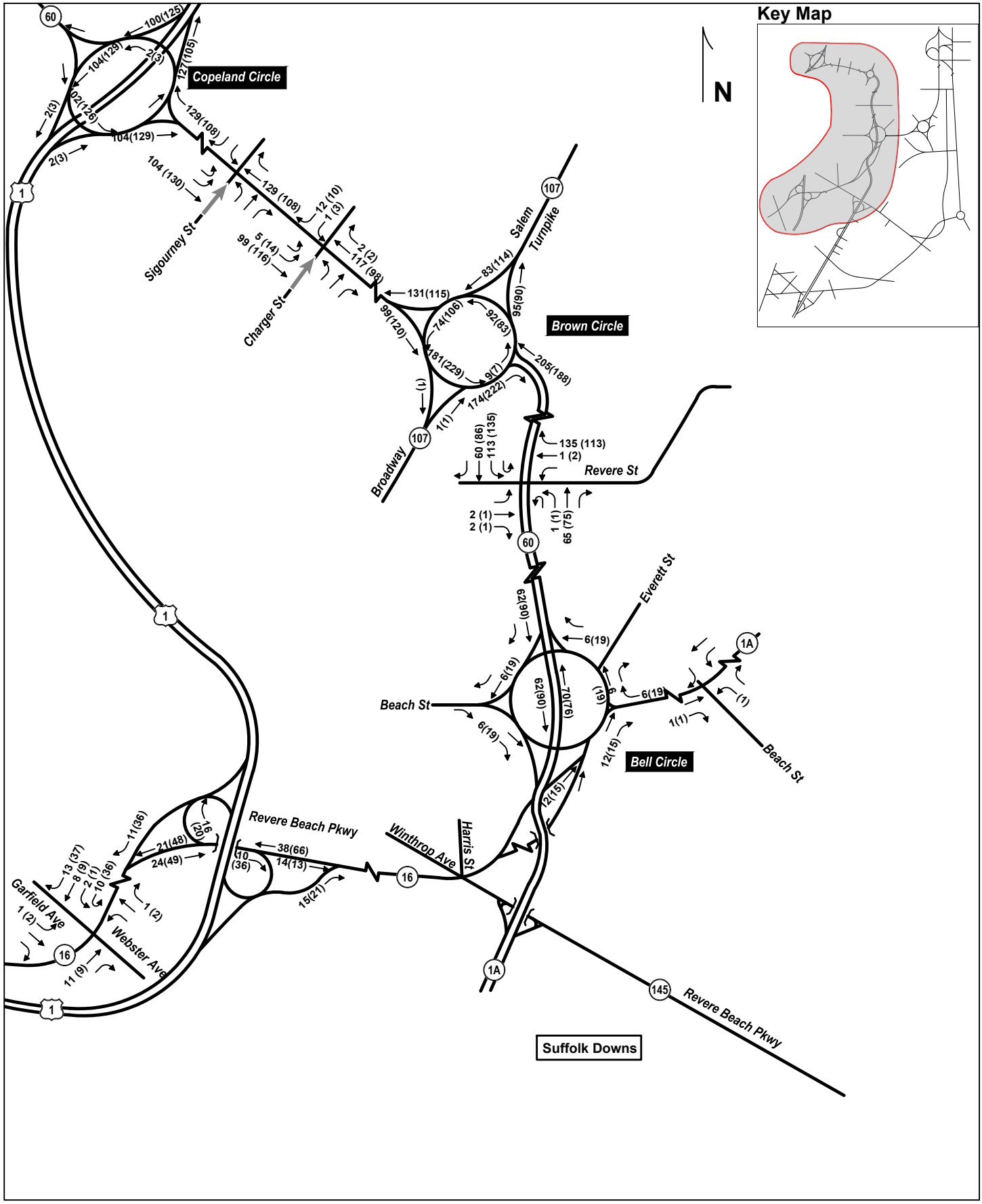
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



xx (xx) = AM Trips (PM Trips)

Figure 6.12a
Morning and Evening Peak Hour
Background Project Vehicle Trips

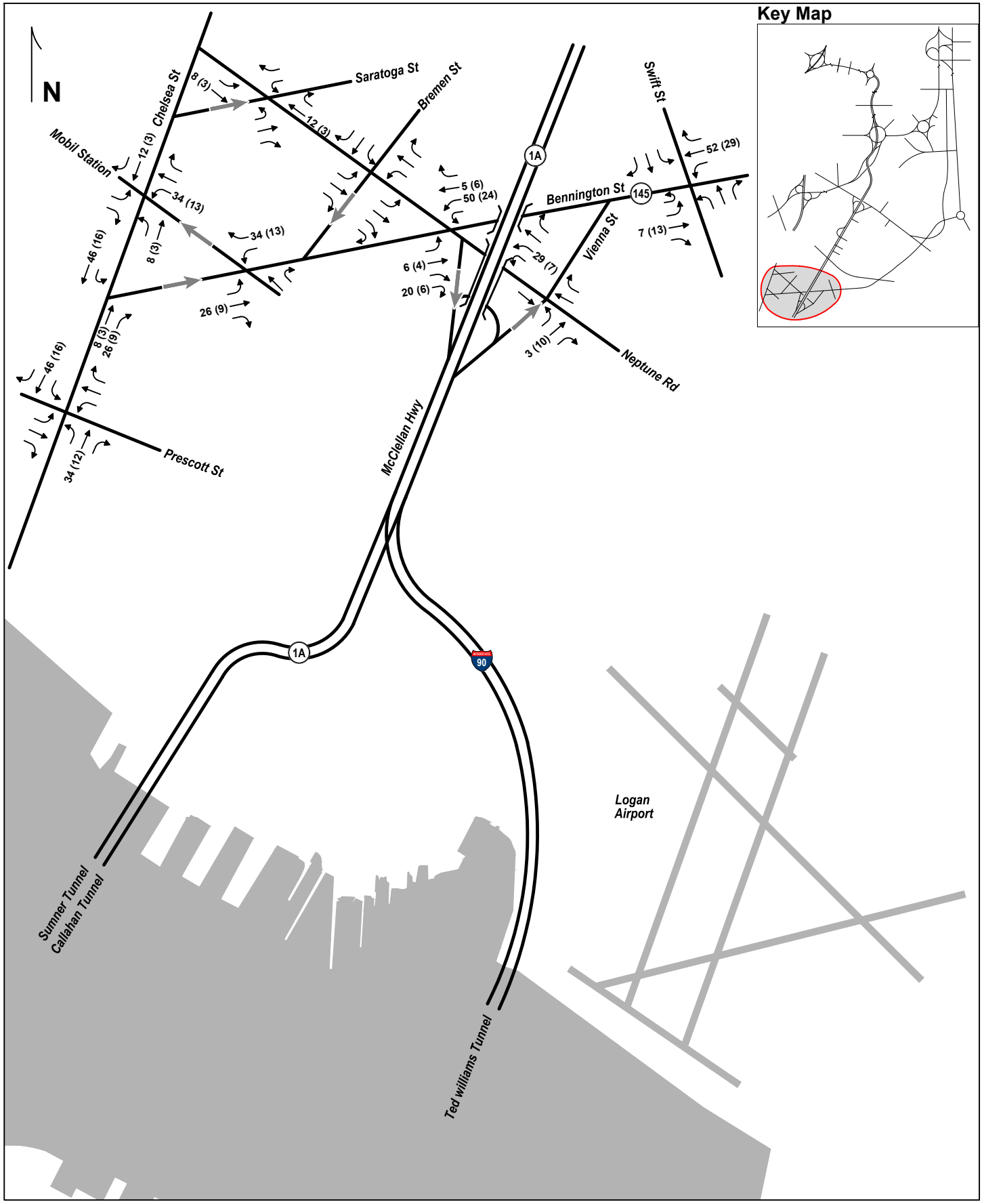
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.12b
Morning and Evening Peak Hour
Background Project Vehicle Trips

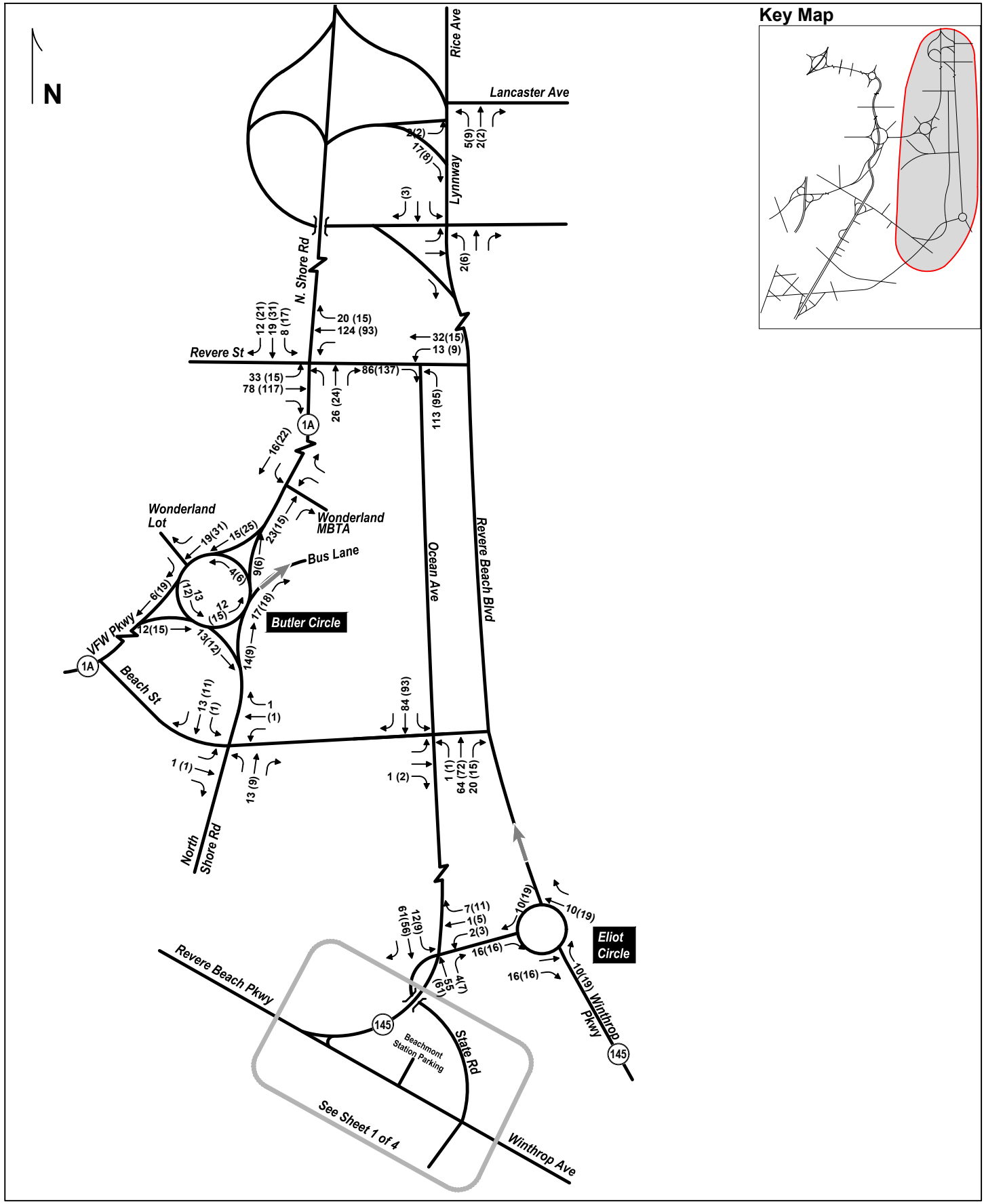
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



xx (xx) = AM Trips (PM Trips)

Figure 6.12c
Morning and Evening Peak Hour
Background Project Vehicle Trips

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

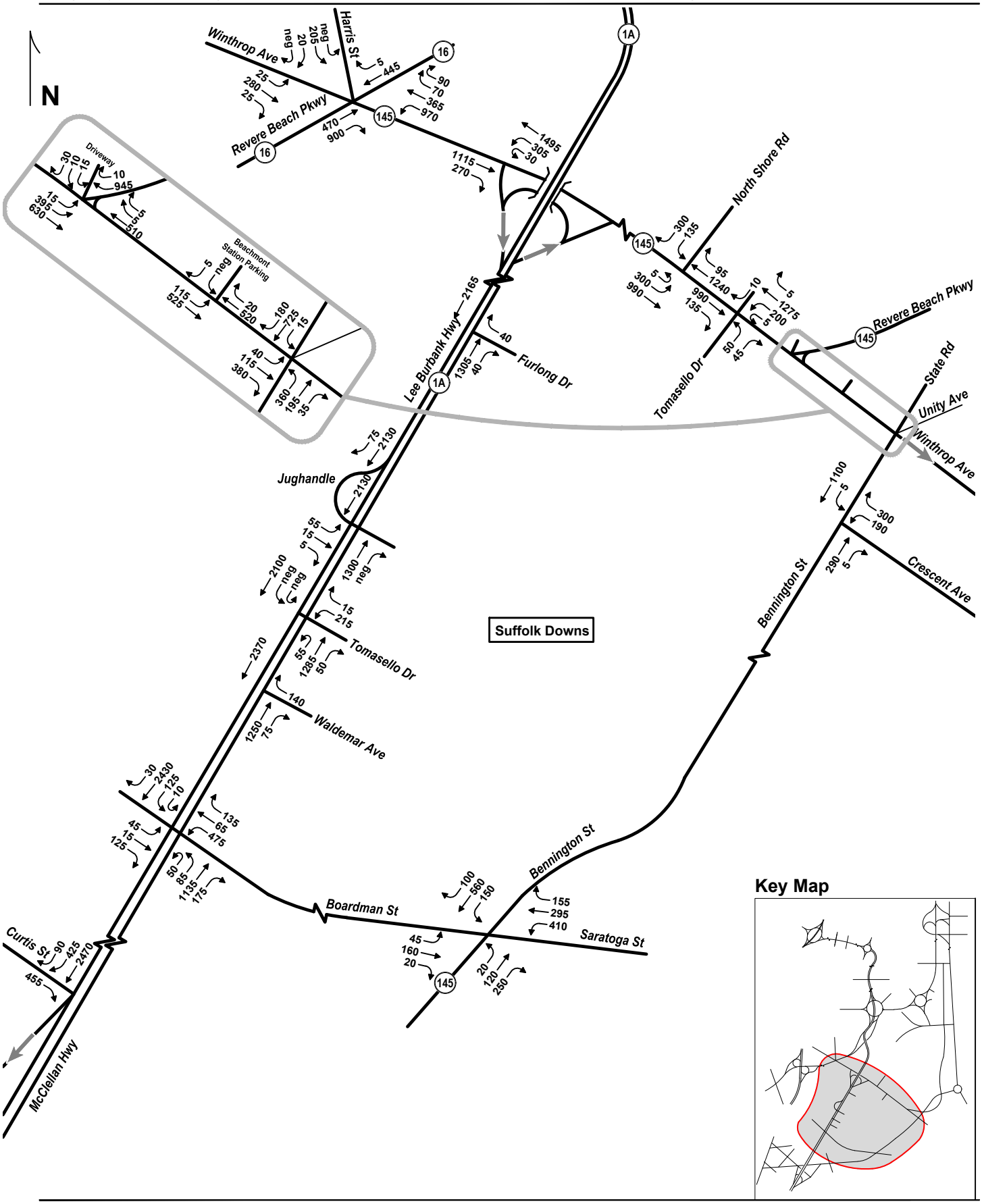


xx (xx) = AM Trips (PM Trips)

Figure 6.12d
Morning and Evening Peak Hour
Background Project Vehicle Trips

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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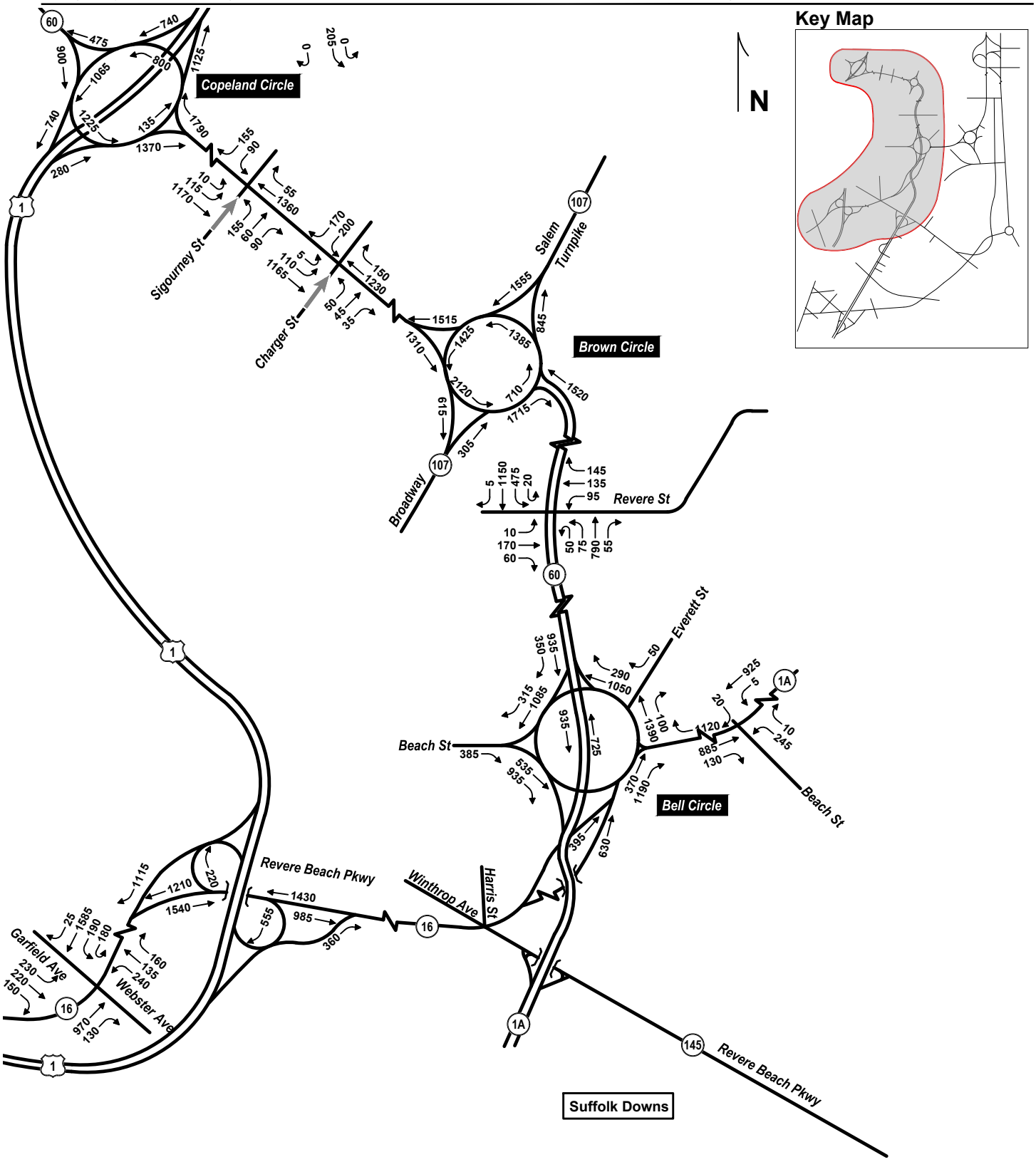


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Figure 6.13a
Morning Peak Hour
2028 No-Build Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

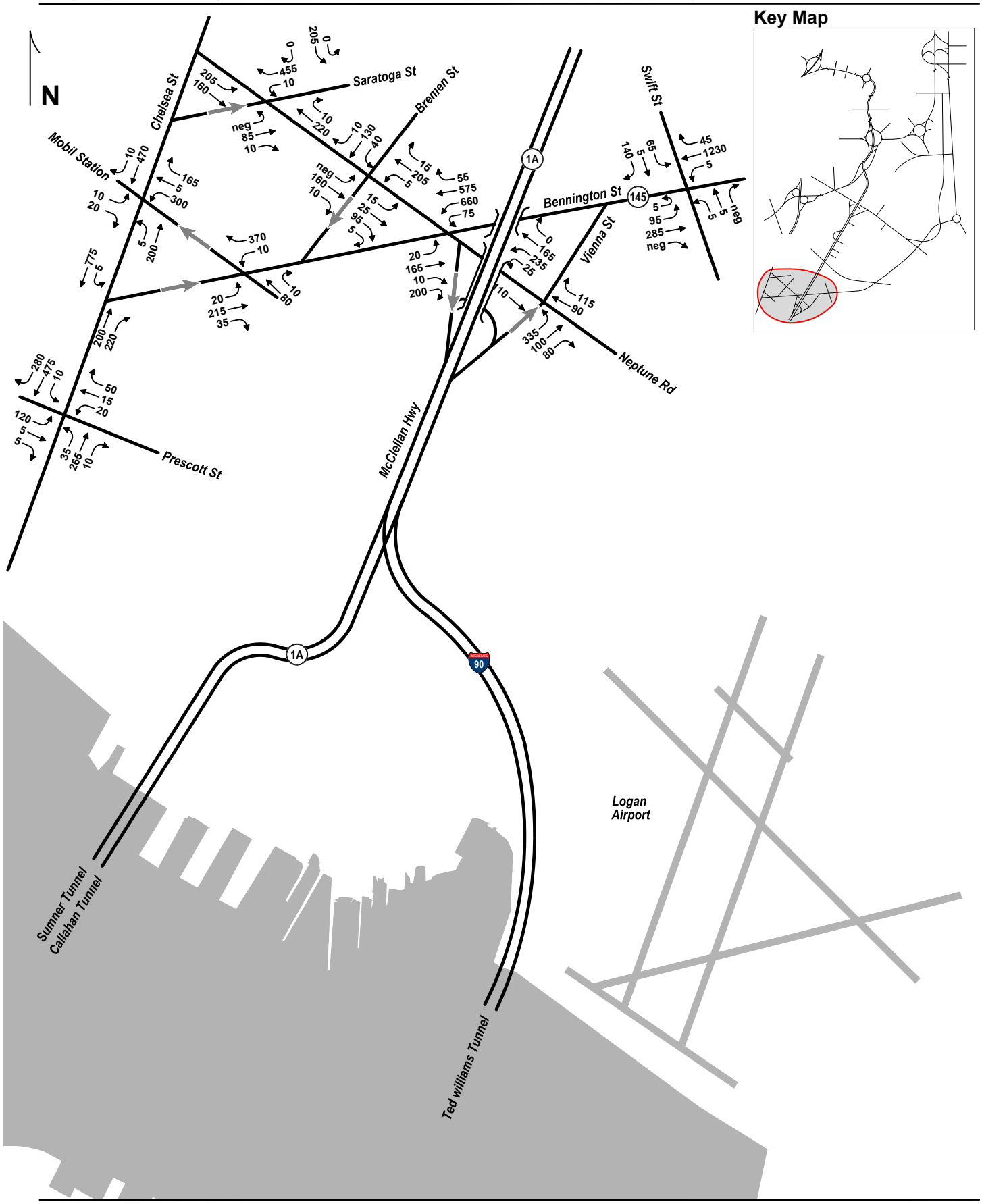
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Figure 6.13b
Morning Peak Hour
2028 No-Build Vehicle Volume Network

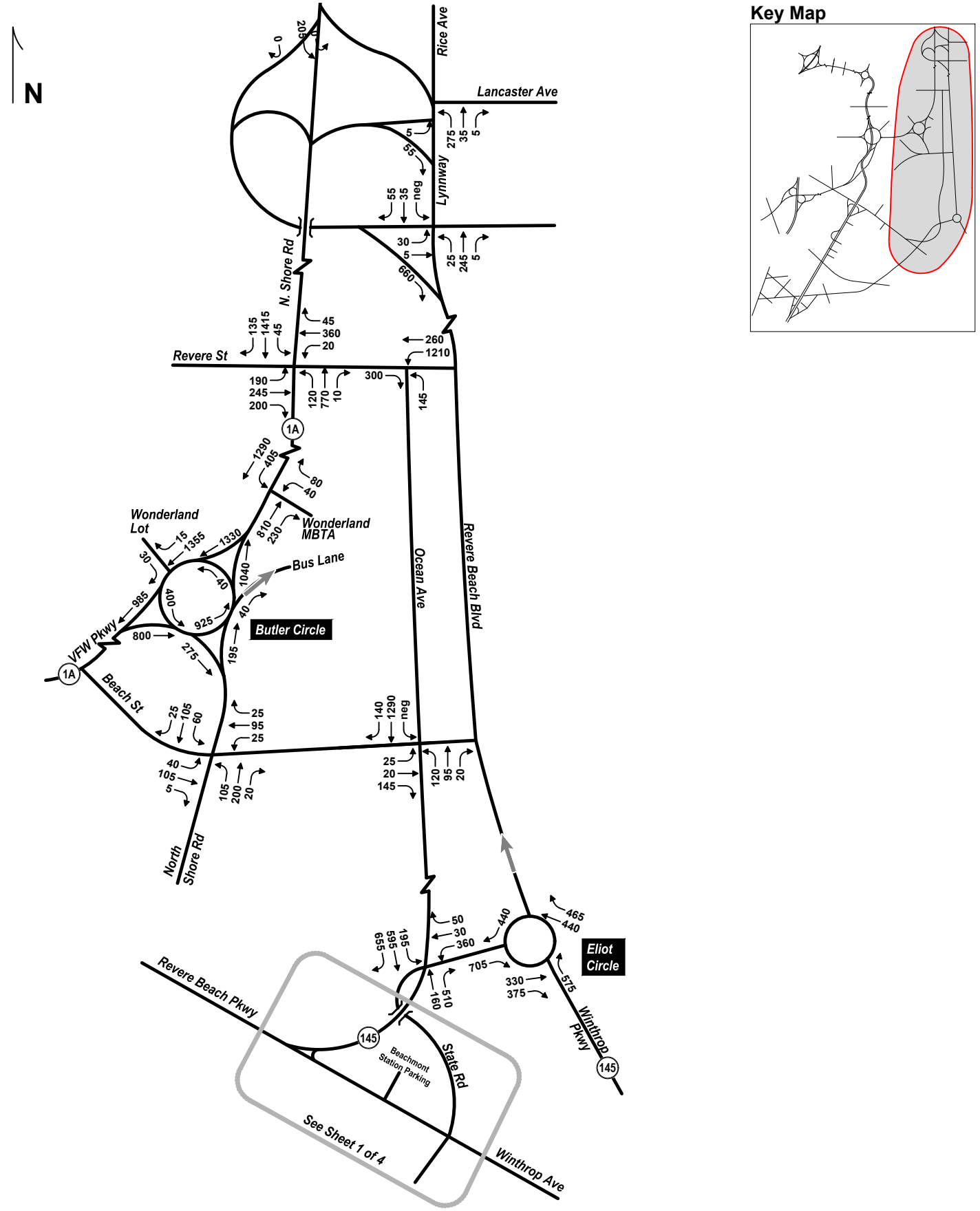
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.13c
Morning Peak Hour
2028 No-Build Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

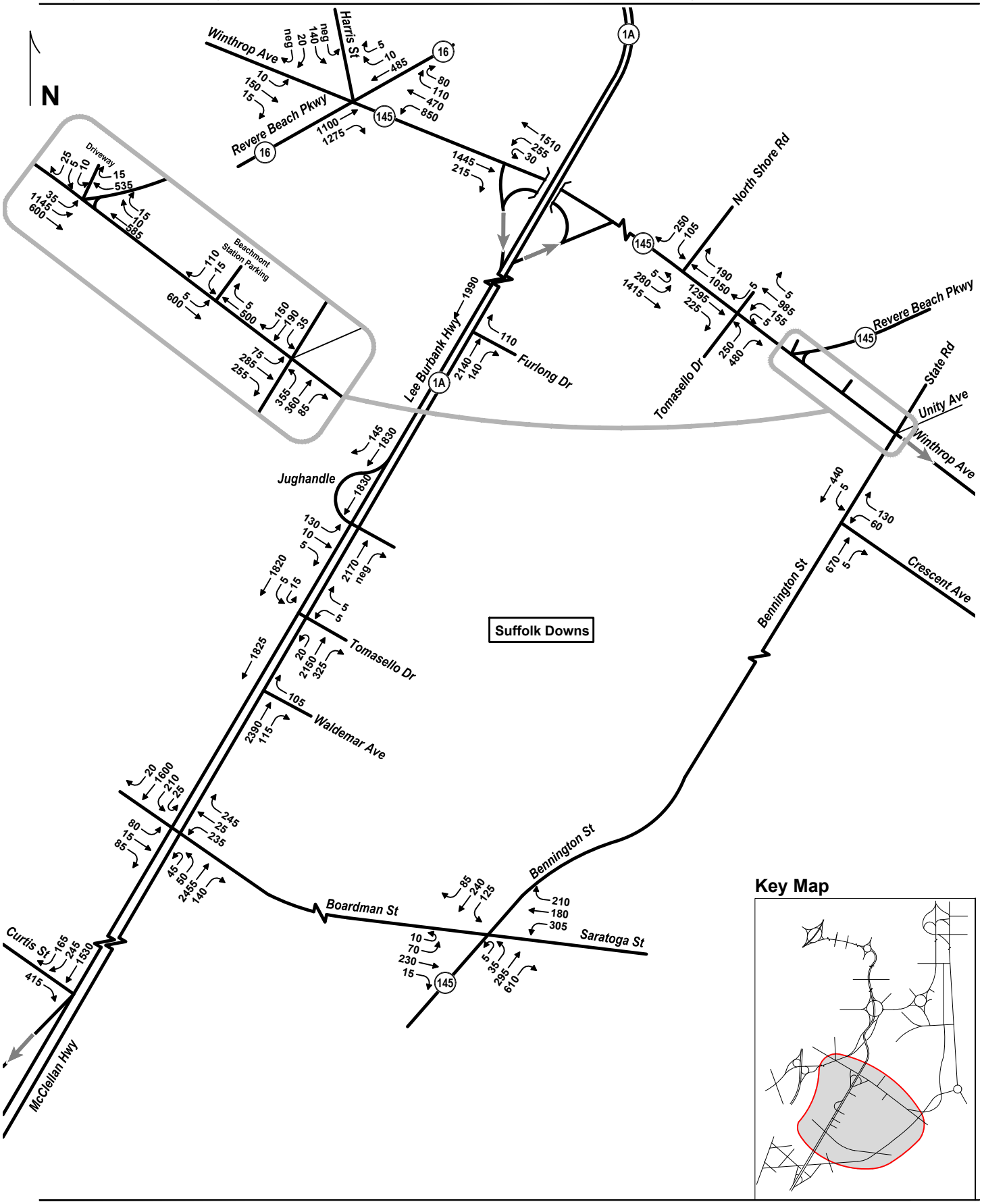


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Figure 6.13d
Morning Peak Hour
2028 No-Build Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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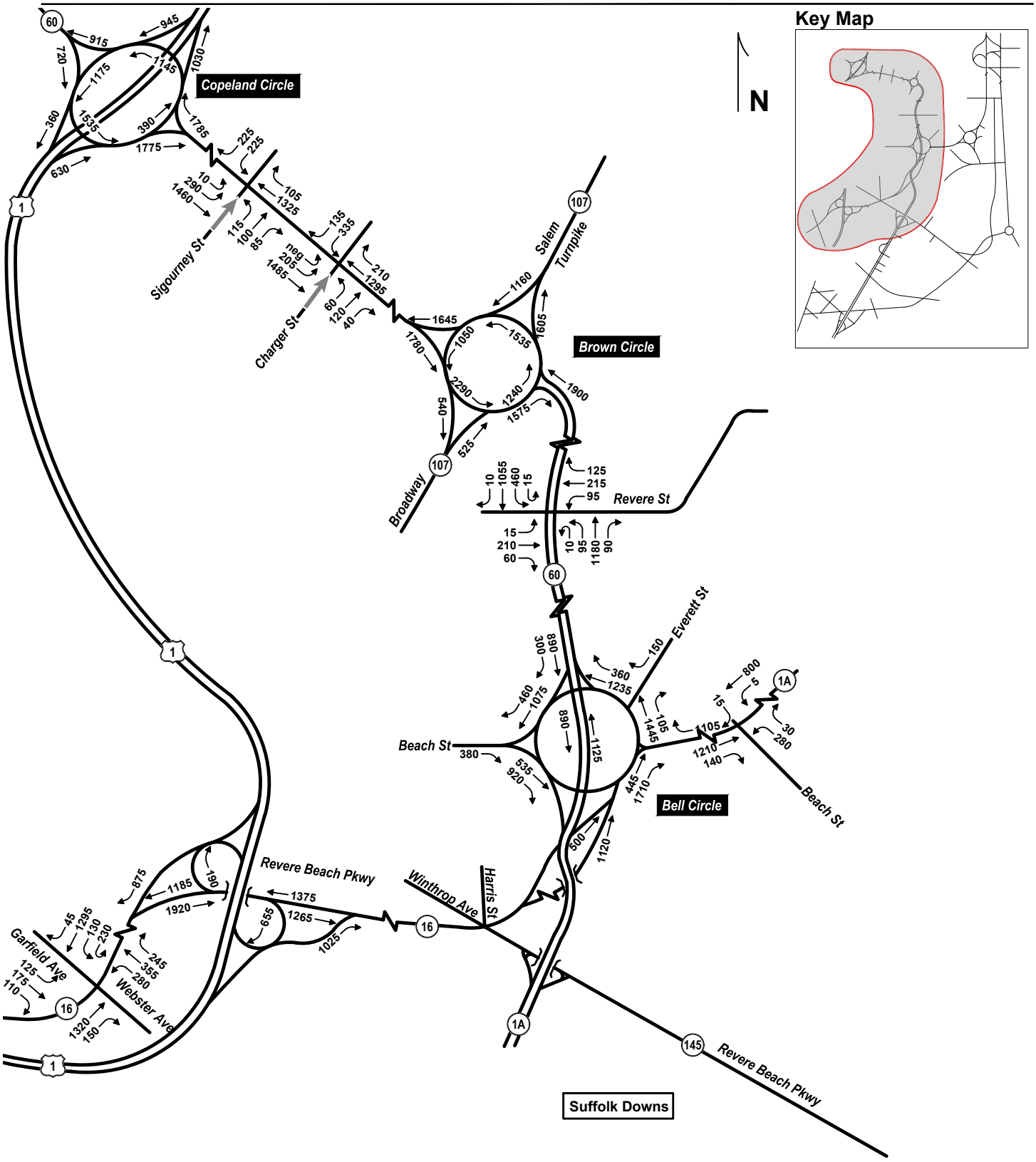


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Figure 6.14a
Evening Peak Hour
2028 No-Build Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

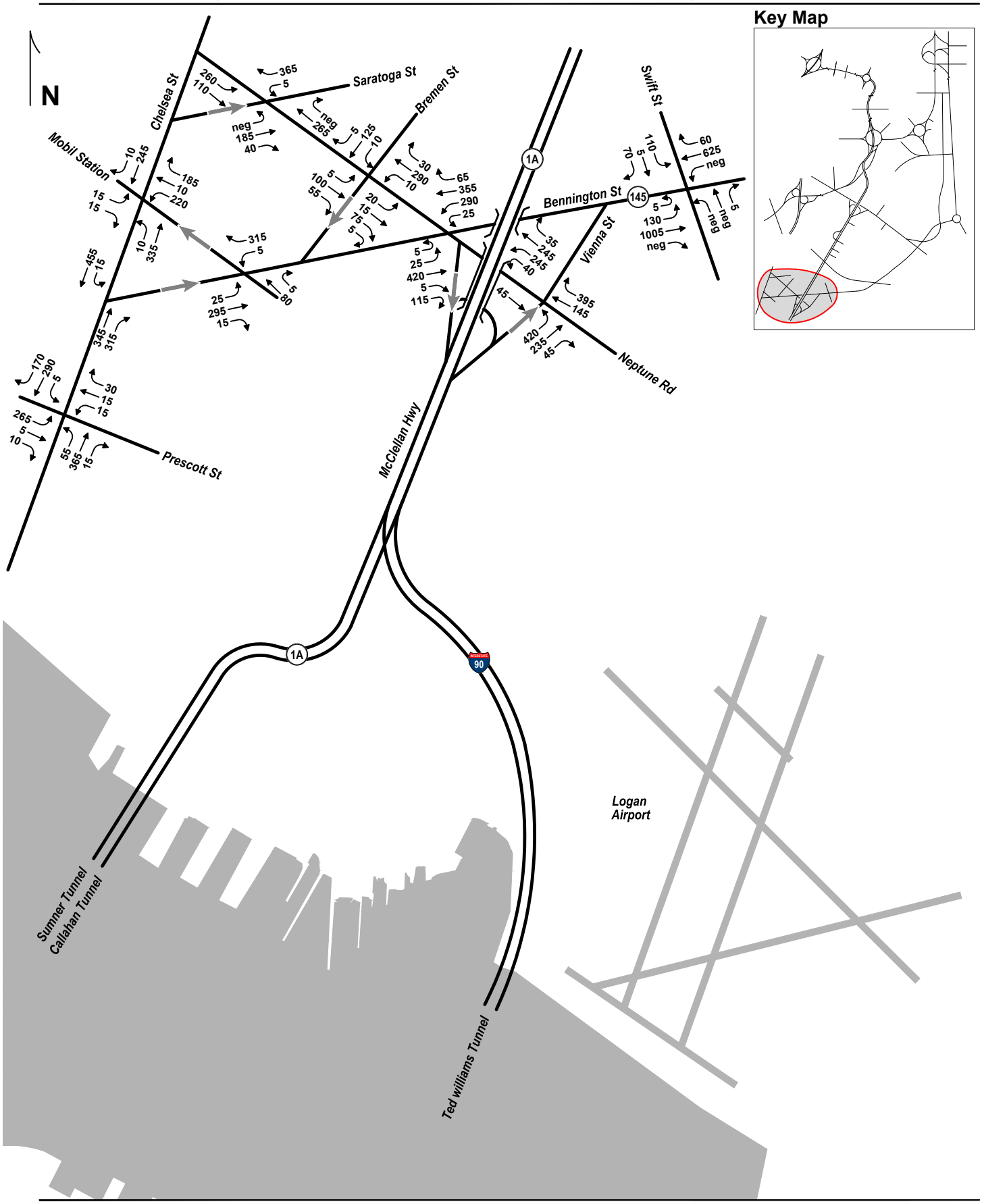
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Figure 6.14b
Evening Peak Hour
2028 No-Build Vehicle Volume Network

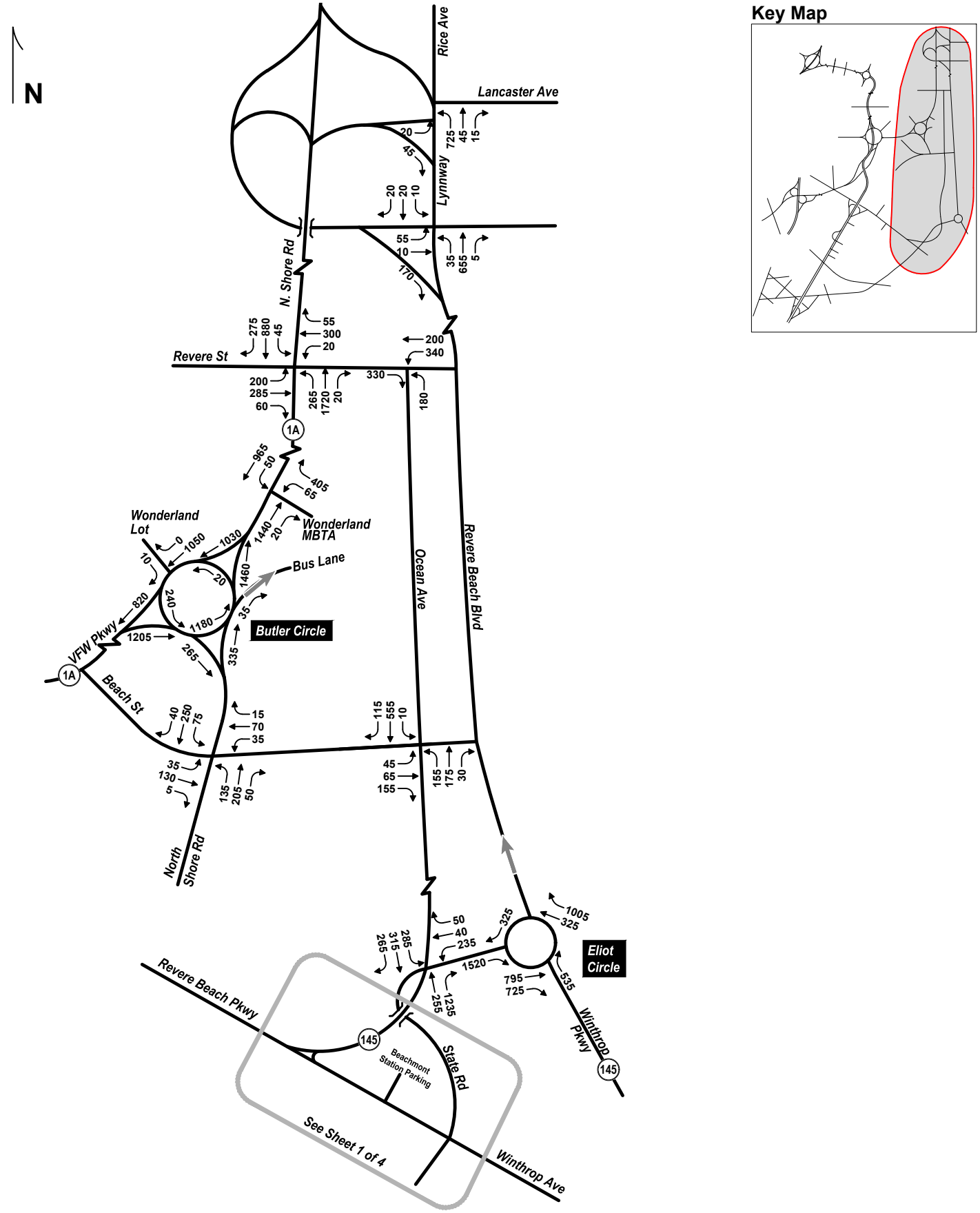
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.14c
Evening Peak Hour
2028 No-Build Vehicle Volume Network

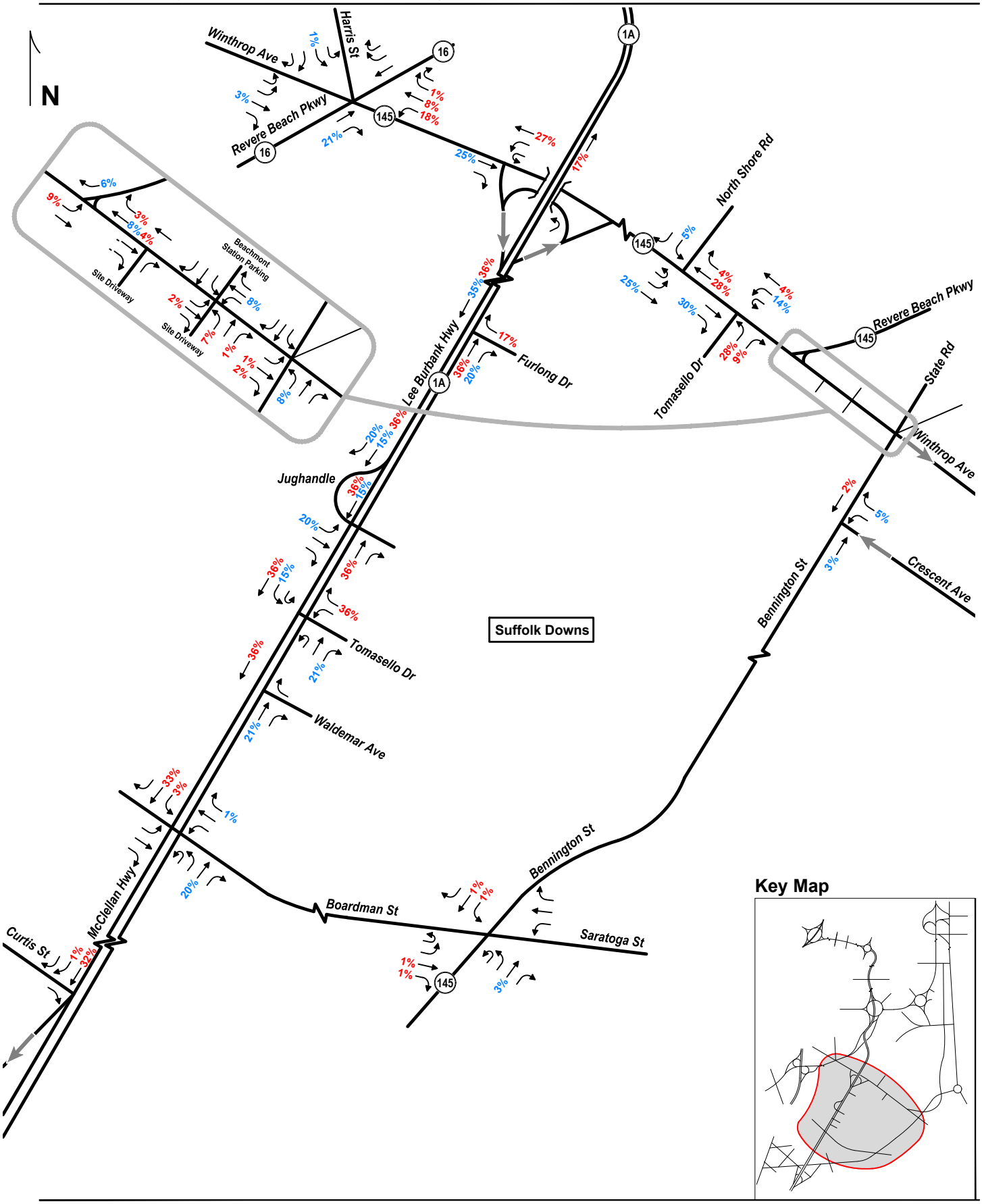
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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Figure 6.14d
Evening Peak Hour
2028 No-Build Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

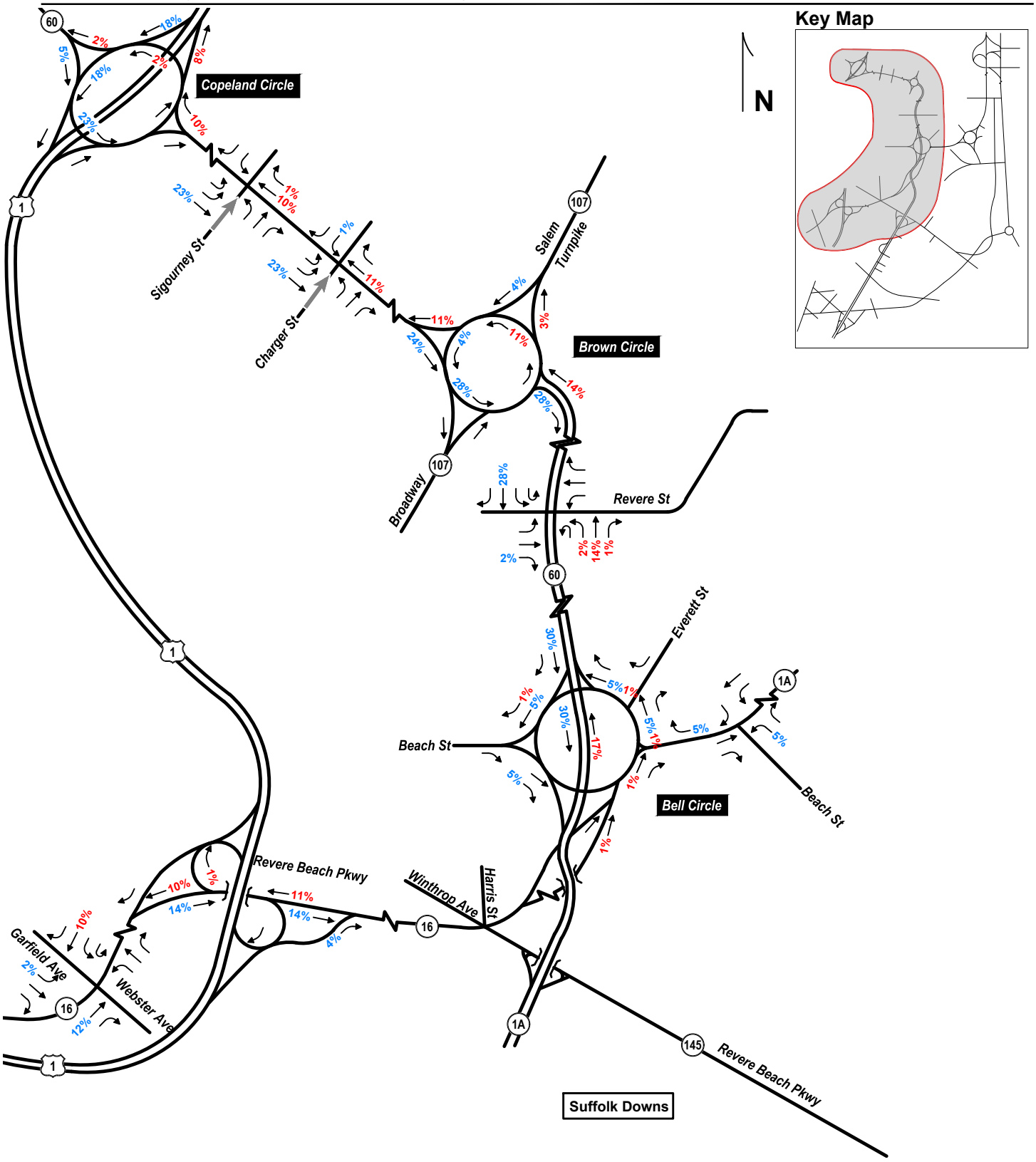


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Figure 6.15a
Morning Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

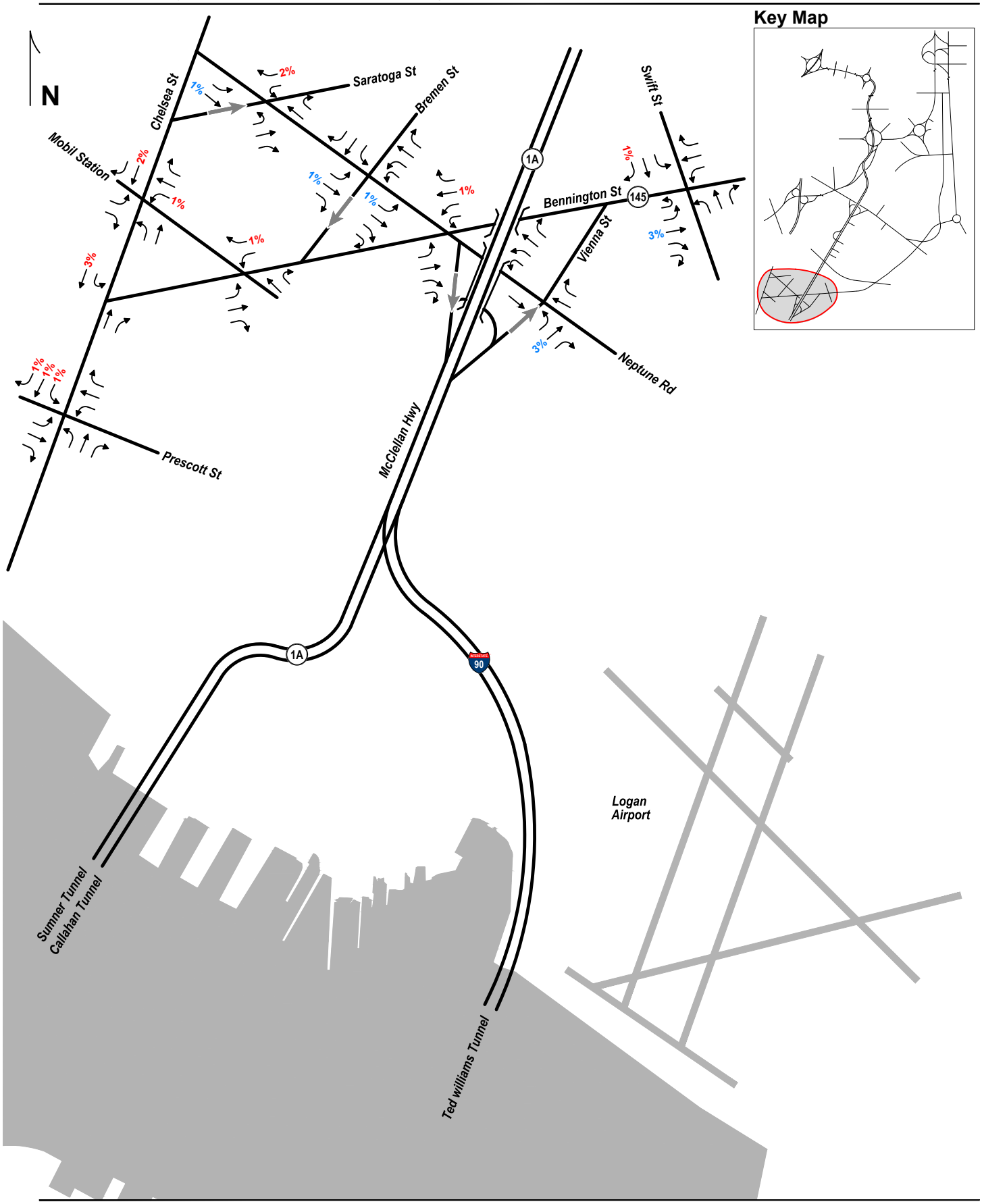


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Figure 6.15b
Morning Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

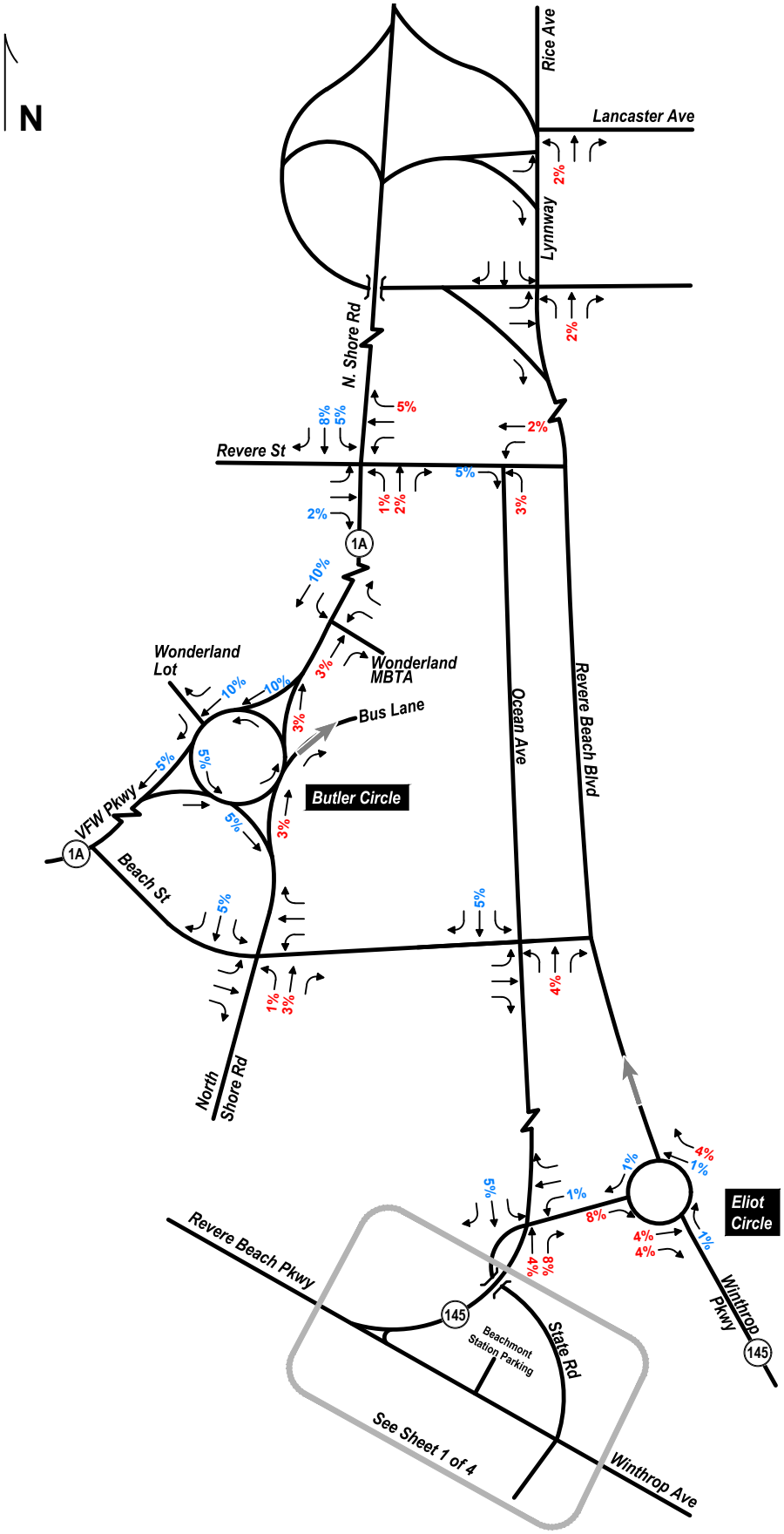


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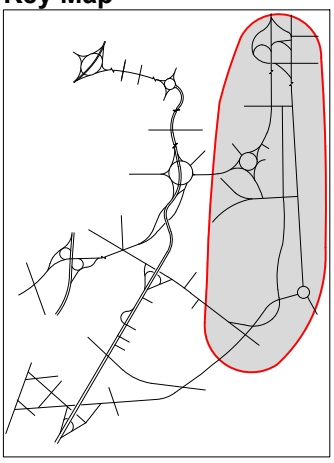
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Figure 6.15c
Morning Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Key Map



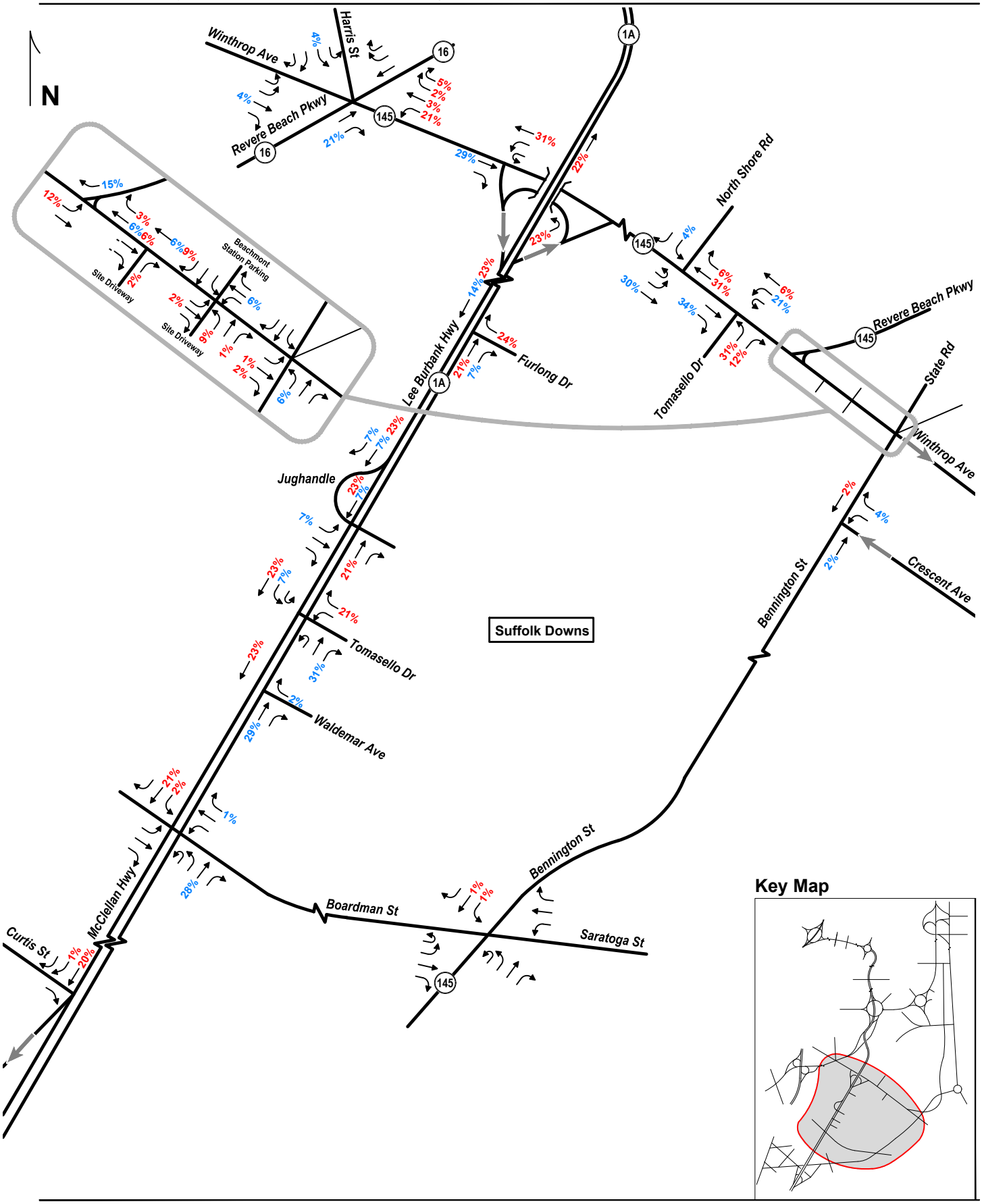
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Figure 6.15d
Morning Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Key Map

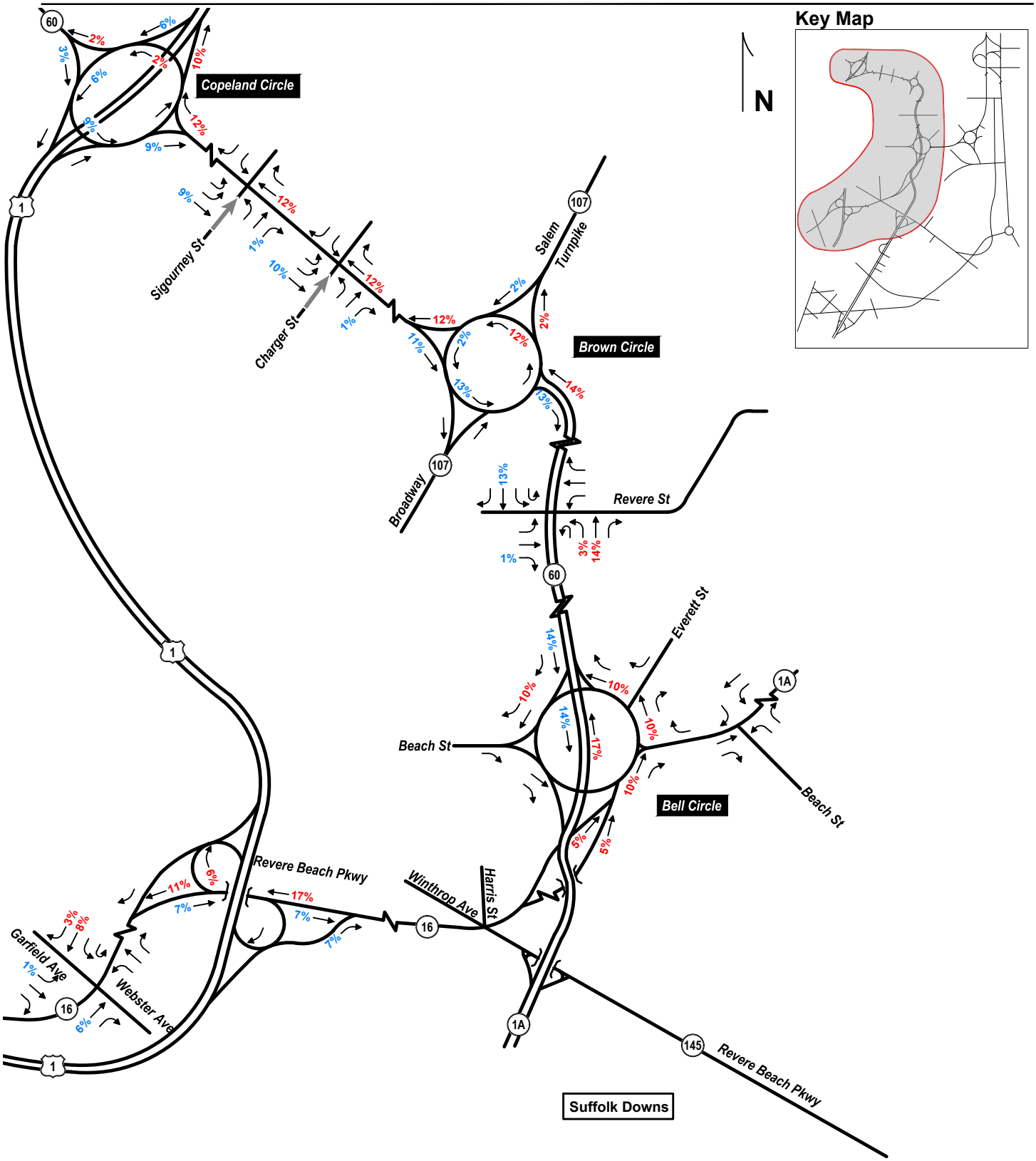
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Figure 6.16a
Evening Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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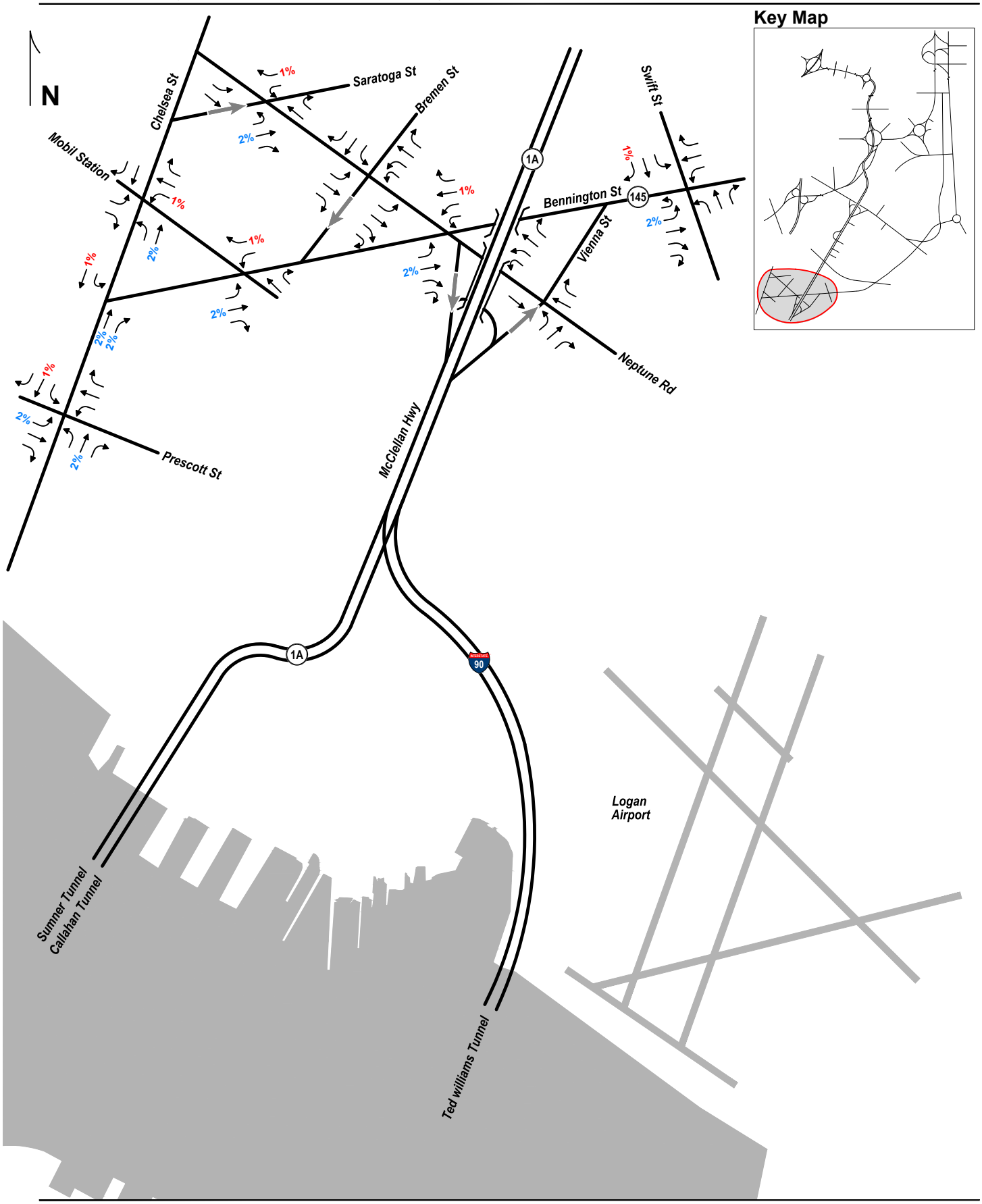


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Figure 6.16b
Evening Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

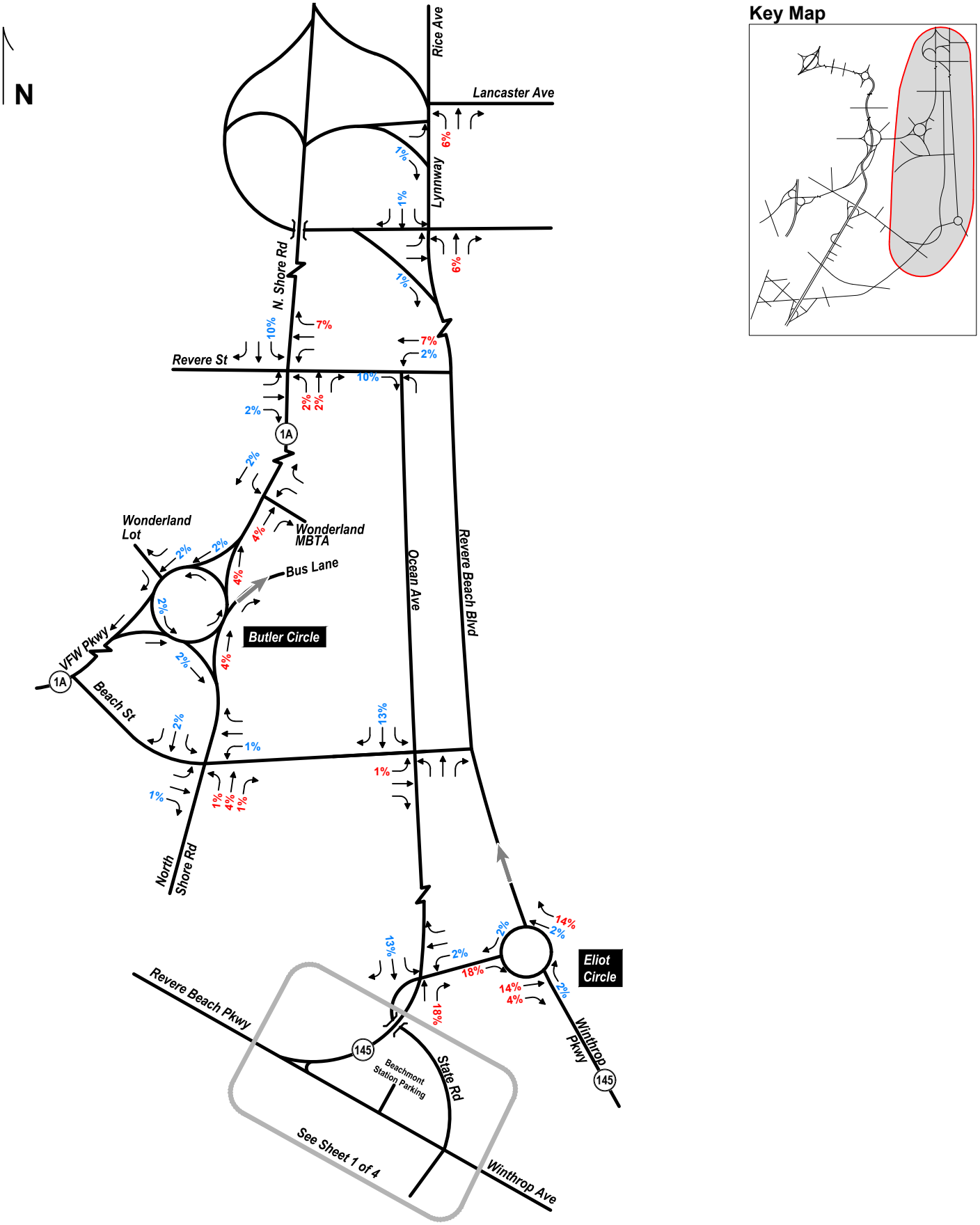


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Figure 6.16c
Evening Peak Hour
Trip Distribution - without Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

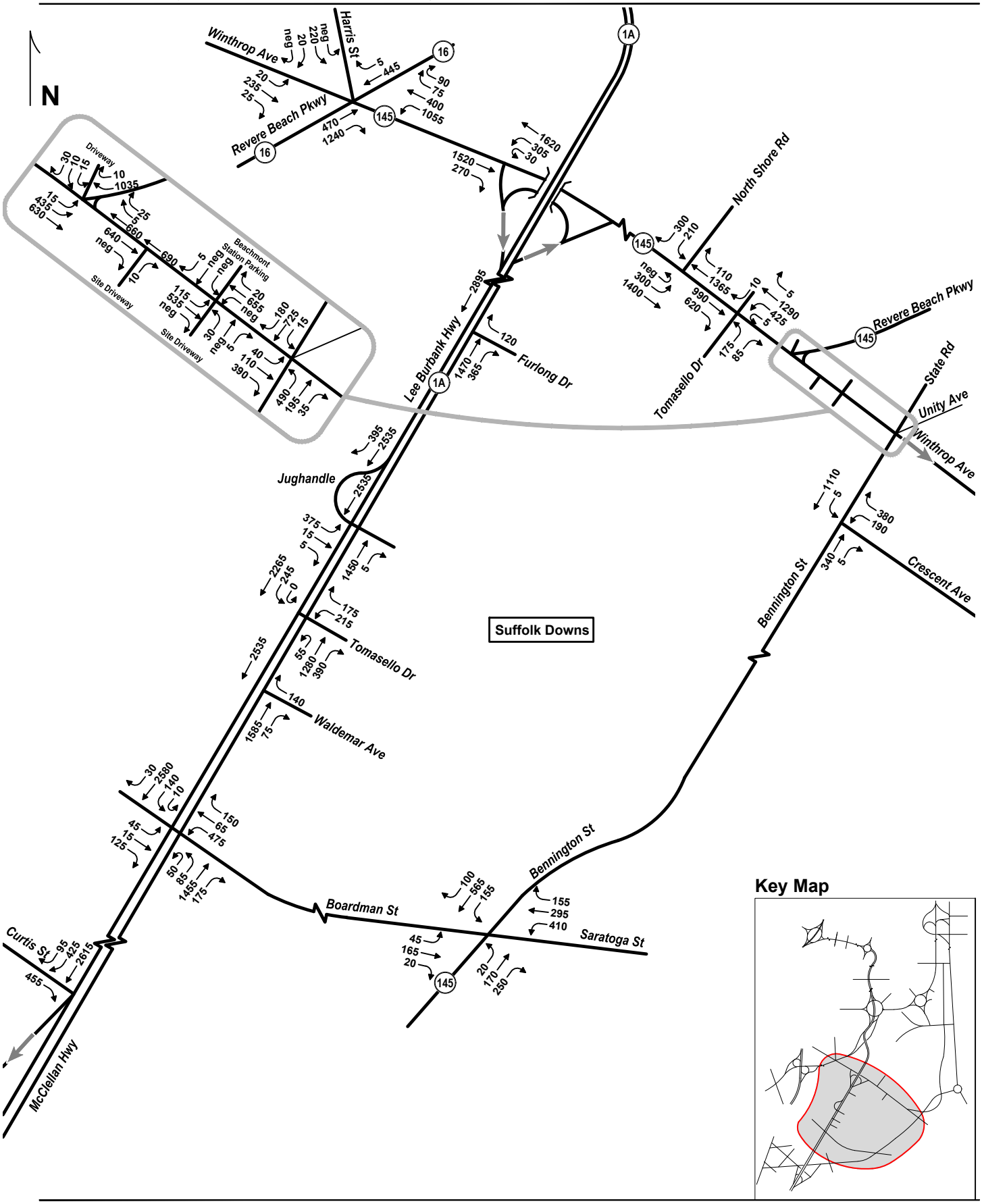


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Figure 6.16d
Evening Peak Hour
Trip Distribution - without Mitigation

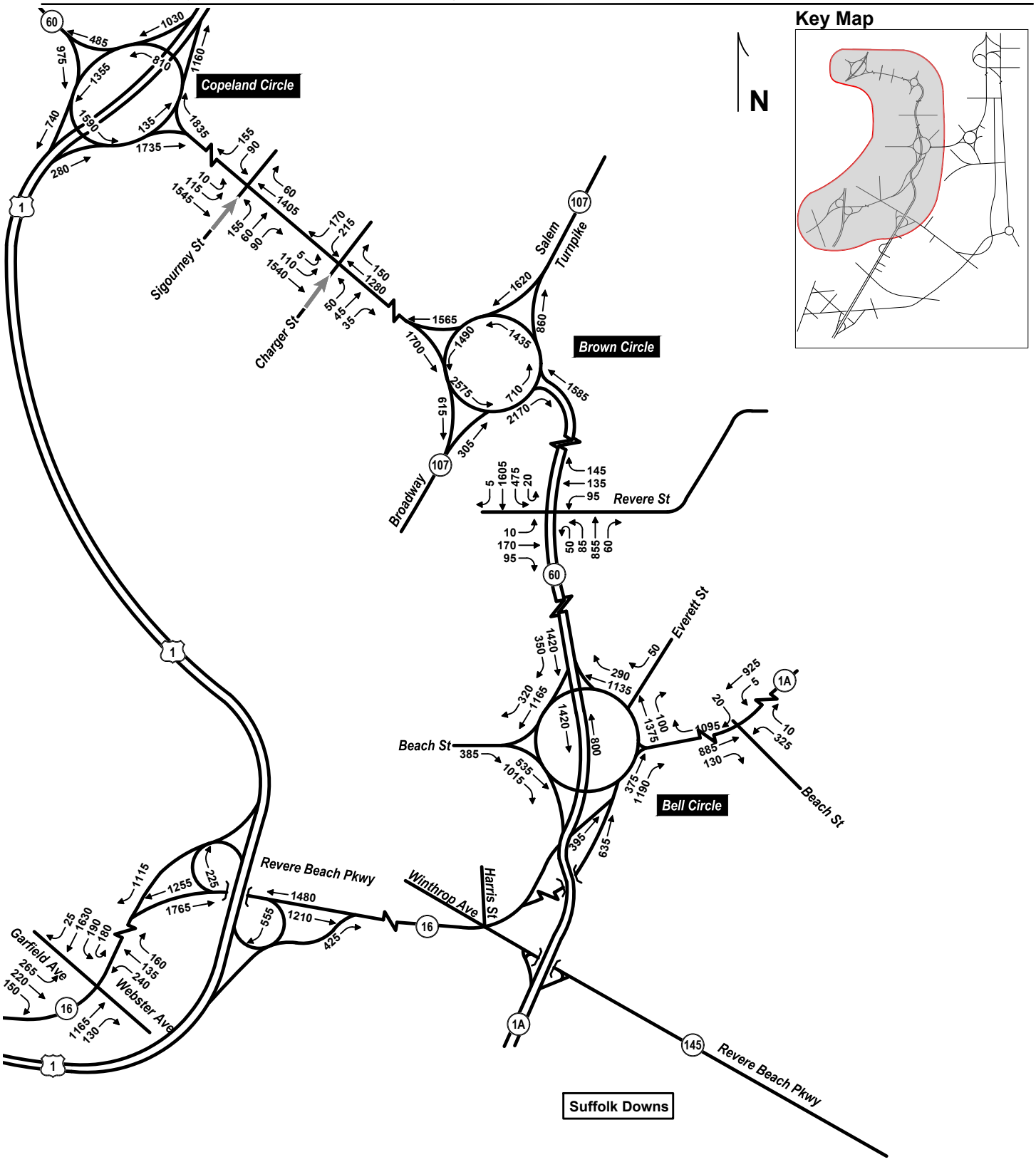
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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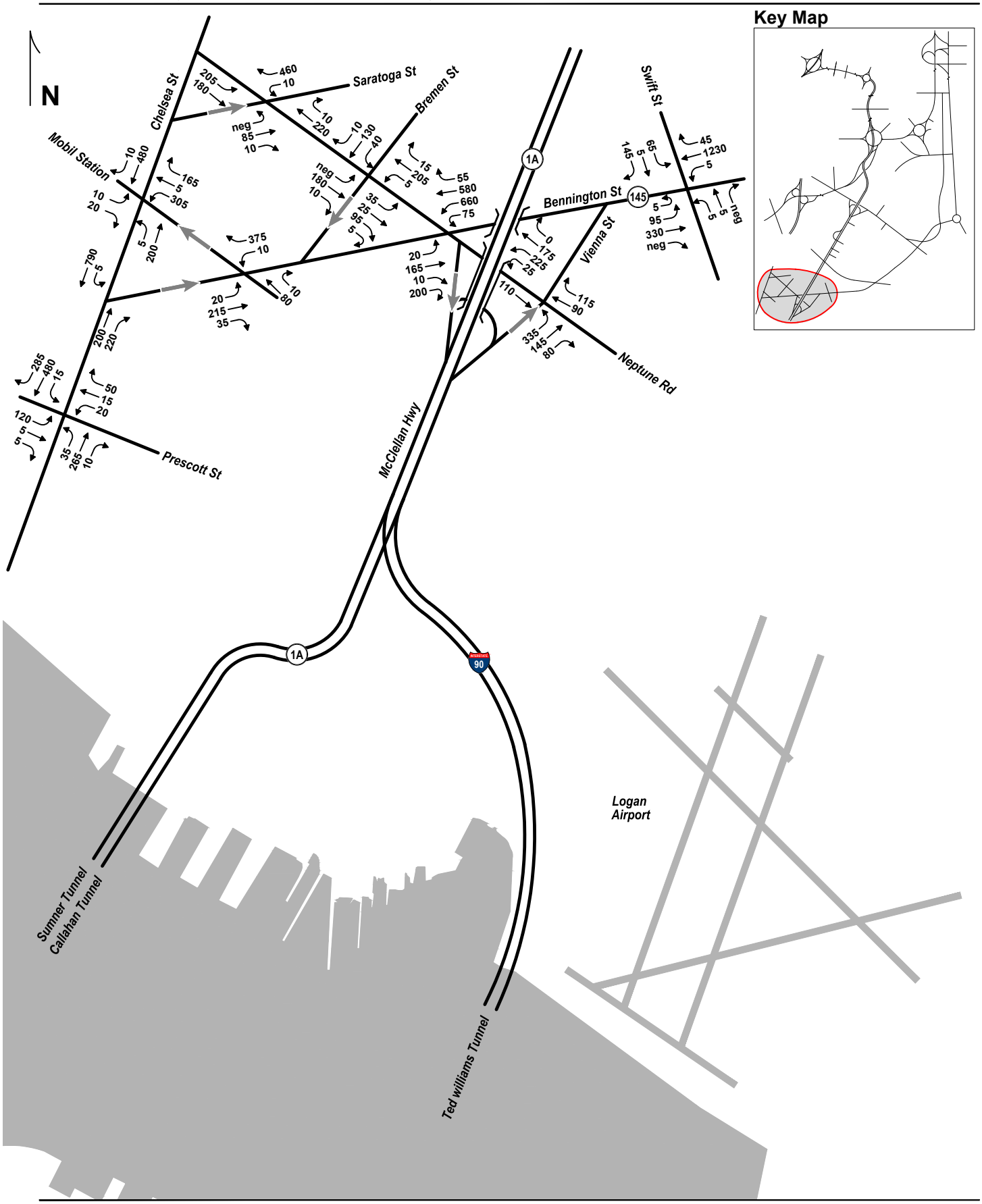
Figure 6.17a
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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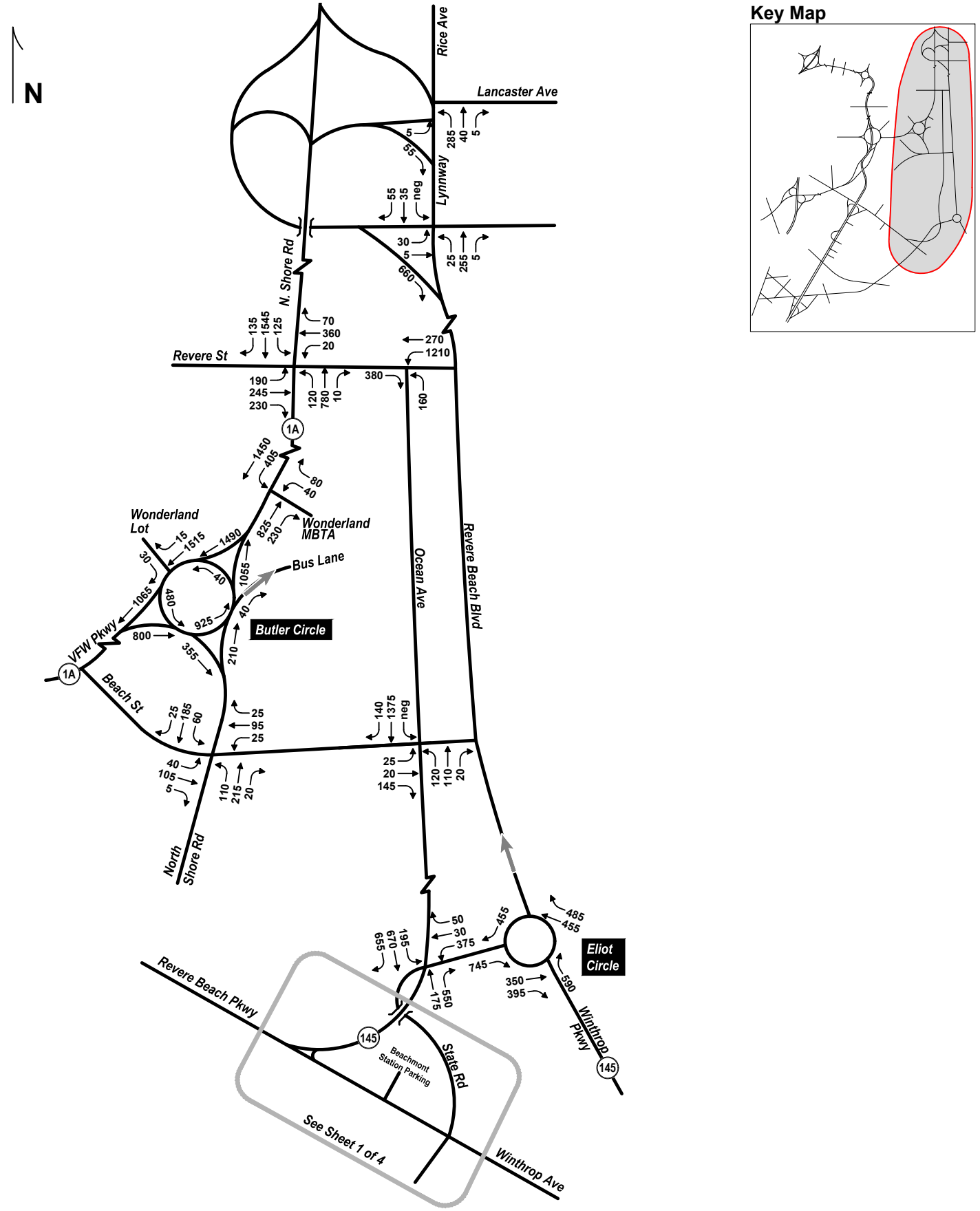
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Figure 6.17b
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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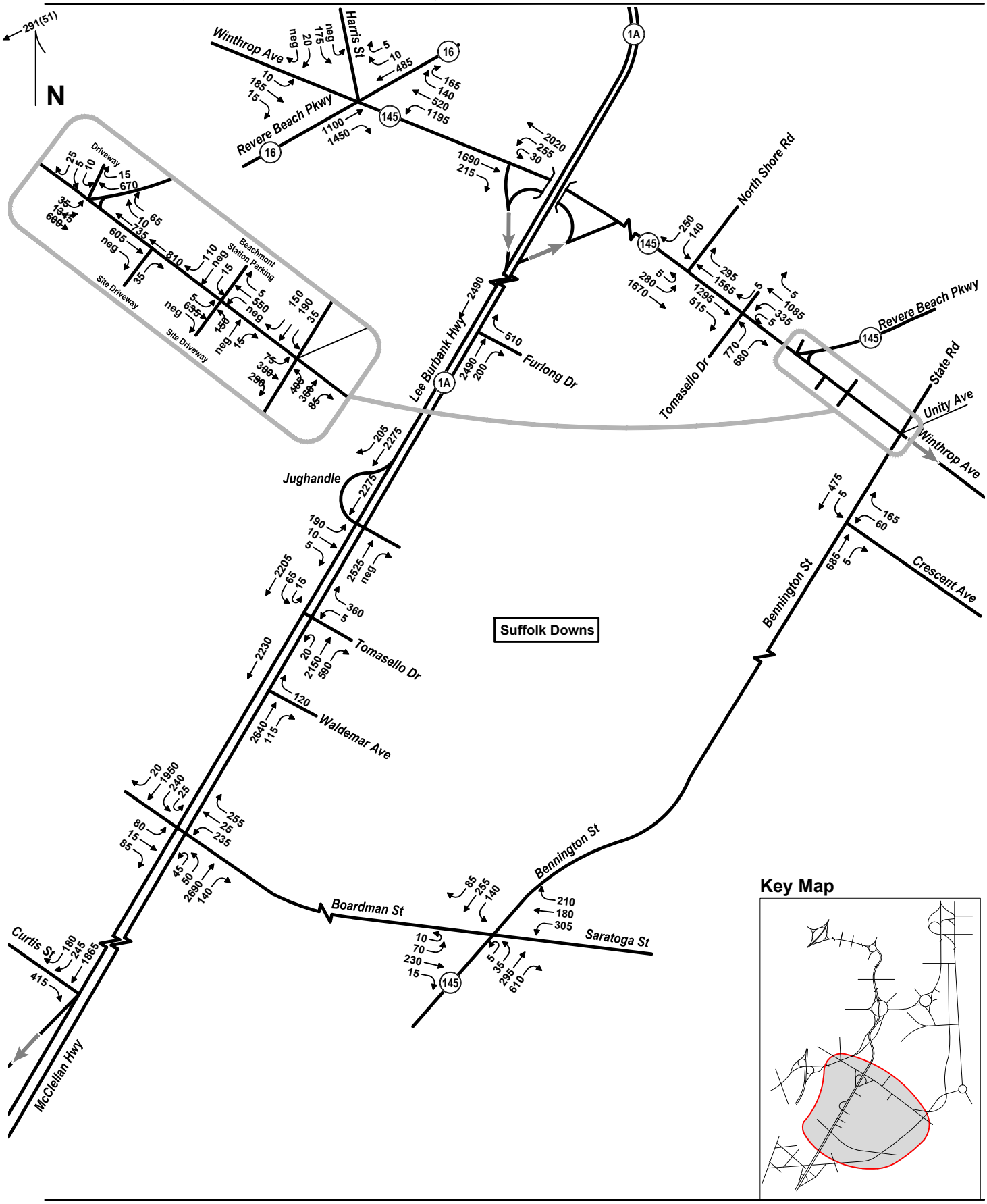
Figure 6.17c
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.17d
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

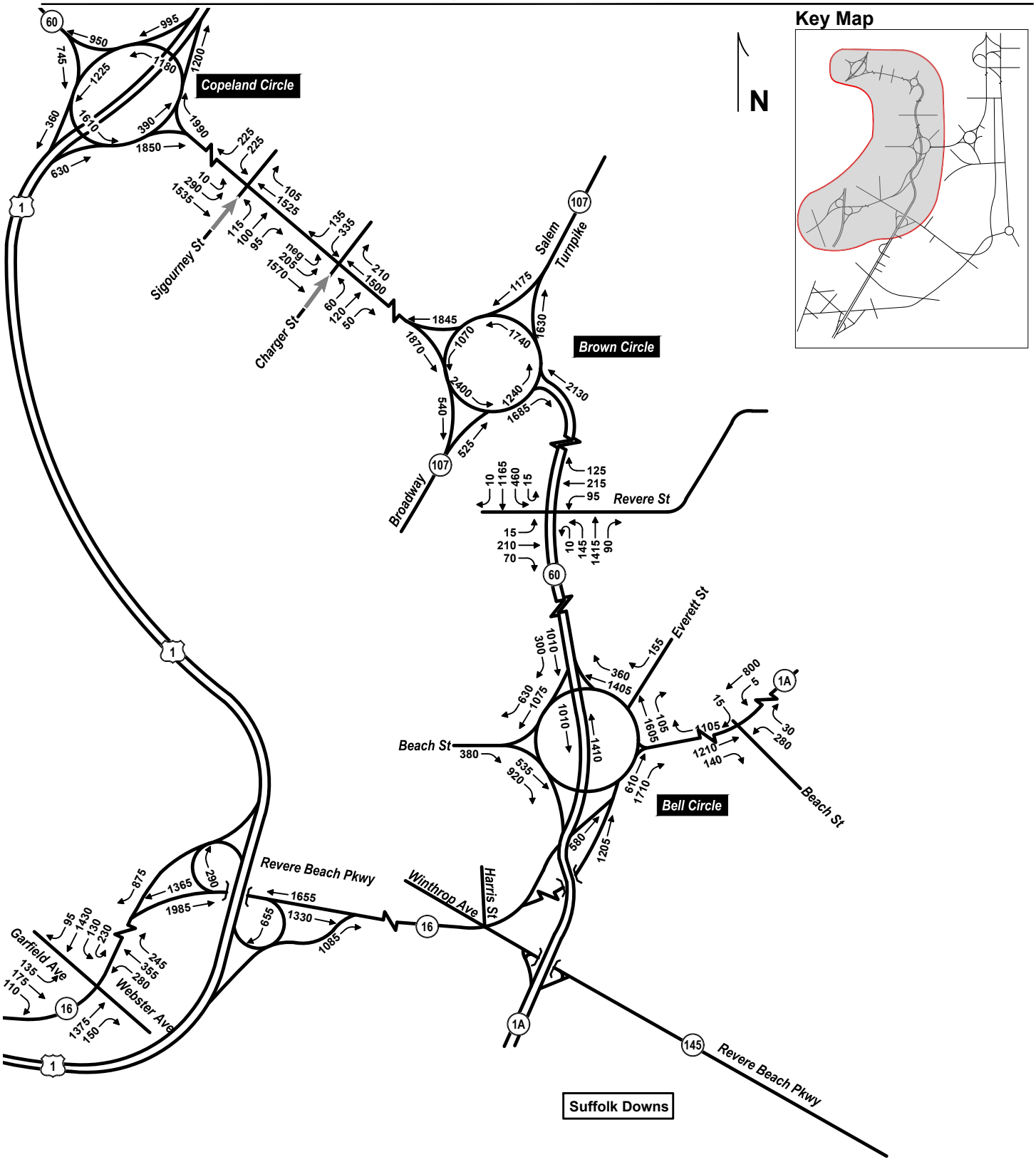
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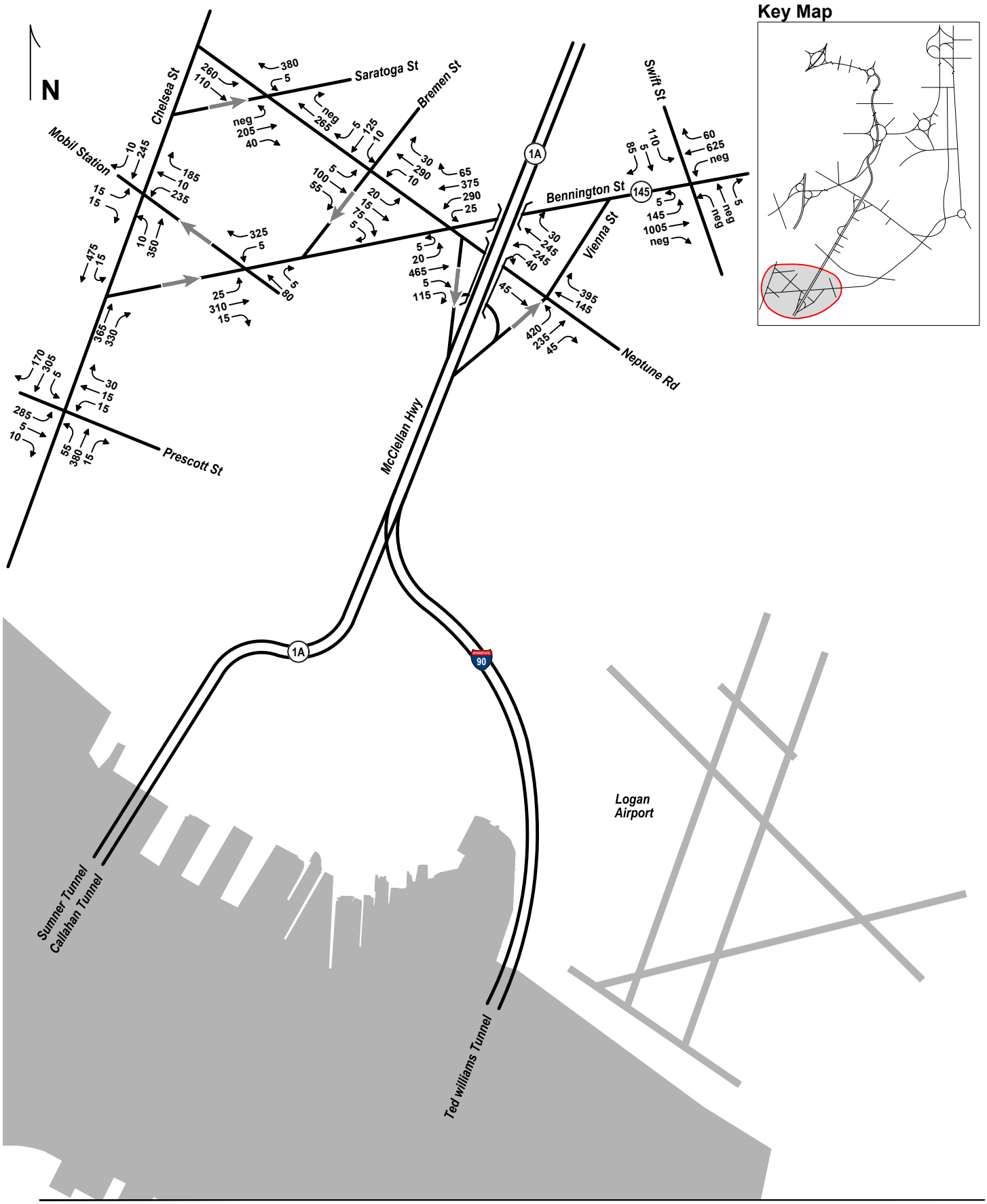
Figure 6.18a
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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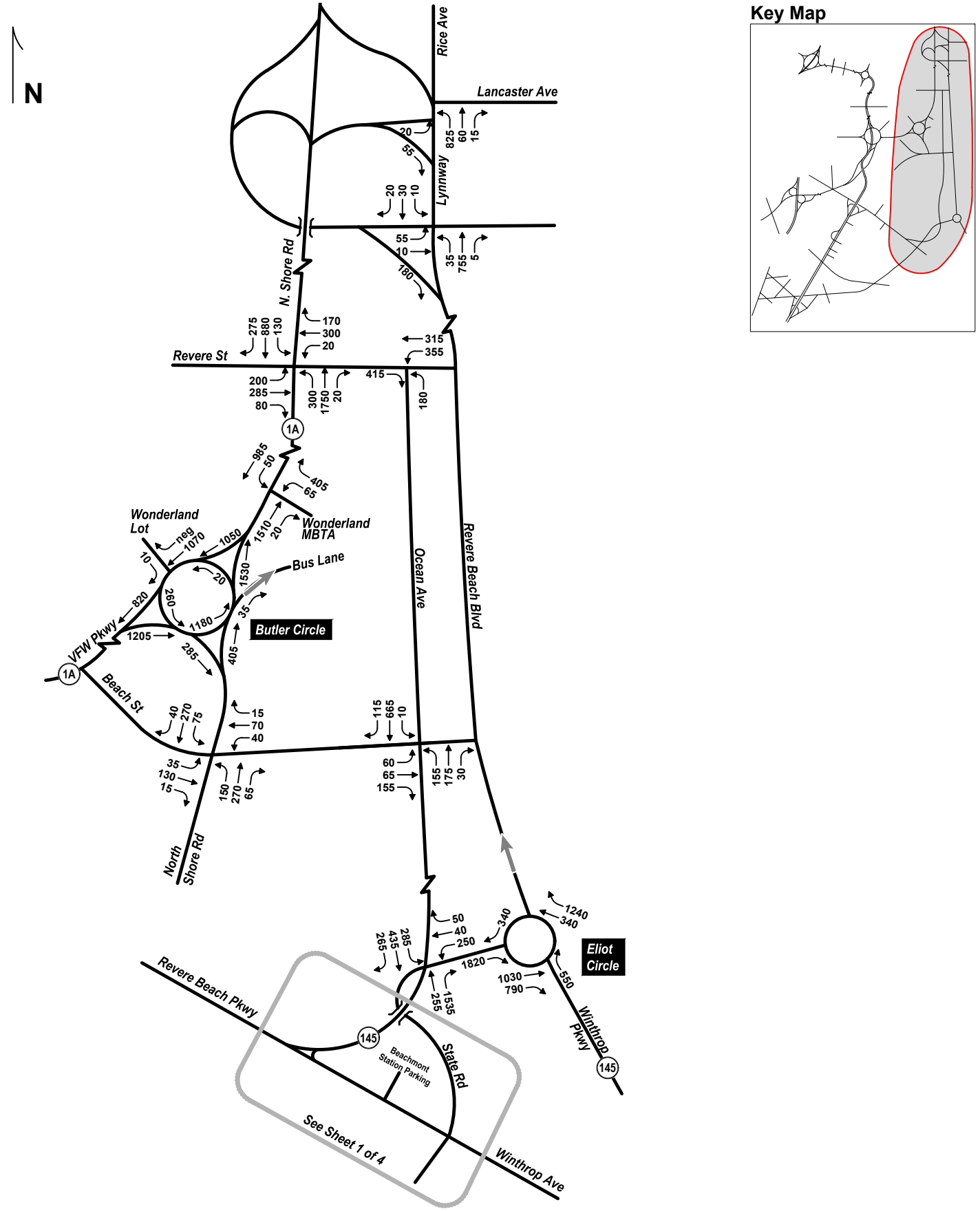
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Figure 6.18b
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



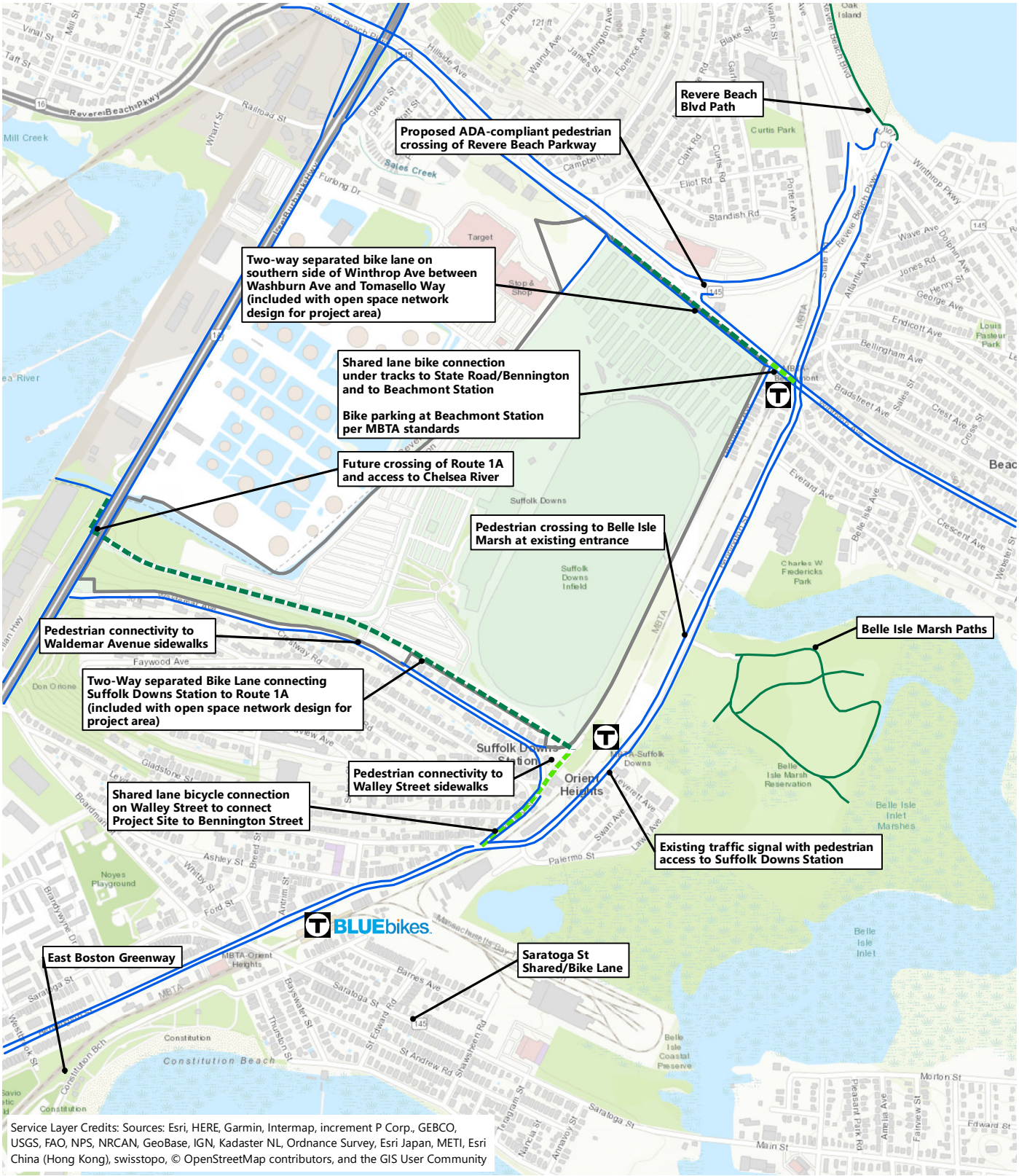
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Figure 6.18c
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.18d
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



0 400 800 Feet

Legend

- Project Site Boundary

Accommodation Type

- Existing Bicycle
- Existing Pedestrian
- Proposed On-Site Bicycle
- Proposed Off-Site Bicycle

Figure 6.19

Existing and Proposed
Bicycle and Pedestrian Accommodations

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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0 490 980 Feet

Project Site Boundary

Primary Route

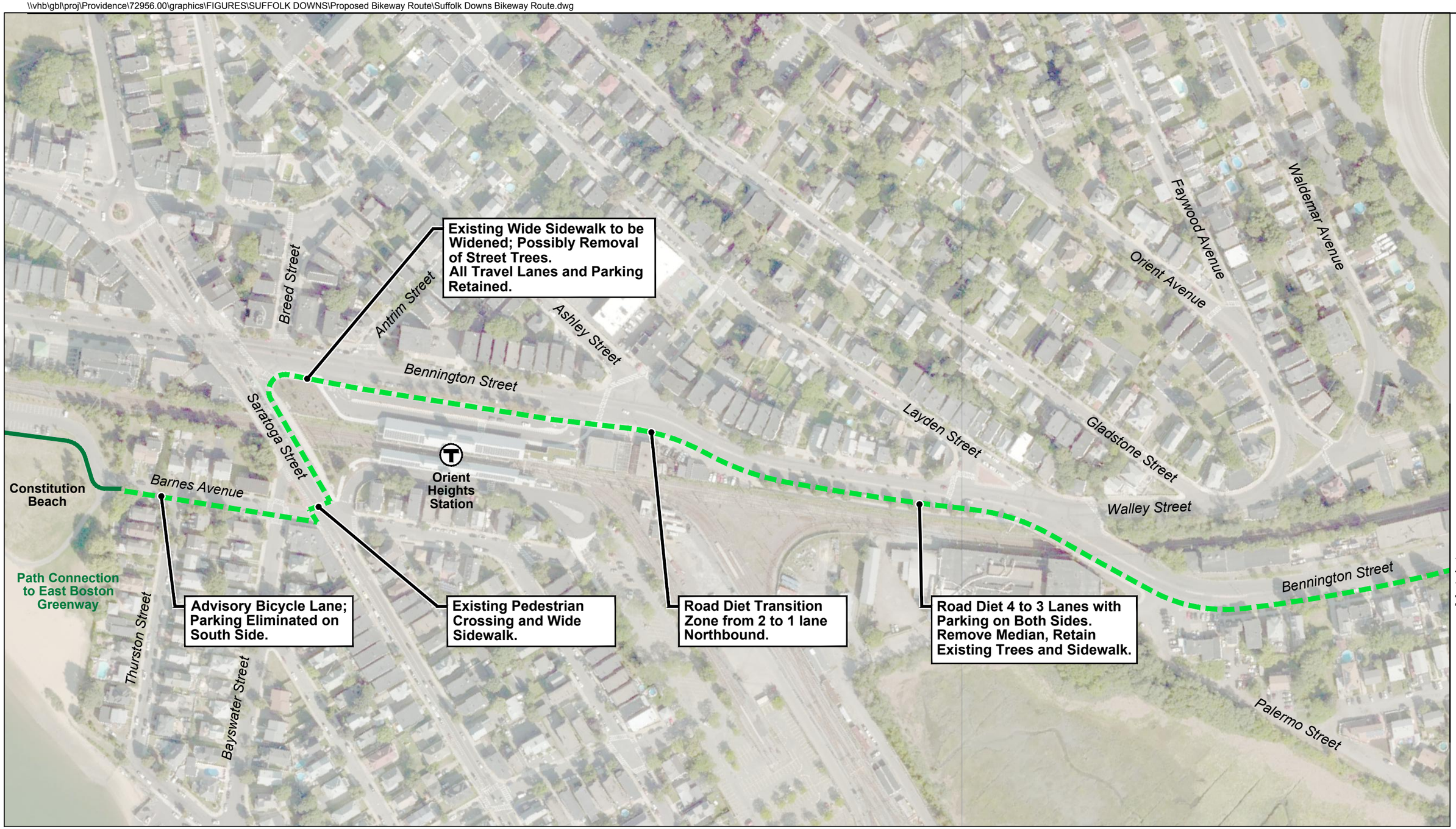
Secondary Route

Figure 6.20

Boston Bicycle Network
30-Year Vision Plan

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

\\vhb\gbl\proj\Providence\72956.00\graphics\FIGURES\SUFFOLK DOWNS\Proposed Bikeway Route\Suffolk Downs Bikeway Route.dwg



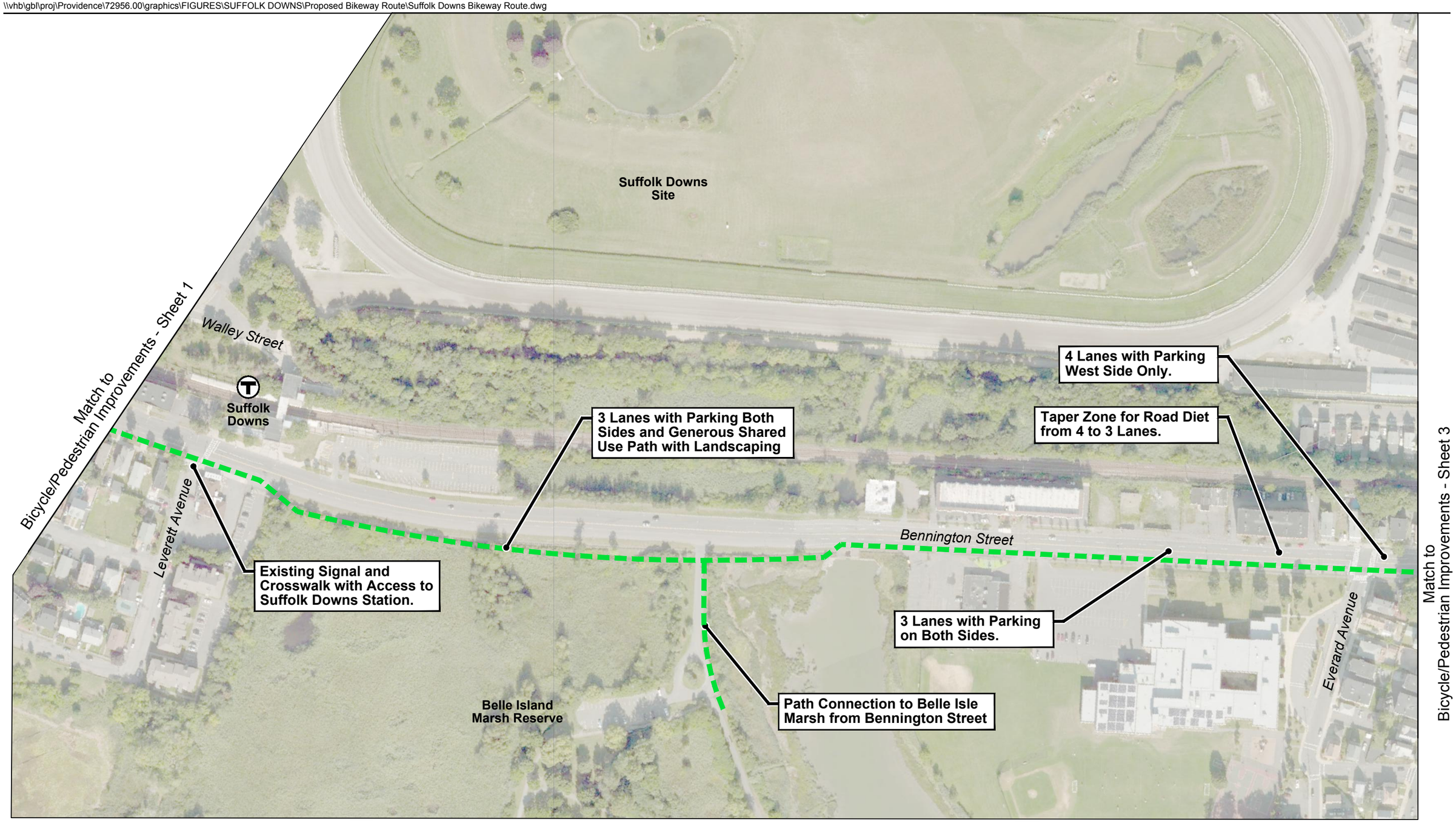
0 100 200 Feet

Legend
- Existing Bicycle Accomodation
- Bennington/State Path Corridor

Figure 6.21a

Bicycle/Pedestrian Improvements-Sheet 1
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



0 100 200 Feet

Legend
- Existing Bicycle Accomodation
- Bennington/State Path Corridor

Figure 6.21b

Bicycle/Pedestrian Improvements-Sheet 2
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Match to Bicycle/Pedestrian Improvements - Sheet 2

Donelly Square North Approach: 2 Lanes Southbound, 1 Lane Northbound, Median Island, No Parking.

Road Diet from 4 to 2 Lanes (No Center Turn Lane); Parking on Both Sides, Existing Trees and Sidewalk Retained.

Taper Zone for Southbound Lanes from 2 to 1.

Beachmont

Revere Beach Parkway

State Road

State Road

State Road

Revere Beach Parkway

Eliot Circle

Ocean Avenue

Revere State Boulevard

Revere Beach Reserve

Revere Beach Boulevard Path

Bennington Street

Atlantic Avenue

Endicott Avenue

Unity Avenue

Crescent Avenue

Winthrop Avenue

Wave Avenue

Dolphin Avenue

Winthrop Parkway

1 Lane Northbound with Parking.

Donelly Square South Side: 2 Lanes Northbound, One Wide Lane Southbound, Median Island.

This Segment of Crescent Avenue Would be Closed.

After Merge with Revere Beach Parkway: 2 Lanes Northbound, No Parking. Street Trees and Existing Sidewalk Retained.

Path Would Wrap Around Eliot Circle to Cross Winthrop Parkway. Upgraded Pedestrian Ramps and High Visibility Markings.

0 100 200 Feet

Legend

Existing Bicycle Accomodation

Bennington/State Path Corridor

Figure 6.21c

Bicycle/Pedestrian Improvements-Sheet 3
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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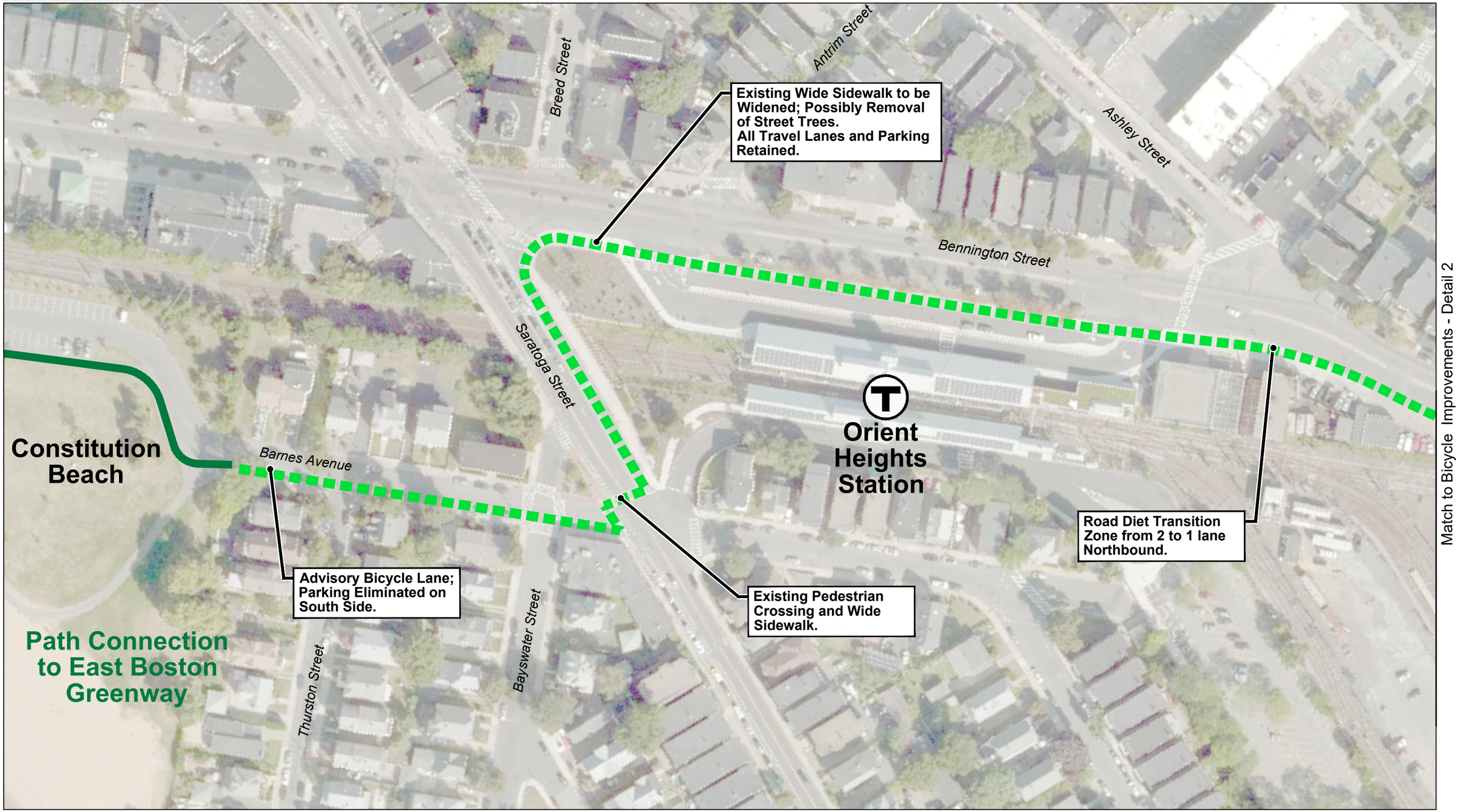


Figure 6.22

Bicycle/Pedestrian Improvements-Detail 1
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Match to Bicycle Improvements - Detail 1

Match to Bicycle Improvements - Detail 3

Layden Street

Gladstone Street

Walley Street

Bennington Street

Palermo Street

Road Diet 4 to 3 Lanes with Parking on Both Sides. Remove Median, Retain Existing Trees and Sidewalk.

0 50 100 Feet

Legend

Existing Bicycle Accomodation

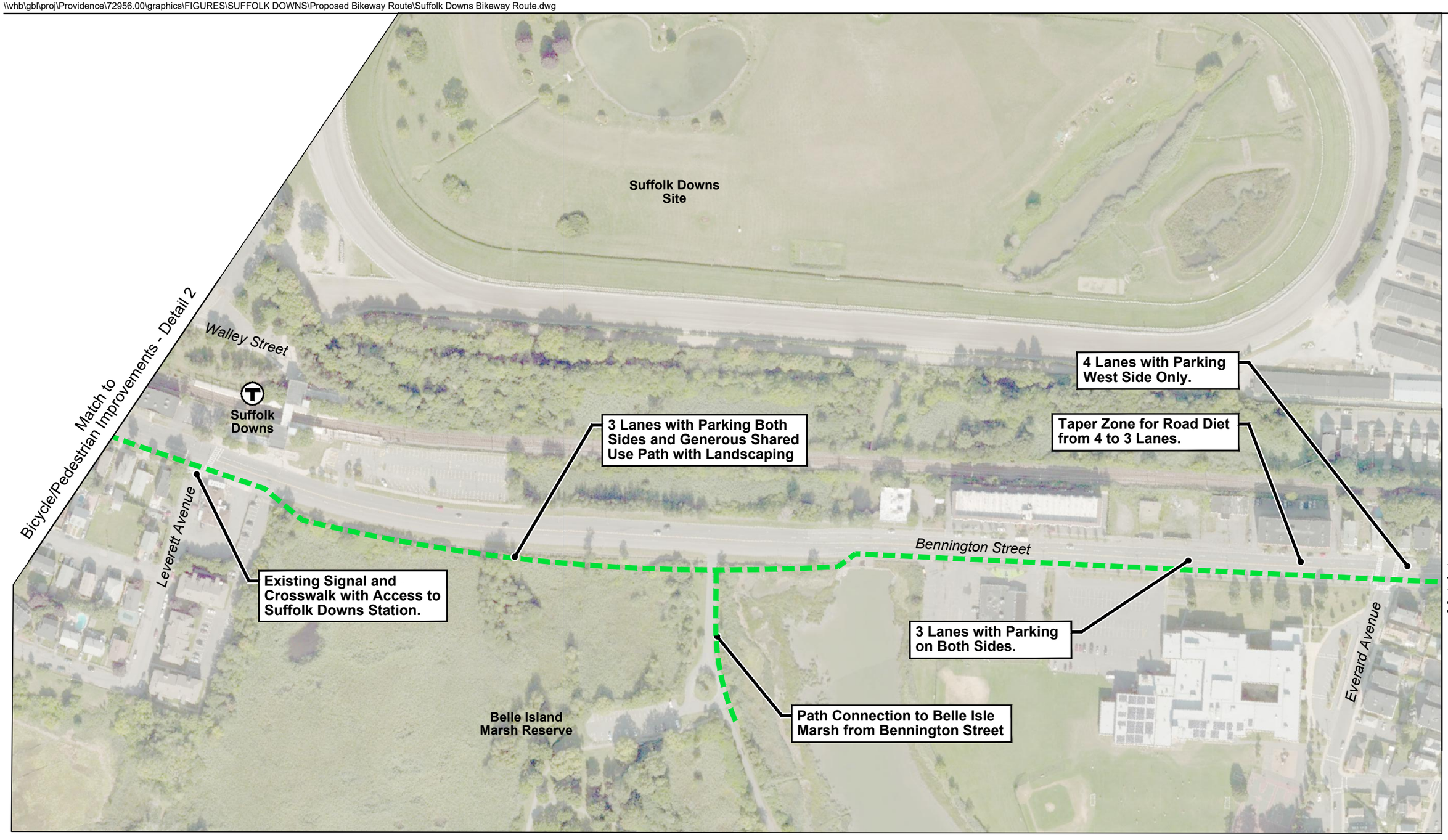
Bennington/State Path Corridor

Figure 6.23

Bicycle/Pedestrian Improvements-Detail 2
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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0 100 200 Feet

Legend
- Existing Bicycle Accomodation
- Bennington/State Path Corridor

Figure 6.24

Bicycle/Pedestrian Improvements-Detail 3
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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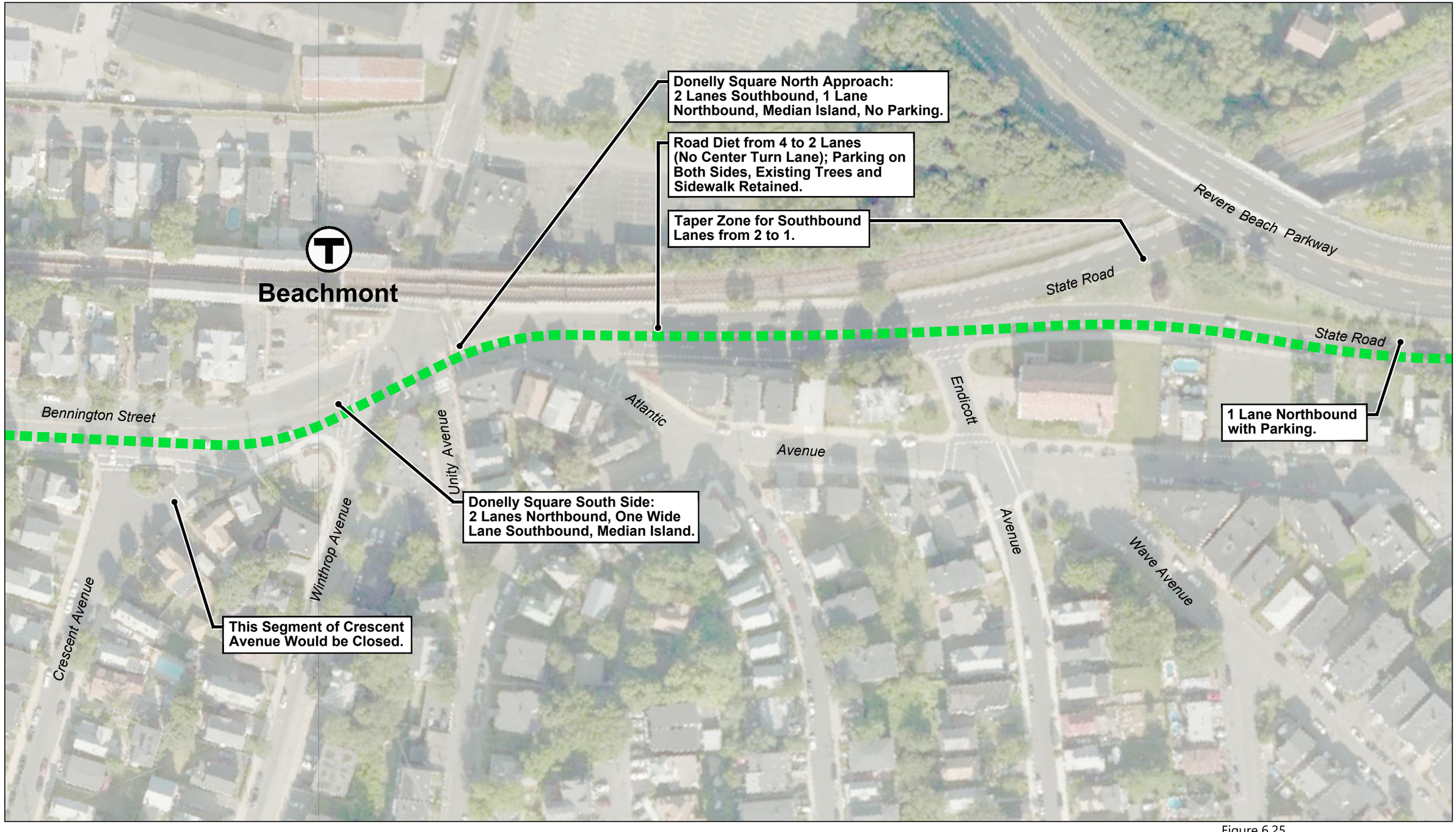


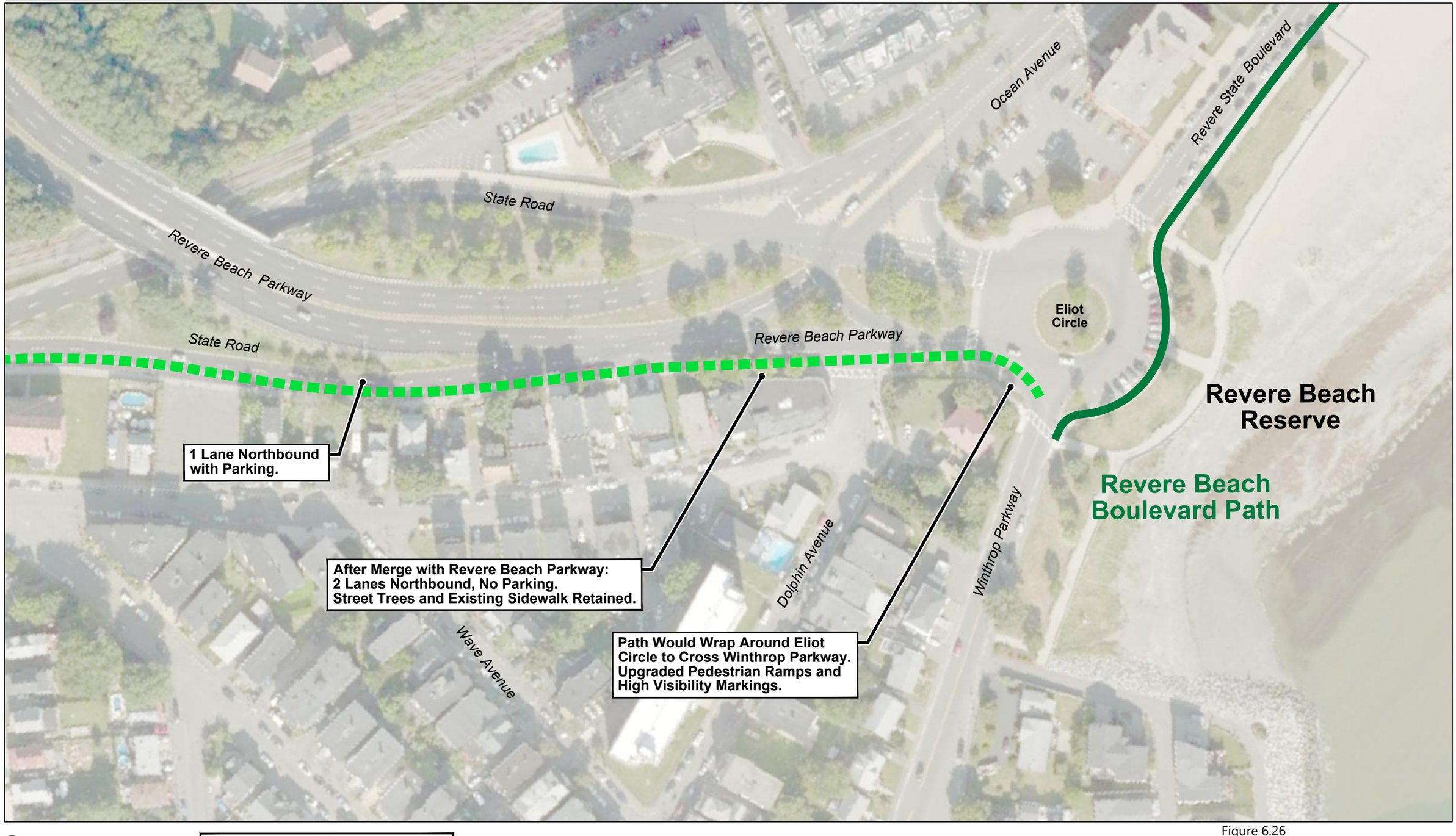
Figure 6.25

Bicycle/Pedestrian Improvements-Detail 4
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

\\vhb\gbl\proj\Providence\72956.00\graphics\FIGURES\SUFFOLK DOWNS\Proposed Bikeway Route\Suffolk Downs Bikeway Route.dwg

Match to Bicycle/Pedestrian Improvements - Detail 4



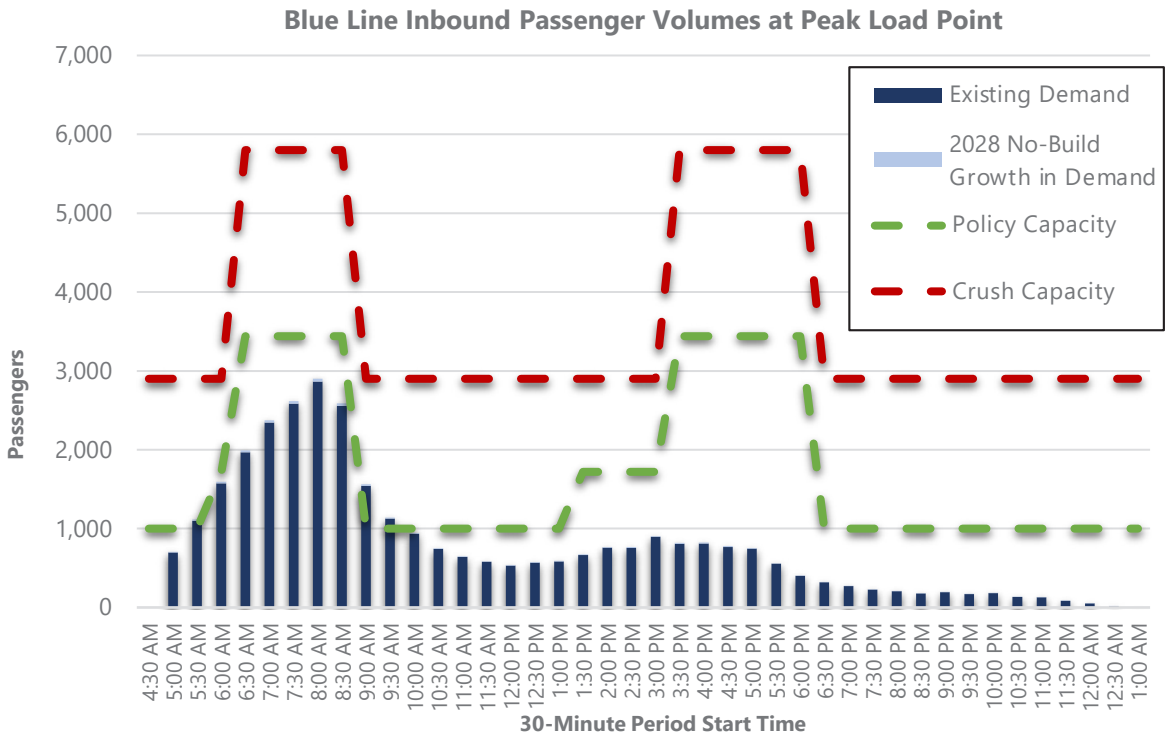
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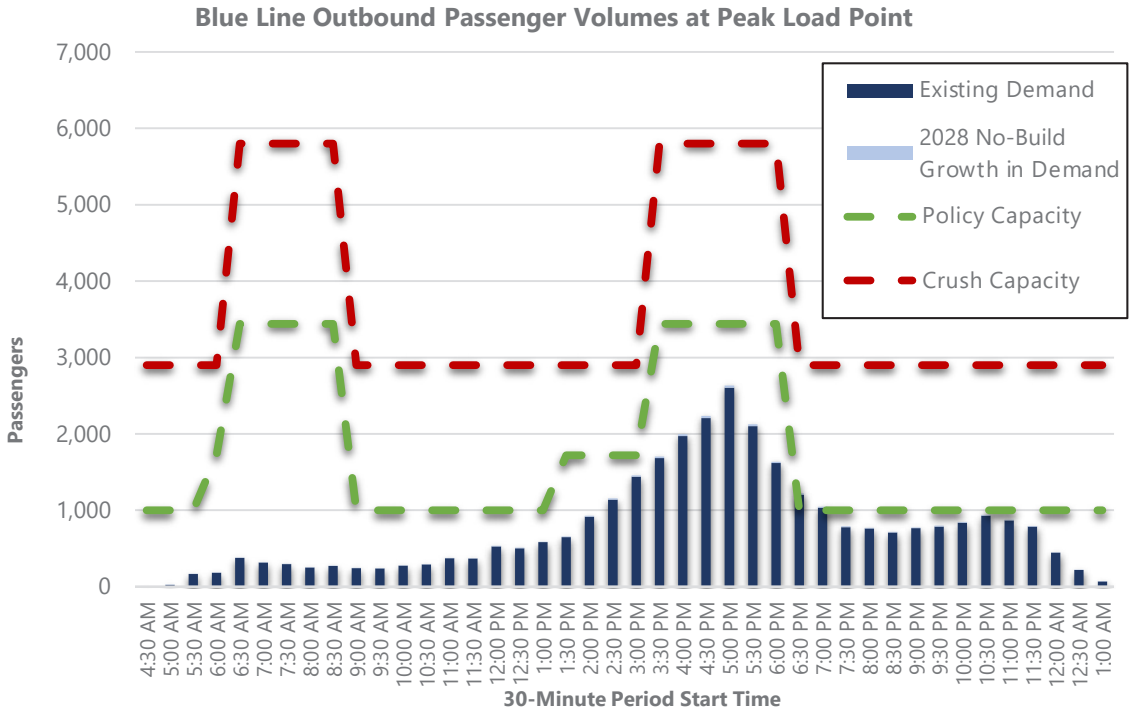
Legend
- Existing Bicycle Accomodation
- Bennington/State Path Corridor

Figure 6.26

Bicycle/Pedestrian Improvements-Detail 5
Bennington Street/State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





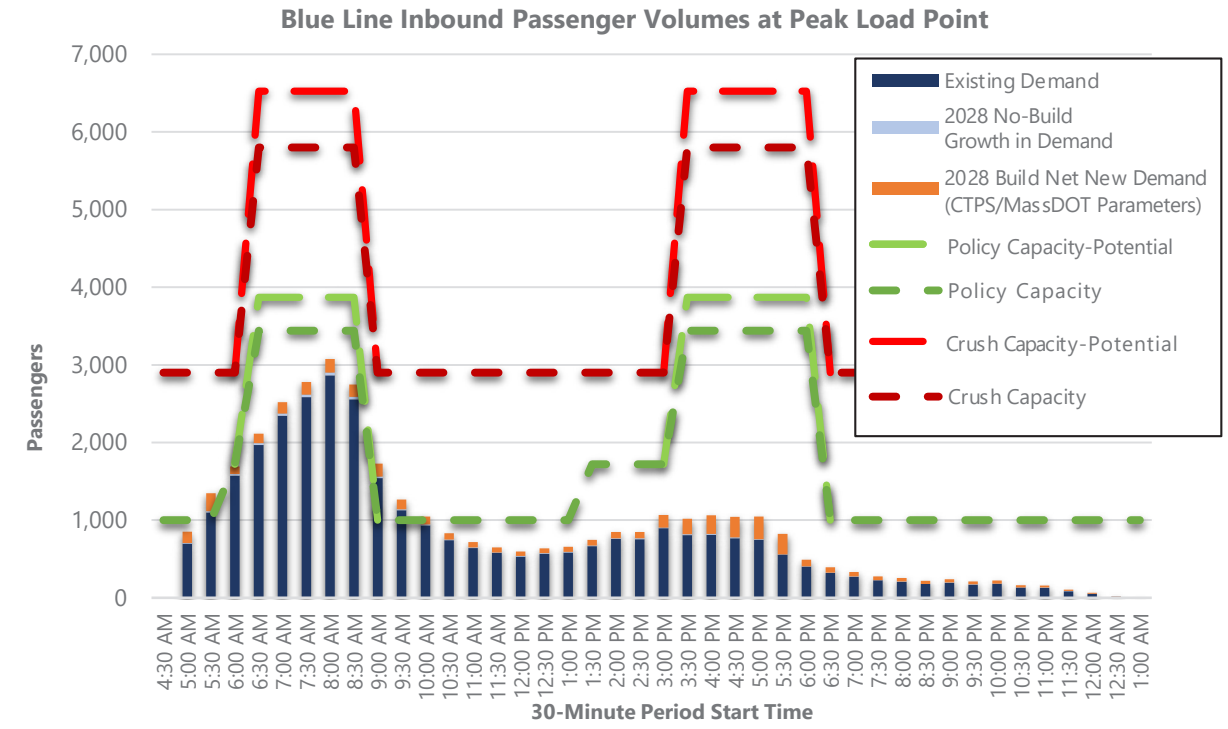
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

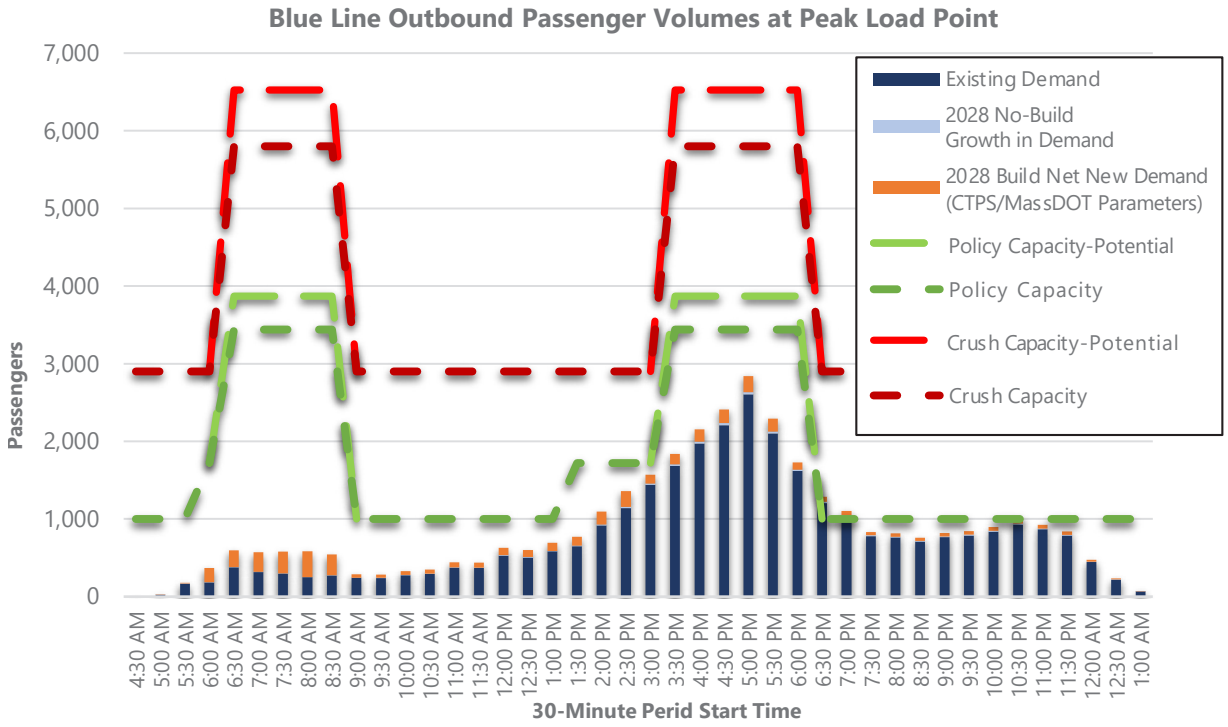
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.27a

2028 No-Build Condition
Blue Line Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





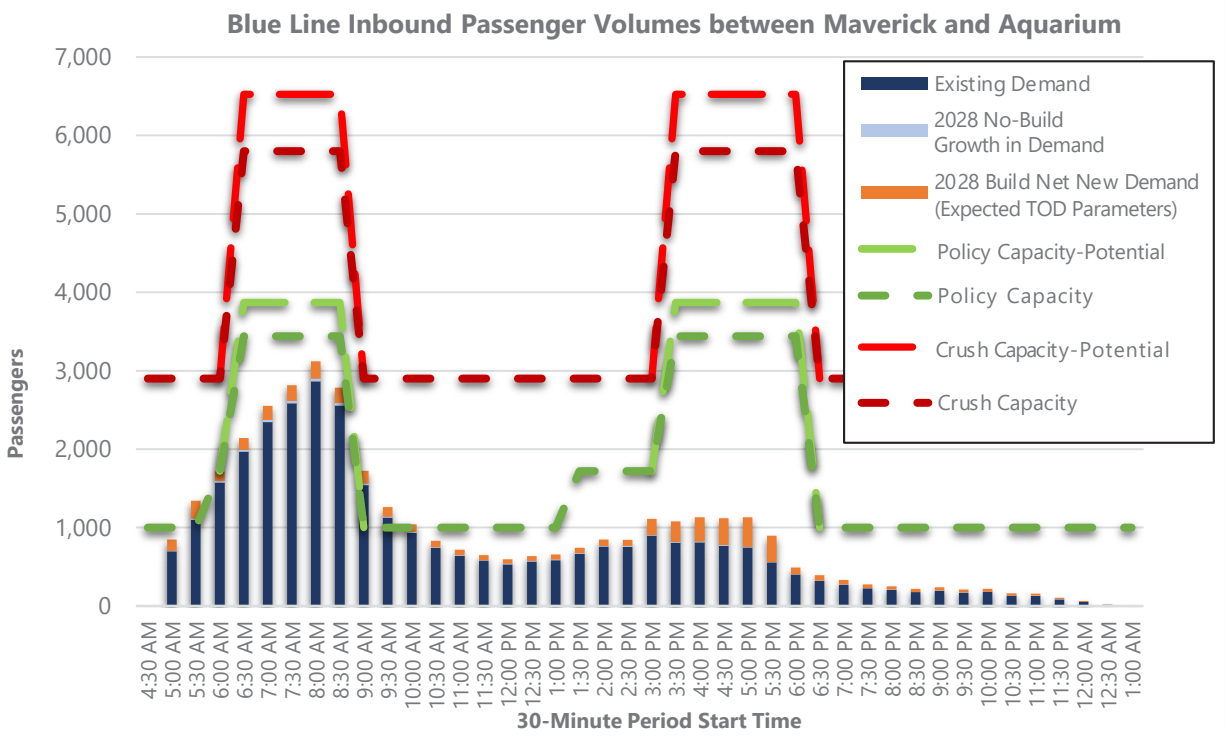
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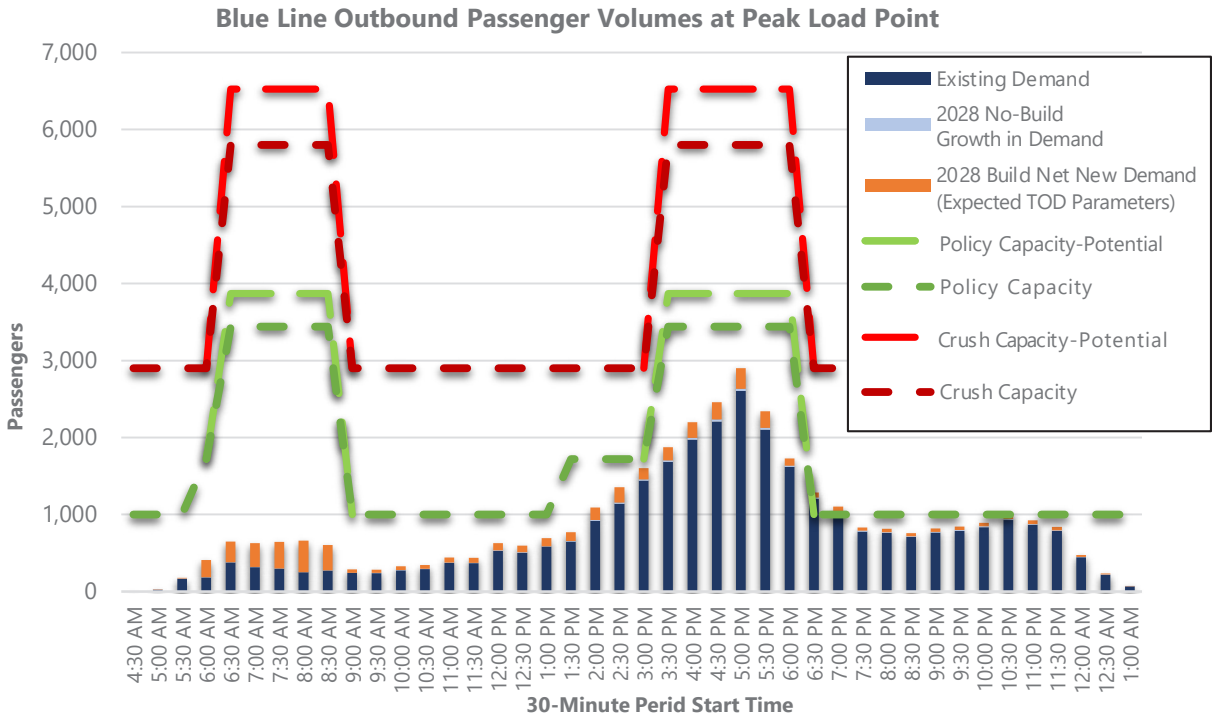
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.27b

2028 Build Condition (CTPS/MassDOT Parameters) Blue Line Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





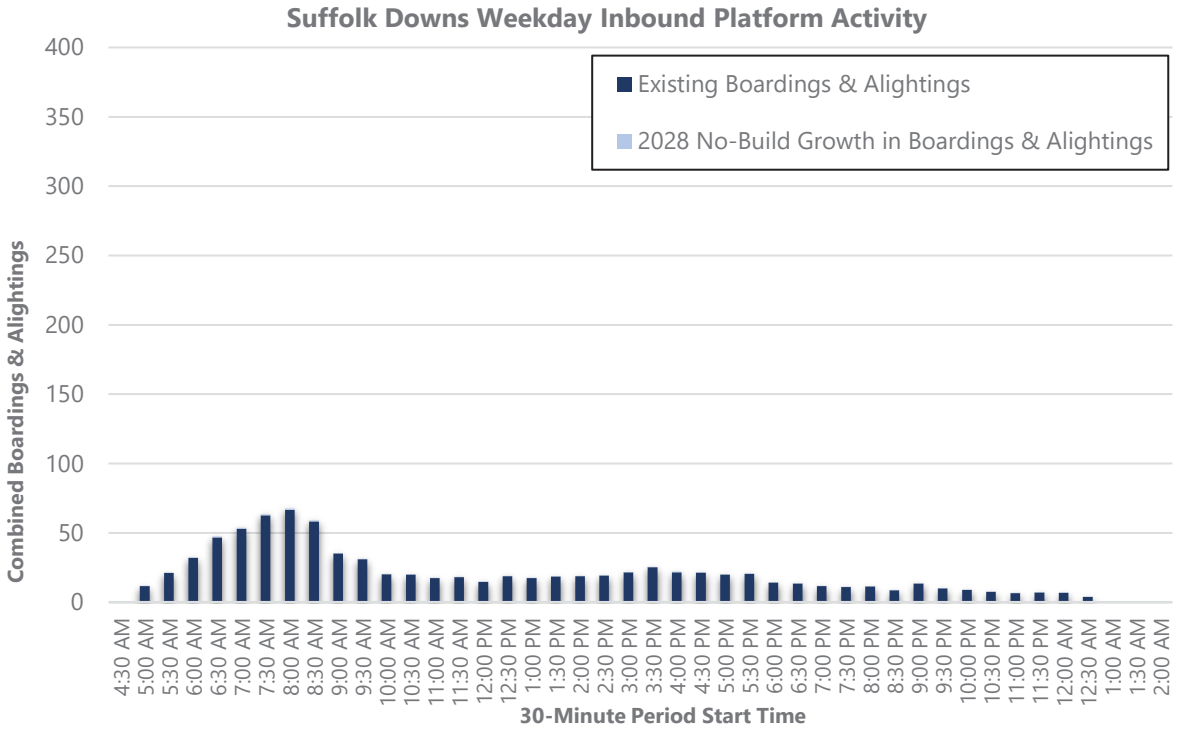
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

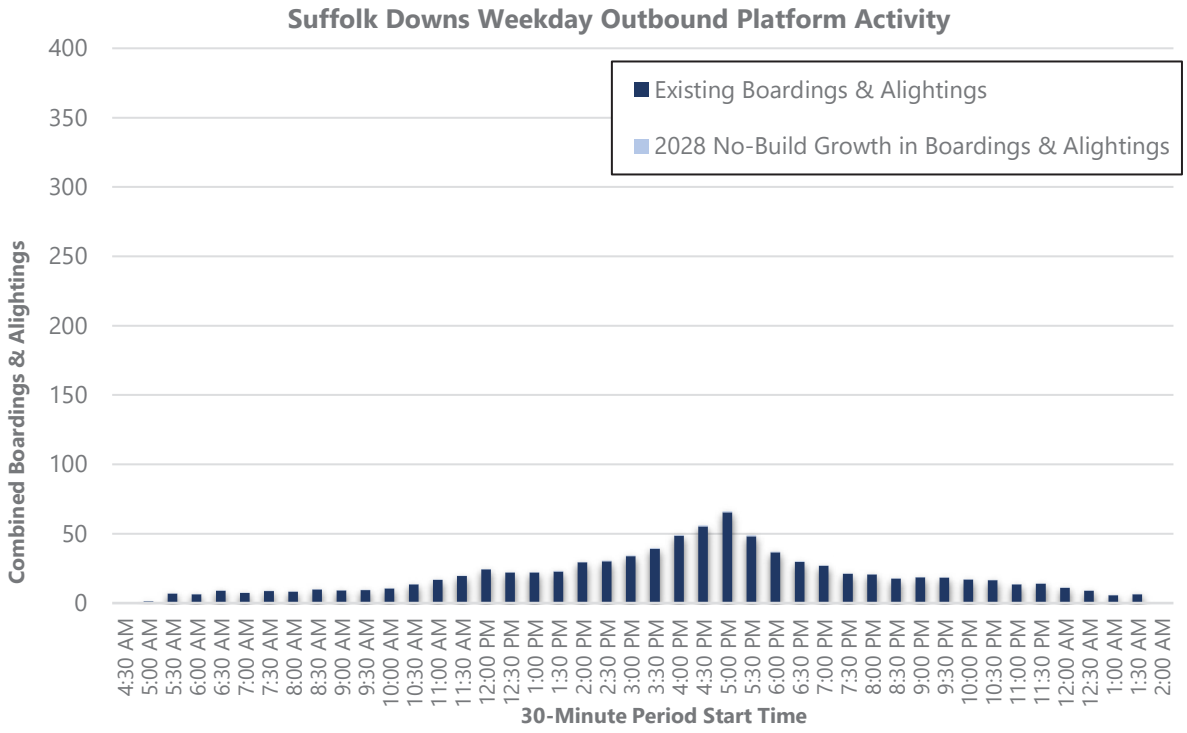
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.27c

2028 Build Condition (Expected TOD Parameters) Blue Line Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





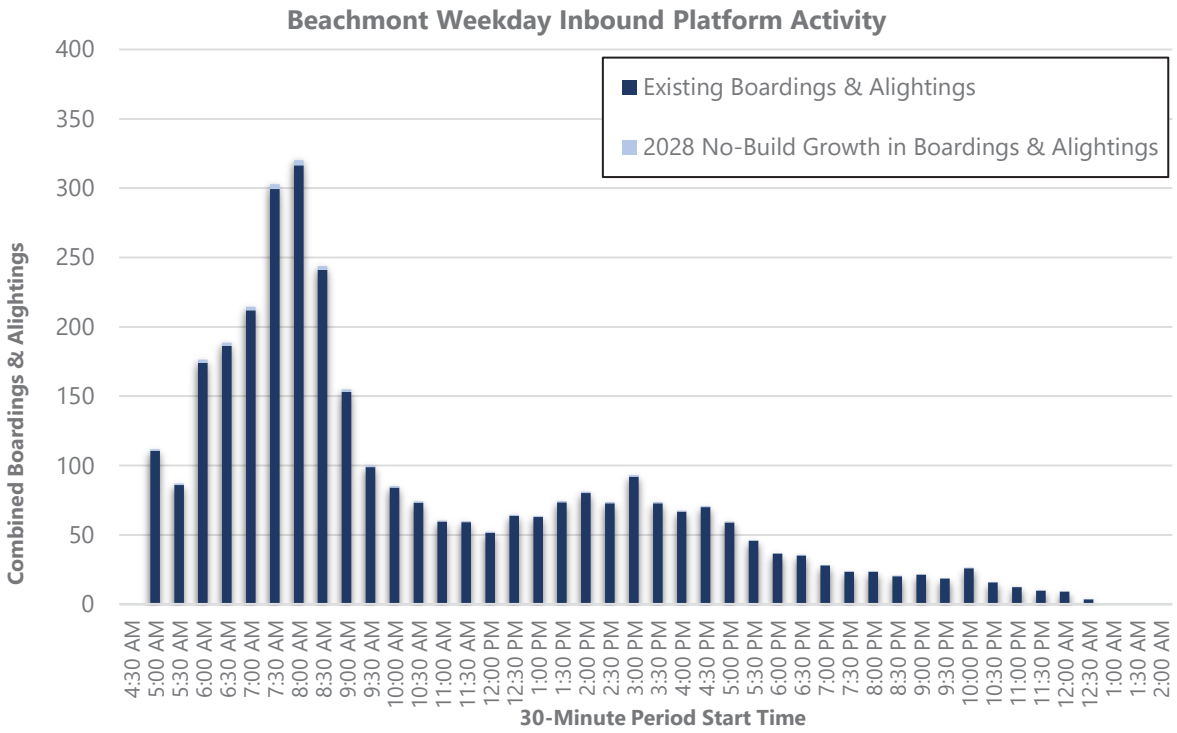
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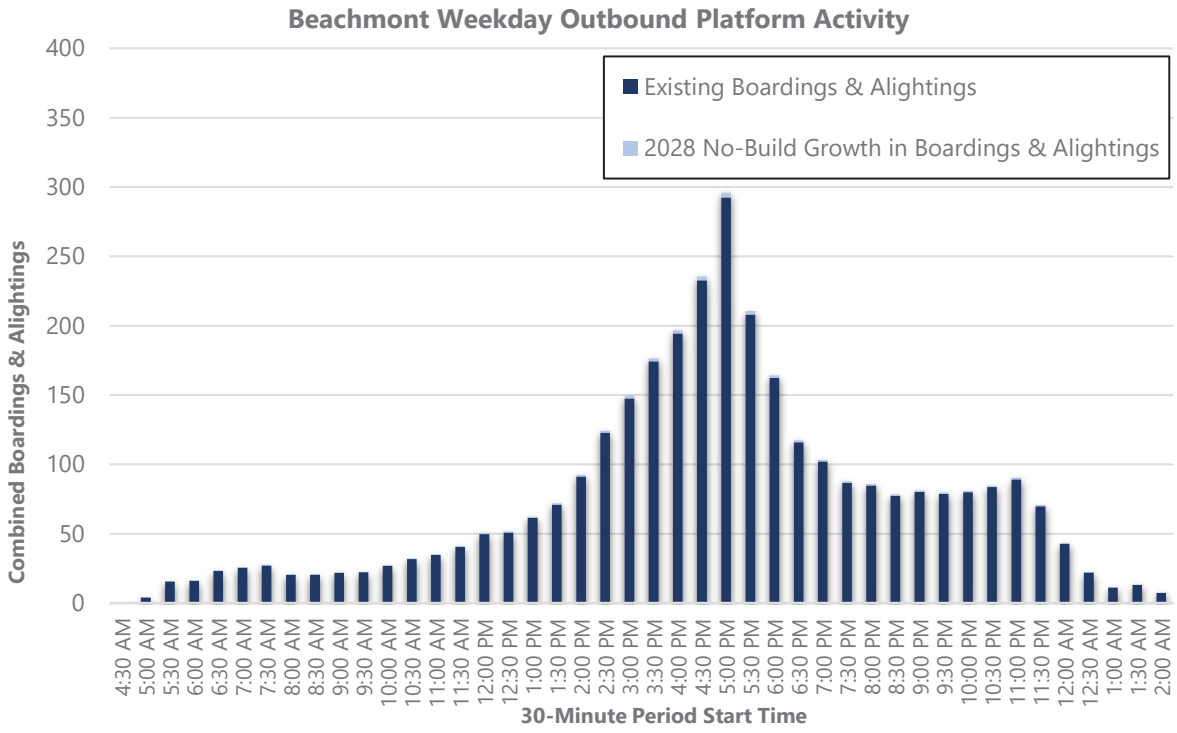
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28a

2028 No-Build Condition
Suffolk Downs Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





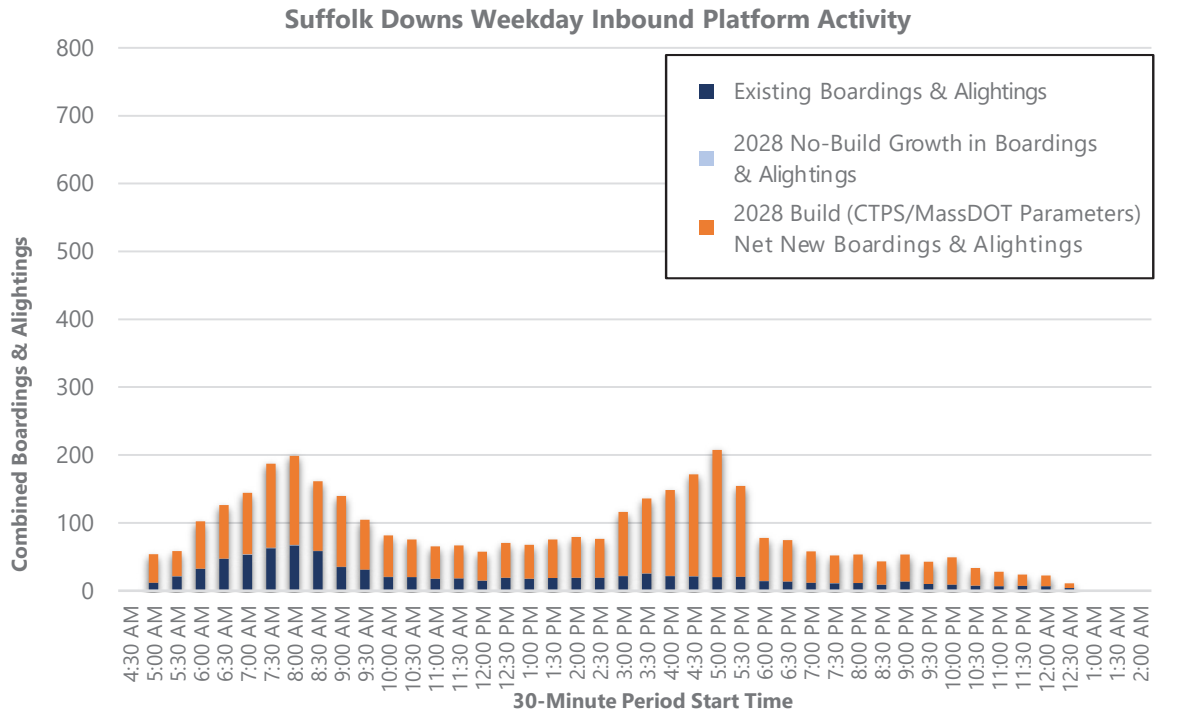
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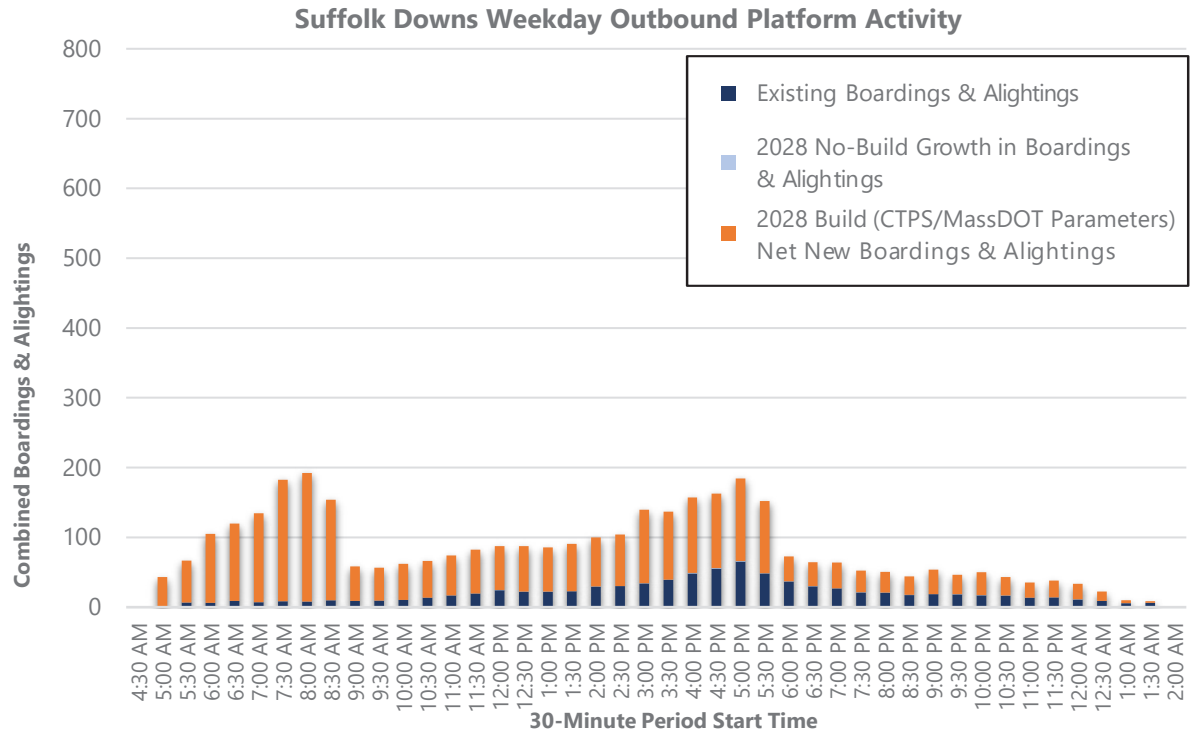
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28b

2028 No-Build Condition
Beachmont Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





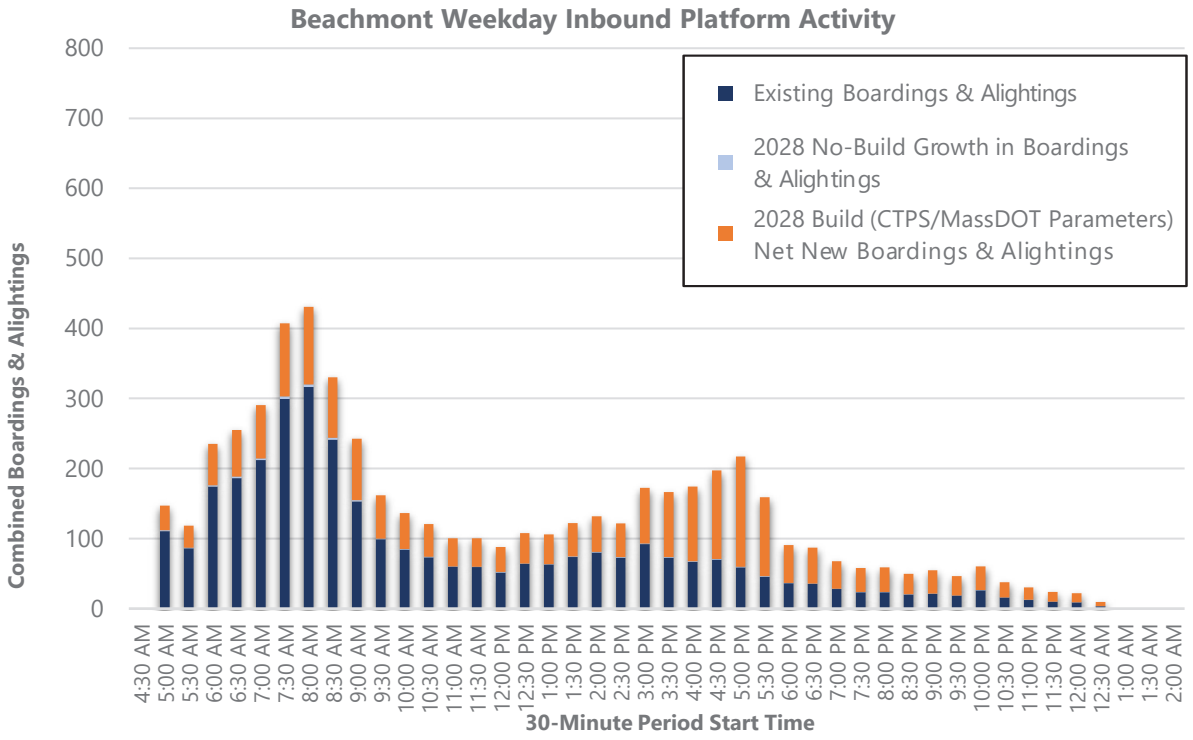
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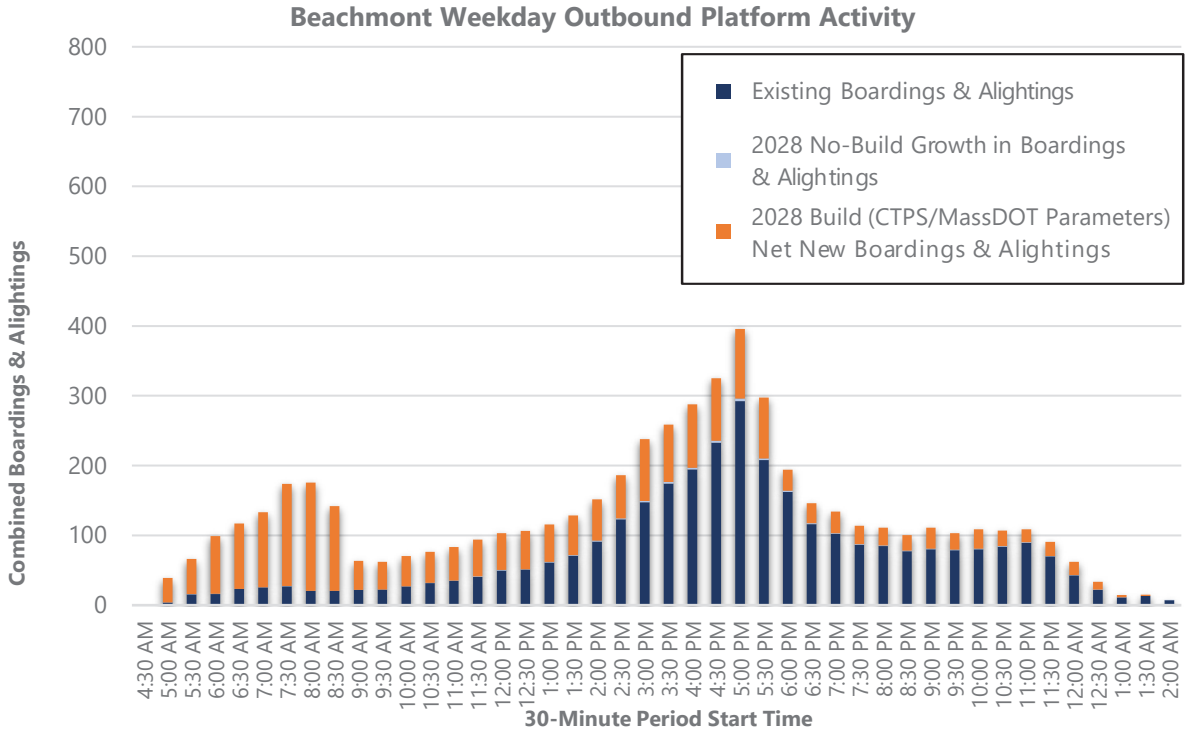
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28c

2028 Build Condition (CTPS/MassDOT Parameters) Suffolk Downs Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





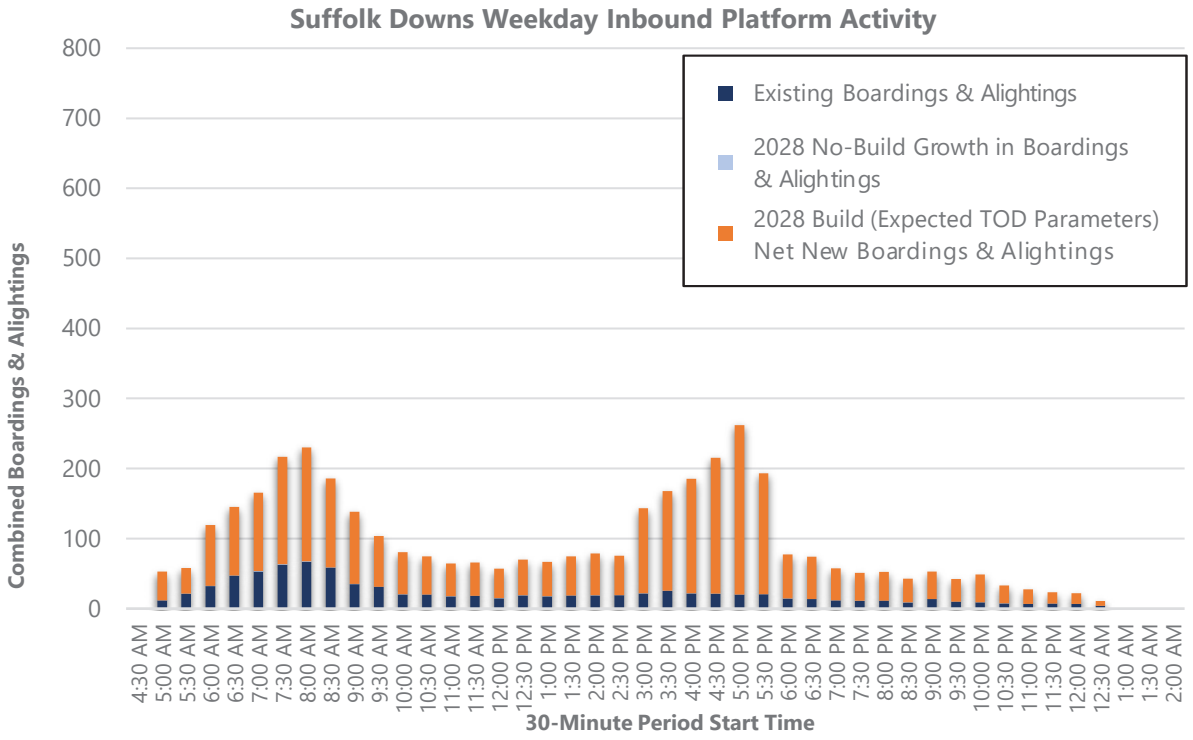
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

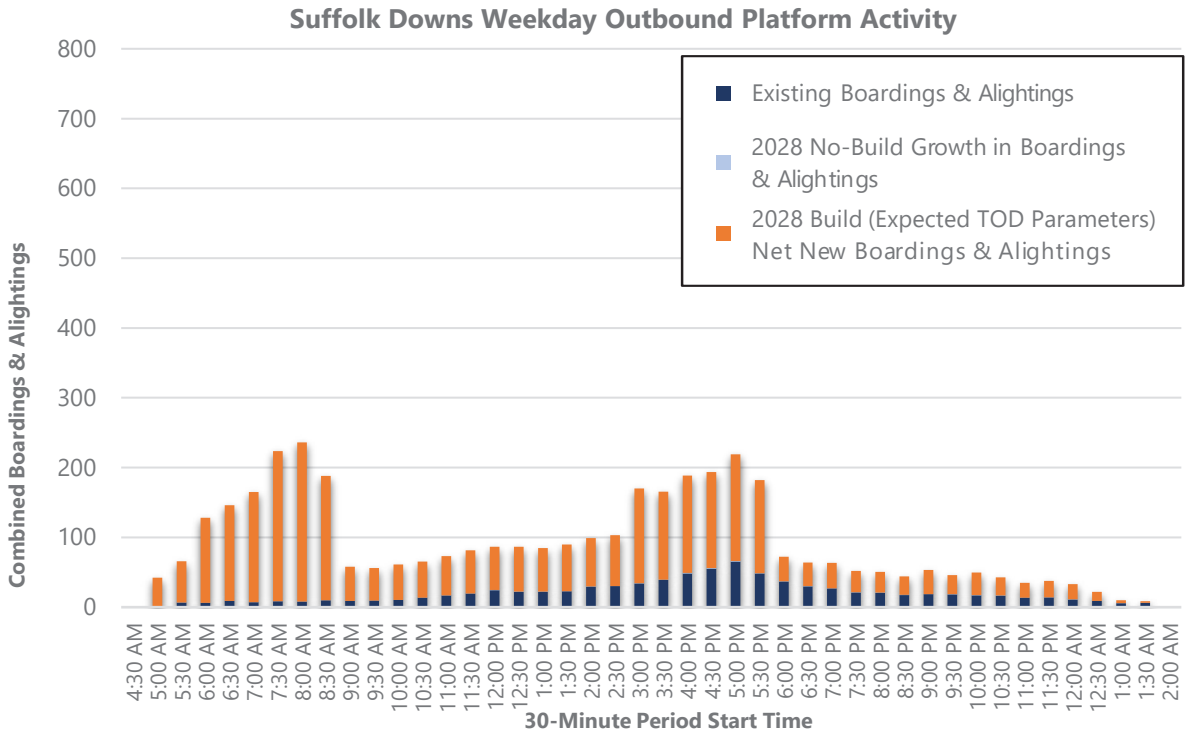
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28d

2028 Build Condition (CTPS/MassDOT Parameters) Beachmont Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





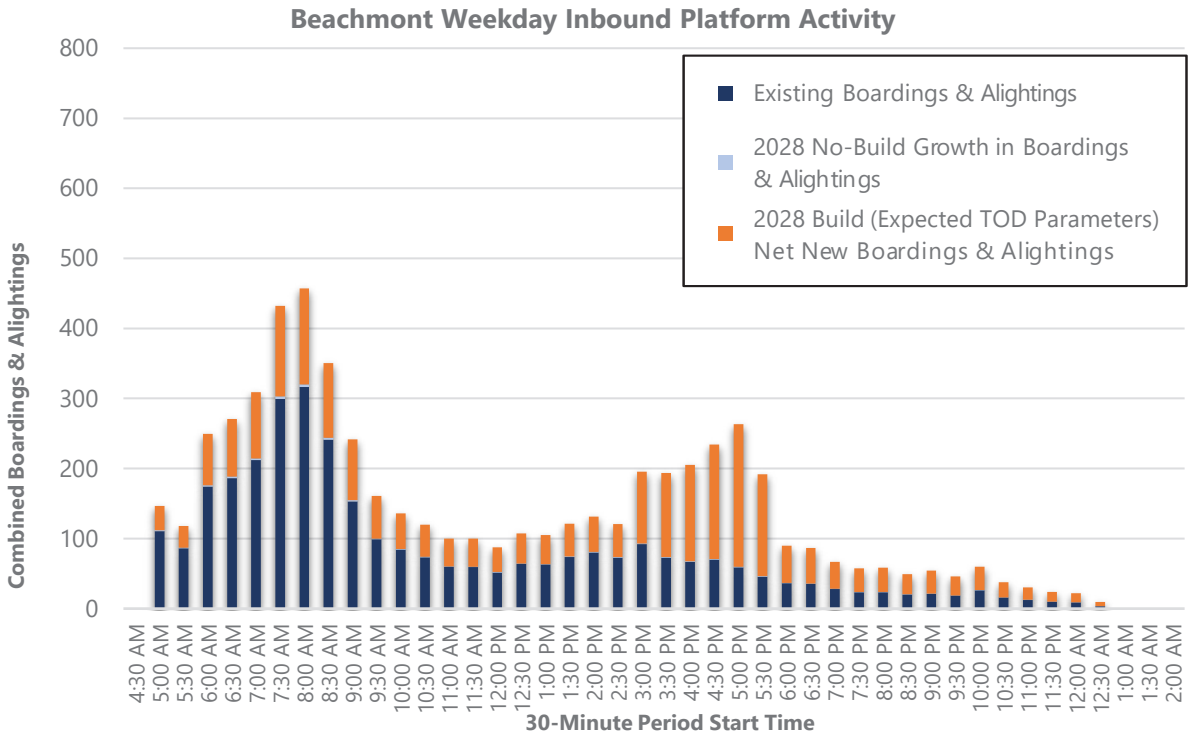
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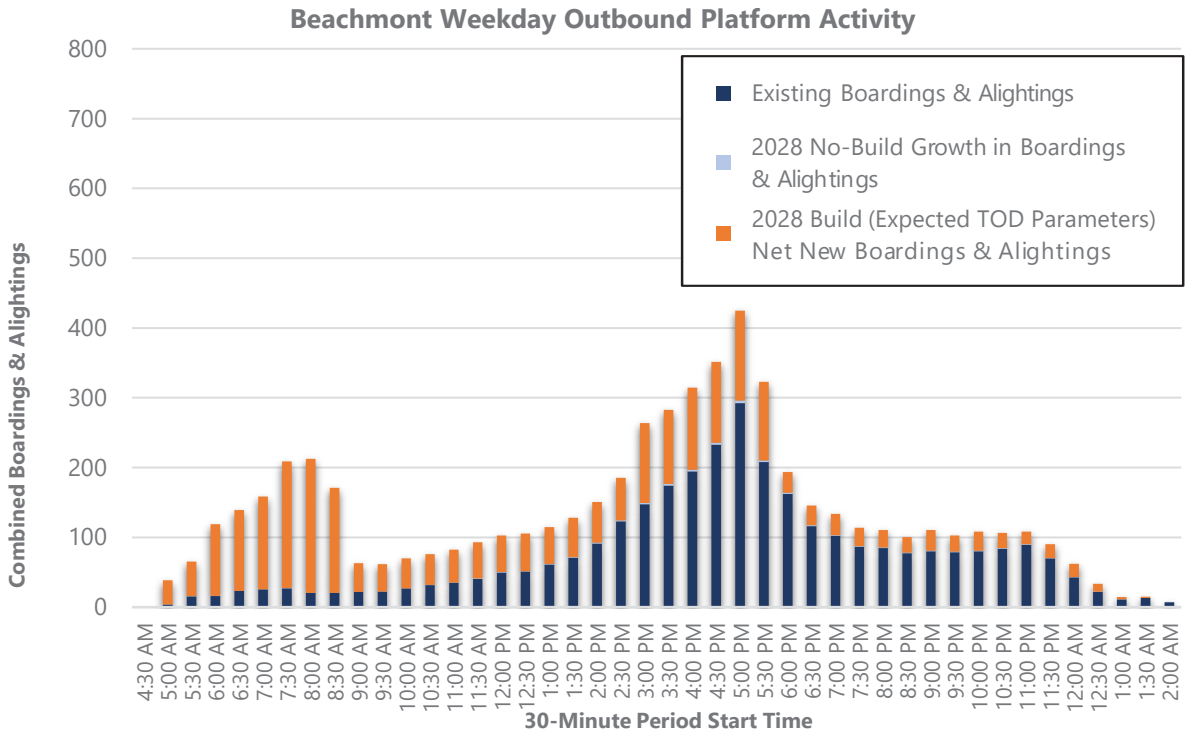
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28e

2028 Build Condition (Expected TOD Parameters) Suffolk Downs Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





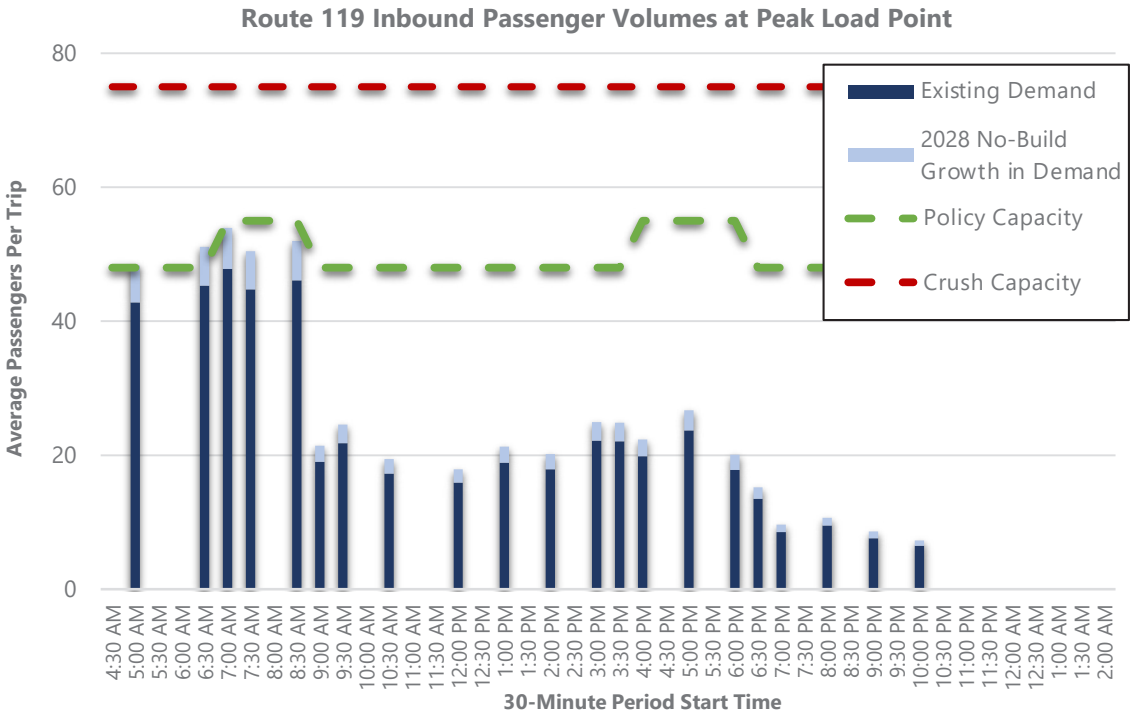
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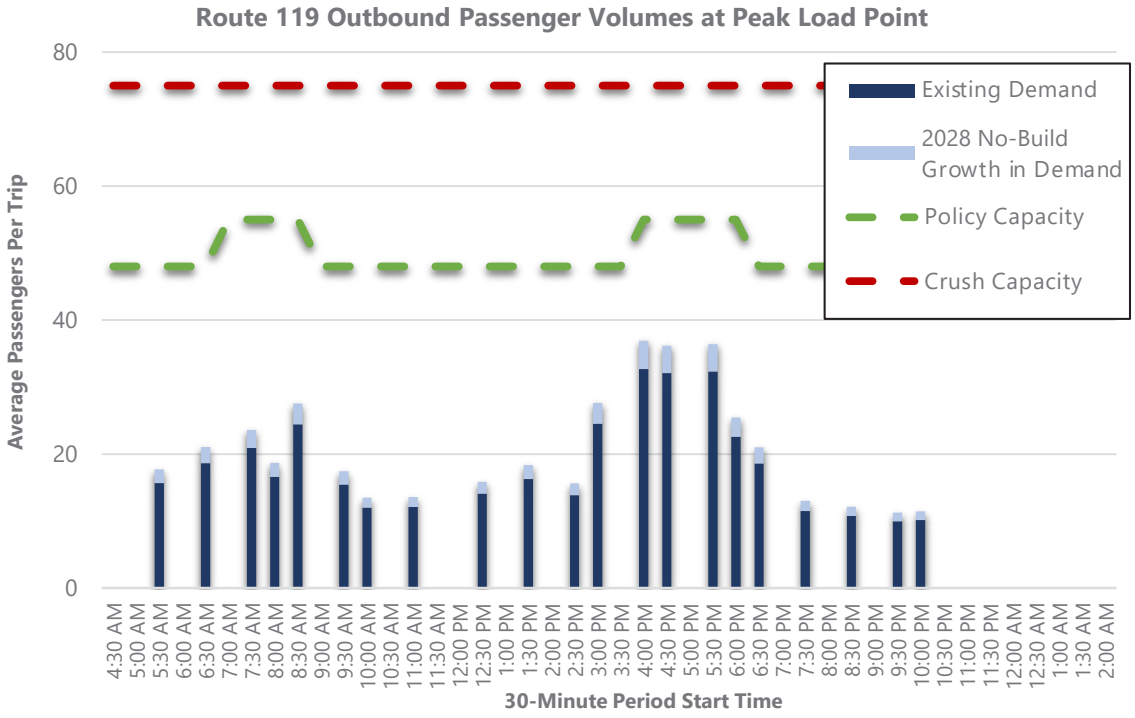
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.28f

2028 Build Condition (Expected TOD Parameters) Beachmont Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

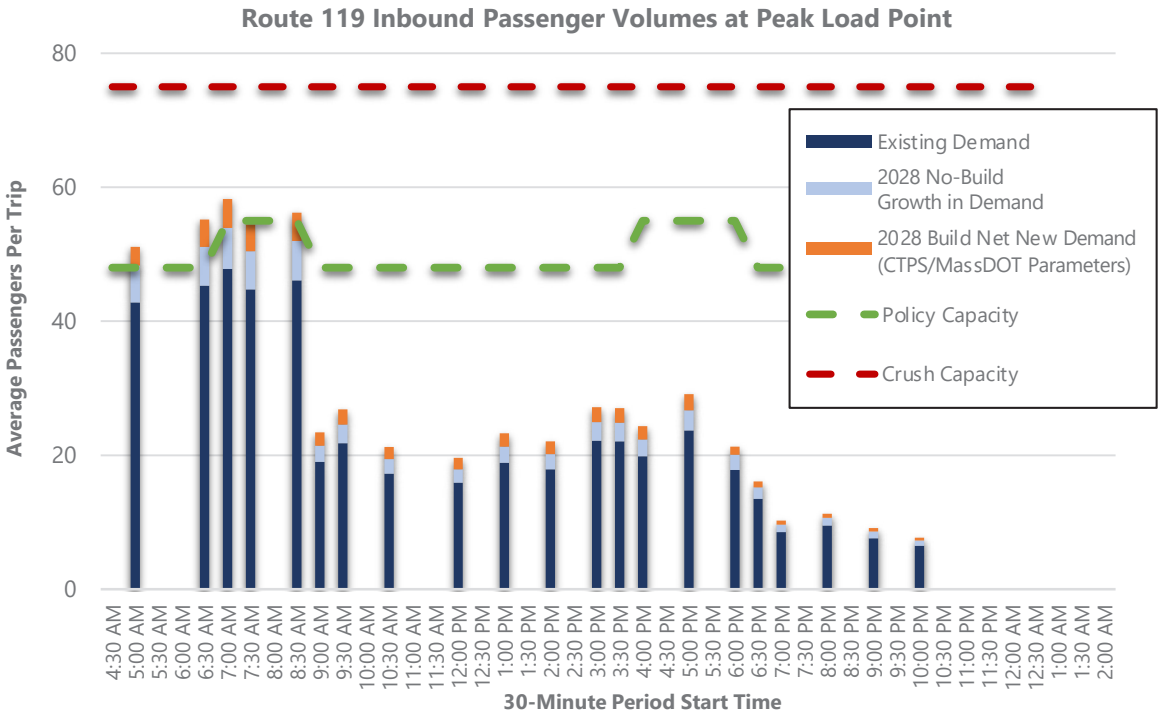
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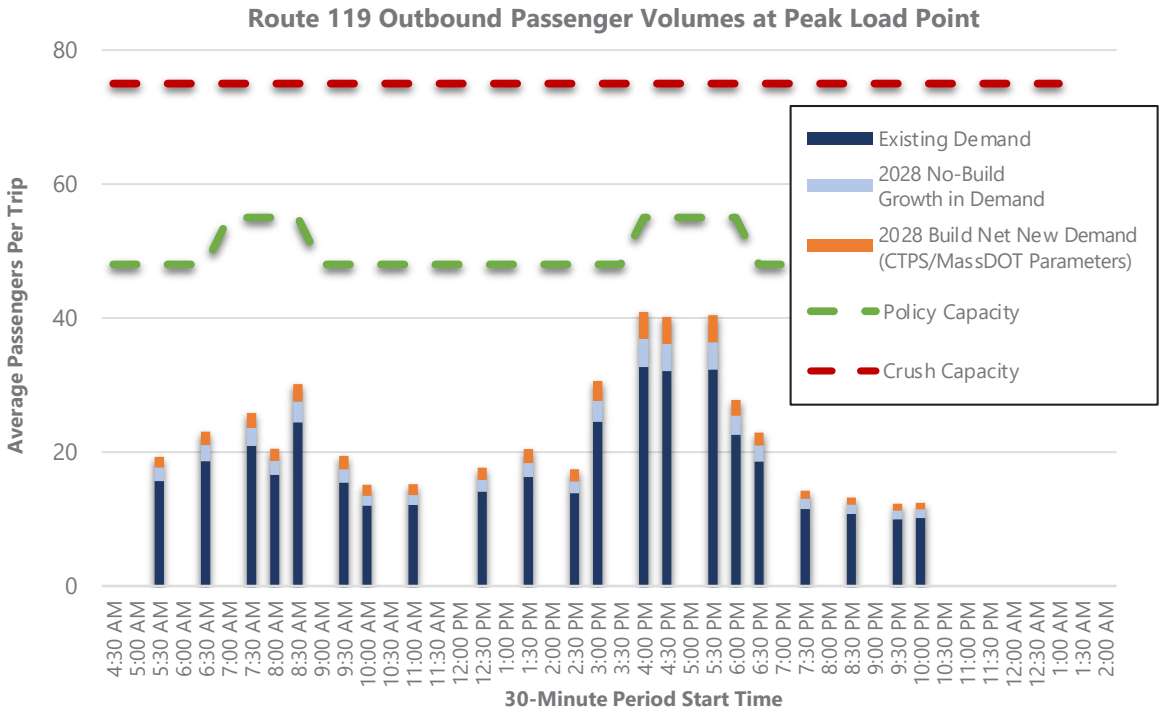
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.29a

2028 No-Build Condition
MBTA Route 119 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

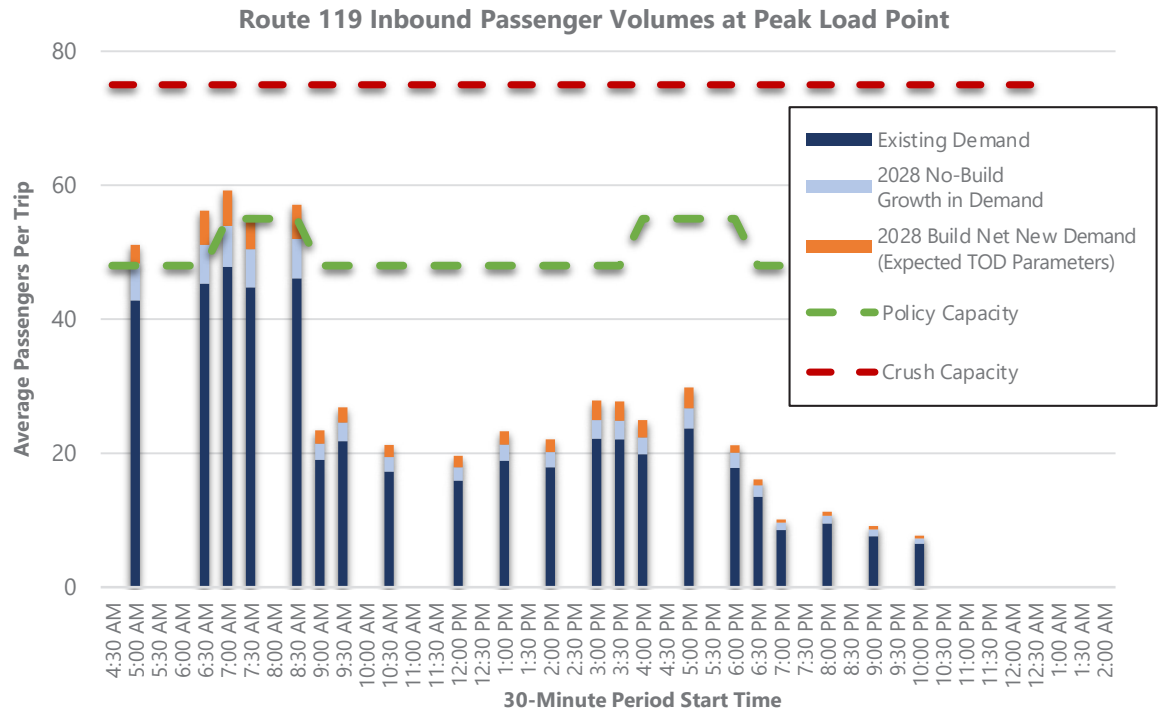
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.1% average annual growth rate for MBTA Route 119 ridership).

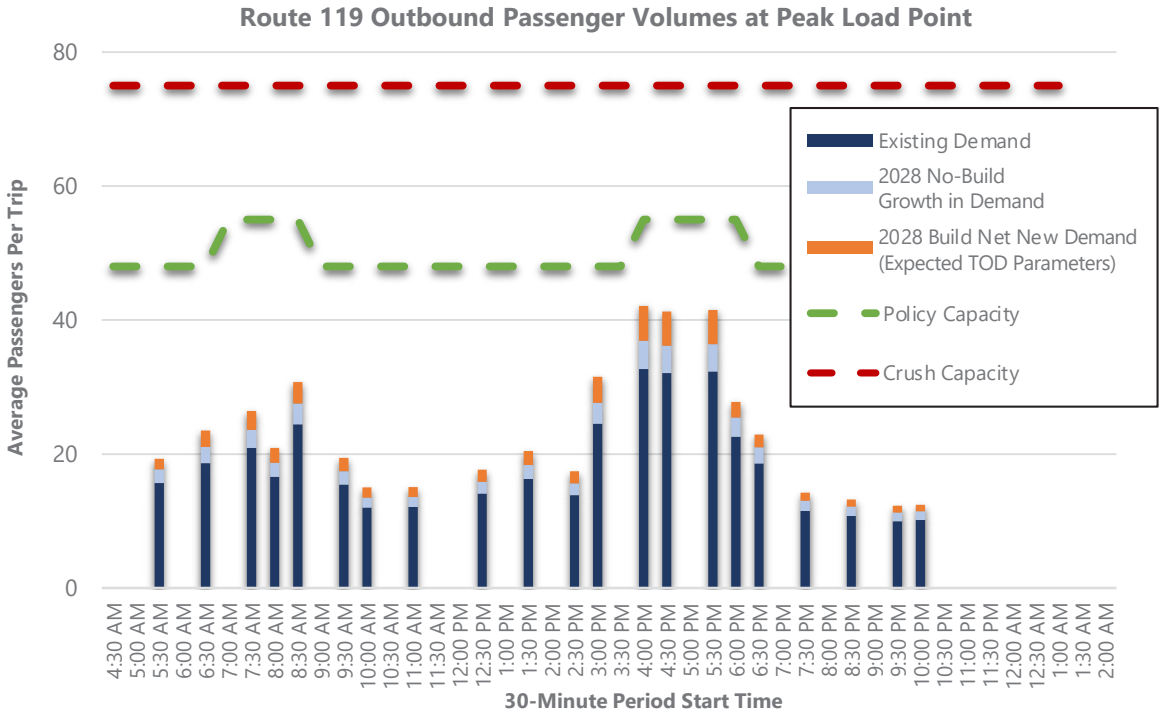
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.29b

2028 Build Condition (CTPS/MassDOT Parameters) MBTA Route 119 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

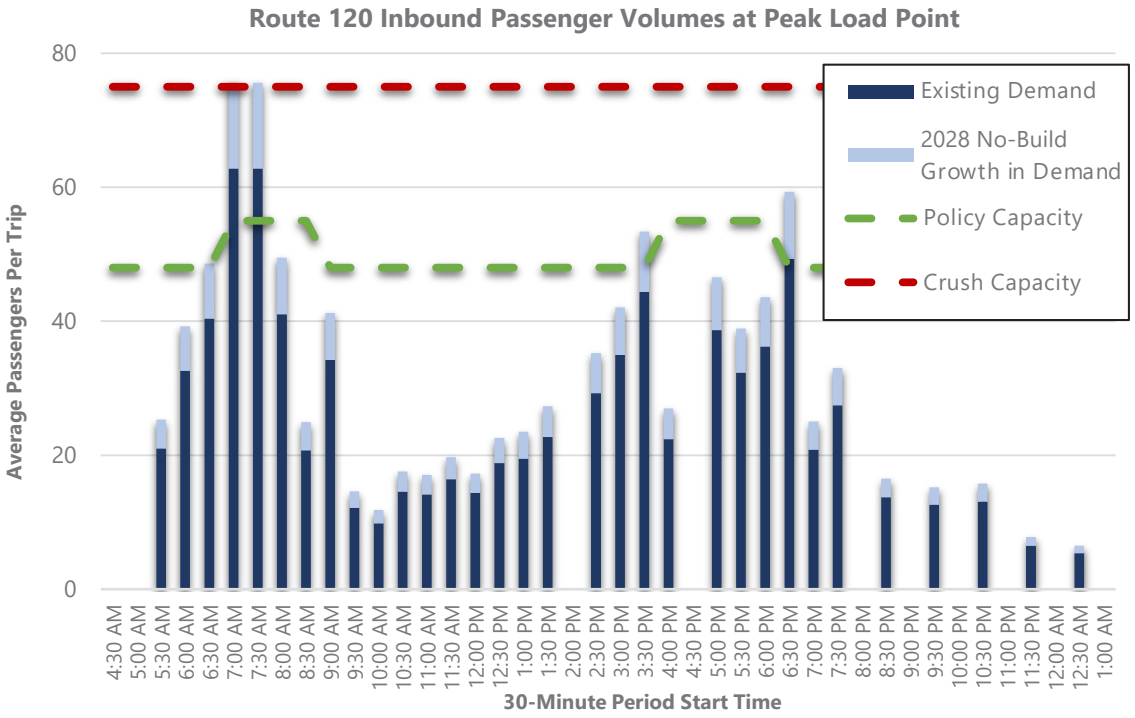
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.1% average annual growth rate for MBTA Route 119 ridership).

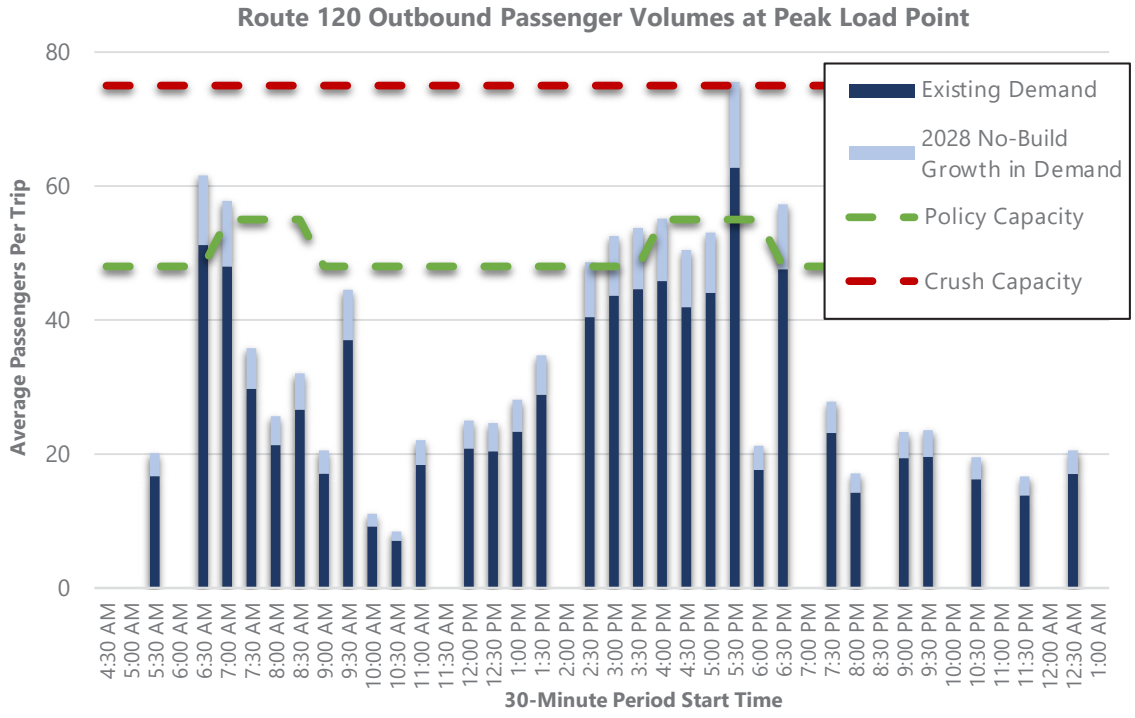
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.29c

2028 Build Condition
(Expected TOD Parameters)
MBTA Route 119 Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 120 Ridership Data, Fall 2017.

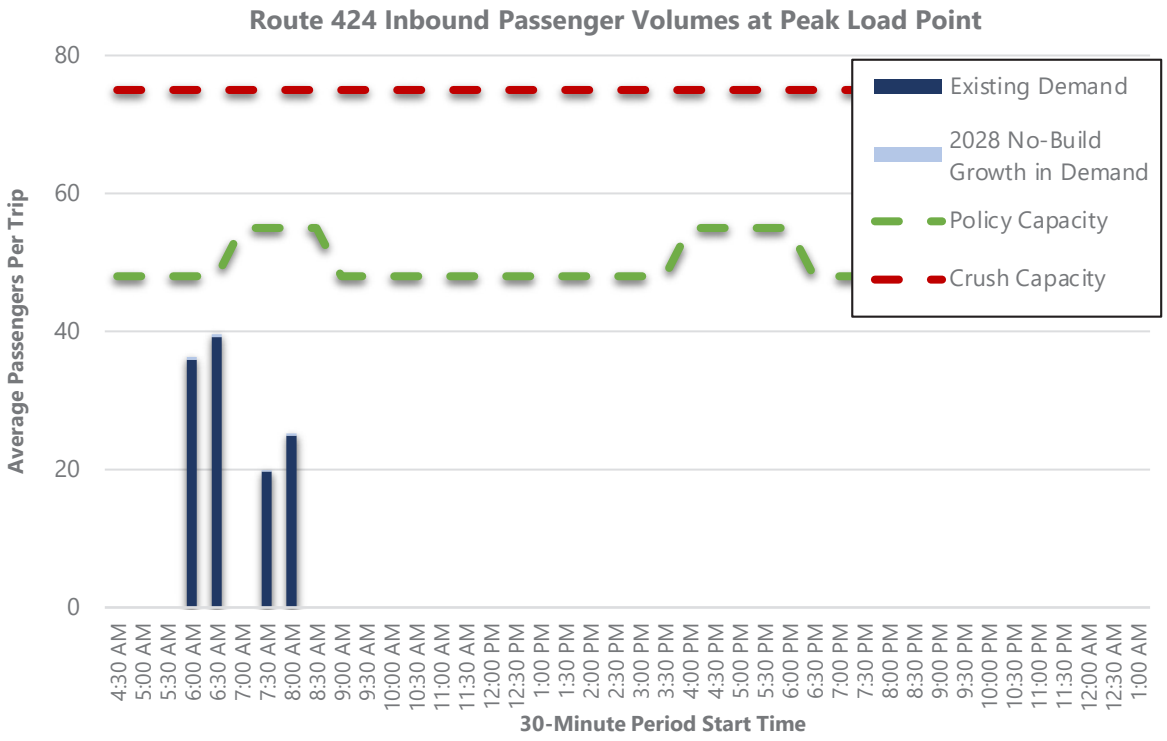
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.7% average annual growth rate for MBTA Route 120 ridership).

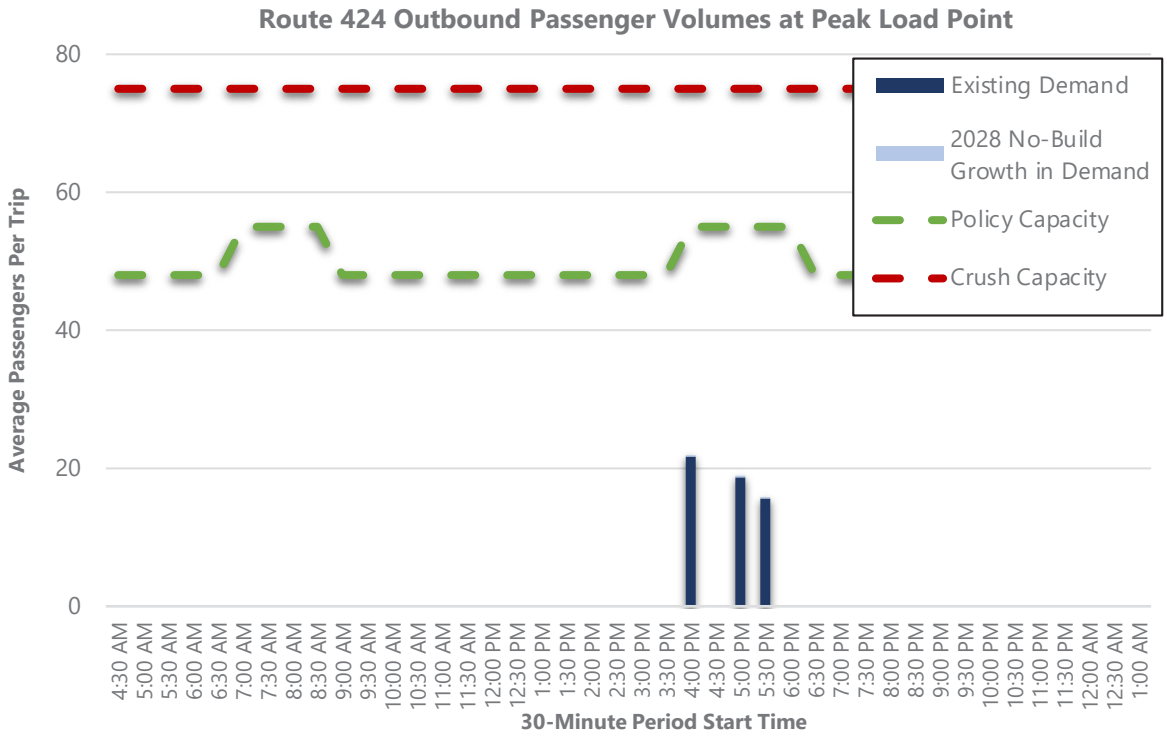
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.30

2028 No-Build Condition
MBTA Route 120 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





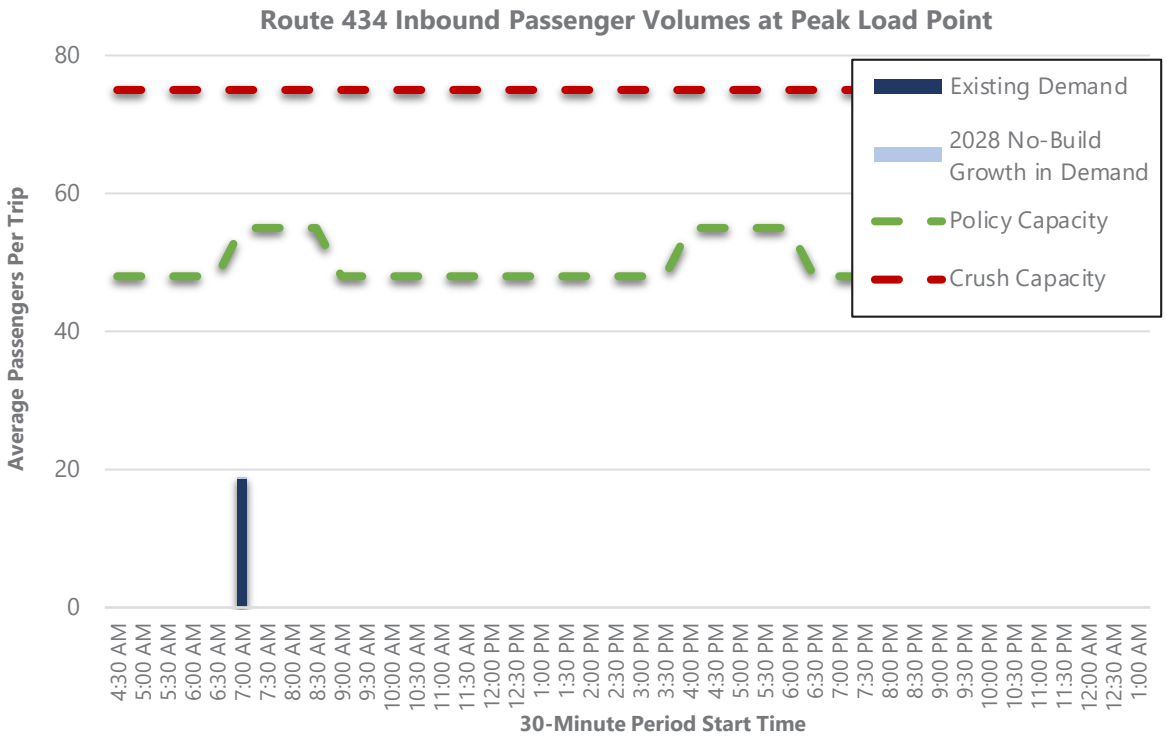
Existing Conditions Data Source: MBTA, Route 424 Ridership Data, Fall 2017.

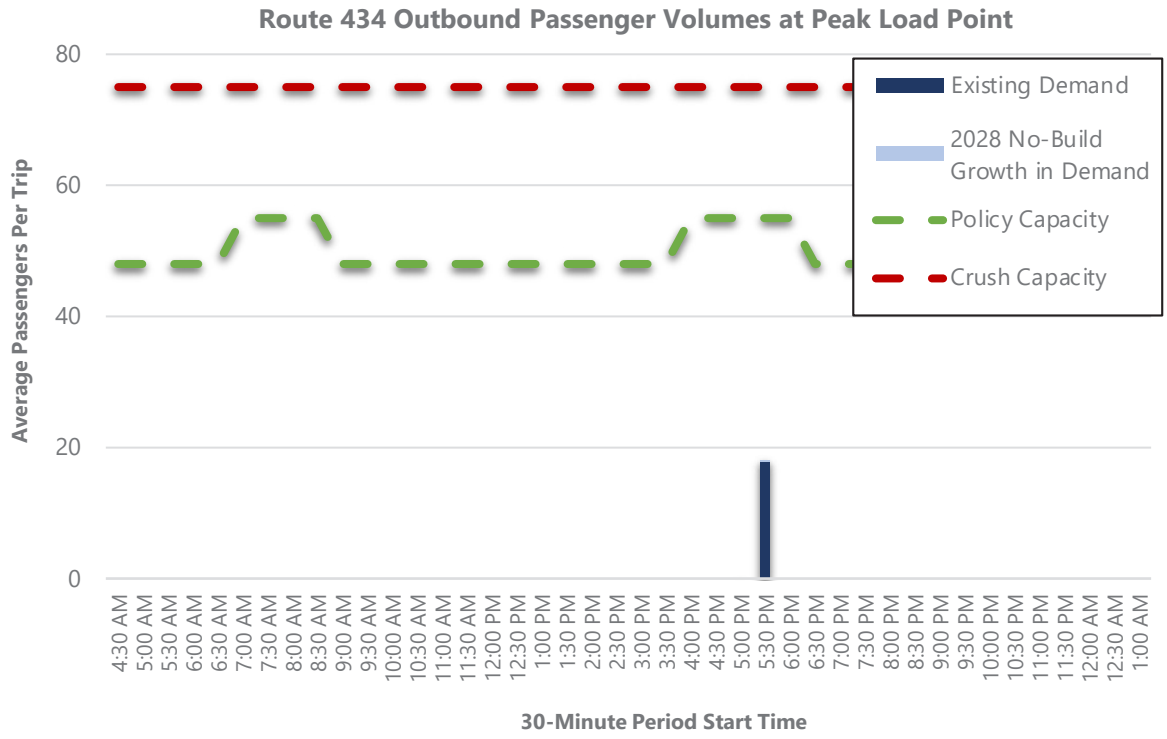
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 424 ridership).

Figure 6.31

2028 No-Build Condition
MBTA Route 424 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





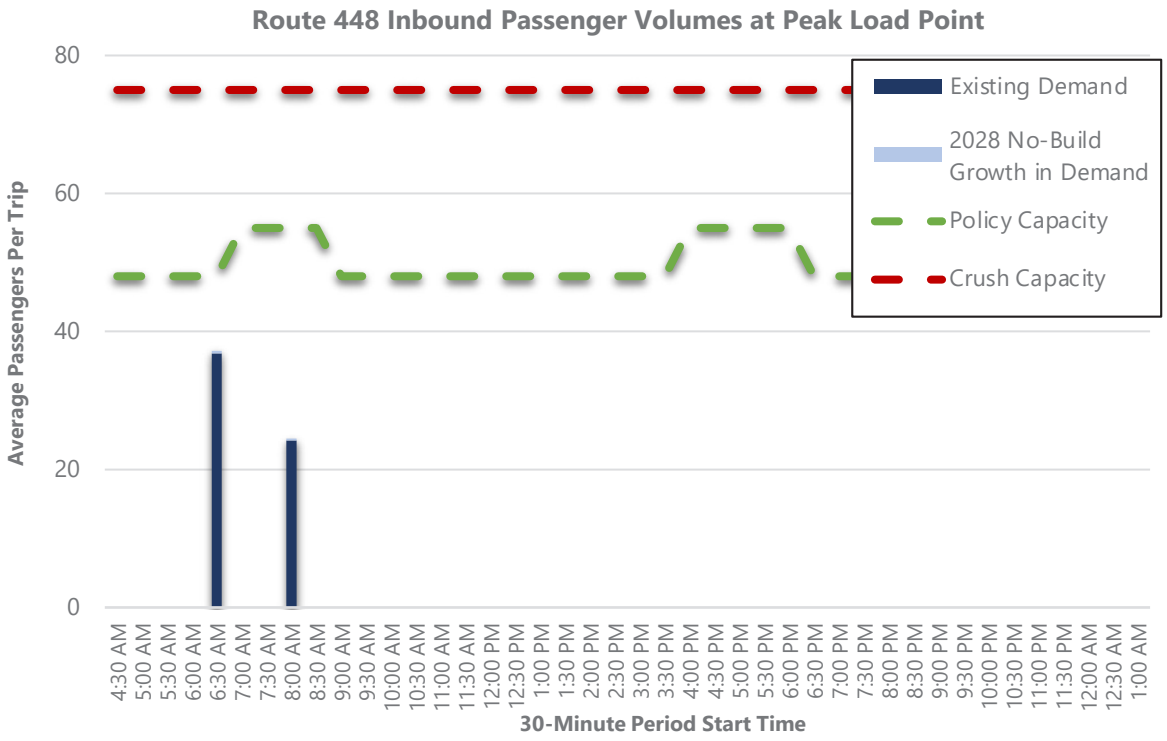
Existing Conditions Data Source: MBTA, Route 434 Ridership Data, Fall 2017.

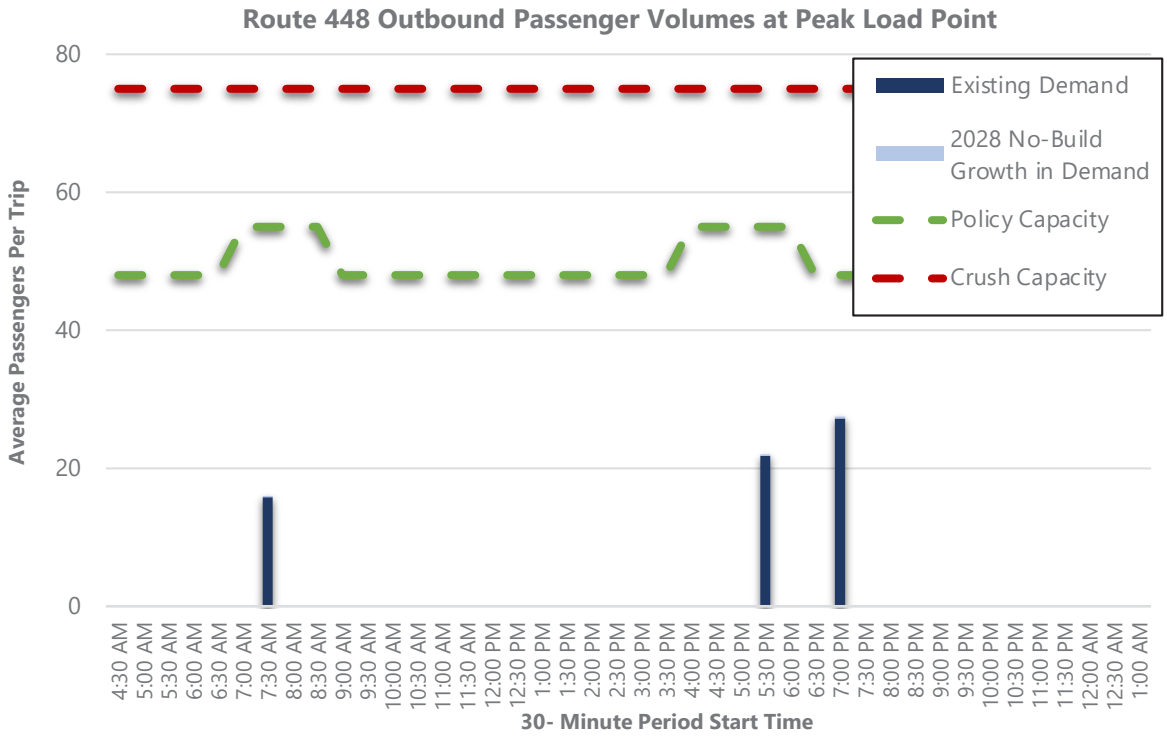
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (0.1% average annual growth rate for MBTA Route 434 ridership).

Figure 6.32

2028 No-Build Condition
MBTA Route 434 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





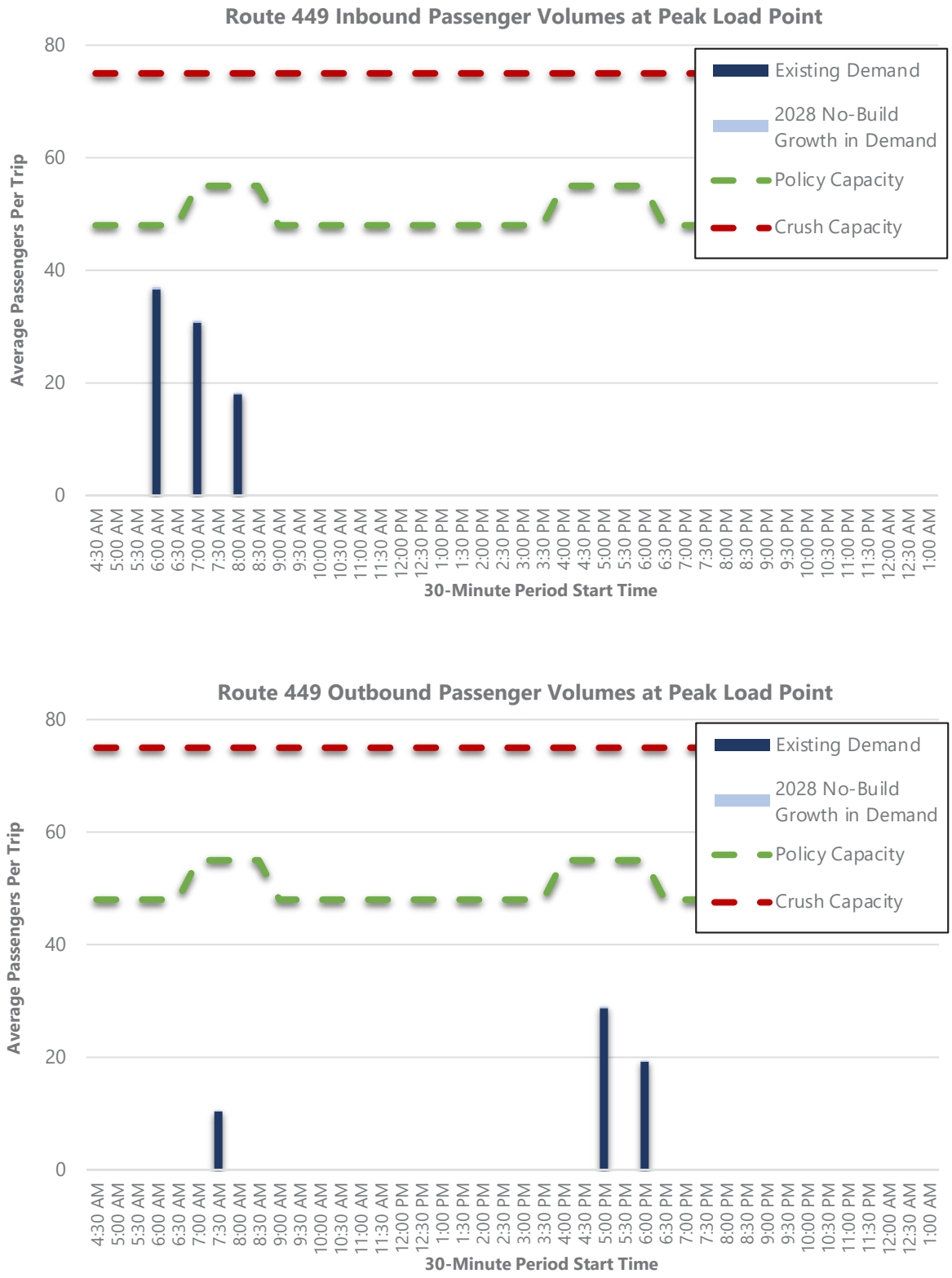
Existing Conditions Data Source: MBTA, Route 448 Ridership Data, Fall 2017.

No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 448 ridership).

Figure 6.33

2028 No-Build Condition
MBTA Route 448 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



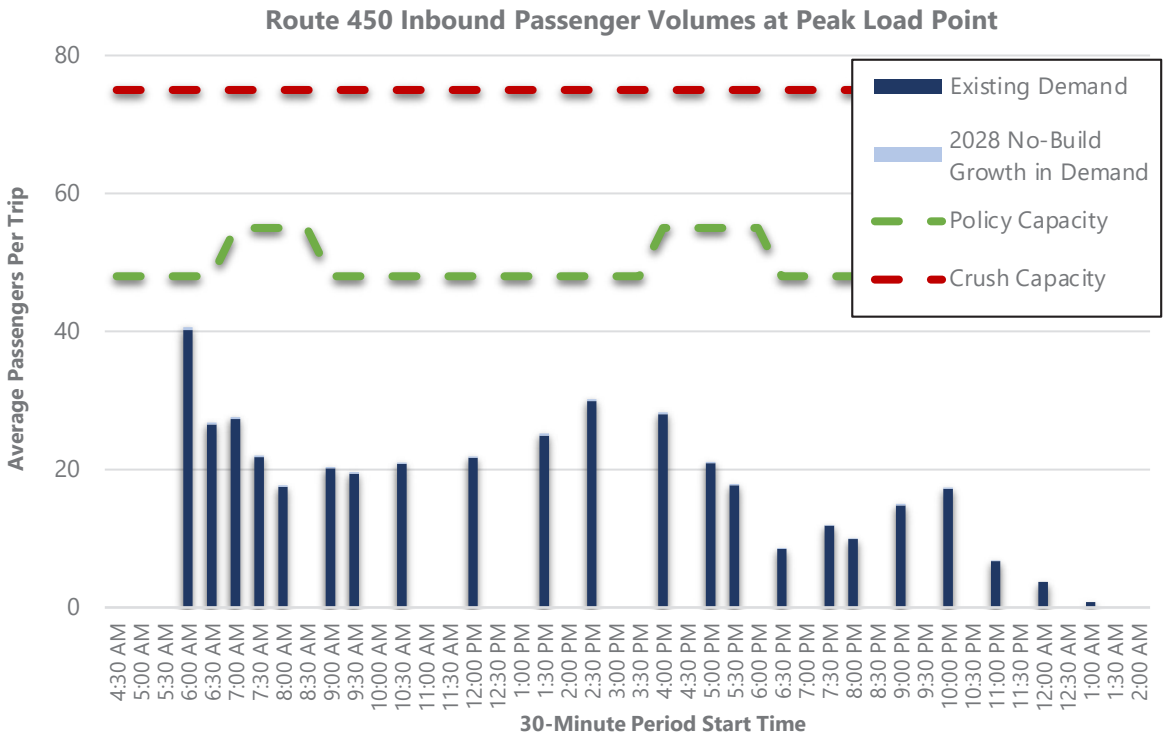
Existing Conditions Data Source: MBTA, Route 449 Ridership Data, Fall 2017.

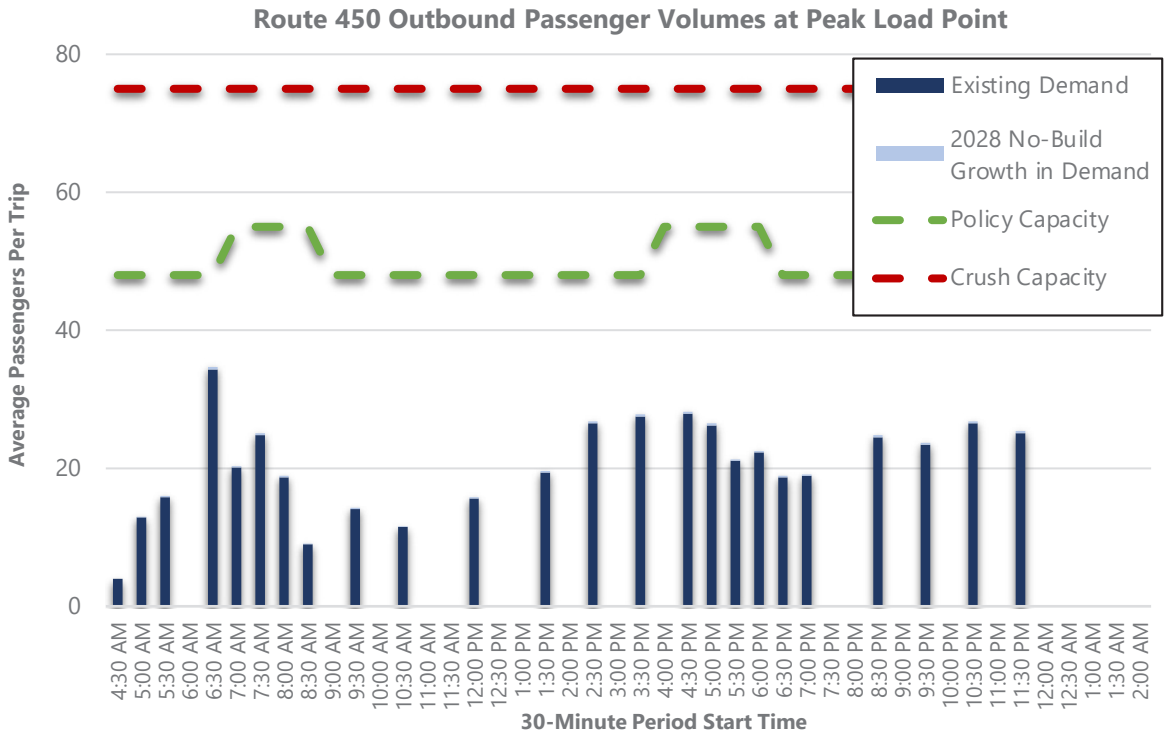
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 449 ridership).

Figure 6.34

2028 No-Build Condition
MBTA Route 449 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





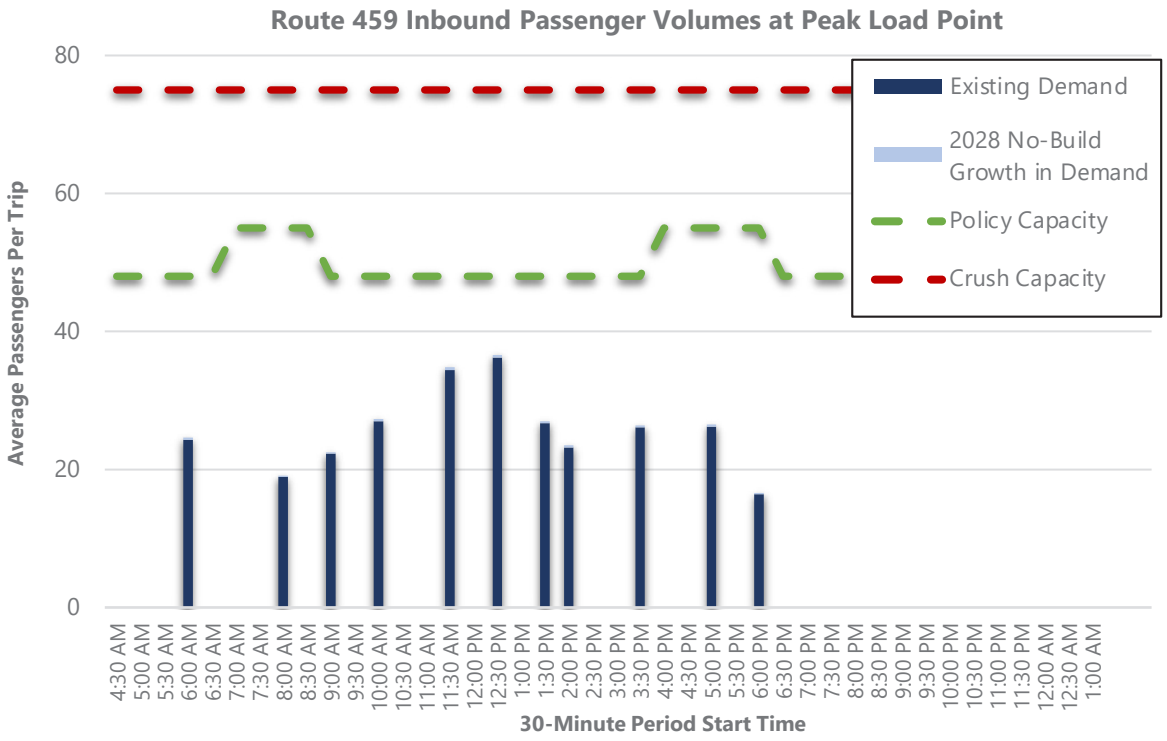
Existing Conditions Data Source: MBTA, Route 450 Ridership Data, Fall 2017.

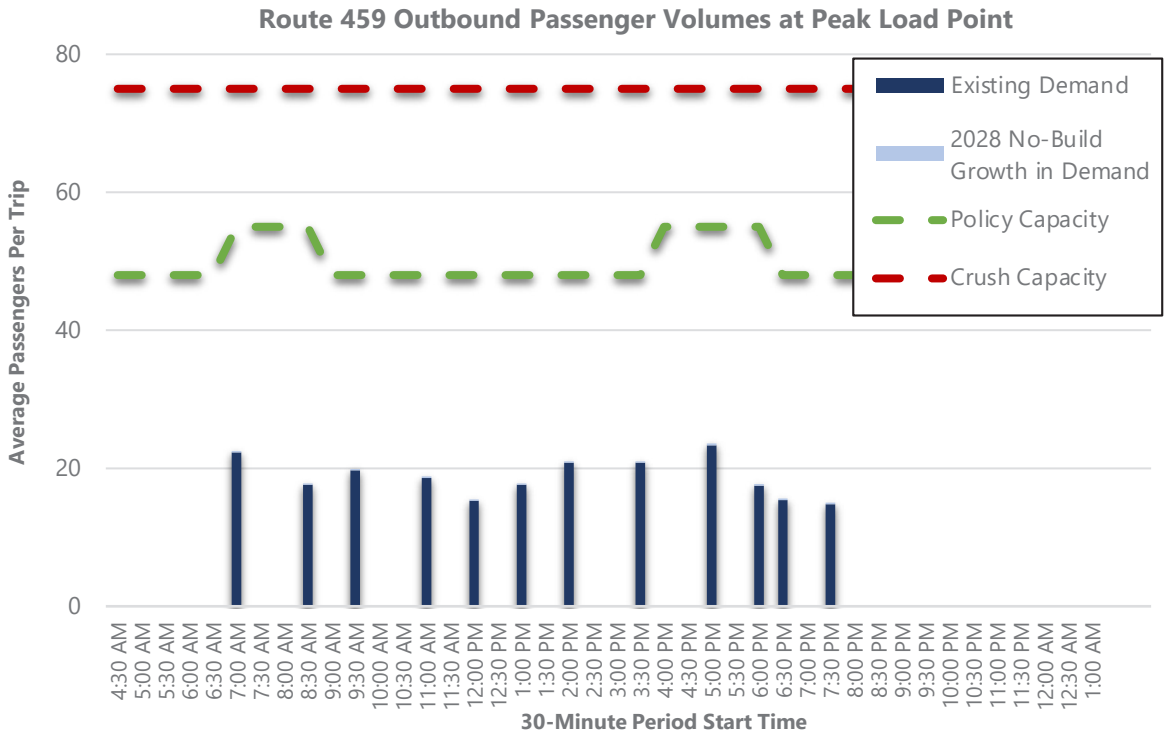
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 450 ridership).

Figure 6.35

2028 No-Build Condition
MBTA Route 450 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 459 Ridership Data, Fall 2017.

No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (0.1% average annual growth rate for MBTA Route 459 ridership).

Figure 6.36

2028 No-Build Condition
MBTA Route 459 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

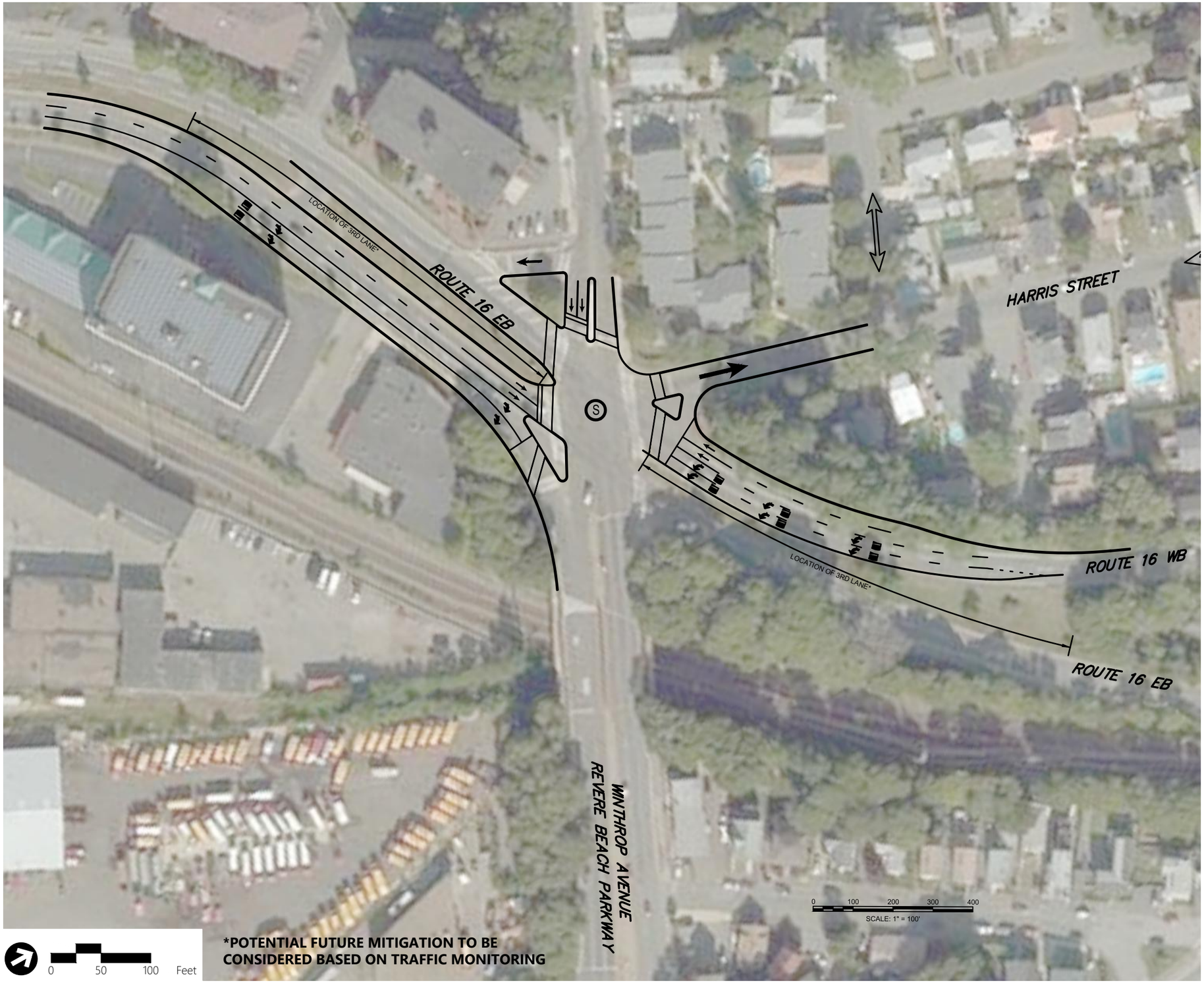


Figure 6.37

2038 Conceptual Roadway Improvement
Revere Beach Parkway at Winthrop Avenue/Harris

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

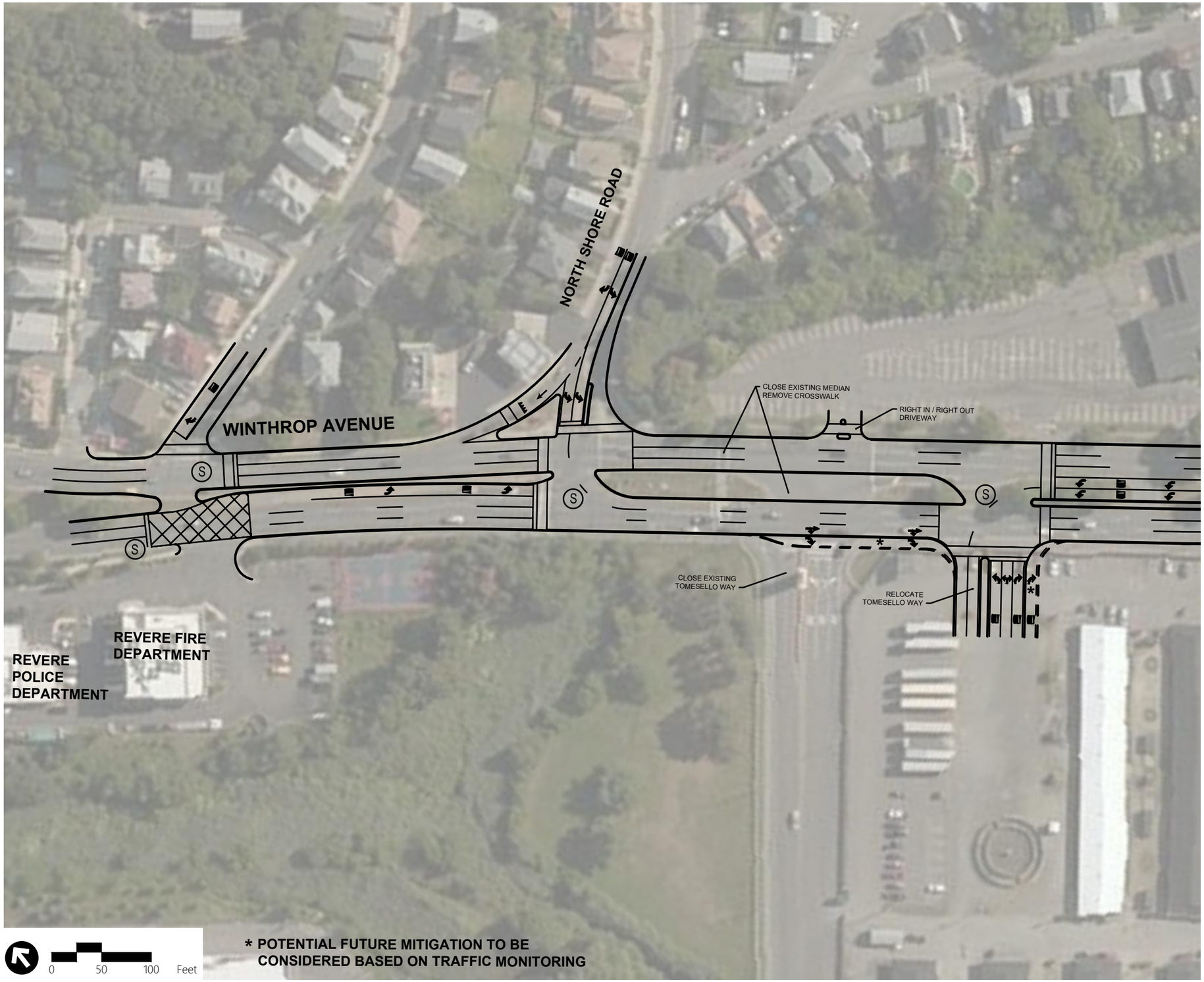


Figure 6.38

Conceptual Roadway Improvement
Winthrop Avenue at N. Shore Road and Tomasello Drive

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

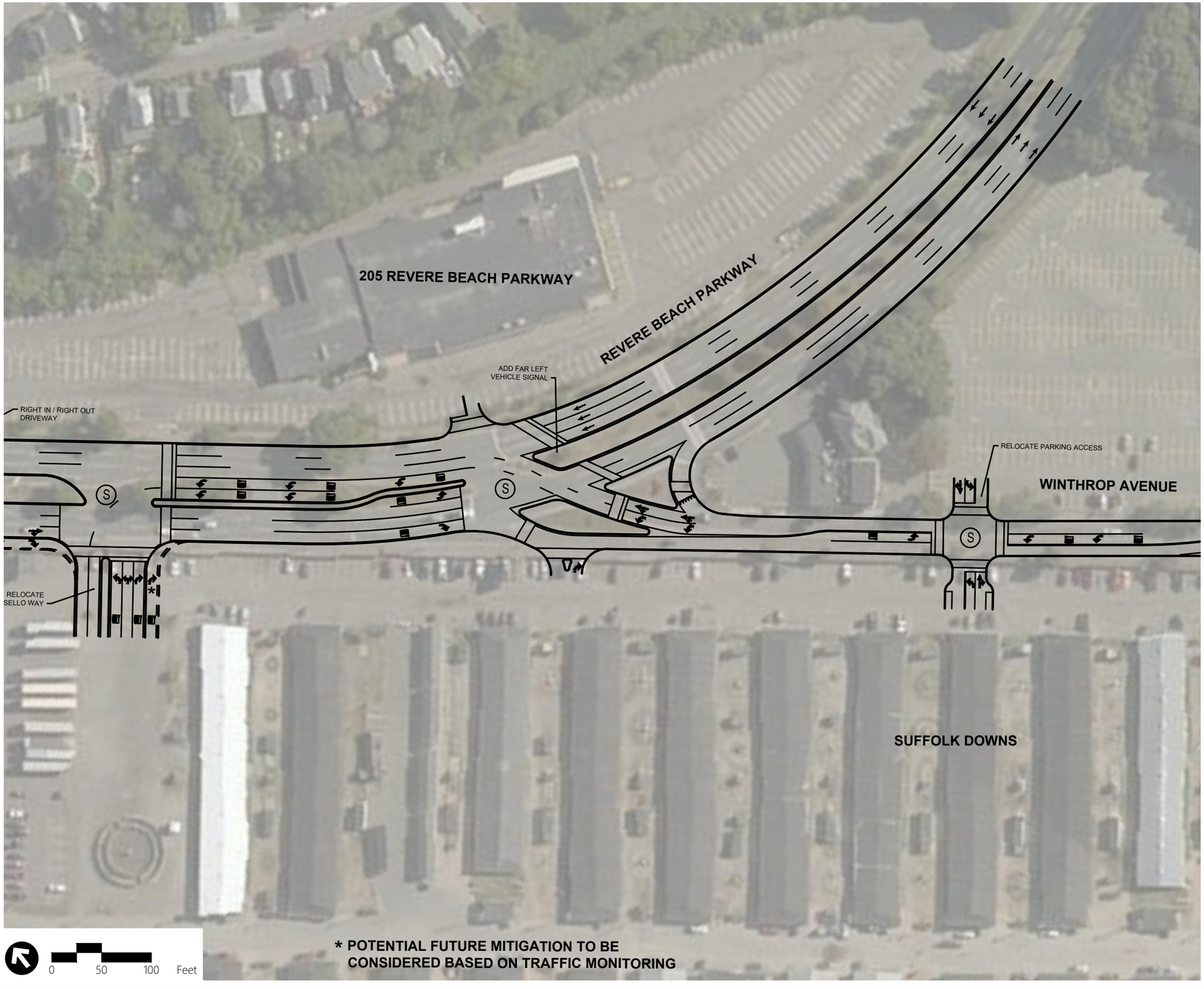


Figure 6.39

Conceptual Roadway Improvement
Winthrop Avenue at RBP and Beachmont Station Driveway

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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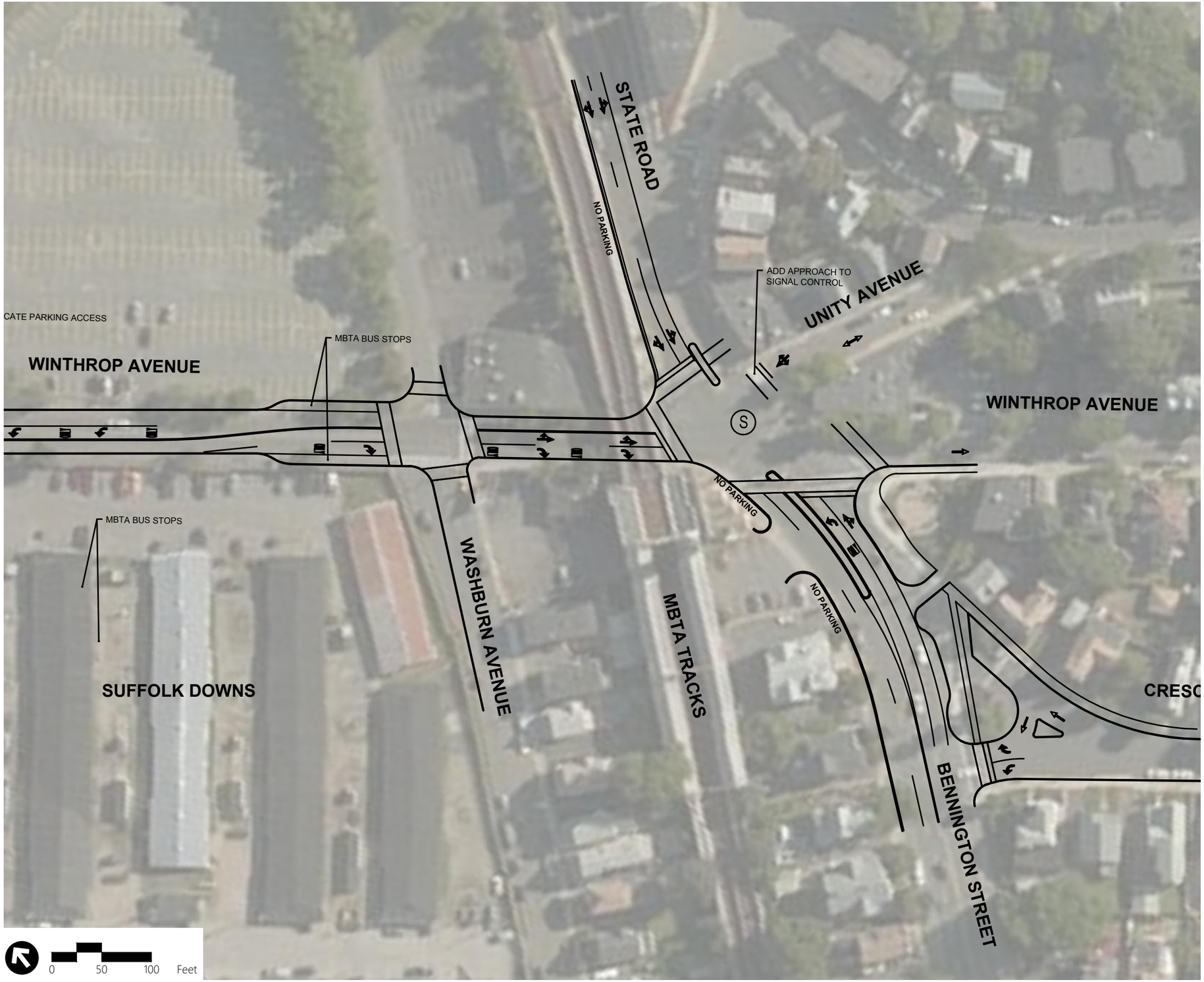


Figure 6.40

Conceptual Roadway Improvement
Winthrop Avenue at Bennington St. and State Road

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

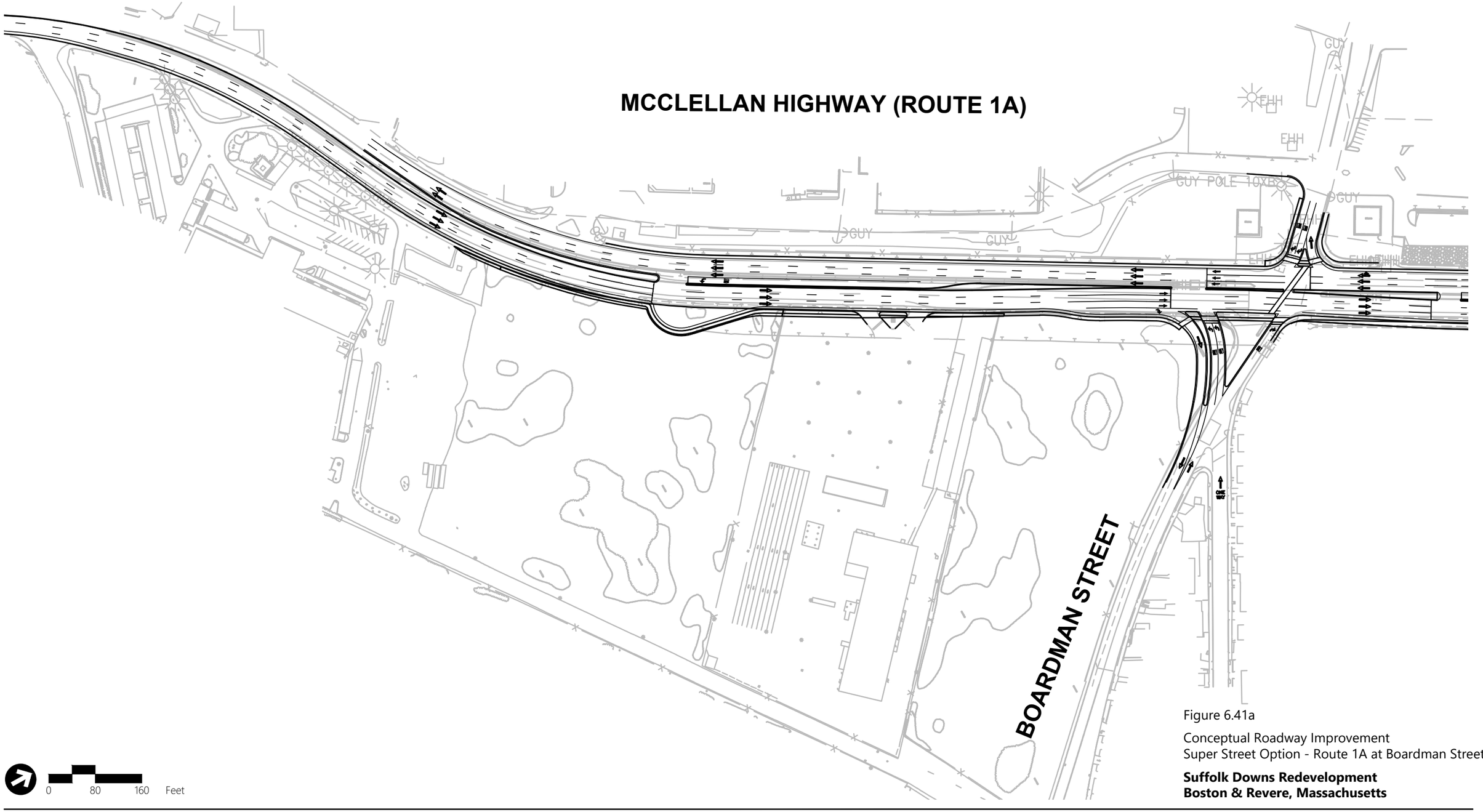


Figure 6.41a

Conceptual Roadway Improvement
Super Street Option - Route 1A at Boardman Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

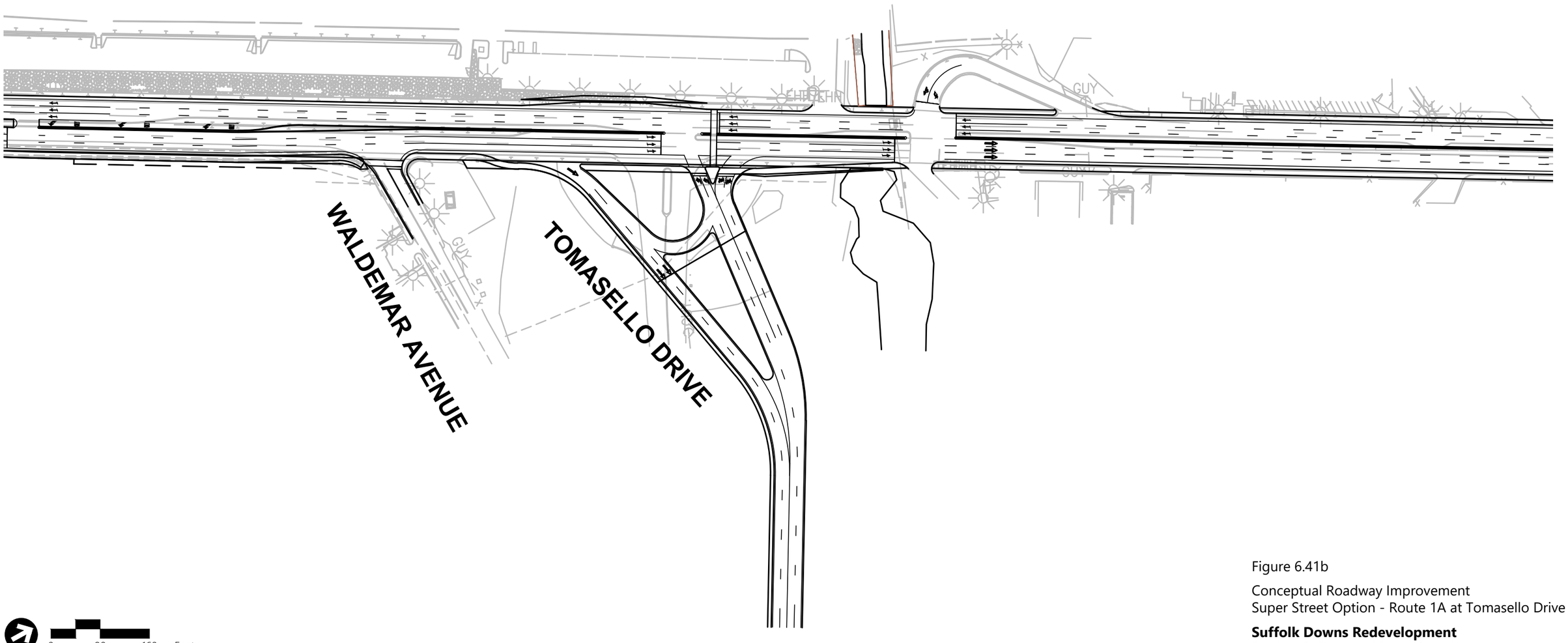


Figure 6.41b

Conceptual Roadway Improvement
Super Street Option - Route 1A at Tomasello Drive

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

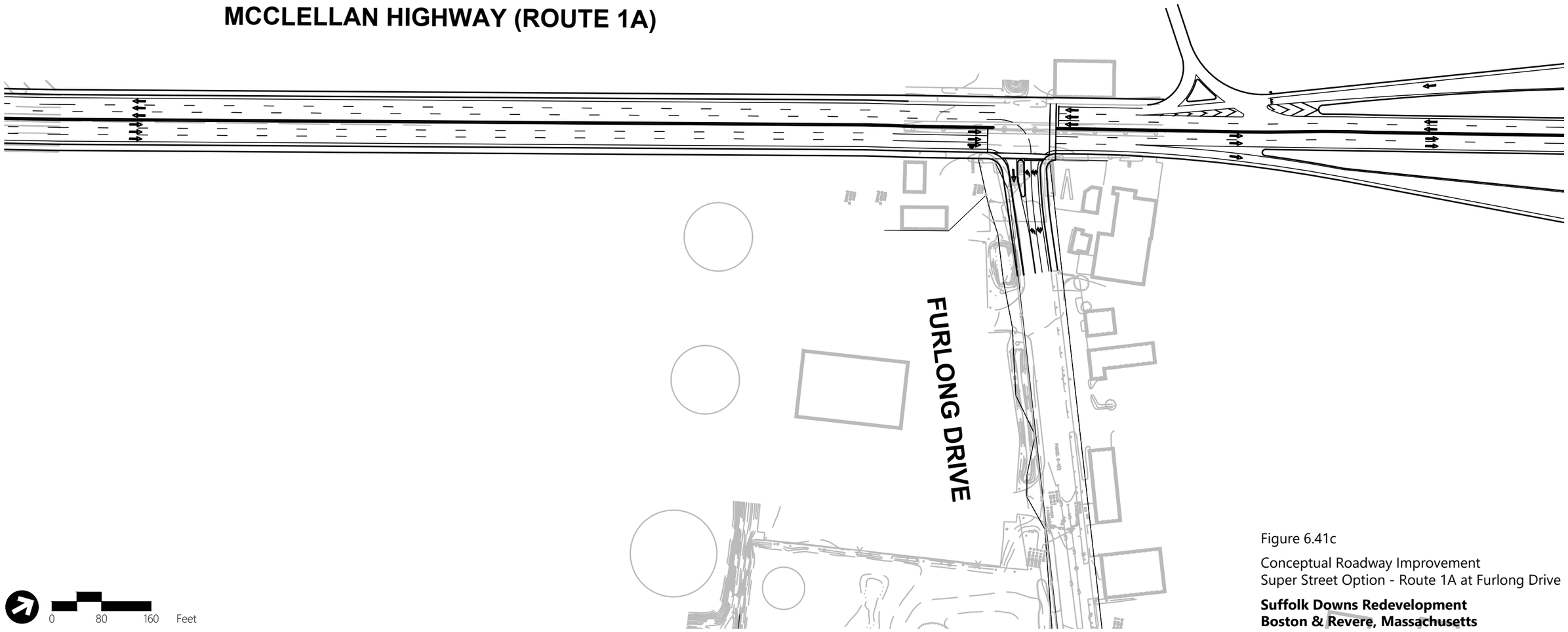


Figure 6.41c

Conceptual Roadway Improvement
Super Street Option - Route 1A at Furlong Drive

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

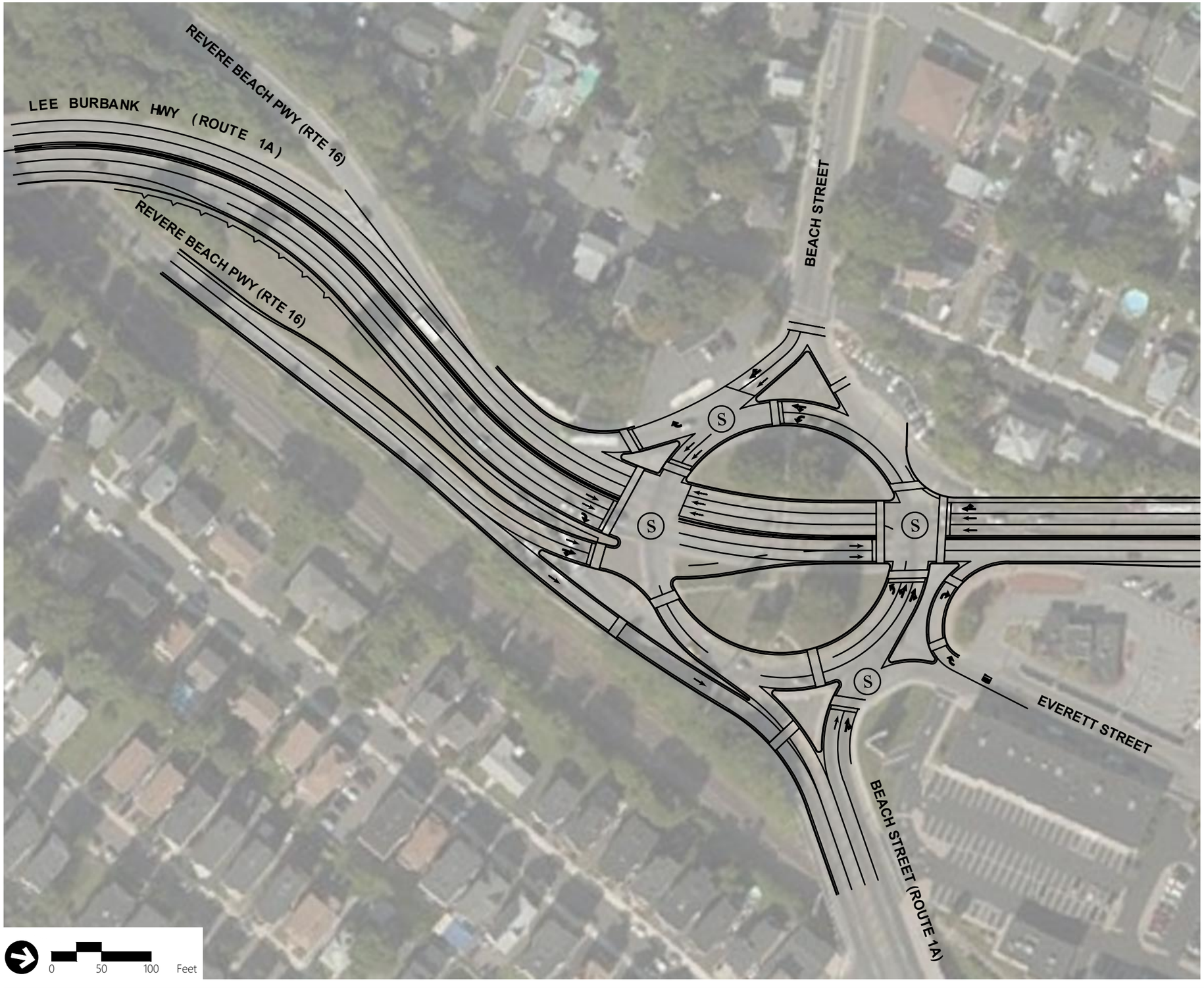


Figure 6.42a

Conceptual Roadway Improvement
Bell Circle

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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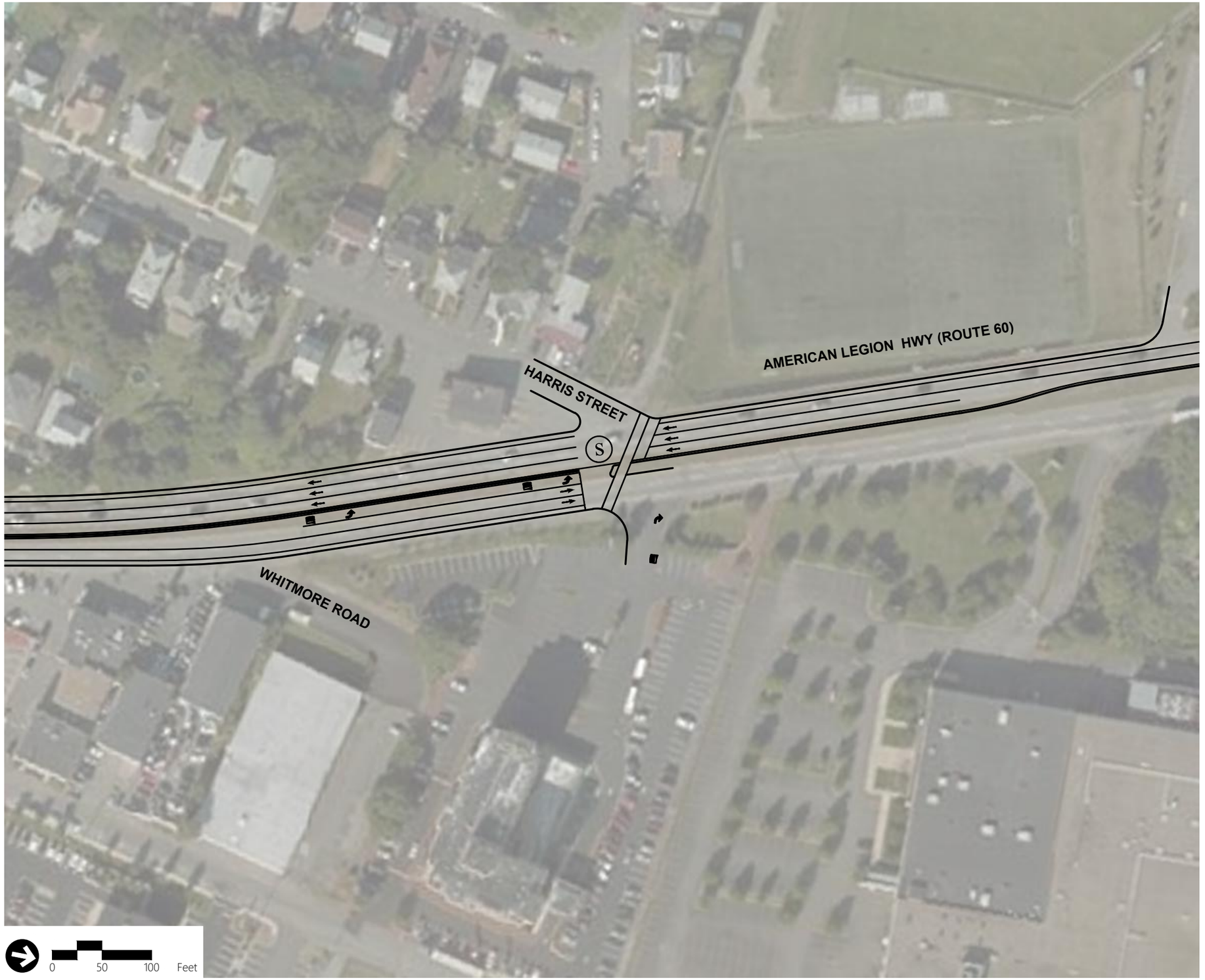
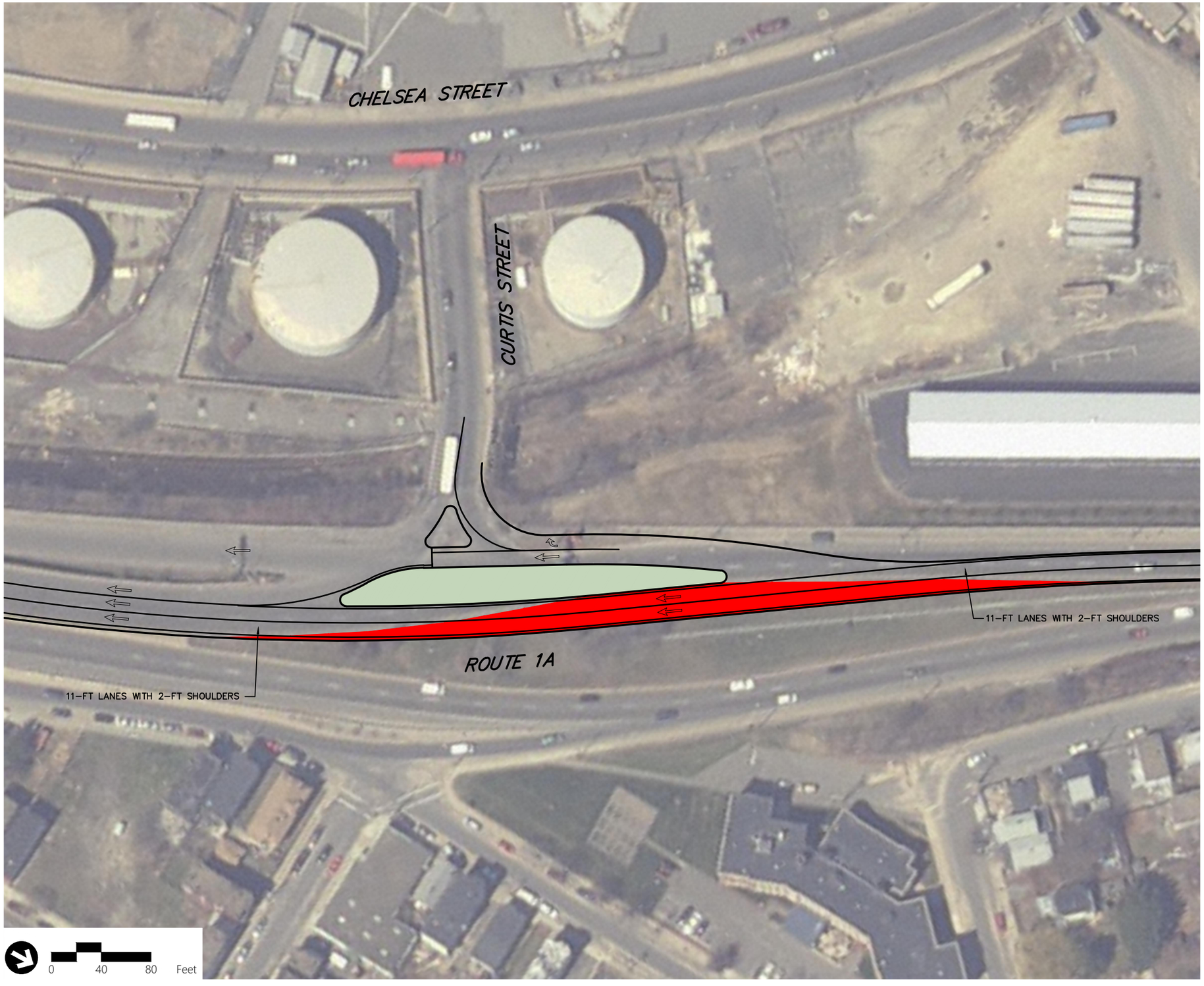


Figure 6.42b

Conceptual Roadway Improvement
Bell Circle

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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New Pavement

New Landscaped Area

Figure 6.43

Conceptual Roadway Improvement
Route 1A at Curtis Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

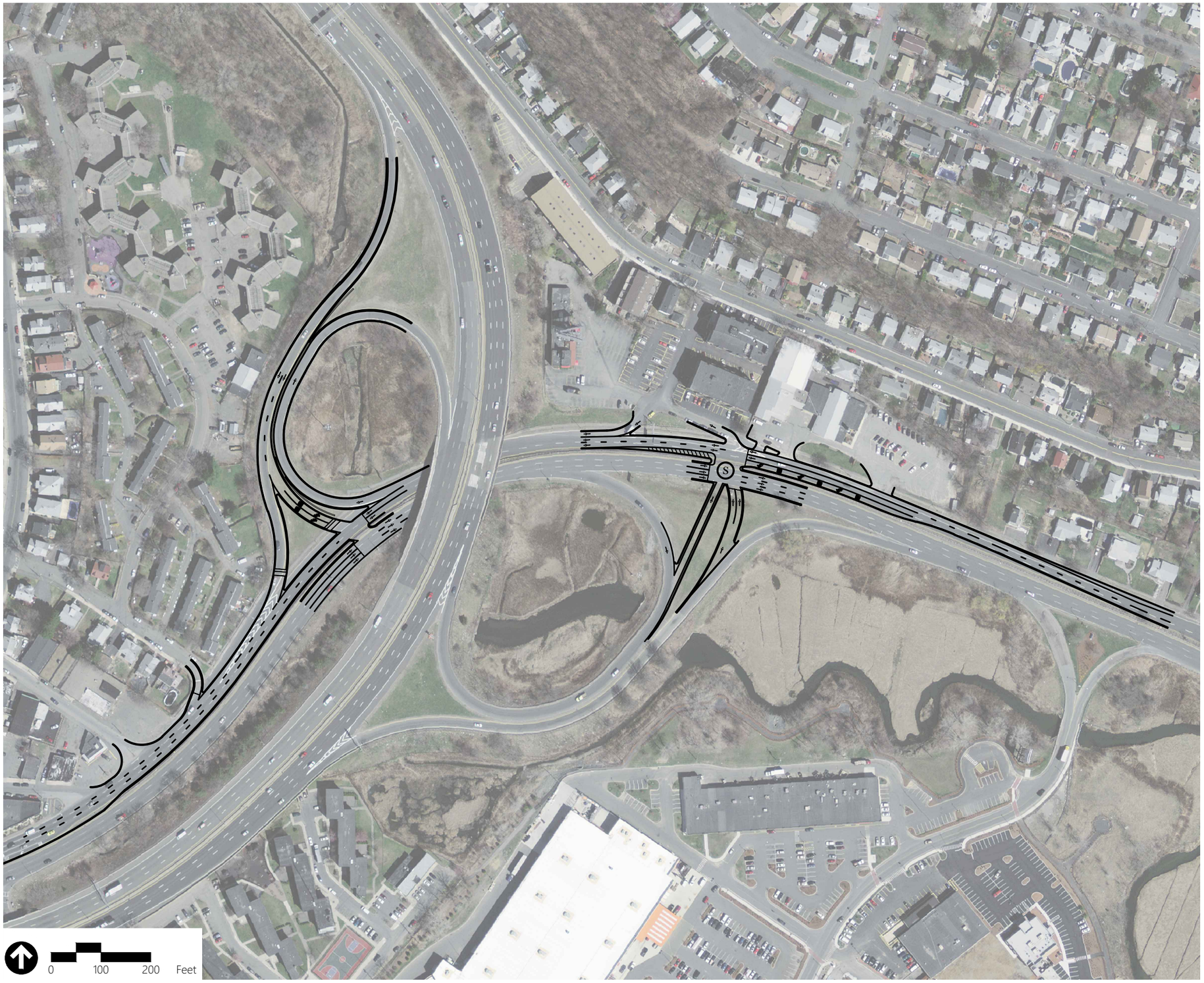


Figure 6.44

Conceptual Roadway Improvement
Route 16 at Route 1 Interchange

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

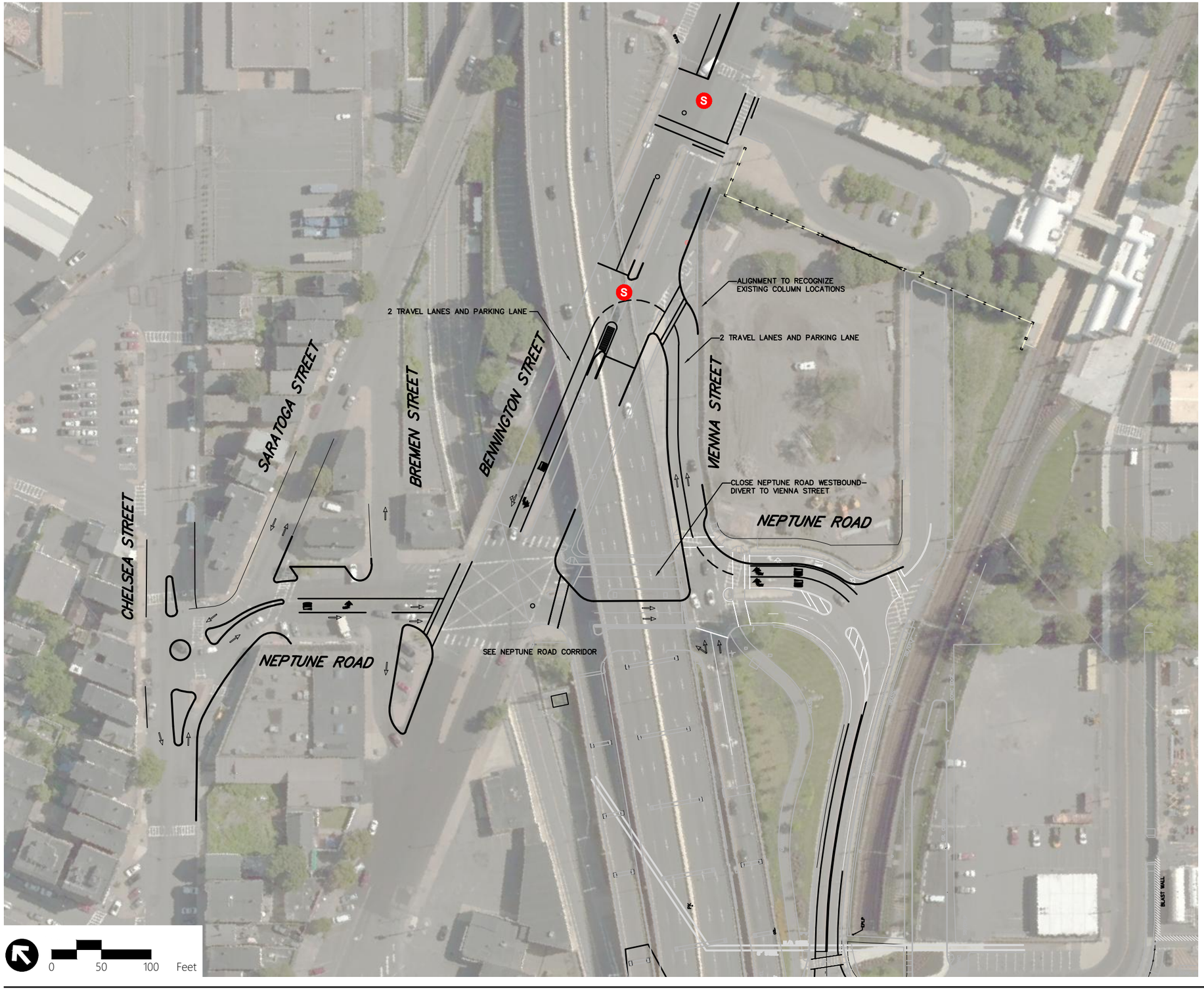
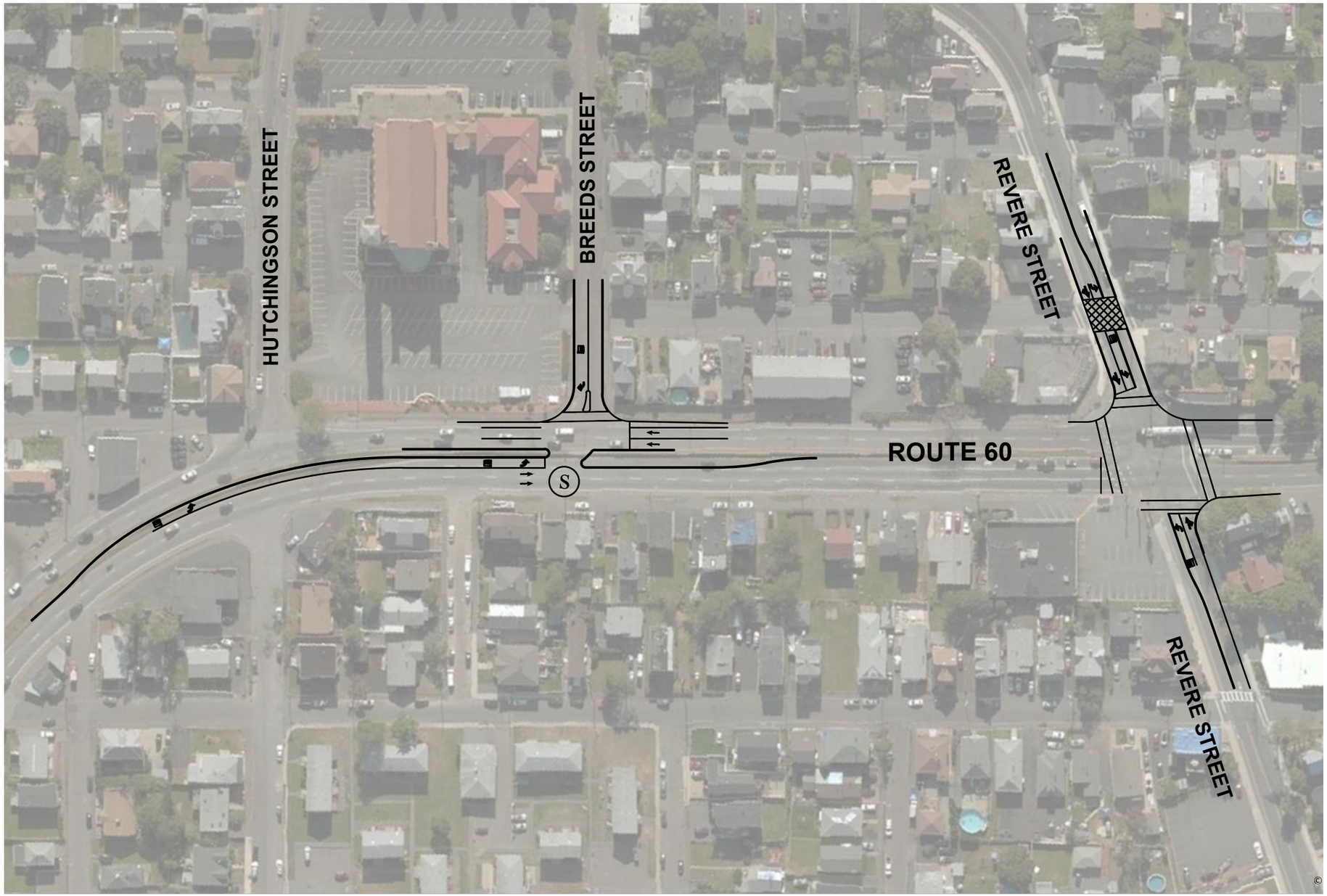


Figure 6.45

Conceptual Roadway Improvement
Neptune Road and Bennington Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

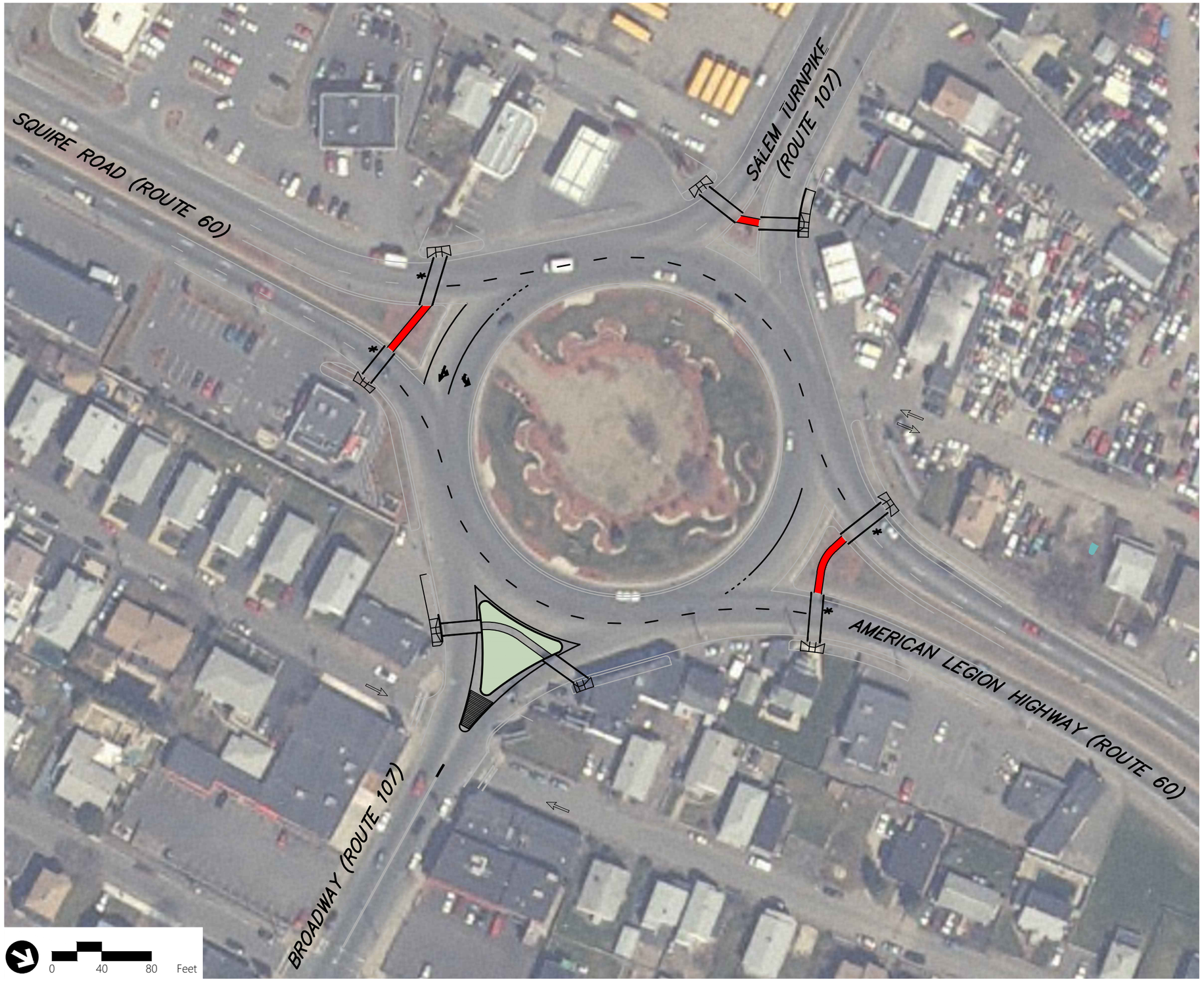


0 60 120 Feet

Figure 6.46

Conceptual Roadway Improvement
Route 60 at Revere Street and Breeds Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



New Pavement

New Landscaped Area

Figure 6.47

Conceptual Roadway Improvement
Brown Circle

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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Figure 6.48

Conceptual Roadway Improvement
Route 1A (N. Shore Road) at Revere Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

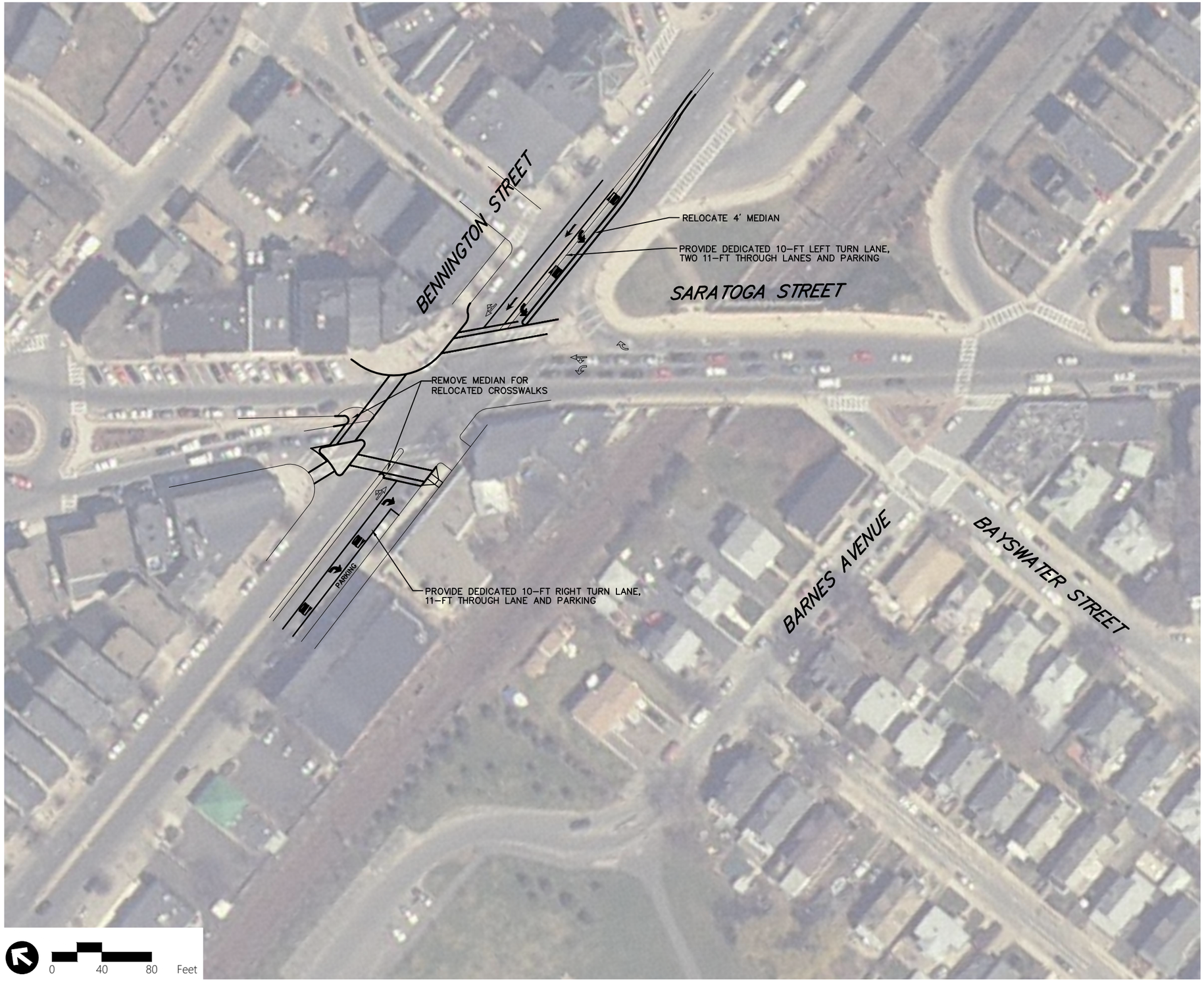
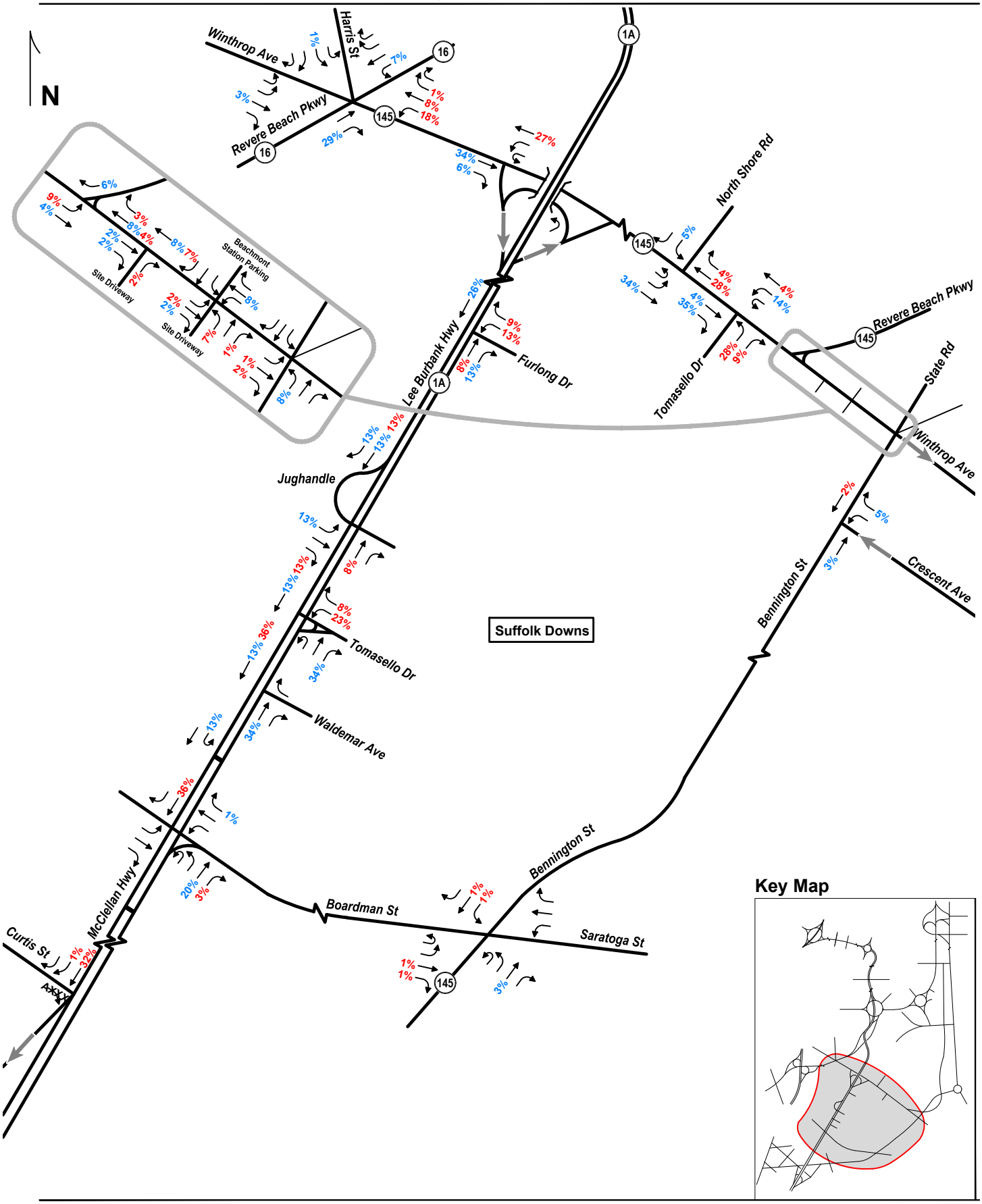


Figure 6.49

Conceptual Roadway Improvement
Bennington Street at Saratoga Street

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

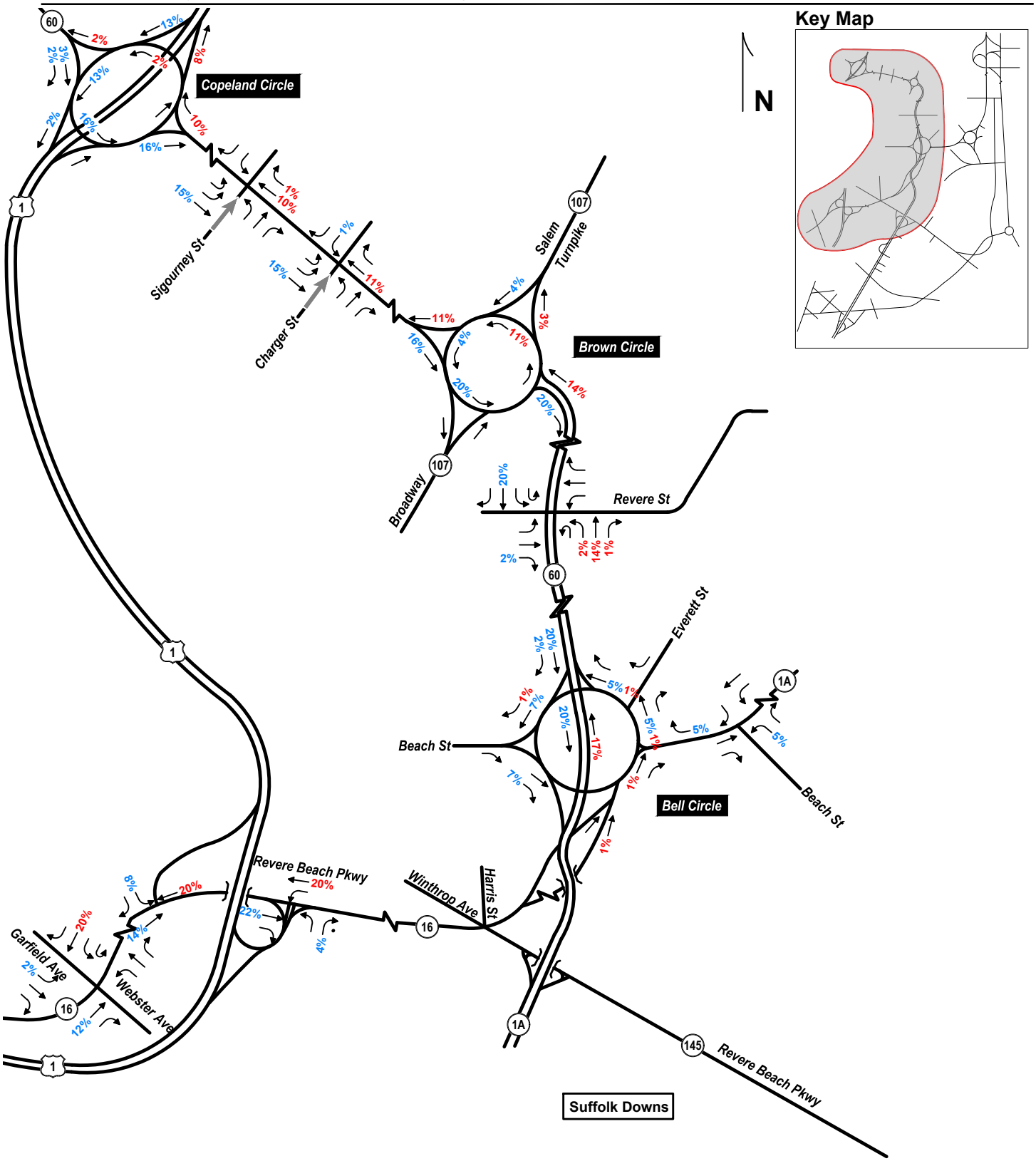


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Figure 6.50a
Morning Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

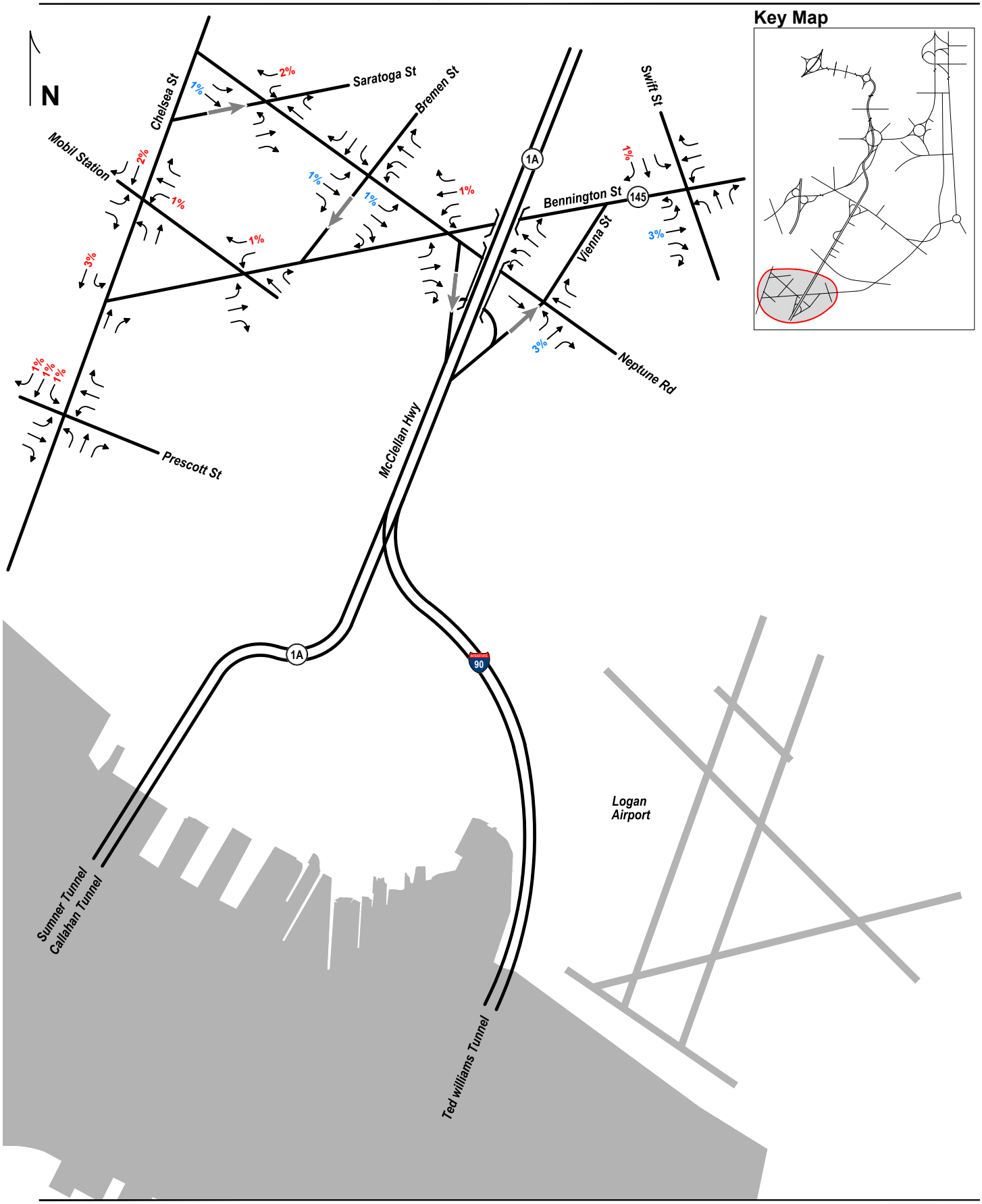


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Figure 6.50b
Morning Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

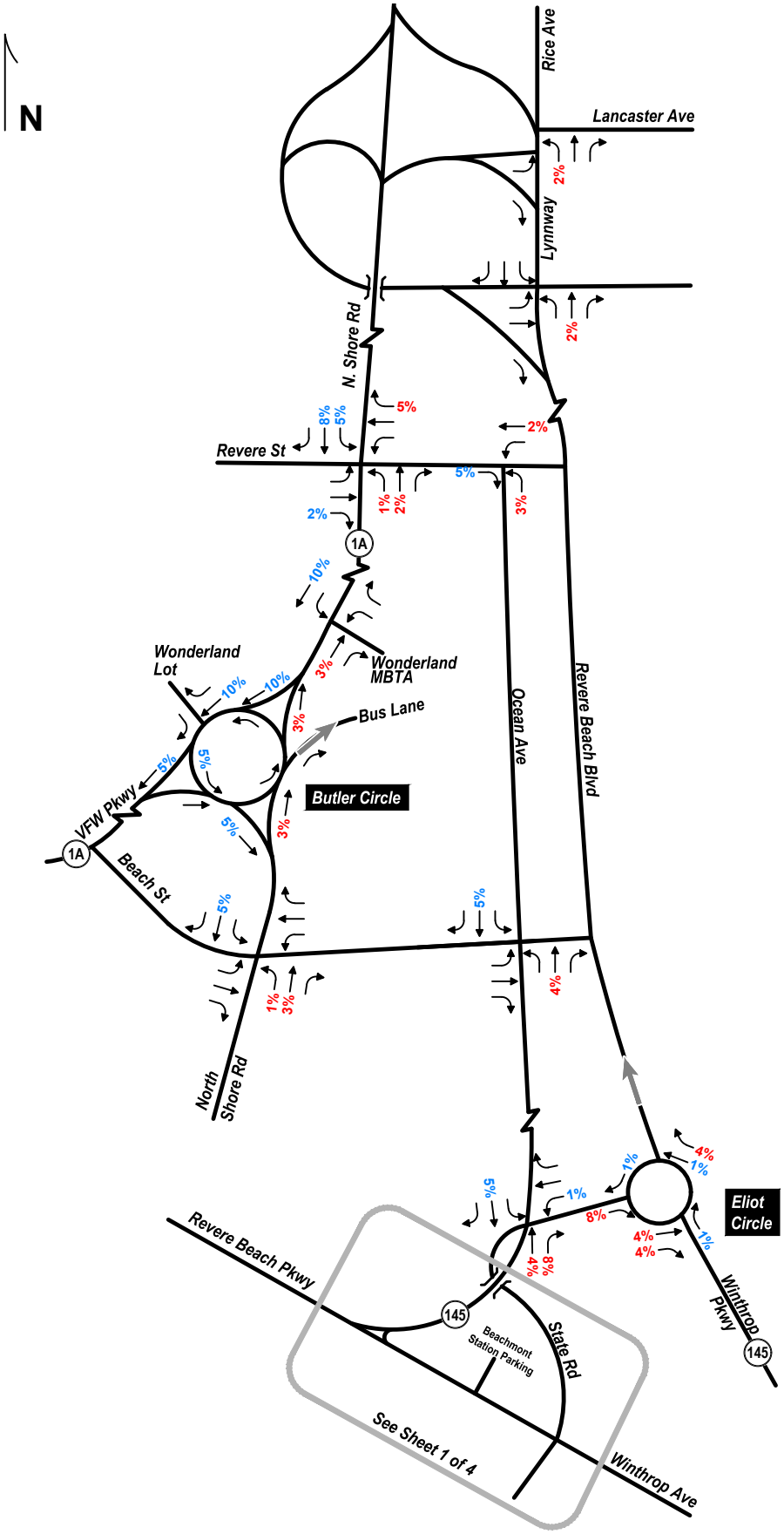


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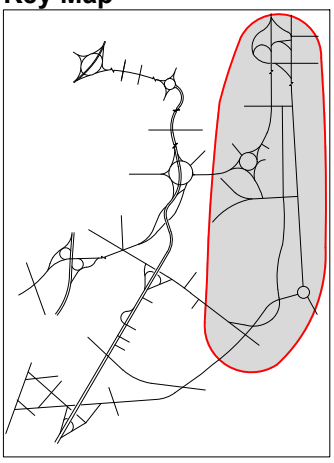
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Figure 6.50c
Morning Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



Key Map

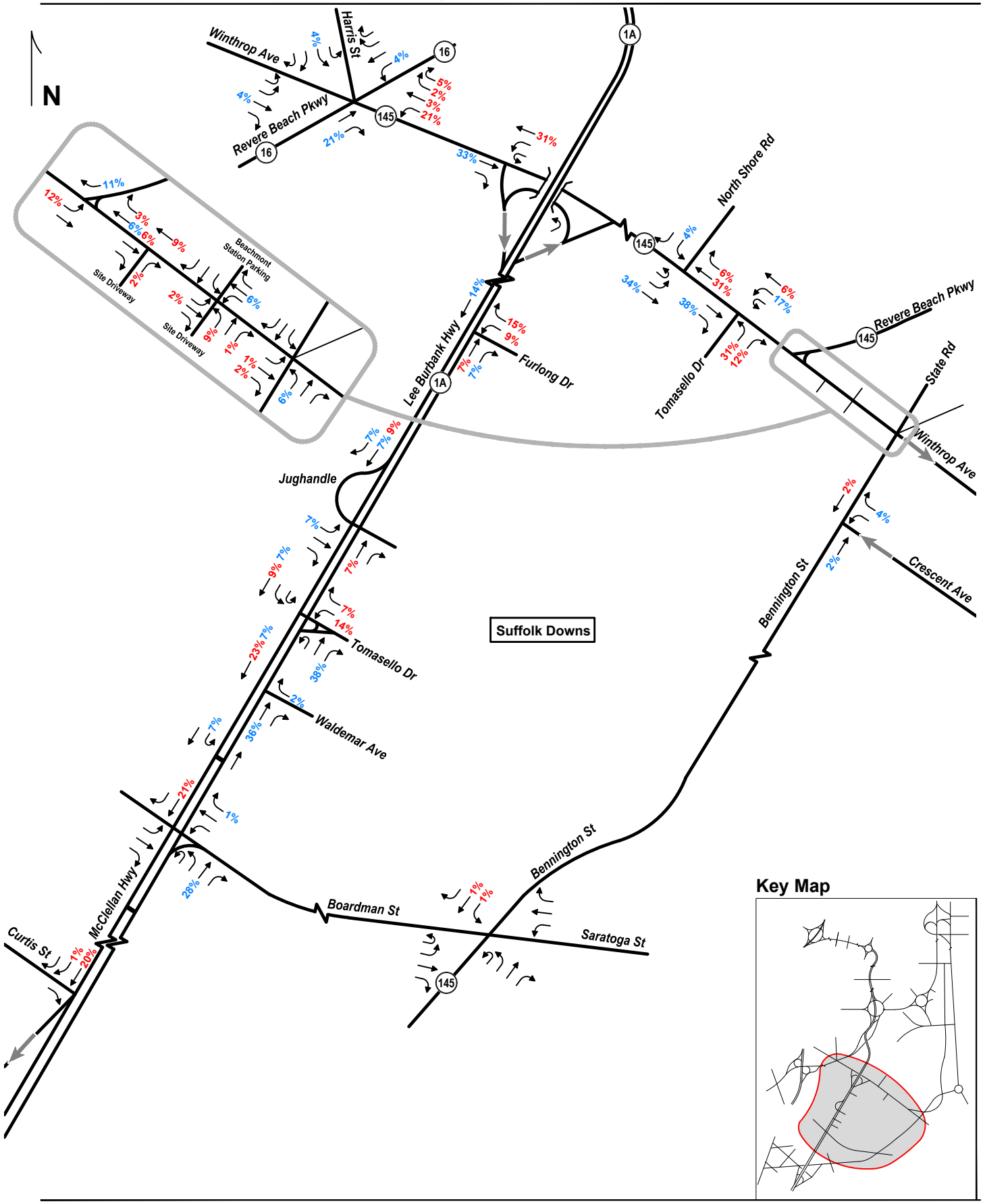


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Figure 6.50d
Morning Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

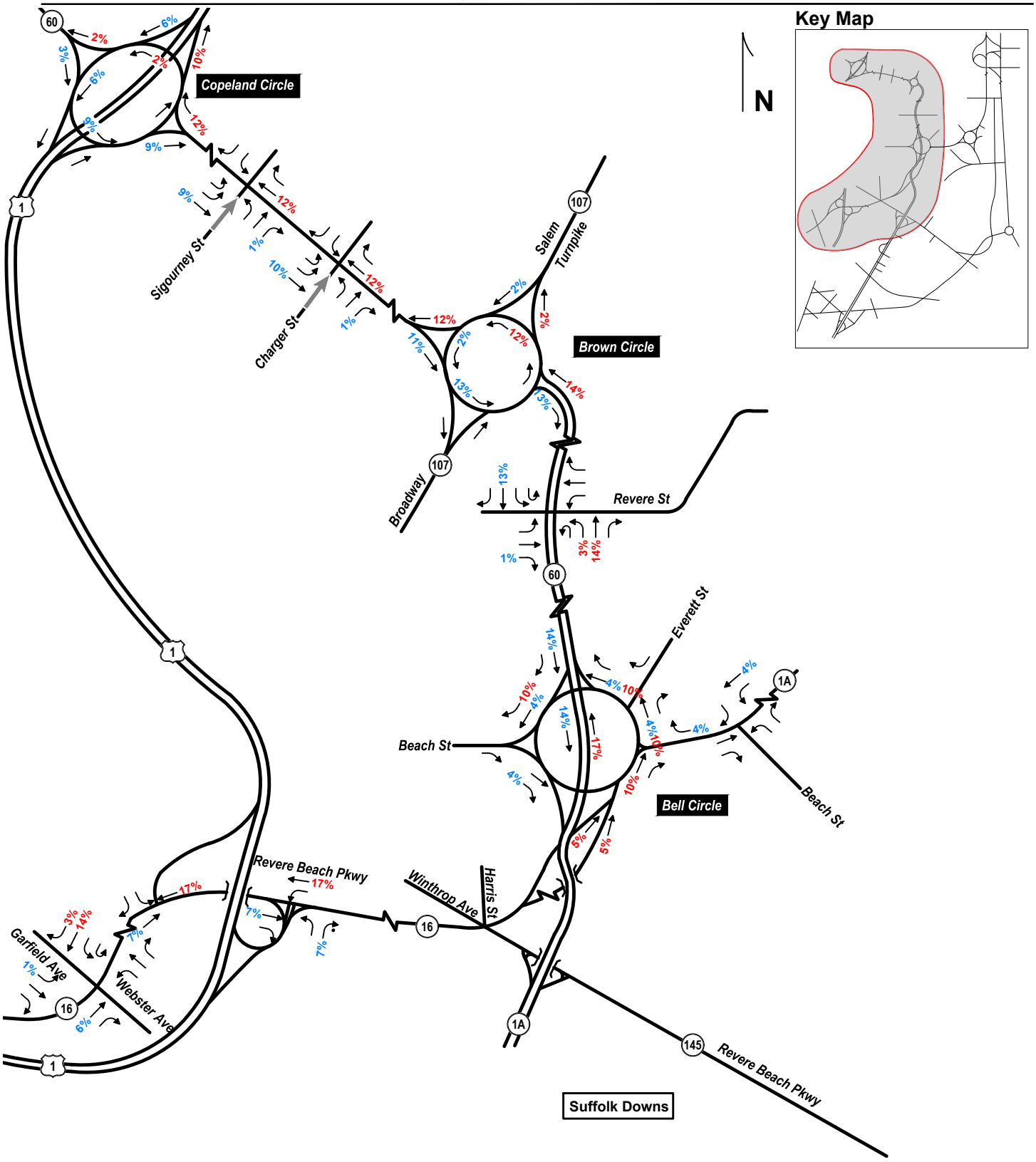


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Figure 6.50e
Evening Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

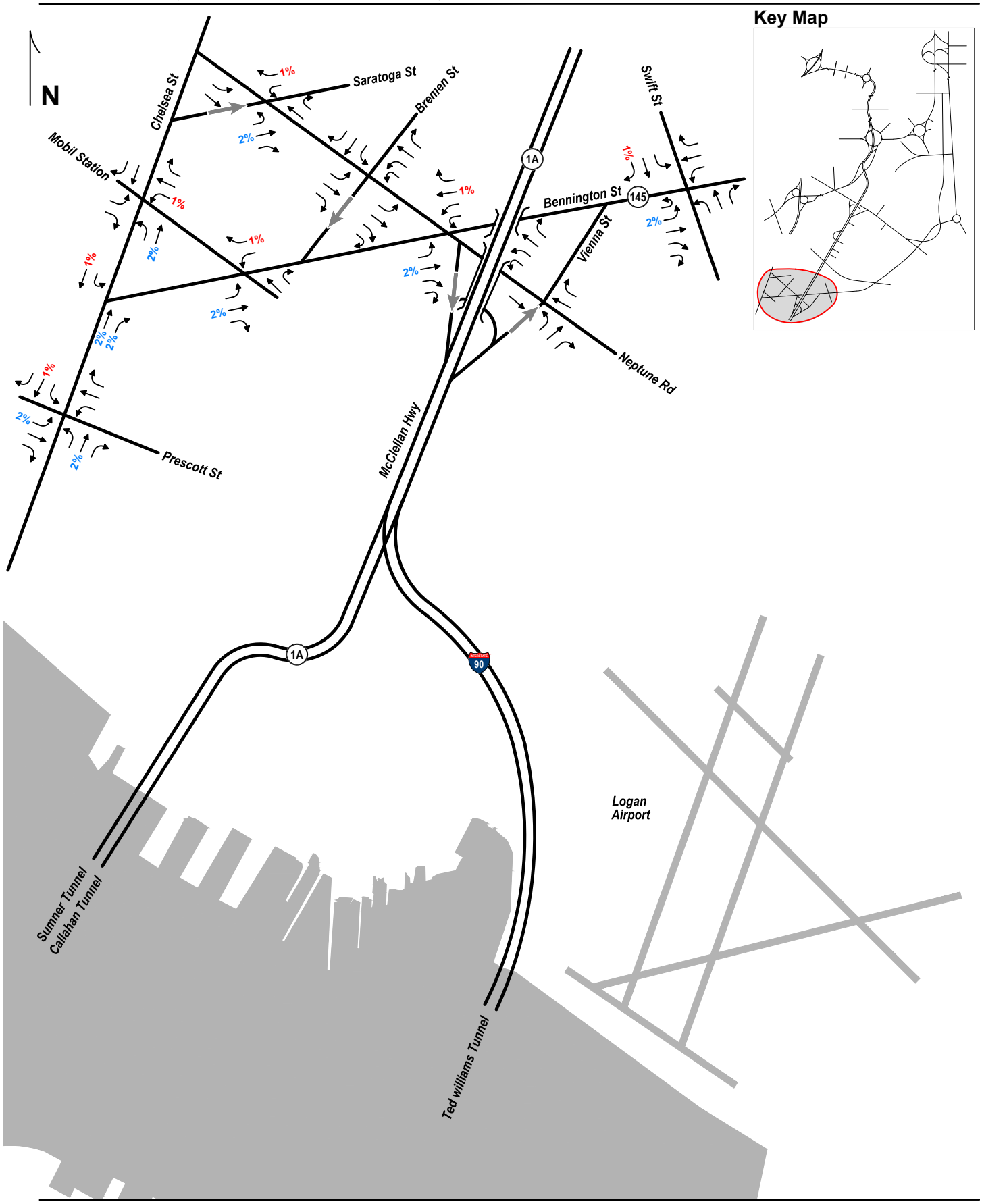


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Figure 6.50f
Evening Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

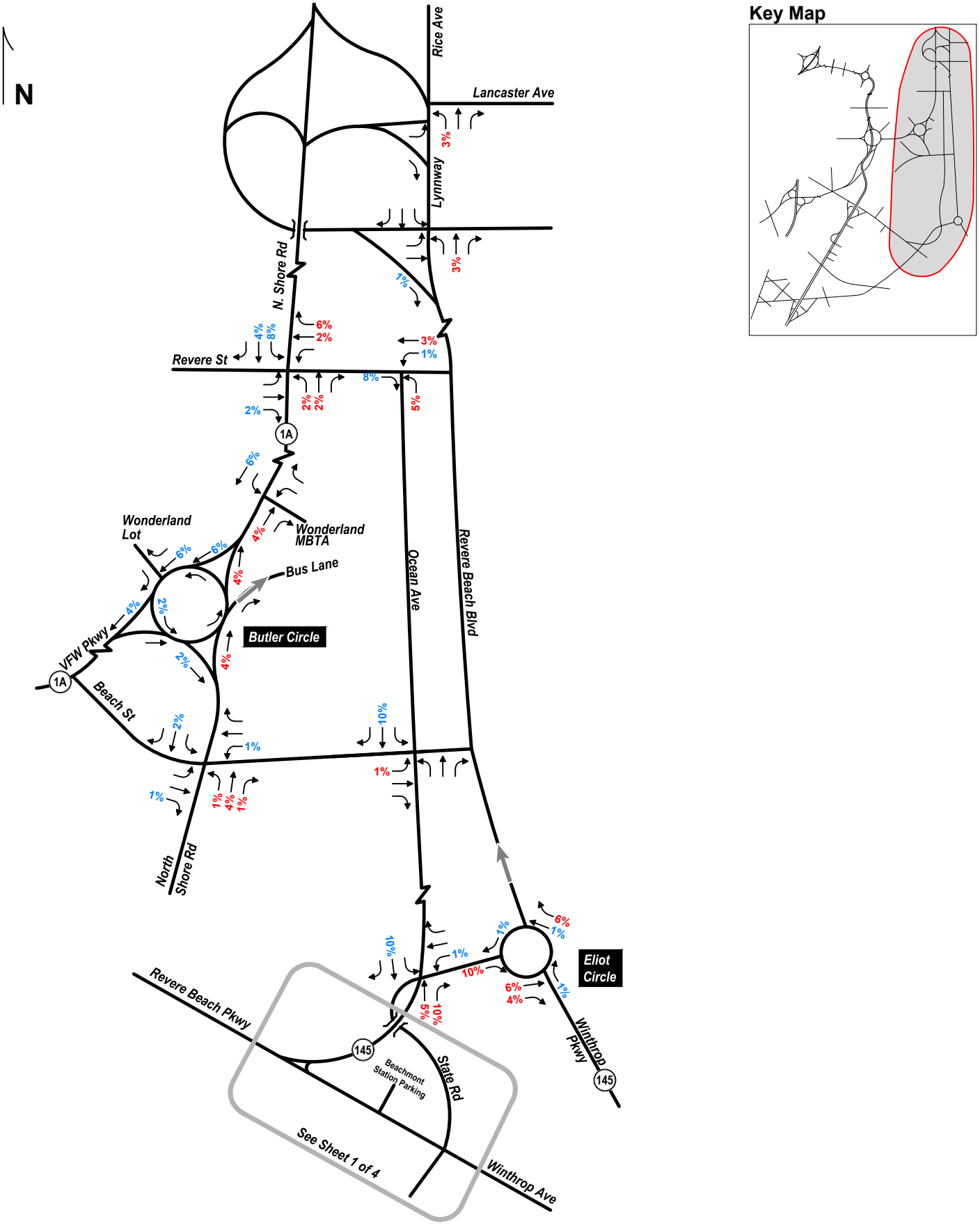


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Figure 6.50g
Evening Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

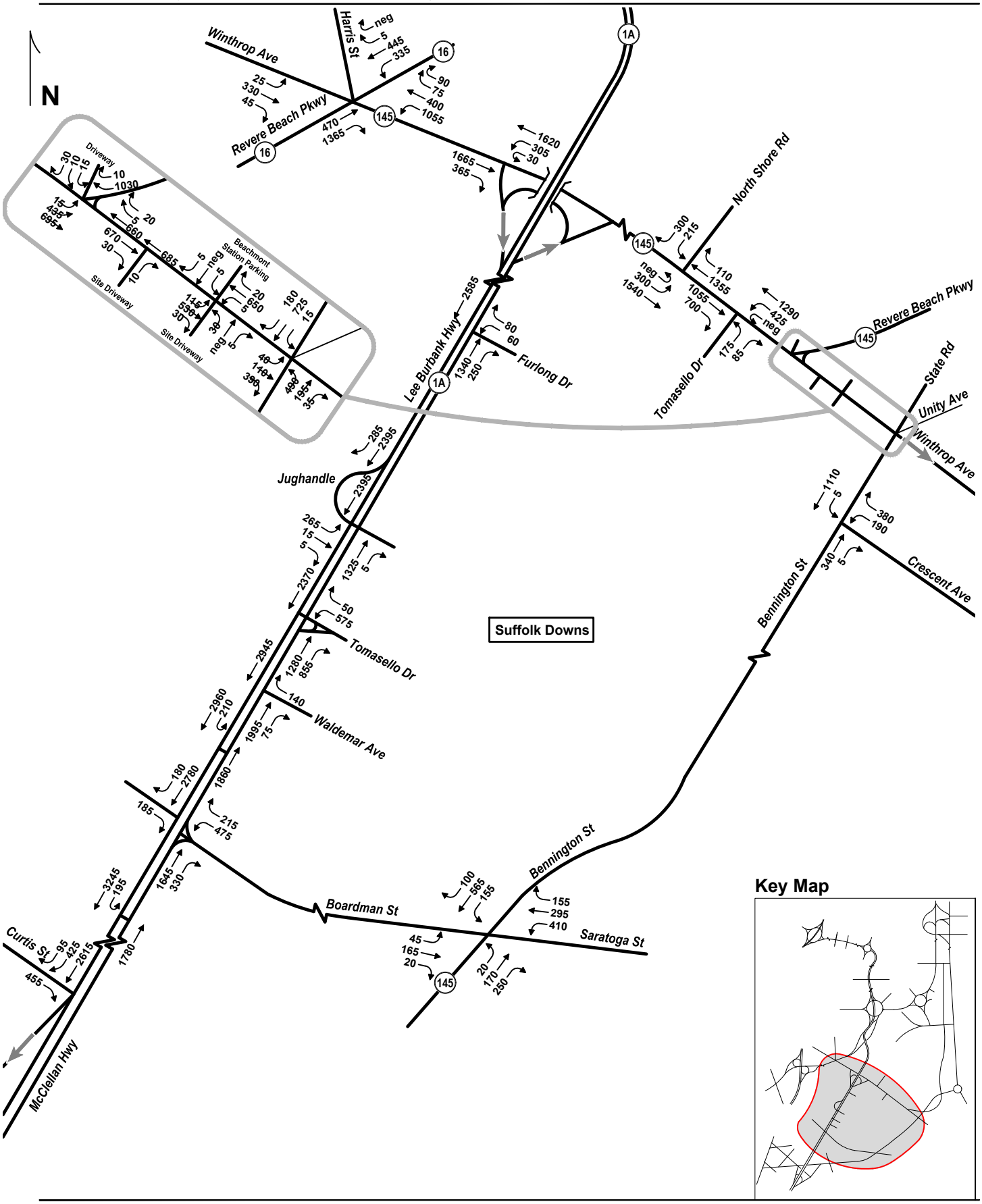


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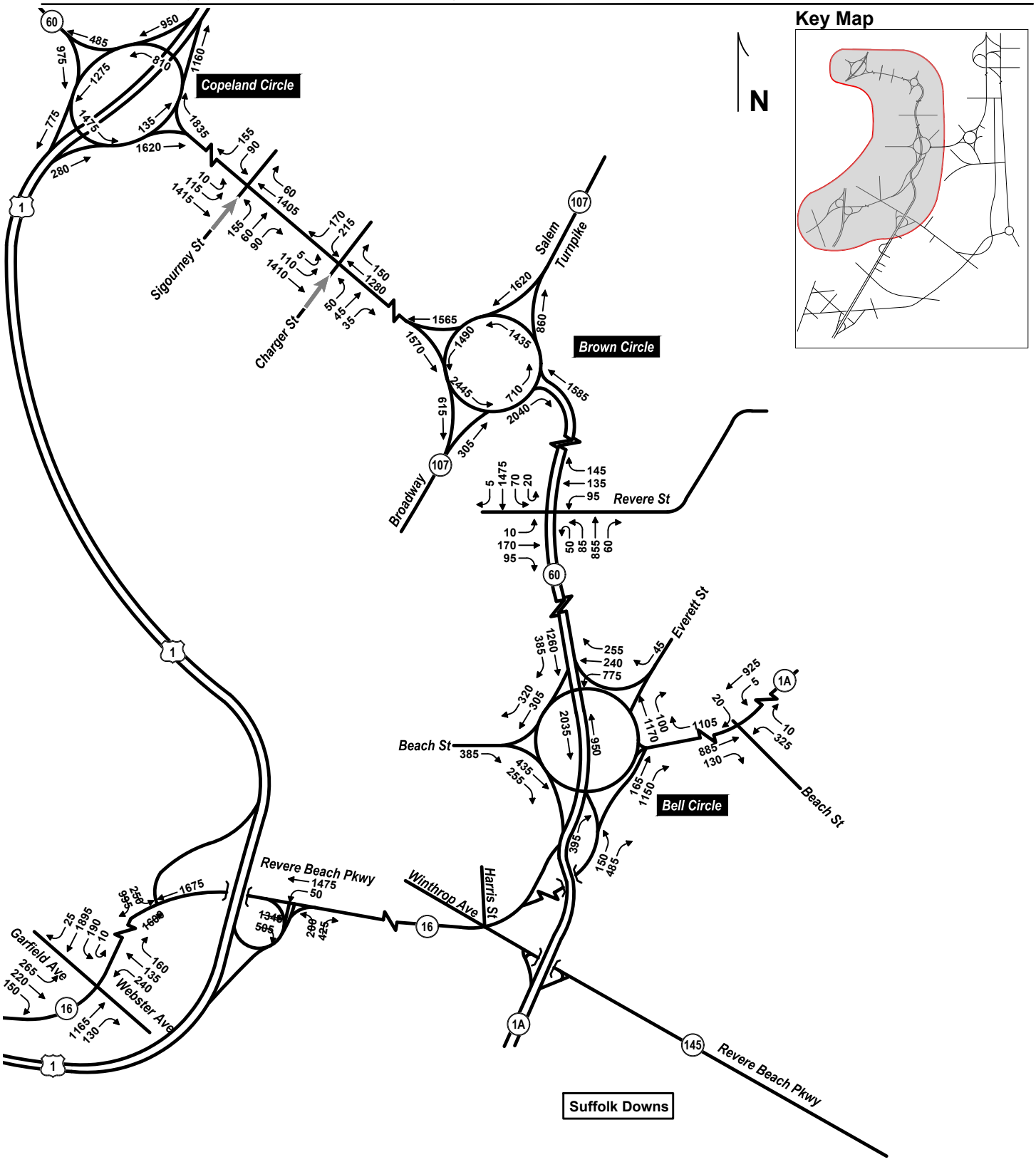
Figure 6.50h
Evening Peak Hour
Trip Distribution - with Mitigation

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



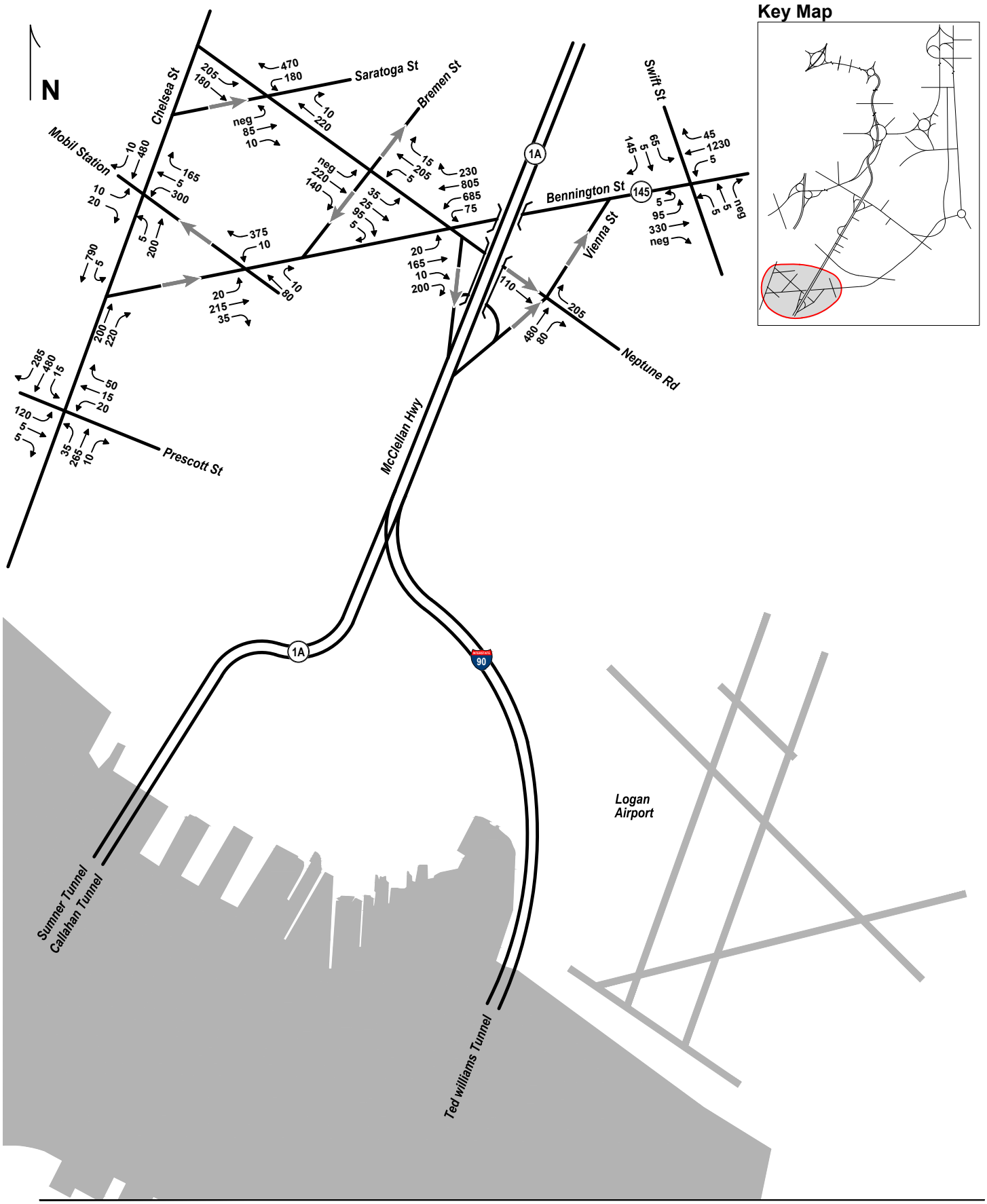
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Figure 6.51a
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



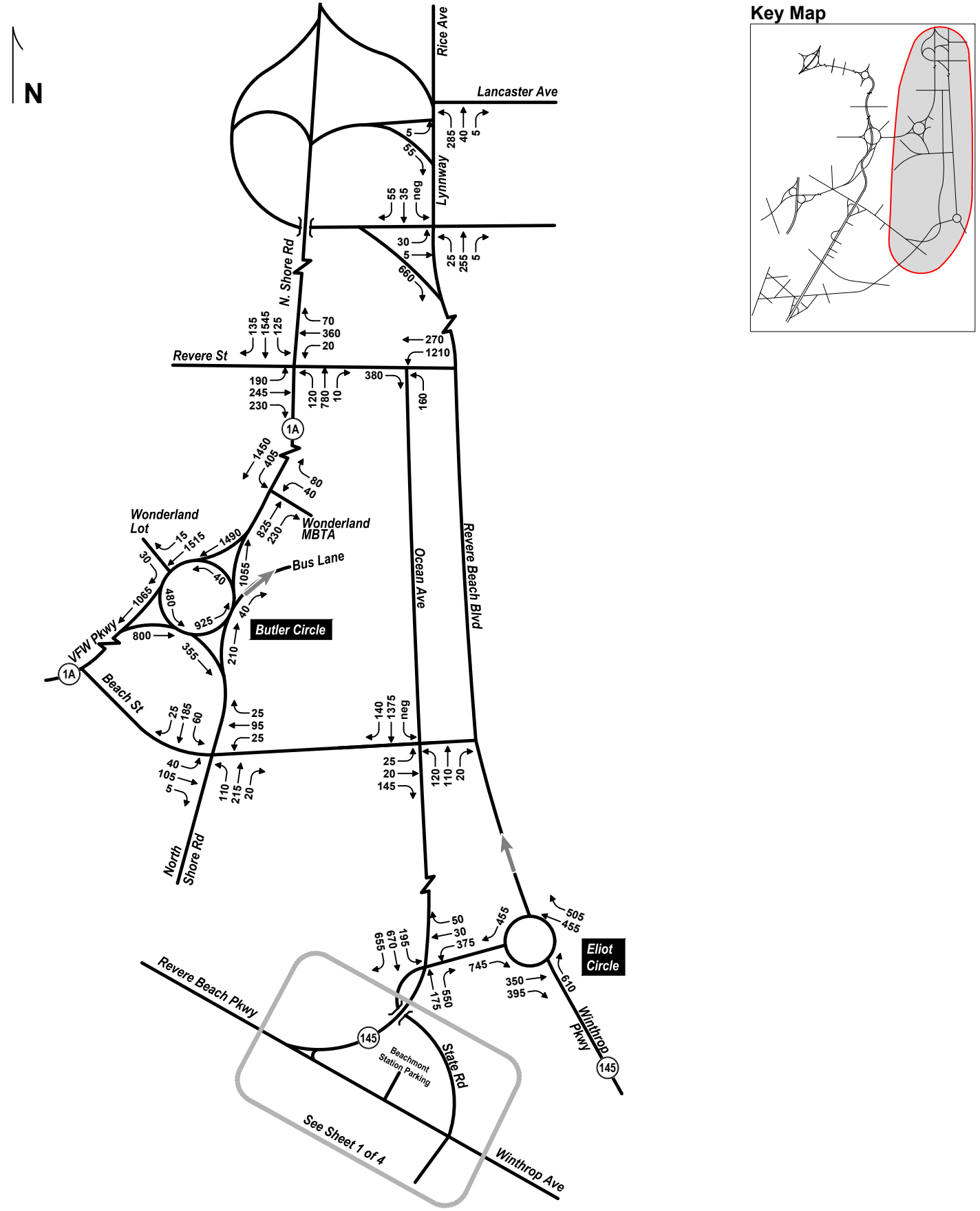
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Figure 6.51b
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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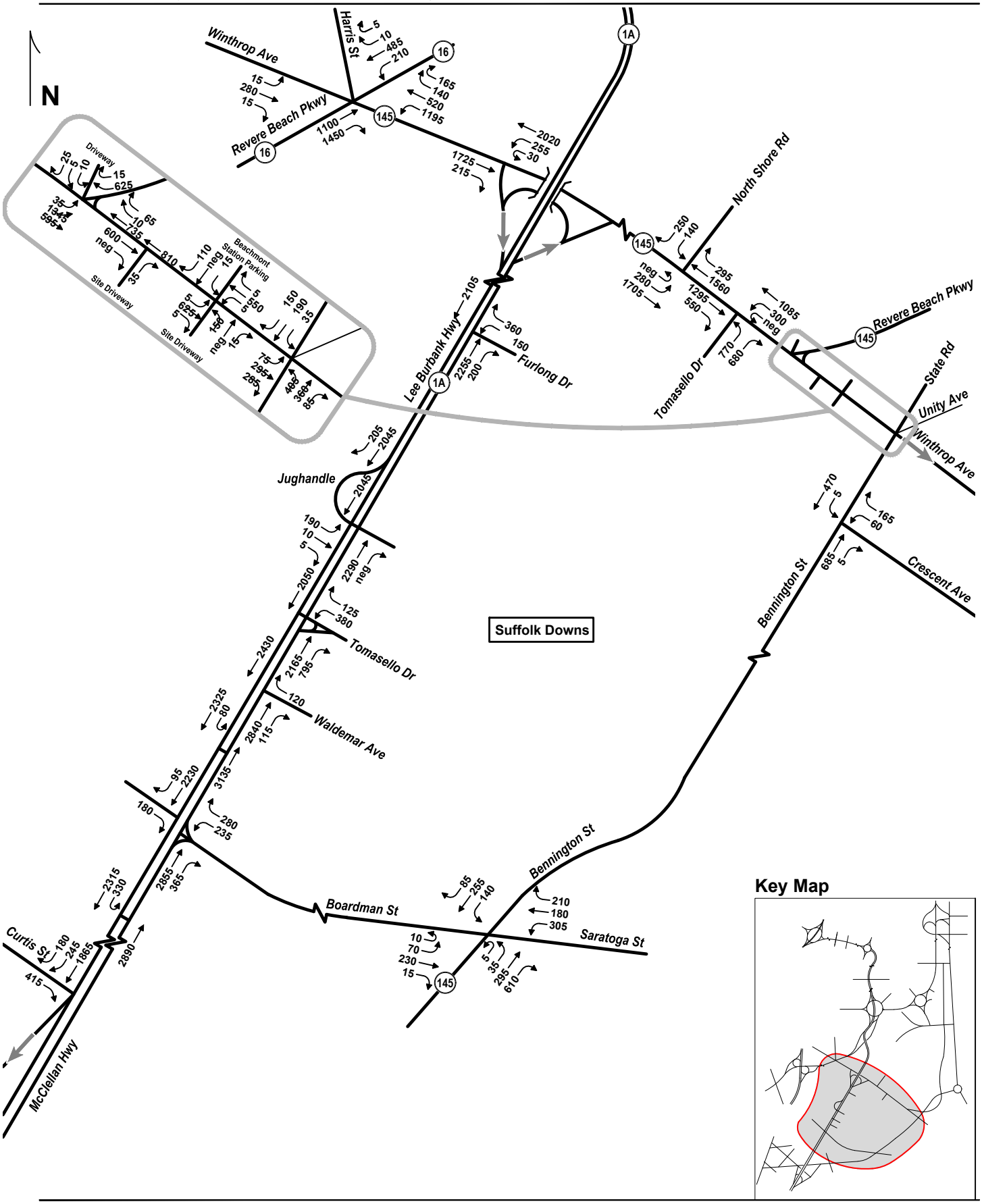
Figure 6.51c
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.51d
EvENing Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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neg = negligible

Figure 6.52a
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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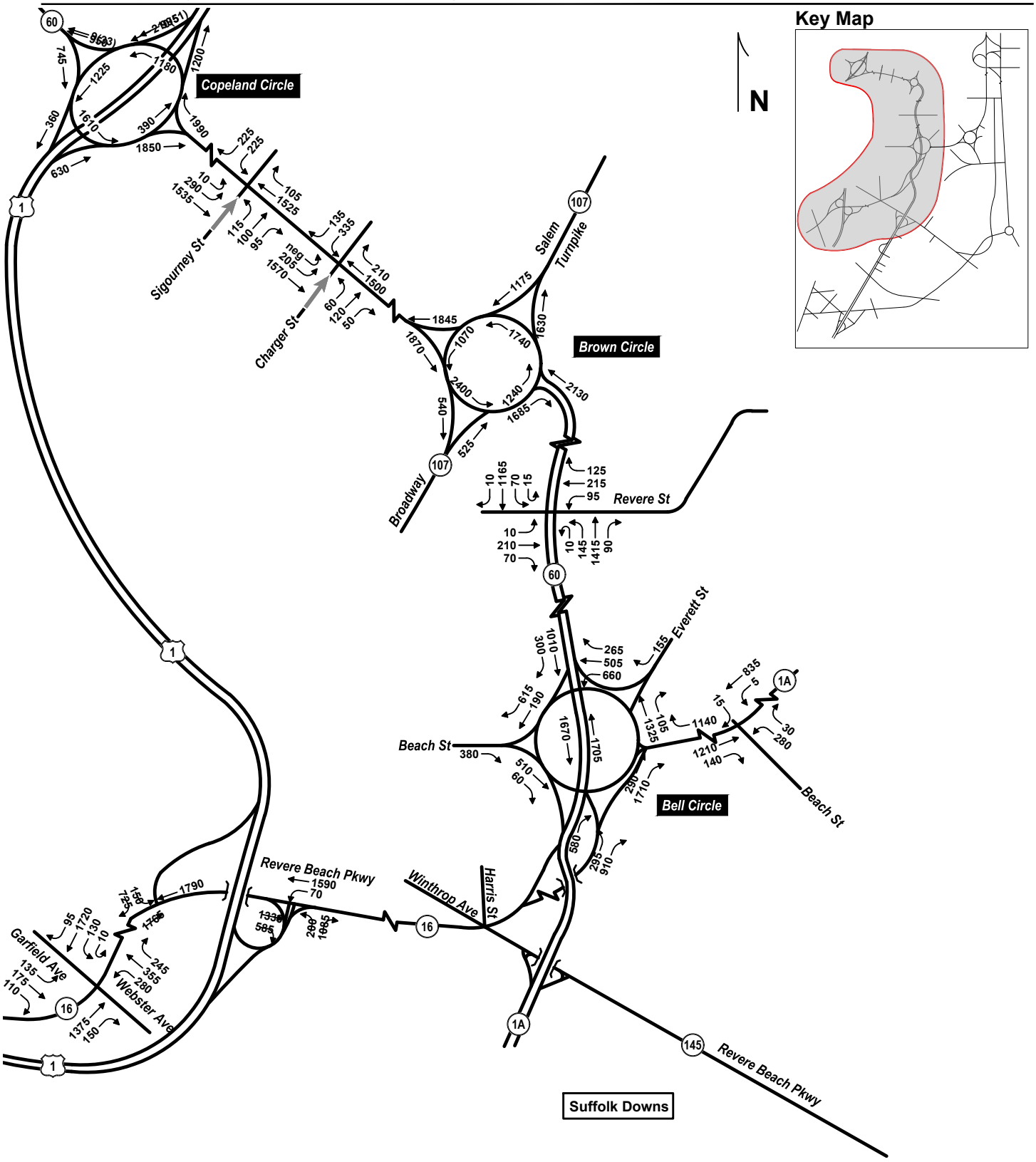
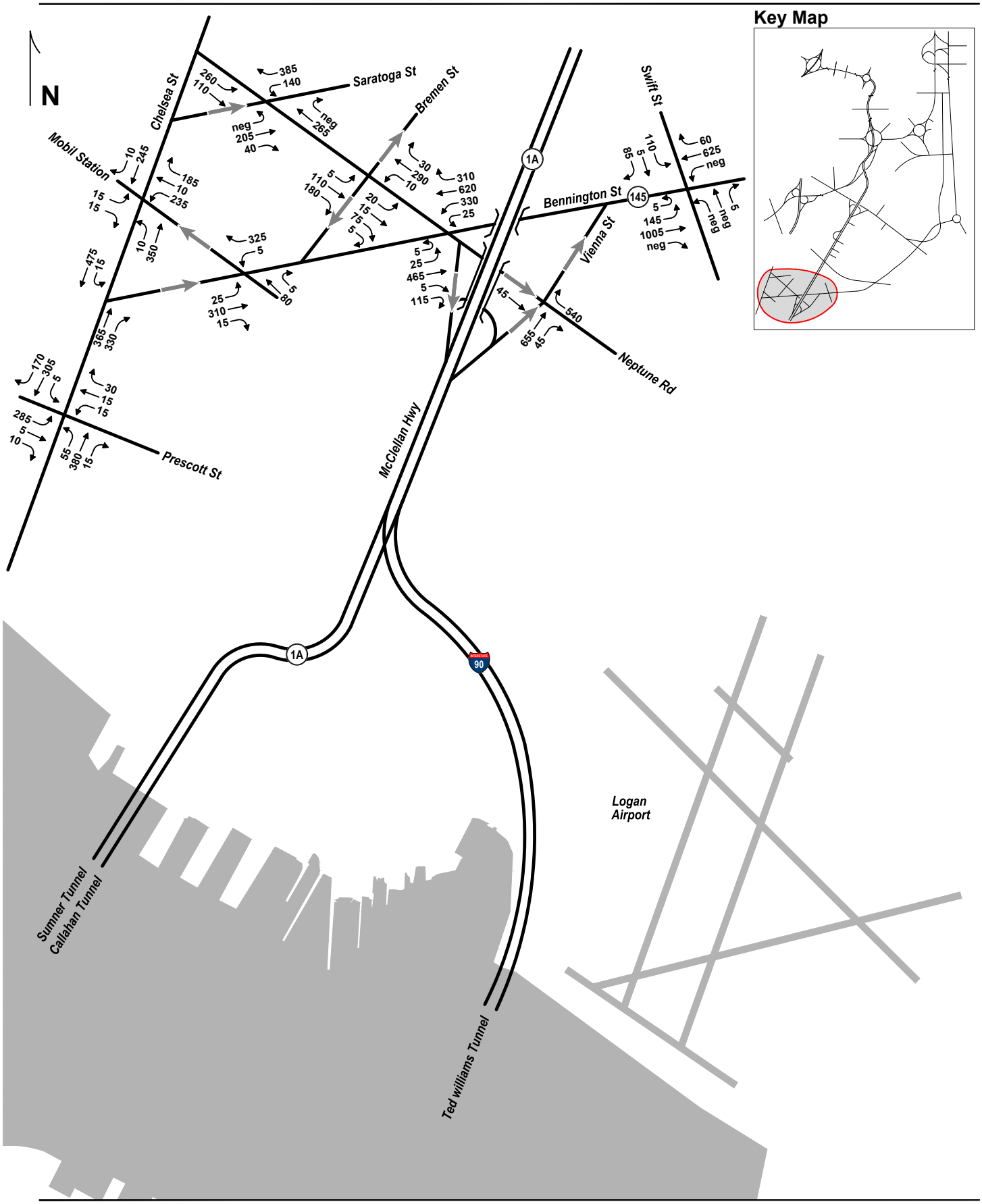
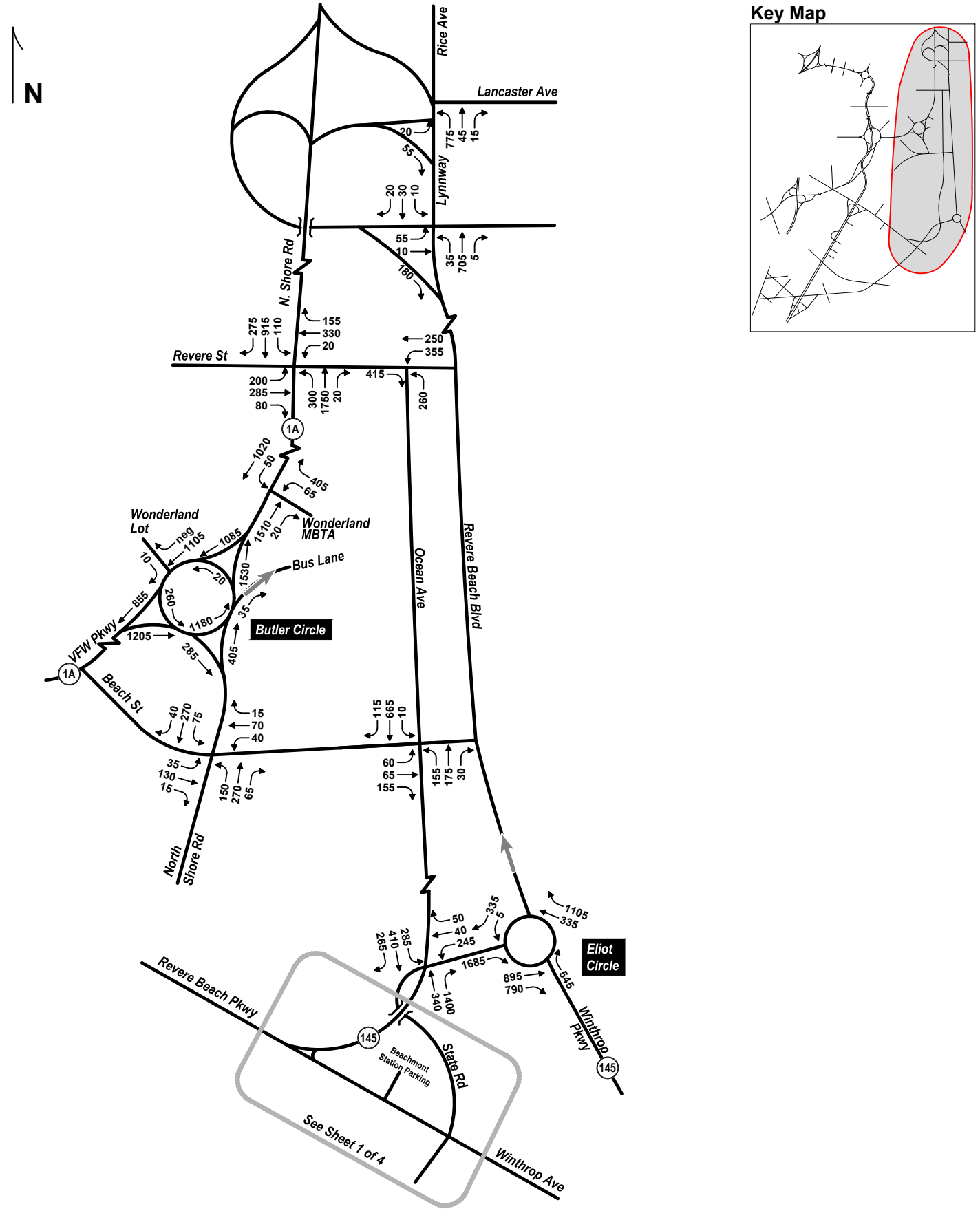


Figure 6.52b
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



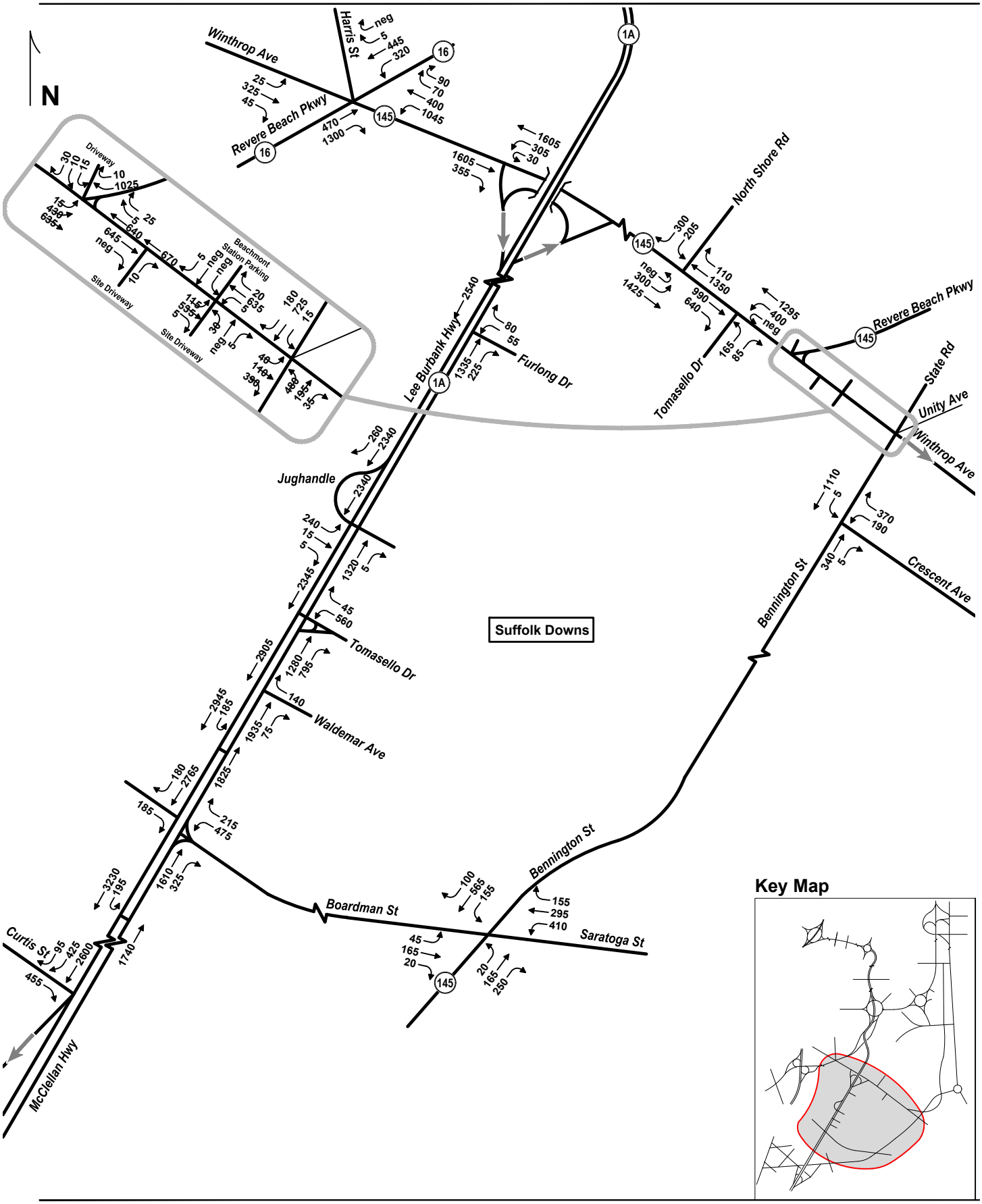
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Figure 6.52c
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



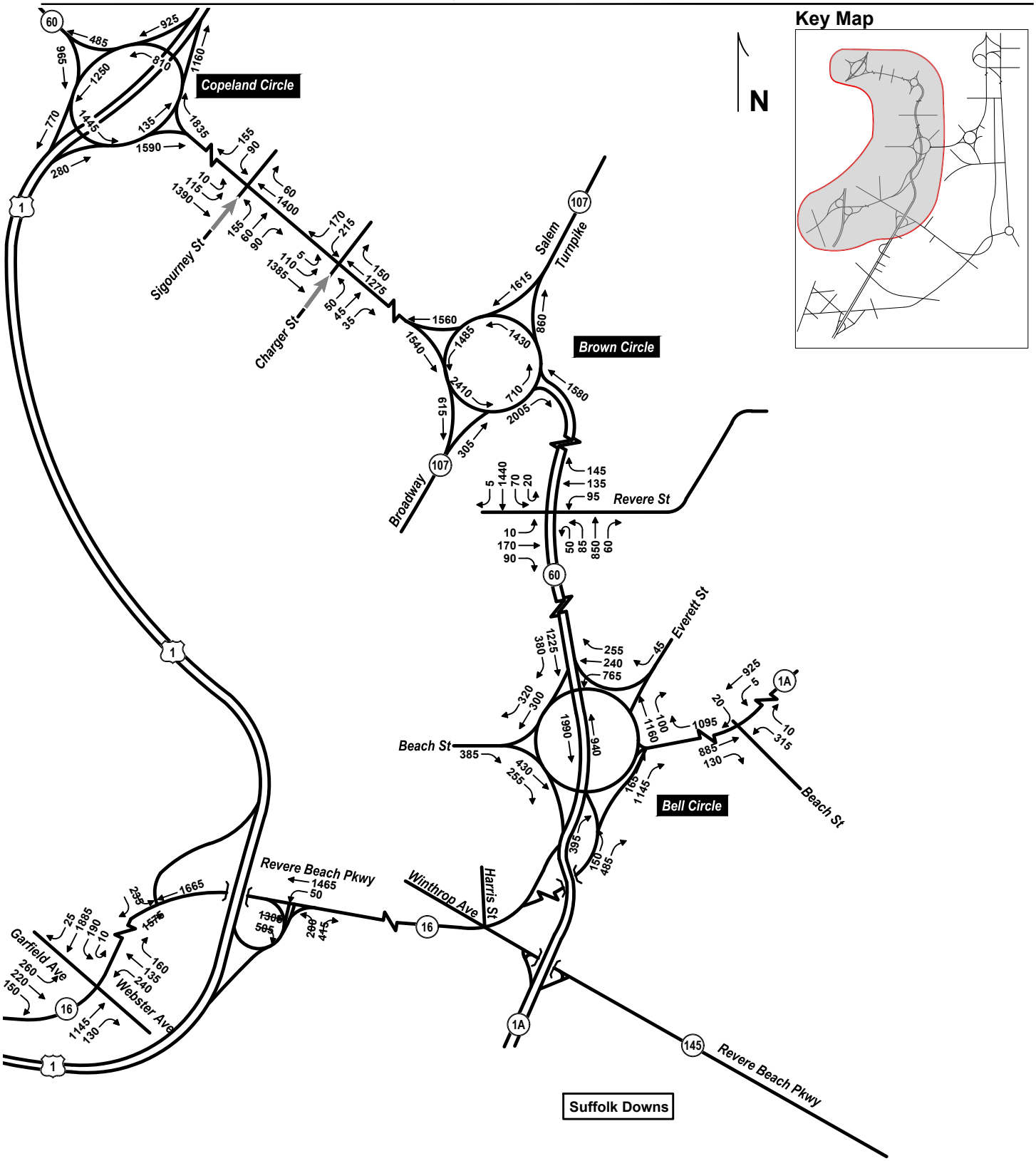
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Figure 6.52d
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



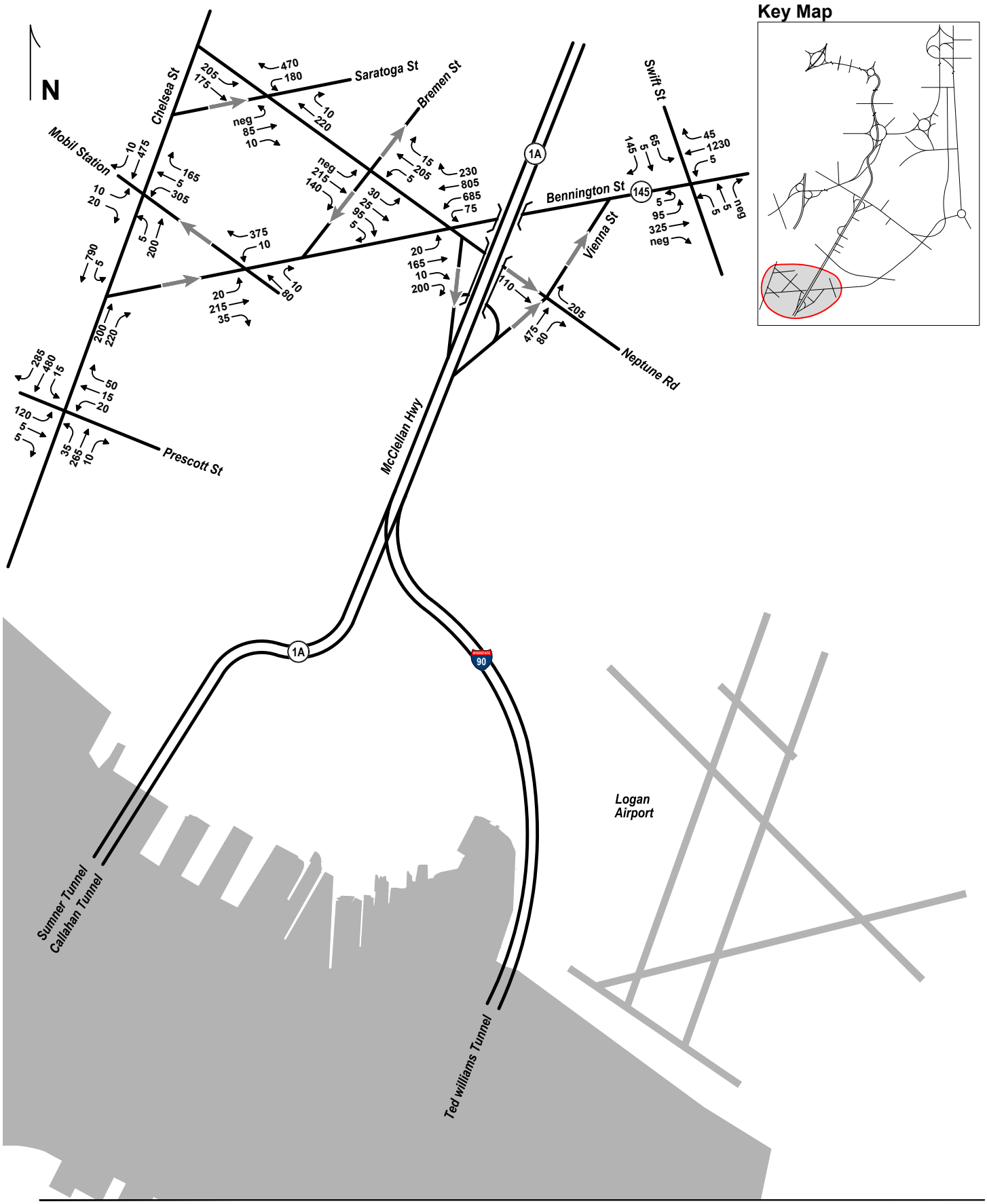
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Figure 6.53a
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



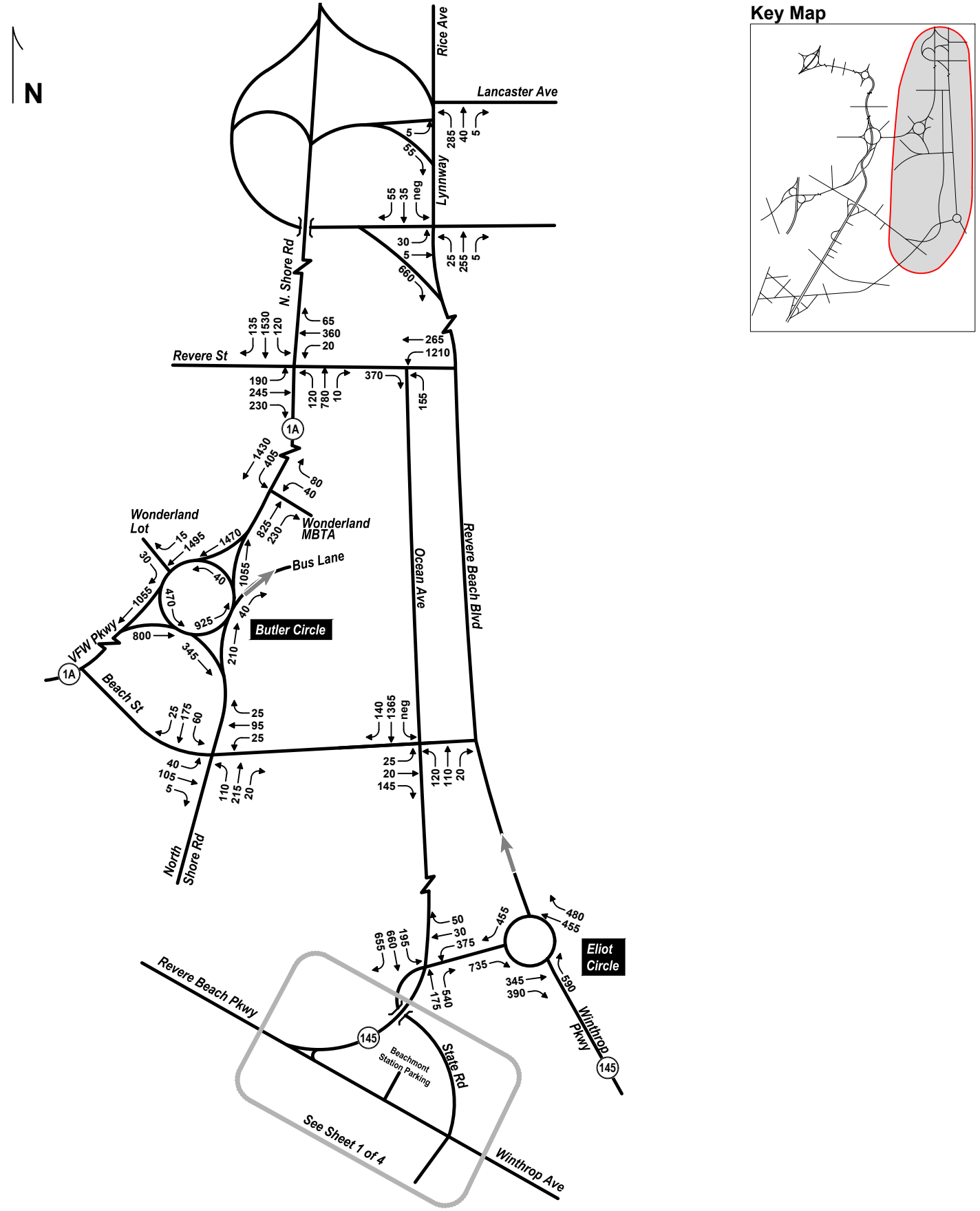
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Figure 6.53b
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



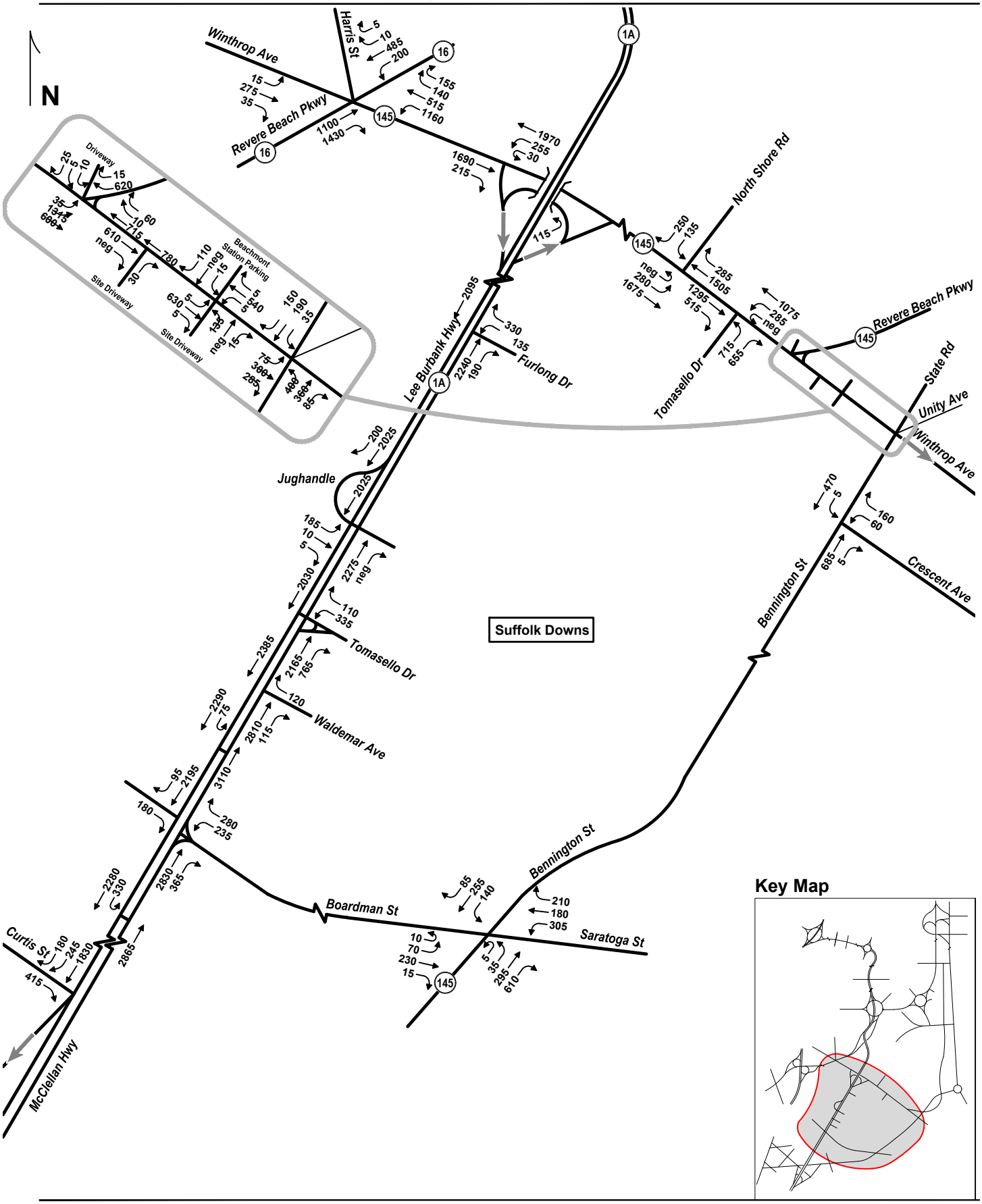
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Figure 6.53c
Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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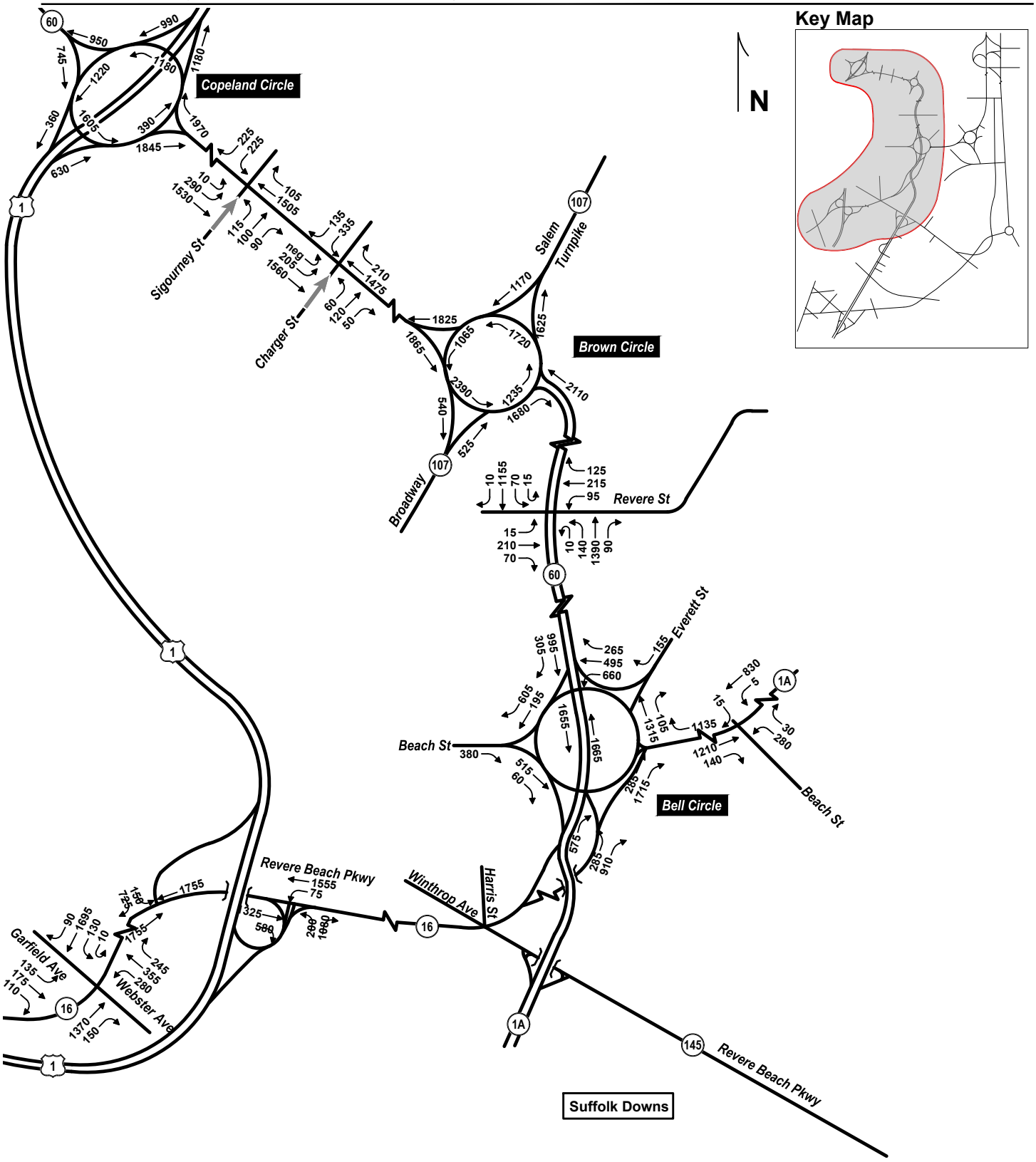
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Morning Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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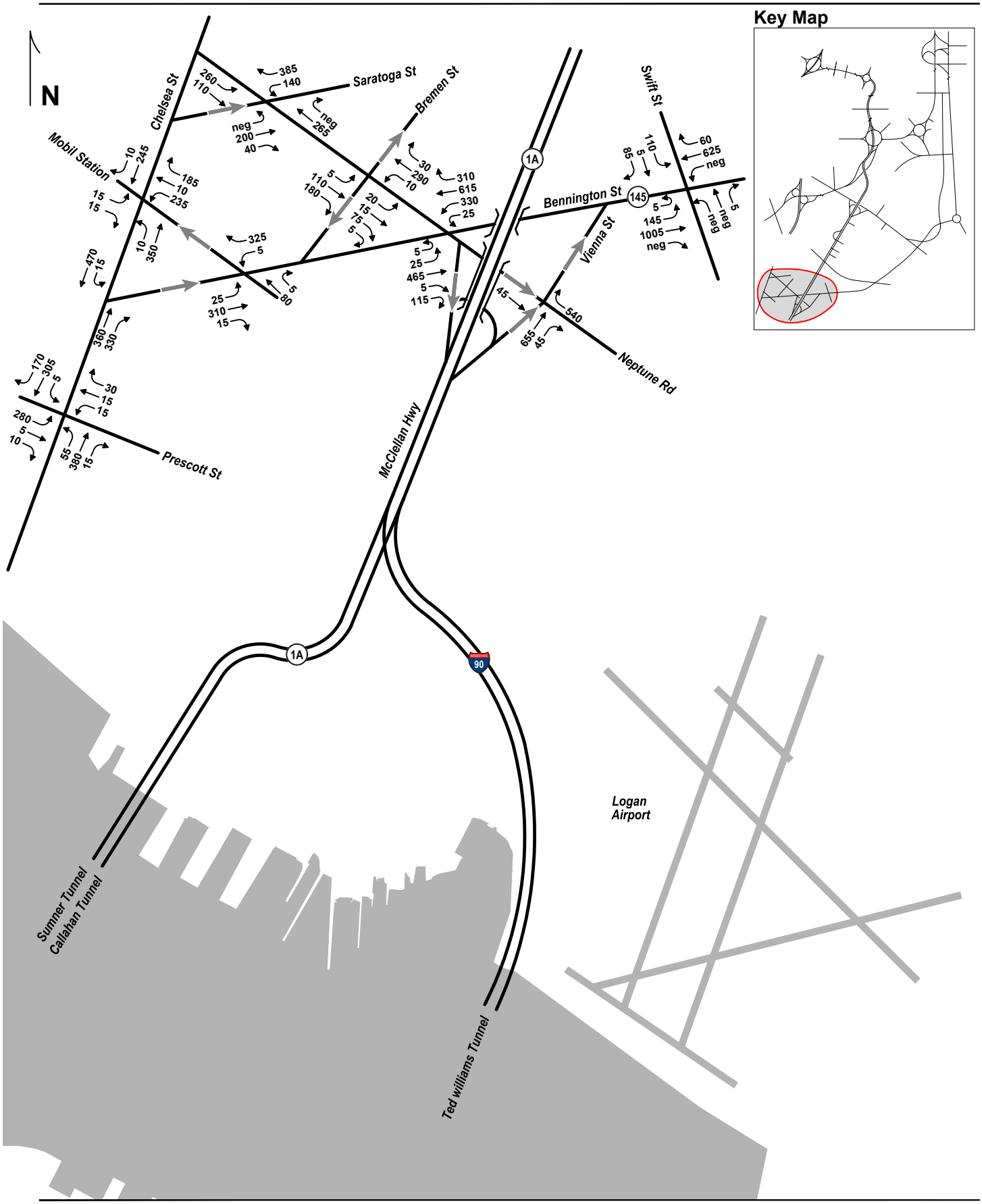
Figure 6.54a
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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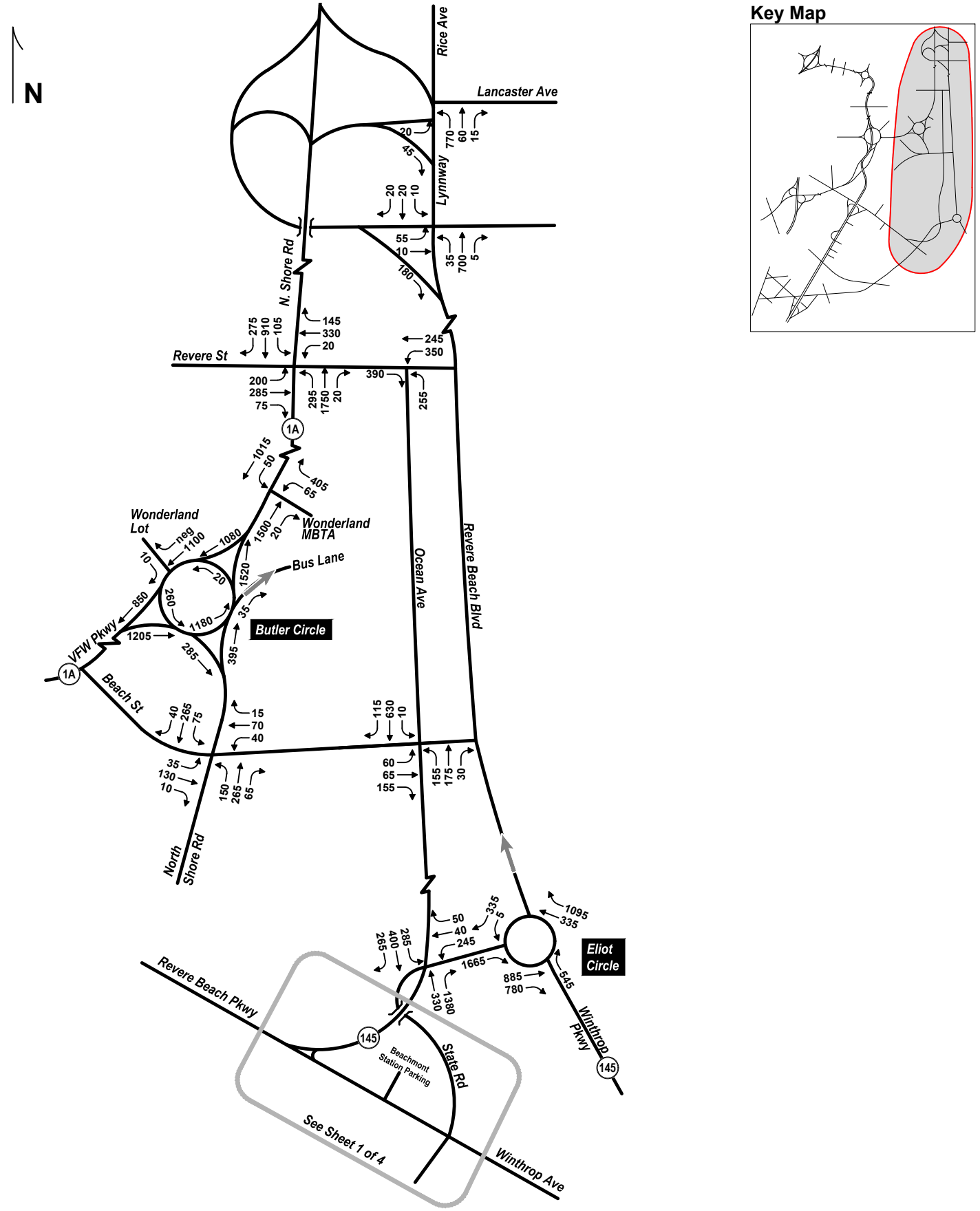
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Figure 6.54b
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.54c
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.54d
Evening Peak Hour
2028 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

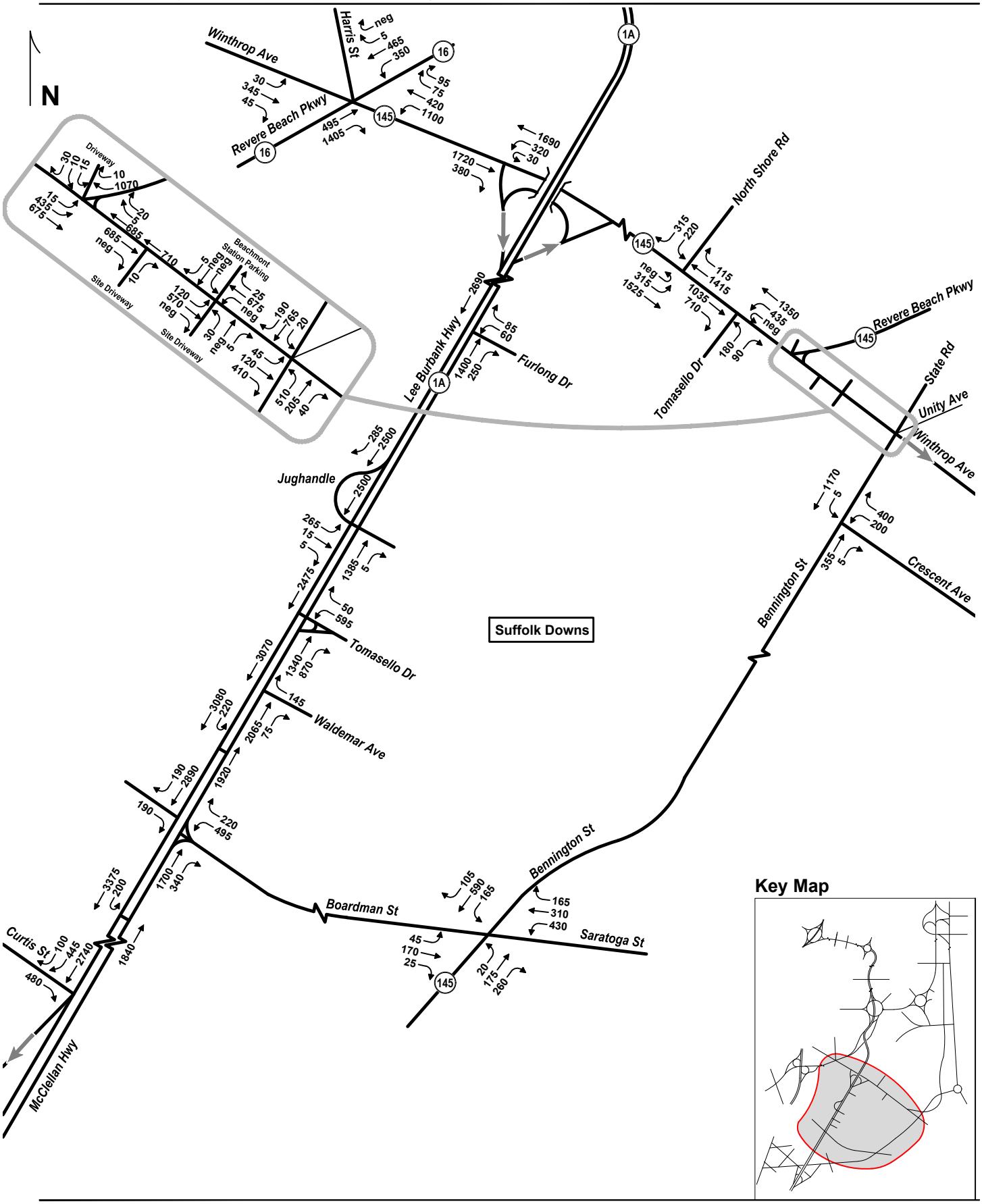


Figure 6.55a
Morning Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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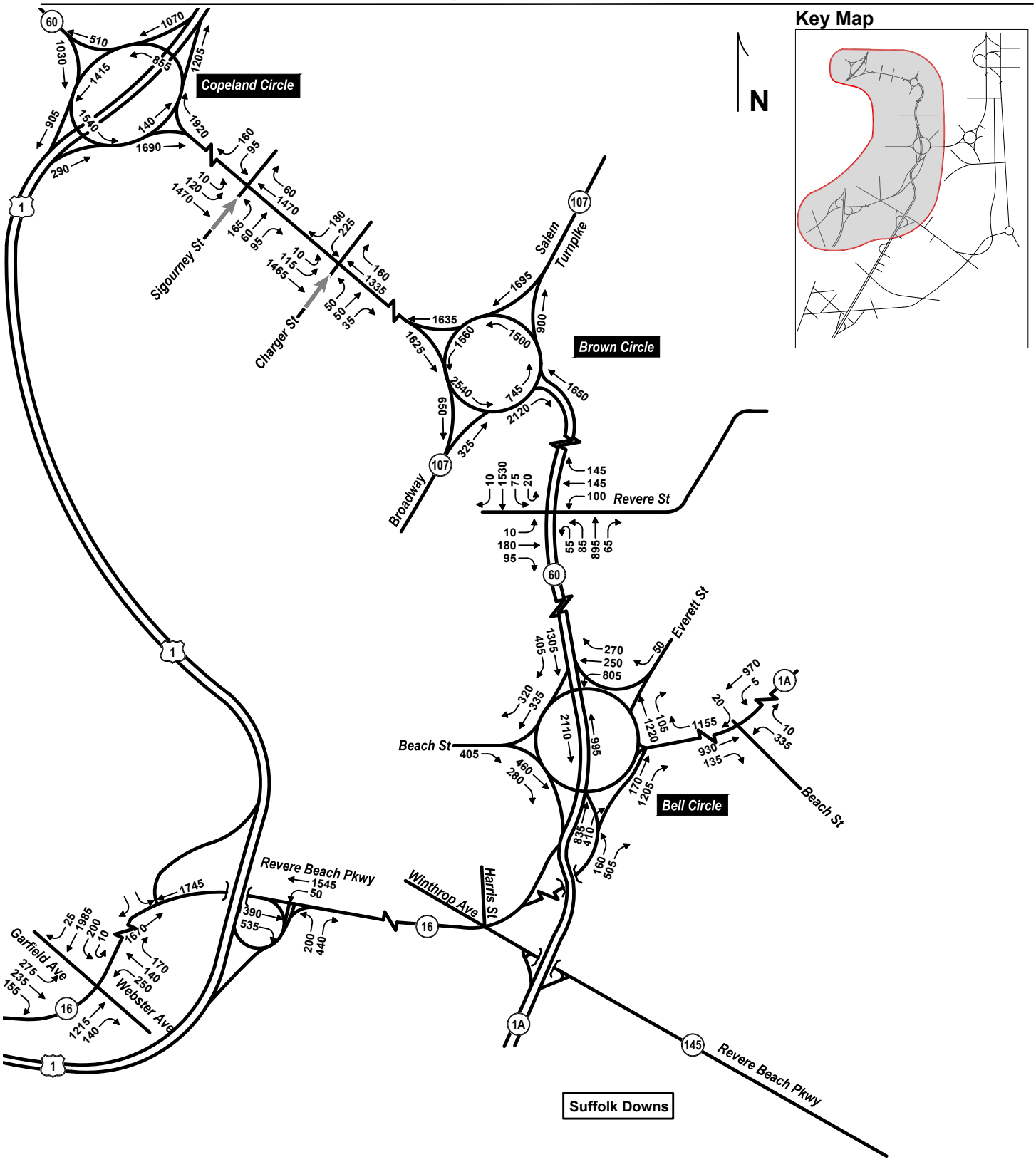


Figure 6.55b
Morning Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

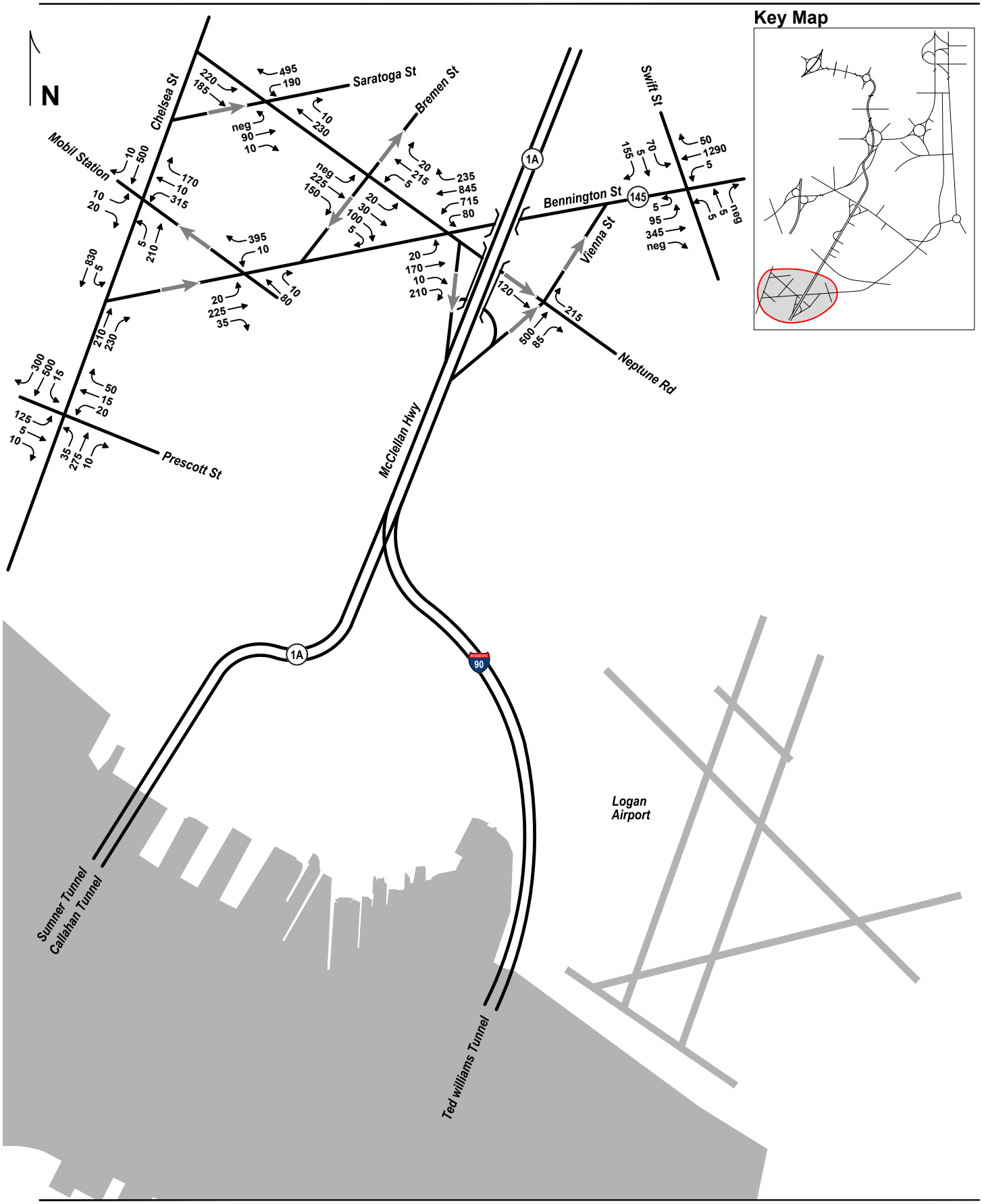
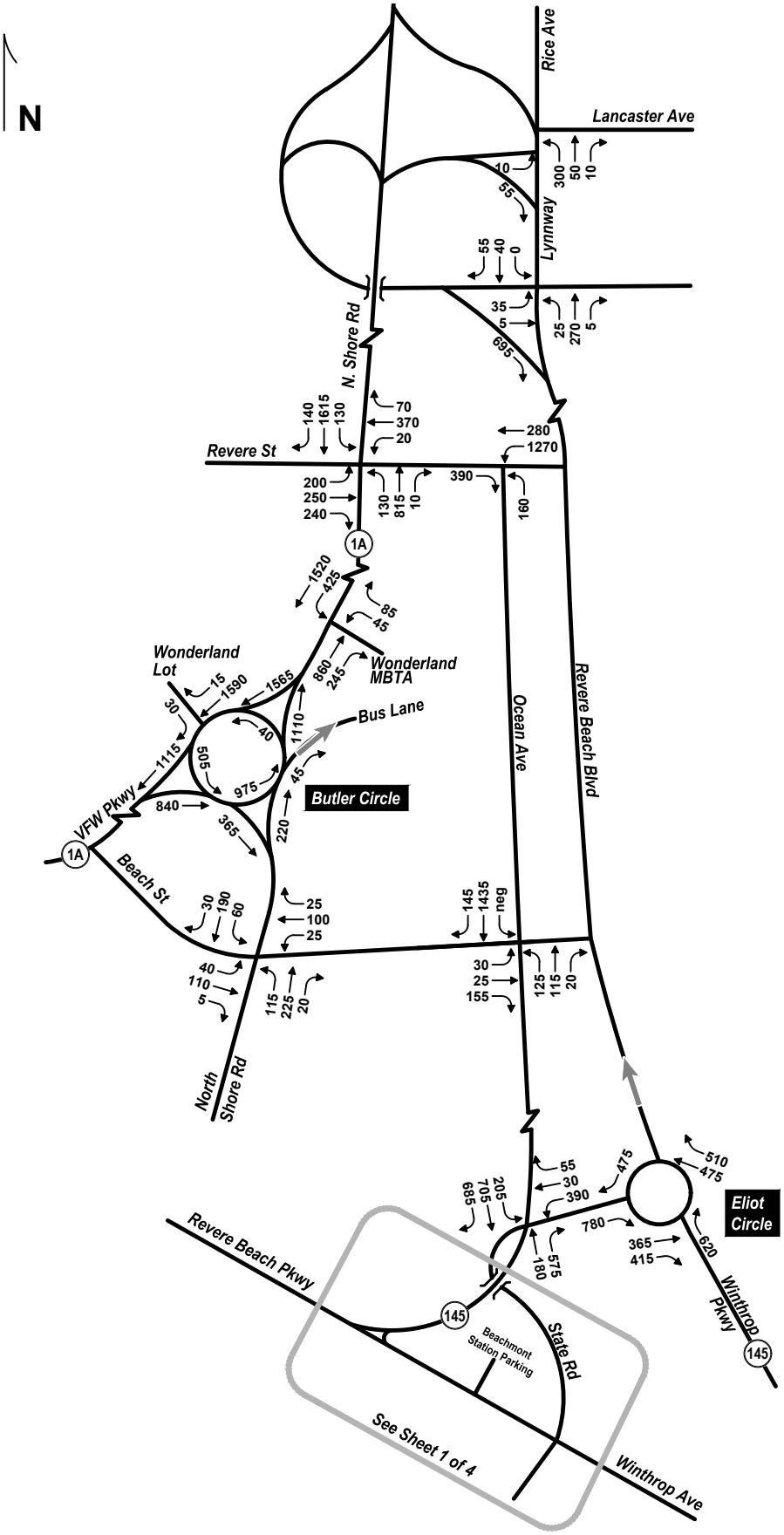


Figure 6.55c
Morning Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



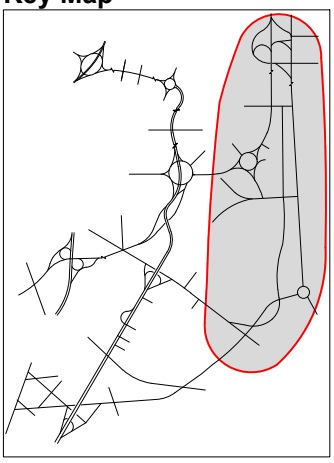


Figure 6.55d
Morning Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

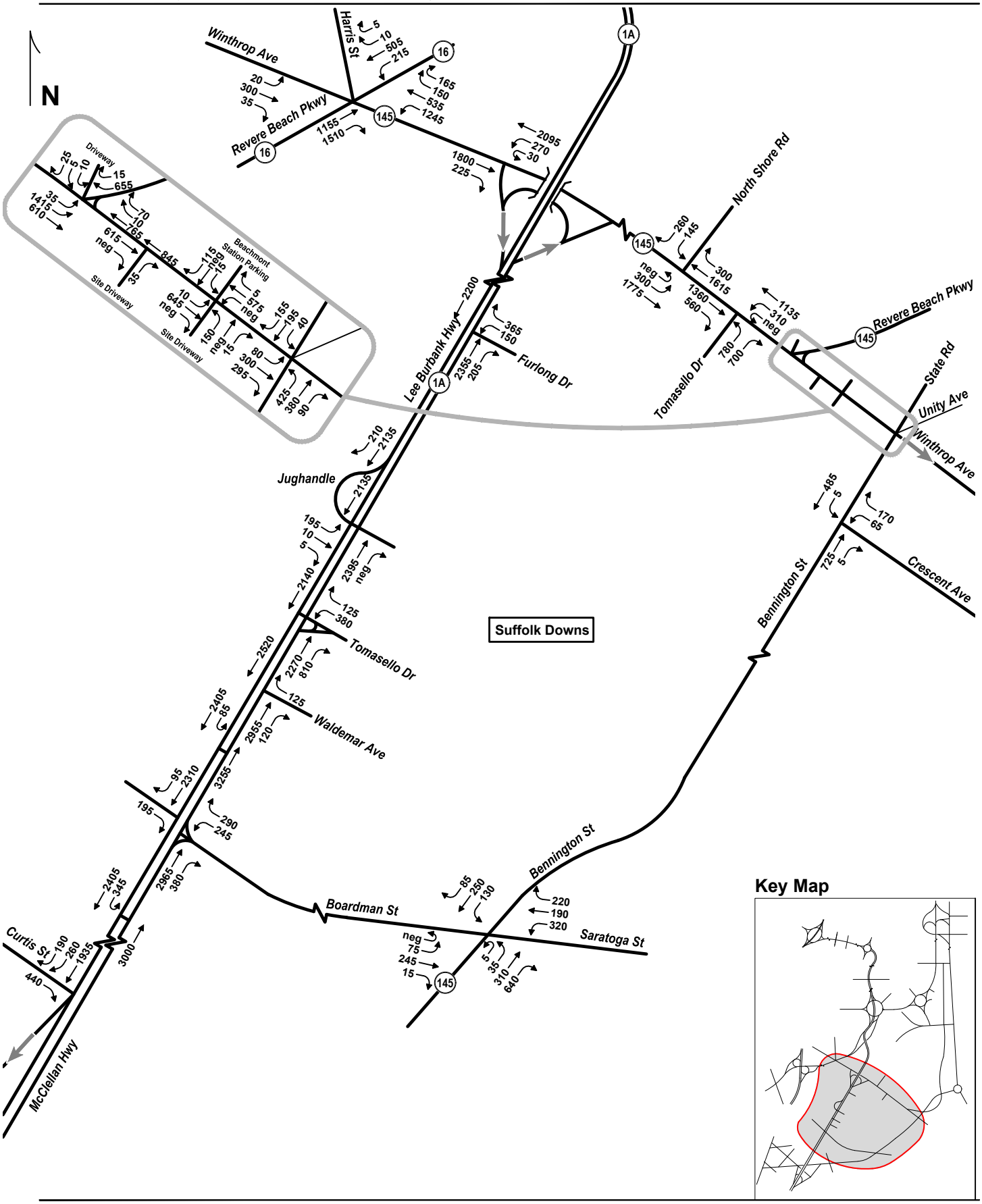


Figure 6.56a
Evening Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

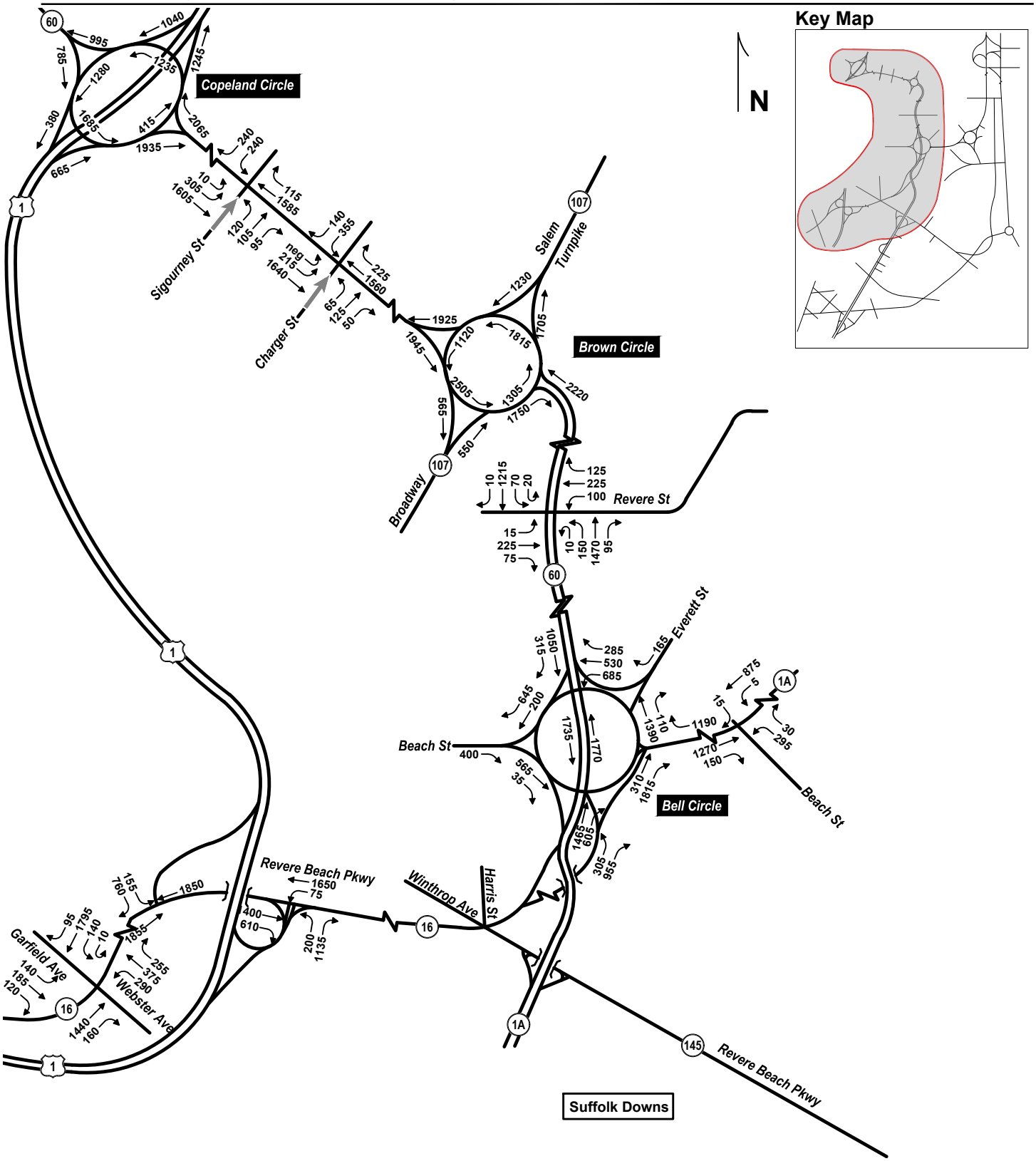


Figure 6.56b
Evening Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

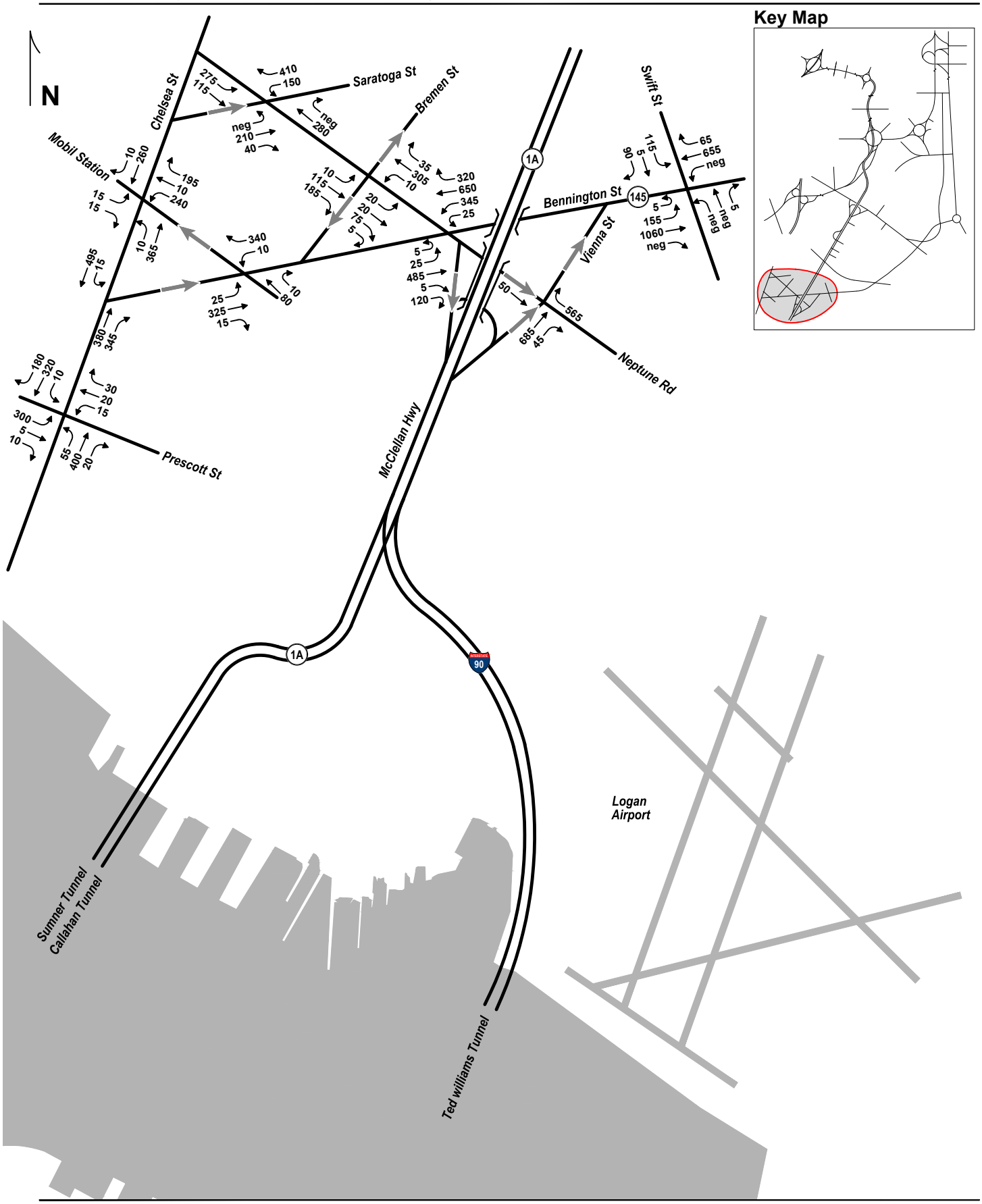


Figure 6.56c
Evening Peak Hour
2038 No-Build Condition Vehicle Volume Network

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

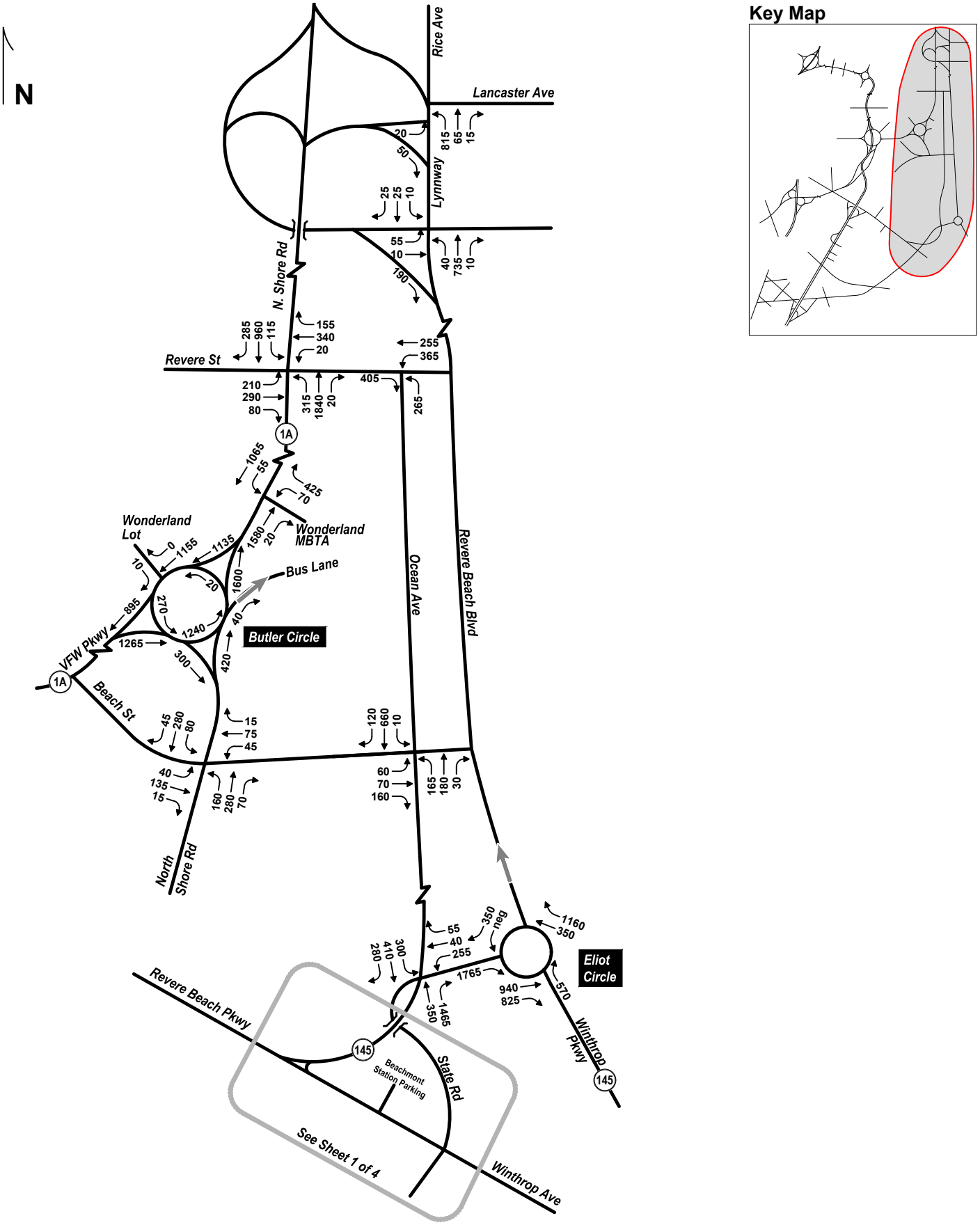
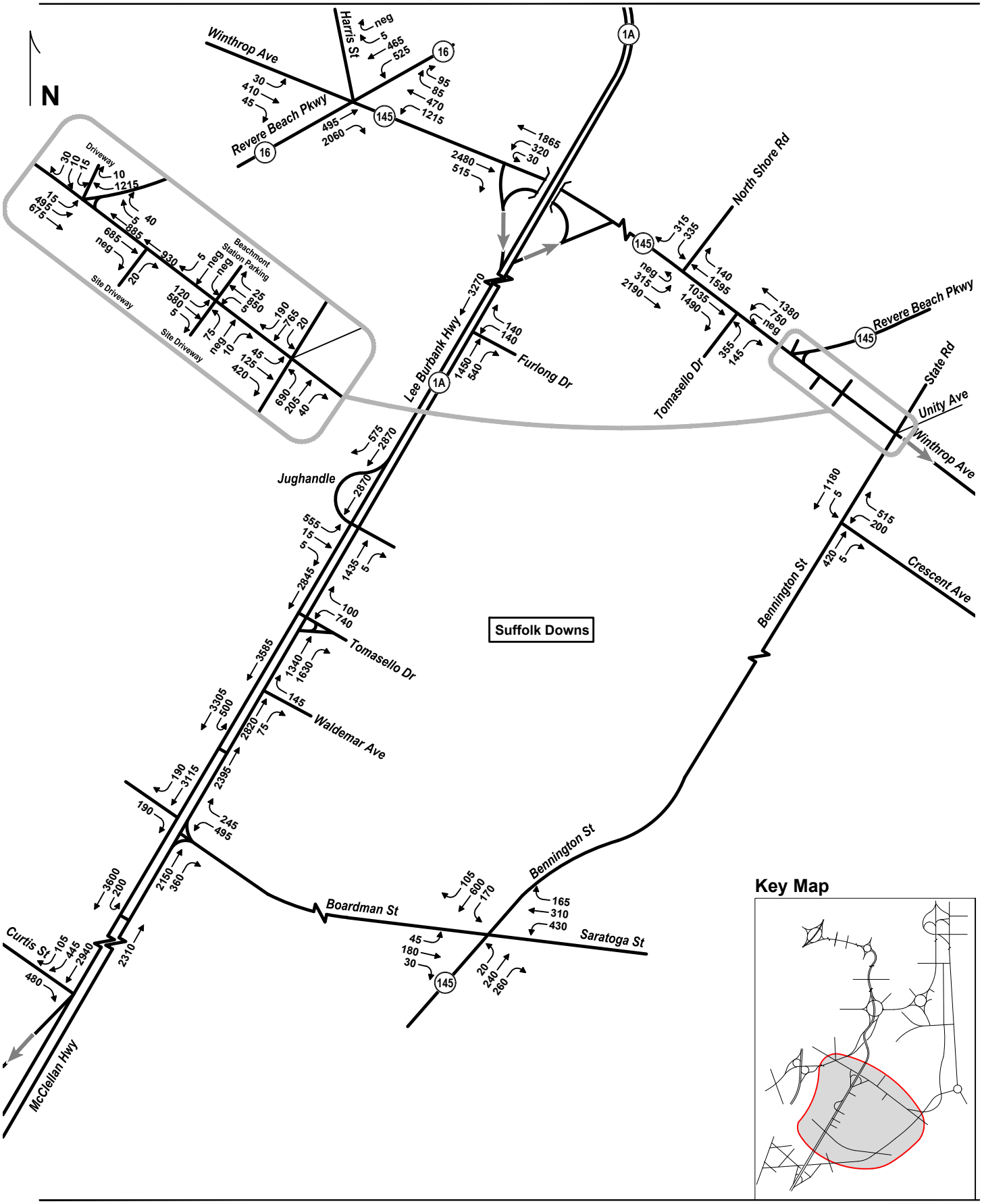


Figure 6.56d
Evening Peak Hour
2038 No-Build Condition Vehicle Volume Network

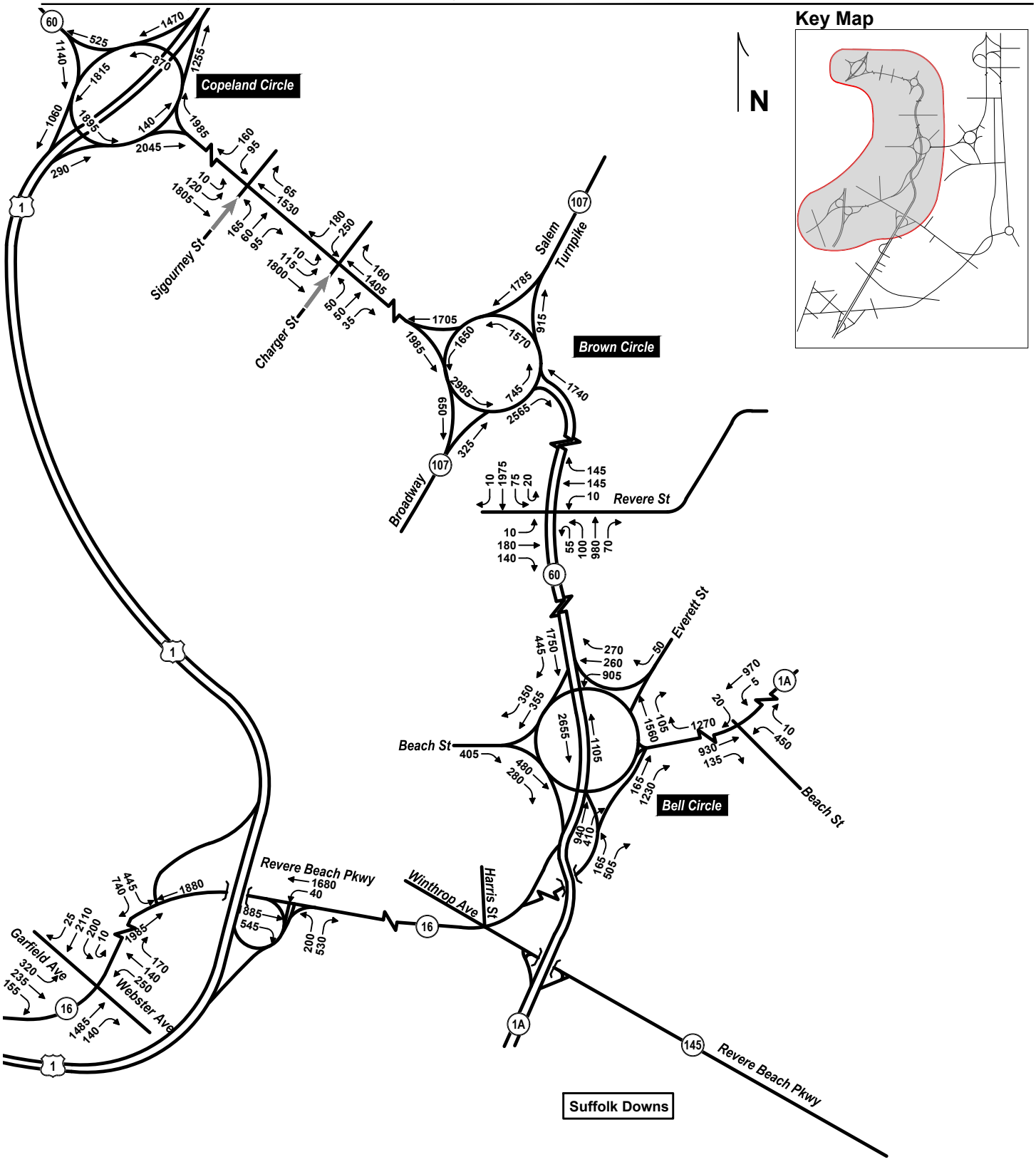
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



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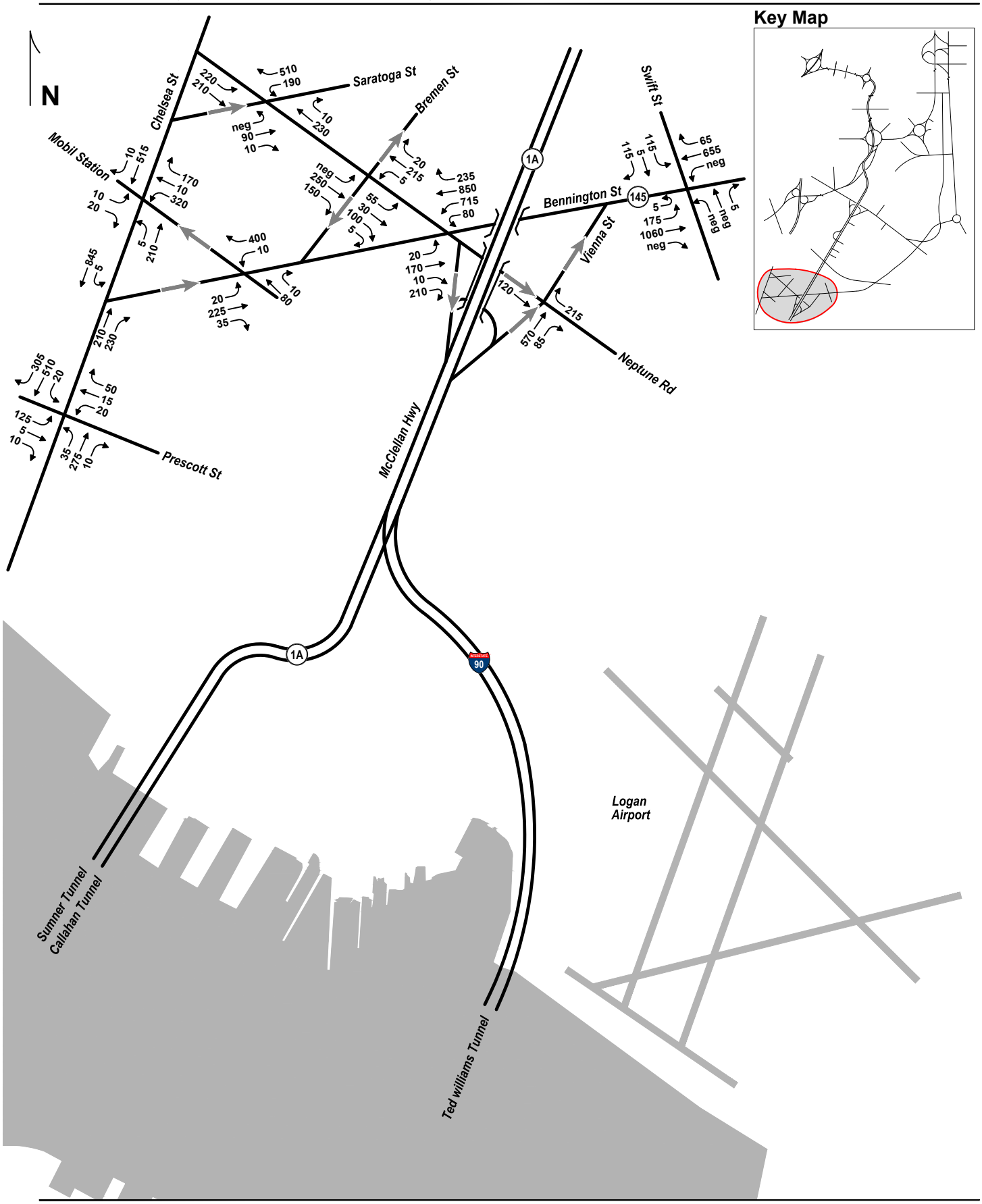
Figure 6.57a
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

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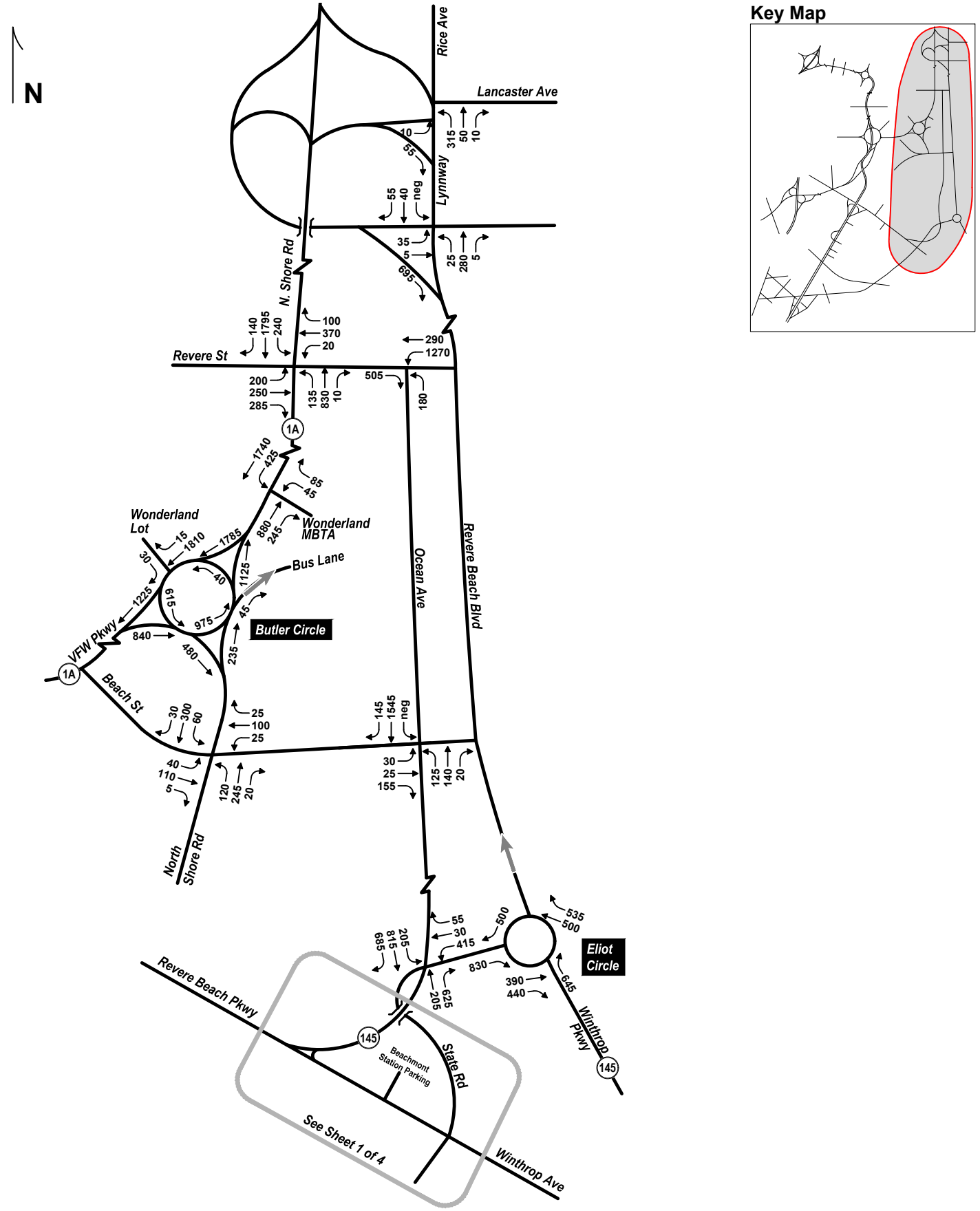
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Figure 6.57b
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



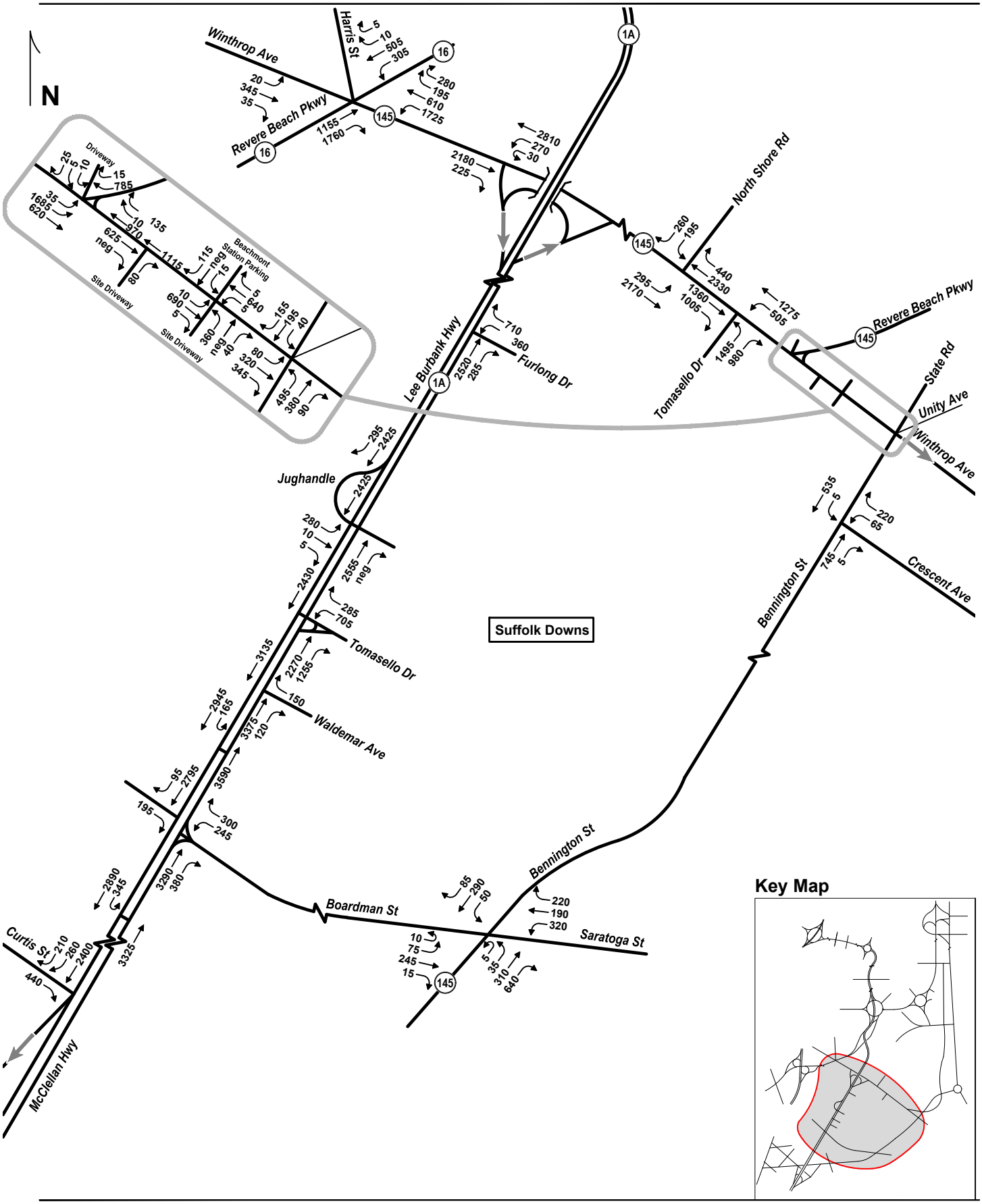
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Morning Peak Hour
2038 Build Condition Vehicle Volume Network
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Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



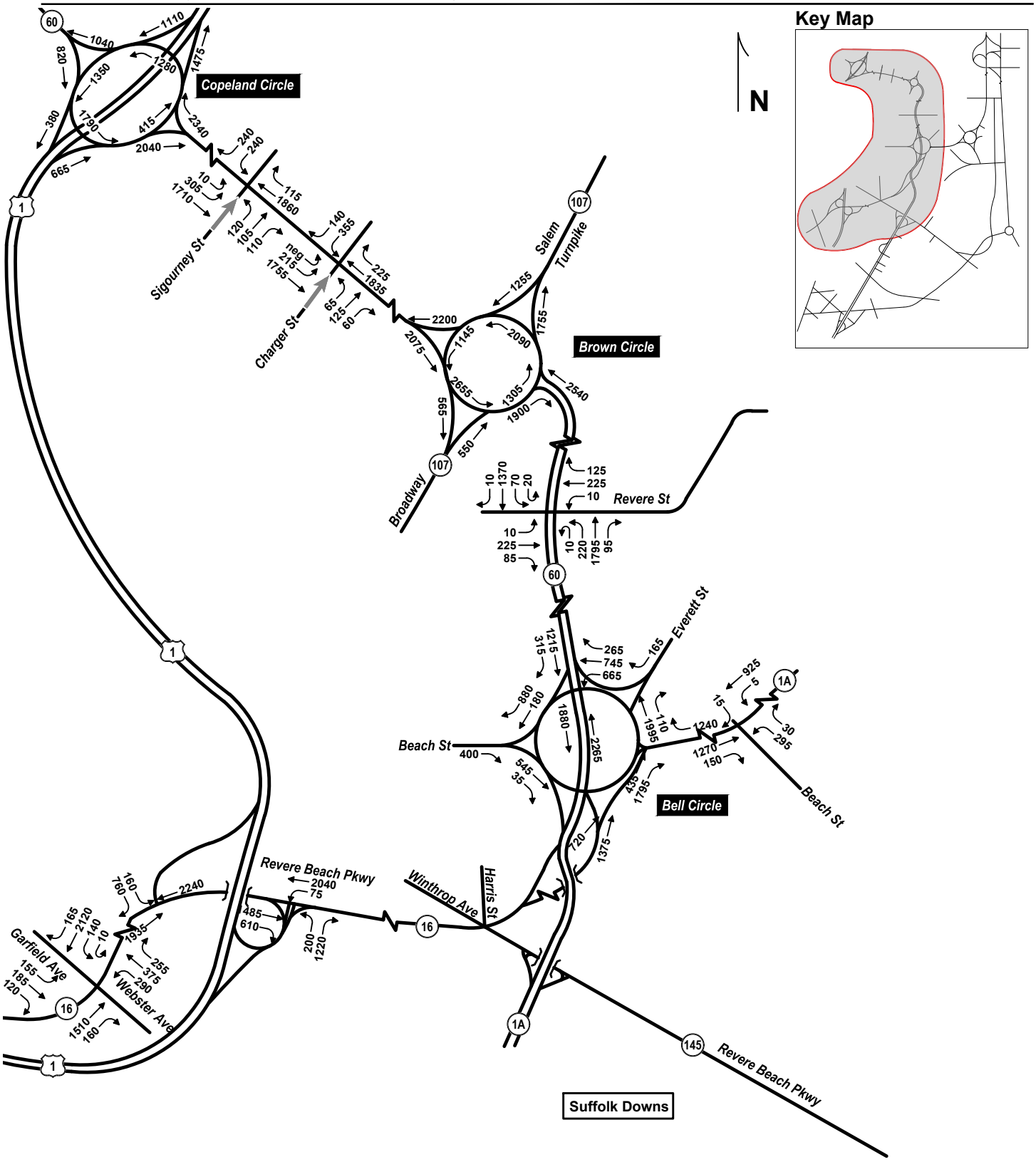
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Figure 6.57d
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



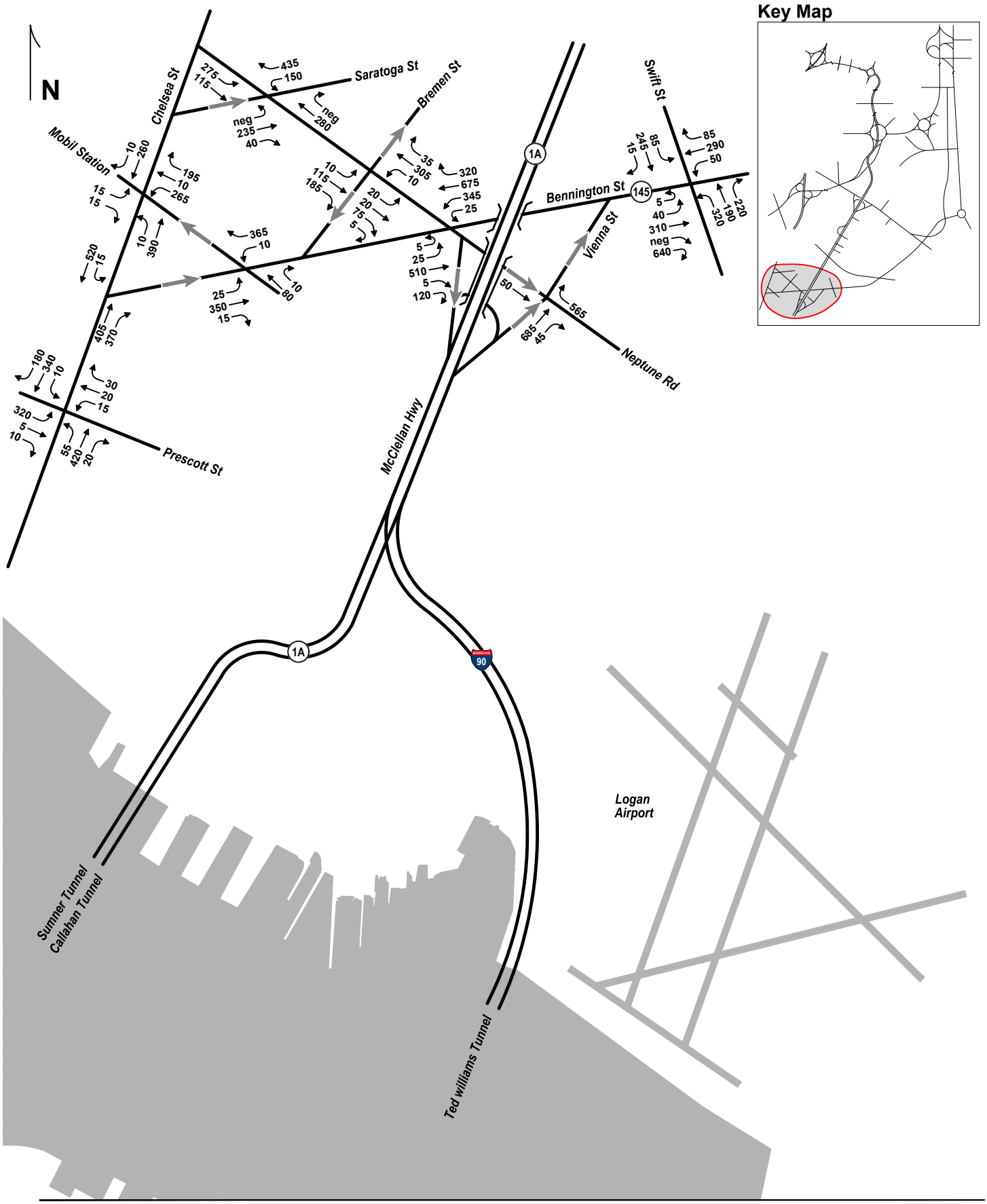
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Figure 6.57e
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



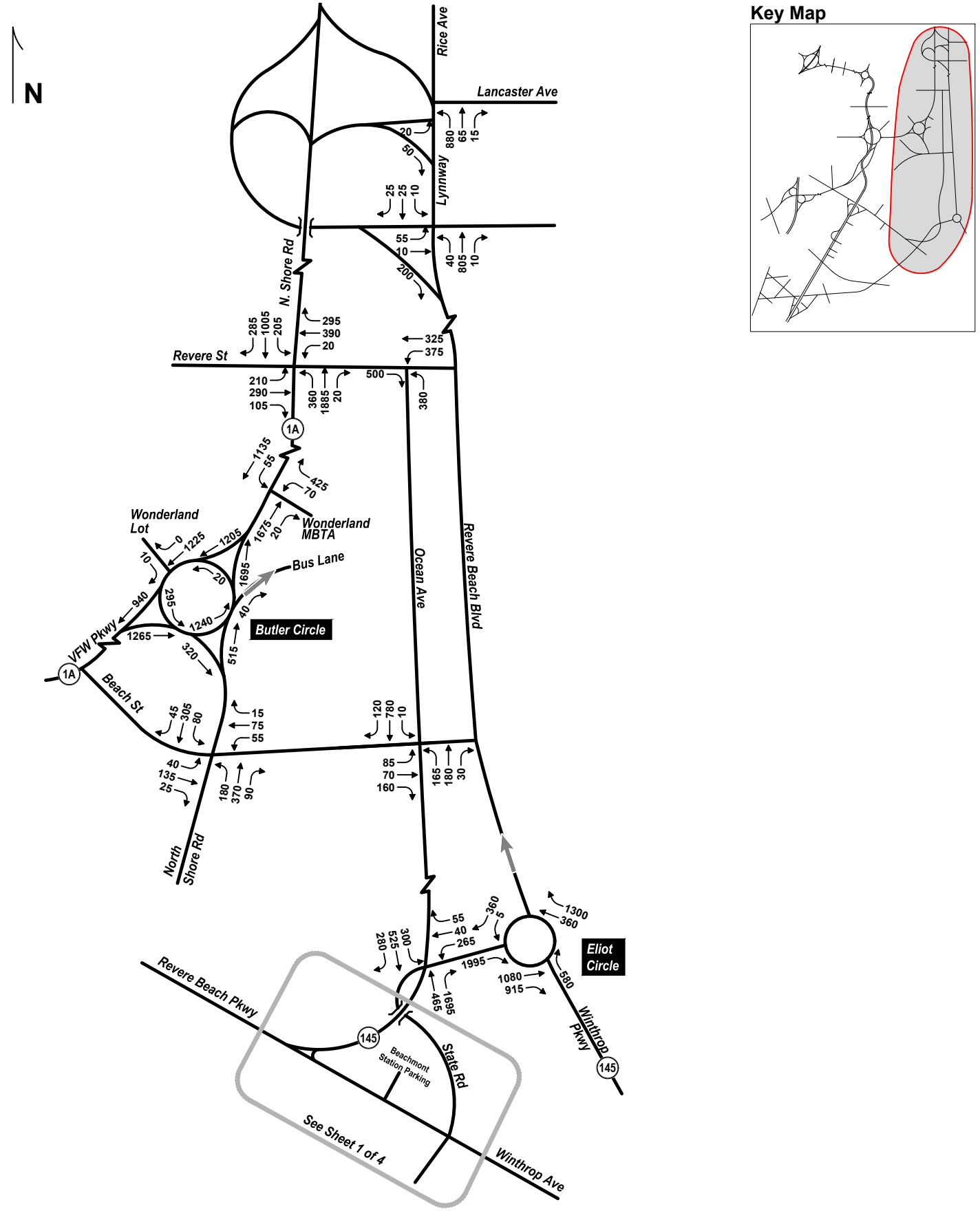
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Figure 6.57f
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.57g
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



neg = negligible

Figure 6.57h
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(CTPS/MassDOT Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

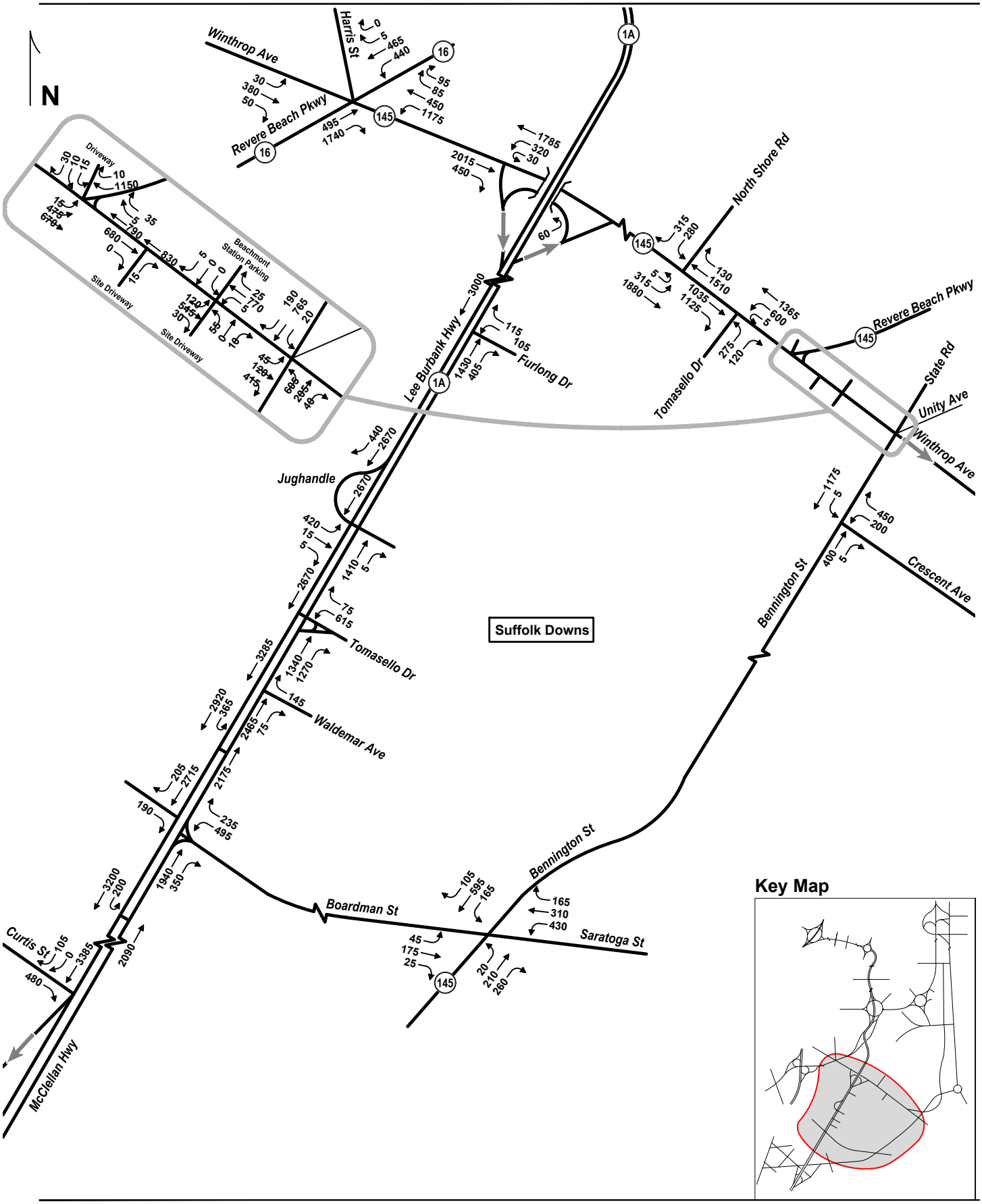


Figure 6.58a
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

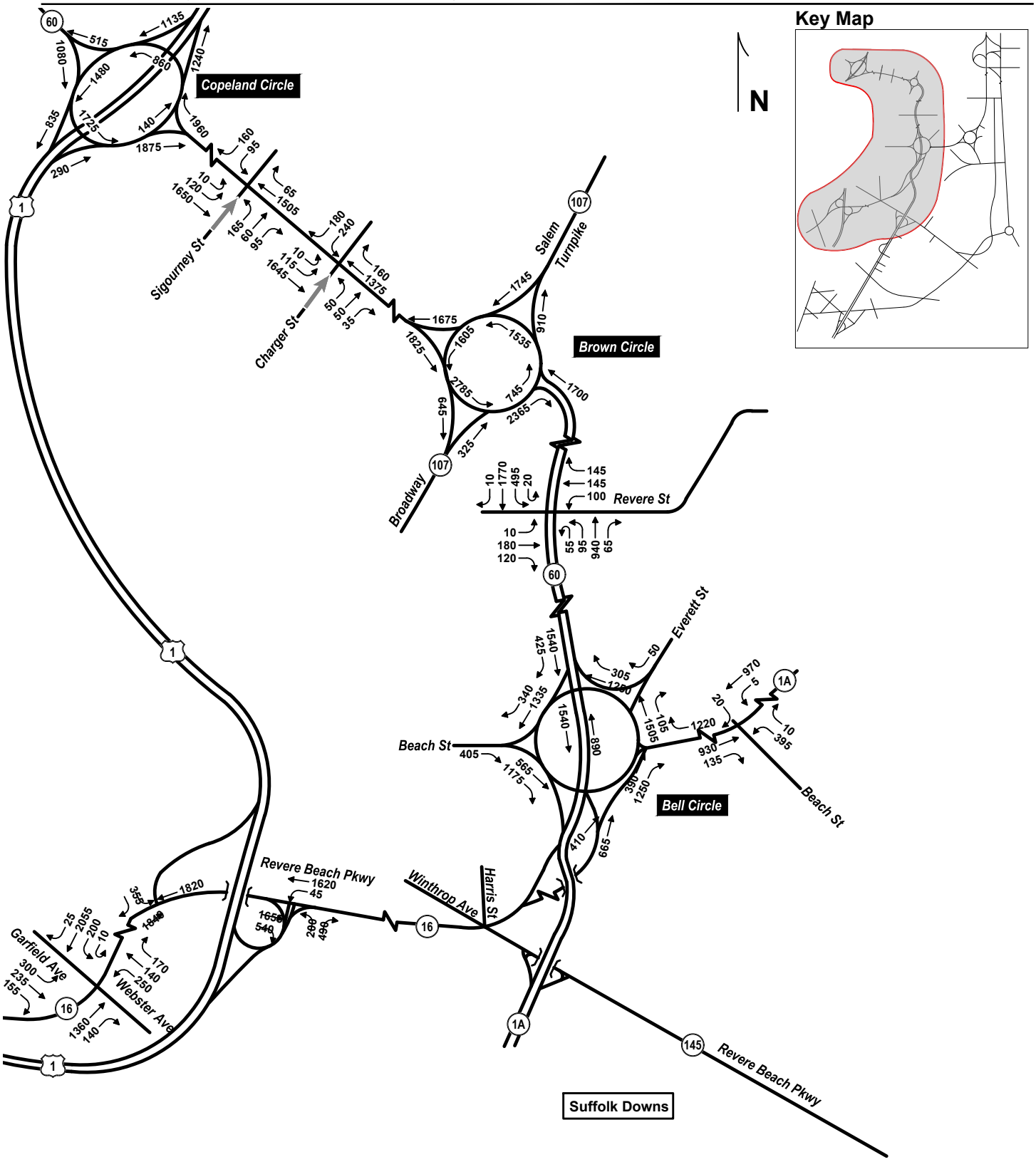


Figure 6.58b
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

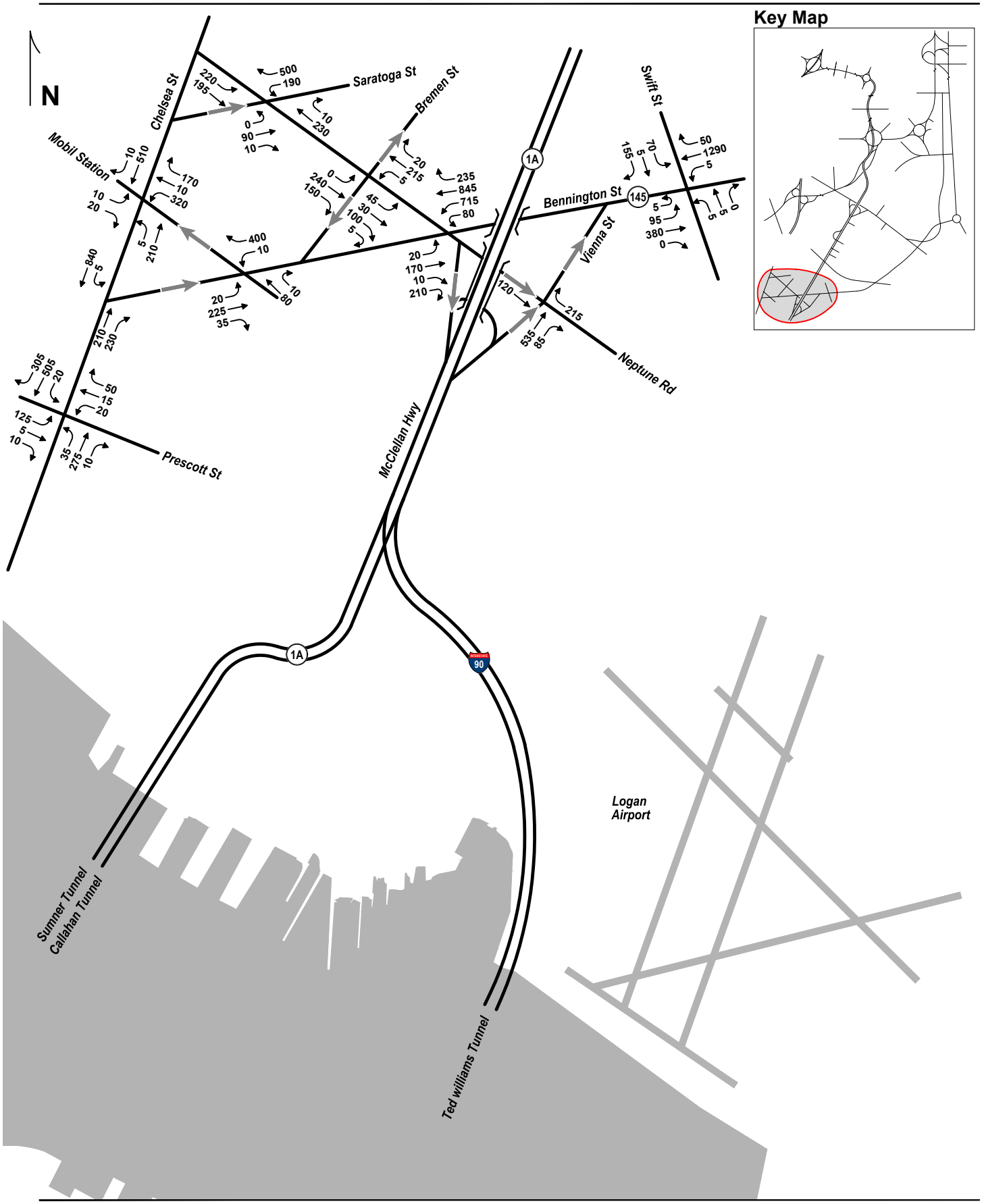


Figure 6.58c
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
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Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

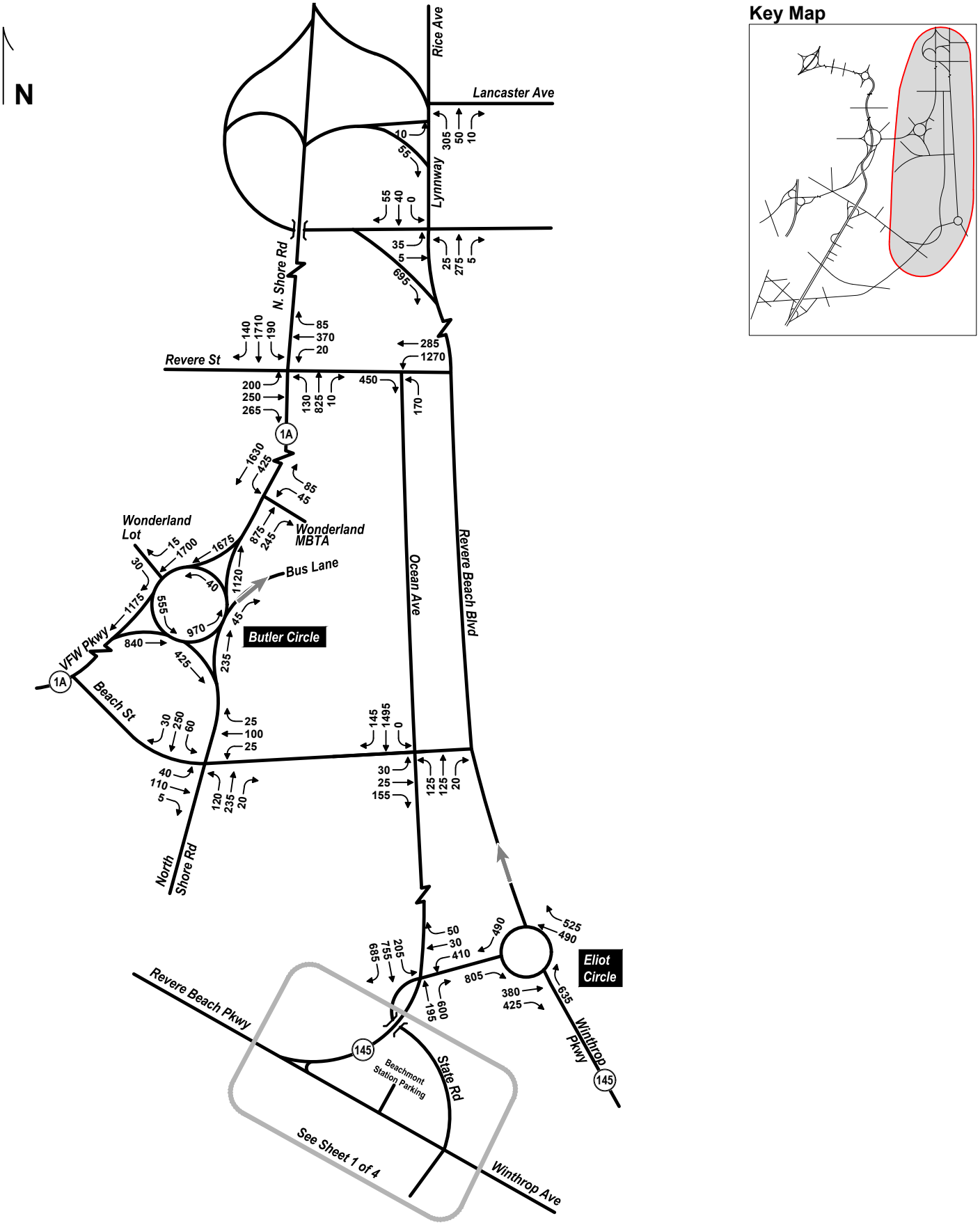


Figure 6.58d
Morning Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

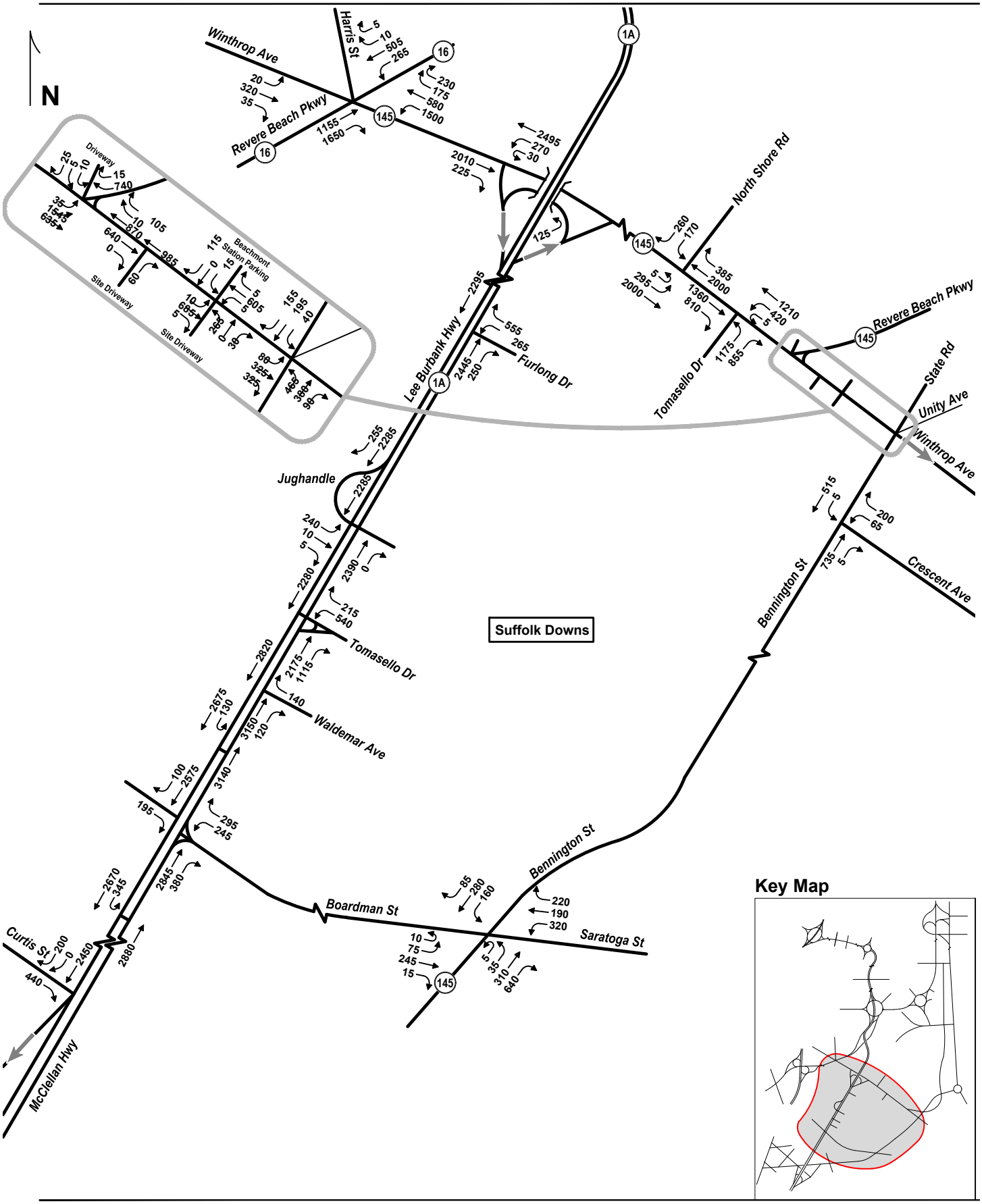


Figure 6.58e
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

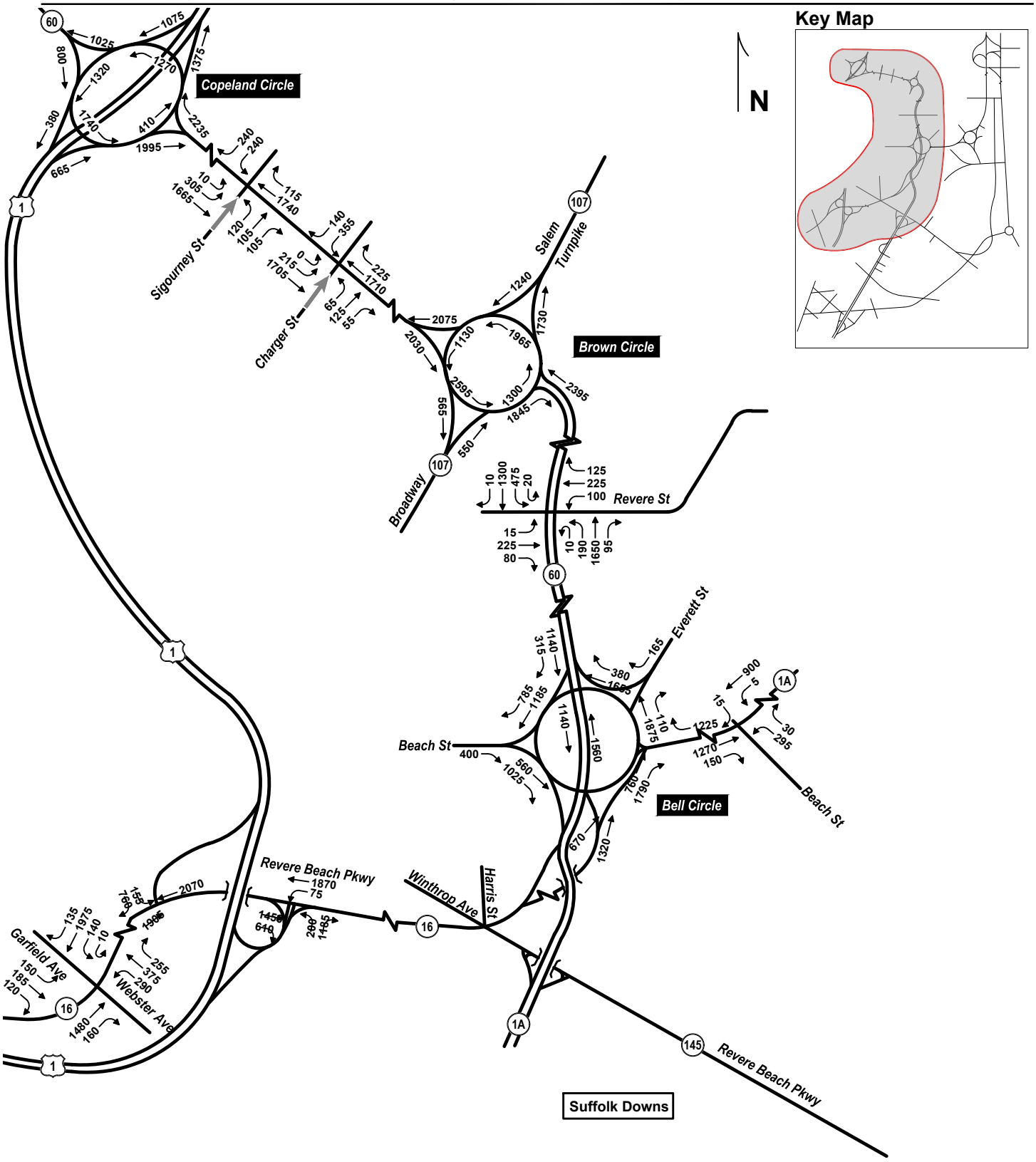


Figure 6.58f
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

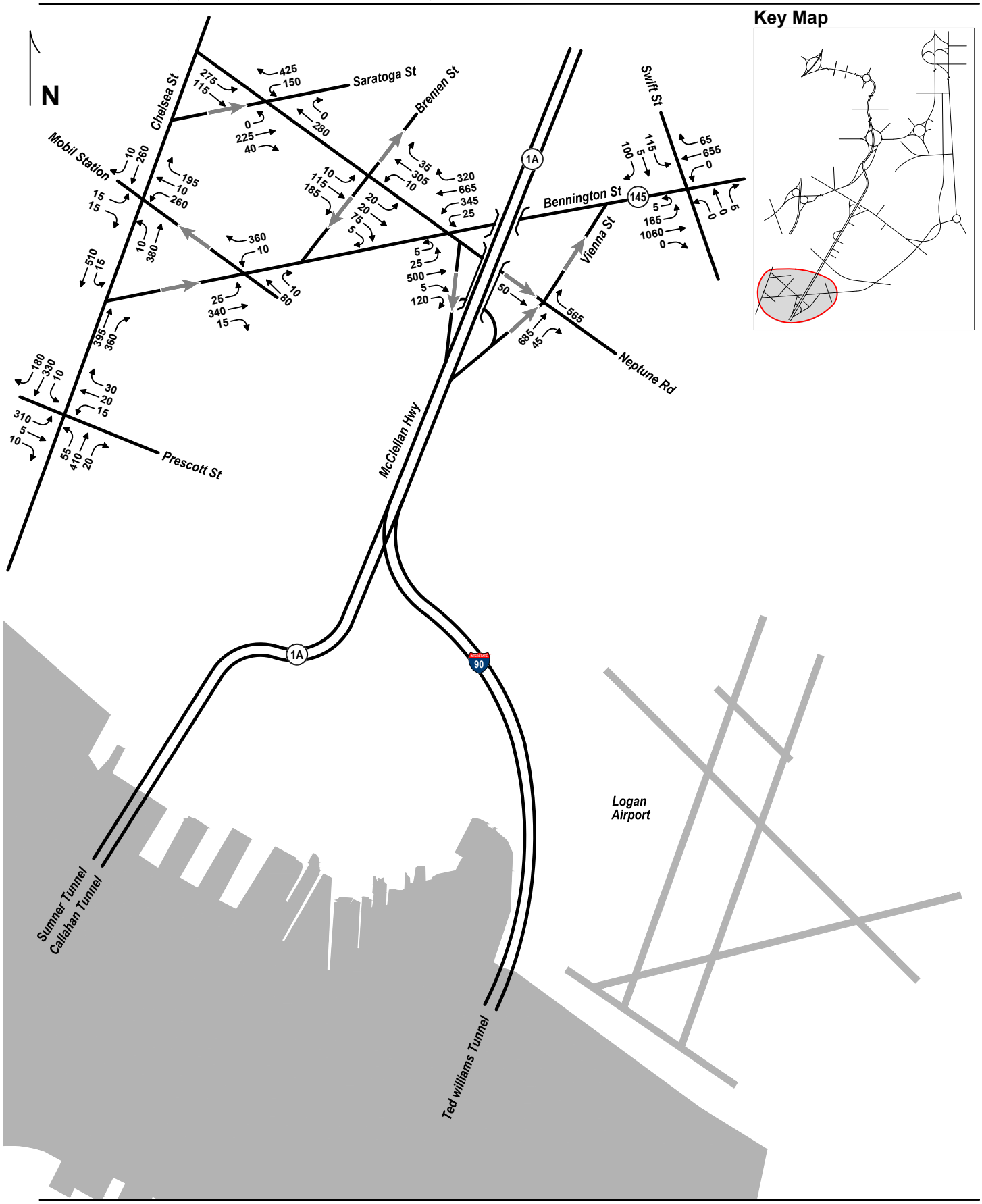


Figure 6.58g
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts

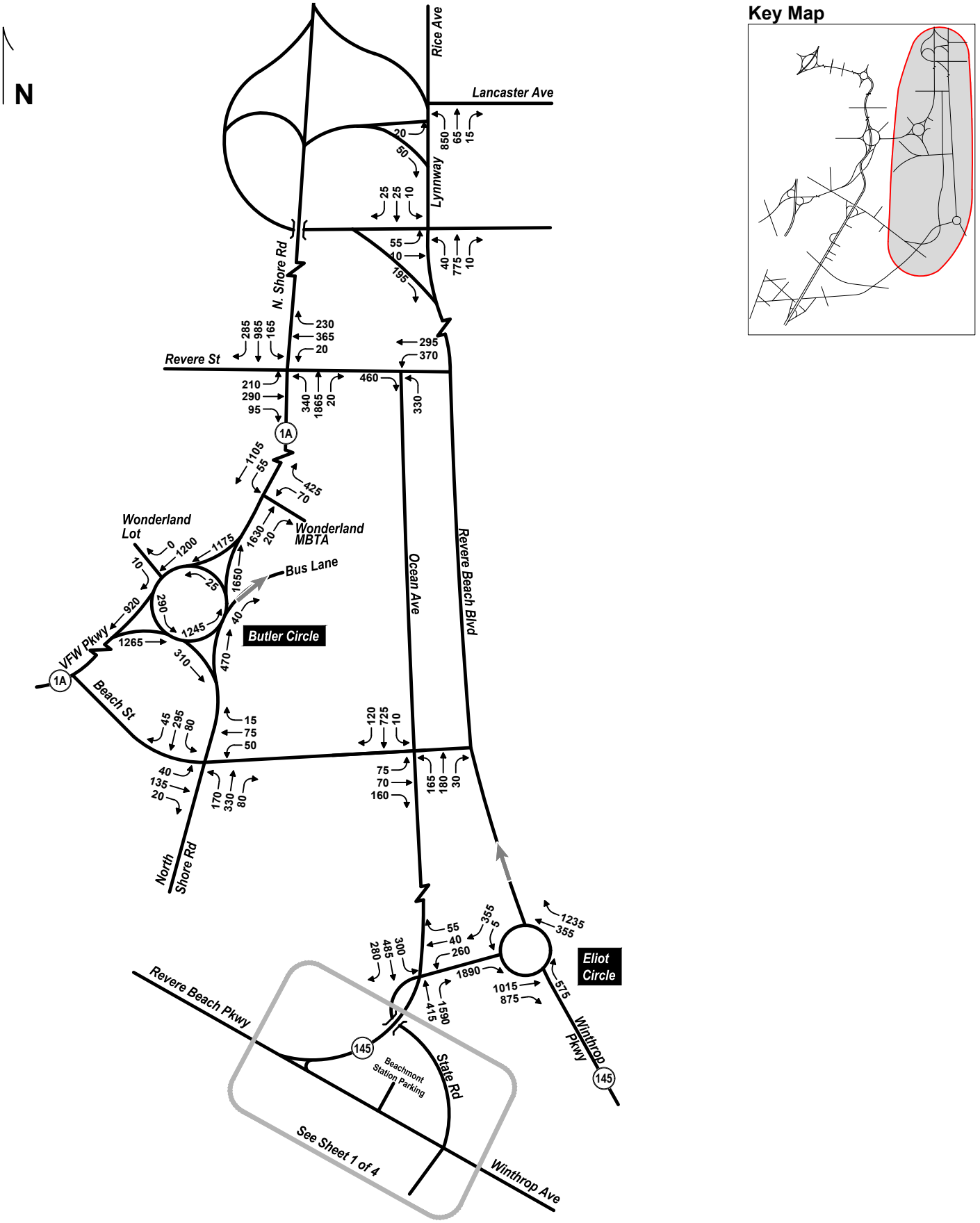
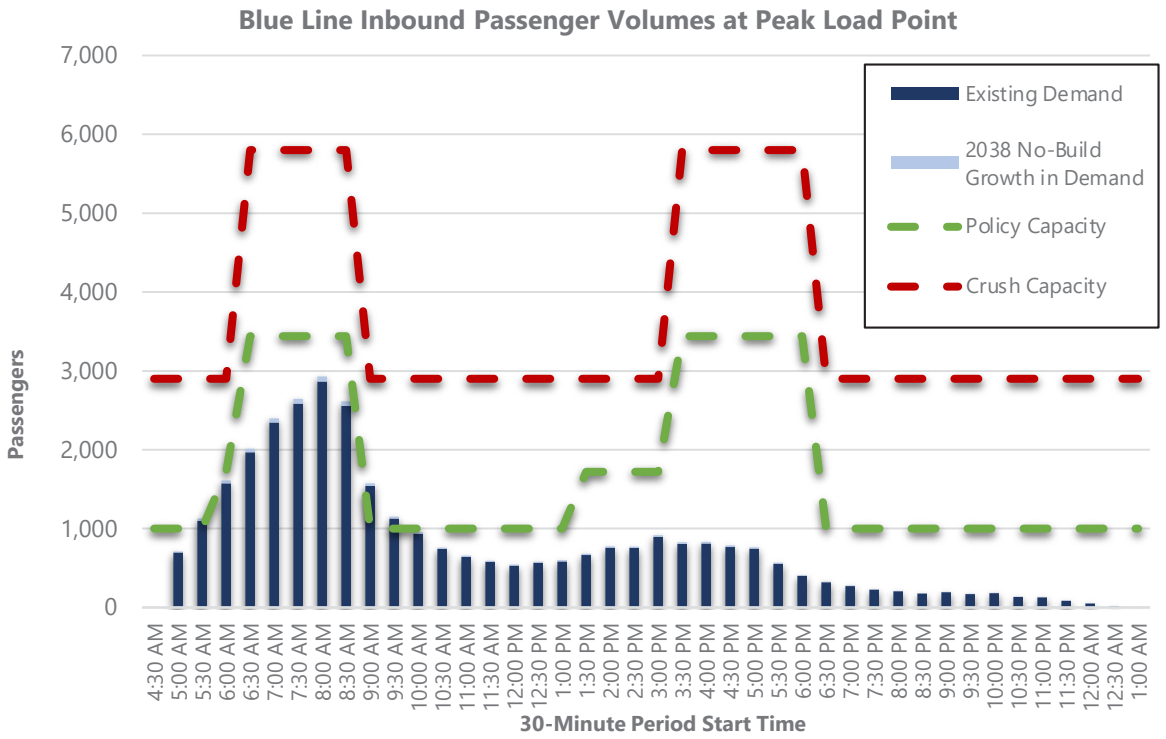
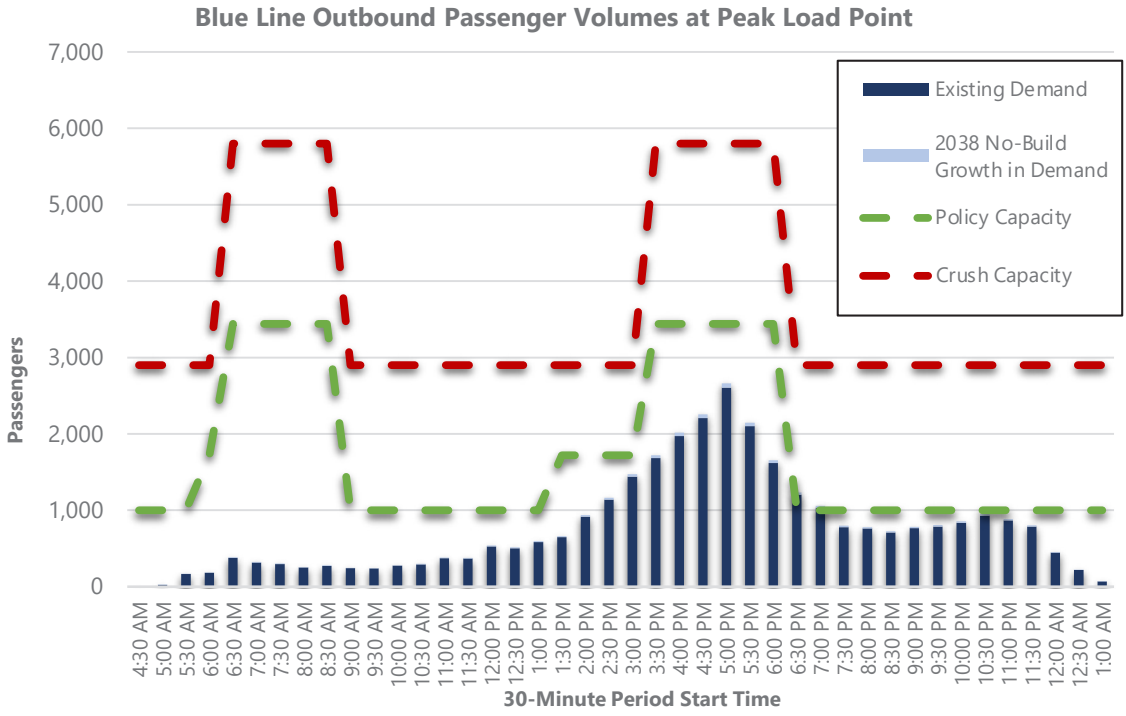


Figure 6.58h
Evening Peak Hour
2038 Build Condition Vehicle Volume Network
(Expected TOD Parameters)
Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





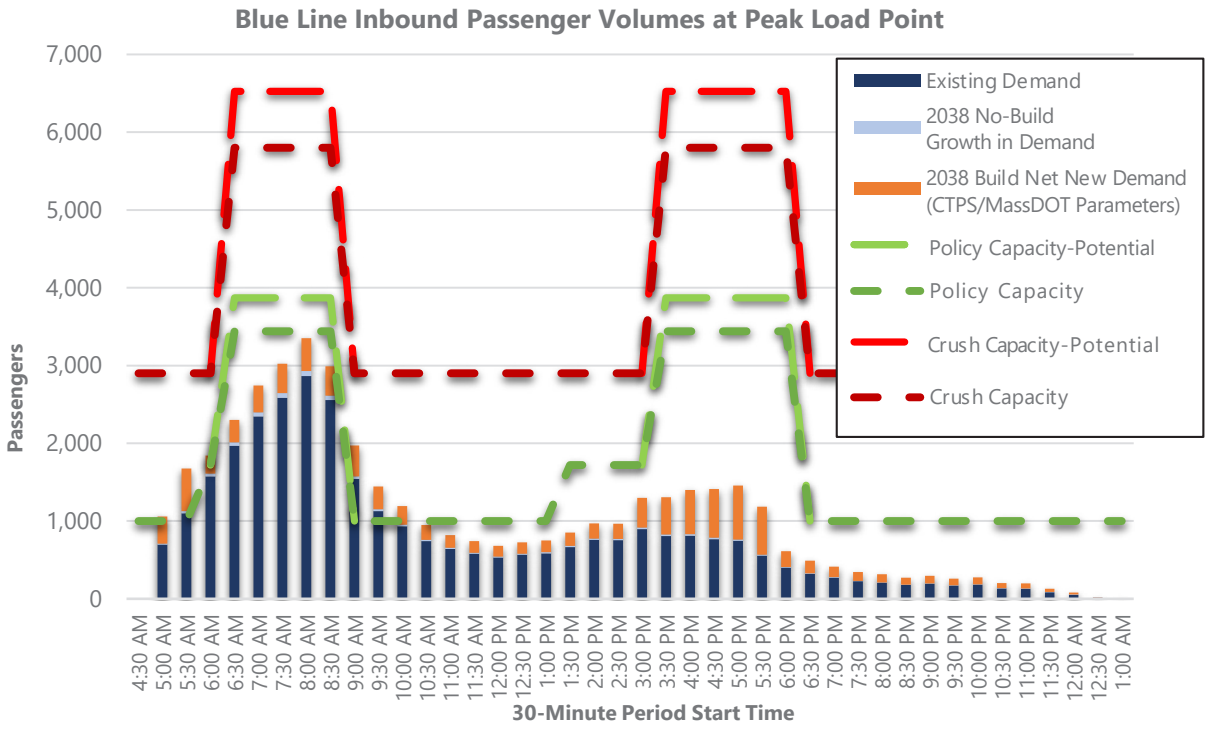
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

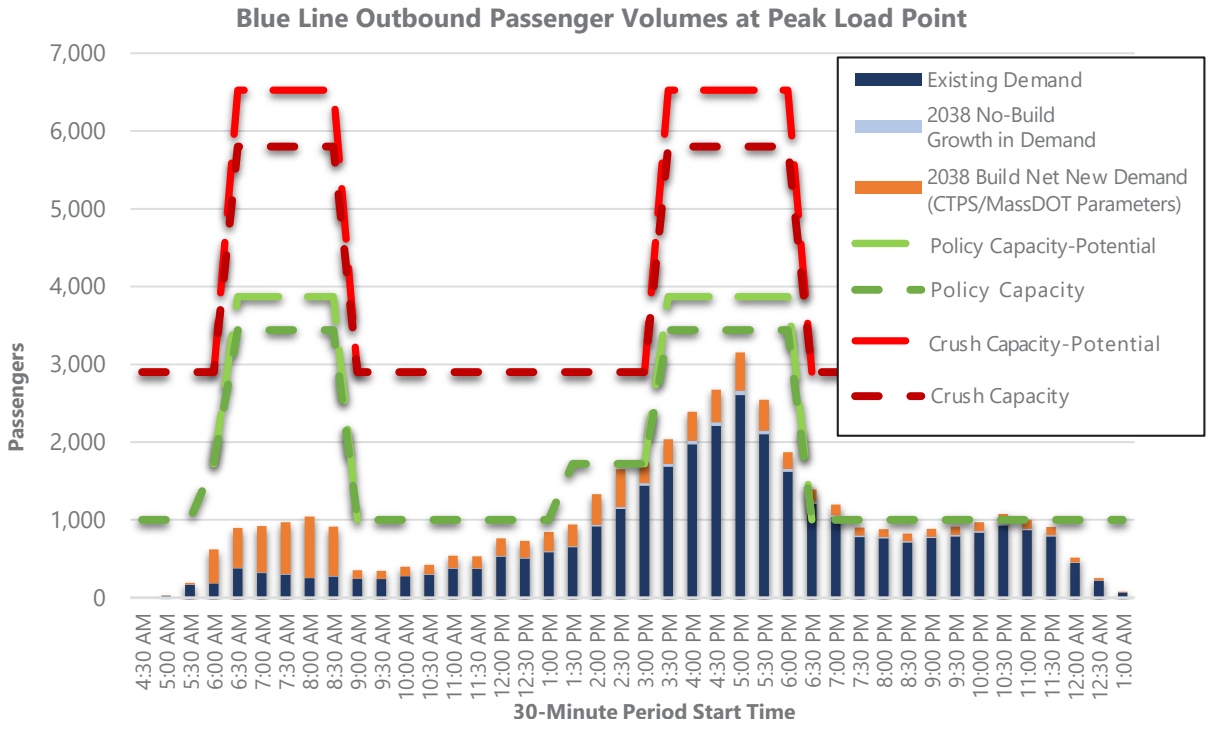
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.59a

2038 No-Build Condition
Blue Line Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





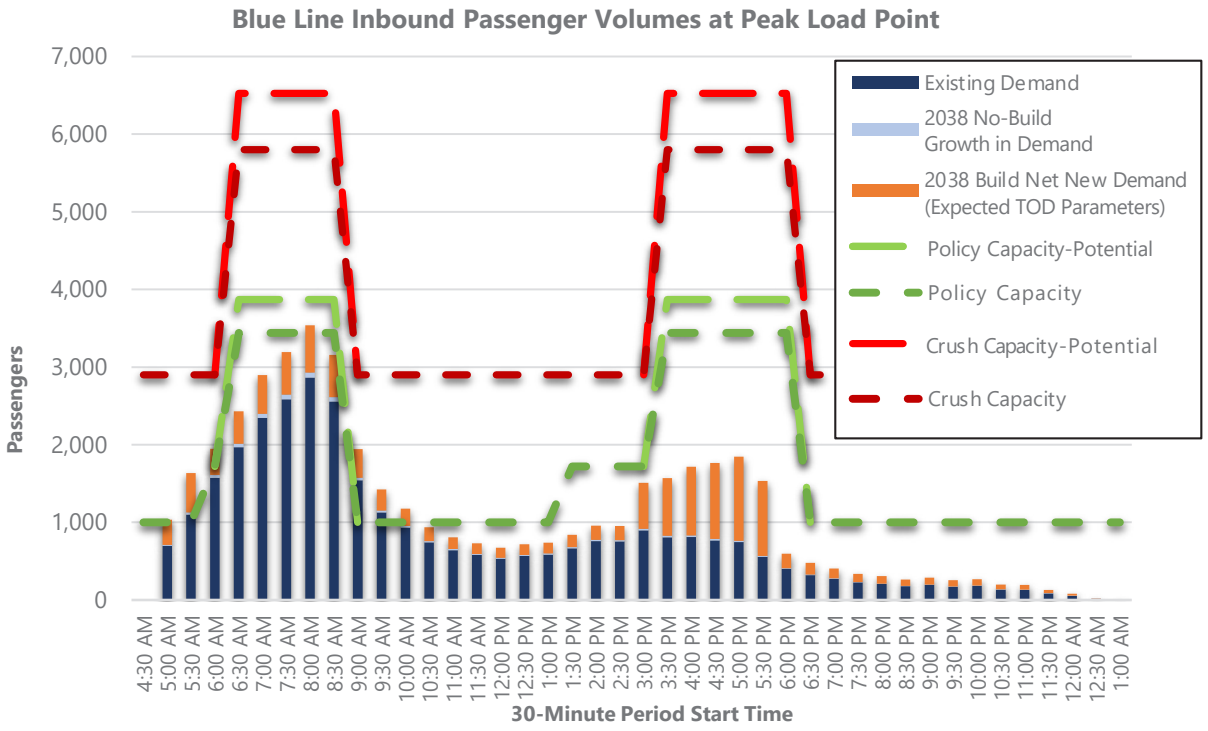
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

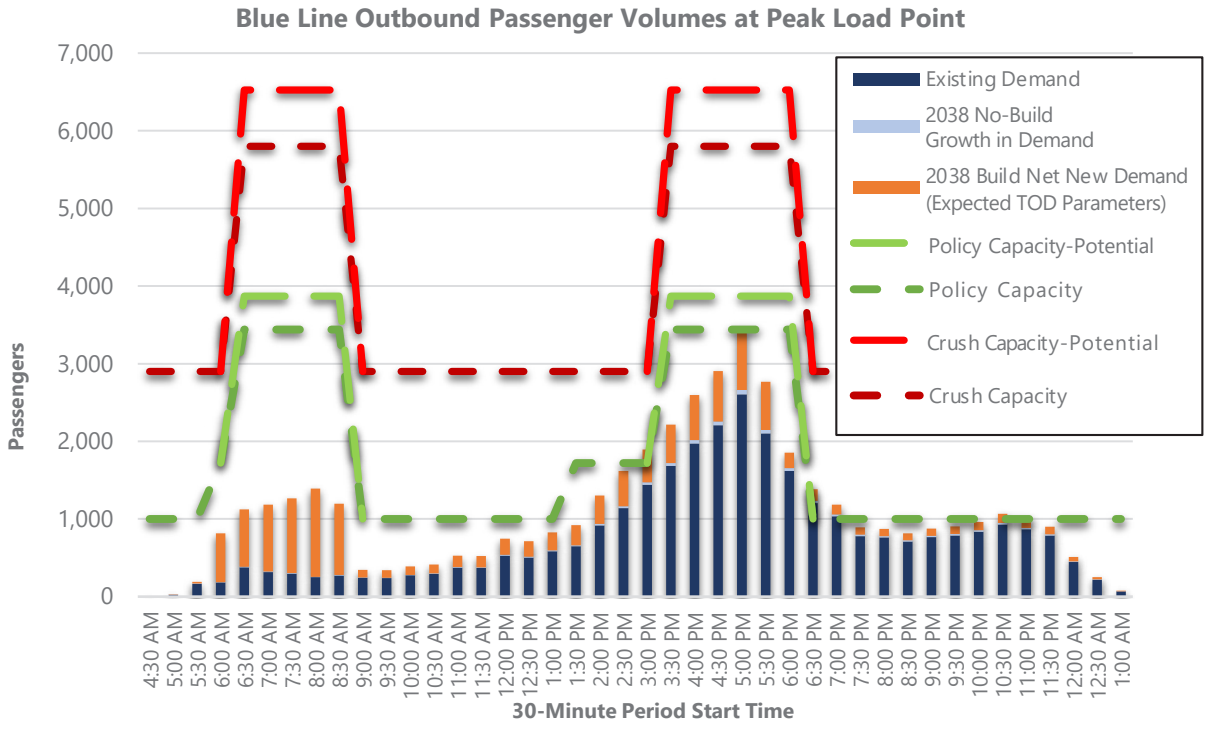
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.59b

2038 Build Condition (CTPS/MassDOT Parameters) Blue Line Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





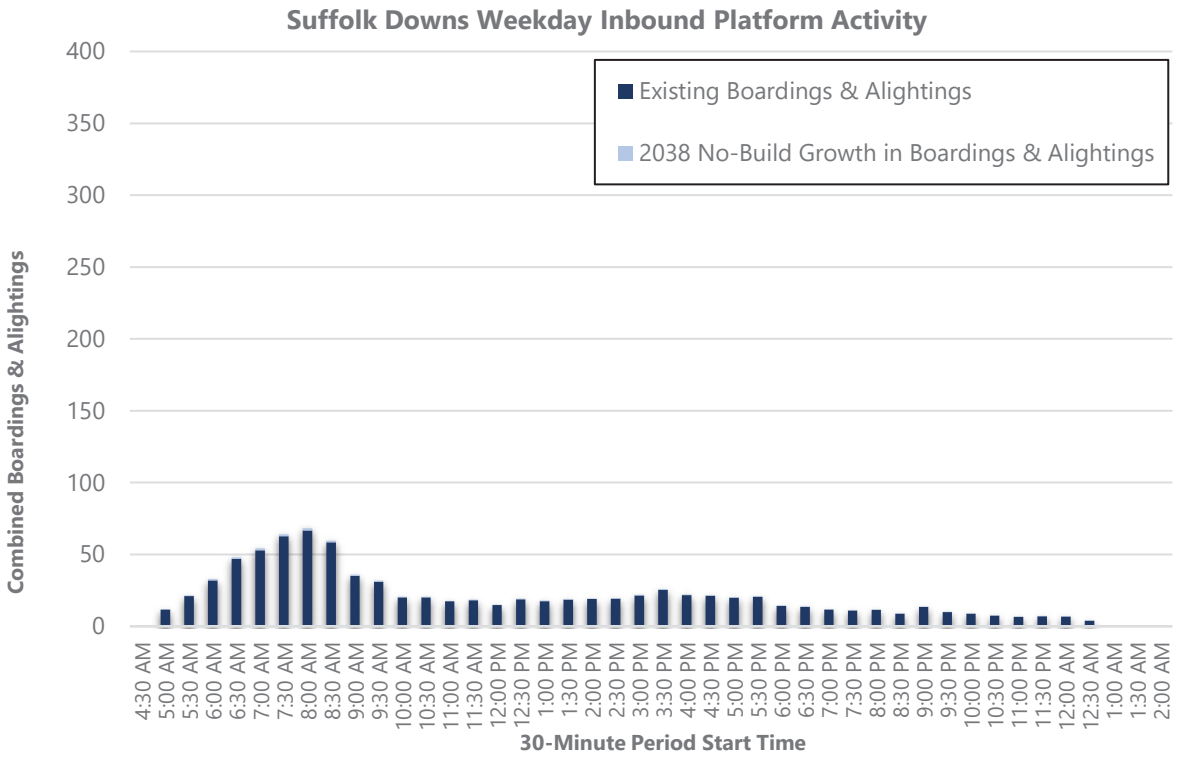
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

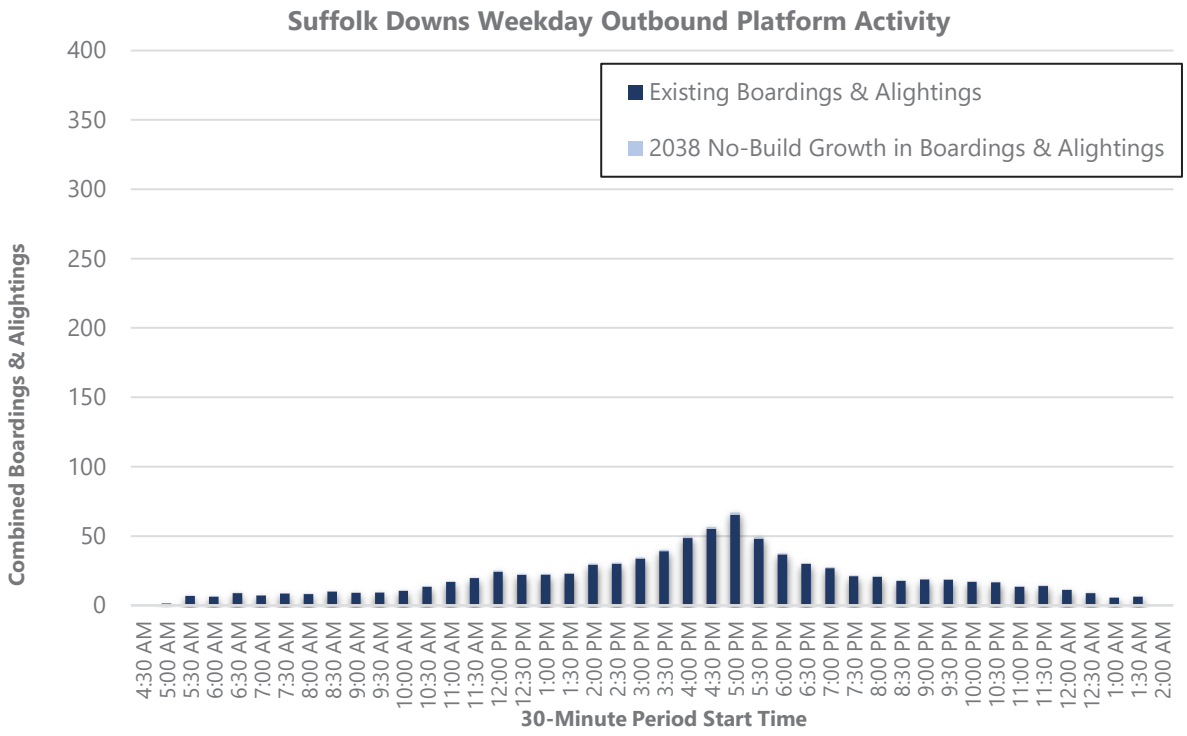
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.59c

2038 Build Condition (Expected TOD Parameters) Blue Line Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





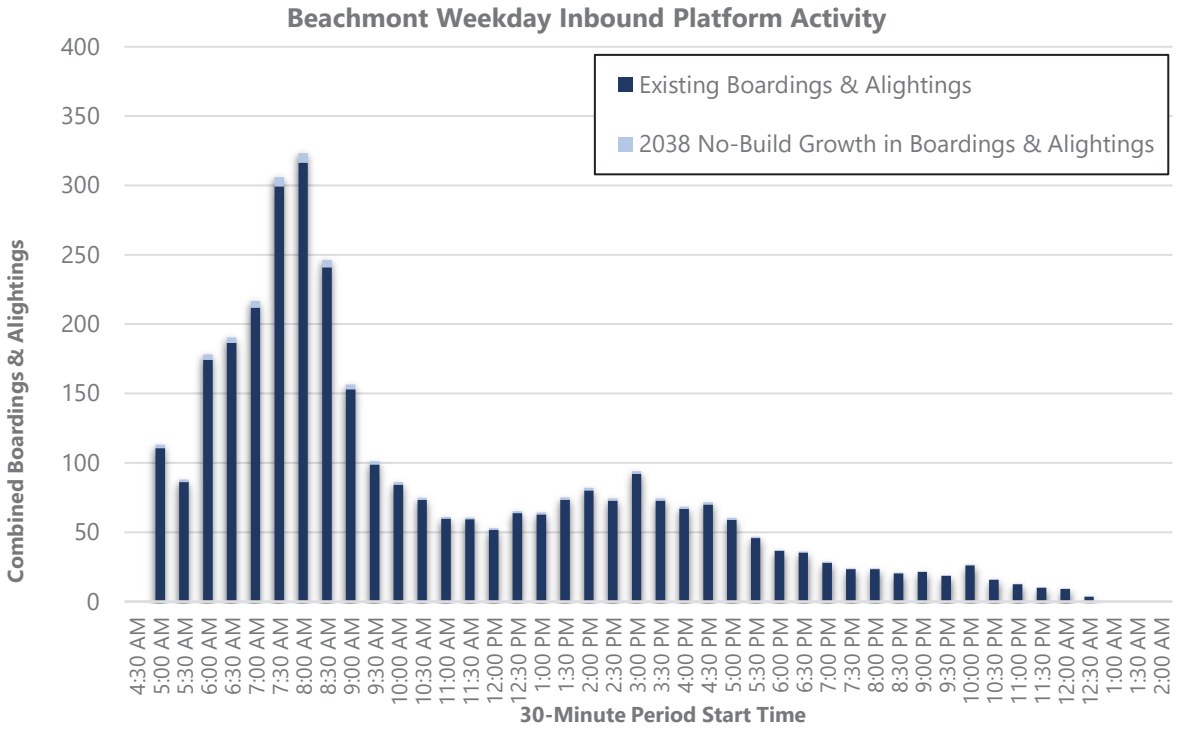
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

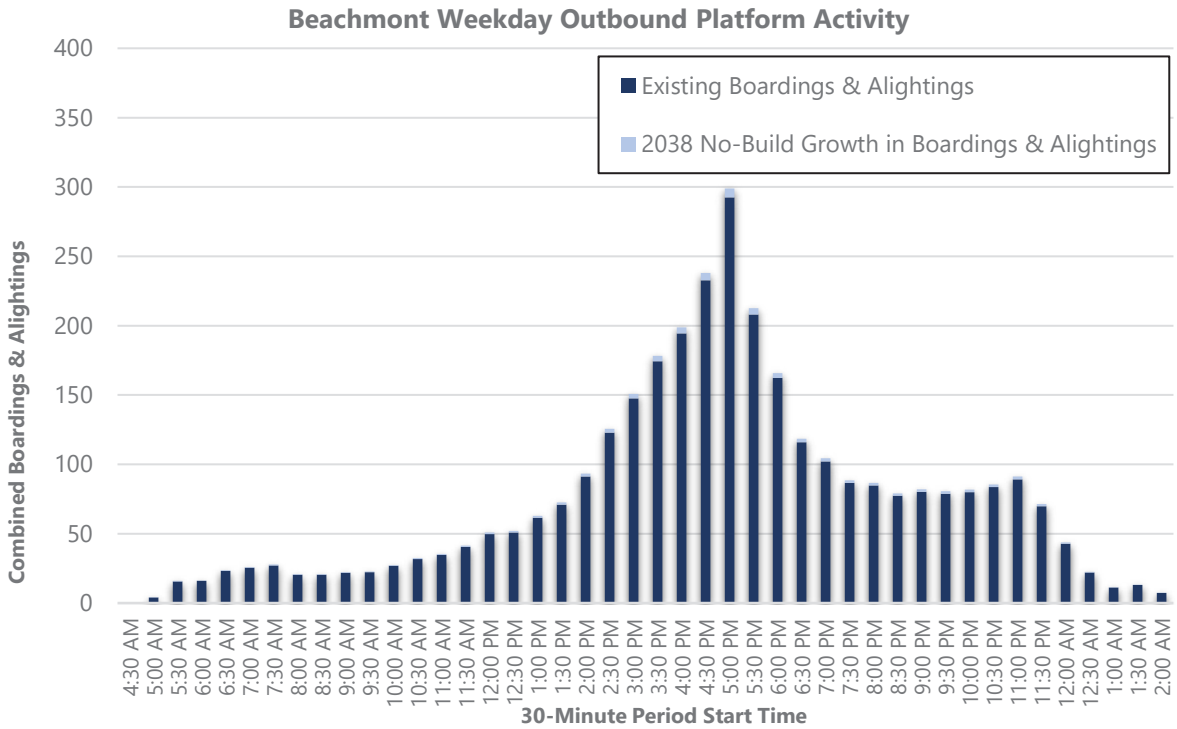
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60a

2038 No-Build Condition
Suffolk Downs Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





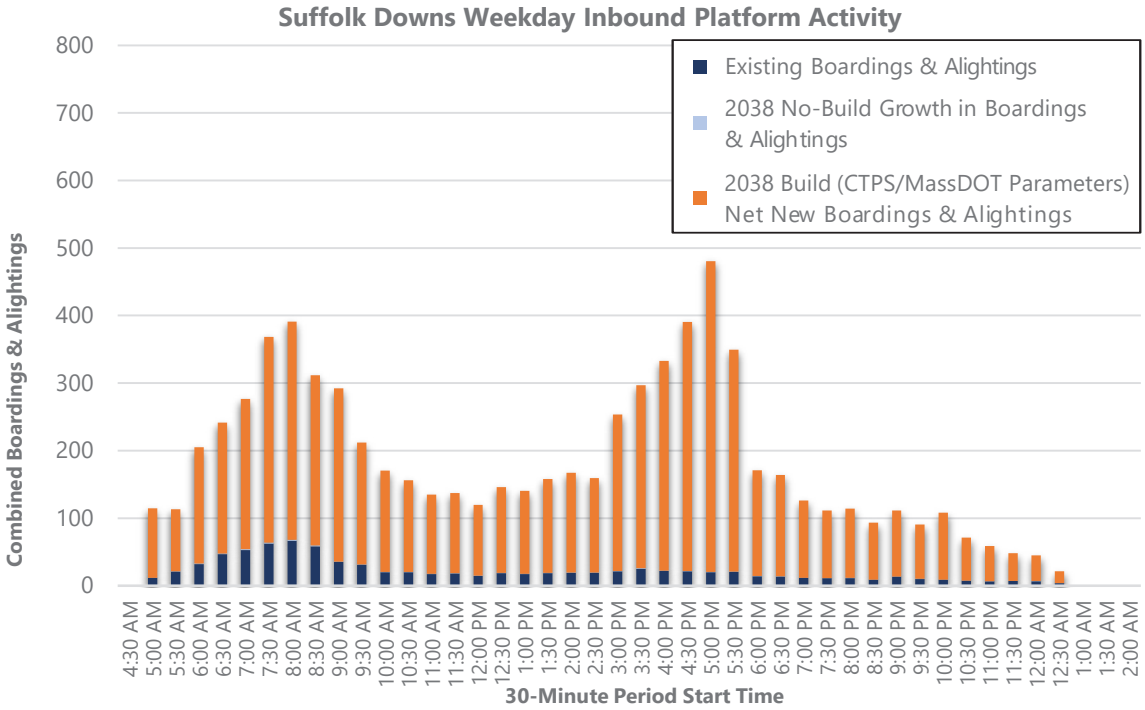
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

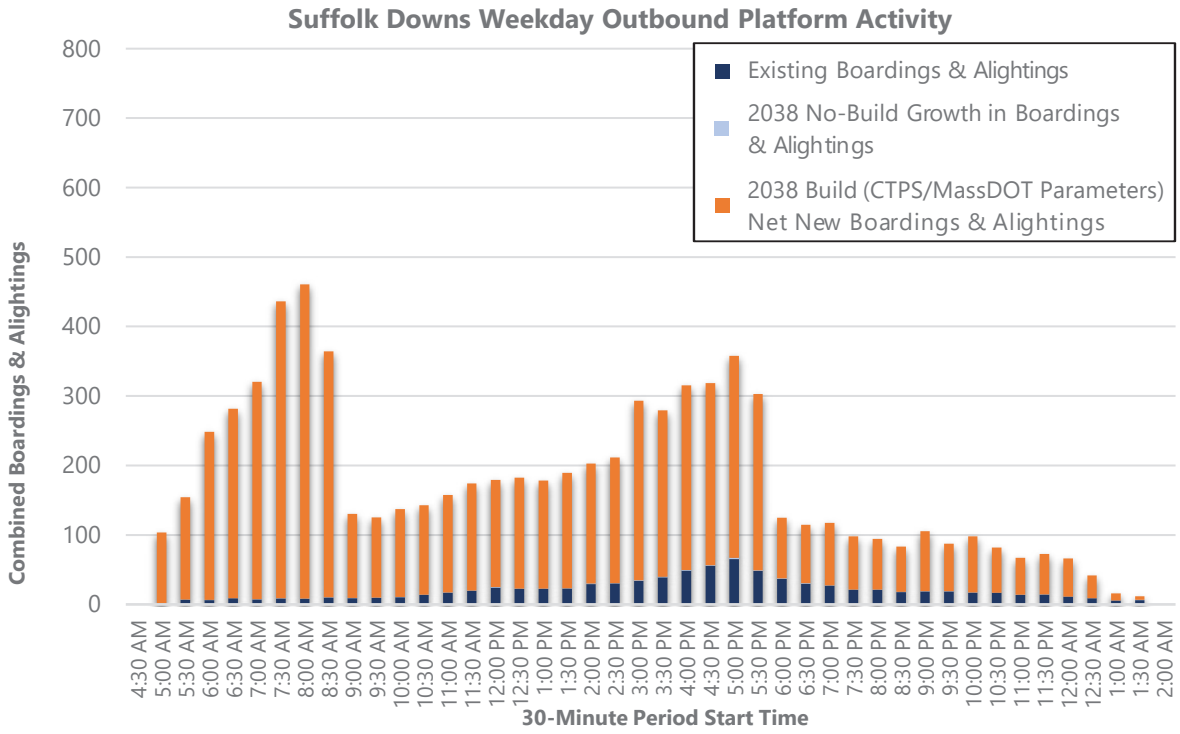
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60b

2038 No-Build Condition
Beachmont Station
Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





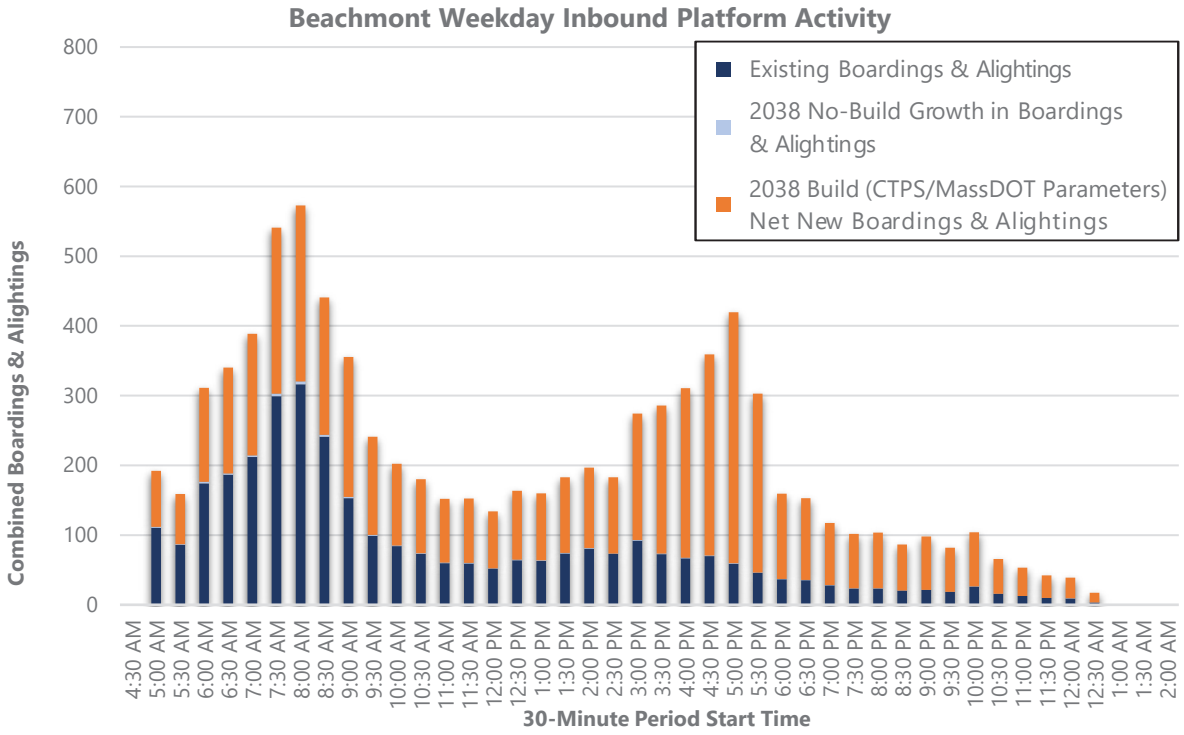
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

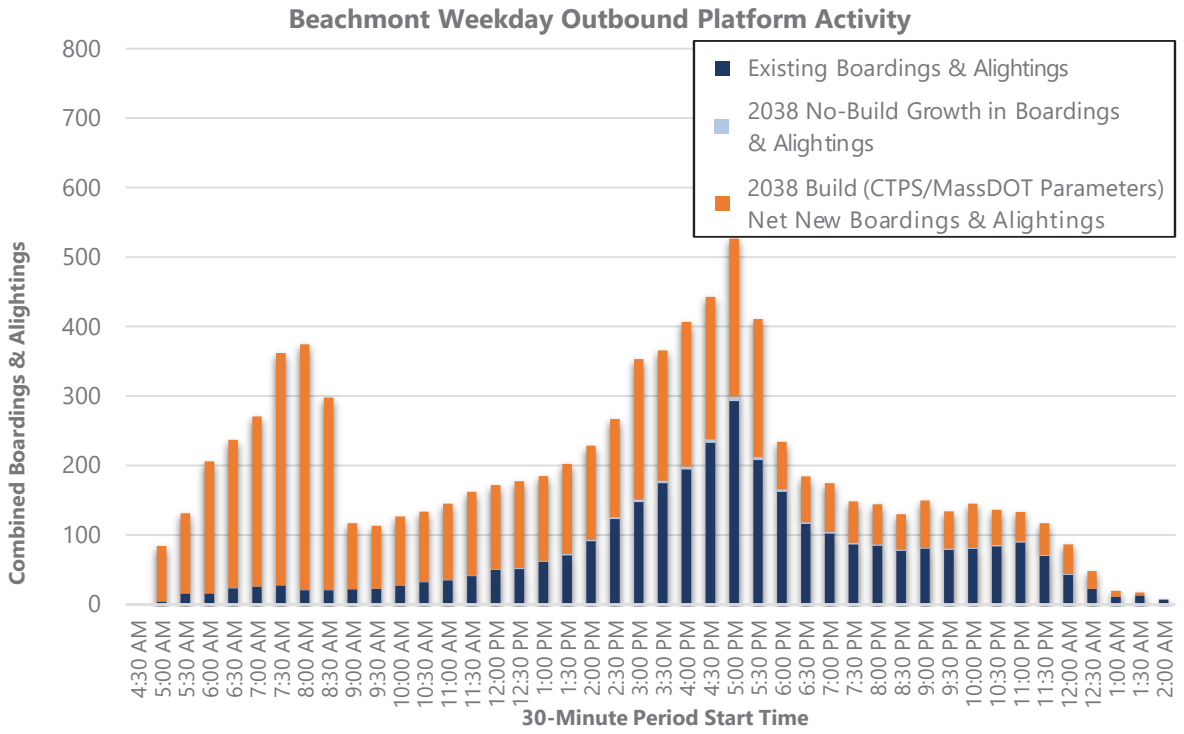
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60c

2038 Build Condition (CTPS/MassDOT Parameters) Suffolk Downs Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





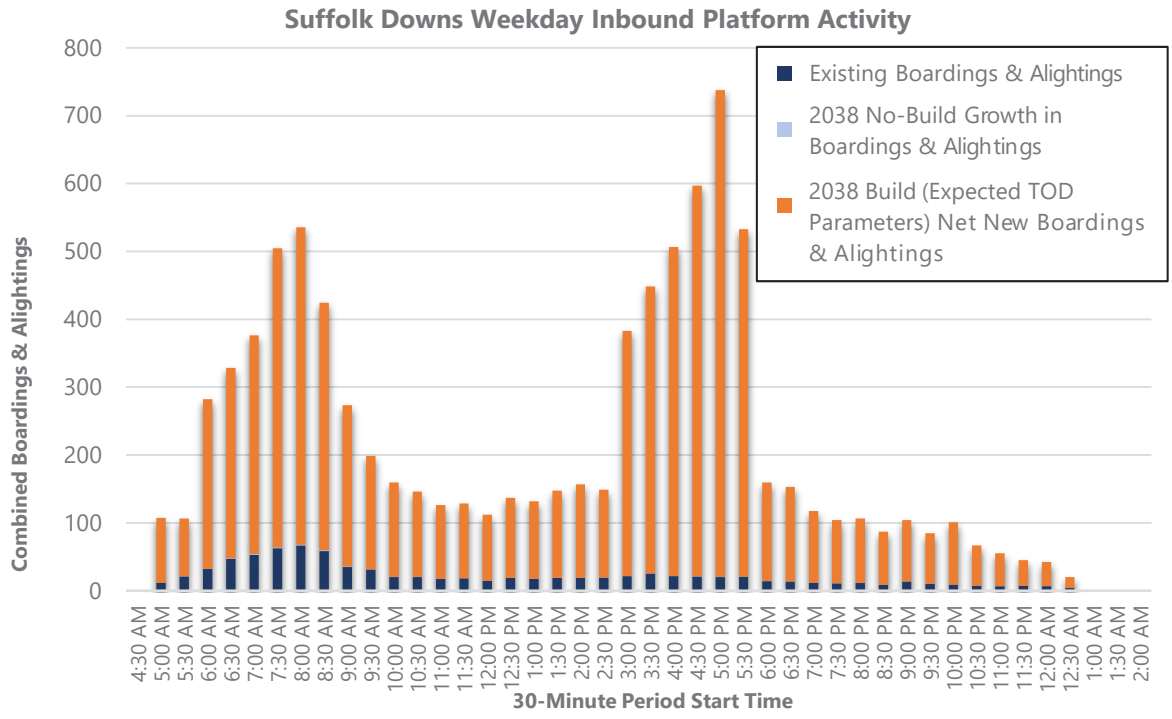
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

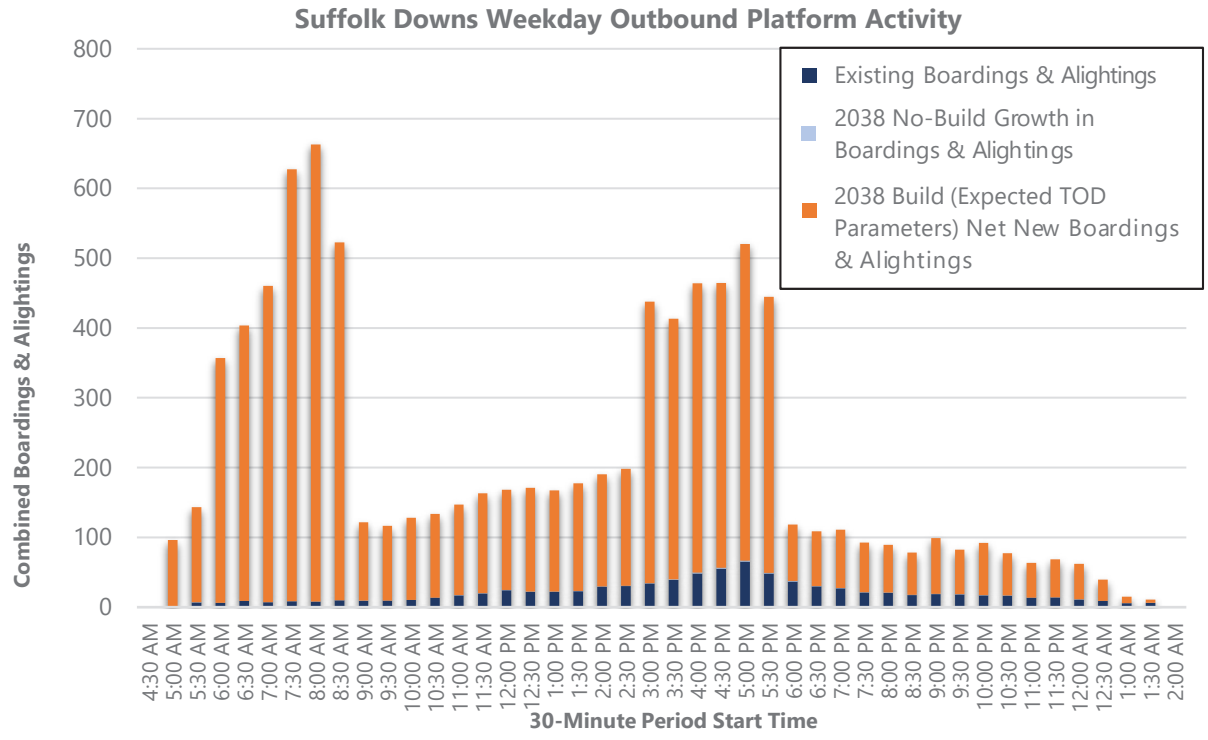
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60d

2038 Build Condition (CTPS/MassDOT Parameters) Beachmont Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





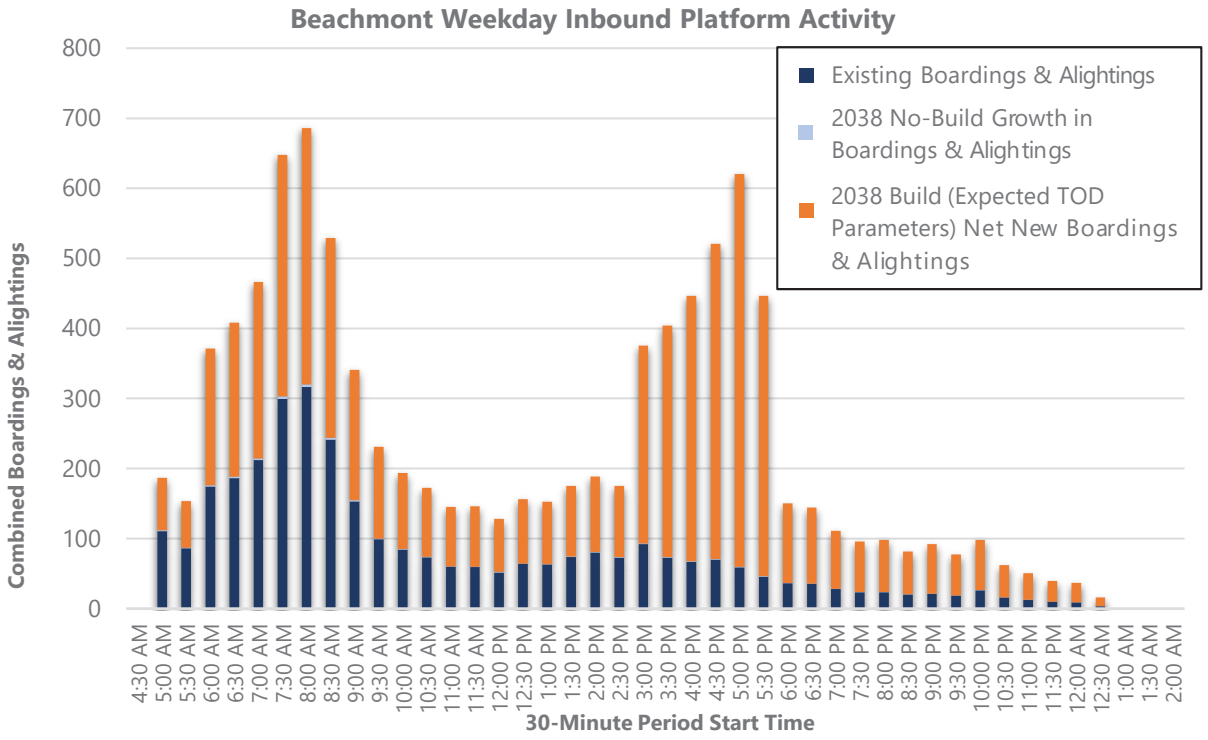
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

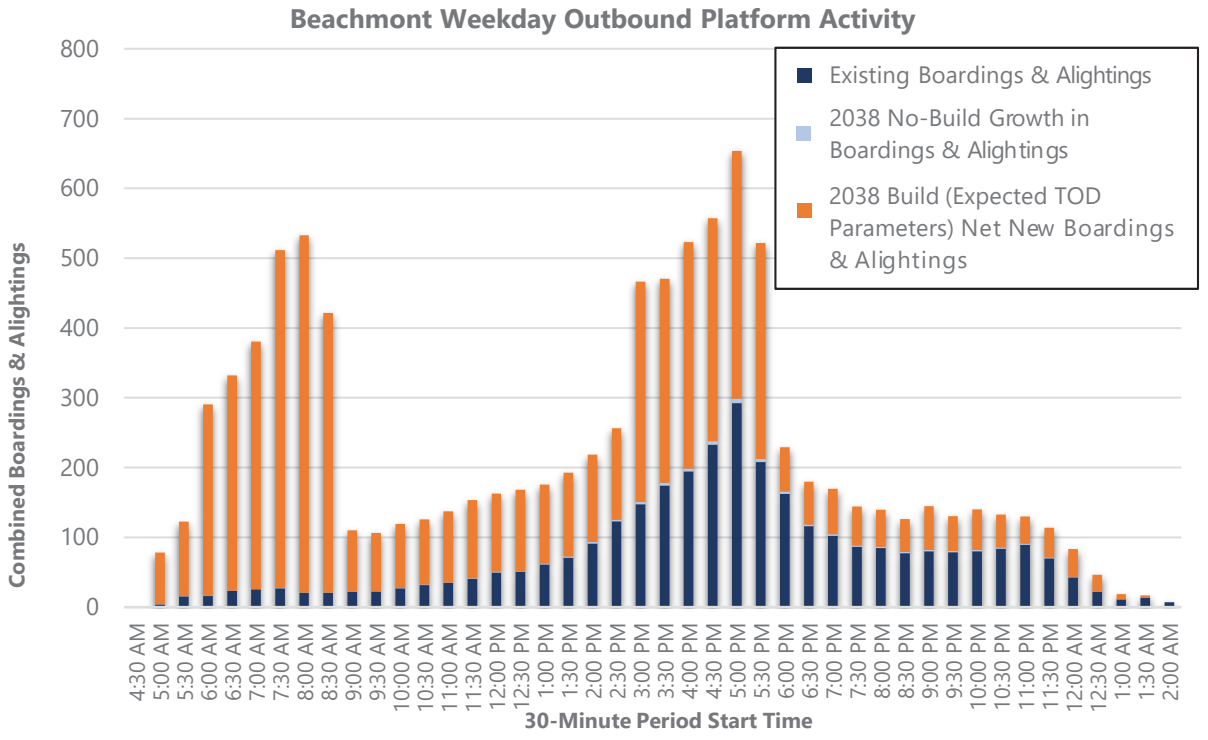
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60e

2038 Build Condition (Expected TOD Parameters) Suffolk Downs Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





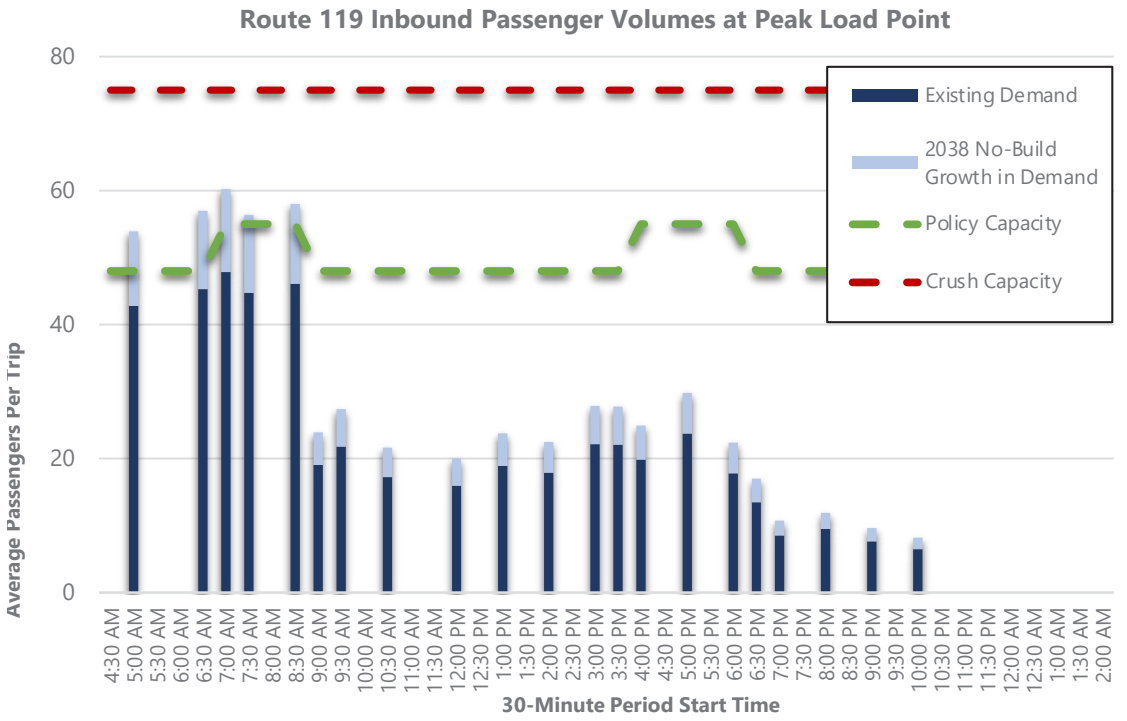
Existing Conditions Data Source: MBTA, Blue Line Ridership Data, Fall 2016.

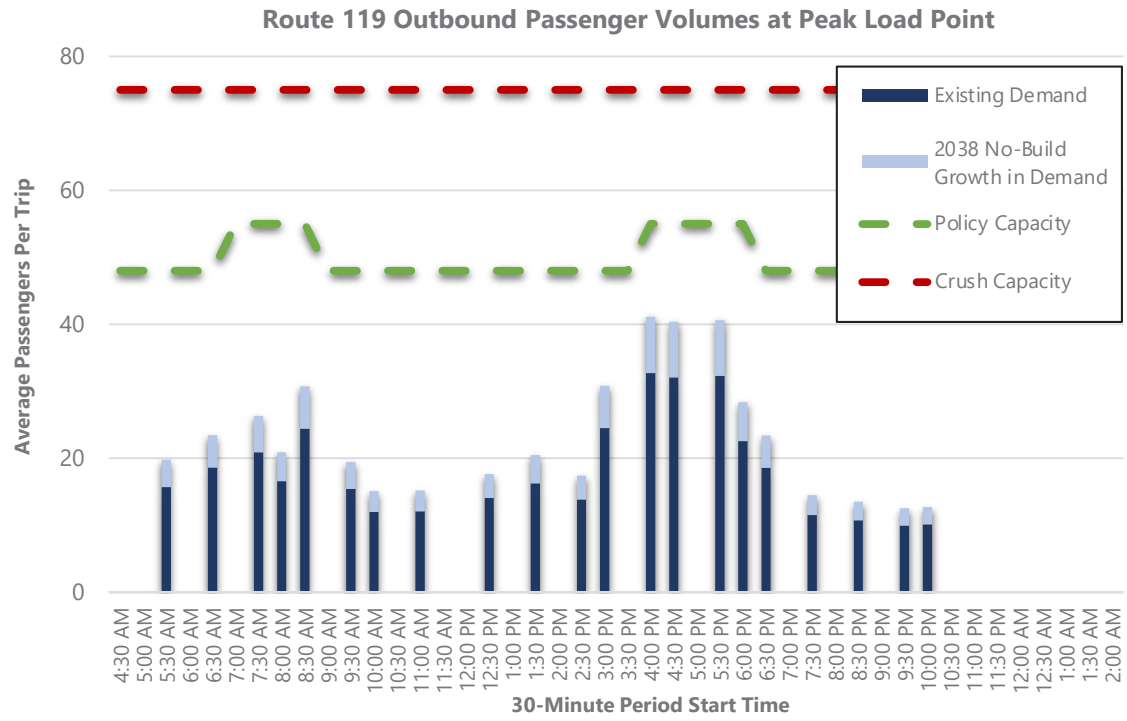
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes 0.1% minimum average annual growth rate for MBTA Blue Line ridership).

Figure 6.60f

2038 Build Condition (Expected TOD Parameters) Beachmont Station Platform Activity

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

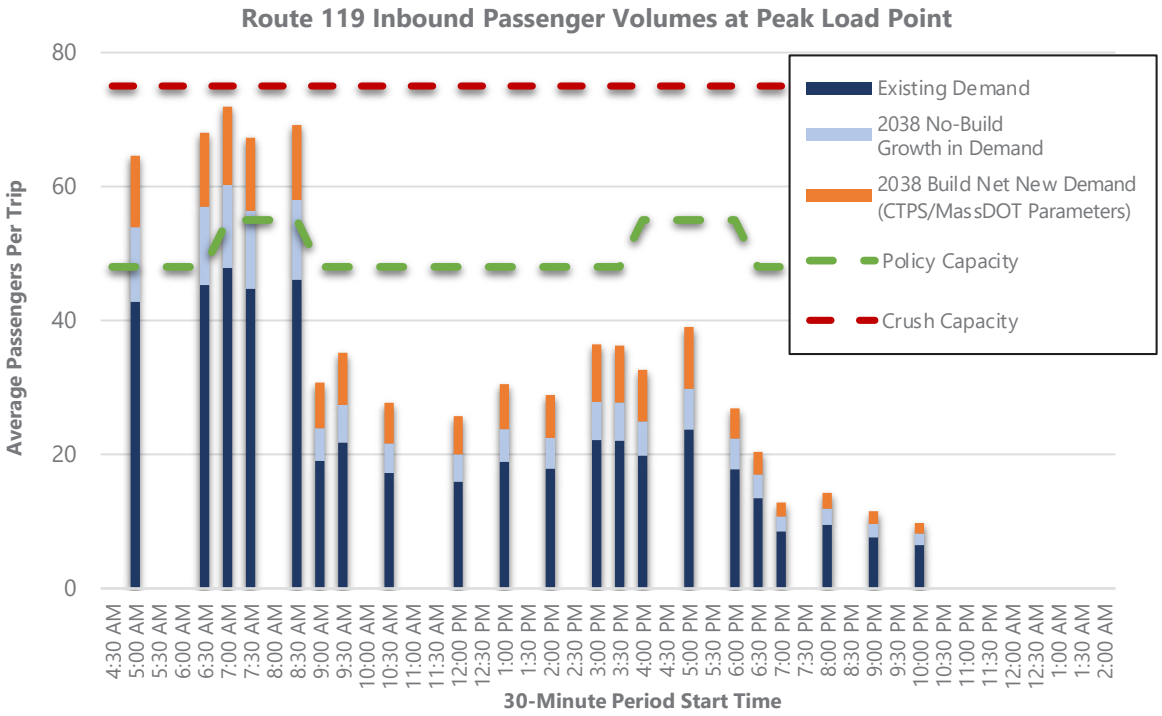
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.1% average annual growth rate for MBTA Route 119 ridership).

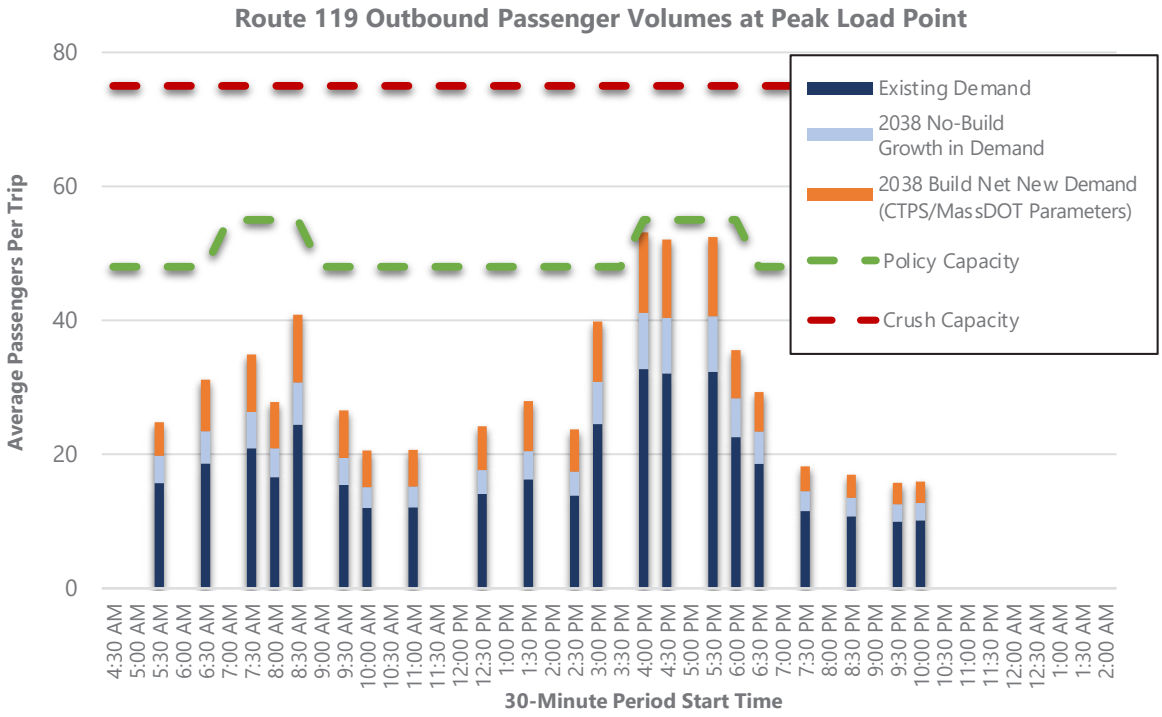
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.61a

2038 No-Build Condition
MBTA Route 119 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

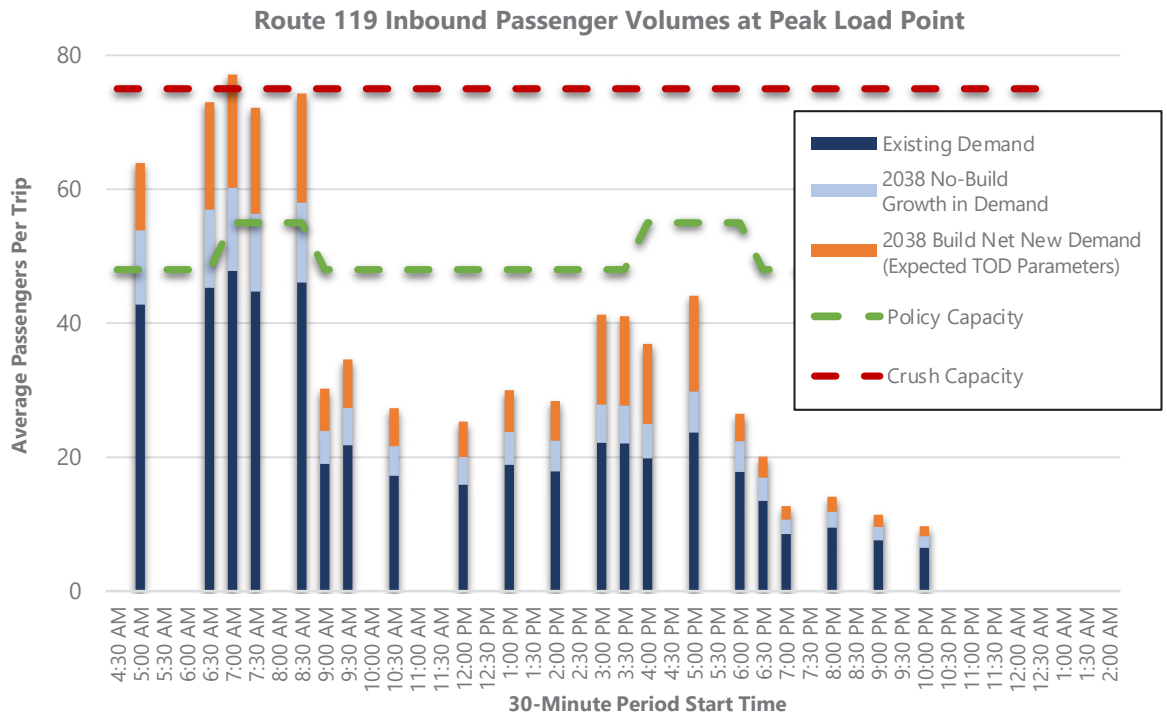
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.1% average annual growth rate for MBTA Route 119 ridership).

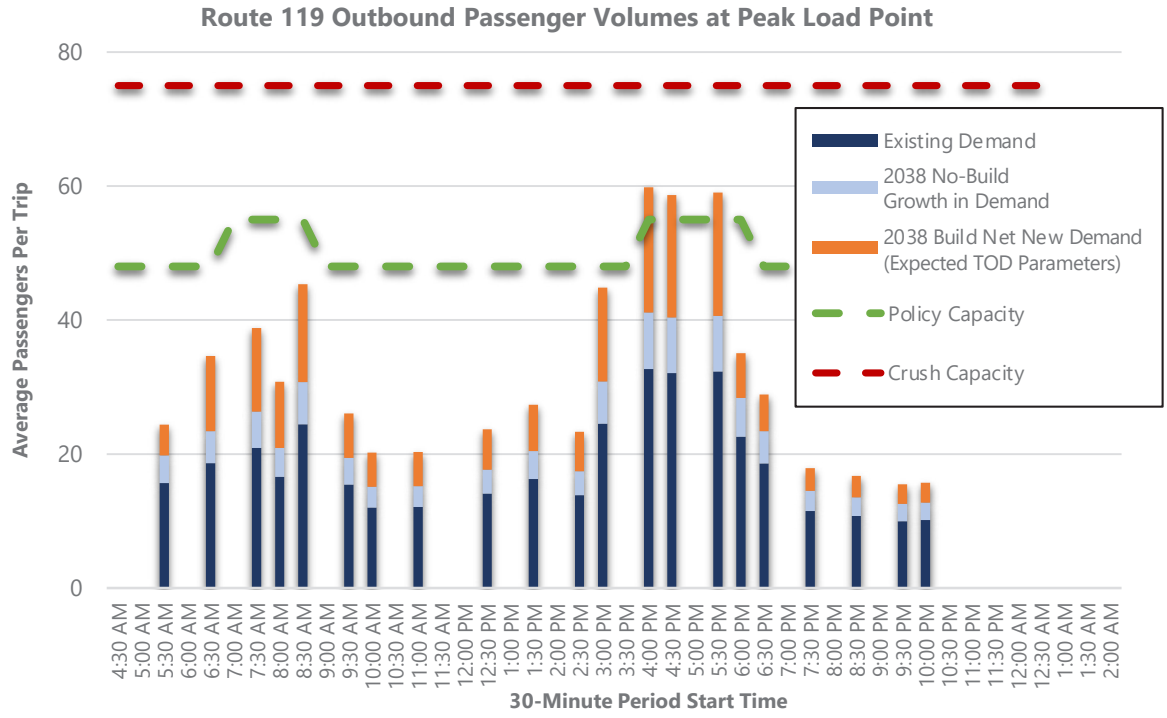
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.61b

2038 Build Condition (CTPS/MassDOT Parameters) MBTA Route 119 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 119 Ridership Data, Fall 2017.

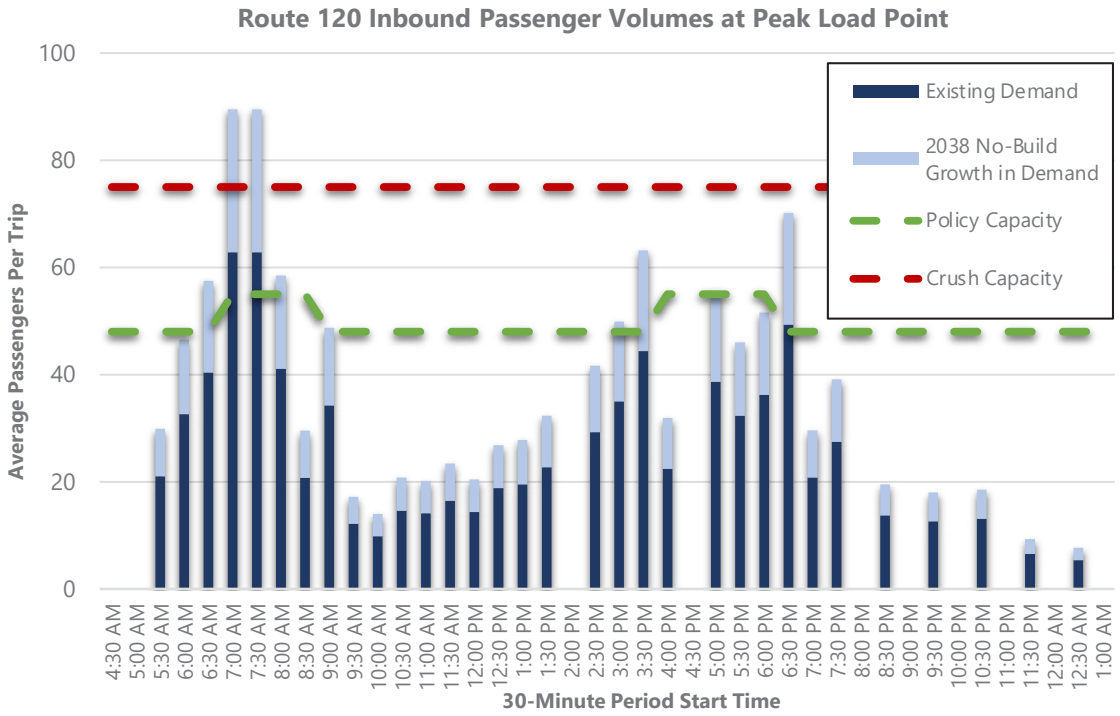
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.1% average annual growth rate for MBTA Route 119 ridership).

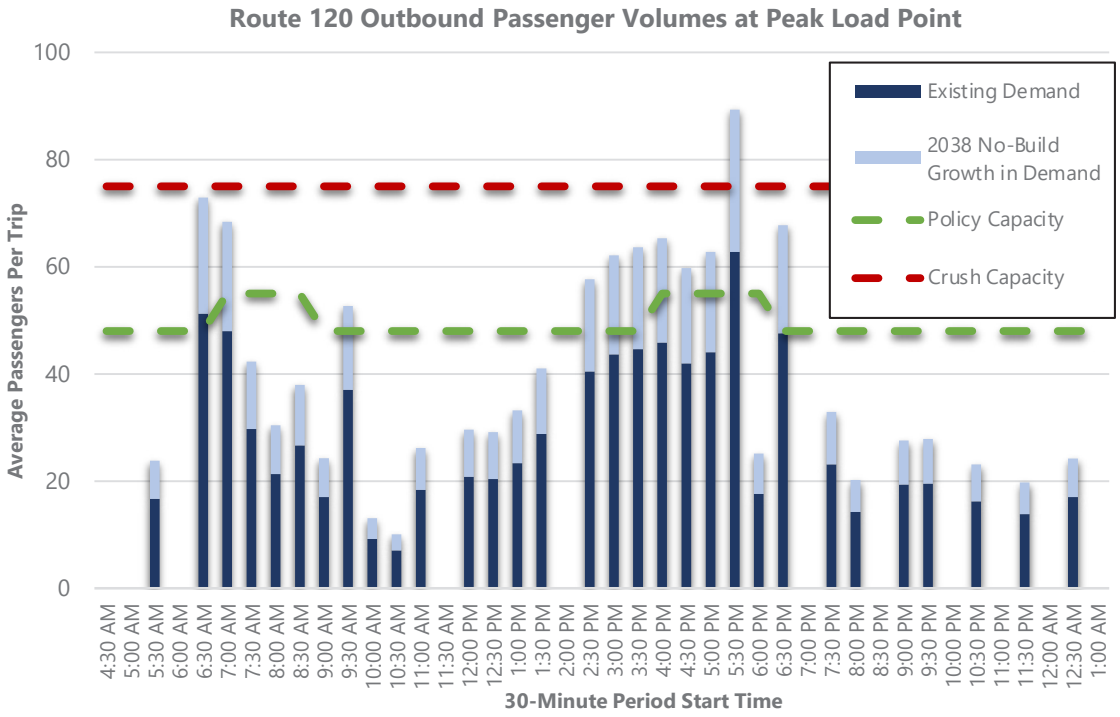
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.61c

2038 Build Condition
(Expected TOD Parameters)
MBTA Route 119 Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 120 Ridership Data, Fall 2017.

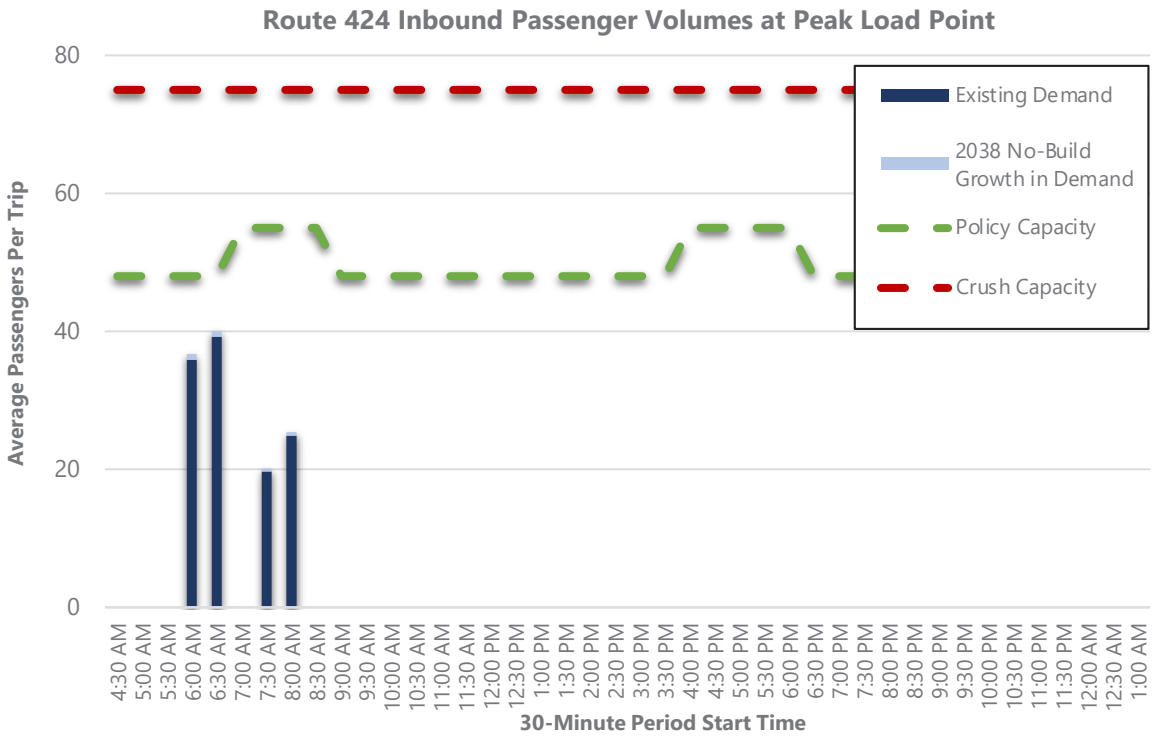
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (1.7% average annual growth rate for MBTA Route 120 ridership).

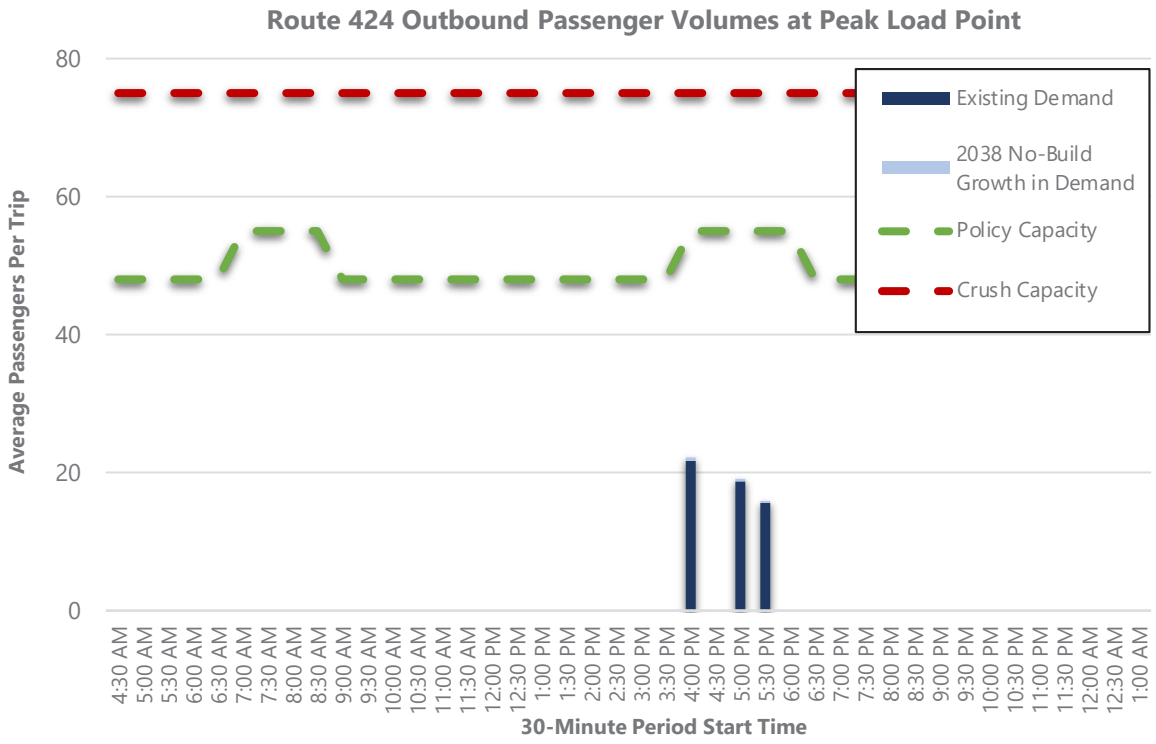
Note: Existing conditions passenger volumes shown are based on Fall 2017 data, with adjustments made to reflect estimated volumes for each 30-minute period per June 2018 schedule changes.

Figure 6.62

2038 No-Build Condition
MBTA Route 120 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 424 Ridership Data, Fall 2017.

No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 424 ridership).

Figure 6.63

2038 No-Build Condition
MBTA Route 424 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts



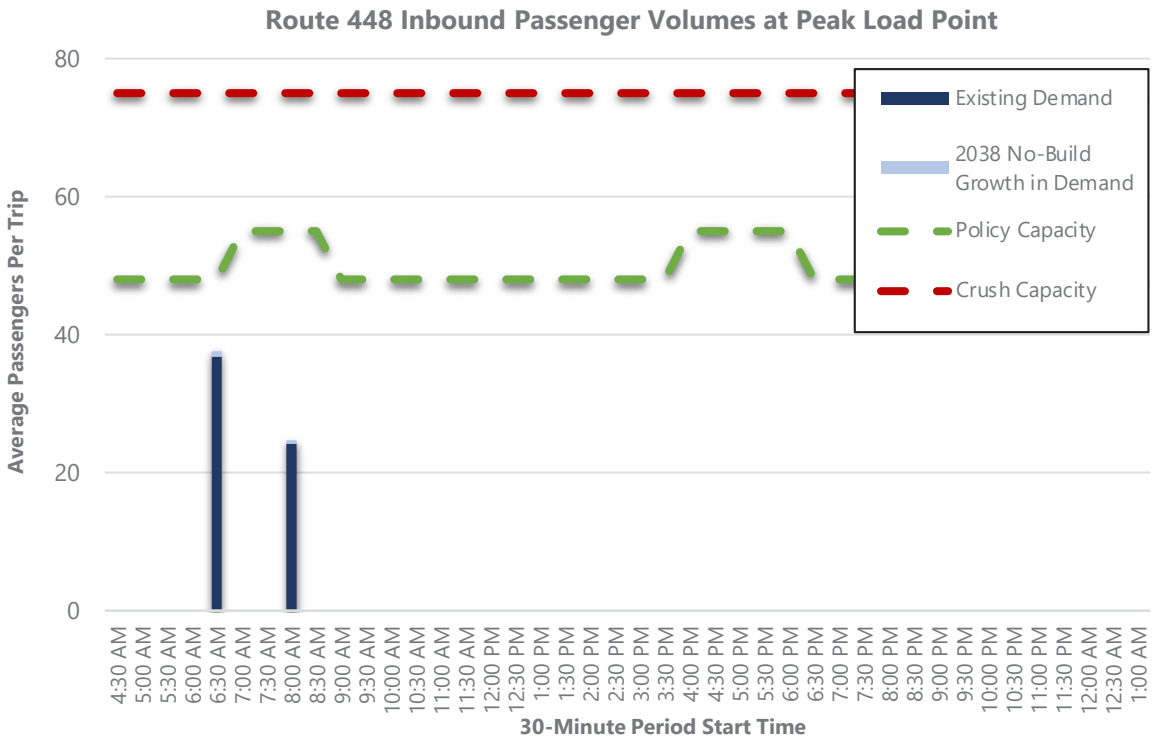
Existing Conditions Data Source: MBTA, Route 434 Ridership Data, Fall 2017.

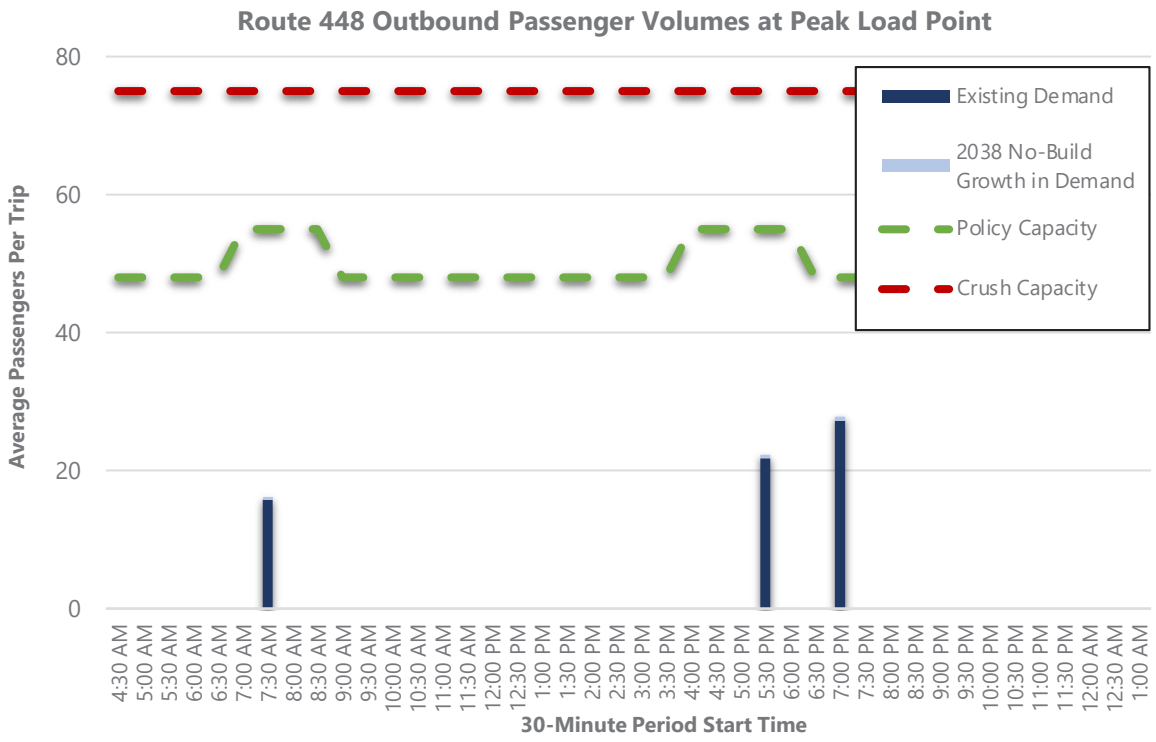
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (0.1% average annual growth rate for MBTA Route 434 ridership).

Figure 6.64

2038 No-Build Condition
MBTA Route 434 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





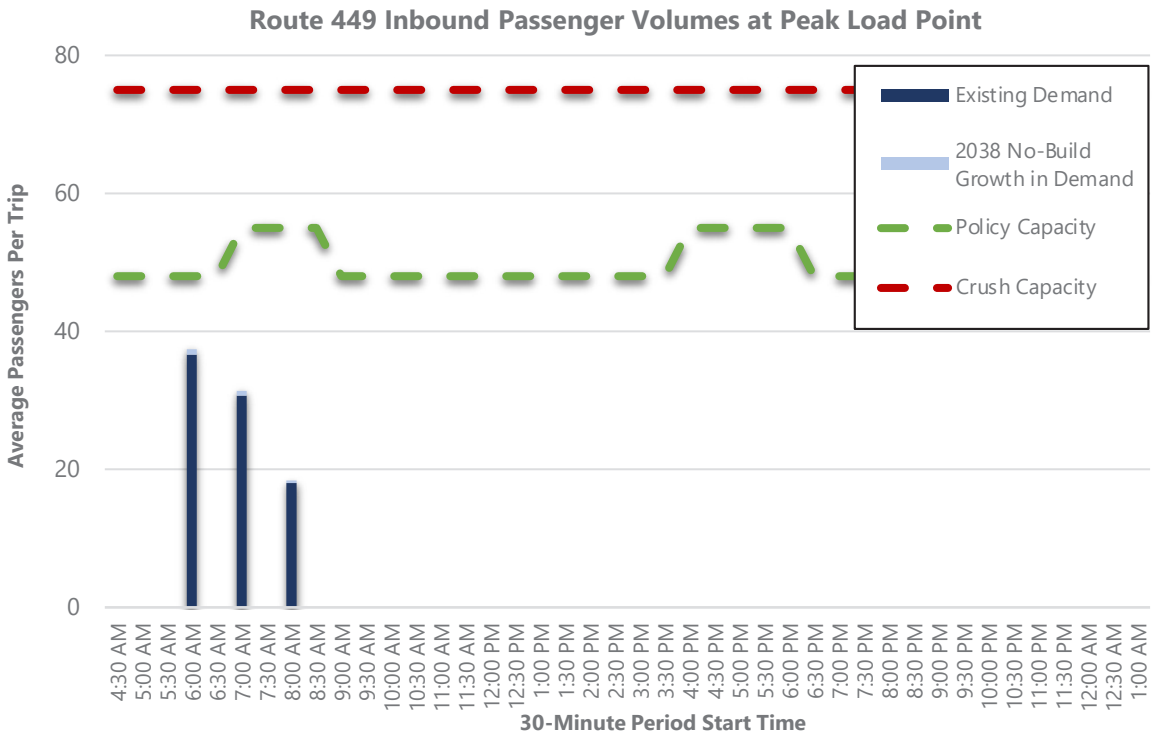
Existing Conditions Data Source: MBTA, Route 448 Ridership Data, Fall 2017.

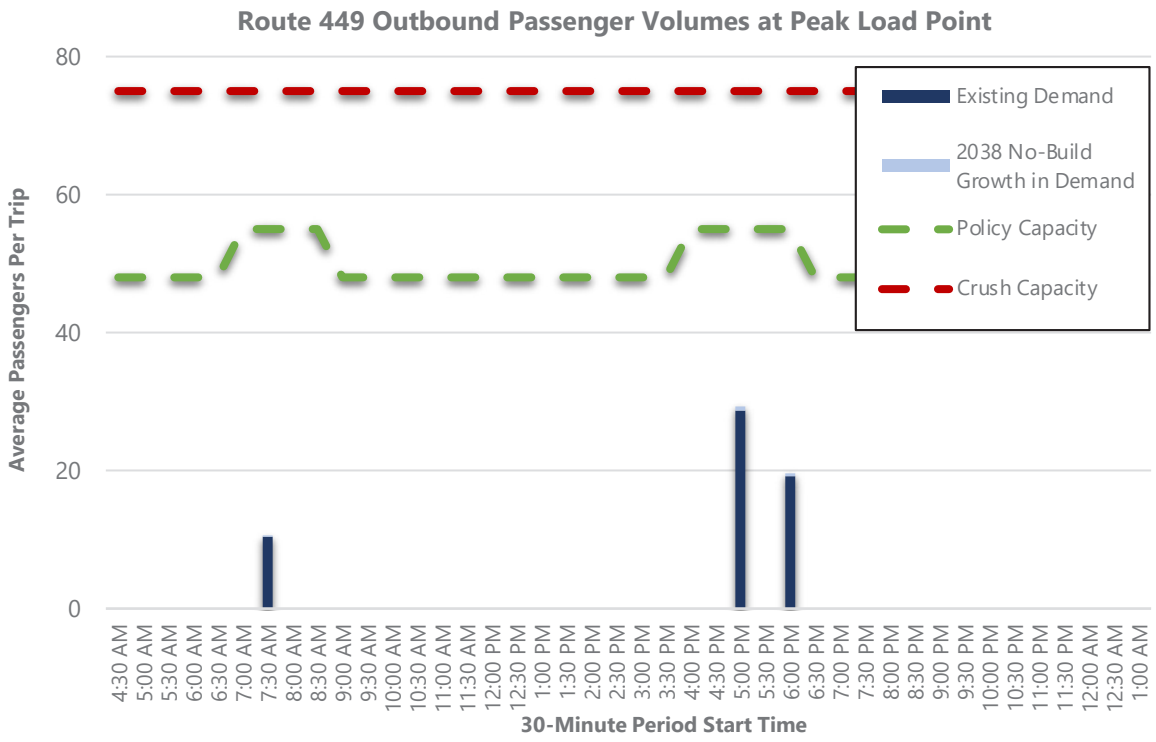
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 448 ridership).

Figure 6.65

2038 No-Build Condition
MBTA Route 448 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





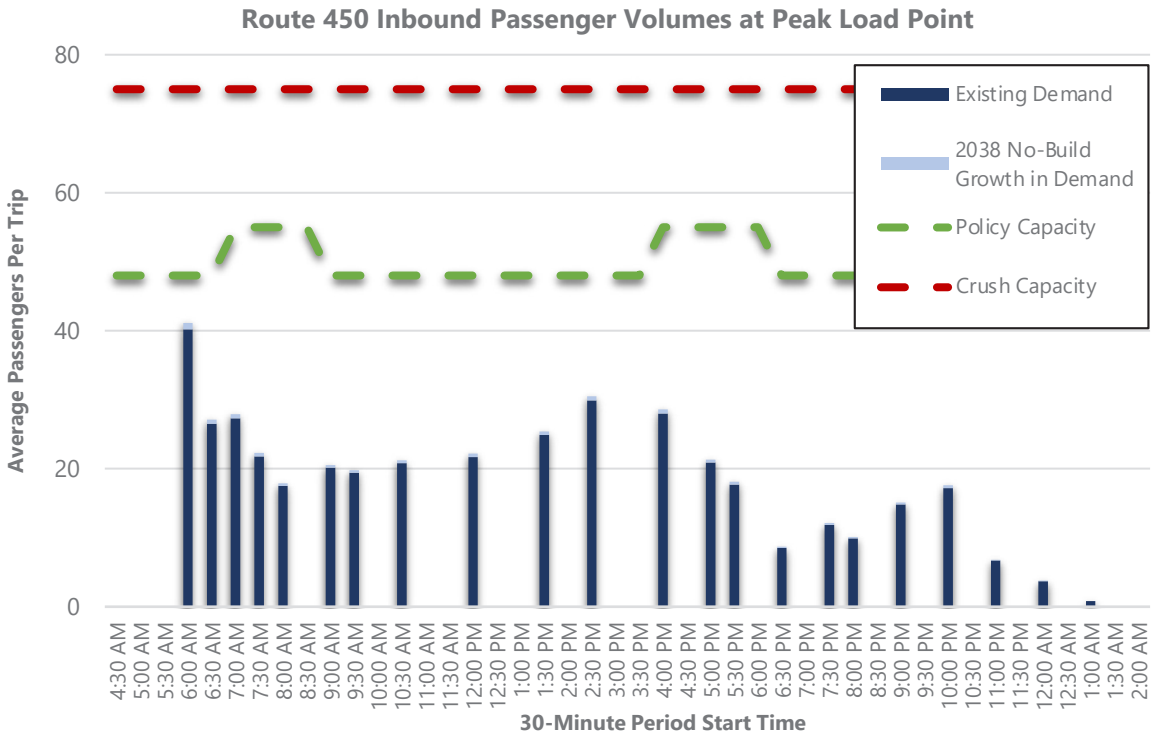
Existing Conditions Data Source: MBTA, Route 449 Ridership Data, Fall 2017.

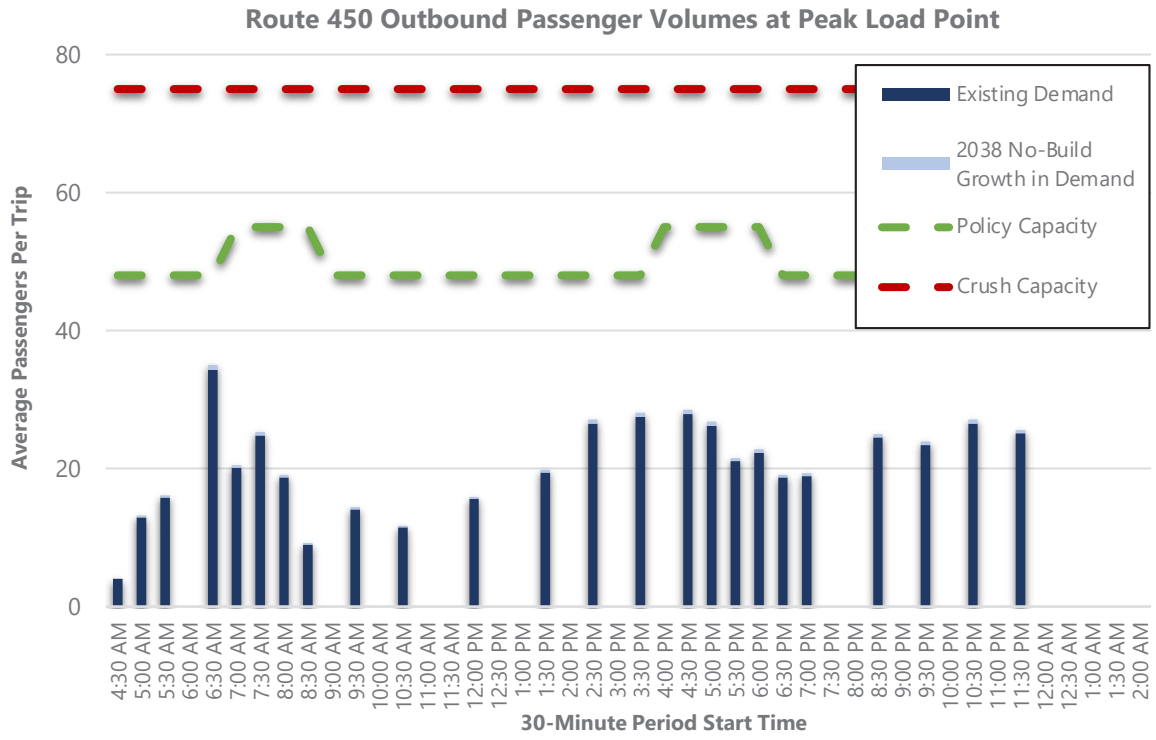
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 449 ridership).

Figure 6.66

2038 No-Build Condition
MBTA Route 449 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





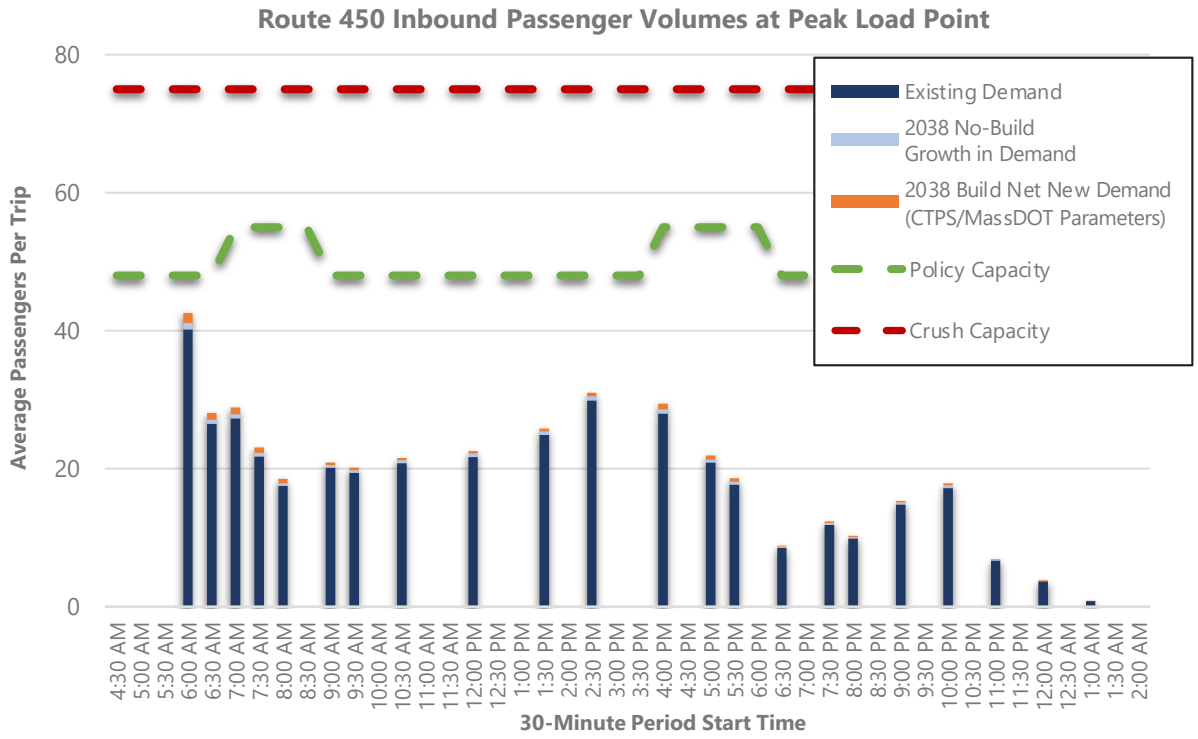
Existing Conditions Data Source: MBTA, Route 450 Ridership Data, Fall 2017.

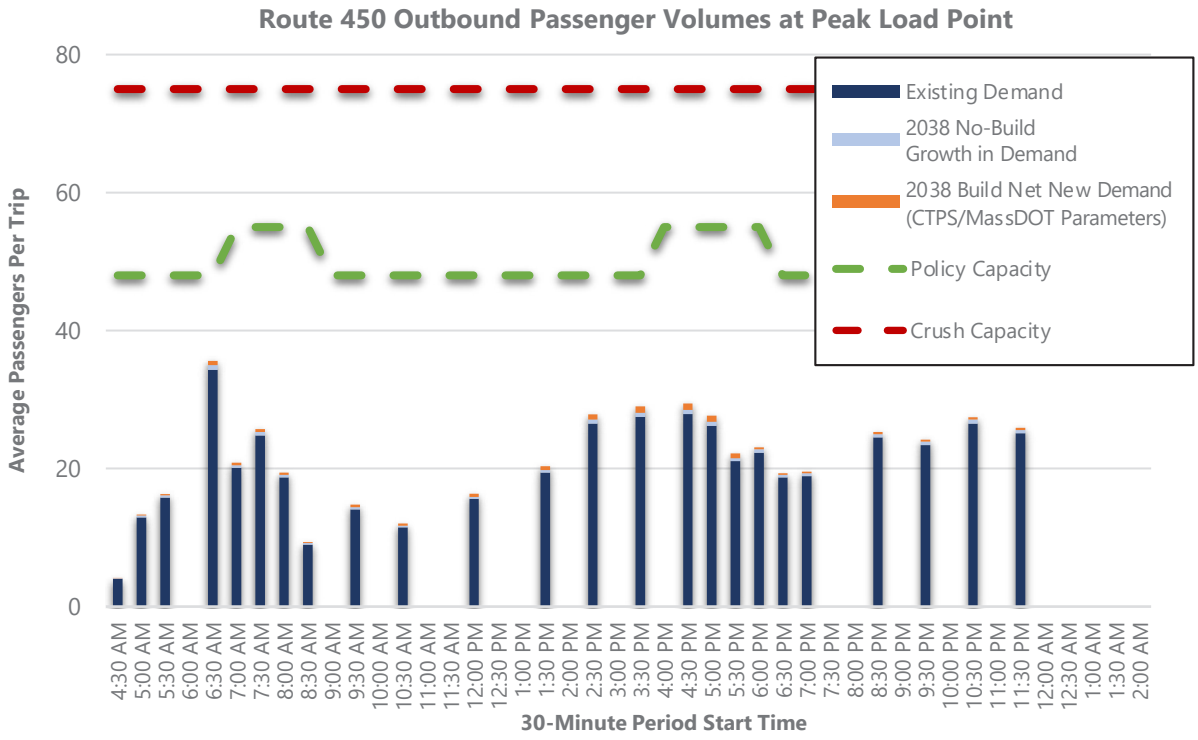
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 450 ridership).

Figure 6.67a

2038 No-Build Condition
MBTA Route 450 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





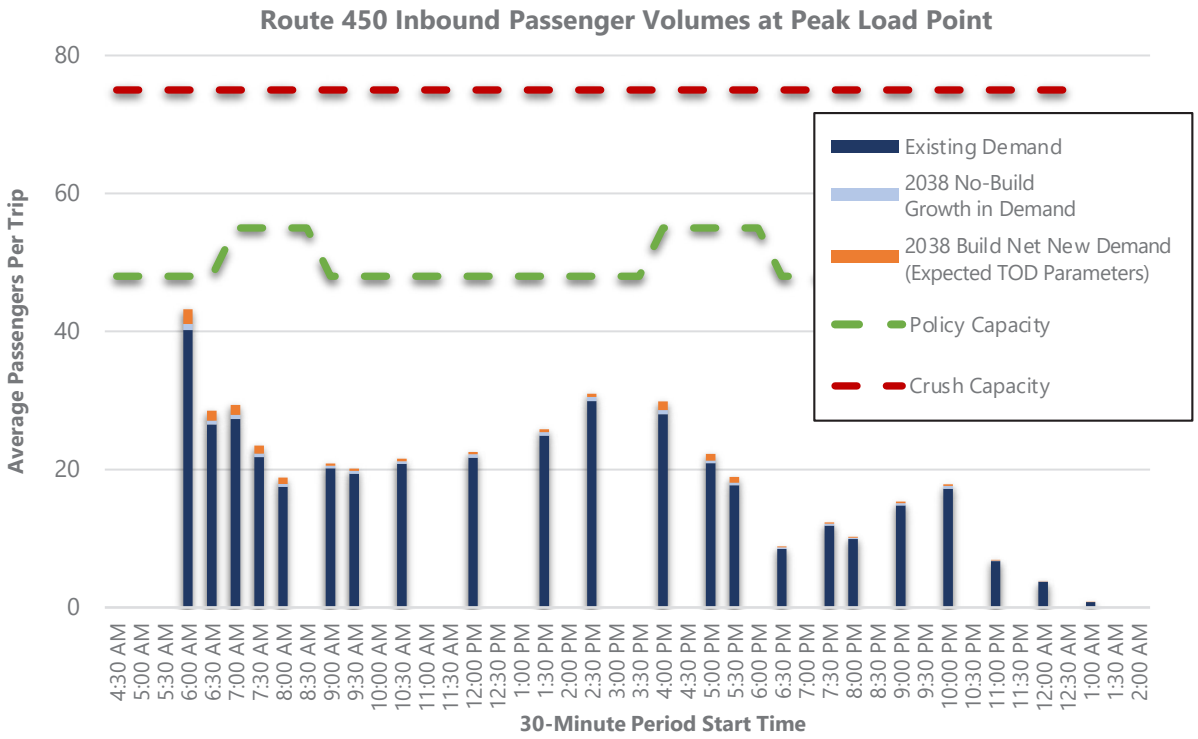
Existing Conditions Data Source: MBTA, Route 450 Ridership Data, Fall 2017.

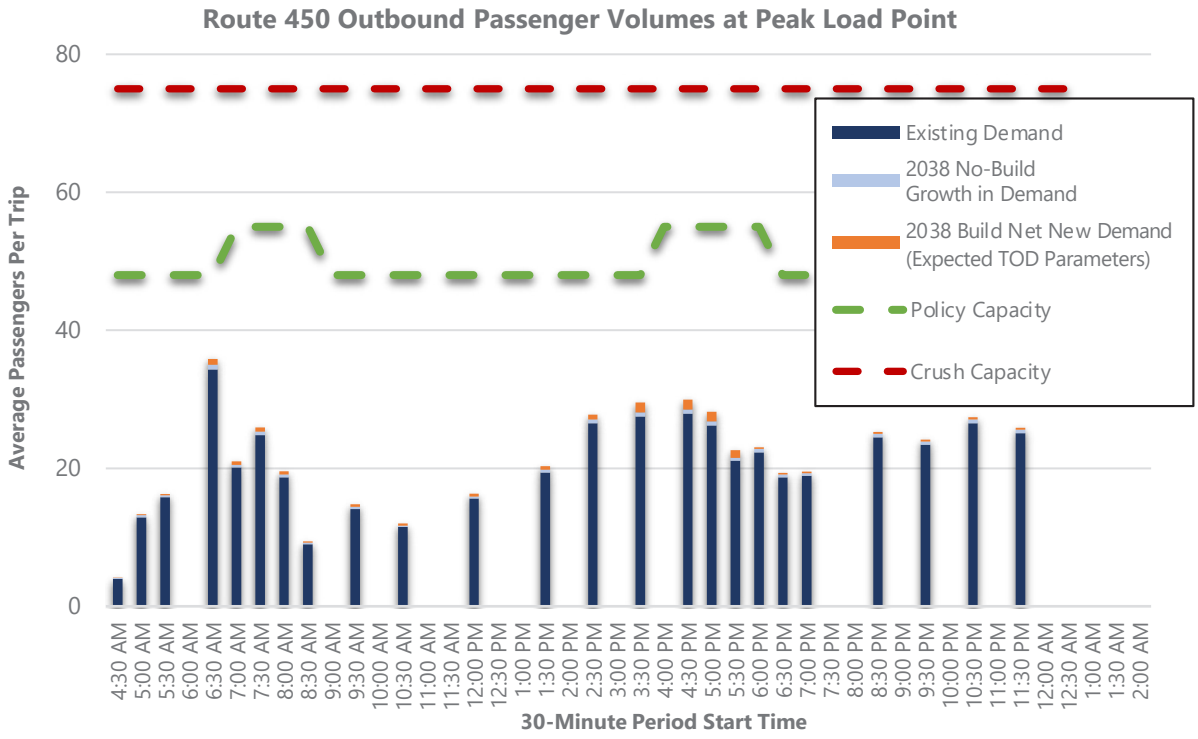
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 450 ridership).

Figure 6.67b

2038 Build Condition (CTPS/MassDOT Parameters) MBTA Route 450 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





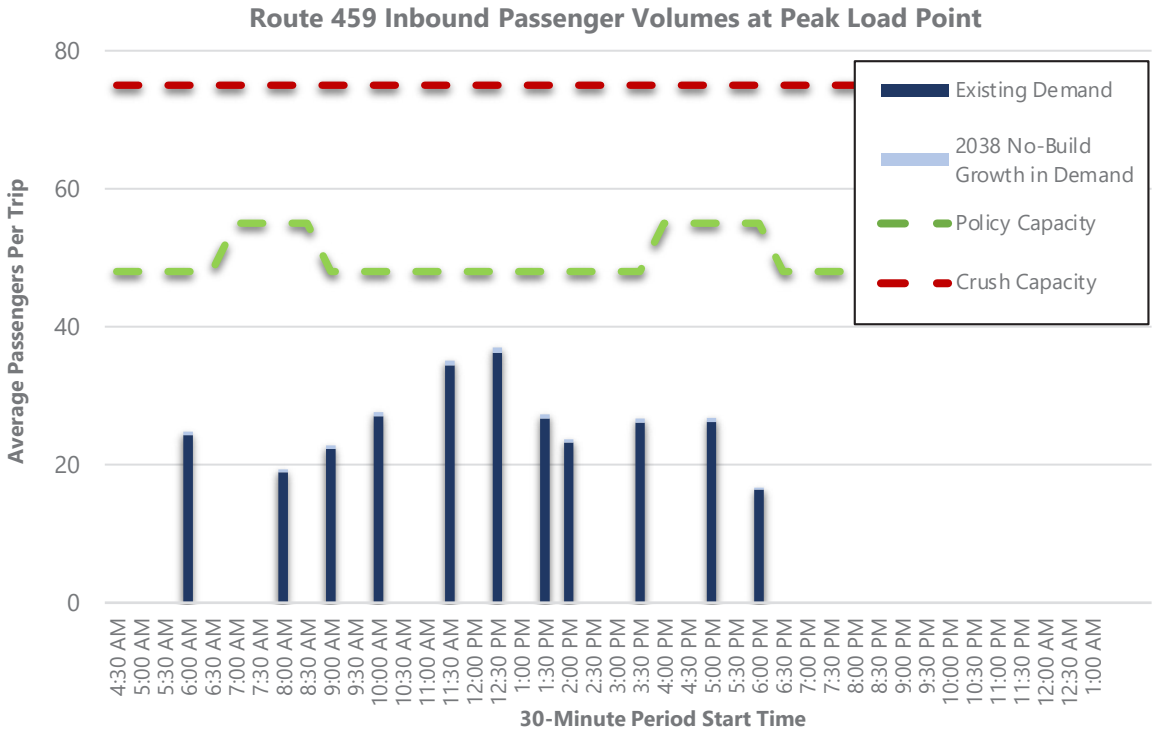
Existing Conditions Data Source: MBTA, Route 450 Ridership Data, Fall 2017.

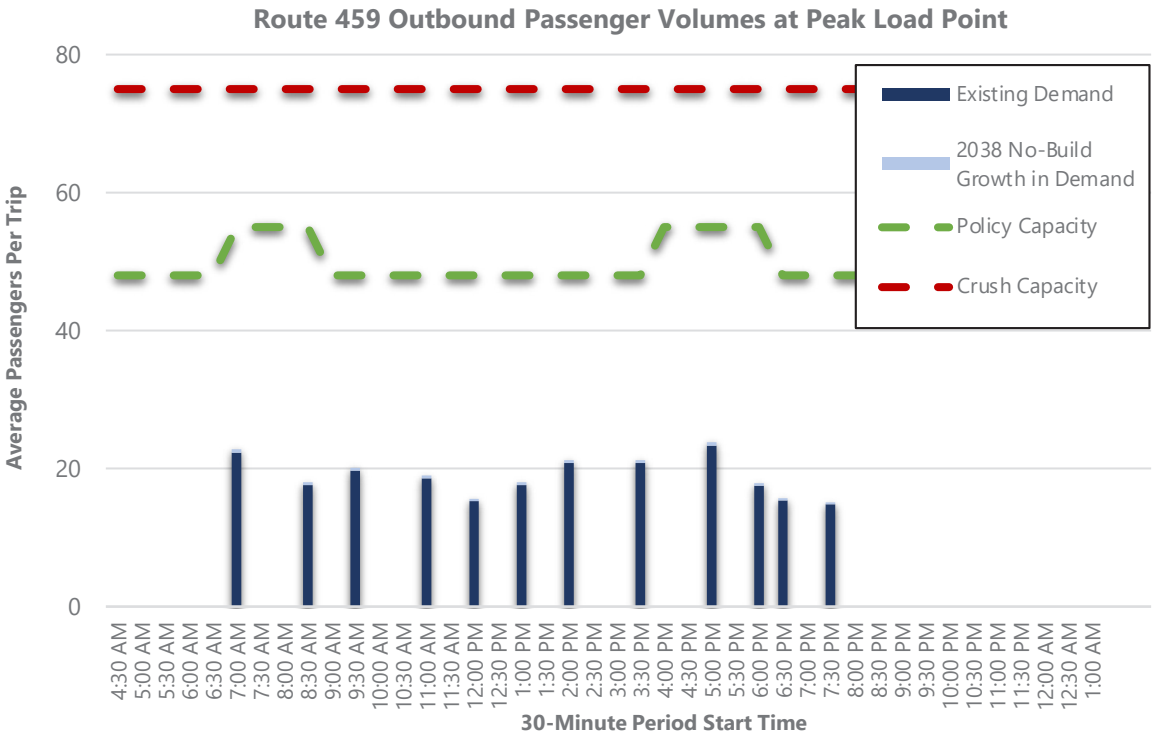
No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (analysis assumes minimum 0.1% average annual growth rate for MBTA Route 450 ridership).

Figure 6.67c

2038 Build Condition
(Expected TOD Parameters)
MBTA Route 450 Passenger Volumes
at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts





Existing Conditions Data Source: MBTA, Route 459 Ridership Data, Fall 2017.

No-Build Conditions Data Source: Average Annual Growth Rate based on CTPS Model Results (0.1% average annual growth rate for MBTA Route 459 ridership).

Figure 6.68

2038 No-Build Condition
MBTA Route 459 Passenger Volumes at Peak Load Point

Suffolk Downs Redevelopment
Boston & Revere, Massachusetts